

Similarity in Personal Relationships:

Associations with Relationship Regulation
Between and Within Individuals

Cornelia Wrzus

This work is licensed under a Creative Commons License:
Attribution 3.0 Unported
To view a copy of this license visit
<http://creativecommons.org/licenses/by/3.0/>

Online published at the
Institutional Repository of the Potsdam University:
<http://opus.kobv.de/ubp/volltexte/2008/2015/>
[urn:nbn:de:kobv:517-opus-20158](http://nbn-resolving.org/urn:nbn:de:kobv:517-opus-20158)
[<http://nbn-resolving.de/urn:nbn:de:kobv:517-opus-20158>]

Similarity in Personal Relationships:

Associations with Relationship Regulation
Between and Within Individuals

An der Humanwissenschaftlichen Fakultät
der Universität Potsdam eingereichte

DISSERTATION

zur Erlangung des akademischen Grades

Doctor philosophiae

Dr. phil.

vorgelegt am 25. April 2008 von

Dipl.-Psych. Cornelia Wrzus

Dekan: Prof. Dr. Ria De Bleser

Gutachter: Prof. Dr. Franz J. Neyer

Prof. Dr. John B. Nezlek

Mündliche Prüfung am 04. September 2008

INDEX OF CONTENTS

Abstract	x
1 Similarity, closeness and reciprocity in personal relationships	6
1.1 Personal relationships in light of evolutionary psychology	7
1.1.1 Major principles in evolutionary psychology	8
1.1.2 The evolutionary model of relationship regulation	14
1.2 Relationship regulation within ego-centered networks	26
1.2.1 Personal network structure	27
1.2.2 Closeness and reciprocity in ego-centered networks	31
1.2.3 Similarity and the interaction with closeness and reciprocity	43
1.3 Friendships and relationships in patchwork-families – Examples for relationship regulation within specific relationships	54
1.3.1 Who belongs to the family? - A comparison of parent-child relationships in patchwork and traditional families	55
1.3.2 Why do we have friends?	60
1.4 Summary and research questions	73
2 Method	77
2.1 Ego-centered network studies	77
2.1.1 Participants	77
2.1.2 Procedure	81
2.1.3 Measures	81

2.2	One-year follow-up of the family study	85
2.2.1	Participants	85
2.2.2	Procedure	87
2.2.3	Measures	87
2.3	Experimental similarity studies	87
2.3.1	Participants	87
2.3.2	Procedure	89
2.3.3	Measures	91
2.4	Analytical strategy	92
2.4.1	Relationship regulation across the network and the mediating role of similarity	93
2.4.2	Relationship regulation in traditional and patchwork families	97
2.4.3	Relationship regulation in friendships	99
3	Results	101
3.1	Relationship regulation across the personal network	101
3.1.1	Network structure	101
3.1.2	Similarity, emotional closeness and perceived reciprocity across the personal network	108
3.1.3	Addressing the question of causality	131
3.2	Relationship specificity	150
3.2.1	Who belongs to the family? - A comparison of parent – child relationships in patchwork and traditional families	150
3.2.2	Why do we have friends?	166

4	<i>Discussion</i>	177
4.1	Similarity, emotional closeness, and reciprocity across the network	177
4.1.1	The structure of personal relationship networks in adulthood	177
4.1.2	The relevance of similarity for kin selection and for cooperation	179
4.1.3	Causal relationships among psychological similarity, emotional closeness, and perceived reciprocity	184
4.2	Similarity, emotional closeness, and reciprocity in parent-child relationships and friendships	186
4.2.1	Parent-child relationships	186
4.2.2	Friendships	189
4.3	Conclusions	192
4.3.1	Limitations	192
4.3.2	What can be taken home?	195
4.4	Future directions and practical applications	198
	<i>LITERATURE</i>	201
	<i>APPENDIX</i>	231

INDEX OF TABLES

Table 1	Overview of evolutionary psychological studies of similarity	45
Table 2	Overview of social psychological studies of similarity	48
Table 3	Overview of demographic sample characteristics in the Young adult study, the Family study and the Similarity Studies	80
Table 4	Structural variables in the ego-centered networks (wording, scaling, means)	83
Table 5	Overview of the number of participants in the longitudinal follow-up of the family study	86
Table 6	Consistency within rater and agreement between parents for parent-child relationships at T1 and T2	98
Table 7	Overview of network composition in the young adult and the family study	103
Table 8	Overview of the mean structural characteristics of relationships in the young adult and the family study	105
Table 9	Prediction of contact frequency by proximity and relationship type (level 1), and gender and family type (level 2)	107
Table 10	Overview of the mean relationship qualities in the young adult and the family study	110
Table 11	Multilevel logistic regression of relationship subsystems on emotional closeness and perceived reciprocity	111
Table 12	Young adult study: multilevel stepwise model building for regressing emotional closeness on age parity, genetic relatedness, and psychological similarity (level 1)	114
Table 13	Family study: multilevel stepwise model building for regressing emotional closeness on age parity, genetic relatedness, and psychological similarity (level 1)	115
Table 14	Young adult and Family study: multilevel mediation analyses with genetic relatedness as predictor and emotional closeness as criterion	117
Table 15	Young adult study: multilevel stepwise model building for regressing perceived reciprocity on genetic relatedness, age parity, and psychological similarity (level 1)	119

Table 16	Family study: multilevel stepwise model building for regressing perceived reciprocity on genetic relatedness, age parity, and psychological similarity (level 1)	120
Table 17	Young adult and Family study: multilevel mediation analyses with age parity as predictor and perceived reciprocity as criterion	122
Table 18	Family and gender differences in associations among subjective similarity, skill similarity, genetic relatedness, and emotional closeness	123
Table 19	Family and gender differences in associations among subjective similarity, physical similarity, skill similarity, age parity, and perceived reciprocity	126
Table 20	Family and gender differences in the prediction of emotional closeness by social similarity characteristics	130
Table 21	Family and gender differences in the prediction of perceived reciprocity by social similarity characteristics	131
Table 22	Similarity study A: means and standard deviations of similarity, emotional closeness and negative emotion at T1	133
Table 23	Similarity study A: percentages and absolute values of participants who changed in their expected return between T1 and T2	138
Table 24	Similarity study B: means and standard deviations of similarity, emotional closeness and negative emotion at T1	140
Table 25	Similarity study B: percentages and absolute values of participants who changed in their expected return between T1 and T2	146
Table 26	Cross-lagged effects and correlated change between psychological similarity, emotional closeness, and perceived reciprocity	149
Table 27	Description of the parent-child dyads in patchwork and traditional families at T1 and T2	151
Table 28	Prediction of emotional closeness by psychological similarity (level 1) and family type (level 3) in parent-child dyads at T1	156
Table 29	Prediction of emotional closeness by psychological similarity, relatedness (level 1), and family type (level 3) in parent-child dyads at T1	158
Table 30	Prediction of perceived reciprocity by psychological similarity, relatedness, the interactions between similarity and relatedness (level 1), and family type (level 3) in parent-child dyads at T1	160

Table 31	Prediction of emotional closeness at T2 by psychological similarity and relatedness, while controlling for emotional closeness at T1 (level 1)	164
Table 32	Prediction of perceived reciprocity at T2 by psychological similarity and relatedness, while controlling for perceived reciprocity at T1 (level 1)	165
Table 33	Means and standard deviation of the number and proportion of friends and family members in the personal networks	167
Table 34	Estimated means of structural and qualitative characteristics of relationships with family members and friends	169
Table 35	Prediction of closeness and reciprocity in horizontal family relationships and friendships by psychological similarity	172
Table 36	Prediction of emotional closeness in friendships by the relationship quality with horizontal family members	175
Table 37	Gender differences in the prediction of emotional closeness in friendships by the relationship quality with horizontal family members	176

INDEX OF FIGURES

<i>Figure 1</i>	Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005)	15
<i>Figure 2</i>	Level 1 cross-lagged panel model for psychological similarity, emotional closeness, and perceived similarity	96
<i>Figure 3</i>	Level 1 measurement and structure model of effects of psychological similarity on emotional closeness and perceived reciprocity	100
<i>Figure 4</i>	Estimated closeness and reciprocity of relationship subsystems	112
<i>Figure 5</i>	Family type differences in predicted scores of emotional closeness (men)	125
<i>Figure 6</i>	Family type differences in predicted scores of emotional closeness (women)	125
<i>Figure 7</i>	Family type differences in predicted scores of perceived reciprocity (men)	127
<i>Figure 8</i>	Family type differences in predicted scores of perceived reciprocity (women)	128
<i>Figure 9</i>	Means of similarity, emotional closeness, and negative emotions for friends, siblings and colleagues	133
<i>Figure 10</i>	Mean emotional closeness for friends, siblings and colleagues when focusing at likeness (L) or differences (D)	136
<i>Figure 11</i>	Means of emotional closeness (a) and negative emotions (b) for friends and strangers	141
<i>Figure 12</i>	Within-person change in perceived similarity for friends and strangers	143
<i>Figure 13</i>	Means of emotional closeness (a) and negative emotions (b) for friends and strangers	145
<i>Figure 14</i>	Estimated mean emotional closeness (a) and estimated mean perceived reciprocity (b) in parent-child relationships at T1	154
<i>Figure 15</i>	Estimated mean psychological similarities in parent-child relationships at T1	155

<i>Figure 16</i>	Predicted values of emotional closeness (a) and perceived reciprocity (b) in parent-child relationships at T1	163
<i>Figure 17</i>	Change in emotional closeness (a) and perceived reciprocity (b) for dissimilar and similar social and biological children	167
<i>Figure 18</i>	Means of psychological similarity facets for good friends, regular friends, and horizontal family in the Young adult study (a) and the Family study (b)	172
<i>Figure 19</i>	Average percentage of relationships in personal networks similar in social characteristics	173

INDEX OF USED ABBREVIATIONS

CLI	Costly long-term investment
CR	Closeness regulation
EPM	Evolved psychological mechanism
FS	Family study
MRCM	Multilevel random coefficient modeling
PcK	Patchwork family with a common child
PwoK	Patchwork family without a common child
RM	Reciprocity monitoring
SIT	Selective investment theory
YAS	Young adult study

Wrzus, Cornelia

Similarity in Personal Relationships: Associations with Relationship Regulation Between and Within Individuals

University of Potsdam, Doctoral Thesis

230 Pages, 37 Tables, 19 Figures, 427 References, 6 Appendices

ABSTRACT

People engage in a multitude of different relationships. They maintain personal relationships with family members, romantic partners, friends, colleagues, neighbors, and other persons from various surroundings. What is the function of different kinds of similarity, e.g., in skills, appearance, demographic characteristics, in these diverse relationships? Neyer and Lang (2005) propose an evolutionary-informed model of relationship regulation. They assume that people's relationships are distinguished through the mechanisms of *regulation of closeness* and *regulation of reciprocity*: within an individual's network, relationships differ in the amount of experienced closeness and reciprocity of support. The role of psychological (e.g. skills, global appraisal) and social (e.g. gender, familial status) similarities in connection with emotional closeness and reciprocity of support in personal relationships was examined in four independent studies. Young adults ($N = 456$; $M = 27$ years) and middle-aged couples from four different family types ($N = 171$ couples, $M = 38$ years) gave answer to a computer-aided questionnaire regarding their ego-centered networks. A subsample of 175 middle-aged adults (77 couples and 21 individuals) participated in a one-year follow-up questioning. Two experimental studies ($N_A = 470$; $N_B = 802$), both including two assessments with an interval of five weeks, were conducted to examine causal relationships among similarity, closeness, and reciprocity expectations. Results underline the role of psychological and social similarities as covariates of emotional closeness and reciprocity of support on the between-relationship level, but indicate a relatively weak effect within established relationships. In specific relationships, such as parent-child relationships and friendships, psychological similarity partly alleviates the effects of missing genetic relatedness. Individual differences moderate these between-relationship effects. In all, results combine evolutionary and social psychological perspectives on similarity in personal relationships and extend previous findings by means of a network approach and an experimental manipulation of existing relationships. The findings further show that psychological and social similarity have different implications for the study of personal relationships depending on the phase in the developmental process of relationships.

*Similis simili gaudet*¹

Personal relationships are important for the human being for a variety of reasons. They enhance well-being (e.g., Myers, 1999; Nezlek & Allen, 2006; Segrin & Taylor, 2007; Stevens & van Tilburg, 2000), are related to one's health (e.g., Aartsen, van Tilburg, Smits, & Knipscheer, 2004; Avlund, Damsgaard, & Holstein, 1998; Reis, Wheeler, Kernis, Spiegel, & Nezlek, 1985; Vänäänen, Buunk, Kivimäke, Pentti, & Vahtera, 2005), ensure the fulfilling of tasks one could not have managed on its own (e.g., Cole & Teboule, 2004; Tooby & Cosmides, 1996), are supportive in daily life (e.g., Davis, Morris, & Kraus, 1998; Ikkink & van Tilburg, 1998; Sun, 2002), and provide an environment for individual development (Bronfenbrenner, 1979/1989; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007). Despite the importance and the cultural universality of personal relationships (Baumeister & Leary, 1995), psychological research focuses mainly on specific relationships rather than on a general psychology of relationships. Exceptions are comprehensive books, e.g., by Asendorpf and Banse, (2000), Duck (1988) or Vangelisti and Perlman (2006), which bring together theories and empirical findings on a multitude of different relationship types. Recently, theories have been proposed that focus on the similarities of quite different relationships, such as parent-child relations, sexual relationships, friendships, relationships between neighbors, and work relationships (Brown & Brown, 2006; Bugental, 2000; Fiske, 1992; Lang & Neyer, 2005, see chapter 2.1.2).

Lang and Neyer (2005) introduced a model of relationship regulation, which combines two major and influential research traditions in relationship research: attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1991) and exchange theory (Thibaut & Kelley, 1959). They propose two psychological mechanisms, closeness regulation and reciprocity monitoring, which are common to all relationships, but to a varying extent. Thus, people differentiate and regulate their relationships through emotional closeness and the perception of reciprocity. Lang and Neyer (2005, Neyer & Lang, 2007) hypothesized individual variation in these two

¹ Latin origin of the proverbs *Birds of a feather flock together* and *Gleich und gleich gesellt sich gern*, respectively (Wander, 2004).

mechanisms depending on environmental specificities. Since their model is derived from evolutionary principles, environments that address variations in reproduction and inclusive fitness (Hamilton, 1964), e.g., familial types like infertile couples or patchwork-families, are especially instructive for examining the applicability of the theory.

Resemblance is a third important concept in research questions dealing with reproduction and inclusive fitness (e.g., Daly & Wilson, 1982). Physical similarity enables people to differentiate between kin and non-kin (Buss, 1999a; Platek, Burch, Panyavin, Wasserman, & Gallup, 2002) and to treat them differently (Burch & Gallup, 2000; DeBruine, 2002). Different types of similarity (e.g., in demographic variables, attitudes, or personality) have also been extensively studied in non-kin relationships such as friendships, acquaintances or romantic relationships (Byrne & Nelson, 1965; Selfhout, Branje, & Meeus, 2007; Watson et al., 2004). Exploring the function and the analogies of similarity in diverse types of relationships is beneficial for a further understanding of relationship regulation. Furthermore, it enhance the theoretical understanding of the importance of similarity in personal relationships by comparing and combining evolutionary psychological and social psychological perspectives.

People can be similar (and dissimilar) in many different characteristics: in apparent features like age, gender, education, and appearance or in less observable characteristics such as personality, skills, attitudes, or interests. Similarity can be assessed either objectively - by measuring the respective characteristic in both persons and comparing their values - or subjectively - by asking one or both persons, how similar they think they are in a certain characteristic. There is no overall similarity of two people, but similarity in a certain attribute or a group of characteristics. Therefore, similarity always refers to relative similarity between two individuals. Two individuals are similar in some characteristics, but not in others. The concordance between objective and subjective similarity varies depending on the characteristic (e.g., Kenny & Accitelli, 2001; Neyer, Banse, & Asendorpf, 1999; Watson et al., 2004). Nevertheless, both objective and perceived similarity are relevant for the initiation, development, and maintenance of relationships (Henderson & Furnham, 1982; McPherson, Smith-Lovin, & Cook, 2001; Montoya, Horton, & Kirchner, in press; Rosenfeld & Jackson, 1965; Sutor, 1987). One aim of this work is to group the scattered theoretical and empirical knowledge about similarity in different relationships and to draw conclusions about general and relationship-specific functions of similarity.

This goal is pursued by combining two main research approaches for the study of similarity. Evolutionary psychological theories focus on similarity as one cue for kinship (Porter, 1987) and investigate it in studies with family members (including spouses) with varying degrees of genetic relatedness. Social psychological research

concentrates on similarities in less observable attributes between non-related persons, mostly of same age, e.g., friends, spouses, and zero-acquaintances. The combination of both theoretical approaches promotes a deeper understanding of similarity, because the social psychological approach offers a rich empirical source and aims at identifying immediate processes and the relatively recent evolutionary psychological approach provides more distal, generalizable explanations why certain behavioral dispositions exist². The inclusion of the differential perspective of personality psychology allows for a more profound comprehension of interpersonal processes by enlarging the general principle perspective. Personality psychology completes the circle and comes back to evolutionary psychology, because “(n)atural selection is based upon individual differences.” (Bjorklund & Pellegrini, 2002, p. 76).

The diversity of these three fields is resumed in the applied methods of this work. Investigating the function of similarity in all kinds of relationships demands an almost complete assessment of an individual’s relationships as realized in the social network approach (Asendorpf & Banse, 2000; Baumann & Laireiter, 1996). Assessment of an ego-centered network³ is the method of choice if the network is to be measured as an individual construct (cf. Baumann & Laireiter, 1996) and dates back to the 1950 (e.g., Bott, 1957). Evolutionary psychological studies often use quasi-experimental designs to vary the degree of genetic relatedness within the same relationship type (e.g., Hetherington, Henderson, & Reiss, 1999; Jankowiak & Diderich, 2000). However, both designs are cross-sectional and do not permit causal interpretations. Experimental and longitudinal designs are necessary and called for in relationship research (Clark & Reis, 1988). Apart from the advantage of causality, experimental manipulations of relationships and change of relationship qualities over time offer new insights into the role of similarity in relationships, because they and the network approach refer to different levels: the interindividual, the intraindividual and the intrarelational level.

As mentioned earlier, evolutionary psychological informed studies often use different family types (adoptive families, stepfamilies, families with twins) to vary the degree of genetic relatedness in a quasi-experimental design. Although the social roles are comparable (e.g., parent and child or siblings), consistent differences have been

² Evolutionary psychology also attempts to identify the proximate mechanisms that solve ultimate problems in human evolution (Asendorpf, 2007), but incorporates a broader phylogenetic perspective.

³ The term “ego-centered network” subsumes all the personal relationships of an individual from the perspective of the interviewed individual (=ego). Only relationships (=ties) between the individual and his/her relationship partners (=alters) are examined, but no relationships among the alters are analyzed. Information about the relationships is only obtained from the ego, but not from the relationship partner. Ego-centered network and personal network are used synonymously.

found between dyads that were genetically related and dyads that were less or not related (e.g., Dunn, 2002; Hetherington et al., 1999; Jankowiak & Diderich, 2000). These differences between kin and step-kin are empirically well proven and have major implications for well-being and further development (Amato & Keith, 1991a, 1991b). However, most research focused on differences between kin and step-kin and had a pathogenic perspective. The possible buffering function of similarity in non-related family members has yet not been investigated. Studies of patchwork-families⁴ are ideal for investigating those conditions under which genetically non-related family members can be perceived and treated like kin. It is supposed that similarity can compensate genetic relatedness to a certain degree.

If genetically non-related family members can be perceived (and treated) like kin because of fuzziness of kin selection and kin recognition mechanisms, other non-related persons, such as friends, who have been labelled “Wahlverwandtschaft” (family of choice or elective affinity) (Goethe, 1809/1972; Widmer, 2006) could also be perceived like kin. Friendships can be as close and as important as relations with family members (Doherty & Feeney, 2004) and evoke similar behavioural tendencies (Ackerman, Kenrick, & Schaller, 2007, Cole & Teboul, 2004). Like family members, friends are viewed as communal relationships (Clark & Mills, 1979), social bonds (Brown & Brown, 2006) or directly named as family (Widmer, 2006). However, despite the psychological similarities in emotional closeness and helping, they are distinct in two important characteristics: genetic relatedness and voluntariness. A comparison and contrasting of both types of relationships within a network approach is missing so far in relationship research.

This work focuses on variation in similarity, emotional closeness, and perceived reciprocity within ego-centered networks of young (young adult study) and middle-aged (family study) adults and enriches relationship research by focusing on middle adulthood. Causal inferences are drawn from a longitudinal extension of the family study and from experimental studies that supplement the two cross-sectional studies. Similarity in existing relationships and zero-acquaintances was manipulated (both between- and within-subjects) in the two experimental studies. Both network studies permitted the analysis of general similarities and differences between relationships and the examination of interrelations among the main concepts of this work: similarity, emotional closeness and perceived reciprocity. Furthermore, they allowed for the

⁴ The term ‘patchwork-family’ is used instead of stepfamilies or reconstituted families throughout this work. In addition genetically related custodial parents are called ‘biological parent’ and non-related ones are called ‘social parent’ (Döring, 2002). The terms ‘biological child’ and ‘social child’ are used analogously.

testing of associations among individual dispositions, contextual features, structural characteristics of the network, structural characteristics of specific relationships, and psychological properties of particular relationships. The inclusion of different family types (family study) led to a quasi-experimental variation of genetic relatedness in specific relationships and provided different contextual environments in which relationship regulation should vary. Thus, (1) the general role of similarity in personal networks, (2) individual differences in the general function of similarity and (3) relationship-specificities of similarity are addressed.

The following part first provides an overview of the evolutionary psychological research of relationships and explains the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005). In the second chapter, the experience of closeness, the perception of reciprocity and the recognition of similarity in diverse relationships are examined using evolutionary and social psychological theories and findings. The last chapter focuses on two specific kinds of relationships –family relations and friendships– to provide a basis for the later demonstration of the applicability of relationship regulation to particular relationships.

Part 2 describes the methods, instruments and participants and explains statistical specifics for analyzing ego-centered networks.

The combined results of the five studies are presented in Part 3. First, general and differential results of relationship regulation are presented. The second chapter addresses the question of causality on the basis of the results of the experimental and the longitudinal studies. Finally, relationship specific results from focused analyses of patchwork-family relationships and friendships, respectively, are shown.

The discussion part (Part 4) summarizes the results and integrates them in the current scientific literature. In addition, further possible analyses and future studies are discussed.

1 Similarity, closeness and reciprocity in personal relationships

Two cornerstones need to be set to examine similarity in personal relationships. The first chapter gives a brief overview on the evolutionary psychological concepts relevant for understanding the theoretical framework of this work, the Evolutionary Model of Relationship Regulation. This framework is chosen, because of its exhaustive approach to personal relationships and its sound theoretical anchoring in evolutionary psychology. In this framework, personal relationships are defined by different levels of emotional closeness and reciprocity. The other cornerstone is erected in the second chapter. This chapter reviews previous work on similarity in relationships and combines findings from evolutionary psychological and social psychological studies by examining the findings of the latter from an evolutionary perspective. Then, the relevance of similarity for emotional closeness and reciprocity in relationships is discussed.

The first two chapters address the general mechanisms of personal relationships while the last chapter focuses on two specific relationships within a personal network: parent-child relationships and friendships. The general approach to relationships can be criticized for comparing apples and oranges. Concentrating on specific relationships (1) shows that the proposed general mechanisms also apply in specific relationships and (2) holds important variables constant which vary considerably across the social network, e.g., age, residential proximity or genetic relatedness of the relationship person. Parent-child relationships vary in genetic relatedness in patchwork- and traditional families. At the same time, they are comparable in structural characteristics such as contact frequency, residential proximity or social role (compared to e.g., work relationships). This allows a detailed analysis of the interplay among similarity, emotional closeness, and reciprocity. In addition to replicating differences in emotional closeness between biological and social parents and their children, new insights can be gained by including the perception of similarity and reciprocity. Friendships, on the other hand, offer additional insight into the regulation of relationships because they vary greatly within and between individuals in emotional closeness, the importance of reciprocity, and the amount and kinds of similarities. Despite their commonness they remain a puzzle from evolutionary perspective (Silk, 2003). Until now, they have been seldom researched in combination with family relationships⁵. This combined examination and the reinterpretation of the social psychological similarity findings from

⁵ An exception is the study on compensatory effects of support from family and friends in school-aged children (van Aken & Asendorpf, 1997). Doherty and Feeney (2004) compared attachment quality of family members and friends, however chose only the best friend and not the friendship network.

an evolutionary perspective provide additional insight into friendships that might solve their puzzle.

Human beings have an innate *need to belong* that persistently drives them “to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships” (Baumeister & Leary, 1995, p. 497). Personal relationships can be defined as reoccurring interactions between two people that cover a certain time span (Asendorpf & Banse, 2000; Baumeister & Leary, 1995; Hinde, 1979; Kelley et al., 1983). Thus, the dyadic nature with frequent interaction and the interaction history are defining element of personal relationships. Two additional, however not sufficient, characteristics of personal relationships are an emotional and/or instrumental purpose and a cognitive representation which is a prerequisite for studying relationships with self-report methods. The basic assumption of this work, which is in line with Baumeister and Leary, is that the need to belong and therefore personal relationships are universal, but people might differ when and how their need⁶ is satisfied in personal relationships. Hence, all humans have personal relationship, but the general question remains: Why do people have different enduring relationships?

1.1 Personal relationships in light of evolutionary psychology

Evolutionary psychology understands current human behavior and cognition as results⁷ of evolution, i.e., the process that leads to hereditary characteristics of living organisms over thousands and millions of years through genetic variation (e.g., mutation, genetic recombination) and natural selection. Genes, as predispositions of physiology, traits, and behaviors, vary within a population and offer their carrier a reproductive advantage compared to other individuals of the same population without those features or behavior. Natural selection favors the hereditary transmission of a certain gene (or gene combination) if it is adaptive in a specific environment. Thus, fitness is not a feature of an individual or a gene per se, but the function of a gene and its environment (Asendorpf, 2004). Therefore, the key assumptions of evolutionary psychology are that behavior (1) is (unconsciously) directed at promoting one’s genes, (2) must be viewed within the environmental context which affects its occurrence (MacDonald, 1988) and (3) is an adaptation to former environmental demands or problems. These problems are survival, mating, parenting, kin selection, cooperation,

⁶ Personal relationships satisfy further needs, e.g., agency or power. These needs are expressed in the relationship mechanism *monitoring of reciprocity*.

⁷ This does not imply that the process is finished; rather, by definition, adaption to environmental demands will continue as long as environments change.

social dominance, aggression, and sexual rivalry (e.g., Asendorpf, 2004; Bjorklund & Pellegrini, 2002, Buss, 1999a).

However, these demands do not refer to concrete behavior, but rather posit ultimate biological explanations for the assumed selective pressure. Proximate mechanisms are needed to translate these ultimate mechanisms into concrete behavior. Evolved psychological mechanisms (EPMs, Cosmides, Tooby, & Barkow, 1992) implement a domain-specific solution to these ultimate demands. They do not necessarily have to follow the principles of ultimate mechanisms, but must not contradict them. Also, EPMs are psychological processes and therefore measurable as opposed to ultimate demands, which are not directly assessable, but rather assumed to underlie human behavior. The main task of evolutionary psychology is the identification of rules of information processing, behavioral regulation and individual development such as EPMs (Asendorpf, 2004). Before clarifying the assumed *universal* EPMs of relationship regulation in section 1.1.2, the next section will present three major principles in evolutionary psychology.

1.1.1 *Major principles in evolutionary psychology*

Putting aside individual differences for a moment, there are three central ultimate demands in evolutionary psychology that serve the purpose of promoting one's genes: (1) kin selection, (2) sexual selection (including mating and parenting) and (3) cooperative selection. In addition, these demands occur within the context of social relationships as defined before and relate to an individual's most central relationships: his/her relatives, his/her romantic partners and his/her stable relationships with non-related repeated interaction partners.

Kin selection. The concept of preference of genetically related kin has its origins in the theory of *Inclusive Fitness* (Hamilton, 1964). Hamilton showed that the fitness of an individual's genes depends on the reproductive success of that individual as well as of his/her genetically related kin. Thus, helping kin can enhance the inclusive fitness if the benefit for kin weighted with the reciprocal of Wright's coefficient for genetic relatedness r is greater than the cost for the individual. For example, the benefit to a child must be greater than twice the loss to the individual, the benefit to a niece at least four times the cost, and so on. Wright's coefficient for relationship r differs according to the expected amount of shared alleles due to common lineage. Monozygotic twins have a coefficient r of 1. The relatedness is approximately 0.5 between an individual and his/her full siblings, parents or children, 0.25 with half-siblings, grandparents,

uncles, nieces, etc., 0.125 with cousins and zero with romantic partners, stepkin, friends or colleagues.

The amount of shared alleles has a well-documented multiplicity of psychological correlates: genetically closer related persons receive more help, are emotionally closer, are less likely to be hurt, resemble each other more strongly and are perceived so (e.g., Burnstein, Crandall, & Kitayama, 1994; Buss, 1999a; Daly, Salmon, & Wilson, 1997; DeBruine, 2004; Hetherington et al., 1999; Korchmaros & Kenny, 2006; Neyer & Lang, 2003; Simpson & Kenrick, 1997; Wadsworth, Corley, Hewitt, Plomin, & DeFries, 2002). However, it is not clear how people evaluate genetic relatedness in other people.

Kin recognition relies on direct and indirect cues (Pfennig & Sherman, 1995), which are differently combined depending on environmental and individual factors. Direct cues are phenotypic features, e.g., physical, auditory or olfactory characteristics. Indirect cues relate to time and space, i.e., familiarity and proximity. Kin recognition is widespread among animals and humans, since the costs of producing, recognizing and acting on cues are generally smaller than the benefits of kin altruism and prevention of inbreeding through choice of optimal mating partner (Pfennig, 2002). Under most conditions, direct and indirect cues do not contradict each other. Hence, the people, one grows up with (familiarity), live close (proximity), look and behave similar (phenotypic resemblance). However, in cases of uncertainty of paternity or adoption, familiarity and proximity might indicate genetic relatedness, but phenotypic resemblance might not (Buss, 1999a). On the other hand, if twins were reared apart, they might lack familiarity and proximity, but show a great extent of similar phenotypic features (Segal, Hershberger, & Arad, 2003). This exemplifies the fallibility of kin recognition and possible cases of non-kin bearing features of kin such as proximity, familiarity, or similarity (e.g., in patchwork families). DeBruine (2002; 2004) and Platek and colleagues (2002) demonstrated the relationship between kin-like behavior and facial resemblance as one direct cue of genetic relatedness. They manipulated facial resemblance between participants and unrelated strangers by partial merging of participants' and strangers' photographs and found an increase in helping behavior, trust and emotional closeness. Others started to extend the range of characteristics towards traits (e.g., Horn, 1983; Wadsworth et al., 2002), behavior (Dunham & Dunham, 1983; Klump, Holly, Iacono, McGue, & Willson, 2000) and attitudes (Park & Schaller, 2005). Two studies (Bressan & Dal Martello, 2002; Oda, Matsumoto-Oda, & Kurashima, 2005) disentangled the confounded variables *actual genetic relatedness* and *knowledge about relatedness* and showed that physical cues have an effect on resemblance ratings over and above the knowledge of relatedness.

In summary, people differentiate between genetically related and non-related persons. They experience different emotions and differ in helping behavior. Similarity between genetically related persons refers to shared characteristics that possess a hereditary component and also underlie environmental influences (e.g., Asendorpf, 2006; Neyer, 2002). Due to environmental influences on phenotypic matching and uncertainties in kin recognition, similarity is associated with kin-like behavior and emotions even in the absence of actual genetic relatedness.

Sexual selection. The relationship between sexual partners has multiple facets and functions, but from an evolutionary psychological perspective its primary function is direct reproduction. During the two phases of reproduction, mating and parenting, different aspects are important.

In general, human mating is temporarily monogamous and shows moderate sex differences in strategies (more elaborated in Bjorklund & Pellegrini, 2002 and Buss, 1999a). However, both males and females have the tendency to select partners who are similar in several aspects, e.g., phenotypic features, age, abilities, values (Watson et al., 2004). This has two potential benefits. First, the choice of a modestly similar looking mate (regarding stature, complexion, etc.) assures compatibility between immune systems. Here, mechanisms of kin recognition prevent (1) inbreeding by avoiding too strongly resembling mating partners and (2) incompatibility by avoiding too foreign looking partners (Pfennig, 2002). Second, assortative mating is partly the result of social homogamy (i.e., mostly having contact with people of comparable social background and common interests) and in part due to actively seeking and selecting similar partners with whom interactions promise to be more harmonious and with less conflicts (Gonzaga, Campos, & Bradbury, 2007; Lutz-Zois, Bradley, Mihalik, & Moorman-Eavers, 2006; Luo & Kohnen, 2005).

Partnerships are also close attachment relationships that satisfy the innate need to belong (Baumeister & Leary, 1995) and serve as a stable foundation for parental care (Fraley, Brumbaugh, & Marks, 2005). Duties of parental care (e.g., providing material resources, satisfying basic needs for food and safety, child rearing) are likely to be shared between partners and partners must support and help each other. Hence, sexual partnerships are highly complex relationships which incorporate strong emotional attachment as well as exchange of instrumental help. In contrast to kin relationships, there are no shared alleles between partners and helping occurs in order for better rearing of the offspring, because survival of offspring and later reproduction benefits both partners (Buss, 1999a; Davis & Daly, 1997). But if sexual selection is directed towards producing offspring, how can phenomena like infertility and motivated

childlessness be explained? An attempt to answer this question is made in relation to individual differences in relationship regulation (section 1.1.2).

Cooperative selection. Social exchange is a widespread phenomenon throughout all human civilizations and also the animal kingdom (Axelrod & Hamilton, 1981; Buss, 1999a; Bjorklund & Pellegrini, 2002). Exchanged resources can be material things such as money and possessions and also immaterial things, e.g., status, help, physical and cognitive abilities. However, exchange is always costly for the giver and social exchange would not have evolved, if it had not followed certain rules that also ensure benefits to the giver (Cosmides & Tooby, 1992; Fetchenhauer & Bierhoff, 2004). Social exchange between kin (=kin altruism, Fetchenhauer & Bierhoff, 2004) is easily explained using Hamilton's (1964) concept of inclusive fitness (see section 1.1.1 on kin selection). Social exchange between non-relatives (i.e., reciprocal altruism, Trivers, 1971) however, has even been termed "altruism puzzle" (Fehr & Gächter, 2002; van Vugt & van Lange, 2006) and literature draws on five principles that solve the puzzle and foster cooperation: 1) direct reciprocity or tit-for-tat behavior, 2) stable environments for interaction, 3) the detection of cheater, 4) the punishment of deception, 5) the norm of reciprocity and social exchange heuristics. Cooperation, reciprocal altruism and sometimes social exchange are used as synonyms (Buss, 1999a). Throughout this work, cooperation refers to voluntary reciprocal exchange behavior in more than one interaction between two individuals for the benefit of both. This definition follows Cosmides and Tooby (1992) and Brosnan and de Waal (2002), but is slightly more strict.

1. Tit-for-tat behavior (Axelrod & Hamilton, 1981) or direct reciprocity is the general rule to behave like the cooperation partner in repeated interaction. If the partner shares or helps, then one has to help, too. If the other is not cooperative, one does not help either. Dawkins (1989/1999) viewed tit-for-tat behavior as an evolutionary stable strategy, because if most members of a population use it, no alternative strategy can defeat it and game theory confirmed tit-for-tat behavior's superiority compared to other strategies (Axelrod, 1984; Cosmides & Tooby, 1992). Grooming between equals is an example for reciprocity from the animal kingdom, but direct reciprocity is seldom in humans, therefore compensation for received help will often occur after a longer time period and/or exchanged resources differ. The often used example of sharing prey (Buss, 1999a) highlights the limits of direct reciprocity for explaining cooperation. Other factors are needed, such as a stable

environment, detection and punishment of cheaters and cooperation as a norm shared by the group or society.

2. Stable environments ensure the availability of cooperation partners over a longer time period. People living together will experience need and abundance of resources at different times. Therefore, helping a group member in need and knowing that member will be available in the future removes the necessity of direct compensation. In addition, frequent interaction in a stable group enhances the detection and punishment of cheaters.
3. Cosmides (1989) showed the human cognitive ability to identify cheaters (i.e., violators of social contracts). She also stated necessary characteristics for cheater detection: discrimination of different interaction partners, remembering of costs and benefits over a long period, and understanding the intentions of others, in order to differentiate between inability and unwillingness to reciprocate.
4. If an intended deception was identified, punishment would occur in form of no future cooperation. Altruistic punishers, although they experience costs, always will dominate defectors, non-participants and non-punishing contributors in a population and help to explain why cooperation lasts (Fowler, 2005; Gintis, Bowles, Boyd, & Fehr, 2003; Irons, 2005; Johnson, Stopka, & Knights, 2003). Emotions of anger and guilt serve as motivators/ proximates for punishment (Fehr & Gächter, 2000; 2002; Fessler & Haley, 2003; Fetchenhauer & Bierhoff, 2004; Keller, Gummerum, Tien Wang, & Lindsey, 2004). Furthermore, cheaters acquire a bad reputation, so even others, who have not been deceived by that same person, will be careful or avoid cooperation with the cheater. Frank (1988) looks at the other side of the coin and assumes (1) a universal preference for trustworthy, cooperative interaction partners and (2) acquiring a trustable reputation will spread within a group and foster future cooperation.
5. The norm of reciprocity (Gouldner, 1960; Perugini, Gallucci, Presaghi, & Ercolani, 2003) is widespread throughout civilizations and species and has both an inherited (emotional) as well as a learned (cognitive) component. It inhibits overreaching (beneficiary feels guilty) and exploitation (giver feels angry) and is also driven by a social exchange heuristic (Buss, 1999a). (Altruistic) punishment reinforces the norm.

Two more things need to be addressed when explaining cooperative behavior. First, mostly unidirectional exchange in dominance relationships is excluded. The behavior cannot be termed cooperation, because it occurs involuntarily and through threat and dependence. Protection from group members of higher rank in exchange for other benefits, e.g., food, information, etc., is a special case and not yet classified.

Second, apart from the necessity to identify deceivers, there is also the need to judge whether the interaction partner is (physically) able to cooperate, i.e., to reimburse the help. Since cooperation does not depend on direct altruism, exchanged resources can be quite different. Thus, a general estimation of parity of resources (i.e., rough equality in material and immaterial means) is sufficient and there may be a variety of indicators for resource parity, e.g., status, gender, possessions or age. In general, available resources and need for resources of others vary with age (e.g., Heckhausen, Dixon & Baltes, 1989, Keith, 1983; Schulz & Heckhausen, 1996; Thye & Witkowski, 2003). From childhood to adulthood, there is a steady gain in material as well as in physical and cognitive resources. Resource availability is, by and large, greatest during adulthood and decreases in late adulthood and old age. Therefore, people roughly the same age should possess a similar quantity of resources compared to significantly younger or older people. So far, there are no known studies that directly address the question which age difference is perceived as age disparity and whether this is related to actual differences in resources, but there is some evidence from comparative studies, which also found similarity in age to be an important variable in social exchange (Brosnan & de Waal, 2002). Gender seems to be an unreliable indicator of resources, because heterogeneity within both sexes is too large (especially within men, e.g., Baumeister, 2007). Evaluation of status or possessions is likely to a valid indicator of resources as well, but restricts resources to material objects and power. Further studies regarding the perception of cooperative values and the cues used in this perception are needed.

One can conclude that cooperation is a highly complex behavioral class that is rather rare in the animal kingdom and largely unique in humans (Fehr & Gächter, 2002; Hammerstein, 2003). The norm of reciprocity, emotions related to exploitation and overreaching, and exchange behavior are important concepts for understanding relationships between non-kin. Despite the costs of altruistic acts, cooperation offers benefits that serve reproductive advantages as compared to non-cooperation (Davis & Daly, 1997; Voland, 2000): (1) reduction of efforts of solitary life, (2) decrease of deadly peril through enemies and resource shortage, and (3) decrease of risks in step-relationships.

1.1.2 *The evolutionary model of relationship regulation*

Throughout civilizations, people maintain social relationships with a variety of different people. Lang and Neyer asked, “why do people differentiate social relationships?” (Lang & Neyer, 2005, p. 167, own translation). The heterogeneity of relationships is implicitly included in relationship research as stated in the beginning. Family relationships are examined separately from friendships and from work relationships; relationships with neighbors are researched isolated from romantic partnerships, etc. This diversity of relationships and their similarities and differences in functioning are explicitly addressed in the Evolutionary Model of Relationship Regulation. Lang and Neyer identified two EPMS (1) *closeness regulations (CR)* and (2) *reciprocity monitoring (RM)*, which were derived from the three ultimate mechanisms kin selection, mating and cooperation (as described before). The model of relationship regulation (figure 1, Lang & Neyer, 2005) assumes *CR* and *RM* being two distinctive, but not orthogonal, mechanisms, which evolved to distinguish between genuine kinship and genuine cooperative relationships.

The formation of every relationship is simultaneously based on *CR* and *RM*, which, however, differ in proportion. Taking the perspective of relationship regulation as disposition, *CR* and *RM* are based on two basic human motives, attachment (Bowlby, 1969/1991) and the agency (Lang, 2005; Lang, Featherman, & Nesselroade, 1997). The need to be attached reflects the preference for affiliation, security, intimacy and care, whereas the need for agency mirrors the desire to influence, dominate and shape (Lang & Neyer, 2005). Lang and Neyer acknowledge that there might be other EPMS aside from *CR* and *RM*, but assume these two to be most important in life-long relationship formation, maintenance and dissolution. According to them, *CR* and *RM* do not aim to explain singular interactions between strangers, but long-term social relationships, characterized by frequent interactions, a relationship history and interdependence between two individuals. Both mechanisms will be explained first as universal mechanisms in humans, before looking at individual differences in these mechanisms.

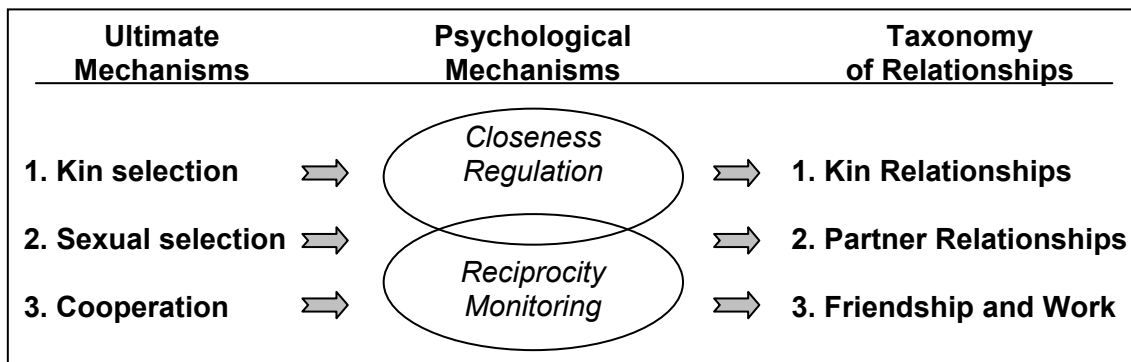


Figure 1. Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005)

Closeness regulation. People perceive their relationships within their ego-centered network as differing in emotional closeness. In general, the closest relationships are those with family members and romantic partners, and sometimes friends. Relationships with colleagues, neighbors and acquaintances are normally less close. Neyer and Lang (2003) found a strong covariation between emotional closeness and genetic relatedness and this result has since been often replicated (Korchmaros & Kenny, 2006, Neyer & Lang, 2004, Segal et al., 2003; Segal, Seghers, Marelich, Mechanic, & Castillo, 2007). The association between genetic relatedness and emotional closeness is predicted by the concept of kin selection (cf. p. 8), which states a preference for close kin compared to distant kin in terms of interaction partners, recipients and providers of help. Emotional closeness is one proximate cue, among others, for genetic relatedness. Furthermore, there is no known structural variable that predicts emotional closeness better than genetic relatedness (Neyer & Lang, 2004; Lang & Neyer, 2005), but this association is not deterministic. The flexible adjustment of differentiation within an ego-centered network is termed “closeness regulation”. Closeness regulation is not necessarily an active and conscious process, but rather a general evolved psychological mechanism. This mechanism serves the purpose of forming and maintaining close, stable relationships and indirectly the ultimate demand of kin selection and sexual selection. Individual differences in this general mechanism are comparatively stable (Neyer & Lang, 2004). They result from social opportunity structures and developmental demands during different stages in life, which will be addressed after the next section.

The relationship quality of one specific relation is the result or status quo of *CR*. The mechanism per se is operationalized as intraindividual covariation of emotional closeness and genetic relatedness, for example using intraindividual correlations

(Neyer & Lang, 2003) or slope coefficients in multilevel models (Korchmaros & Kenny, 2006). For quasi-experimental studies, this association is relatively large (around .50) and remains stable after controlling for other correlates of emotional closeness, e.g., contact frequency and residential proximity. Still, the association is not perfect, leaving room for adaptation to specific circumstances. Throughout life, relationships with romantic partners and spouses are emotionally closest compared to other relationships (Grau, 2003; Neyer & Lang, 2003; 2004), although one is not genetically related to the spouse, but engages in a quasi-kin relationship. On the other hand, there is a strong preference for genetic relatives even in the presence of equally long known social relatives. Social children are not perceived and treated like biological children, with respect to emotional closeness, care-taking, support, etc. (e.g., Clawson & Ganong, 2002; Dunn, 2002; Hetherington et al., 1999, Love & Murdock, 2004; overview in Buss, 1999a). This prominent finding has been replicated with sibling relationships (e.g., Deater-Deckard, Dunn, & Lussier, 2002; Ihinger-Tallmann, 1987; Jankowiak & Diderich, 2000). A well-known example for the preference for close kin is the study by Smith, Kish, and Crawford (1987) that showed an association between genetic relatedness and amount of legacy. However, genetic relatedness is not the only important relationship characteristic varying among relationship partners and other significant variables will be addressed in section 1.3.1.

The previous examples showed that emotional closeness can be viewed as a proximate cue for genetic relatedness. Covariation of emotional closeness and genetic relatedness within an ego-centered network is one indicator of closeness regulation and likely an EPM related to the ultimate mechanisms of kin selection and sexual selection.

Reciprocity monitoring. “People tend to maintain ‘balanced’ social support patterns” (Uehara, 1995, p. 493). This quotation implies two things: (1) people engage in interactions where they exchange resources (support, material help, information) and (2) people monitor whether the relationship is balanced, i.e., how much each interaction partner puts in and receives from the interaction (Lang & Neyer, 2005).

People cooperate for the long-term benefit of both and on the basis of several premises, e.g., reciprocity, stable environments, identification and punishment of deception and norm of reciprocity (see pp. 11-12). Reciprocation and deception are two opposite behavioral tendencies that might occur in interactions. Hence people need to be aware of the status of costs and benefits of different relationships. Monitoring of reciprocity is based upon the preference for fairness, equity, and justice in social relationships (Lang & Neyer, 2005). In general, people expect to receive something in

return for a favor and also feel obliged to give something in return (for review of this work, see Uehara, 1995). Unbalanced relationships are often encumbering, associated with negative emotions and likely to be dissolved (Axelrod, 1984; Thomése, van Tilburg, & Knipscheer, 2003, Uehara, 1995). Lang and Neyer postulate that the underlying process “reciprocity monitoring” (*RM*) keeps track of the costs and benefits of both interaction partners. Although the general moral norm of reciprocity and *RM* should apply in every relationship, the actual degree of *RM* and the preference of reciprocity largely depend on the specific relationship, on individual disposition and on environmental demands. Relationships between kin are often (temporarily or permanently) unbalanced with respect to exchanged resources and are often not expected to be balanced (Clark & Mills, 1979; Lang & Neyer, 2005). Due to differences in available resources, e.g., between parent and child or elderly grandparents and younger relatives, objective support might be unidirectional or unbalanced. As argued in the concepts of *kin altruism* and *inclusive fitness*, there is no real need for reciprocal behavior. Clark and Mills differentiated between communal and exchange relationships. The former are characterized by an emotional concern for the welfare of the other and help occurs due to this concern. They demonstrated the relationship type dependency of reciprocity expectations: direct repayment of favors relates positively to relationship quality only in exchange relationships and even has adverse effects in communal relationships. Furthermore, in exchange relationships people monitor their own and their partners’ input more (Clark, 1984) and are less concerned about the other’s need for help (Clark, Mills, & Powell, 1986; Clark, Ouellette, Powell, & Milberg, 1987). Kin relationships are seen as communal relations; relationships with neighbors and colleagues are exchange relationships. The categorization of friends and romantic partners is less clear and varies with manipulation (expected relationship), relationship duration and marital status (Clark & Grote, 1998; Clark et al., 1986; Clark et al., 1987).

Due to the risk of deception, reciprocity and reciprocity monitoring are much higher in cooperative relationships, which focus mainly on the equitable exchange of resources (Clark, 1984; Clark & Mills, 1979; Lang & Neyer, 2005). However, cooperative relationships also do not depend on direct reciprocity, because repayment can occur later and with a different resource, a fact that increases the risk of deception and therefore the necessity for *RM*. Differences in exchanged resources, time delay between reciprocal acts, a strong norm of reciprocity and a general preference for balanced relationships are reasons why reciprocity and *RM* are difficult to measure. Most people perceive their relationships as balanced, if asked in self-report (e.g., Buunk, Doosje, Jans, & Hopstaken, 1993, Thomése, van Tilburg, & Knipscheer, 2003, Väänänen et al., 2005). Main reasons for this could be that the relationships (1) are

balanced, because unbalanced relationships ended, and (2) **are perceived** as balanced, because people counted emotions (thankfulness) as repayment, and/or compared exchanged resources over a long time-period or in relation to the individual abilities to reciprocate. Assessing the perceived reciprocity across an ego-centered network enables one to measure *RM* as individual disposition to differentiate relationships regarding reciprocity. The immanent assumption is that perceived reciprocity in one relationship is the result of the *RM* in that relationship and little monitoring leads to unbalanced relationships. So far, no empirical work studied the within-network variation of reciprocity and possible correlating variables. Affordance to cooperate, differences in resources, opportunity to cooperate in direct contact, and other concepts are such possible variables.

The previous remarks demonstrate the importance of *RM* in relationships with non-kin. Costs and benefits in these relationships need to be observed in order to minimize the risk of deception. Reciprocity Monitoring is viewed as one EPM that serves the ultimate mechanisms of cooperative selection and sexual selection. The indicators of *RM* have not yet been empirically tested, but within an ego-centered network the covariation between perceived reciprocity and parity of resources and/ or relationship stability could be such an indicator of *RM*.

Contextual variation. Although evolutionary psychology mainly addresses universal strategies of human behavior it also offers explanations for deviations from general rules. Buss (1999b; Buss & Greiling, 1999) states six heritable and environmental sources of individual differences. First, *adaptive self-assessment* describes a differential usage of behavioral strategies depending on own physical characteristics, for instance the degree of attractiveness is associated with different mating strategies. Second, against the general tendency of more successful heritable variants overcoming less successful ones, equilibrium between two or more alternatives can be maintained in certain contexts through *frequency dependent selection* (e.g., proportion of sexes). Third, *strategic specialization* refers to the environmentally triggered selection of a faintly competitive niche, where personality develops differently than it would have in another niche. Birth order, for example, is an environmental factor that can lead to strategic specialization. Fourth, *early environmental calibration* means that within an individual with several equivalent inherited strategies, one strategy is chosen on the basis of early environmental events, e.g., different sexual strategies are chosen depending on father presence during the first five to seven years of life (Geary, 2000; Moffitt, Caspi, Belsky, & Silva, 1992). Fifth, *enduring situational evocation* refers to environmental variations leading to different degrees in application of a universal

strategy: although jealousy is a general phenomenon, the degree of jealous behavior depends on mate value and faithful behavior of the partner. And finally, *continuous condition-dependent heritable strategies* imply a combination of heritable and environmental sources, e.g., individuals with condition-dependent strategies might differ in their inherited threshold for change in strategy. However, the evolutionary psychological perspective can, but does not have to, explain individual differences, because these could be either non-adaptive or neutral to selection in current environmental conditions (Buss, 1999b; Rhode, 2005).

Closeness regulation and reciprocity monitoring are two **general** EPMs, which differentiate the three relationship systems kinship, partnership, and cooperative relationships. Lang and Neyer (2005, Neyer & Lang, 2003) hypothesize that both work within every social network and every personal relationship, but there are dynamic interactions with the (social) environment. From the before mentioned evolutionary explanations for individual differences, early environmental calibration, enduring situational evocation, continuous condition-dependent heritable strategies and potentially non-adaptiveness are assumed to be related to differences in *CR* and *RM* as relationship regulatory strategies. The individual level of relationship regulation is the adaptation to existing environmental demands and resources (Lang, 2005; Lang & Neyer, 2005). Differences in the degrees of *CR*, *RM* and the interaction of both vary between distinct (social) environments. Different social opportunity structures shape the interplay of both regulatory processes and can be related to the specific environmental sources of individual differences.

Childlessness (infertility and purposeful childlessness) is an interesting phenomenon, because it means that the direct way of reproduction is not executed. The indirect way of reproduction through inclusive fitness, i.e., helping one's kin, should be increasingly chosen (Davis & Daly, 1997). Despite the multitude of medical and psychosomatic reasons for infertility in men and women (Brähler, 1990; Henning & Strauß, 2000; Strauß, 1991), there is the commonness of the body not being capable of enduring a pregnancy, birth and/or rearing of a healthy child. For example, high stress levels can cause hormonal imbalance in men as well as in women that leads to hormonal induced infertility. Restoring of hormonal equilibrium can increase the likelihood of pregnancy. From an evolutionary point of view, uncertain or dangerous environmental conditions, that caused stress, where less than ideal surroundings for pregnancy and upbringing. Perhaps, infertility could be an indicator that biological and/or environmental conditions are not sufficient for reproduction. Buss and Greiling (1999) divide environmental effects into *early environmental calibration* and *enduring situational evocation*, depending on the time of occurrence during life. Hence, stressful

environmental conditions can be judged as enduring situational evocation that also affects the extent of the EPMs *closeness regulation* and *reciprocity monitoring*.

Early environmental calibration could be related to motivated childlessness. Motivated childless persons more often stem from incomplete families and also later on report worse or dissolved familial relationships (Carl, Bengel, & Strauß, 2000). If social network ties, especially relationships with kin and extended kin, are weak, mating and reproduction could be delayed or even dismissed. Since relying on kin for help is difficult -if not impossible-, these individuals need to develop a greater independence and also cooperate more often with non-kin. Thus, diminished *CR* and increased *RM* can be consequences of early environmental calibration to instable family networks and thus a heightened dependence on non-kin. As argued before, increased cooperation with non-kin and greater environmental instability demands a heightened monitoring of costs and benefits in social exchange in order to lessen the risk of deception. A stable familial environment during childhood, on the other hand, might lead to an enhanced preference of kin and a reduced *RM* (relative to *CR*). "Normative" families with only biological children can be one example. In addition, the current family type can be the influencing environmental factor, viz. the enduring situational evocation.

Social networks are relatively stable characteristics of the social environment (Neyer & Lang, 2004; Neyer & Lehnart, 2007; van Tilburg, 1998). These enduring situational features can evoke specific degrees of *CR* and *RM* themselves. For example, taking care of children requires help from others, which is often provided by the parents of the couple (Papastefanou & Buhl, 2002). Thus, having biological children and interacting with one's parents a lot can be associated with greater *CR*, i.e., a greater emotional closeness towards genetically closely related kin. The long lasting unfulfilled wish for an own child can also increase *CR* for two reasons. First, involuntarily childless couples often have especially close relationships with their partner and close family, because of emotional support and understanding (Callan, 1987). Second, having especially close relations with siblings, nieces and nephews can compensate the absence of own children (Davis & Daly, 1997). The implications of these environmental conditions on the degree of *RM* are not yet explored, but a moderate degree is presumed, because of a moderate need to cooperate and relatively stable environments for social exchange.

Familial and parental statuses are especially flexible. Throughout the life course these statuses continually change from living with parents/grandparents over living alone, residing with friends or partner to living with own children and increasingly living alone again, with a new partner, and/or with social children. Changes back and forth in these various living conditions are likely, since the plurality of family conditions

increases (Harknett & Knab, 2007; Stewart, 2001). However, the likelihood of these changes and its effects on *CR* and *RM* can be partly due to heritable characteristics that predispose someone to specific applications of relationship regulatory strategies. In this case, one would assume *CR* and *RM* being continuous condition-dependent heritable strategies. This means, individuals might differ in their inherited threshold for change in strategy due to a new environmental condition. The comparison of traditional and patchwork families is an appropriate example to demonstrate the interaction of environmental and heritable sources. Individuals from both families start the same: with a partner and at least one biological child. Due to dispositional, situational, and dyadic factors, some individuals break up the relationship and eventually form a new relationship. This process can be viewed as differential strategy to regulate the specific relationship *partnership*. In addition, the changed situation might affect the relationships within the wider network (e.g., dissolution of relationship with ex-parents-in-law and a recurrence to family of origin, i.e., kin). Possibly the new patchwork family consists of a multiplicity of step relationships, e.g., children from both partners, which are also social siblings to each other, which demands new adaptations of relationship regulation. Cooperation with differently related children needs to be monitored and also differences in emotional closeness need to be adjusted. Again, when and how strongly relationship regulation changes, depends both on the environment and individual dispositions. This interaction of nature and nurture cannot be predicted for the individual case, only for a characteristic within a population, where the influence of environmental factors is stronger the more heterogeneous the environment is and vice versa (Asendorpf, 2005).

Not all extremes of behavior can be explained with evolutionary assumptions of individual differences. Some characteristics are simply neutral to selection or even non-adaptive. Decreased *CR* in motivated childless individuals is probably not neutral to selection, might be adaptive to certain unsuitable environments or could even be non-adaptive. However, this question still unsettled.

The previous section outlined the complex field of explaining individual differences as resulting from dynamic interactions of environment and heritable dispositions. Extensive longitudinal research on changes in social relationships and familial environment needs to be done, before comparable answers like in the research field of individual differences in cognitive and personality development (e.g., Roberts, Walton, & Viechtbauer, 2006; Salthouse, Schroeder, & Ferrer, 2004; Spinath, Wolf, Angleitner, Borkenau, & Riemann, 2005) are obtained.

Alternative theories of relationship regulation. There are other comprehensive theories about the mechanisms that regulate human relationships. The focus is on three prominent theories that also rest upon an evolutionary background and aim to cover all human relationships: Fiske's Relational Models Theory (1992; Haslam & Fiske, 1992; 1999) the Domain-Based Social Algorithms by Bugental (2000) and Selective Investment Theory by Brown and Brown (2006). They are first described and then compared with the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005).

Fiske (1992, p. 242) proposes "four elementary cognitive models in terms of which social relationships are represented, comprehended, evaluated, and constructed." He claims his framework applies to all personal relationships and does not exclude specific or rare ones. All personal relationships can be determined by some combination of the four models (1) *communal sharing*, (2) *authority ranking*, (3) *equality matching* and (4) *market pricing*. Thus, they are not expected to be orthogonal. The communal sharing model mostly applies to relationships that are characterized by collective belonging and solidarity. Relationships based on dominance and obedience are driven by the authority ranking model. Reciprocity and the distribution of equal shares are central in the equality matching model. Finally, the market pricing model mostly applies to relationships that are characterized by cost-benefit calculations and monitoring of proportions. Fiske declares that the behavior towards one person can be driven by different models in different situations. For example, the behavior towards the spouse may be mostly driven by the communal sharing model. However, in situations that evoke sharing or scarcity of resources, equality matching could be the dominant model. The empirical approaches are creative, using self-reported confusion of relationship partners (Fiske, Haslam, & Fiske, 1991), substitution of relationship persons (Fiske & Haslam, 1997) or clustering in recall of relationship persons (Fiske & Haslam, 1996), but the empirical evidence is mixed, because the samples are inadequate. Confirmatory factor analyses (Haslam & Fiske, 1999) provided limited evidence for the relational models as well, because relationships were operationalized by rating ten acquaintance (!) relationships on 33 items (number of participants was 42). In addition, the item loadings on predicted factors were low, as was internal consistency, and when item loadings were restrained to a certain factor, the model fit was insufficient. Although Haslam and Fiske (1992) tried to show supremacy of their model in comparison to four other powerful models (social motives, communal vs. exchange orientation, resource exchange, role expectations), the general empirical evidence is limited.

Bugental's (2000) approach goes further than Fiske's Relational Models Theory by expanding from social relationships to social life in general. She states domain-specific regulatory mechanisms that are assumed to facilitate successful human behavior in social groups. These algorithms are believed to be acquired in five different domains: *attachment*, *hierarchical power*, *coalitional group*, *reciprocity*, and *mating*. The attachment domain helps to establish mechanisms that aid proximity seeking and achieving security. Algorithms that manage the "interests between two people with unequal control, resources or resource-holding potential" (Bugental, 2000, p. 201), are achieved in the hierarchical power domain. The coalitional group domain prepares for forming groups and for distinguishing between in- and out-group. That is useful for defending the in-group against attacker and gaining scarce resources, which could not be obtained by a single individual. Mechanisms that facilitate mutually beneficial interactions between related or unrelated individuals are prepared through the reciprocity domain. Finally, the mating domain trains for selecting a mating partner and creating a bond for shared parental care.

Bugental (2000) derived these five domains from frequently studied domains of other fields, e.g., cognitive, social, sociobiological, evolutionary, and developmental psychology. The strength of her approach is the thorough description of the five domains including the adaptive problems they solve, the calibration processes, the developmental timing, neurohormonal correlates and the social responses they evoke. Furthermore, she considers the flexibility of these algorithms through interaction with the environment at three different levels: bioecological, cognitive and cultural.

There exists some overlap between Bugental's social life domains and Fiske's relational models, but Bugental (2000) explicitly names three differences. First, she focuses on the processes associated with the acquisition of the algorithms and on biological mediators. Second, while Fiske assumed one domain (communal sharing) to be sufficient, Bugental distinguishes between two domains (attachment and coalitional group). Last, mating is included as a separate domain, which, although it is only relevant later in life, acquires some features during early life. So far, the empirical testing of this interesting approach is still unsettled.

None of the preceding concepts are mentioned in the most recent theory proposed by Brown and Brown (2006). The selective investment theory seeks to explain costly long-term investment (CLI) through the formation and maintenance of stable social bonds. According to their theory, social bonds are the reason, why parents engage in raising children, spouses take care of each other over a long period of time and people risk their resources and life for companions/non-kin. Brown and Brown (2006) state four preconditions for CLI: (1) fitness interdependence, (2) affinity

mechanisms, (3) social bonds and (4) the motivation of CLI by social bonds. Fitness interdependence is the mutual reproductive interdependence of two individuals. It is based on and weighted by shared genes (drawing upon Inclusive Fitness Theory, Hamilton, 1964), behavioral synchrony and/or shared affective experiences. Thus, every interaction partner “receives” a value for his/her worth for one’s own fitness. An “enduring neurohormonal affinity for fitness-interdependent other” (Brown & Brown, 2006, p. 2) evolved over time and leads to social bonds. Social bonds are seen as a dynamic memory complex with affective and cognitive (attention and memory) characteristics. They are assumed to be a reason for a preference for special others who have a high fitness-interdependence value. This preference is expressed through behavior like proximity seeking and maintenance. Finally, social bonds motivate CLI through the combination of fitness interdependence and stable cognitive and affective ties.

Brown and Brown (2006) suppose that humans have self-centered and other centered motivations. As a result, selfish actions conflict with altruistic actions. This problem is partly solved through the concept of kin-based altruism, which explains CLI in a certain group of other humans, i.e., kin. Researchers tried to explain costly long-term investment in nonkin with concepts of reciprocal altruism (Trivers, 1971), indirect reciprocity (Alexander, 1987), strong altruism (Gintis et al., 2003; Fehr & Rockenbach, 2004) or costly signalling (Gintis et al., 2001). However, these theories and theories about kin recognition (Porter, 1987) and decision making in social exchange (Cosmides, 1989, Cosmides & Tooby, 1992) explain how CLI would work, but not why selfish tendencies are overridden by altruistic ones (Brown & Brown, 2006). Brown and Brown offer social bonds as a conglomeration of affective, cognitive and motivational processes that overcomes egoistic motivations and directs helping behavior towards special, i.e., fitness-interdependent, others. They compare the Selective Investment Theory with existing theories and provide empirical evidence from former studies to strengthen their theory.

Extensive criticism has been expressed in replies from distinguished scholars following Brown’s and Brown’s target article and can be organized in three groups: (1) theoretical rationale, (2) empirical validation, (3) linguistic fuzziness. The assumption of one mechanism underlying all human relationships seems too simple (Jeon & Buss, 2006; Krebs, 2006; Sundie & Kenrick, 2006) and ignores the main distinction in social life between related and unrelated others. In addition, the incorrect usage of evolutionary concepts is criticized (Batson, 2006; Jeon & Buss, 2006). The empirical validation is vulnerable, because Brown and Brown did not conduct studies themselves, but relied on results from former studies. These results can be interpreted

in favour of alternative theories (Batson, 2006; Sundie & Kenrick, 2006) or contradict other studies (Berscheid, 2006). Several authors found fault with imprecise or missing definitions of central concepts (Berscheid, 2006; Krebs, 2006; Shaffer & Williamson, 2006). Although it is difficult to add to this comprehensive evaluation, there are two additional points. First, the concept of fitness interdependence needs better definition to enable operationalization. As a consequence, the authors would need to state to what extent they assume an awareness of fitness interdependence in humans. Do people think about other people in terms of usefulness for their own progression? Second, people have stable relationships⁸ with others without costly long-term investment or without forming social bonds, e.g., neighbours, colleagues, professional helpers. Interactions and mechanisms involved in these relationships are not covered by Selective Investment Theory.

The Evolutionary Model of Relationship Regulation answers some of the aforementioned critical points. Like Brown and Brown (2006), Lang and Neyer (2005) hypothesize general evolutionary psychologically derived mechanisms that regulate human relationships. However, they include all possible relationships and confirm that they are differentiated by *closeness regulation* and *reciprocity monitoring*. Contrary to Brown and Brown, they assume two instead of only one single mechanism of relationship regulation. They assume an interaction of CR and RM in the three relationship systems -*kin relationships*, *romantic relationships*, and *cooperative relationships*- and explicitly account for differences between these three systems which cannot be explained by only one mechanism. Furthermore, they presume a relative independence of the two postulated mechanisms in contrast to Fiske's (1992) relational models. Lang and Neyer, as well as Bugental and Fiske, derive their mechanisms from ultimate problems in human social life and therefore build their models on the solid theoretical foundation of the evolutionary psychological paradigm.

There are obvious overlaps in these mechanisms. All four models state one algorithm or mechanism that is based on positive emotions (*communal sharing*, *attachment*, *social bond*, *emotional closeness*). These emotions relate to proximity seeking, experiencing security and pleasantness in interactions. Another important concept in Fiske's, Bugental's and Lang and Neyer's theories involves exchanging resources and perceiving this exchange as fair and just over time (*equality matching*, *reciprocity*, no correspondence in SIT, *reciprocity monitoring*). However, *equality matching* and *reciprocity* focus on equality in relationships, whereas *reciprocity monitoring* simply assumes that people are differently aware of exchanged resources in

⁸ As defined before as having dyadic nature of interaction and an interaction history.

different relationships. Interestingly, both Bugental and Fiske suggest further domains and mechanisms, but it remains open whether people differentiate their relationships with that many different concepts and in general a more parsimonious approach is often preferable. Two mechanisms, which interact, are a satisfying balance between domain-specificity⁹ and overall generality. Furthermore, the earlier approaches need further empirical validation, whereas Neyer and Lang (2003) showed empirical evidence for the assumed mechanism of emotional closeness and for the discriminant power of emotional closeness and reciprocity within a network approach (Neyer, Wrzus, Wagner, & Lang, 2008).

A positive characteristic shared by the approaches of both Bugental (2000) and Neyer and Lang (2005) is the assumed environmental flexibility, which is well elaborated by Bugental. Again, sound empirical validation is needed. Furthermore, a valuable theory of personal relationships is characterized by a developmental perspective. Fiske and Bugental propose a developmental order, where communal sharing and attachment, respectively, develop first, and equality matching and reciprocity develop later in life. Lang and Neyer also state that emotional closeness develops in early childhood, whereas the concept of reciprocity and reciprocity monitoring as a consequence is acquired later in childhood (an assumption shared with Keller et al., 2004).

So far, the evolutionary background of human relationships was sketched and a model of relationship regulation was explained. Individual differences in relationship regulation were hypothesized and related to contextual variations in the social environment. Last, alternative models for the regulation of relationships have been reviewed and related to the Evolutionary Model of Relationship Regulation.

1.2 Relationship regulation within ego-centered networks

This chapter provides further empirical evidence in support of relationship regulation, i.e., differentiation of relationships through variation in relationship qualities. It draws on multiple backgrounds in addition to evolutionary psychology and also includes studies that did not analyze ego-centered networks, but instead compared specific relationships. The reason for doing so is the vast literature on specific relationships, e.g., familial relations, romantic partnerships and friendships, but the comparatively small number of studies addressing personal networks and their

⁹ Here, domain-specificity does not relate to cognitive modularity (Barrett & Kurzban, 2006) yet, but modularity in processing social information seems to be a valuable concept for studying relationship regulation.

relationship qualities. Some of those studies focused only on either the network size (e.g., Gerich & Lehner, 2006; Shye, Mullooly, Freeborn, & Pope, 1995; van Tilburg, 1998, Veiel & Herrle, 1991) or special types of networks (e.g., *supportive networks*: e.g., Avlund et al., 1998; Thomése et al., 2003; Väänänen et al., 2005; *affective networks*: e.g., Doherty & Feeney, 2004; Takahashi, 2004).

Before going into detail about emotional closeness and reciprocity in personal relationships, the general structure and variability of personal networks as well as basic descriptors are explained. Finally, the concept of similarity and its function in relationship regulation is addressed.

1.2.1 *Personal network structure*

Network size. The primary descriptor of personal networks is network size. The observed average number of personal relationships varies little (around ten plus/minus three or four, e.g., Doherty & Feeney, 2004, Gerich & Lehner, 2006; Neyer & Lang, 2003) and depends on age and gender of participants, applied network-generator and the specific type of network. Network size is greatest in young adulthood, reaches a plateau during middle adulthood and decreases in old age (Neyer & Lang, 2003; van Tilburg, 1998). Gender differences are also constantly found: women report a slightly larger (one to two additional persons) network than men (Doherty & Feeney, 2004; Kogovsek & Ferligoj, 2006; Shye et al., 1995). Personal networks can be assessed by using several different techniques, depending on the research question, e.g., using Antonucci's (1976) concentric circles or name generators that ask for different persons either from specific groups, e.g., partner, family, colleagues, friends or from different activities, e.g., talking about problems, sharing of leisure activities, living together, working together, asking for help, etc. (Kogovsek & Ferligoj, 2006; Marsden, 1987; McCallister & Fischer, 1978; van der Poel, 1993, van Groenou & van Tilburg, 1996). Generated networks will vary to some extent, but the most important people are assessed with all of them. A relatively exhaustive network is created using cued recall, asking for positive as well as negative relations, and for people who have been known for a long period of time (e.g., Asendorpf & Wilpers, 1998, Neyer & Asendorpf, 2001). Despite these main effects, individual differences are large and personal networks can range from one or two persons to several dozen, depending on social opportunity structures and personal dispositions. Availability of colleagues depends on working status and organizational structure; existence of neighbors is founded on the living situation; relationships with romantic partner and friends are based upon having a partnership and friendships, and the number of kin in one's network depends on the size of the family as a whole. Personal dispositions, however, interact with social

opportunity structures and personality shapes one's occupational, living, and friendship environments. Baumeister and Leary (1995) assumed a universal, innate *need to belong* and support their assumption with empirical evidence: (1) personal relations are easily formed under a variety of (impedimental) circumstances; (2) people are reluctant to dissolve relationships; (3) deprivation of this need, which is characterized by missing pleasant interactions within contexts of relatively stable and enduring frameworks, is related to negative effects on health and well-being. For example, social interactions with strangers are not as rewarding and satisfying as interactions with close others and having personal relationships without direct interaction (e.g., due to spatial separation) also has negative effects on well-being. Thus, people vary in how many people they need in order to satisfy their need to belong. They also differ in arrangement, differentiation and pursuit of their personal relationships, but across age, gender, personality types, and cultures, all people form and maintain some lasting, rewarding relationships.

Network structure and residential proximity. The previous section showed small, but persistent effects in overall network size due to age and gender, but failed to explain the large variance between individuals. One starting point for explaining these differences is the structure of personal networks. Basic information is obtained through the knowledge of family-to-friends ratio (Takahashi, 2004) and in greater detail by looking at the proportion of core family, distant kin, friends, colleagues and others in the whole network (McLanahan, Wedemeyer, & Adelberg, 1981; Widmer, 2006). Widmer (2006) stated seven different networks types which he defined by the amount of kin and their connectedness within the network (=density). Five of them are characterized by a high density, low centrality of the target and a large amount of either vertical (beanpole, mother-oriented or father-oriented network) or horizontal (sibling or conjugal, i.e., in-law-oriented, networks) relatives. Friendship networks consist mostly of friends and some core family members and are characterized by a high centrality of the target and lower density, two features also found in post-divorce networks, which consist of both parents and their new partners and children. Low density (network persons do not know each other) is closely related to high centrality of the target, because the target is the link between his/her network persons. High density, on the other hand, implies that most of the network persons know each other without necessity of the target to connect them, i.e., low centrality of the target. Hence, knowing the structure of a personal network always includes information about its density or connectedness. As early as 1957, Bott argued for the dissolution of the kin-network, because spouses moved according to their work demands and did not rely

that much on family members for help. Newer studies diminish this pessimistic view. Allan (2001) found no proof for individualization and Doherty and Feeney (2004) showed that although the romantic partner is the most eminent attachment figure for most adults, relationships with parents, siblings and friends remain very important and were considered to be full-blown attachment relationships.

This controversy may be resolved by defining “individualization” and “dissolution of kin network”. Individualization is understood as a detachment from normative lifestyles and is thus a societal phenomenon (Allan, 2001; Beck, 1996). Multiple diverse patterns for family structure, labor division and familial changes are possible and acknowledged by society. Thus, individualization means dissociation from the population leading a traditional life (where the wife of the married heterosexual couple raises the children while the husband works fulltime for family subsistence) by turning towards alternatives, e.g., childless, single or double-earner lifestyles, patchwork-families, same-sex relationships, and living apart together (Levin, 2004). It does not refer to a personal phenomenon, i.e., exchanging the traditional lifestyle for single lifestyle without deeper relationships (= living as an individual). On the contrary, Allan (2001) argued that due to societal transformations like globalization and increased flexibility in occupational and living conditions, family ties and friendships become more important for coping with the demands introduced by these changed societal environments. Likewise, “dissolution of kin network” does not relate to the break-up of family ties, but to a partial decrease in residential proximity to kin relations. “Partial” means it applies (a) to a part of the population due to the increase in diversity of lifestyles and (b) to a portion of a social network. In some cases relationships with the extended family are less important and distant kin live further away (Schmidt-Denter & Spangler, 2005), but relationships with parents and siblings often remain physically and emotionally close (Doherty & Feeney, 2004; Feeney, Hohaus, Noller, & Alexander 2001; Schmidt-Denter & Spangler, 2005; Schütze, 1993). Residential proximity is thus another important variable in studying social networks, because of its implications for further relationship quality measures. For example, it is positively related to contact frequency, emotional closeness, and intention to help (Clawson & Ganong, 2002; Hill & Dunbar, 2003; Korchmaros & Kenny, 2006).

Contact frequency. Apart from network size and proximity, contact frequency is a central structural characteristic in social networks. It is related to proximity, because proximity eases contact or makes it even inevitable, e.g., for colleagues or neighbors. Proximity is not a necessary prerequisite, because contact can be achieved using telephone, internet or mail. Both face-to-face and indirect contact are crucial for

relationship qualities like emotional closeness, conflict, and reciprocity, because contact frequency refers to the amount of interactions. Interactions, on the other hand, provide the opportunity to exchange resources and help. They also foster relationship development and maintenance by sharing positive experiences (enjoyable, rewarding interactions strengthen the general relationship and promote self-disclosure, Blieszner & Roberto, 2004). Furthermore, frequent contact (=interaction) itself is a defining feature of social relationships (Hinde, 1979; cf. p. 6), although Fingerman and Lang (2004) have argued otherwise, stating that relationships can exist without contact and the mental representation of the relationships is more important for its definition. This work follows the first understanding of relationships, where frequent interactions are necessary or else no relationship regulation would occur. However, one has to keep in mind that interaction is not only a prerequisite for emotional closeness and exchange, but also an indicator for relationship quality or even a result. In established relationships, emotional closeness and contact frequency are positively related (e.g., Berscheid, Snyder, & Omoto, 1989; Fehr, 2000; Neyer & Lang, 2003) and reciprocally reinforcing. During relationship establishment increased contact is associated with greater liking and emotional closeness (Berscheid & Regan, 2005; Fehr, 2000) and frequent contact is a prerequisite for relationship establishment. The latter finding is restricted to voluntary relationships like friends, mating partners or colleagues. The relationship formation of family relations has not been studied from this perspective and presumably emotional closeness is less strongly related to contact frequency in family relationships. Once the relationship has been established, the same emotional closeness can even be maintained with less frequent contact, and as such making relationship duration a characterizing feature.

Relationship duration. Relationship duration varies considerably within an ego-centered network. Longest relations exist with kin and relatives. In kin relations, relationship duration is equal to age of the younger relationship partner. This rule is broken in cases of step relations and in-laws. All other relationships with friends, spouses and colleagues are in general much shorter in young and middle adulthood. Likely, relationship duration is not linearly related to relationship quality. During the first months and years, the gradient is strongly positive and then proceeds asymptotically. Empirical evidence, especially with a social network approach, is yet still missing. In addition, duration is often confounded with other variables like genetic relatedness or relationship type. This leads to the conclusion that relationship duration has only limited value when describing and evaluating relationships, especially established relationships.

Social similarity. Another general characteristic of social networks is similarity in demographic characteristics, i.e., homophily. Homophily is defined as the “principle that a contact between similar people occurs at a higher rate than among dissimilar people.” (McPherson et al., 2001). Across a wide range of relationships (friends, family, colleagues, spouses, etc.) and of characteristics (ethnicity, gender, age, education, religious orientation, and socioeconomic status, e.g., Albeck & Kaydar, 2002; Gerich & Lehner, 2006; Hamm, 2000; Marsden, 1987; Watson et al. 2004; for a comprehensive review see McPherson et al., 2001), people form ties with similar people more often than random assortment would predict. Two major (interacting) causes can be identified: (1) distribution of a certain characteristic in population (baseline homophily) and (2) active selection. Assessment of similarity in a certain feature should take into account the baseline probability of this characteristic. In certain German rural areas, homophily of social networks in ethnicity has to be expected, because the percentage of people with different ethnicity is close to zero. The gender distribution, on the other hand, is largely equal and therefore deviation from an equal gender distribution within a social network is likely ascribable to active selection (Gerich & Lehner, 2006; Marsden, 1987). Both causes provide no final explanation why people form ties with similar others – an evolutionary psychological informed answer will be offered in section 1.2.3. Furthermore, a distinction is drawn between social similarity, e.g., in age, gender, marital, parental or socioeconomic status, and similarity in abilities, attitudes, appearance or personality. While the former is almost always objectively identified, the latter is sometimes objectively obtained by comparing two persons on the relevant concept (Luo & Klohnen, 2005; Watson et al., 2004) and sometimes subjectively assessed by asking one partner about the perceived similarity (Hill & Stull, 1981; Korchmaros & Kenny 2006; Morry, 2005; Segal et al., 2003). For certain research questions perceived similarity is an equal or better predictor than objective similarity (Montoya et al., in press) or the only achievable measure in case of social network studies. This is further discussed in section 1.2.3.

This last section explained structural characteristics of ego-centered networks. To understand personal relationships and individual relationship regulation, psychological qualities are needed. The next section focuses on emotional closeness and perception of reciprocity within ego-centered networks and specific relationships.

1.2.2 Closeness and reciprocity in ego-centered networks

Definition of closeness. Closeness is a very prevalent concept in studies of any kind of social relationships. It has many related concepts and is often used interchangeably with attraction, intimacy, interdependency or attachment. Therefore, a proper definition

and a clear differentiation from related concepts are needed. Although closeness a) can be objective and subjective, b) can be a short-term state and a long-term characteristic and c) varies in content (e.g., values, activities) (Grau, 2003), the chosen definition for this work is: emotional closeness as a construct is a subjective, relatively stable characteristic of a relationship with another person. This relationship characteristic is a cognitively represented and memorized emotion which is based on previous experiences of closeness. It is understood as a dimension ranging from not close to very close. This definition is much stricter than concepts of attraction, intimacy, or closeness defined by others, e.g., Berscheid et al. 1989; Grau, 2003, that also include behavioral and motivational components.

Emotional closeness is not synonymous with attraction because attraction refers to initial liking of nonrelated persons (e.g., Byrne, Griffitt, & Stefaniak, 1967; Montoya & Horton, 2004; Morry, 2005) and hence excludes family relationships. Attraction is a concept mostly used in studies of friendships or romantic relationships. It relates to initial positive evaluations of another person, intentions for future activities and interactions, and positive emotions. In the study of romantic relationships, it can also mean feeling physically attracted to someone. Similarity (e.g., Byrne et al., 1967; Montoya & Horton, 2004), proximity (Festinger, Schachter, & Back, 1950), reciprocal liking (Sprecher, 1998), and physical attractiveness (Berscheid & Regan, 2005; Sprecher, 1998) predict attraction. The most noticeable differences between emotional closeness and attraction thus are a) its application to different relationships (closeness can be rated in all relationships, whereas ratings of attraction towards neighbors or family members are unusual) and b) the time frame: emotional closeness is defined as a relatively stable characteristic which developed after some interactions, whereas attraction can be rated at first encounter with minimal knowledge of the other person.

Emotional closeness differs from intimacy (Reis & Shaver, 1988), in that intimacy is a special case of extreme closeness, occurring mostly in romantic relationships, long-term friendships, and sometimes core family relationships, e.g., between siblings or parent and child. Self-disclosure, a behavior where self-relevant personal information (e.g., needs, self-concept, and values) is communicated, is essential for achieving intimacy. It is not the exchanged facts themselves that are central, but the emotions related to these facts. If self-disclosure is answered by positive emotions, understanding, appreciation and returned self-disclosure, intimacy between relationship partners will increase. Intimacy is not a characteristic of all relationships because self-disclosure of private and personal information can be inappropriate in some relationships, e.g., with colleagues, neighbors or acquaintances. In summary, the difference between emotional closeness and intimacy is a) the range of relationships

covered by the concept and b) the theoretical scope of both concepts: intimacy is mainly achieved through self-relevant communication. Closeness, on the other hand, is a stable relationship characteristic which is fostered by many different sources, e.g., communication, positive interactions, shared experiences, perception of similarity, and/or attraction.

Emotional closeness is not closeness in a sense of interdependence because this concept relies heavily on reciprocal influence of a relationship partner's behavior and attitudes (Berscheid et al., 1989). Furthermore, both partners' behavior mutually influence the other partner's outcomes (Kelley et al. 1983; Rusbult & van Lange, 2003). Emotional closeness is seen as a characteristic and a consequence of behavioral interdependence which is defined by frequency and diversity of shared activities and influence experienced in various fields (Berscheid et al. 1989). The main difference between emotional closeness and interdependence is the focus on emotions (i.e., feeling close) as opposed to behavior (i.e., behaving close).

Emotional closeness is not synonymous to attachment for two reasons. First, attachment or attachment style is often seen as stable dispositional, thus relationship unspecific, characteristic of an individual (Ainsworth et al., 1978; Bowlby, 1969; Hazan & Shaver, 1994). This characteristic guides behavior (proximity seeking and affect regulation) in dangerous situations that activate the attachment system (Ainsworth et al., 1978; Bowlby, 1969; Mikulincer, Florian, & Weller, 1993). Second, even if attachment quality is defined as a relationship feature rather than an individuals' characteristic (Asendorpf, 2004; Asendorpf, Banse, Wilpers, & Neyer, 1997), it is not synonymous to emotional closeness. An attachment relationship in adulthood is seen as especially important relationship usually with the parents, the romantic partner, the child, and sometimes with a best friend (Asendorpf et al., 1997; Doherty & Feeney, 2004). In case of physical or psychological threat the attachment person is sought for proximity, protection (also figuratively), and comfort (Simpson, Roles, & Nelligan, 1992). The attachment quality refers to a category of behavioral tendencies in case of threatening situations and a mental representation of a relationship whereas emotional closeness relates to the emotions experienced with the relationship person. Attachment quality and emotional closeness are assumed to be only loosely related. Emotional closeness is expected to be high in secure relationships; it might vary in anxious-ambivalent relationships, and might be low or suppressed in avoidant relationships (Bartholomew, 1990, Shaver & Mikulincer, 2007). Although attachment quality and emotional closeness are different concepts, they share their roots in the attachment system of early childhood (Lang & Neyer, 2005).

In summary, emotional closeness is broader than intimacy, attraction, and attachment regarding the covered relationship types, but stricter than intimacy, attraction, attachment, and interdependence with respect to the defining characteristics (only the emotion and the cognitive representation of that emotion). Activities, interactions, and behavior in general are seen as antecedents and consequences of emotional closeness, but not defining characteristics.

Measurement of closeness. Except for the approach of Hall (1966), emotional closeness is assessed using self-report scales. These scales can be organized in a) single item measures (Antonucci, 1976; Aron, Aron, & Smollan, 1992; Repinski, 2005) b) one-dimensional scales (Miller & Lefcourt, 1982) and c) multi-dimensional scales (RCI, Berscheid, et al. 1989; Grau, Mikula, & Engel, 2001; see Grau, 2003 for an overview). The one- and the multidimensional scales include emotional as well as attitudinal and behavioral components. They are unsuitable for social network approaches, because the target would have to answer the scale for each relationship person. This would be too strenuous, considering an average network size between 10 and 20. Single item verbal measures of closeness have been successfully used in social network studies (Kogovsek & Ferligoj, 2005; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007), but Aron and colleagues (1992) argued that their graphical assessment of closeness (Inclusion of Other in Self Scale) is a good measure for the emotional component of closeness and it can be used in diverse samples. The advantage of this graphical item is its independence from educational differences in comprehension and interpretation of the item in contrast to verbal items. Furthermore, the objection that participants might misunderstand the overlapping Venn diagrams as one person covering or obscuring the other partner has been refuted. The reliability, convergent and discriminant validity of the item have been shown in several studies (Aron, et al. 1992; Aron, Aron, Tudor, & Nelson, 1991; Korchmaros & Kenny, 2006).

Hall (1966) claimed that emotional closeness is expressed in physical distance and can be observed by others. He assumed four circles of distance spheres around a person. Within about one and a half feet ($\approx 40\text{cm}$) is the intimate distance, where only very close persons are allowed. A range of four feet ($\approx 1\text{m}$) is considered as personal distance that is related to feeling close and familiar. The social distance is up to 12 feet ($\approx 3.5\text{m}$) and the public distance amounts to 25 feet (8 m) and more. People protect these differences and feel uncomfortable if people are closer than their relationship quality (i.e., emotional closeness or familiarity) and relationship status would suggest. Antonucci (1986) seemed to have used this concept in her assessment of social networks, where the target should imagine himself/ herself in the middle of three

concentric circles that represented relationships differing in closeness. A similar idea was used in this work where emotional closeness was indicated by placing a relationship person on a one-dimensional ray which represents distance (see method section for further explanation).

Thus, emotional closeness as previously defined can be measured with items translating emotional distance in (graphical) physical distance (Antonucci, 1976; Neyer et al., 2008) or indicating emotional closeness with a hypothetical overlap between two persons (Aron et al., 1992).

Function and correlates of emotional closeness. "The main goals of having close relationships are to maintain one's survival and feeling of safety, and to enhance one's well-being" (Takahashi, 2004, p. 131). Although it seems impossible to evaluate the function of emotional closeness independent of specific relationships, there are two aspects that are true for all relationships. Emotional closeness is a central characteristic of social bonds and therefore seems to ensure certain stability. In addition, emotional closeness itself is rewarding on a cognitive and hormonal basis.

Stable relationships are valuable for a number of reasons. Emotionally close relationships between romantic partners ensure difficult to dissolve relationships that provide support and sharing of tasks throughout daily life and especially with respect to child care. Rearing children is a strenuous and cost-intensive behavior due to long developmental immaturity of human offspring. Affective ties within the couple hold the family together and provide advantages for reproduction (MacDonald, 1988) and parental care (Fraleley et al., 2005). Comparative studies (Curley & Keverne, 2005; Fraley et al. 2005) showed a simultaneous occurrence of emotionally close and stable relationships between parents and the provision of parental care. Anthropoid primates, and mammals in general, who demonstrate stronger parental care also show stronger bonds with partners, above and beyond expected influences of common ancestry and developmental immaturity of offspring (Curley & Keverne, 2005; Fraley, et al. 2005). An indirect proof of the advantages of dual parental care and child rearing is given in the meta-analyses of Amato and Keith (1991a; 1991b). They show that children from divorced and single-parent households experience reduced well-being (even as adults) compared to children from intact household. Reasons for this are economic decline, a general decrease in resources (less care and attention due to lacking a parent and extended kin) and experienced stress and critical life events (divorce and factors leading to divorce). Stability of relationship is important not only for parental care and not only for romantic partners. Partners offer emotional support, functional help, and companionship (Grau, 2003) and family relationships and friendships can provide the

same advantages (Argyle, 1999; Nezlek & Allen, 2006; Papastefanou & Buhl, 2002). Thus, stable relationships offer advantages for survival in a literary sense (Takahashi, 2004; Baumeister & Leary, 1995) as well as in a contemporary understanding of receiving functional and emotional support and satisfying the innate need to sustain relationships. Emotional closeness in familial, romantic, and friendship relationships increases stability and feelings of togetherness (Fehr, 2000; Felmlee, 2001; Kelley et al., 1983; Simpson, 1987; Sprecher, 2001).

Apart from the supportive benefits of relationships with close others, such interactions are rewarding themselves on two levels which might be interrelated. On a hormonal level, oxytocin has been shown to have an attachment or affiliation effect in parent-child relations and relationships with mating partners (Curley & Keverne, 2005; Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). Feeling close to another person increases physical proximity and touching which releases oxytocin and intensifies emotional closeness (Curley & Keverne, 2005; Reite, 1990). Furthermore, oxytocin activates the reward system in the brain and might be a correlate of experiencing interactions with close others as rewarding and pleasant. However, this experience can also be explained by cognitive mechanisms. Interactions with close others are mostly pleasant interactions (Berscheid & Regan, 2005; Fehr, 2000; Lydon, Jamieson, & Holmes, 1997; Nezlek, 1993) because they are not as threatening and demanding as interactions with strangers; they validate one's values and attitudes and occur in more relaxed settings.

Both facets of emotional closeness in relationships (receiving support and experiencing pleasant and rewarding interactions) might explain the association between emotional closeness and well-being, and even health and longevity. Emotional support, especially from close persons like children and friends is related to greater well-being (Avlund et al., 1998; Davis et al., 1998; Hartup & Stevens, 1997) and an increase in well-being (Lang & Schütze, 2002). Furthermore, having rewarding interactions with close others might affect the health status through positive effects of touch, smiling and laughter on the immune system (McArnaney, 1990; Reite 1990). On the other hand, health and well-being facilitate the pursuit of close relationships. Interactions and activities need a certain degree of physical health. Therefore, scholars have to be extremely careful in their conclusions and use longitudinal data to control for previous levels of health, well-being and relationships.

So far, the purpose of feeling emotionally close has been examined largely independent of specific relationships. However, relationships vary in emotional closeness: people feel closer towards friends than towards acquaintances (Lydon et al, 1997), closer towards siblings than towards half- or social siblings (Ihinger-Tallmann,

1987; Jankowiak & Diderich, 2000), closer towards biological children than towards social children (Dunn, 2002; Dunn, Deater-Deckard, & Pickering, 1999; Henderson & Taylor, 1999), closer towards closely related kin than towards distant kin and in turn closer than to non-related others (Neyer & Lang, 2003; 2004), and closest towards partners (Grau, 2003; Neyer & Lang, 2003; 2004). These distinctions by relationship type and genetic relatedness conceal the fact that the relationships also differ in associated factors, e.g., amount of contact, relationship duration, similarity, familiarity, and proximity. Although correlations between these factors and emotional closeness have been often replicated, when other factors are held constant (e.g., proximity, amount of contact and relationship duration), genetic relatedness is the strongest predictor of emotional closeness in family relationships (Hetherington, 1999; Jankowiak & Diderich, 2000; Neyer & Lang, 2003; Segal et al., 2003; Segal et al., 2007).

The previous paragraphs first defined emotional closeness in relationships and distinguished this concept from related constructs like attraction, intimacy, interdependence, and attachment. Different scales and items for the measurement of closeness were presented and the advantages of graphical single item measures for network studies were discussed. Finally, the functional value of emotional closeness in various relationships was explained. Emotional closeness stabilizes relationships and thus provides advantages for parental care, receiving support, and satisfying the need for belonging and affiliation. Furthermore, interactions with emotionally close others are rewarding by themselves – likely on a cognitive and a hormonal basis. Differentiation of relationship persons by the degree of experienced emotions can be explained by kin selection theory and, although relationships do not **only** vary in terms of their genetic relatedness, this variable is a strong covariate of emotional closeness over and above structural variables like contact frequency and residential proximity. The fact that emotional closeness has been studied only in romantic relationships, friendships and familial relationships, emphasizes its importance in relationships with family and romantic partners. Emotional closeness has been neglected in studies of cooperative relationships, such as those with neighbors, colleagues, and professional helpers. They are studied with focus on exchange, equity and reciprocity which are the topic of the next paragraphs.

Definition of reciprocity. Reciprocity characterizes the relationship of two people where the behavior of one person is answered with reimbursement for the previously received benefits. It incorporates the exchange of resources as well as collaboration in joint activities (Charlesworth, 1996; Cole & Teboul, 2004). Objective reciprocity relates to observation of exchanged goods, help, and benefits. Subjective reciprocity of

relationships can be achieved without objective reciprocity through repayment in psychologically relevant means (e.g., gratitude) and reevaluation of received benefits which deviates from the objective value. Reciprocity refers to the balancing of costs and benefits of both exchange partners (Thibaut & Kelley, 1959) without the need for tit-for-tat behavior. It has been conceptualized as a social norm (Gouldner, 1960) and strategy for achieving cooperation between unrelated individuals (Axelrod & Hamilton, 1981). Related, but distinct, concepts are cooperation, equity, and exchange.

The term “cooperation” is mostly used in game theory and bioeconomics and refers to a joint behavior between two or more individuals in order to achieve mutual benefits. In this context, reciprocity is used in terms of strategies (direct reciprocity, indirect reciprocity) for achieving cooperation which is seen as important evolutionary problem (cf. chapter 1.1.1 p. 10). Reciprocity in this work is viewed as a relationship characteristic or the status quo, whereas cooperation and direct and indirect reciprocity refer to behavior. Furthermore, cooperation is assumed to occur between unrelated persons and is studied with strangers (Fehr & Gächter, 2000; 2002; Fehr & Fischbacher, 2004) whereas reciprocity or the absence of reciprocity is applied to existing relationships between kin as well as unrelated persons and spouses (Lang & Neyer, 2005).

“Exchange” is defined through social exchange theory (Thibaut & Kelley, 1959) and describes an actual behavior. It is assumed that people engage in interactions with other, where goods, favors and emotions are exchanged, with the aim of maximizing their benefits while minimizing their costs. This view is obsolete, because several theories and experiments (e.g., Communal and Exchange Theory, Clark & Mills, 1979; Kin Altruism, Hamilton, 1964) showed altruistic motives and helping behaviors in humans that cannot be explained by social exchange theory. Exchange applies to a transfer of material or immaterial goods whereas cooperation, which also incorporates exchange, additionally includes the joint execution of tasks. In comparison to exchange, reciprocity marks the outcome of one or more interactions where exchange occurred, and again refers to a characteristic of the relationship.

“Equity” is closely related to reciprocity because it is assumed that people monitor their cost (input) and benefit (outcome) of certain relationships and compare their cost-benefit-ratio with the cost-benefit-ratio of their relationship partner. Although both partners input into the relationship might differ, the relationship is perceived as equal if the ratios are comparable (Walster, Walster, & Berscheid, 1978). In addition, Walster and colleagues (1978) already addressed the emotional reactions to inequality: people strive for equality in relationships, if they are overbenefited, however, they would feel guilty and ashamed. If they are underbenefited they would feel anger, frustration,

sadness, and hurt. The main differences between the concepts of equity and reciprocity lie in their theoretical background (social psychology vs. evolutionary psychology). Some researchers use both terms interchangeably, however during this work I will continue to use *reciprocal* or *balanced* and by doing so indicate the evolutionary psychological background.

In summary, reciprocity is seen as a relationship characteristic that arises from cooperation and exchange. Cooperation and exchange are overlapping terms stemming from different theoretical schools, with cooperation being the slightly more general term. Reciprocity and equity are sometimes used as synonyms, however, since they also originated in different schools, I continue to use *reciprocal* or *balanced*.

Measurement of reciprocity. There are three prevailing ways to measure reciprocity within a relationship: (1) self-report of the perceived balance (e.g., Buunk et al., 1993; Sprecher, 2001; Väänänen et al., 2005), (2) self-report of the contribution and the received benefit and calculation of difference scores (Ikking & van Tilburg, 1998; Mendelson & Kay, 2003; Thomése et al., 2003; van Tilburg, 1998), and (3) self-report of contribution of both relationship partners and calculation of difference scores between partners (Mendelson & Kay, 2003; Neff & Karney, 2005). These measures can be applied domain-specific (emotional support, material help, instrumental help, etc.) and general (e.g., "In your relationship with this person, which of you gives or receives more support and help?", Väänänen et al. 2005, p. 180).

Most relationships are perceived as reciprocal regardless of the used measure (Buunk et al., 1993; Buunk & Prins, 1998; Laursen, 2000; Väänänen et al., 2005; van Yperen & Buunk, 1990, 1991). This might be due to several reasons. First, relationships between non-related persons and romantic partners were investigated mainly and these are assumed to be balanced, in contrast to kin relationships which can be unbalanced (Lang & Neyer, 2005; Thomése, et al. 2003). Second, relationships **are perceived** as balanced because people count immaterial goods (thankfulness) as repayment and compare exchanged resources over a long time-period or in relation to the individual abilities to reciprocate. Third, relationships **are** balanced because imbalanced relationships had ended. The norm for reciprocity (Gouldner, 1960; Uehara, 1995) is so strong that unbalanced relationships with neighbors and colleagues are ended, if reciprocity is not restored (Ikking & van Tilburg, 1998). Thus, the measurement of imbalance and balance in relationships is rather difficult. The finding that most relationships are balanced is valid and in concordance with theory on reciprocity and equity in relationships. Van Horn, Schaufeli and Taris (2001) showed that global assessments of reciprocity are valid and correspond to the calculated

reciprocity score of global measures of costs and benefits as well as domain-specific measures (at least for relationships with unrelated persons).

Function and correlates of reciprocity. The amount and the function of reciprocity in relationships differ depending on the most basic distinction by genetic relatedness, i.e., relationships with kin and relationships with non-kin. Second, other factors of the relationship (similarity of the partners, duration, stability, i.e., security of repeated encounters) and the relationship partners (resources, individual dispositions, e.g., prosocial orientation, van Lange, de Bruin, Otten, & Joireman, 1997) are also connected to the amount and the function of reciprocity and are not independent of the type of relationship.

Reciprocity is less important in relationships with kin or communal relationships (Clark & Mills, 1979; 1993) because help and provision of support and resources depend on the need of the recipient and benefits in return are not expected (Clark & Mills, 1979; Clark et al., 1986; Davey & Norris, 1998). These assumptions are in agreement with kin selection theory (Hamilton, 1979). Benefits in return for helping kin are not expected and not needed because indirect benefits are achieved by means of inclusive fitness (cf. p. 8). Since inclusive fitness is a linear function of genetic relatedness, reciprocity is least important in relationships with closest kin ($r = .5$). Kin selection theory and Communal and Exchange Theory (Clark & Mills, 1979) agree about predictions for kin, however they differ when addressing romantic partners and close friends. While Clark and Mills view these as communal relationships, evolutionary psychologists categorize romantic partners and friends as unrelated, and therefore exchange relationships. As a consequence, reciprocity is supposed to be high among romantic partners and friends following evolutionary psychology, but exchange is supposed to be based on needs and not previously received benefits, according to Communal and Exchange Theory. A possible solution considers the time span between costs and benefits. Direct reciprocation (in terms of tit-for-tat behavior as used in the experiments of Clark and Mills, 1979) is not expected and has detrimental effects on relationship satisfaction and stability. Long-term balance without direct in-kind reciprocation is expected and achieved in most relationships and imbalance leads to dissatisfaction and instability (Ikking & van Tilburg, 1998; van Yperen & Buunk, 1990). Short-term imbalance in stable relationships is tolerated because it increases interdependence and future recovery of balance is expected (and has been proven in previous interactions). Although tit-for-tat behavior is not needed and uncommon

between unrelated humans in stable¹⁰ relationships, long term reciprocity is indispensable. However, the kind of exchangeable resources (Teichman & Foa, 1976) and time span between reciprocation can vary as a function of relationship characteristics like similarity, contact frequency, duration, availability of resource, and residential proximity.

Helping unrelated others diminishes one's own resources at that instance, however cooperating and receiving help and support at a later time has several advantages. First, cooperative groups and alliances are better protected against aggressors and survive longer [literarily in evolutionary psychology (Bjorklund & Pelegrini, 2002; Buss, 1999a) and figuratively referring to detrimental effects of loneliness (Baumeister & Leary, 1995) and beneficial effects of support (Davis et al., 1998) on health and well-being]. Second, groups of two or more can solve problems an individual would not be able to solve (Charlesworth, 1996; Cole & Teboul, 2004). This kind of cooperation (coordinated work on problems) is a special case of reciprocity because the costs of both partners occur at the same time and benefits are only achieved if both partners work on the problem. In most cases, however, even the coordinated and collective work on a problem that could not be solved alone tolerates delayed input of work and thus makes reciprocity necessary again. Examples from the evolutionary perspective are the sharing of food and collective hunting; nowadays examples include the provision of support (information, help) and the collective work on projects, e.g., at work.

Since cooperation is costly and only beneficial if the other does not deceive, appropriate reactions to deceptions are necessary. Non-reciprocity is punished by termination of the cooperative relationship or by imposing costs on the deceiver (Fehr & Gächter, 2000; 2002). Moral emotions are means for triggering punishment and ensuring future reciprocity by adhering to norms of cooperation (Fessler & Haley, 2003). Keeping track of former collaborations and cooperation is more easily achieved through emotions (e.g., trust, liking, guilt, anger) than through remembering (Fehr & Rockenbach, 2004; Fessler & Haley, 2003). Being overbenefited or underbenefited has been associated with distress, negative emotions and decreased well-being (Buunk et al. 1993; Vänäänen et al., 2005;) and more specifically with guilt and shame in case of receiving too much and with anger, sadness, distress in case of being underbenefited (Keller et al., 2004; Sprecher, 2001; Walster et al., 1978) Depending on the type of

¹⁰ The behavior is different in one-shot encounters used in game-theoretical experiments. There, direct reciprocation with equal resources (mostly money) is necessary because cooperation occurs outside of relationships which are likely marked by trust and postponed benefits.

relationship (kin vs. non-kin) and intentionality of non-reciprocation, the extent of experienced negative emotions should vary tremendously. If a favor is not reciprocated deliberately, anger is supposed to be greater in cooperative relationships than in familial ones. Guilt and shame due to imbalance in relationships after a failure to reciprocate should be lower in familial relationships than in cooperative relationships and if the non-reciprocation was unintentional.

Cooperation does not occur with every possible unrelated other individual. The choice of a cooperative partner is based on two considerations: (1) who is **able** to cooperate and (2) who is **willing** to cooperate. The risk of being deceived is minimized if a) cooperation occurs within highly stable interaction systems, b) prosocial behavior is a relatively stable trait and c) people can recognize prosocial behavior correctly (Fetchnauer & Bierhoff, 2004). The last premise has been discussed in terms of a “cheater detector” ability of social interaction partners (Cosmides & Tooby, 1992) which refers to the detection of intentional deception. Then, the question of ability for achieving a reciprocal relationship is still to be answered. Cooperation for the benefit of both (i.e., resulting in a balanced relationship) is most likely if both interaction partners are equally needy and possess a comparable amount of resources which could be exchanged during cooperative interaction. Resources can be material things such as money and possessions, and also immaterial things, e.g., status, information, physical and cognitive abilities. They can also be quite different, because cooperation does not depend on tit-for-tat behavior (Brosnan & de Waal, 2002) and equal resources that are exchanged (Teichman & Foa, 1975). Thus, a general estimation of equality in resources is sufficient and can be achieved through comparison of age (F. J. Neyer, personal communication, August 2006). In general, available resources and need for resources of others vary with age (e.g., Heckhausen et al., 1989, Keith, 1983; Schulz & Heckhausen, 1996). Physical, cognitive, and material resource increase from childhood and adulthood and they decrease again in old age. Thus, people of approximately the same age or decade should roughly be similar in their available resources. People very much younger or older than one self should possess different and a different amount of resources, generally speaking. There might be other indicators of resource parity, but so far there are no known studies.

Cooperation depends not only on the amount of possibly tradable resources, but also on frequency of contact, residential proximity (providing the environmental opportunity for cooperation), and stability of the relationship. Investment and benefits are highest in proximate relationships with frequent contact (van Horn et al., 2001) and also in long-term relationships because trustworthiness of the cooperation partner has been proven. Therefore, reciprocity should be greatest in proximate, long-term non-kin

relationships with high contact frequency (Krackhart, 1999); otherwise the relationship should have been terminated.

The previous section showed that relationships differ in reciprocity and perceived reciprocity. These differences are associated with type of relationship, availability and parity of resources, frequency of contact, and duration of relationship. However, individuals also vary in differentiating relationships according to their balance. Clark (1984) resourcefully showed that people keep track of investments and benefits in relationships differently, however, she associated this monitoring with relationship characteristics (being a communal or an exchange relationship) and I claim that this dichotomy is too general.

1.2.3 Similarity and the interaction with closeness and reciprocity

Psychological similarity in relationships is mainly studied from two perspectives. First, similarity in genetically transmitted characteristics (e.g., facial resemblance, personality, and cognitive abilities) is the focus of kin recognition research. Second, similarity in attitudes, interests, personality, and skills is investigated in studies on relationship formation with non-kin, i.e., friends and romantic partners. The overlap of both research traditions becomes interesting when using an ego-centric network approach for studying personal relationships. Questions regarding (1) the commonalities and differences of both kinds of similarity, (2) the function of similarity in diverse relationships and (3) the interplay between similarity, emotional closeness, and perceived reciprocity arise. To begin with, the concept of psychological similarity is described and defined, subsequently, the function of similarity in relationships is explained, and finally the interplay of the three concepts is examined.

Definition. Psychological similarity differs from social similarity (p. 30) in the studied constructs. The first relates to similarity between two individuals in psychological constructs such as personality, attitudes, interests, and appearance. Although these constructs are heterogeneous with respect to their ontogenetic development (portion of heritable and environmental influence), they are distinct from demographic constructs (e.g., gender, age, marital status) because the latter are no explanatory variables of psychology in a strict sense. Psychological and social similarity are examined separately and the next sections concentrate on psychological similarity.

From an evolutionary psychological perspective, similarity is referred to as phenotypic similarity, facial resemblance or resemblance in general. It is a relationship characteristic that measures the differences between two individuals regarding a

certain characteristic (e.g., facial features, personality traits, cognitive abilities), which is heritable and/or relevant for kin recognition. The smaller the differences are, the greater is the similarity between these two individuals. These differences can be either perceived (subjective judgments using self- or other report) or actually measured (difference measures or correlations between the individual's measures). Similarity measures are obtained from dyads differing in genetic relatedness, e.g., parent-child vs. parent-social child, monozygotic (MZ) vs. dizygotic (DZ) twins.

The definition of similarity in social psychology is almost identical. Again, smaller differences between two individuals indicate greater similarity in a given characteristic or conglomerate of characteristics. Differences can be either subjective (perceived similarity) or objective (calculated from the individual's scores). However, the studied constructs and samples differ. Mainly, attitudes, values, and personality traits are assessed for non-related persons, i.e., acquaintances, friends or romantic partners. The evolutionary and the social psychological approach vary in their opinion of the functionality of similarity in personal relationships.

Evolutionary psychological approach. Phenotypic similarity between two individuals is seen as one cue for genetic relatedness that serves the purpose of kin recognition. Kin recognition is relevant for kin altruism (Buss, 1999; Debruin, 2004; 2005; Fetchenhauer, & Bierhoff, 2004; Pfennig, 2002), the prevention of inbreeding in mating (Debruin, 2004; 2005; Pfennig, 2002), and incest avoidance (Westermarck, 1891 as cited in Asendorpf, 2007). There are other direct and indirect cues that are also related to kin altruism and incest avoidance, e.g., proximity during growing up, familiarity, and odor. Kin recognition by proximity and familiarity can be error-prone under environmental circumstances where proximity and familiarity are not closely associated with actual genetic relatedness (e.g., multiple mating, inter-brood aggregation, lives in kibbutz) (Hauber & Sherman, 2001; Smith, 1988; Westermarck, 1891 as cited in Asendorpf, 2007). Therefore, self-referred phenotypic matching could be appropriate, because templates for comparing features are not innate but learned. The comparison with one self is most useful because the template is always available and does not depend on other relatives being proximate, e.g., "nestmates".

It has been largely shown that humans: (1) differ in recognizable features depending on their genetic relatedness (step 1 of the kin recognition system: production of characteristic); (2) are able to distinguish kin from non-kin (step 2: recognition of relevant characteristics); and (3) behave differently towards kin and non-kin (step 3: behavioral consequence; Neyer & Lang, 2003; DeBruin, 2002; 2004, Henderson & Taylor, 1999). Table 1 gives an overview of relevant studies.

Table 1
Overview of evolutionary psychological studies of similarity

Author	Year	Relationship type ^a	Characteristic	Step
Alverne, Faurie, & Raymond	2007	Parent-child	Facial features	Production
Bergeman et al.	1993	Twin sibling	Personality	Production
Bressan & DalMartello ^b	2002	Parent-child	Facial features	Recognition
Daly & Wilson	1982	Parent-child	Facial features	Recognition
DeBruine	2002	Pictures of modified strangers	Facial features	Recognition, Behavioral consequence
Gall	2000	Parent-child; Sibling	Odor	Recognition
Grotevant, Scarr, & Weinberg	1977	Parent-child; Sibling	Interests	Production
Hetherington, Henderson, & Reiss	1999	Parent-child; Sibling	Behavior	Recognition, Behavioral consequence
Horn	1983	Parent-child	Intelligence	Production
Klump, Holly, Iacono, McGue, & Willson	2000	Twin sibling	Attitudes, behavior, resemblance	Production
Nesse, Silverman, & Bortz ^b	1990	Parent-child	Facial features	Recognition
Neyer, Banse, & Asendorpf	1999	Twin sibling	Personality	Recognition
Oda, Matsumoto-Oda, & Kurashima ^b	2005	Parent-child	Facial features	Recognition
Palmer	1937	Sibling	Height, Weight	Production
Park & Schaller	2005	Kin	Attitudes	Recognition
Porter, Cernoch, & Balogh ^b	1984	Parent-child	Facial features	Recognition
Rushton & Bons	2005	Twin sibling; Spouses; Friend	Personality, attitudes	Production
Saudino, McGuire, Reiss, & Hetherington	1995	Twin sibling	Temperament	Production
Wadsworth, Corley, Hewitt, Plomin, & DeFries	2002	Parent-child	Reading abilities	Production

Note. ^a Genetic relatedness was varied by means of the study design, e.g., twin studies, adoptive and/or patchwork-families studies. ^b See text for comments.

People use facial cues to reduce paternity uncertainty which is relatively high in humans because of female internal fertilization and long pregnancy. Anderson (2006) showed in his meta-analysis on nonpaternity rates that fathers who experience paternal confidence are more likely to be the actual father than fathers who experience uncertainty. Although other persons, besides the parents, can also judge relatedness at a better rate than chance (Bressan & DalMartello, 2002; Nesse et al., 1990; Oda et al., 2005; Porter et al. 2004), these results are irrelevant for the research on kin recognition and for similarity studies in general. There is no (evolutionary) advantage in judging genetic relatedness between two individuals who are not related to oneself. The ability needed for kin altruism and prevention of inbreeding is the judgment of other's relatedness in reference with one self, i.e., self-referred phenotypic matching. In humans, ratings of relatedness are usually confounded with verbal knowledge of relatedness. However, people judge relatedness correctly even in knowledge of wrong information about relatedness (Bressan & DalMartello, 2002; Oda et al. 2005). Also, they behave differently towards closer kin even without the knowledge of relatedness (Segal et al., 2003).

In conclusion, the perception of similarity (in facial features, personality, cognitive abilities, maybe attitudes) is an indicator for genetic relatedness and increases kin-like emotions and behavior which will be further elaborated in the section on the interplay of similarity, emotional closeness, and reciprocity. Perceiving unrelated others as kin should be maladaptive and can be explained with this approach only so far as being an overgeneralization. Rushton (1989) offered a contentious explanation by claiming a greater genetic relatedness with friends and spouses than with random strangers and perceiving that this greater genetic relatedness through similarity should increase fitness of one's genes. I propose an easier explanation: choosing similar others is simply a strategy for stranger avoidance, since interactions with unknown individuals is always risky, and interaction with similar others increases the possibilities of untroubled and cooperative interactions (cf. paragraphs on the interplay of the three relationship qualities).

Social psychological approach. The studies by Byrne and colleagues in the mid-1960s were groundbreaking for the similarity-attraction research (e.g., Byrne et al., 1967; Byrne & Nelson, 1965). In laboratory studies, they showed that liking of a stranger was increased if the perceived proportion of shared characteristics between the stranger and the participant increased. Another new path in the study of similarity was struck by Rosenfeld and Jackson (1965). They studied actual similarity of personality traits of friends at the work place. Thus, studies on similarity differ in two aspects mainly: (1)

measurement of similarity (objective vs. perceived) and (2) type of relationship (strangers, acquaintances, friends, romantic partners). The preference for similar persons as close relationship partners on a variety of personal characteristics (e.g., personality, attitudes, values, demographic background; see table 2) is explained by reinforcement theory (Byrne, 1971). Simplified, interactions with similar others are pleasant because they confirm one's own beliefs, behavior, and attitudes. Pleasant interactions are repeated and lead to greater liking and further interactions. In addition, assortative mating in couples works by the same processes, although recent studies show that there are also small influences of environmental opportunities: we are most likely to meet friends and spouses in environments that hold people with the same background (SES, ethnicity, age) and interests (McPherson et al., 2001; Watson et al., 2004). However, the effect of active assortment is larger than that of social homogamy or convergence (Berscheid, 2005; Caspi, Herbener & Ozer, 1992; Luo & Klohnen, 2005; Watson et al., 2004). Thus, people actively choose similar others from the variety of available persons within a given environment.

Table 2
Overview of social psychological studies of similarity

Author	Year published	Relationship type	Characteristic	Type of similarity
Back	2007	Friends	Personality, Attitude; life style	Objective
Byrne & Nelson	1965	Stranger	Attitude	Objective (faked)
Byrne	1967	Stranger	Personality; Attitude	Objective (faked)
Cappella & Palmer	1990	Friends, Stranger	Attitude	Objective (faked); Subjective
Caspi, Herbener, & Ozer	1992	Romantic partner	Personality	Objective
Graham-Bermann	1991	Siblings	Personality	Objective
Hamm	2002	Friends	Attitudes	Objective
Haselager, Hartup, & van Lieshout	1998	Friends	Behavior	Objective
Kalmijn & Vermunt	2007	Voluntary relationships	Marital status & age	Objective
Kenny & Kashy	1994	Friends	Personality	Objective
Luo & Klohnen	2005	Romantic partner	Personality; Attitude	Objective
Morry	2005	Friends	Personality; Behavior	Subjective
Morry	2007	Friends	Personality; Behavior	Subjective
Neyer & Voigt	2004	Romantic partner	Personality	Objective
Rosenfeld & Jackson	1965	Friends	Personality	Objective
Selfhout, Denissen, Branje, & Meeus	2008	Friends	Personality	Objective; Subjective
Sprecher & Regan	2002	Friends; Romantic partner	Personality; Attitude; Sociodemographic Background	Preferred similarity
Watson, Klohnen, Casillas, Simms, Haig, & Berry	2004	Romantic partner	Personality; Attitude; Values	Objective

The field and the strength of similarity depend on the similarities in other characteristics of the dyad members. The most obvious characteristics where relationship partners are highly similar are demographic characteristics, e.g., ethnicity, age, gender¹¹, and education (McPherson et al., 2001). Friends and couples that are dissimilar in these characteristics compensate with increased similarity in psychological characteristics such as personality and attitudes (Hamm, 2000; Rushton, 1989). Therefore, similarity of two individuals is always relative similarity in some aspects of their personality and attitudes and never absolute similarity. When measuring actual similarity, the profile similarity can be more informative than similarity in single measures (Luo & Klohnen, 2005). If measures of perceived similarity are used, the subjective process of perception already accomplished the aggregation or profile building unconsciously.

Reinforcement theory suggests the conclusion that actual similarity should be more relevant in relationships and more predictive for relationship qualities and outcomes than perceived similarity. In addition, objective congruence in individual characteristics relevant for social interaction eases communication and collaboration by providing *common ground* (Clark, Schreuder & Buttrick, 1983). The meta-analysis by Montoya and colleagues (in press) draws a more complex picture. Actual similarity is always smaller in effect sizes than perceived similarity; therefore we can speak of an “illusory similarity”. This perceived similarity, however, is highly predictive of liking, satisfaction, and emotional closeness in relationships. Some studies propose that actual similarity is slightly more predictive for relationship stability (Montoya et al., in press).

Perceived similarity is the result of a perception and evaluation process which depends on the existing relationship and its quality between two persons. The disadvantage of perceived similarity is its circular association with attraction and liking. Greater perceived similarity correlates with greater liking, but greater liking increases the perception of similarity as well (Morry, 2005). This confounding of perceived similarity and liking is attributable to biases in perception and attribution, but more likely represents the recursive nature of similarity and liking. Similarity in attitudes, interests, and personality leads to positive interactions which increase the liking or emotional closeness. Liking, on the other hand, increases the chance for future interactions that offer the possibility to discover more similarities. Through its subjective nature, perceived similarity has to be classified as a relationship quality variable, comparable to perceived reciprocity, which can exist without objective reciprocity within a

¹¹ This applies only to heterosexual couples.

relationship. And just like other perceived psychological phenomena (e.g., reciprocity, support) perceived similarity is important if it has real consequences (Thomas & Thomas, 1928) for the relationship and its involved individuals, e.g., the amount of emotional closeness or reciprocity.

An effort to combine findings from evolutionary and social psychology and to relate them to emotional closeness and perceived reciprocity is made in the following section.

Similarity and emotional closeness. The previous section began to provide evidence for the association of emotional closeness and similarity which is acknowledged in evolutionary psychology as well as in social psychology. The studied relationships and the explanations for this association differ, but they do not contradict each other. The perception of (visual) kinship cues is related to greater emotional closeness and kin-like behavior (Daly, Salmon, & Wilson, 1997; DeBruine, 2004; Korchmaros & Kenny, 2006; Platek et al., 2002; Platek et al. 2003). Greater similarity in attitudes, personality, and behavior may include cues for kinship (Park & Schaller, 2005), but foremost they promise pleasant interactions and suggest familiarity (Hill & Stull, 1981; Mesch & Talmut, 2006) which reduces the fear of strangers. Since kinship cues (facial resemblance, cognitive abilities, personal dispositions) are partly transmitted by heritage, they are more likely to appear in kin than in random strangers. That makes them kinship cues in the first place and, as Cole and Teboul (2004) nicely noted, “kin selection could not have evolved except in an environment where kin and nonkin were noted as such and treated differently” (p. 139). However, Cole and Teboul also admit that such a distinction is not perfect and may fail in individual cases. Thus, although perceived similarity is an important mediator of the emotional-closeness - genetic-relatedness association (Segal et al. 2003; Segal et al. 2007), there may be cases where nonkin are mistakenly perceived and treated like kin, e.g. in patchwork families (cf. section 1.3.1). Furthermore, although Lang and Neyer (2005; Neyer et al., 2008) state that emotional closeness is a cue for genetic relatedness, Park and Schaller (2005) counter that the arousal of emotions depends on more primary perceptual and cognitive cues, e.g., olfactory, higher-order familiarity or similarity.

The mediational function of similarity in kin relationships does not exclude its reinforcing function in relationships in general. Morry (2005) impressively showed that an induction of greater relationship satisfaction increased both emotional closeness and perceived similarity. Effects were largest for behavioral ratings, moderate for ratings of traits, and no effects occurred for highly visible characteristics. In consequence, easily verifiable characteristics are less susceptible to distortions when

measured as perceived similarity. A recent support for the importance of similarity in attraction simply rehashes the findings by Byrne and Nelson (1965) by stating that more information can also decrease liking if dissimilarities are discovered (Norton, Frost, & Ariely, 2007). Byrne and Nelson (1965) already found that not the absolute number of shared characteristics, but the proportion, is relevant for relationship quality and naturally longer interaction histories increase the likelihood of discovering more similarities as well as more discrepancies. The impact of both similarities and differences on relationship qualities and the relationship development can be mediated by their subjective importance (Lutz-Zois et al., 2006; Montoya & Horton, 2004). These results specify the general finding that similar others are our preferred interaction partners, whether they are kin, romantic partners or friends and acquaintances.

Following the argumentation of evolutionary psychology, all perceivable and inherited characteristics [e.g., appearance, personality, cognitive abilities, interests mediated by personality (Grotevant et al., 1977)] can serve as cues for genetic relatedness (hence similarity and genetic relatedness should correlate positively), and objective similarity in these characteristics indicates kinship. As a result, stronger emotional closeness is assumed to be associated with greater similarity in these characteristics. Subjectively assessed similarities in the before-mentioned constructs should also show positive associations with emotional closeness as well as genetic relatedness. Social similarity (e.g., in gender, age, or family status) is not assumed to be related to emotional closeness per se, because it does not indicate kinship. Therefore, these characteristics should not covary with genetic relatedness. However, similarity in interests, values or preferred activities is greater between same-aged, same-sex individuals, therefore a small association between social similarity and emotional closeness is to be expected.

If similarity is a cue for kinship and kin assistance mostly occurs without expectations of reciprocation, similarity is expected to covary negatively with reciprocity in relationships. The next section shows that the association between reciprocity and different kinds of similarity is somewhat more complex.

Similarity and reciprocity. So far, research on similarity and reciprocity is sparse. Kin altruism suggests that helping occurs without reciprocation because indirect benefit is achieved through genetic relatedness. Therefore similar others (in cases, when similarity is ascribable to genetic relatedness) should have imbalanced relationships because help was not directly reciprocated. Although, Korchmaros and Kenny (2006) assessed genetic relatedness, similarity, and helping, their work cannot answer that question because they assessed willingness to help which is distinct from obligation to

reciprocate and actual reciprocal behavior. They found that people are more willing to help similar people (whom they feel closer to) what can be explained using the concept of fitness interdependence (Brown & Brown, 2006). Fitness interdependence is related to inclusive fitness (Brown & Brown, 2006), but also to collaboration and cooperation with unrelated others. Therefore, people might be willing to help similar kin as well as similar non-kin, but for different reasons. Helping similar kin is an expression of kin altruism, whereas being willing to help similar **non-kin** aims at collaboration and cooperation.

There are two environmental problems which cannot be solved alone but through cooperation with others. First, resources are not equally distributed chronologically and among individuals. This makes exchange necessary, and exchange is only beneficial if both partners cooperate and do not deceive. Similar others are trusted more (DeBruine, 2002) and are probably better able to recompense the favor. Second, several tasks are too complex to be solved alone and need to be mastered in collaboration (Brown & Brown, 2006; Cole & Teboul, 2004). Here, similarity indicates shared attitudes, goals, and experiences (Cole & Teboul, 2004) and increases the likelihood of jointly successful collaboration and cooperation. In collaboration, similar people engage in similar goals and accomplish their goals more easily because the dyadic coordination is achieved more facily (Cole & Teboul, 2004). Their work is more coordinated because of common ground (Clark et al., 1983), i.e., shared knowledge about the task, the environmental conditions influencing the task, and necessary steps to solve the problem. Shared knowledge is most likely available between people with similar socioeconomic background, interests, and abilities. Cooperation (defined earlier as **repeated** exchange of resources) is most successful if none of the parties deceives. Deception is least likely if cooperating partners share the same values and resources (cf. section 1.1.1). Also, Segal (1998) and Graham-Bermann (1991) showed that similar siblings were more cooperative and less competitive than dissimilar siblings. Yet another support for the similarity-cooperation association stems from Stapel and Koomen (2005) who showed that under a variety of circumstances the perception of similarity is related to cooperation.

Therefore, relationships are assumed to be most reciprocal between similar people who engage in just collaboration and cooperation. In this case, similarity refers to psychological similarity in values, abilities, skills, knowledge or resources in general and not to inherited similarity (e.g., physical resemblance). Similarity of resources can be roughly deduced from demographic measures like gender, age or family status and is assumed to be positively related to similar skills and interests, and they in turn should correlate positively with perceptions of reciprocity in relationships. Since similar

appearance is assumed to be a cue for genetic relatedness and not resource parity, it should be negatively related to perceived reciprocity in relationships.

Finally, different types of similarity are assumed to be distinctly related to emotional closeness and perceived reciprocity because similarity is not a cue for kinship per se. Otherwise, similarity in non-kin and its behavioral consequences would contradict the theory of kin altruism. The ambiguity of similarity in its relation to both emotional closeness and perceived reciprocity across the variety of personal relationships results from the basic distinction between kin and non-kin and the related processes. In kin relationships, psychological similarity is a cue for kinship and therefore positively related to emotional closeness. Perceived psychological similarity is assumed to be more strongly related to emotional closeness because it is partly confounded with a general evaluation of the relationship quality. Perceived physical similarity is assumed to be an exception because it is more directly obtainable and therefore less susceptible to be biased by the relationship evaluation (Morry, 2005). In non-kin relationships, psychological similarity (e.g., in skills and attitudes) is not a cue for kinship, but is assumed to indicate pleasant, cooperative, and successful interactions. Actual and perceived psychological similarity should be positively related to emotional closeness in general. Similarity in skills and attitudes, but not in physical appearance, should also relate positively to perceived reciprocity.

Social similarity is assumed to be weakly related to emotional closeness and perceived reciprocity in kin and non-kin because it is a distal influencing factor of relationship behavior and quality. Same-sex relationships are slightly closer than cross-sex relationships, but should not differ in perceived reciprocity. Similarity in marital or parental status is higher in voluntary relationships, e.g., friendships, but should be only slightly related to emotional closeness and perceived reciprocity because of the assumed distal relation to similarity in values, interests, and life styles. In family relationships, these associations should not exist.

As a consequence, similarity in itself is not enough to differentiate and manage relationships, but needs additional information like emotional closeness and perceived reciprocity. Social and psychological similarity in kin and non-kin mean different things because language serves as another important mean to communicate genetic relatedness. In kin relationships, similarity in physical features and abilities is related to emotional closeness and serves as a cue for kinship (which is supported by the actual knowledge of relatedness). In non-kin relationships, similarity in abilities, skills and attitudes is associated with emotional closeness and reciprocity and serves as a cue for cooperation.

Emotional closeness and perceived reciprocity. Although the interaction of these two relationship qualities is not central in this work, a few additional findings are presented to provide a more exhaustive overview on the topic of relationship regulation. Emotional closeness and reciprocity covary differently in specific relationship types (Lang & Neyer, 2005; Neyer et al., 2008). In kin or especially close relationships emotional closeness is assumed to be slightly negatively related to reciprocity. Exchange is more based on needs of the relationship partner (Clark, Mills, & Powell 1986; Davey & Norris, 1998), and direct reciprocation is negatively related to liking (Clark & Mills, 1979). In exchange (or cooperative) relationships, people pay more attention to individual input than they do in communal relationships; thus, they strive for a more balanced relationship (Clark, 1984). In addition, exchange relationships are less close (Clark & Mills, 1979) which allows the conclusion that in exchange relationships a stronger monitoring of exchanges is related to less emotional closeness. Findings regarding the relationship between exchange and liking in romantic relationships are infrequent and not very consistent. Berg and McQuinn (1986), for example, found that the relationship stability in newly formed couples was predicted by a higher exchange of symbolic resources than actual help, though they make no comment on the reciprocity of exchanged resources. Grau and Döll (2003) found higher equity of exchange between partners with a secure attachment style. With broad interpretation of this result, relationship satisfaction and reciprocal exchange are assumed to be positively correlated in romantic relationships, although that study also included emotional exchange. Lang and Neyer (2005; Neyer et al., in prep.) stated that closeness regulation and reciprocity monitoring would be positively correlated in romantic partnerships, leading to generally high levels of emotional closeness and perceived reciprocity in partnerships.

1.3 Friendships and relationships in patchwork-families -

Examples for relationship regulation within specific relationships

The previous chapters dealt with general principles of relationship regulation across various relationships and their evolutionary psychological background. It was argued that emotional closeness, perceived reciprocity and similarity vary across the network and covary with genetic relatedness and parity of resources. Interrelations between these concepts and individual differences in interrelations were described. The aim of this chapter is the specification of these assumptions and their application to two specific relationship systems within personal networks.

Relationships within the core family are highly instructive because they can vary in the central variables (emotional closeness, similarity, perception of reciprocity) while

structural variables (frequency of contact, residential proximity, relationship duration) are kept comparable. Within the core family, relationships between parent and child and between siblings can vary in genetic relatedness, while relatedness between partners is always constantly zero.

Friendships on the other hand are worth studying because they are a phenomenon across the life span, have been extensively studied, and still remain a puzzle from an evolutionary perspective (Silk, 2003). They are relationships between non-related persons but can be as close and as supportive as kin relations (Ackerman et al., 2007), without depending on formal legitimation or reciprocal altruism. In addition, friendships vary more strongly in emotional closeness, perceived reciprocity and similarity than other non-related relationships, e.g., romantic relationships or work relations, and are therefore especially suitable for studying relationship regulation within a specific type of relationship.

1.3.1 Who belongs to the family? - A comparison of parent-child relationships in patchwork and traditional families

The number of divorces increased over the last decades in Germany (almost 37 percent of all marriages dissolve, Engstler & Menning, 2003) and in western countries in general (Bray & Hetherington, 1993). Most divorced parents establish a new relationship¹² sooner or later. Therefore, the number of step-relations increased as well (Bray & Hetherington, 1993; Inhinger-Talmann & Pasley, 1987). The structure of these patchwork families can be quite diverse. Often two or three types are distinguished (e.g., Hetherington et al., 1999; Golding & ALSPAC Study Team, 1996; Reiss, et al. 1994; Visher, Visher, & Pasley, 2003): (1) simple stepfamilies are composed of a custodial mother, her biological children and a social father; (2) complex stepfamilies type A consist of partners with at least one common child and at least one child from a previous partnership; and (3) in complex stepfamilies type B, both partners have biological children from previous partnerships, but no common child. Sometimes, types 2 and 3 are subsumed as complex stepfamilies. Another type of stepfamily, although seldom occurring, has a social mother. The genetic relatedness between siblings is the differentiating characteristic: children are full siblings in simple stepfamilies, half siblings in complex families type A and social siblings in complex families type B¹³.

¹² Fifty-eight percent of all divorced persons marry afresh (Engstler & Menning, 2003). Exact numbers of remarried **parents** or divorced parents with new relationships are not available from the German census "Mikrozensus".

¹³ Further hybrids are possible and alternative typologies are offered in Ihinger and Talmann (1987). The typology by Hetherington and her colleagues (1999) was chosen, because of its parsimony and prevalence in the current literature.

The appropriate comparison group for patchwork families has been questioned. Comparing patchwork families with traditional families yields the risk of confounding, e.g., genetic relatedness with family history variables. Another possibility is the comparison of different kinds of patchwork families which diminishes the broadness of achievable interpretations. Thus, contrasting different kinds of patchwork families with traditional families allows conclusions about genetic relatedness and family history. The focus will be on middle-aged adults and their dependent children to limit the vast literature on relationships in normative and alternative families. Studies dealing only with single-parent families or adoptive families are also left out because they would introduce additional complexity regarding family dynamics, economic circumstances, and motivations. Adoptive families blend the familial environments of formerly involuntary childless couples newly created social parents and propose problems of comparability with other family types. From all three possible dyads within the family, i.e., parent-child, sibling and mother-father dyad, the parent-child dyad is chosen as example to demonstrate the dynamics of relationship regulation. The mother-father dyad does not vary in genetic relatedness and therefore possible effects of similarity compensating the missing genetic link cannot be tested. The parent-child dyad was preferred to the sibling dyads because (1) age effects of the children are better to handle if one dyad member does not vary in developmental stage¹⁴ and (2) although parent-social child relationships have been extensively researched, the effect of similarity between parents and social children on their relationship has not.

First, parent-child relationships in these different family types will be compared regarding emotional closeness, and reciprocity, before introducing possible buffering effects of similarity.

Often replicated, relationships between social parents and children are less emotionally close, less positive in general, and more conflict laden than relationships between biological parents and their children (Amato & Keith, 1991b; Bray & Berger, 1993; Dunn, 2002; Dunn et al., 1999; Fine, Voydanoff, & Donnelly, 1993; Henderson & Taylor, 1999; Hetherington, Bridges, & Insabella, 1998; Hetherington et al., 1999; Love & Murdock, 2004; White, 2001). These findings are consistent with the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005) which views these differences between genetically related parent-child-dyads and genetically non-related dyads as a result of the closeness regulation process: people feel emotionally closer to genetically

¹⁴ Although parents of under-aged children might differ in age by five or ten years, they can be recruited to be in either young or middle adulthood. Sibling dyads can show much more variability by combing siblings in infancy, early childhood, middle childhood, and adolescence.

related others (Neyer & Lang, 2003; Korchmaros & Kenny, 2006, compare section 1.1.2). Two qualifications need to be made. First, the majority of social parent-child relationships are within the normal, non-clinical range of family relationships. Thus, although there are consistent mean differences, these and differences in social adjustment problems vary in size and practical relevance (Amato & Keith, 1991a; 1991b). Second, the positive correlation between genetic relatedness and positive, supportive parent-child-relationships is not deterministic and covarying factors such as age, contact frequency, relationship duration, gender or similarity may contribute to the relationship. These moderators will be addressed in a moment.

When comparing social parent-child relationships in different kinds of patchwork families, the picture becomes less clear. Social mother families were hypothesized to comprise more problematic parent-child relationships as opposed to social father families (Davis & Daly, 1997), however this was not confirmed empirically (Clingempeel, Brand, & Eivoli, 1984; Collins, Newman, & McKenry, 1995; Fine et al., 1993; Henderson & Taylor, 1999). Ihinger-Talmann and Pasley (1987) argue that relationships worsen as complexity increases, e.g., families with halfsiblings and/or social siblings. Contrarily, Henderson and Taylor (1999) found no worse relationships in families with a common child (complex stepfamily type I) than in simpler family relations. It is likely that while a common child increases complexity, it also engenders stability and commitment in the reconstituted family (Visher et al., 2003). At the same time, higher stability is likely a precondition for getting a common child. Therefore, it seems more appropriate to include variables that indicate stability, e.g., family duration and presence of a joint child, than a multitude of family types as further predictors of parent-child relationships.

High amounts of contact and long relationship duration are related to stabilized, more positive relationships (Bray & Berger, 1993). During the first months of the new social parent-child relationship, increased conflicts about boundaries, rules, and roles are to be expected, accompanied by low emotional closeness and negative feelings (Bray & Berger, 1993, Visher et al., 2003). Certain equilibrium is achieved after the first year(s), and as a consequence of this stability, the interdependence between family members increases. This increased interdependence is assumed to reveal itself in less monitoring of reciprocal exchange and in increasingly temporally unbalanced relationships, making these relationships more comparable to biological parent-child relationships. However, exchange, equity, and reciprocity are understudied fields in parent-child relationships which might reflect the lowered importance of reciprocity in kin relations as stated by the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005).

Sociological studies on resource allocation in different family types are an exception. In a series of studies, Thomson and colleagues showed that social parents engage in fewer activities with children and give less support with school related work. However, they report about the same amount of shared meals, supervision, and rules as biological parents and parents in traditional families (Thomson, Hanson, & McLanahan, 1994; Thomson, McLanahan, & Curtin, 1992). These differences have serious consequences for the academic success, health, and behavioral functioning of the children (Biblarz & Raftery, 1999; Bloom & Dawson, 1991; Dawson, 1991; Thomson et al., 1994). Most of the associations between family type and children's well-being are explained, however, by the decreased socioeconomic status of stepfamilies¹⁵ (Amato & Keith, 1991b). Compared to single mother families, households with social fathers provide at least some advantage regarding supportive relationships with parents (Thomson, Mosley, Hanson, & McLanahan, 2001). Recently, Hamilton, Cheng and Powell (2007) tried to provide arguments against kin selection theory by showing that adoptive parents invest more in their genetically unrelated children than children from normative and alternative families. However, as indicated before, studies with adoptive parents have to be carefully interpreted because of large differences in socioeconomic background (financial and educational) and motivation for becoming parents. The advantage of adoptive parents largely decreases after controlling for socioeconomic status (Hamilton et al., 2007).

Overall, if social children receive less support and resources than biological children, their relationship with social parents should be more balanced than the relationships between parents and biological children. On the other hand, increased monitoring of exchange with unrelated children can result in perceptions of imbalance and non-reciprocal relationships. Since the evidence regarding differences in resource allocation and reciprocity is much weaker than evidence concerning the emotional quality of the parent-child relationship, only cautious assumptions can be made.

Several factors, such as age of the child, gender, and similarity, can moderate the differences between biological parent-child dyads and social parent-child dyads concerning emotional closeness and reciprocity. Relationships between adolescents and parents are less close and less dependent than relationships between younger children and their parents (Hetherington, 1993, Hetherington et al., 1999; Repinski & Zook, 2005, Steinberg, 1987). A necessary process in adolescence is the partial

¹⁵ Reliable numbers for differences in education, family income and occupational status are not obtainable from German "Mikrozensus". Data from the USA and the UK suggest, that stepfamilies possess about 2/3 to 4/5 of traditional families income (Hamilton, Cheng, & Powell, 2007).

dissolution of the relationship with the parents and the achievement of autonomy without emotional distance (Hofer & Pikowski, 2002). Thus, when comparing emotional closeness and reciprocity in biological and social parent-child dyads, the age of the children, which likely differs although the age of parents is comparable, needs to be taken into account as a moderating variable.

Gender effects regarding parents and children have been mixed. Some results favor same-sex custody (Hetherington et al., 1998; White & Woollett, 1992), while social father families are the prevalent type and no differences are found in relationships with daughters or sons (Clingempeel et al., 1984, Spiel, Kreppner, & von Eye, 1995). Social mother families may be more problematic because the non-related parent has to take over parenting tasks and set rules which might be hard to accept for the child, especially from an almost “stranger” (Beer, 1988). The fact that few differences have been found might indicate that the communication and problem solving behavior might be a stronger predictor of the relationship quality than the gender of both parents and child.

Finally, as argued in section 1.2.3, similarity is a cue for genetic relatedness, and perceived similarity correlates with greater emotional closeness. Hence, the perception of similarity in non-related children is assumed to correlate with greater emotional closeness. Kin recognition is error-prone and (automatic) perception of resemblance and other similar characteristics might cue kin-like feelings. Since no study has yet investigated this specific relationship in patchwork-families, results from Segal and her colleagues (2007) are taken as a basis. Their studies showed that uncles and aunts felt closer to the children of their MZ twins (they share a genetic relatedness of $r = .5$ with their nieces and nephews) than towards nieces and nephews from DZ twins with whom they share a relatedness of $.25$. In addition, DeBruine (2004) demonstrated that adults tended to like and help unrelated children more if they resembled them in facial features. A study from the other extreme of relationship quality, i.e., physical abuse, found that abusive fathers' higher perception of resemblance was related to better relationship with children (Burch & Gallup, 2000).

Parents are more similar to their biological children than to social children in a variety of characteristics other than physical resemblance, e.g., cognitive abilities (Horn, 1983), interests (Grotevant et al., 1977), and personality (Huesmann, Eron, Lefkowitz, & Walder, 1984). Thus, common heritage and shared family history are revealed through a multitude of similar characteristics. The shared history between parents and social children should increase perceived similarities and consequently emotional closeness between them.

In sum, parent-child relationships in traditional and patchwork families do not only differ in genetic relatedness. Some consistent differences in psychological variables have been documented and explained by parental investment theory. In addition, socio-economic hardship, family structure, and family history provide additional explanations and need to be considered (Hetherington & Stanley-Hagan, 1999). Consequently, besides the main effect of genetic relatedness, moderating effects of stability and structure of the family as well as of personal and demographic characteristics of the parents are to be expected. Finally, when looking for differences in social relationships in traditional and patchwork families, one always has to bear in mind that most families are working well and “both self-reports and observations of stepfamilies were within normal and balanced ranges according to normative marital and family relationships.” (Bray & Berger, 1993, p. 88).

1.3.2 *Why do we have friends?*

Friendships have been more than extensively researched over the last six decades. It is still worthwhile to study friendships for two reasons. They are a prevalent phenomenon across ontogeny, (recent) phylogeny, and cultures. Then again, their ultimate function and their incremental value to kin and mate relationships remain unclear.

This section first defines friendships and delineates this phenomenon from other relationships. It includes a short description of the development of friendships and an explanation why established (as opposed to developing) friendships are investigated. The function of friendships will be briefly discussed from developmental perspective because different purposes are assumed to be relevant at different times during the life course. In addition, two levels of reasoning will be used for describing the function of friendships during adulthood: (1) proximate explanations provided by theories about reinforcement (Byrne & Nelson, 1965) and well-being (Hartup, 1996) and (2) ultimate explanations about cooperation and fitness interdependency (Brown & Brown, 2006; Cole & Teboul, 2004). Finally, empirical results about similarity, emotional closeness, and perceived reciprocity are presented to corroborate the hypothesized function of friendships.

Definition. Defining friendships is not easily done because relationships called friendships differ much in contact frequency, emotional closeness, duration, shared activities, source/context of knowing or interaction behavior depending on age, gender, and individual dispositions (Argyle & Henderson, 1986). The following criteria

differentiate friendships from other relationships (Argyle & Henderson, 1986; Auhagen, 1993): Friendships

- are a dyadic, personal, informal social relationship.
- rest upon reciprocity.
- possess a value for both partners, which might differ in content and weight.
- are voluntary regarding choice, formation, maintenance, and dissolution.
- have a time perspective with aspects of the past and the future.
- exhibit a positive character. They are perceived as being pleasant.
- do not contain open sexuality.

These characteristics allow delineation from other relationships. As opposed to friendships, family relationships are formal (officially confirmed and partly ruled by law) and involuntarily. Relationships with romantic partners generally contain open sexuality and are partly officially confirmed (in cases of marriages and marriage-like living arrangements).

Although Lang and Neyer (2005) count friendships as cooperative relationships like co-workers, neighbors or professional relationships, friendships can be distinguished as follows: Co-workers are defined as coequal staff who work together in a manageable working unit and have a direct interpersonal relationship (Neuberger, 1993). The relationship between co-workers is predetermined by official and nonofficial company culture, rules, and norms. Contrary to friendships, co-worker relationships are characterized by the embedding in a larger social context, performance demands, heteronomy, evaluation, remuneration, and involuntariness (Neuberger, 1993). Neighbors are usually not seen as friends, because they lack the voluntary nature of interaction. Although one could argue that there is still some choice regarding the frequency and the intensity of interaction with neighbors, the same freedom of choice as with friendships is not achieved. Neighbors are more comparable to acquaintances, who can be seen both as pre-stage of friendships (Lydon et al., 1997) and as a discrete type of relationship. In contrast to acquaintance relationships, friendships are multiplex, which means both relationship partners share more than one common topic, activity or life domain (Mehlbeck, 1993). Professional relationships (with therapists, servants or coiffeurs, for example) possess also a uniplex and formal nature and are therefore clearly distinguishable from friendships. However, all of these cooperative relationships have in common to be based on reciprocity (cf. section 1.1.2) and bear the possibility to develop into friendships (through intensified voluntary contact, increased multiplexity in activities and roles, and strengthened commitment).

During childhood, adolescents, and emerging adulthood, *peers* is used synonymously with friends and refers to unrelated others of same age (Asendorpf & Banse, 2000). In adulthood, the term *peer* is not longer applied because of increasing heterogeneity of age of relationship partners. The current work focuses on adulthood and uses the term *friend*.

While the nature of friendships partly changes over the life course, the deep structure (i.e., the characteristics as defined by Argyle and Henderson, 1986 and Auhagen, 1993) remains stable (Hartup & Stevens, 1997¹⁶). It is noteworthy, that the defining characteristics of friendships do not contain assumptions about the relationship quality (e.g., emotional closeness, conflict) and the configuration of the interactions (frequency, activity), though Auhagen (1993) mentioned a general positivity of friendships. This will be readdressed, when discussing the function of friendships.

Friendships (like other non-related relationships) follow a developmental process which can be roughly divided into three stages: (1) formation, (2) maintenance, and (3) dissolution. Aspects of initial liking, similarity, proximity, frequency and intensity of interaction are momentous during formation (e.g., Blieszner & Adam, 1992; Fehr, 2000; Hays, 1985). These characteristics were confirmed to be important for relationship formation in laboratory (e.g., Byrne et al., 1967; Byrne & Nelson, 1965, Lydon et al., 1995) as well as field studies (e.g., Back, 2007; Festinger et al., 1950; Berg & McQuinn, 1986; Hays, 1985; Moreland & Beach, 1992 Newcomb, 1961). Although these studies confirm the influence of environmental restrictions (e.g., proximity, mere exposure, similarity due to social homogamy) and therefore availability of potential relationship partners, it has to be noted that people still actively choose among the available persons (Fingerman & Lang, 2004). Hence, structural variables explain only parts of the variation in relationship qualities during the formation as well as later on during maintenance.

Research on the maintenance and development of established friendships of adults mostly focus on descriptive statements (Blieszner, 2004) and rarely on the involved processes. After the first contacts, self-disclosure, shared positive activities, similarity in key characteristics, and support are relevant for increasing intensity of friendship (Blieszner, 2004; Fehr, 2000). The maintenance of friendships is closely linked to their assumed functions and will be addressed in the next subsection. The issue of interrelations between similarities between friends, self-disclosure/ feelings of closeness and interdependent support will be broached in the subsection thereafter.

¹⁶ Hartup and Stevens limited their distinction between surface and deep structure of friendships to the concepts of exchange and reciprocity. However, this distinction and its implications for the study of friendship over the life course apply to characteristics of friendships as a whole.

Finally, relationship dissolution is mentioned for reasons of completeness, but is not part in this work. So far, only vague findings on the reasons of dissolution are available and research pays more attention to the emotional and developmental consequences. However, for a more profound understanding of relationships, it would be desirable to study why conflicts, betrayal, situational constraints or decreases in similarity (e.g., values, interests, life styles) lead to relationship dissolution in some cases, but not in others.

In sum, friends are non-related others, with whom an informal, voluntary, reciprocal, and nonsexual relationship exists. Friendships develop over time and the different stages are characterized by distinctive processes and correlates. This work focuses on established friendships (and relationships in general) because it addresses the differentiation and different function of relationships across the network. The role of specific relationships is revealed only after a certain settlement has occurred. The function of established friendships is the topic of the next paragraphs.

The functions of friends. Although friendships are available throughout the life course, reviewing the literature on friendships in childhood, adolescence, adulthood and old age leads to the conclusion that the function changes. *Function* refers to the advantages of having friends and having positive interactions with them. Additionally, the function of friends can be examined on two levels: (1) ultimate evolutionary explanations and (2) proximate explanations which are also addressed in social psychology and sociology.

The positive outcomes of friends vary at different life stages. During childhood, friends are playmates and role models (Blieszner & Roberto, 2004). For adolescents, friends are key confidants; they provide support and the opportunity to learn social competence (Asendorpf & Banse, 2000; Connolly, Furman & Konarski, 2000; Dunn, Davies, O'Connor, & Sturgess, 2001; Simpson, Collins, Tran, & Haydon, 2007). In young adulthood, friends also give advice and support, and engage in leisure activities (Blieszner & Roberto, 2004). Their presence in daily life somewhat decreases in middle adulthood, when occupational and familial demands limit the amount of interactions with friends. However, friends remain important role models for transitions (Feld & Carter, 1998), providers of emotional and social support, companions (Suitor, 1985; Suitor, Pillemer, & Keeton, 1995), and stimulators of the identity development (Allan, 2001). In old age, friends continue to provide emotional and practical support, especially if the spouse and other family is (no longer) available (Aartsen, van Tilburg,

Smits, & Knipscheer, 2004; Lang & Carstensen, 1994; Lang, Staudinger, & Carstensen, 1998).

Studying friendships in adulthood is instructive because the diversity in roles, demands, environmental constraints, and opportunities (e.g., having a steady romantic relationship, being a parent, having responsibilities at work) is associated with differences in friendships. Doherty and Feeney (2004) found differences in attachment networks depending on major life transitions. Persons in steady partnerships had weaker friendships compared to single and dating persons, whereas parents did not differ in their attachment to friends compared to childless persons (Doherty & Feeney, 2004). Further, the heterogeneity of friendships in adulthood regarding age, relationship duration, multiplexity, contact frequency, similarity, emotional closeness, reciprocity, and conflict provides an optimal foundation for understanding friendships in their manifold facets. Results from studying friendships in college student samples cannot be generalized to friendships at large because the "availability of different social partners, the desired quantity of social ties, and the value placed on specific relationships" varies with age and environmental demands (Fingerman & Hay, 2002, pp. 430-431). Thus, studies of friendship networks outside of psychology introductory classes are necessary.

Differences in friendships at various ontogenetic stages have been identified and the concentration on adult friendship has been explained. Now, proximate and ultimate explanations for engaging in friendships will be provided.

The definition of friendships includes the general positive character (Auhagen, 1993). The positivity of interactions is seen as reinforcement and reward of the relationship (Byrne & Nelson, 1965; Fehr, 1996; Morry, 2005; Leonard, Kearns, & Mudar, 2000). Similarity and the perception of similarity are related to experiencing interactions as rewarding. Similar people are preferred as relationship partners (Byrne, 1971; 1997; Byrne & Nelson, 1965) because the perception of similarity is linked to liking through (a) effectance-arousal, (b) uncertainty reduction, and (c) the perception of the interaction as pleasurable (Byrne, 1971; Morry, 2005). Similar others also confirm the own *weltanschauung* and opinions (Reis & Shaver, 1988). Therefore the interactions are pleasant and more often conflict-free and can facilitate personality development (Fingerman & Lang, 2004; Schmidt-Denter & Spangler, 2005) and identity building of the interaction partners (Allan, 2001). Even, and especially, in adulthood, friends are seen as important for identity formation because there are greater possibilities for the construction of the self-identity (e.g., gender roles and life trajectories are not that prescribed anymore, Allan, 2001). "As individualization and

associated lifestyle diversity increase, those with whom one chooses to relate informally are likely to play an active part in framing and endorsing the constitution of one's social identity" (Allan, 2001, p. 333). The social identity is assumed to be established through communication and shared activities with friends. However, the empirical confirmation is less clear and shows that although friendship qualities in adolescence are predictive for later romantic relationship qualities (Connolly et al., 2000, Simpson et al., 2007) and surface personality characteristics (Asendorpf & van Aken, 2003), the effects of adult friendships on personality development are generally smaller than vice versa (Asendorpf & Wilpers, 1998; Neyer & Lehnart, 2007).

After the romantic partner, friends are most supportive (Argyle 1999; Argyle & Furnham, 1983; Wan, Jaccard, & Ramey, 1996). They most often provide emotional support and companionship, instead of tangible support, which is offered by spouses and family (Argyle & Furnham, 1983; Wan et al., 1996). Especially friends with similar experiences are chosen as providers of companionship (Albeck & Kaydar, 2002; Morgan, Carder, & Neal, 1997) and emotional support (Suitor, 1987; Suitor, Pillemer & Keeton, 1995), with noticeable effects. The association between having friends and health (Hartup & Stevens, 1997) is likely ascribable to friends providing social support and pleasant interactions (happiness and subjective well-being are both positively related to health) (Argyle 1999; Coventry, Gillespie, Heath, & Martin, 2004; Myers, 1999; Väänänen et al., 2005). Self-evidently, friends can have detrimental effects, if they are sources of stress or role models for health impairing behavior (Hartup & Stevens, 1997; Leonard et al., 2000). In most cases, however, interaction with them and support from them serve as buffering factors of external stressors and are thus positively related to physical and psychic health.

Self-confirmation and pleasantness of interaction presumably are proximate mechanisms that promote the ultimate functions of friendships (= costly relationships with unrelated others without reproduction). Social support and increased health may be even closer related to ultimate collaboration, cooperation, and better "survival" in a group. From evolutionary perspective, close bonds with unrelated others can provide advantages if one engages in collaboration and cooperation (Buss, 2004; Cole & Teboul, 2004, Tooby & Cosmides, 1996) and forms coalitional groups against outsiders (Bugental, 2000).

Help and support provided by unrelated others can be grouped in two categories: mutualism and cooperation. Contrary to Volland (2000), cooperation is used instead of the term "reciprocal altruism" to describe the kind of behavior, where one person incurs costs through investing in another unrelated person and expects fitness increase through later repayment (benefits) (Volland, 2000). When talking about helping behavior

in friendships, this type of behavior is usually assumed. It is beneficial for both partners because resources and threads of resources are not equally distributed in time and among persons of a group and helping one person at one time likely results in receiving help at a later time. Mutualism on the other hand (or collaboration, Cole & Teboule, 2004) describes cooperative behavior for the mutual advantage of all participants (Volland, 2000). No direct costs occur for either participant because the behavior would have taken place without the others or would have been impossible to accomplish alone (Cole & Teboule, 2004; Tooby & Cosmides, 1996, Volland, 2000). The formation of coalitional groups (Bugental, 2000) can be counted as mutualism. Brown and Brown (2006) argue that there can be fitness interdependence even between unrelated persons because they depend on each other for the accomplishment of certain tasks which are not manageable on their own (=mutualism). Social bonds (like between friends) are means to solve the problem of fitness interdependence. They provide the stability for long-term relationships where direct, immediate reciprocation (tit-for-tat) is unnecessary and the "Banker's Paradox" (Tooby & Cosmides, 1996, p. 131) can be resolved.

Tit-for-tat behavior is a characteristic of exchange between acquaintances or strangers (Fehr & Rockenbach, 2004; Clark & Mills, 1979), but not between friends (Silk, 2003; Tooby & Cosmides, 1996). People value balanced relationships with friends, but they avoid keeping track of costs and benefits accurately (Clark, 1984; Lydon et al., 1997; Silk, 2003). The "narrow exchange contingency does not capture the phenomenology or indeed the phenomenon of friendship" (Tooby & Cosmides, 1996, p. 131). Furthermore, direct reciprocation has negative consequences for relationship satisfaction (Clark & Mills, 1979; Lydon et al., 1997; Shackelford & Buss, 1996).

Although people do not necessarily (and regularly) depend on others with their lives anymore, they form friendships to provide long-term reciprocal support and engage in mutual tasks. Cooperation and mutualism are not restricted to tangible help. Emotional support can be as beneficial as practical support for subjective well-being and health (see before). The ultimate reasons for friendships, cooperation and mutualism do not necessarily have to exist anymore nowadays. However, they offer possible explanations why humans form close and persistent social bonds with unrelated others. Thus, friendships can exist and be explained without the hypotheses that friendships are either a by-product of over-generalized kin-preference to familiar group members or an adaptation to present-day life-threatening situations (at work or in social groups). Rather the proximate mechanism -positive emotions- remained and functions independently from assumed benefits of friendships. Perhaps, the positivity

and its effects on health became the benefit of this type of behavior, instead of the life-saving role. Furthermore, close, meaningful relationships are related to less feelings of loneliness, which also has detrimental effects on health (Baumeister & Leary, 1995).

Our relatives are the family, we are born with, our friends are the family we choose.

proverb

This subsection addresses the question whether and under which circumstances friends can substitute kin. A substitution refers to psychological and functional equivalence. Hence, one could argue for a replacement of kin by friends in adulthood if friends are as important, emotionally close, similar and/or supportive as relatives and if the quality of friendships is related to the relationship quality with kin.

Baumeister and Leary (1995) assume humans to have an innate need for personal relationships. However, there should be large individual differences how and with whom people satisfy this need. Widmer (2006) identified seven different types of networks, of which four were family oriented (containing mainly family members) and two mainly consisted of friends. However, he did not provide explanations why people choose and maintain certain types of networks. Though people usually feel closest towards kin, the relationship between genetic relatedness and emotional closeness is not a deterministic one, leaving room for individual adjustment. This means that people can feel as close to unrelated others as to genetically closely related persons, e.g., siblings or parents (Doherty & Feeney, 2004), and show similar behavioral tendencies (Ackerman et al., 2007; LaFreniere, 1996; Mikulincer, Gillath, & Shaver, 2002).

Although Neyer and Lang (2003; 2004) showed that across adulthood and age, people feel closest to their partner, followed by their relatives in descending order of genetic relatedness and only then came friends, there were individual differences in this order. Other studies did not find differences between friends and kin in emotional closeness (Ackerman et al., 2007; Fingerman, Hay & Birditt, 2004; Floyd, 1995) what might be attributable to differences in measuring closeness, in selecting friends (best friend vs. general friends), and in samples (student vs. general population). Doherty and Feeney (2004) showed that relationships with friends were also full-blown attachments comparable to romantic partners and parents. In their study, best friends were more important than biological siblings and if a partner was not available, mothers and friends were the most important persons in adult's attachment networks.

The amount of similarity in kin relationships and friendships has not been addressed simultaneously in one study. Similarity in friendships mostly related to attitudes and values, whereas similarity between kin mainly referred to physical resemblance. Similarity in demographic characteristics and in personality has been

addressed in both types of relationships, but separately. Friends tend to be similar in gender, age, education, and lifestyle because of sharing the same context and because of active choice (Albeck & Kaydar, 2002; Gerich & Lehner, 2006; Hamm, 2000; McPherson et al., 2001; Morgan et al., 1997; Suitor et al., 1995). Although people engage in certain activities (at work, in a sports club, in the neighbourhood), where they are likely to meet and therefore befriend with already similar people, they still make an active choice among the available people. After serious life transitions (e.g., parenthood, divorce, death of spouse), people actively increase contact with friends sharing the same characteristics (Albeck & Kaydar, 2002; Morgan et al., 1997; Suitor et al., 1995). Most family members are significantly older or younger, with possible exceptions for siblings and cousins. The number of male and female members is mainly balanced. Likeness in education and socioeconomic status is mostly due to socialisation and not to active choice of relationship partners (except for spouses, of course). Therefore, social similarity between friends and between family members is not comparable, but it can be concluded that social similarity between friends is fairly high. Actual similarity in personality is higher between relatives than between friends. This can be concluded from comparing indices of personality similarity in family studies (e.g., Bergeman et al., 1993; Saudino, Pedersen, Lichtenstein, & McClearn, 1997) with similarity indices of friendship studies (e.g., Back, 2007; Hill & Stull, 1981; Montoya et al., in press) and is explained by the fact that heritability has stronger effects than active selection¹⁷. Despite the mixed findings regarding actual similarity in friends and kin, perceived similarity is generally relatively high in both types of relationships (Graham-Berman, 1991; Korchmaros & Kenny, 2006; Morry, 2005; Segal et al., 2003; Segal et al., 2007).

The findings by Wan and colleagues (1996) complement this picture by showing that regarding support, friends provide at least as much emotional support and companionship as parents (both following the spouse). Although friends and kin do not differ very much in provided and received support (Argyle & Furnham, 1986; Wan et al., 1996), the expectation for reciprocity is much lower in family relations than in friendships. The reciprocal exchange of resources is especially important in less close friendships, i.e., acquaintance relationships (Lydon et al., 1997; Törblom, Fredholm, & Jonsson, 1987). On the other hand, established, good friendships as well as family relationships are perceived as communal relationships (Clark & Mills, 1979) where

¹⁷ In addition, the effect of active selection on personality similarity is even more decreased through the fact that personality perception in others is only moderately and not 100% accurate.

helping does not depend on reciprocal exchange, but on the needs of the other person and direct reciprocity is rather negatively valued (Clark, 1984).

All in all, some friends (usually referred to as best friend) can be as similar, as close and as supportive as close family relations. Possibly, friendships and kin relationships diverge in the expectations of reciprocity and friendships themselves are very heterogeneous concerning reciprocity. No definite answer can be achieved from literature because previous studies did not include the whole network with multiple friendships and a variety of family relationships. In addition, the interrelations among emotional closeness, similarity, and the perception of reciprocity have not been addressed simultaneously in friendships and kin relationships. Therefore, a final conclusion about the equality of the interplay of these relational processes is not possible.

The general interrelations between similarity, emotional closeness and perception of reciprocity have been explicitly described in section 1.2.3. Those general statements are now applied to friendships and confirmed with empirical findings from friendship studies. Most common are studies that investigate the relationship between similarity and liking or positive emotions and evaluations, in general, and are carried out with college students. The positive relationship between (perceived) similarity and emotional quality has often been replicated (Deutsch, Sullivan, Sage, & Basile, 1991; Floyd, 1995; Montoya et al., in press; Morry, 2005; 2007; Rosenfeld & Jackson, 1965). However, the causal direction is unclear because earlier similarity (both actual and perceived) predicts later liking (Hill & Stull, 1981) and higher experimentally induced relationship satisfaction leads to perceiving more similarities with friends (Morry, 2005). Capella and Palmer (1990) argue that attraction is increased through the perception of similarities and reinforcing behaviour (nodding, smiling) mediates the similarity-attraction association. Their findings have to be carefully applied because of the small sample and some methodological short-comings. Most likely, initial similarity has some predictive power of later liking, but after a few moments of interaction liking also influences the further perception and evaluation of similarities. All these findings relate to friendship development, however a decrease in similarity (e.g., because of life transitions) results in decreased contact and decreased emotional closeness with formerly close friends (Suitor, 1995).

Empirical findings regarding the association of similarity and reciprocity are very scarce. So far, only theoretical advances have been made (Cole & Teboul, 2004) and await empirical validation. Morgan and colleagues (1997) and Suitor and colleagues (1995) showed that friends who shared similar experiences (thus may have similar attitudes and knowledge) are preferred as providers of support. Cole and Teboul

(2004) assume that not only similarity in attitudes and values, but also in skills and abilities is advantageous for the interaction with friends. They do not restrict their assumptions on social support, but also include collaboration and cooperation. Romer, Bontemps, Flynn, McGuire, and Gruder (1976) showed that similarity in status increased support if future interactions and reciprocation was likely which confirms the assumption of Cole and Teboul (2004). In cases of no future interaction, (dis-)similarity was unrelated to support. Their study provides a first empirical hint on the beneficial character of similarity in cooperation.

Finally, the relationship between reciprocity and positive emotions varies with status of the friendship. Generally, fairness is preferred in friendships and the general rule of reciprocity (Gouldner, 1960) applies to friendships, too. Relationship satisfaction is directly related to reciprocity or equity in friendships (Buunk & Prins, 1988; Mendelson & Kay, 2003). Best friends and regular friends do not differ in equity, but more support was exchanged between best friends (Mendelson & Kay, 2003). In general, although keeping track of individual costs and benefits is not valued in close friendships, a general perception of long-term reciprocity is related to satisfaction and positive emotions in friendships.

These explanations showed that although some friends can be comparable to kin relationships in their psychological qualities, i.e., similarity, and emotional closeness, there is no evidence that similar and close friends engage in unreciprocal relationships. While similarity among kin is an indicator of genetic relatedness and therefore negatively related to reciprocity, similarity likely is positively related to reciprocity in friendships. The norm of reciprocity remains even under conditions of kin-like feelings. Are there other explanations, why friends can be as close as kin?

In cases when the usual primary persons are not available (e.g., single persons, persons without contact with kin or the relationship with them is insufficient), friends are assumed to have a greater importance in the social network (Allan, 2008; Doherty & Feeney, 2004). So far, this compensation hypothesis has been tested only on a structural level and not with taking the heterogeneity in the quality of friendships as well as of kin relationship into account. Not all friends are equally important and as initially noted, there is tremendous variation within the group of friends regarding relationship duration, frequency of contact, emotional closeness, conflict frequency, perceived reciprocity, and similarity. Long-lasting and similar friends are likely chosen as substitutes for kin for two reasons. First, close friends might satisfy the “need to belong” and provide emotional support not (enough) available from kin. Therefore, relationships with friends should be closer, if kin relationships are not as close, not available or otherwise insufficient. Another explanation for the before reported findings on kin-like

emotions with non-kin is that people may form close bonds to unrelated persons to foster stable, long-term relationships which minimize the risk of cheating in cooperation. As argued before, trust is important for cooperation and collaboration. People are trusted most, if they are known for a long time (have themselves proven as reliable) and share the same (honest) values. Hence, high familiarity and similarity in friends are probably related to higher trust (DeBruine, 2002 and Park & Schaller, 2005 showed that for unacquainted persons) and similar others are preferred as interaction partners for joint activities and tasks. The emotional bond of friends serves as a substitute for the missing genetic link and ensures fair cooperation without deception, but is not an erroneous cue for kinship.

Gender differences in the function of friends. The previous remarks on the function of friendships left the impression that male and female friendships have a similar function. The found differences between male and female same-sex friendships indicate something else. Although men and women do not differ in the number of friends and close friends and the amount of time spent together (Barth & Kinder, 1988; Caldwell & Peplau, 1982; Wheeler & Nezlek, 1977), they differ in the type of pursued activities. Women report and engage in more conversation and emotion expressing (Caldwell & Peplau, 1982) and have more involved and deeper friendships (Barth & Kinder, 1988). Since women cultivate more intimate and self-disclosing friendships, where the discovering of similarities is more likely, it is reasonable to assume that similarity shows stronger associations for men than for women. Hill and Stull (1981) showed that the similarity between female same-sex friends was more predictive for their liking than the similarity between male friends. Similarity is positively related to talking and self-disclosure, which in turn increases the opportunities for discovering more similarities (Deutsch et al., 1991) and women engage in more talking and self-disclosure (Caldwell & Peplau, 1982; Tschann, 1988). Since men execute more activities, similarity may play a greater role for mutual work and mastering of joint tasks. This could result in a stronger association between similarity and support and likely reciprocity, but no previous theoretical or empirical article analyzed gender differences in the relationship between similarity and reciprocity. Cross and Madson (1997) reasoned that men rather have an independent self-construal, whereas women have an interdependent self-construal, i.e., are more focused on relating with other people. Baumeister and Sommer (1997) objected by saying that men's affiliation may be directed towards larger groups, whereas women's relationships are mainly dyadic and intimate. Their arguments fit nicely into the earlier findings that men and women do not differ largely in quantitative aspects of their social relationships, but in their activities. Self-disclosure

and talking is mostly done in small, intimate groups or in private, whereas activities can be easily pursued in larger groups. Thus, female friendships are emotionally closer, whereas male and female same-sex friendships should be equally reciprocal and might differ only in the type of exchanged support, e.g., emotional vs. instrumental.

Since women are found to feel closer towards friends and receive more satisfaction from social support from friends than men (Argyle & Furnham, 1983), it is possible that women are more likely to treat friends like family (Ackerman et al., 2007) and replace kin relations with friends. However, the last point depends on the availability and relationship quality with family members and men and women might differ in those as well.

Although men and women engage in distinct kinds of activities with friends, they do not differ in the fact that they establish and maintain friendships. The diverging activities may be merely distinct ways of establishing social bonds which foster the same goal in the long term. This line of reasoning may be only true for same-sex friendships, because the possibility of mating is excluded there.

Cross-sex friendships are difficult to study, because there is a smooth transition from cross-sex friendship to romantic partnership. Also, there is a strong preference for same-sex (close) friends (Connolly et al., 2000; Gerich & Lehner, 2006; Nezlek, 1993), therefore cross-sex friendships occur less often than same-sex friendships. In general, they are less intimate and somewhere in the middle between female-female and male-male friendships regarding activities and emotionality. Ackerman and colleagues (2007) showed strong gender differences between men and women in cross-sex friendships, because of differences in mating and parental investment. They showed that women treat opposite sex friends more like kin and men treat female friends more like strangers. Thus, cross-sex friendships might be different for men and women regarding the functionality: men likely perceive and treat women more like (potential) mating partners, whereas women possibly show less differences in their male compared to their female relationships.

In sum, friendships are expected to be heterogeneous regarding their relationship quality. With respect to structural variables like age or gender, they are largely similar to the target. Best friends who constitute a special group of friends are comparable to family relationships in emotional importance. This equivalence and previous findings that friends are more important if partners or family members are absent, led to the assumption that psychologically comparable friendships can substitute kin relationships

under certain conditions, such as not available or insufficient relationships with close family members.

1.4 Summary and research questions

The multitude and diversity of personal relationships as well as the value of the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005; Neyer et al., 2008) as comprehensive framework, which includes all relationship types, have been addressed. Social relationships differ in emotional closeness and reciprocity and also in the efforts to sustain closeness and reciprocity. Emotional closeness indicates kinship and “Wahlverwandtschaft” in romantic partners and perhaps in special friends, too. Reciprocity is important in relationships based on exchange, e.g., relationships with colleagues, neighbors, friends, but also the romantic partner. Similarity in its manifoldness is related to emotional closeness and reciprocity. Equivalent kinds of similarity (e.g., in personality, but for different reasons) can be found in kin relationships, between romantic partners, friends, and to a lesser extent other non-related persons, too. Evolutionary and social psychological explanations of the function of similarity in these relationships differ, but do not contradict each other because they argue on different levels (distal and proximal). The general question addressed in this work is:

How are different kinds of similarity related to emotional closeness and the perception of reciprocity across personal relationships in ego-centered networks?

Psychological similarity is assumed to be positively related to emotional closeness. In kin relationships, physical similarity, similar skills and even a subjective feeling of similarity are assumed to indicate kinship. Emotional closeness correlates positively with the degree of genetic relatedness and therefore the before mentioned facets of similarity should be positively correlated with emotional closeness. It is assumed that psychological similarity mediates the association between genetic relatedness and emotional closeness partly. Reciprocity is assumed to be negatively related to physical similarity because physical similarity indicates genetic relatedness which is assumed to correlate negatively with reciprocity. In non-kin relationships, similar skills and subjective similarity are believed to facilitate trustworthy, stable cooperative relationships and thus, should be positively related to emotional closeness and reciprocity. It is assumed that relationships that are approximately equal in resources should be reciprocal in exchange and experienced as balanced. In addition,

psychological similarity is supposed to mediate this association between resource parity and reciprocity.

Social similarity, i.e., homogeneity in gender, marital or parental status, is assumed to be positively related to emotional closeness and reciprocity because it might indicate a common ground, similar goals and values, and facilitate more harmonious interactions.

Although the outlined associations among similarity, closeness, and reciprocity might be general mechanisms of relationship regulation, they are assumed to adapt flexibly to specific circumstances of the social environment. These social environments relate to (1) gender specific relationship roles and societal demands regarding relationships and (2) structural and psychological demands regarding having and raising children.

How do men and women differ in emotional closeness, psychological and social similarity, and reciprocity in their relationships? How do they differ in the associations among these relationship qualities?

Women are assumed to show stronger emotional closeness to kin than men, but they should not differ in perceptions of similarity or reciprocity in their relationships. Limited evidence from previous studies regarding the association between closeness and similarity suggests no gender differences in the associations among the relationship qualities.

How do people from childless and patchwork families differ in emotional closeness, psychological and social similarity, and reciprocity in their relationships? How do they differ in the associations among these relationship qualities?

The effects of familial environments on the whole network are analyzed exploratively to some extent. It is assumed that involuntarily childless individuals should feel closer towards their kin than motivated childless individuals. Individuals from patchwork families should also feel closer towards kin to better distinguish between kin and non-kin within the family. With respect to psychological similarity and reciprocity no a priori assumptions can be derived from previous studies.

Though psychological similarity is likely confounded with relationship qualities like emotional closeness and reciprocity in established relationships, it is assumed that the perception of similarity in others increases emotional closeness and decreases expectations of direct reciprocity. This effect should apply to all relationships and for a variety of psychological similarity attributes from which similarity in skills and subjective similarity are chosen. Thus, experimentally increased similarity should increase feelings of emotional closeness and decrease expectations of reciprocity. In addition, though recursive effects of liking on the perception of similarity have been shown in previous studies, it was assumed that psychological similarity predicts later emotional closeness and perceived reciprocity better than vice versa, even in established relationships. Effects are assumed to be small, but significantly different from zero, although parameters of relationship stability should be larger than parameters of relationship change.

Do the general effects of psychological and social similarity apply to specific relationships, such as parent-child relationships and friendships?

The general effects (1) of similarity partly mediating the association between genetic relatedness and emotional closeness and (2) of similarity being positively related to perceived reciprocity are assumed to apply to specific relationships as well. This is examined in parent-child relationships and friendships.

Does similarity in social children increase kin-like feelings of emotional closeness and less reciprocity?

Parent-child relationships can vary in genetic relatedness while the social relationship type (parent and child relationship) and structural variables are held constant. Previous empirical work showed that biological parent-child relationships are emotionally closer and less supportive than social parent-child relationships. Aim of this work is to replicate this difference in emotional closeness and to extend this robust finding in two ways. First, it is assumed that the (perceived) reciprocity is also lower in biological parent-child relationships because mechanisms of inclusive fitness render direct reciprocity unnecessary. Second, buffering effects of similarity are assumed for social parent-child relationships. It is assumed that relationships with similar social children are comparable to relationships with biological children with respect to

emotional closeness and reciprocity. Furthermore, relationships with similar social children are assumed to become closer and less reciprocal by and by.

Are similar friends “Wahlverwandtschaft”, i.e., comparable to kin relationships with respect to emotional closeness and reciprocity?

Friendships are chosen as second specific relationship type because their heterogeneity ranging from “Wahlverwandtschaft” with kin-like feelings and behavior to purely exchange relationships allows the detailed examination of the associations among different kinds of similarity, emotional closeness, and perceived reciprocity. It is assumed that good friends are perceived as more similar than regular friends. Good friends are supposed to be as close as kin relationships and the lessened demand for direct reciprocal behavior should result in perceptions of less balanced relationships compared to regular friends. The perception of similarity should increase emotional closeness in good friends and regular friends; however, perceiving similarity is assumed to be unrelated to reciprocity in good friendships and kin relationships, but positively related to reciprocity in regular friendships. The kin-like characteristics of good friends should enable them to substitute non-available or insufficient kin relationships. Since the compensation model is scarcely tested in empirical studies, hypotheses about differences between men and women or between childless persons and parents are rather explorative. Women are assumed to perceive friends more like kin and therefore they might compensated insufficient kin relationships more easily. Furthermore, motivated childless persons are assumed to value family less and therefore friends might be more important and closer than kin relationships.

The design of the studies that were conducted to answer these research questions and test these predictions is explained in the next part.

2 Method

The empirical investigation is based on four independent samples, using two different methodological approaches. The first two studies followed an ego-centered network approach using (1) a large internet sample of young adults (herein after referred to as *young adult study*) and (2) a community based sample with four different family types (herein after referred to as *family study*). Participants of the family study were answered a second questionnaire about one year after their first participation, thus providing longitudinal data on their relationships and adjustment. In the third and fourth study, perceived similarity in specific relationships was manipulated and they will be referred to as *similarity study A* and *B*.

Procedure and instruments were almost identical in the young adult and the family study, therefore they are reported jointly.

2.1 Ego-centered network studies

2.1.1 Participants

Young adult study. Four-hundred-fifty-six internet users (mean age $M = 27.41$, $SD = 9.38$; 79 % female) completed the questionnaire and named at least three network partners. Participants received no monetary compensation for participation, but feedback on parts of the study. Table 3 provides additional demographic information.

Family study. The second study used a community sample of 171 cohabiting couples from four different family types: 41 motivated childless couples, 35 involuntarily childless couples, 47 couples with at least one stepchild and one other child (i.e., patchwork-families), and 48 couples with at least two exclusively own children. Fifty-six percent of the couples ($n = 96$) lived in Berlin; the others ($n = 75$) in the metropolitan area of Halle/Leipzig. Recruitment strategies (articles in local press and flyers at highly frequented places) were identical in both cities, and participants were comparable regarding education, occupational status, religious orientation, and frequency of relocation. Participants in Berlin were on average 1.9 years older ($t(341) = 3.50$, $p < .01$). All couples were screened by telephone to ensure appropriate operationalization of childlessness and genetic relatedness within families.

A couple was considered *motivated childless*, if they did not have children, did not wish to have children, and used contraceptives. Couples, classified as *involuntarily childless*, also had no children, but wished for a child and either tried to become pregnant for at least 18 months or were under medical infertility treatment. Parents were recruited, if they lived with at least two children in the household. They were

regarded as *patchwork family*, if at least one child in the family was a social child to one of the parents. As explained in section 1.3.1 patchwork families can be very heterogeneous regarding the relatedness of the members, custodial and living arrangements. The present study includes all previously mentioned types of patchwork families (social father families, social mother families, complex families type B and complex families type A; Hetherington et al., 1999; Visher et al., 2003). The distinction between patchwork families without a common child (the first three types) and patchwork families with a common child (complex families type A) was drawn after the recruitment of the participants for two reasons. First, the fine-grained distinction was not possible because too few social mother families (four families) and complex families type B (five families) participated. The current study focused on the comparison of childless families and families with varying genetic relatedness. It did not aim at replicating extensive stepfamily studies like ALSPAC (Golding & ALSPAC Study Team, 1996) or NEAD (Reiss, et al. 1994). Second, the distinction between patchwork couples, who have a child together and who do not, was theoretically relevant in terms of family dynamics, stability, and commitment of the partnership. This theoretical distinction received empirical confirmation by the fact that 72% of the patchwork families with a common child (from here on referred to as PwC) were married compared to only 27% of the patchwork families without a common child (from here on PwoC). Finally, couples were regarded as *traditional family*, if both partners were the biological parents of all of their children. Thus, five types of families were compared in the family study: motivated childless couples, involuntarily childless couples, patchwork-families without a common child, patchwork-families with a common child and traditional families. The original design aimed at similar group sizes of at least 40; however the post-hoc distinction of the patchwork-families and difficulties in recruiting involuntarily childless couples resulted in slightly different, but still sufficient numbers of participants (see table 3).

Average age of participants was 37.69 years ($SD = 5.03$) and did not differ between family types. Wives¹⁸ ($M = 36.83$ yrs., $SD = 4.62$ yrs.) were 1.7 years younger than their partners ($M = 38.55$ yrs., $SD = 5.27$ yrs.; $t(170) = 5,39$, $p < .00$); again there were no significant differences between family types. Couples of all family types had to live together for at least two years, in order to safely assume a steady partnership and stable relationships within families. Marriage would have been a too strict criterion, esp.

¹⁸ Women and men in the Family study are addressed as wives and husbands, respectively, although not all couples were married. However this appellation is chosen to indicate connectedness of the males and females and to distinguish participants from network persons, which are addressed as women and men.

for patchwork families which often consist of cohabiting partners (Stewart, 2001). As expected, there were differences marital status ($X^2 = 57.34$, $df = 4$, $p < .01$) and in partnership duration ($F(4,337) = 31.82$, $p < .01$) between the family types (see table 3). On average 65.5 % of all couples were married, but significantly more involuntarily childless couples as well as couples in traditional families and patchwork families with a common child were married compared to the other two groups. Partnerships lasted at least 2.5 years and up to 25 years ($M = 10.45$, $SD = 5.43$). Their duration was significantly longer in traditional families than in all other family types. All couples with children had at least two children. Patchwork families with a common child consisted of slightly more children in household ($M = 2.72$, $SD = 0.68$) than traditional families ($M = 2.21$, $SD = 0.54$; $F(2,92) = 5.03$, $p < .01$). Almost 60% of children in patchwork families were social children to one adult. The oldest child was much younger in traditional families than in patchwork families with or without a common child ($F(2, 90^{19}) = 8.24$, $p < .01$). No difference between families occurred for the age of the second child ($M = 8.15$, $SD = 5.07$), however the third child in traditional families (age $M = 5.31$, $SD = 2.94$) and patchwork families with a common child (age $M = 4.83$, $SD = 2.74$) was much younger than the third child in patchwork families without a common child (age $M = 11.17$, $SD = 3.25$, $F(2, 32) = 11.71$, $p < .01$).

¹⁹ Data for the age of children was missing for two families due to incomplete data assessment.

Table 3
Overview of demographic sample characteristics in the Young adult study, the Family study and the Similarity Studies

	Young adult study		Family study				Similarity studies		
			Motivated childless	Involuntary childless	Patchwork family with...		Traditional family	A	B
					without a common child	a common child			
Number of participants	456	82	70	30	64	96	470	802	
Percentage of female	79 %	50 %	50 %	50 %	50 %	50 %	79%	74%	
Mean age of male (SD)	30.11 (12.45)	37.41 (5.64)	38.09 (6.16)	40.04 (5.63)	39.63 (4.89)	38.69 (4.22)	31.05 (10.65)	26.90 (8.32)	
Mean age of female (SD)	26.68 (8.23)	36.16 (5.12)	36.71 (5.41)	37.16 (4.36)	37.05 (4.24)	37.24 (3.93)	30.84 (10.36)	26.25 (7.62)	
Education in years	13.30 ^a (2.78)	15.60 (4.77)	15.56 (4.06)	14.97 (3.49)	15.34 (3.94)	15.82 (3.39)	13.80 ^a (2.93)	13.88 ^a (2.10)	
Partnership status									
Single	50 %	0	0	0	0	0	42%	45%	
Steady partnership	34 %	56 %	26 %	73%	28 %	15 %	33%	43%	
Married	12 %	44 %	74 %	27%	72 %	85 %	17%	10%	
Other	4 %	0	0	0	0	0	8%	2%	
Partnership duration in years	/	9.46 _b (5.55)	9.33 _b (5.17)	5.63 _a (2.56)	8.82 _{ab} (4.14)	14.72 _c (4.30)	/	/	
Number of children in household	0.24 (0.60)	0	0	2.47 _{ab} (1.13)	2.72 _b (0.68)	2.21 _a (0.54)	0.42 (0.92)	0.26 (0.72)	
Age of oldest child				14.43 _b (3.80)	13.97 _b (5.85)	9.84 _a (4.84)	/	/	

Note. Slashes indicate the information was not assessed. ^a Years of education were calculated from highest school degree. Means in the family study with different subscripts differ significantly ($p < .01$) from each other.

2.1.2 Procedure

Young adult study. Participants were registered users of the PSYTESTS portal, which received information about the study through a newsletter in May 2005. PSYTESTS (www.psytests.de) is a home page at the psychology department of Humboldt-University Berlin for web-based personality research. Participants anonymously answered the questionnaire via internet, which took between thirty and sixty minutes and included assessment of ego-centered network and its qualities and several personality measures. Afterwards they were debriefed and received personalized feedback on their general tendency of kin selective behavior and monitoring exchange in personal relationships.

The validity of internet studies has often been questioned, but Gosling, Vazire, Srivastava and John (2004) weakened the most common objections. They showed the equal (and better) representativeness of internet samples compared to the mostly used college samples. The validity of data collected with online questionnaires was proven through comparable psychometric properties and consistency with previous findings using other methods (Gosling et al., 2004; Krantz & Dalal, 2000; Riva, Teruzzi, & Anolli, 2003; Tuten, Urban, & Bosnjak, 2002). Gerich and Lehner (2006) refined these results for the field of ego-centered network studies and proved the comparability of web-based studies and advantages because of customized questionnaires.

Family study. Both partners of participating couples were simultaneously assessed during single sessions. Sessions typically lasted from one-and-a-half to two hours. After explaining the aims of the study, the structure of the session and the handling of the PC-based questionnaire, the research assistant conducted a half-structured interview about the couple's current partnership and their families of origin. The PC-based main questionnaire was congenerous to the online questionnaire used in the young adult study and included the assessment of the ego-centered network, its structural and psychological qualities and several self-report measures of personality. It was presented with Microsoft Internet Explorer on standard personal computers. Partners answered the questionnaires separately and on their own. To ensure honest and independent responding, the research assistant was constantly attendant. At the end prosocial behavior was assessed with each partner individually using a money sharing game. Then, the couples were compensated 30 € (approximately 36 US\$) for their participation and debriefed.

2.1.3 Measures

Demographic information. Information regarding participants' age, socioeconomic status (education, occupation, income), marital status, and number of biological and social children was assessed in both studies. In the family study, additional information regarding the

partnership duration, the cohabitation duration, the marital year, prior partnerships, and the current wish for a(nother) child was collected. Information from the half-structured interview included information on whom the participant grew up with, current familial status of his/her parents, number of full, half- and social siblings and family type specific information on infertility, contraception or genetic relatedness and custody regulations for the children.

Personal network generator. Generation of ego-centered networks was identical in both studies. Following Hinde's (1979) definition, personal relationships were defined as relationships with persons the participant interacts with frequently and/or knows for a long time. These relationships could be in the family, at work or in leisure and could provide straining as well as pleasant experiences (see Appendix A for the original German instruction). Participants named at least one and up to 35 people which fit the definition. They provided information about each relationship person with respect to gender, age, relationship duration, residential proximity, contact frequency, and conflict frequency (table 4 provides detailed information on the measures and their scaling). During the generation of personal network, a self-actualizing table yielded an overview on the already named relationship persons. On the pages following the generation of the network, participants rated their specific relationships on several items which are explained in the subsequent paragraphs. The order of the items was *by question*, because this order yields a higher reliability and validity than asking items *by alters* (Coromina & Coenders, 2006; Kogovsek & Ferligoj, 2005).

Table 4
Structural variables in the ego-centered networks (wording, scaling, means)

Construct	Instrument or wording	Scaling	YAS <i>M (SD)</i>	FS <i>M (SD)</i>
Relationship duration	Relationship duration	Less than 1 year (1) 1-2 years (2) 2-5 years (3) 5-10 years (4) 10-20 years (5) more than 20 years (6) since my birth (7)	4.41 (1.93)	4.86 (1.52)
Residential proximity	We live ...	more than 200 km away (1) between 50 km & 200 km away (2) less than 50km away (3) in the same town (4) in the same house (5) in the same household (6)	3.22 (1.49)	3.28 (1.56)
Contact frequency	We have contact (meet, call, etc.) ...	once a month or less (1) several times a month (2) once a week (3) several times a week (4) daily (5)	2.92 (1.45)	2.47 (1.49)
Conflict frequency	We ... have conflicts.	never/ very seldom (1) - very often (5)	1.98 (1.09)	1.87 (0.99)
Marital status	Is this person married?	Yes/no	/	53 % ^a
Parental status	Has this person any children?	Yes/no	/	64 % ^a
Friendship	Are you friends?	Not at all (1) – very much (5); the word “friend” does not apply (6)	/	4.09 (0.98)

Note. YAS = Young adult study; FS = Family study. ^a Percentage of all 4561 named relationship persons.

Similarity. Perceived similarity was assessed in both studies with three items. Two items concerned similarity in heritable characteristics: “I think, ... and I resemble each other.” and “... and I have the same skills and talents.” (instead of three dots, the name of each previously named person was presented in the personalized questionnaires). Resemblance and similarity of skills/talents were preferred to similarity in values and attitudes to represent kinship cues and opportunity for cooperation and collaboration. Subjective assessment of kinship cues is likely biased by other evaluations of the relationship (e.g., emotional closeness). However objective assessment of resemblance through other-ratings or ratings of photograph was too demanding in combination with the ego-centered network approach. The third items was a more general, global measure of subjective similarity “I feel myself being similar to” . Across all relationships, the three items were consistent enough to combine them to one scale *perceived similarity* (young adult study $\alpha = .69$, family study $\alpha = .73$), but still having enough unshared variance (especially in specific relationship types) for analyzing them separately in relation to other relationship qualities.

Social similarity was assessed by comparing marital and parental status (family study, see table 1) and gender (both studies) of target and relationship person. Similarity in marital

and parental status was only calculated for relationship persons older than 18 years. All three variables for actual similarity were dummy coded (1 = similar in marital status/parental status/gender; 0 = dissimilar).

Relationship index and coefficient r of genetic relatedness. In the young adult study, participants attributed each relationship to one of 13 relationship categories (Appendix B, table 1, “*stepkin*” comprised stepparents and stepsibling; “*other*” included neighbors, club fellows, acquaintances and other). As a measure of genetic relatedness, coefficient r was derived from these relationship categories.

Assessment of genetic relatedness was more detailed in the family study, where participants assigned each relationship person one of 85 relationship indices (see Appendix B, table 2). In general, there were four large groups of relationship indices: 1) biological kin, 2) step-kin, 3) in-laws, and 4) non-related other people, e.g., co-worker, neighbor, professional helper, which allowed a fine-grained assessment of genetic relatedness and distinction between maternal and paternal relatives.

Age parity as a measure of equality of resources. In these present studies, age parity was assumed, if the participant was less than seven years younger or older than his/her relationship partner. The coefficient for age parity was interval coded varying between 1 (greatest parity, the maximum age difference between participant and relationship person is seven years) and 0 (no parity, the maximum age difference is 35 years and more). At intervals of seven years, the coefficient for age parity decreased by 0.25 points. Thus, relationship persons being between 7 and 14 years older or younger received a value of 0.75; between 14 and 21 years age difference they held the value of 0.5 and everybody with 35 or more years of age difference received a value of 0. The interval of seven years was chosen by considering five years a too short and ten years a too long time span to represent perceivable similarity in age and resources. No difference was made, whether the relationship partner was younger or older because it was assumed that both cases meant a difference in resources unspecific of the direction. For illustration, in the family study, mean age of participants was about 38 years. If a participant was 38 years old, his/her relationship partners between 31 and 45 years should be roughly of equal age and therefore should possess approximately a comparable amount of resources, regarding material possessions, status and physical fitness. This coefficient is a first operationalization of the construct *resource parity*. Previous works on this topic did not specify cut-off values or used dichotomous variables (Heckhausen & Schulz, 1995; Schulz, Heckhausen & Locher, 1991; Voorpostel, van der Lippe, Dykstra, & Flap, 2007).

Closeness and reciprocity towards personal network partners. In both studies, participants rated emotional closeness and perceived reciprocity towards each network partner with two graphic items each. Emotional closeness with each network member was assessed using the Inclusion of Other in the Self Scale (Aron, et al., 1992), and the Graphic Closeness Scale (GCS, Neyer, et al., 2008.; Appendix C, figure 1). The GCS is based on the assumption, that emotional closeness is cognitively represented in a similar way as physical closeness or distance. Hence, it should be possible to mark closeness on a one-dimensional line with oneself as anchor point. Participants rated closeness by moving the controller on a sliding bar²⁰, ranging from 100 (very close) to 0 (not close=very distant). After linear transformation, items were averaged for each relationship (young adult study $\alpha = .80$, family study $\alpha = .77$).

Reciprocity in each specific relationship was assessed with two graphic items, the Graphic Balance Scale (GBS, Neyer, et al., 2008; Appendix C, figure 2) and the Graphic Interdependence Scale (GIS, Neyer, et al., 2008; Appendix C, figure 3). Participants rated each item on a 7 point scale. Varying tilt of balance and differing strength of arrows represented different degrees of reciprocity. Both items were recoded one-dimensional (1 = relationship perceived as not reciprocal to 4 = relationship perceived as reciprocal) and averaged (young adult study $\alpha = .79$, family study $\alpha = .77$).

To minimize answering patterns within one construct, participants answered first Graphic Closeness Scale for all network persons, followed by Graphic Balance Scale, IOS (Aron, et al., 1992) and last Graphic Interdependency Scale. Graphical items were used, because they possess greater reliability than verbal single-item measures (Aron, et al., 1992). They were more appropriate than scales for measuring emotional closeness and perceived reciprocity in social networks because answering a scale with several items for up to 35 relationship persons would have been too strenuous for the participants.

2.2 One-year follow-up of the family study

2.2.1 Participants

All participants of the family study ($N = 342$) received a questionnaire via mail about one year²¹ after their first participation. The overall response rate was 51 percent ($n = 175$) and varied between family types: 60 % of persons from involuntarily childless couples and from traditional families answered the second questionnaire, whereas only 43% of persons in patchwork-families and from motivated childless couples replied to the questionnaire. Table 5 provides an overview on the number of complete questionnaires from both partners and single questionnaires from wives and husbands for the five family types.

²⁰ Remember, that assessment was computer-aided.

²¹ Interviews at the first assessment took place between October 2005 and April 2006: Follow-up questionnaires were mailed in January 2007.

Table 5

Overview of the number of participants in the longitudinal follow up of the family study

	Motivated childless	Involuntarily childless	Patchwork family without a common child	Patchwork family with a common child	Traditional family
Couples (T1)	41	35	15	32	48
Complete couples (T2)	15	19	8	8	27
Wives (T2)	4	3	1	4	3
Husbands (T2)	1	1	0	3	1

The number of female ($n = 91$, 52%) and male participants ($n = 84$, 48%) was almost balanced, because most retrieved questionnaires were from both partners (i.e., complete couples, cf. table 5). As expected from the first assessment, women were slightly younger ($M = 37.13$ yrs, $SD = 4.30$ yrs) than their male partners ($M = 39.02$ yrs, $SD = 5.02$ yrs, $t(76) = 3.06$, $p < .01$). The average relationship duration of the sample ($M = 12.24$ yrs, $SD = 5.32$ yrs) varied tremendously between the five family types ($F(4, 94) = 15.54$, $p < .01$). Couples in traditional families reported longer relationships ($M = 16.31$ yrs, $SD = 4.58$ yrs) than couples in all other family types (all post-hoc comparisons $p < .05$). Couples in patchwork families without a common child had much shorter relationships ($M = 4.97$ yrs, $SD = 0.99$ yrs) than all other couples (all post-hoc comparisons $p < .05$). Motivated childless couples ($M = 11.47$ yrs, $SD = 4.33$ yrs), involuntary childless couples ($M = 10.61$ yrs, $SD = 4.54$ yrs) and couples in patchwork-families with a common child ($M = 10.94$ yrs, $SD = 3.61$ yrs) were in between. All motivated childless couples were still without children, whereas three previously involuntarily childless couples became parents in the meantime. The average number of children in the household was comparable for couples in PwC ($M = 2.67$, $SD = 0.90$) and traditional families ($M = 2.32$, $SD = 0.83$). Couples in PwoC had significantly less children ($M = 1.61$ years, $SD = 0.86$) in the household than couples in PwC ($F(2,52) = 4.31$, $p < .05$; post-hoc comparison $p < .05$).

Selective attrition. Persons who participated in the follow-up study did not differ at T1 from persons who did not participate with respect to age, years of education, number of children, relationship duration, network size, life satisfaction, relationship satisfaction or personality. This was still true, if selective attrition was analyzed separately for women and men or for family types. There were two exceptions: persons in patchwork-families without a common child who participated in the follow-up had shorter romantic relationships ($M = 4.50$ yrs, $SD = 2.30$ yrs) than couples who did not participate ($M = 7.12$ yrs, $SD = 2.13$ yrs, $t(28) = -3.19$, $p < .01$). Involuntarily childless persons who participated were slightly younger ($M = 36.03$ yrs, $SD = 5.30$ yrs) and had larger networks ($M = 15.71$, $SD = 8.85$) than involuntarily childless persons, who did not participate (age $M = 39.45$ yrs, $SD = 6.01$ yrs, $t(68) = -2.51$, $p < .05$;

network size $M = 8.79$, $SD = 4.95$, $t(68) = -3.76$, $p < .01$). Participation in the follow-up study was lightly biased concerning city of data collection: 63% of all participants from Halle participated in the follow-up study, whereas only 42% of Berlin people participated again ($\chi^2 = 14.14$, $df = 1$, $p < .01$).

2.2.2 Procedure

Couples received two paper questionnaires and two prepaid return envelopes together with a letter explaining the purpose of this second assessment. Instruction in the letter told the participants to answer the questions alone and especially without their partner. The questionnaire took about 30 minutes to answer. Participants did not receive financial reimbursement.

2.2.3 Measures

Current demographic measures were asked first, before five specific relationship persons were addressed: romantic relationship partner, (social) mother, (social) father, close friend and colleague or neighbor. Participants from patchwork and traditional families were also asked to provide information on their relationships with their children in a separate questionnaire. No ego-centered network was assessed, because of the unexploredness of self-administered network questionnaires and the too heavy burden on side of the participants. All items and measures regarding structural (age, relationship duration, residential proximity, contact and conflict frequency) and qualitative (similarity, emotional closeness, perceived reciprocity) variables of the relationships were identical with T1.

The measures of personality characteristics, marital satisfaction and subjective well-being were identical with the measures at the first assessment point.

2.3 Experimental similarity studies

Two studies were conducted to manipulate perceived similarity in specific relationships. Study A contrasted sibling relationships with friendships and relationships with colleagues. In study B, friendships were compared with strangers using a second independent sample. All used measures were identical in study A and B and are therefore reported jointly.

2.3.1 Participants

Study A. Five-hundred-ninety-two internet users (mean age $M = 31.27$, $SD = 11.09$; 75 % female, cf. table 3 for additional demographic information) answered at least the demographic questions of the T1 questionnaire. Data from 122 participants were excluded from further analyses, because participants discontinued the questionnaire ($n = 111$), did not fulfill the prerequisite of having at least one sibling ($n = 10$) or were younger than 18 ($n = 1$).

Participants, whose data was excluded, did not differ from the remaining 470 persons regarding age, education, family status, number of children or siblings. However, data from men were more often (34%) excluded than data from women (16%, $X^2 = 21.84$, $df = 1$). This led to an even higher percentage of women (79%) in the final sample of T1.

Of all 470 subjects of T1, who were invited via e-mail to participate at the second part of the study, 63% ($n = 297$) answered the whole second questionnaire. Subjects of T1 who did not participate at all at T2 ($n = 143$) or who discontinued the questionnaire at T2 ($n = 29$) did not differ significantly from the final sample ($n = 297$) regarding age, gender, education, family status, number of children or siblings. There was no manipulation specific dropout, i.e., discontinuing subjects were equally distributed across the experimental and control groups described in the procedure section. Participants at T2 were mostly female (81%). Women did not differ from men in average age ($M_{\text{women}} = 30.85$ yrs., $SD = 10.45$ yrs.; $M_{\text{men}} = 29.74$ yrs., $SD = 9.04$ yrs). Forty percent were single, one third had a steady romantic relationship, 18 % were married and 8 % had a different family status. On average, participants had 13.80 years of education ($SD = 2.97$) and 0.42 children ($SD = 0.95$).

Participants received no monetary compensation for participation, but feedback on parts of the study.

Study B. Of all contacted employees and students of the University of Potsdam, 1259 people (mean age $M = 27.01$, $SD = 8.67$, range 18 - 64 years; 70 % female) completed at least the demographic questions of the T1 questionnaire. Data from 457 participants were excluded from further analyses, because participants discontinued the questionnaire ($n = 437$) or indicated at the end of the questionnaire that they just tested the questionnaire and did not want their data used ($n = 20$). Participants, whose data were excluded, differed negligibly from the remaining 802 persons regarding age, gender, family status, and number of children, but were comparable in education and number of siblings. They were slightly older ($M = 28.04$, $SD = 9.93$) and had more children on average ($M = 0.38$, $SD = 0.80$) than participants who provided full data sets (see table 3 for demographic information). In addition, more men than women (43% vs. 33% $X^2 = 10.80$, $df = 1$) and more married and divorced persons than persons with other family status (49% and 55% vs. 29 – 35 % $X^2 = 21.26$, $df = 4$) did not provide full data sets.

Of all 565 subjects of T1, who provided their e-mail for the participation at the second part of the study, 61% ($n = 344$) answered the whole second questionnaire. Subjects of T1, who did not participate at all at T2 ($n = 424$) or who discontinued the questionnaire at T2 ($n = 34$) did not differ significantly from the final sample ($n = 344$) regarding age, gender, education, family status, number of children or number of siblings. Furthermore, there was no manipulation specific dropout, i.e., discontinuing subjects were equally distributed across the

experimental groups described in the procedure section. Participants at T2 were mostly female (77%), who were on average 26.13 years old ($SD = 8.09$ yrs); men were 28.24 years ($SD = 10.19$ yrs). Forty-four percent were single, 43 % had a steady romantic relationship, 12 % were married and 2 % had a different family status. On average, participants had 13.94 years of education ($SD = 2.11$) and 0.25 children ($SD = 0.73$).

Participants received no monetary compensation for participation, but feedback on parts of the study.

2.3.2 Procedure

Study A. Subscribed users of PSYTESTS (see p. 82) received a newsletter in January 2007 with information about the study and a link to get to the home page. First, participants provided demographic information and names, age and gender of a) their oldest sibling, b) a close living friend and c) a close living colleague. Manipulating similarity could not be done with the whole network, but only with selected relationships. Siblings and friends were chosen to vary the degree of genetic relatedness, while controlling for age of participant, which is another important covariate of relationship qualities. To be able to distinguish effects of genetic relatedness from effects of relationship type, colleagues were chosen as second unrelated relationship partners who are comparable to friends and siblings in age and contact frequency. Participants were randomly assigned to one of three manipulation conditions. In the “in common” condition participants were successively asked to think about which skills they have in common with their sibling, their friend or their colleague and to list three skills each. In the “different” condition, they were successively asked to think about which skills differentiate between them and their sibling, their friend or their colleague. They also listed three skills afterwards. Participants in the control group were asked to name three European capitals, musicians, and mammals instead of thinking about their relationship partners. The German instructions for both experimental groups were identical except for the words “in common” and “different”. No instruction used the words “similar” or “dissimilar” throughout the experiment. The order of the relationship types, i.e., *sibling*, *friend*, and *colleague*, was randomized to minimize and test sequential effects. All questions regarding the first relationship partner were presented en block, before the instruction for the second relationship partner was given. After the manipulation (thinking about similar or dissimilar skills), but before ratings on emotional closeness and reciprocity, a manipulation check was undertaken. At the end, general altruistic tendencies were measured and provided as individualized feedback. Participants were generally debriefed without giving away the hypotheses, thanked for their participation and asked to provide their e-mail address in order to be able to contact them for the second testing five weeks later.

Participants who left their e-mail address received an automatic e-mail after 35²² days with the request to participate and with a personalized link to the second part of the study. Upon entry of a personal code, the names of the sibling, the friend, and the colleague provided at the first measurement point were presented and after reassurance from the participant that these were known the questionnaire started. Participants, who had been in the “in common” condition at T1 received instructions for thinking about differences at T2 and vice versa. Participants in the control group remained in the same condition and were asked to think of three flowers, German politicians, and European countries instead. The order of the relationships and the used measures were the same for both measurement points. After the completion of the questionnaire, participants were fully debriefed about the aims of the study, received individual feedback on their within-person change of closeness towards the three relationship persons and were thanked for their participation.

Study B. All students and employees with an e-mail address of the University Potsdam (about 15,000) received an e-mail in December 2007 with information about the study and an invitation to participate linked to the starting page of the online study. As in study A, participants first provided demographic information as well as the name and age of a close living friend. They were then randomly assigned either to the “in common” or the “different” condition. Wording of the instructions was identical with study A. Different to study A, participants either answered questions regarding their friend or a stranger that was introduced as average person of same age and gender. Friends and strangers were chosen to be able to compare the results with study A (friends) and extend the findings on unestablished relationships (strangers). There were three possible between-person conditions varying the order of the persons and the instruction of the stranger. In the “friends first” condition, persons named skills of their friends first, rated similarity, emotional closeness and expected reciprocity before doing the same for the unknown average person. All used measures were identical with study A. In the “strangers first” condition, the order of persons was reversed. Last, in the “Bogus stranger condition”, persons first named skills of their friends, rated similarity, emotional closeness, and expected reciprocity and then received the following instruction on a stranger: “Now, it is about an unknown person. Please imagine an average person your age and gender. To simplify matters, we call him/her X. Let’s assume, you meet X at a party or in the train and start talking to him/her. After a while you notice that you have many things in common and share the same hobbies and skills.” (in the “different condition” the last sentence read “After a while you notice that you are different in many things and have diverging hobbies and skills.”). This last variation of the stranger

²² Five weeks were chosen as intervening period to ensure an imprecise recall of the exact wording of instructions. On the other hand, relationship qualities were not expected to change significantly during five weeks.

condition was used to have a manipulation similar to the original manipulation used by Byrne (e.g., Byrne & Nelson, 1965; Byrne et al., 1967). In addition, it allowed the distinction between the effects of the manipulation (thinking and writing about similarities vs. reading about similarities) and the rated person (friend vs. stranger). After the instruction, ratings of similarity, emotional closeness, and expectation of reciprocity followed. At the end, general altruistic tendencies were measured and provided as individualized feedback. Participants were debriefed without giving away the hypotheses, thanked for their participation and asked to provide their e-mail address in order to be able to contact them for the second testing five weeks later.

As in study A, participants, who left their e-mail address, received an automatic e-mail after 35 days with the request to participate and with a personalized link to the second part of the study. Upon entry of a personal code, participants were asked, whether they recognize the name of the friend provided at T1 and after an affirmative answer the questionnaire started. Participants, who had been in the “in common” condition at T1 received instructions for thinking about differences at T2 and vice versa. As in study A, no changes in order of relationship persons or measures were undertaken. After the completion of the questionnaire, participants were fully debriefed about the aims of the study, received individual feedback on their within-person change of closeness towards the two persons and were thanked for their participation.

2.3.3 Measures

Apart from the instructions and the addressed relationships, the measures were identical for all participants, at all measurement points and in both studies.

Manipulation check. Participants rated similarity with each relationship person on a seven-point Likert type scale (1= applies not at all, 7 = applies totally). The three items were individualized; thus, participants saw the names or initials of the relationship person instead of the three dots: “... and I are equally good at most things.”, “... and I are very similar.”, “... and I have many talents in common.”. Internal consistency ranged from $\alpha = .78$ to $\alpha = .87$ across the different relationship persons, measurement points and conditions in study A and study B and was $\alpha = .83$ on average²³.

Emotional closeness. Emotional closeness was measured using the same items described before in the young adult and the family study, i.e., the Inclusion of Other in the Self Scale (Aron, et al., 1992) and the Graphic Closeness Scale (Neyer, et al., 2008). Internal

²³ Mean internal consistency was computed after applying Fisher's r-to-Z-transformation.

consistency ranged from $\alpha = .32$ to $\alpha = .74$ across the different relationship persons, measurement points and conditions in study A and study B and was $\alpha = .58$ on average.

Reciprocity expectation. Participants read three different vignettes that described them having done a favor to each of their relationship partners. One was about lending the car, another described helping with removal, and the third dealt with picking up clothes from the dry-cleaning (see Appendix D). All three vignettes equally described the experienced costs and troubles for doing the favor and were phrased to be comparable. After reading the vignettes participants chose one of three options of what they expected in return. For all three vignettes option 1 was “coffee invitation” and option 2 was “invitation to the movies”. Option 3 depended on the vignette and was phrased to be equal with the described cost. Participants indicated their negative emotions (anger, disappointment, dissatisfaction) on a seven-point Likert type scale (1= not at all, 7 = very much), if they would have gotten only a “Thanks” instead. Internal consistency was very high across the different relationship persons, measurement points and conditions in study A and study B, ranging from $\alpha = .88$ to $\alpha = .93$ with a mean of $\alpha = .91$.

Altruism. Altruistic dispositions were measured using the German version of the three facets altruism, tender mindedness, and compliance of the NEO-PIR scale agreeableness (Ostendorf & Angleitner, 2004).

2.4 Analytical strategy

Two important topics recur throughout the analyses and are briefly described in this chapter to facilitate understanding and interpretation of the results. The explanations in the theoretical part imply that similarity functions as a mediator, whereas the assumed differences between family types indicate that family type is a moderator of the hypothesized effects. Thus, mediating and moderating effects are explained first. Second, data from the young adults and the family study are hierarchically structured, which necessitates specific statistical models, i.e., multilevel models. The implementation of these models is described for the each research questions separately.

The distinction between moderating and mediating variables seems to be clear from a theoretical perspective, but in specific research questions mediator and moderator effects are confused, what makes a repeated addressing in the scientific literature necessary (Aiken & West, 1992; Baron & Kenny, 1986; Holmbeck, 1997; Rose, Holmbeck, Coakley & Franks, 2004). Starting point is an assumed linear relationship between two variables, X and Y. If this relationship is weaker or stronger for certain values of Z, Z would be a moderator of the X-Y relationship. X and Z do not have to covary necessarily. If another variable M serves as an

intermediated step in the X-Y relationship, M could be a full or partial mediator of the relationship between X and Y. In this case, M must covary with X and Y (for examples see Baron & Kenny, 1986; Hombeck, 1997). Two phenomena complicate this clear distinction. Mediation and moderation effects can occur simultaneously in models of moderated mediation or mediated moderation (Rose et al., 2004). In addition, a variable can have both functions, moderation or mediation, in some contexts. Although particular variables like gender or age are more likely to be moderators (because the assumed effect of X on gender or age, necessary in mediational models, is highly unlikely), this cannot be said for most psychological variables. For examples, similarity is assumed to mediate the relationship between genetic relatedness and emotional closeness. Thus, genetic relatedness should covary with similarity which in turn should covary with emotional closeness. Last, the relationship between genetic relatedness and emotional closeness should be smaller after taking effects of similarity into account. It is also plausible to assume that the relationship between genetic relatedness and emotional closeness depends on the level of similarity (i.e., moderation). The relationship could be especially pronounced if similarity is low, whereas the effect of genetic relatedness on emotional closeness might be weaker if similarity is large.

In multilevel modelling, interaction effects are highly prevalent because of cross-level interactions. Cross-level interactions occur if a higher level variable has an effect on the associations on a lower level (Kreft & De Leeuw, 1998; Snijders & Boskers, 1999). For example, if the association between genetic relatedness and emotional closeness in social relationships (lower level) differs for people from specific family types (higher level) a cross level interaction exists.

The exigency and the particularities of multilevel modelling in the young adults and the family study are explained next.

2.4.1 Relationship regulation across the network and the mediating role of similarity

Cross-sectional analyses. Data from both studies were hierarchically structured. Hence, a multilevel random coefficient modeling approach was applied which accounts for the dependencies within data (Kreft & De Leeuw, 1998; Nezlek, Schröder-Abé, & Schütz, 2006; Snijders & Bosker, 1999), utilizing HLM 5 (Raudenbush, Bryk & Congdon, 2004). Multilevel random coefficient modeling (MRCM) was used instead of estimating parameters based on ordinary-least-squares (OLS) methods because MRCM provides less biased parameter estimates and appropriate significance tests by taking the correlation among the error terms of the observations into account (Kreft & de Leeuw, 1998; Krull & MacKinnon, 2001; Nezlek, 2005; Raudenbush & Bryk, 2002; van Duijn, van Busschbach, & Snijders, 1999). As further advantage, MRCM allows for unequal observations within the higher level cluster and

includes the number of observations into the parameter estimates by weighing the estimates accordingly.

Multilevel analyses for multinomial data were applied for studying the differentiation of the three relationship systems *kinship*, *partnership* and *cooperative relationship* through emotional closeness and perceived reciprocity. To examine individual differences in the associations between similarity, emotional closeness and perceived reciprocity, multilevel modeling for continuous outcomes was implemented.

In the both studies, relationships (Level 1) were nested within people (Level 2). In the family study, people were additionally nested within couples (Level 3). All three levels were modeled when focusing on associations between relationship variables (level 1). To achieve best fitted models²⁴ and direct tests of gender effects when individual and couple characteristics were included, data was restructured to represent relationships at level 1 and couples at level 2. For this purpose, two additional dummy codes for husband²⁵ and wife each were introduced at level 1, and predictors were multiplied with these two dummy variables (Barnett, Marshall, Raudenbush, & Brennan, 1993; Barnett, Raudenbush, Brennan, & Pleck, 1995). This resulted in husband and wife specific predictors, e.g., contact frequency which held the value of the wife, if the relationship belonged to the female network and which were zero, if the relationship belonged to the male network (and vice versa). At level 2, couple specific variables, e.g., family type, were entered. Differences between family types were tested with post-hoc comparisons of coefficients using the Wald test available in HLM 5. Effects of family type and gender were only tested in the family study because different family types were not explicitly recruited in the young adult study. In addition, the dyadic design of the family study allowed stronger tests of gender effects than the imbalanced gender distribution of the young adult study.

Due to missing data on Level 2, data from eleven persons were excluded from the young adult study, resulting in 455 persons in the final data set. No cases needed to be excluded from sample of the family study. In order to interpret the intercept coefficients, variables with scales without a meaningful zero (e.g., residential proximity) were group-mean centered if not specified differently. This led to estimates of slopes which were unbiased by higher level differences and avoided the problems associated with cross-level effects that include grand-mean centered variables (Enders & Tofighi, 2007; Kreft, deLeeuw & Aiken, 1995; Nezlek & Zyzniewski, 1998). Predictor variables were not z-standardized in order not to blend variance between levels (Nezlek, 2001). In few models, outcome variables were z-

²⁴ Estimation of parameters was improved by introducing husband and wife dummies at level 1, because otherwise level 2 was represented by only two observations (husband and wife). These models quickly exceeded the “information carrying capacity” of the data when entering additional predictors at the individual level.

²⁵ Men in the family study are referred to as husbands and women as wives to indicate their belonging to one couple although not all couples were married.

standardized to compare predicted scores more easily, however results were largely comparable regarding model improvement, significance level, and group comparisons when computed with standardized and unstandardized outcome variables. If interaction terms were included into the analyses, they were computed with group centered variables to reduce collinearity among the predictors (Aiken & West, 1992; Raudenbush & Bryk, 2002).

The hypothesized mediational function of similarity was tested with two approaches. First, multilevel models were set up that followed the logic of stepwise regression. It was assumed that the inclusion of similarity variables as further predictors improves the models and decreases the slope coefficients between the first predictor and the criterion. A multilevel mediation approach (Bauer, Preacher, & Gil, 2006²⁶; Krull & MacKinnon, 2001) was implemented as second and stricter test of mediation. Last, the family type was included as moderator of the mediation, resulting in a multilevel model of moderated mediation.

Longitudinal analyses. The cross-sectional effects among psychological similarity, emotional closeness, and perceived reciprocity were tested for temporal causality using longitudinal path analyses. Multilevel cross-lagged models were conducted with *Mplus 5* (Muthén & Muthén, 2008). Relationships on level 1 were measured twice and were nested within individuals (level 2). Relationship change was modelled with fixed slopes because initial random-slope analyses and inspection of the rank-order stability of similarity, closeness, and reciprocity showed that change did not vary randomly between individuals. In addition, standardized estimates were obtained that permitted a better interpretation of the effect sizes. Participants, who answered the second questionnaire, provided on average information on 3.96 relationships (participants were only asked about six relationships, see p. 88 for details). Relationships were matched between the first and the second measurement point on the basis of name, age, and relationship duration. Thus, actual change within one relationship and not change in aggregated relationship types was analysed. The restricted networks consisted of altogether 139 romantic partners, 144 mothers, 112 fathers, 85 (incl. 6 social) daughters; 70 (incl. 8 social) sons; 44 colleagues, and 75 friends who were rated at both measurement points. Since too many participants did not provide data for all relationships (e.g., childless people did not name relationships with children), modeling within-person variability in relationships using a SEM approach (Mehta & Neale, 2005) was rejected. Instead, cross-lagged effects of relationship change were modeled on level 1 (relationships) of a two-level model (figure 2).

Four types of effects were tested. First of all, concurrent associations among similarity, closeness, and reciprocity can be conceived of as relationship differences in these

²⁶ See Bauer and colleagues (2006) for detailed description of the data file set up and necessary equations.

relationship qualities (cross-sectional correlation *a*, figure 2). These correlations represent the result of previous selection processes and reciprocal influences among similarity, closeness, and reciprocity in relationships. Second and more important, direct influences of perceiving similarity in others on feeling closer to them and perceiving the relationship as more reciprocal over time are depicted by the cross-paths *b* in figure 2. Third, the opposite effects of emotional closeness or perceived reciprocity influencing the perception of similarities over time is represented by the cross-paths *c* in figure 2. These cross-paths denote direct influences of, e.g., physical similarity on change in emotional closeness while taking the initial correlation between physical similarity and emotional closeness as well as the stability of emotional closeness into account. Last, correlated change (correlations *d*, figure 2), as further important aspect of dynamic interactions among relationship qualities, indicates the concurrent change of, e.g., emotional closeness and perceived reciprocity within a relationship and controls for all antecedent factors (i.e., initial correlation and cross-lagged effects). Although saturated models were specified which also included cross-paths between emotional closeness and perceived reciprocity (grey arrows, figure 2), these paths were not central for the analyses and will therefore not be reported. A complex model with emotional closeness and perceived reciprocity was preferred to two bivariate models to reduce the alpha-error associated with too many separate tests. Three models were tested for each kind of psychological similarity, i.e., subjective, physical, and skill similarity.

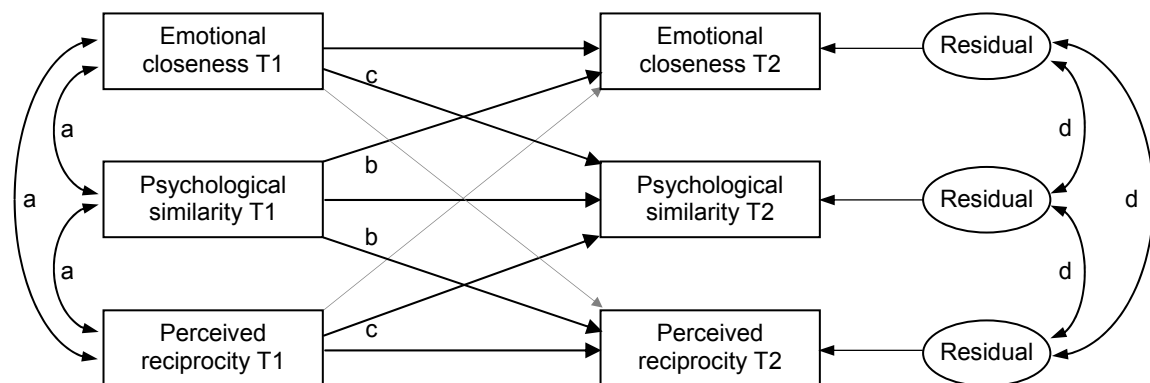


Figure 2. Level 1 cross-lagged panel model for psychological similarity, emotional closeness, and perceived similarity

The purpose of the cross-lagged model analyses were not finding the model that fits the data best, but examining the existing associations among psychological similarity, emotional closeness, and perceived reciprocity. Thus, no model respecification and model comparisons were carried out.

2.4.2 *Relationship regulation in traditional and patchwork families*

The analyses of the associations between similarity, emotional closeness, and perceived reciprocity in families drew only on parts of the assessed sample and relationships. Two groups of the sample - motivated and involuntary childless persons - were left aside because they did not have children. From the first measurement point, parent-child relationships were extracted from the ego-centered networks of persons from traditional and both kinds of patchwork families. At the second measurement point, parent-child relations were explicitly assessed in a separate section of the questionnaire (cf. section 2.2.3). Analyses of the parent-child relationships were conducted cross-sectionally for the first measurement point and then exploratory using the longitudinal data.

Ratings of the parent-child relationships showed dependencies from two sources. First, there were perceiver effects (Kenny, 1994a, b) because participants (mothers and fathers) rated several relationships with children. For example, characteristics of the mother influenced the ratings of the relationships to her children. Second, target effects occurred between mothers and fathers rating the relationship to the same child. Here, characteristics of the child influenced the ratings of both parents. Thus, parent-child relationship ratings cannot be analyzed as if they were independent because they were nested within rater (i.e., participant) on the one side and within rated relationship person (i.e., child) on the other side.

Intraclass correlations were computed for measures of the parent-child relationship to determine which type of dependency is larger and has to be taken into account more strongly during the analyses (McGraw & Wong, 1996). Consistency within participant between his/her first three²⁷ parent-child relationship ratings (compare columns 2 and 5 in table 6) and agreement between mothers and fathers in ratings of the same child (compare columns 3 and 6 in table 6) were computed for similarity, emotional closeness, and perceived reciprocity. Comparison of the two values of dependencies (table 6 column 4 and 7, respectively) showed that dependency within participants ratings were much stronger for similarity, emotional closeness, and perceived reciprocity at T1 and less pronounced, but in the same direction at T2. Therefore, parent-child relationships were analyzed as nested within participants, neglecting the slight dependencies in the data due to characteristics of the child.

²⁷ Two thirds of all parents had two children. Another 28% had three children and only six couples (6%) had four and more children. Therefore, only the three oldest children were taken into account for computing the measures of consistency and agreement.

Table 6.
Consistency within rater and agreement between parents for parent-child relationships at T1 and T2

	T1			T2		
	Consistency ^a	Agreement	Difference (z)	Consistency ^a	Agreement	Difference (z)
Similarity	.39	-.10	2.67*	.18	-.13	1.32
Emotional closeness	.56	.25	1.97*	.39	.24	0.72
Perceived reciprocity	.85	.19	5.47**	.60	.12	2.40*

Note. ^a Correlations were averaged after applying Fishers r-to-z transformation and mean correlations refer to retransformed values. Consistency did not differ between spouses ($p > .05$), neither at T1 nor at T2. Consistency and agreement effects were compared using the formula $z = (z_1 - z_2) / \sqrt{1/(n_1 - 3) + 1/(n_2 - 3)}$ and comparing the results with critical z-value 1.96 for $p < .05$ (Silver & Dunlap, 1987).

At the first measurement point, 413 parent-child relationships were rated by 164 individuals, which belonged to 84 couples. Not all 190 participants, who were parents or social parents named their (social) children as network person and rated the relationship. This issue of selectivity in the inclusion of children as network partner is addressed in the results section. In general, missing data is a smaller problem in MRCM than in repeated measures ANOVA or in general methods operating with OLS. The few data points on level 1 (on average 2.5 relationships per person) restricted, however, the possibilities of data analyses, demanded parsimonious models with few predictors and made an application of the multilevel mediation approach proposed by Bauer and colleagues (2006) infeasible.

First exploratory analyses of longitudinal similarity effects were conducted by regressing the criterion at T2 on its T1 score, the T1 predictor and the mediator measured at T1. Hence, the T2 dependent variable was essentially a residual change variable which represented the change in rank for each relationship on the dependent measure between T1 and T2 (relative to the other relationships in the sample) (Rose, et al., 2004). For further descriptive insight, repeated measures ANCOVAs with extreme groups of similarity and dissimilarity were conducted with knowledge of the limitations.

2.4.3 *Relationship regulation in friendships*

For the analyses of relationships with friends, again only parts of the ego-centered networks were used. Since people differ in their usage of the label “friend” for a specific relationship person, friends were defined in both studies as genetically unrelated persons

- who are not part of the family
- who are not the romantic relationship partner and
- with whom friendship quality was rated at least average²⁸.

This operationalization of friends differs from simply asking for friends because relationships from work or the neighborhood are included without having of individual differences in excluding work relationships from friendships on principle. The different contexts where friends stem from are shown in Appendix E. Good friends were operationalized similarly, except that the friendship quality²⁹ had to be rated as very good. This approach resulted in 2508 identified friendships (without good friends) and 604 good friendships in the young adult study (overall 5385 relationships were named) and 1084 friends and 690 good friends in the family study (from altogether 4561 relationships).

Friendships were compared with two kinds of family relationships: (1) family relationships altogether (including all family relationships, relationships with in-laws and with social father, etc.) and (2) specifically horizontal kin relationships. Horizontal kin relationships were chosen because their importance in association with friendships has been theorized (Doherty & Feeney, 2004; LaFreniere, 1996; Widmer, 2006). Furthermore, they are comparable in age which leads to further commonalities between friends and horizontal kin (e.g., shared current life tasks, belonging to the same cohort) that are missing with older or younger family members. Friends have also been discussed in relation with core family (parents, siblings) availability (Allan, 2008; Doherty & Feeney, 2004). For this work, core family members were judged as inappropriate comparison group for two reasons. First, the importance of the family of origin changes once an own family is founded (Doherty & Feeney, 2004; Schmidt-Denter & Spangler, 2005). The use of the core family seemed inappropriate because the samples varied in having experienced this life transition. Second, participants without children would have less core family members by definition and the samples and subsamples would differ systematically. All in all, from 5385 relationships in the young adult study 1927 were relationships with family and from those 613 belonged to the horizontal family. In the family study, the numbers were 2286 and 727, respectively.

²⁸ The question “Are you friends?” was not asked in the young adult study. There, only the first two criteria applied.

²⁹ In the young adult study, good friends were selected from the general group of friends, if the friendship continuity was rated as very likely.

The analyses of friendships happened in three steps: (1) friendships and family relationships in general as well as good friends, regular friends, and horizontal kin were compared with respect to relationship quality, structural variables, psychological and social similarity; (2) the effects of psychological similarity and of gender homogeneity on emotional closeness and perceived reciprocity were assessed using a multilevel structure equation model (figure 3); (3) the compensation hypotheses were tested with multivariate multilevel models. Steps 2 and 3 were conducted with *Mplus* 4.1 (Muthén & Muthén, 2006).

Perceived similarity was modelled as latent factor predictor for emotional closeness and perceived reciprocity because all three indicators were moderately correlated and the modelled measurement error of the latent factor allowed a prediction that was adjusted for measurement error in similarity. Figure 3 depicts only effects on level 1 (relationship level). No predictors were entered at level 2 (individual level). Accelerated expectation maximization (EMA) with Montecarlo integration was chosen as optimization method for the models estimating the latent similarity factor.

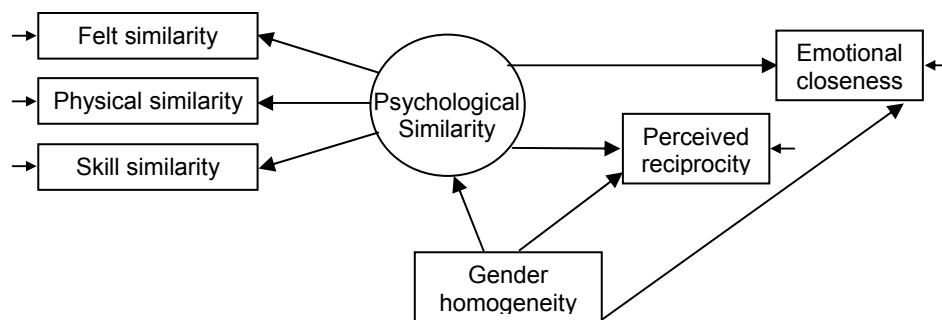


Figure 3. Level 1 measurement and structure model of effects of psychological similarity on emotional closeness and perceived reciprocity (residuals of the endogenous variables are omitted for clarity).

3 Results

This part consists of two larger chapters which are composed of three and two sections, respectively. Relationship regulation across the whole personal network is analyzed first, before addressing two specific relationship types, parent-child-relations and friendships, in greater detail. Results are presented in this order to show the general applicability of the primary principles of relationship regulation first, before demonstrating their function in two very specific relationship types.

3.1 Relationship regulation across the personal network

The main question was how psychological similarity, emotional closeness, and experienced reciprocity correlate in different relationships and how all three vary across relationships, i.e., within ego-centered networks. Before analyzing the relationship qualities, structural information about the networks under focus is required because structural characteristics covary with relationship quality and need to be considered. Each of the following two sections will present results from the Young adult study and the Family study in comparison first and then address family type and gender differences in the Family study. The third section addresses the question of causality by presenting results from the quasi-experimental similarity studies and the longitudinal network analysis.

3.1.1 Network structure

The presentation of the results in this section is structured as follows: first, differences between the Young adult and the Family study are described; next, discrepancies between the family types in the Family study are shown, before last, gender differences are examined.

Size and composition. In the Young adult study, 455 participants named 5363 relationships, compared to 342 participants naming 4561 relationships in the Family study. Thus, the average ego-centered networks comprised of 11.74 persons ($SD = 6.05$) and 13.34 persons ($SD = 8.24$), respectively (table 7). Composition was largely comparable between both studies and differences in frequency of core family, children and friends as network partners were attributable to different mean age of samples. In the Young adult study, age of the participant was negatively related to the number of core family members ($r = -.31, p < .01$) and friends ($r = -.14, p < .01$) named as relationship person. Furthermore, the difference in naming the romantic partner as network person was expected because participants in the Family study were explicitly

recruited to have a stable partnership. A prerequisite that was not necessary in the Young adult study.

In the Family study, persons in different family types scarcely differed in network composition per se, but in relationship regulation within their network (see section on relationship quality). Interestingly, motivated childless persons reported a smaller network ($M = 10.23$; $SD = 6.33$) than persons in traditional ($M = 14.82$; $SD = 8.77$) or patchwork families with a common child ($M = 14.86$; $SD = 8.80$) ($F(4,337) = 4.86$, $p < .05$, post-hoc comparison Scheffè for both comparisons $p < .01$). This difference is not based upon non-existence of children in network, because there were no differences in network size between involuntary childless persons ($M = 12.94$; $SD = 8.23$) and all other family types. Two other interesting differences between motivated childless persons and all other family types emerged: first, motivated childless persons named fewer in-laws than persons from all other family types (all d s < -0.45 , $p < .01$) and they mentioned less often distant kin and core family members, although the post-hoc comparisons were significant only at $p < .10$. The expected differences in naming step kin between family types vanished when stepchildren were excluded from analysis.

On average, women in the Family study named slightly more network persons ($M = 14.05$, $SD = 8.45$) than their male partners ($M = 12.62$; $SD = 7.98$, $t(170) = 2.09$, $p < .05$) and this difference mostly results from differences in naming friends ($M_{\text{female}} = 2.39$, $SD = 2.39$; $M_{\text{male}} = 1.87$, $SD = 3.00$; $t(170) = 2.05$, $p < .05$). There were no other significant gender differences and no significant interactions between family type and gender.

Table 7

Overview of network composition in the young adult and the family study

coefficient r	Type of relationship	Young adult	Family	Cohen's	Family study <i>M (SD)</i>				Family type	
		study <i>M (SD)</i>	study <i>M (SD)</i>	<i>d</i>	Motivated childless	Involuntarily childless	Patchwork without common child	Patchwork with common child	Effect <i>F (η²)</i>	
r = .5	Core family	2.61 _a (1.11)	2.21 _b (1.25)	0.34	1.87 (1.21)	2.31 (1.19)	2.63 (1.25)	2.22 (1.35)	2.29 (1.22)	2.67* (.03)
	Child ^a	0.21 _a (0.58)	0.88 _b (1.17)	-0.73	0	0	1.10 _b (1.09)	1.78 _a (1.25)	1.59 _{ab} (1.10)	3.61* (.04)
r = .25	Close kin	1.22 (1.89)	1.08 (1.42)	0.08	0.78 (0.94)	1.17 (1.69)	1.57 (1.70)	1.00 (1.27)	1.16 (1.53)	<i>p</i> > .05
r > .0625	Distant kin	/	0.52 (1.04)		1.01 (1.29)	1.77 (2.36)	2.23 (2.60)	1.58 (2.04)	1.77 (2.36)	2.52* (.03)
r = 0	Partner	0.59 _a (0.51)	0.78 _b (0.44)	-0.40	0.78 (0.42)	0.73 (0.54)	0.87 (0.35)	0.80 (0.44)	0.77 (0.42)	<i>p</i> > .05
	Stepkin ^b	0.17 (0.52)	0.21 (0.55)	-0.07	0.11 (0.39)	0.10 (0.46)	0.13 (0.43)	0.11 (0.36)	0.07 (0.26)	<i>p</i> > .05
	In-laws	/	1.80 (2.39)		1.00 _a (1.84)	2.07 _{ab} (2.81)	1.70 _{ab} (1.84)	2.02 _{ab} (2.29)	2.16 _b (2.58)	3.24* (.04)
	Colleague	1.26 _a (1.83)	1.64 _b (2.04)	-0.20	2.05 (2.57)	2.31 (2.38)	2.03 (2.28)	2.77 (3.30)	2.35 (2.77)	<i>p</i> > .05
	Friend	4.50 _a (3.67)	2.10 _b (2.67)	0.75	2.23 (3.43)	1.99 (2.37)	2.73 (2.72)	1.95 (2.09)	1.98 (2.48)	<i>p</i> > .05
	Other	1.18 _a (1.94)	2.13 _b (2.69)	-0.41	1.66 (1.83)	1.93 (2.47)	1.23 (1.48)	2.52 (3.38)	2.70 (3.09)	3.01* (.04)
	Total network size	11.74 _a (6.05)	13.34 _b (8.24)	-0.22	10.23 _a (6.33)	12.94 _{ab} (8.23)	14.73 _{ab} (7.86)	14.86 _b (8.80)	14.82 _b (8.77)	4.86** (.05)

Note. ^a F-value is based on the three groups with children; ^b stepkin without social children * *p* < .05; ** *p* < .01; different subscripts indicate significant differences in means.

Structural characteristics. Although age of participants differed between both studies by about ten years, the structural characteristics of the ego-centered networks were largely comparable, except for the expected difference in age of relationship partners and as a result the longer duration of relationships in the Family study (cf. table 8, annotation of statistical procedure under the table). While the mean residential proximity did not differ between the two studies, mean contact frequency was higher in the Young adults study than in the Family study.

The five family types of the Family study were largely comparable in their structural network characteristics (cf. table 8). Couples with rather untraditional life styles (being motivated childless or living in a patchwork-family without a common child and both being less often married) also named fewer married persons in their ego-centered network than couples in traditional (and mostly married) families. Second, childless couples had fewer persons with children in their network compared to persons in traditional and patchwork families with a common child (the last comparison being marginally significant). Both results indicate a tendency to gather people with a similar life style in one's network.

There was only one differences between men and women in the Family study: wives had slightly more sex homogeneous networks than their partners ($M = 0.62$, $SD = 0.15$; $M = 0.53$, $SD = 0.16$, $t = 4.79$, $df = 170$, Cohen's $d = 0.58$). No other significant gender differences were obtained.

Table 8

Overview of the mean structural characteristics of relationships in the young adult and the family study

	Young adult study <i>M</i> (<i>SD</i>)	Family study <i>M</i> (<i>SD</i>)	Cohen's <i>d</i>	Family study <i>M</i> (<i>SD</i>)				Family type effect <i>F</i> (η^2)	
				Motivated childless	Involuntarily childless	Patchwork without common child	Patchwork with common child		Traditional
Residential proximity	3.25 (0.75)	3.32 (0.73)	-0.09	3.18 _a (0.75)	3.08 _a (0.76)	3.22 _{ab} (0.74)	3.65 _b (0.59)	3.41 _{ab} (0.70)	6.82** (.08)
Contact frequency	3.04 _a (0.70)	2.61 _b (0.70)	0.61	2.57 _{ab} (0.72)	2.35 _a (0.62)	2.70 _{ab} (0.82)	2.89 _b (0.65)	2.63 _{ab} (0.68)	5.33** (.06)
Relationship duration	4.52 _a (0.73)	4.95 _b (0.71)	-0.60	4.92 (0.88)	5.01 (0.74)	4.93 (0.50)	4.80 (0.72)	5.03 (0.57)	<i>p</i> > .05
Age of relationship partner	34.85 _a (7.97)	41.18 _b (6.75)	-0.86	42.96 _a (7.97)	43.23 _a (6.48)	38.83 _b (5.19)	39.45 _b (6.21)	40.05 _b (5.84)	6.03** (.07)
Proportion of married	/	0.51 (0.20)	/	0.45 _a (0.23)	0.53 _{ab} (0.17)	0.42 _a (0.17)	0.51 _{ab} (0.18)	0.60 _b (0.17)	9.36** (.10)
Proportion of persons with child	/	0.63 (0.18)	/	0.51 _a (0.22)	0.62 _b (0.18)	0.61 _{abc} (0.15)	0.70 _{bc} (0.15)	0.71 _c (0.13)	18.31** (.18)

Note. Structural variables were aggregated within person. Dichotomous variables (marital status, parental status) were coded 0 and 1, hence computing within person mean describes the proportion of e.g., sex homogeneous relations within each individuals network. These individual means were used for analyses of variance reported above. Results of MRC models which estimated and compared only intercepts confirmed the results. For reasons of simplicity, OLS results were chosen for presentation. * $p < .05$; ** $p < .01$; different subscripts indicate significant differences in means.

Interrelations between structural characteristics. The report of interrelations between the structural variables is limited to the prediction of contact frequency which is known as a significant correlative of relationship qualities (Korchmaros & Kenny, 2006; Neyer, 2002; Neyer & Lang, 2003). Frequency of contact was predicted by multiple variables on level 1: residential proximity, type of relationship (three dummy-coded variables for romantic partnership, kin and cooperative relationship) and the interaction terms of proximity and type of relationship³⁰. These associations on level 1 were expected to vary as a function of the level-2 variables gender of participant (in both studies) and family type in the Family study (see appendix F.1 for the model equation). Table 9 summarizes the results of both studies and of differences between the family types.

Results of both studies were comparable with one exception: participants of the Young adult study had as much contact in cooperative relationships as in kin relationships ($X^2 = 0.65, p > .05$). Participants in the Family study stated more contact with kin ($b = 0.24, p < .01$) and both samples reported more frequent contact with romantic partners (YAS: $b = 1.75, p < .01$; FS $b = 2.66, p < .01$) compared to cooperative relationships. Contact increased significantly with increasing residential proximity in both studies and this association was stronger in kin relationships than in cooperative relationships (YAS $X^2 = 86.26, p < .05$; FS $X^2 = 58.98, p < .05$).

There were no significant gender effects in the Young adult study. Differences between the various family types and gender difference in the Family study were tested in one model. The post-hoc comparisons of the slope coefficients need to be interpreted carefully because unreliability in the coefficients may lead to biases in the post-hoc tests. The level of significance of the slope coefficients is included in the comparison supportively. Men and women from involuntarily childless couples and patchwork families had more often contact the closer the relationship partner lived. To a slightly smaller extent this was also true for persons in traditional families. The main effect of relationship type (see previous paragraph) was largely comparable for the five family types, but family differences were found for the interaction between proximity and relationship type. Men in traditional families had a pronounced positive association between proximity and contact with kin compared to men from other family types.

³⁰ The interaction term between residential proximity and the dummy coded partnership variable was not included, because of limited variation in the young adult study and no variation in the Family study, where all participants lived with their partner.

Table 9
Prediction of contact frequency by proximity and relationship type (level 1), and gender and family type (level 2)

Predictors	Young adult study	Family study, husbands					Family study, wives							
		Family study overall	M		I	PwoK	PcK	T	M		I	PwoK	PcK	T
Proximity	0.18** (0.02)	0.21 (0.16)	0.13 _a (0.09)	0.46 ^{bc} (0.19)	0.19 _b (0.13)	0.67 ^{**c} (0.13)	0.17 ^{**b} (0.06)	0.06 _a (0.06)	0.55 ^{*b} (0.25)	0.09 _{ab} (0.23)	0.59 ^{**b} (0.12)	0.31 ^{**b} (0.09)		
Kin relationship	2.97** (0.04)	2.73** (0.05)	1.99 ^{**a} (0.19)	2.14 ^{**a} (0.20)	2.32 ^{**ab} (0.38)	2.68 ^{**b} (0.21)	2.93 ^{**b} (0.17)	2.72 ^{**a} (0.24)	2.37 ^{**a} (0.23)	3.08 ^{**ab} (0.30)	3.40 ^{**b} (0.17)	2.71 ^{**a} (0.15)		
Romantic relationship	4.43** (0.07)	4.44** (0.42)	4.57** (0.37)	3.85** (0.52)	4.30** (0.48)	3.26** (0.38)	4.77** (0.24)	4.98 ^{**a} (0.25)	3.05 ^{**b} (0.97)	4.90 ^{**ab} (0.81)	3.73 ^{**b} (0.34)	4.00 ^{**b} (0.35)		
Cooperative relationship	2.94** (0.04)	2.37** (0.04)	2.17** (0.17)	2.31** (0.20)	2.37** (0.33)	2.49** (0.19)	2.54** (0.17)	2.52 ^{**ab} (0.22)	2.15 ^{**a} (0.19)	2.63 ^{**ab} (0.30)	2.67 ^{**b} (0.14)	2.03 ^{**a} (0.15)		
Interaction proximity & kin	0.49** (0.03)	0.47** (0.16)	0.25 ^{†a} (0.13)	-0.16 _b (0.17)	0.30 ^{†a} (0.17)	-0.01 _{ab} (0.13)	0.65 ^{**c} (0.08)	0.44** (0.13)	-0.05 (0.25)	0.54* (0.23)	0.13 (0.12)	0.39** (0.10)		
Interaction proximity & cooperative relationship	0.20** (0.03)	0.25 (0.16)	0.35 ^{*a} (0.14)	0.02 _{ab} (0.20)	0.43 ^{**a} (0.14)	-0.03 _b (0.13)	0.15 ^{†ab} (0.09)	0.39 ^{*a} (0.09)	-0.16 _b (0.26)	0.40 ^{†ac} (0.24)	-0.07 _b (0.12)	0.12 _{bc} (0.10)		

Note. Unstandardized slope coefficients (SE in brackets) from MRCM, M = motivated childless, I = involuntarily childless, PwoK = patchwork family without a common child, PcK = patchwork family with a common child, T = traditional family. coefficients with different subscripts are different with $p < .05$, [†] $p < .10$, * $p < .05$, ** $p < .01$.

On the other hand, men who were motivated childless or lived in patchwork families without a common child showed a stronger association between proximity to and contact with cooperative relationships than men in the other three family types. This also applied for their wives. There were no gender differences in coefficients except for men in traditional families showing a stronger association between proximity and contact in kin relations compared to their wives ($X^2 = 6.56, p < .05$). Considering the multitude of post-hoc comparisons this finding should be interpreted carefully; especially because no gender differences were found in the Young adult study either.

In conclusion, structural characteristics of relationships in ego-centered networks –i.e., contact frequency- varied with the type of relationship and residential proximity. There were reoccurring differences between the five family types in these associations. The next section examines, whether these differences are also expressed in the regulation of relationships.

3.1.2 Similarity, emotional closeness and perceived reciprocity across the personal network

Results regarding relationship regulation through emotional closeness, perceived reciprocity and similarity are presented in three steps. A descriptive overview is given before the interplay of psychological similarity, emotional closeness, and perceived reciprocity and their function in relationship regulation are evaluated. This comprises the testing of the mediational role of psychological similarity. Finally, the findings are extended to indicators of social similarity. This section resumes the before used structure of comparing results of the Young adult and the Family study first, than focusing on family type differences and addressing gender differences last in each step.

Description of relationship qualities. The differences between the Young adult and the Family study were small with the exception of the similarity ratings (cf. table 10). Participants in the Young adult study gave their relationship persons on all three facets of psychological similarity higher rating than participants of the Family study. Average emotional closeness was slightly lower in personal networks of participants in the Young adult study, and their average relationship partner was more comparable in age than the average relationship partner in the Family study. The slightly greater average age parity in personal networks of young adults might be explainable by the higher amount of friends in their networks compared to the networks of the participants of the Family study, which could also account for the higher average perception of similarities.

Average network qualities differed little between the five family types. Family types varied to some extent in similarity of marital status ($F(4,337) = 4.50, p < .01, \eta^2 = .05$), similarity of parental status ($F(4,337) = 112.62, p < .01, \eta^2 = .57$), genetic relatedness ($F(4,337) = 6.85, p < .01, \eta^2 = .08$), and age parity ($F(4,337) = 8.56, p < .01, \eta^2 = .09$) averaged within individual networks. In general, persons from motivated childless couples and involuntarily childless couples had a lower average genetic relatedness, a higher average age parity and lower average concordance in parental status within their network than persons from patchwork with a common child and/or traditional families (for complete post-hoc comparisons see table 10). These somewhat unexpected effects indicate a lower portion of kin and a higher portion of same aged non-kin, e.g., colleagues and friends, in the personal networks of childless persons, which is only faintly true (cf. table 7). Furthermore the lower concordance of both childless groups in parental status seems unexpected at first, but is explainable by the fact that parents had on average three fourth persons with children in their network. Though childless persons had fewer persons with children in their network, there were still more than the half of all network persons with children (cf. table 8)

Since both men and women named more female network partners, a gender difference in sex homogeneity of the network was expected. Sex homogeneity was higher for women than for men ($M_{\text{women}} = 0.62, SD = 0.15, M_{\text{men}} = 0.53, SD = 0.16, t = 4.77, p < .01, df = 170$). No further gender differences were identified.

Table 10
Overview of the mean relationship qualities in the young adult and the family study

	Young adult study <i>M</i> (<i>SD</i>)	Family study <i>M</i> (<i>SD</i>)	Cohen's <i>d</i>	Family study <i>M</i> (<i>SD</i>)				
				<i>M</i>	<i>I</i>	PwoK	PcK	<i>T</i>
Psychological similarity								
Subjective	4.11 _a (0.78)	3.62 _b (1.06)	0.53	3.43 (1.16)	3.59 (1.03)	3.65 (0.91)	3.86 (1.00)	3.64 (1.04)
Physical	2.56 _a (0.84)	2.30 _b (1.00)	0.29	2.18 (1.10)	2.17 (0.89)	2.33 (0.89)	2.49 (1.04)	2.35 (0.97)
Skill	3.78 _a (0.78)	3.49 _b (1.01)	0.32	3.41 (1.08)	3.36 (1.01)	3.65 (0.87)	3.58 (1.04)	3.56 (0.96)
Social similarity								
Gender	0.58 (0.15)	0.57 (0.16)	0.06	0.55 (0.16)	0.61 (0.15)	0.58 (0.12)	0.56 (0.18)	0.57 (0.18)
Marital status ^a	/	0.63 (0.21)	/	0.62 _{ab} (0.22)	0.57 _a (0.18)	0.56 _a (0.18)	0.64 _{ab} (0.20)	0.69 _b (0.22)
Parental status ^a	/	0.65 (0.25)	/	0.49 _a (0.22)	0.38 _b (0.18)	0.73 _c (0.17)	0.83 _c (0.13)	0.83 _c (0.13)
Emotional closeness	2.67 _a (0.39)	2.83 _b (0.38)	-0.41	2.78 (0.40)	2.77 (0.38)	2.90 (0.32)	2.91 (0.36)	2.84 (0.37)
Perceived reciprocity	3.31 (0.32)	3.32 (0.34)	-0.04	3.38 (0.35)	3.33 (0.34)	3.23 (0.29)	3.32 (0.35)	3.29 (0.33)
Genetic relatedness	0.16 (0.07)	0.16 (0.09)	0.05	0.13 _a (0.09)	0.13 _{ab} (0.08)	0.18 _{abc} (0.07)	0.17 _{bc} (0.09)	0.18 _c (0.09)
Age parity	0.74 _a (0.11)	0.69 _b (0.14)	0.38	0.74 _a (0.15)	0.72 _{ab} (0.11)	0.66 _{bc} (0.11)	0.64 _c (0.14)	0.66 _{bc} (0.14)

Note. As specified for the structural relationship variables (see note of table 8 for explanations) OLS results were chosen for presentation. *M* = motivated childless; *I* = involuntarily childless; PwoK = patchwork family without a common child; PcK = patchwork family with a common child; *T* = traditional family; ^a computed only for relationship partners older than 18 years, * $p < .05$; ** $p < .01$; different subscripts indicate significant differences in means.

Distinction of relationship subsystems. First, the relative importance of emotional closeness and perceived reciprocity in distinguishing (predicting) the relationship subsystems *partnership*, *kinship* and *cooperative relationship* is shown using multilevel multinomial logistic regressions. The two predictors, emotional closeness and perceived reciprocity, were similarly correlated in the Young adult and the Family study (standardized multilevel correlation coefficient $r = .12$, $p < .01$). In the Young adult study, from 5363 relationship 5 % were romantic partnerships, 34% kinship relationships (e.g., parents, siblings, uncles), and 61% cooperative relationships (e.g., colleagues, neighbors, friends). Composition of named persons in Family study was very much comparable: of 4561 relationships 6% were romantic partnerships, 35% kinship relationships and 59% cooperative relationships.

Cooperative relationships were chosen as comparison group because this type of relationship constituted the largest group. Table 11 provides an overview of the results (see appendix F.2 for the model equation). Negative coefficients and odds-ratios smaller than 1 indicate that an increase on this variable decreased the probability of the relationship belonging to the category under focus relative to the comparison group. On the other hand odds-ratios greater than 1 indicate that an increase on the variable also increased the probability of belonging to the category under focus.

The results of the comparison of romantic partnerships and cooperative relationships are presented first: If a certain relationship in the Young adult study was one standard deviation above the mean emotional closeness, the odds-ratio of being a partnership was fifteen times higher relative to being a cooperative relationship. This effect was even more pronounced in the Family study. An increased level of perceived reciprocity resulted in a slightly lower probability of being a partnership relative to being a cooperative relationship in the Young adult study, but not in the Family study. Comparing kin versus cooperative relationships revealed that an increase of emotional closeness by one standard deviation resulted in a 1.6 higher probability of being a kin relationship relative to being a cooperative relationship. Again, this effect seemed to be stronger in the Family study. An increased level of perceived reciprocity decreased the likelihood of being a kin relationship in the Young adult study as well as in the Family study.

Table 11

Multilevel logistic regression of relationship subsystems on emotional closeness and perceived reciprocity

	Young adult study		Family study	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Partner vs. cooperative				
Intercept	-3.99**	0.02	-4.64**	0.01
Emotional Closeness	2.71**	15.1	3.60**	36.5
Perceived Reciprocity	-0.34**	0.7	0.11	1.1
Kin vs. cooperative				
Intercept	-0.68**	0.5	-0.56**	0.6
Emotional Closeness	0.44**	1.6	0.82**	2.3
Perceived Reciprocity	-0.55**	0.6	-0.55**	0.6

Note. ** $p < .01$.

The comparison of the regression coefficients suggested that high emotional closeness was a strong positive predictor of partnerships and a moderate positive predictor of kin relationships. High perceived reciprocity was a moderate negative

predictor of kin relationships and scarcely distinguished partnerships from cooperative relationships. Figure 4 illustrates these results with estimated means from multilevel intercepts-only-models, which used the three relationship systems as predictors and emotional closeness or perceived reciprocity as z-standardized outcome variables. Partnerships showed a much higher mean level of emotional closeness compared to kin and cooperative relationships (all three post-hoc comparisons $X^2 > 27.36$, $df = 1$, $ps < .001$), whereas kin relationships were much less reciprocal compared to partnerships and cooperative relationships (all post-hoc comparisons $X^2 > 12.42$, $df = 1$, $ps < .001$, except for the non-significant difference between partnerships and cooperative relations in the Family study).

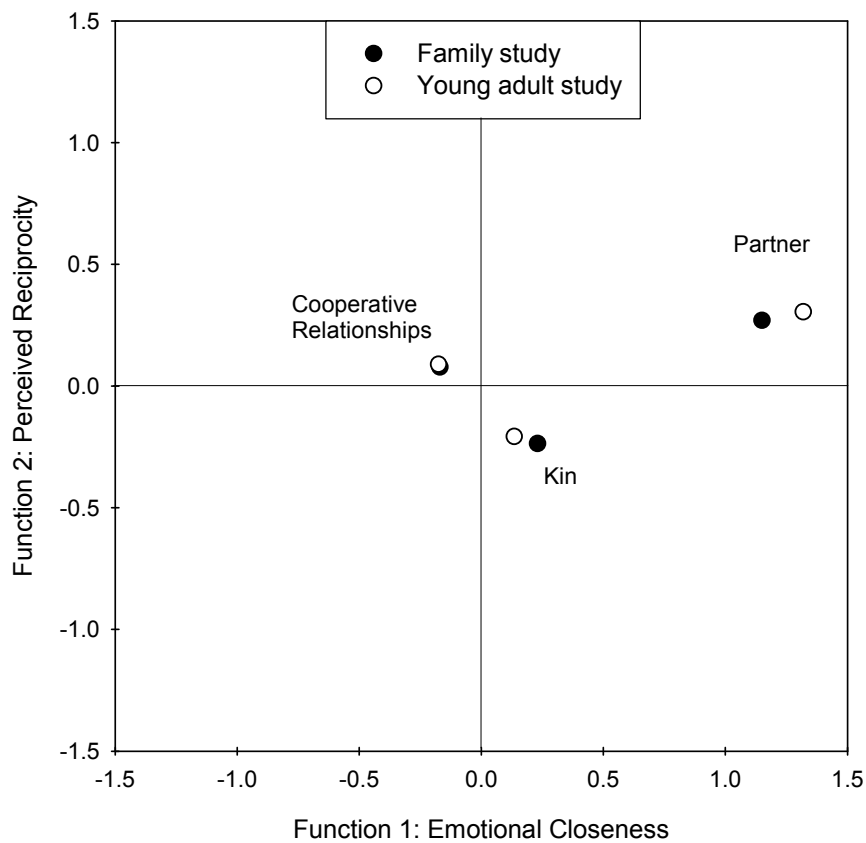


Figure 4. Estimated closeness and reciprocity of relationship subsystems

The previous results showed that relationships within a personal network differ in emotional closeness and perceived reciprocity. The coarse-grained, but central categories of *partnership*, *kinship* and *cooperative relationship* are distinguishable by emotional closeness and perceived reciprocity. High emotional closeness is important in partnerships and kin relations, whereas the perception of reciprocity is more relevant for cooperative relationships and partnerships. Addressing finer-grained distinctions of relationships by using the index *r* of genetic relatedness and the index *p* of age parity, the following results confirm the differentiating role of emotional closeness and perceived reciprocity and the mediating role of psychological similarity.

Predicting emotional closeness. To begin with, multilevel random coefficient models with emotional closeness as criterion are shown. Model building occurred stepwise and followed an above-and-beyond logic: 1) the competing predictor variable –age parity– was entered, 2) the assumed predictive variable –genetic relatedness– was added and 3) psychological similarity variables were included to inspect the incremental value of these predictors³¹. In the Young adults study, genetic relatedness explained additional 5 % of variance in emotional closeness after age parity was added as predictor (for estimation of shared variance see Raudenbush & Bryk, 2002; Roberts & Monaco, 2006). The average association between genetic relatedness and emotional closeness was $b = 0.73$ (cf. table 12), which indicated that people perceived relationships with 0.5 kin (e.g., parents) 0.36 ($0.73 * 0.5$) points closer than relationships to non-kin on a z-standardized scale, while controlling for age parity. Another possible way to judge the effect is by comparing the standard deviation of emotional closeness from a totally unconditional model ($SD = 0.38$) with the effect of genetic relatedness with 0.5 kin and concluding that the effect is about one standard deviation.

³¹ Full information maximum likelihood estimation was used to compare models with different predictors (Kreft & de Leeuw, 1998).

Table 12

Young adult study: multilevel stepwise model building for regressing emotional closeness on age parity, genetic relatedness, and psychological similarity (level 1)

Effect	Step 1		Step 2		Step 3	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
Intercept	0.00 (0.04)	0.11	-0.30 (0.05)	-6.65**	-0.09 (0.04)	-2.09*
Slope of age parity	0.06 (0.04)	1.48	0.33 (0.04)	7.91**	0.13 (0.04)	3.27**
Slope of genetic relatedness	/	/	0.73 (0.08)	8.60**	0.17 (0.07)	2.35*
Slope of subjective similarity	/	/	/	/	0.41 (0.01)	30.85**
Slope of skill similarity	/	/	/	/	0.06 (0.01)	4.67**
Random effect	0.67		0.64		0.32	
Additionally explained variance	5%		5%		50%	
Model improvement	$X^2 = 78.38, df = 4, p < .01$		$X^2 = 172.34, df = 4, p < .01$		$X^2 = 3580.14, df = 11, p < .01$	

Note. * $p < .05$, ** $p < .01$.

The association between emotional closeness and genetic relatedness was slightly higher in the Family study (table 13). After taking relationship differences in age parity into account, the inclusion of genetic relatedness as another predictor improved the model significantly. The average association between genetic relatedness and emotional closeness in this study was $b = 0.89$, which indicated that people perceived relationships with 0.5 kin (e.g., parents) 0.44 ($0.89 * 0.5$) points closer than relationships to non-kin on a z-standardized scale. This effect is larger than one standard deviation of emotional closeness ($SD = 0.30$). Results of both studies confirm that emotional closeness increases with increasing level of relatedness, even when controlling for competing predictors. The strong association between genetic relatedness and emotional closeness shows that emotional closeness even varies within the category of kin relationships, which ranged from 0.125 relatives (e.g., cousins) to 0.5 relatives (e.g., siblings).

Table 13

Family study: multilevel stepwise model building for regressing emotional closeness on age parity, genetic relatedness, and psychological similarity (level 1)

Effect	Step 1		Step 2		Step 3	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
Intercept	0.20 (0.04)	4.82**	-0.10 (0.05)	-2.06*	0.05 (0.04)	1.15
Slope of age parity	-0.22 (0.04)	-5.08**	0.04 (0.04)	0.91	-0.07 (0.03)	-2.00*
Slope of genetic relatedness			0.89 (0.09)	9.85**	0.20 (0.07)	3.04**
Slope of subjective similarity					0.24 (0.01)	19.94**
Slope of skill similarity					0.05 (0.01)	4.38**
Random effect	0.67		0.62		0.35	
Additionally explained variance	3%		8%		43%	
Model improvement	$X^2 = 54.56, df = 5, p < .01$		$X^2 = 235.84, df = 7, p < .01$		$X^2 = 1893.30, df = 20, p < .01$	

Note. * $p < .05$, ** $p < .01$.

The continuative hypothesis stated that different kinds of similarity additionally increase emotional closeness even in the absence of genetic relatedness. Therefore, the psychological similarity facets were added in a third step as additional predictors of emotional closeness (cf. step 3 in table 12 and 13). The inclusion of two similarity variables³² caused a large model improvement, an strong increase in explained variance and a decrease in the coefficient of genetic relatedness and age parity. This indicates that self-ratings of similarity mediated parts of the relationship between genetic relatedness or age parity, respectively, and emotional closeness. The average associations between subjective similarity and emotional closeness were $b = 0.41$ (YAS) and $b = 0.24$ (FS) (each controlled for age parity, genetic relatedness and skill similarity). The average associations between skill similarity and emotional closeness were somewhat lower, $b = 0.06$ (YAS) and $b = 0.05$ (FS) (each controlled for age parity, genetic relatedness and skill similarity), but still significantly different from zero. In conclusion, all three kinds of self-rated similarity were positively associated with emotional closeness (see footnote 32). Subjective similarity showed the strongest

³² Physical similarity was not included in this model because of the strong covariation with genetic relatedness (YAS $b = 3.47, r = .57$; FS $b = 5.09, r = .61$). The simple association between physical similarity and emotional closeness was $b = 0.17 (r = .23)$ in the young adult study and $b = 0.15 (r = .30)$ in the Family study. Note that physical similarity was scaled 1 to 5 in the young adult study and 1 to 7 in the Family study, but not z-standardized for statistical reasons explained on page 95 and 96. Emotional closeness was z-standardized in both studies.

association with emotional closeness, but even facets of psychological similarity which are much less confounded with emotional closeness were significantly related to it. Thus, subjective similarity, physical similarity and skill similarity were correlates of emotional closeness above and beyond effects of genetic relatedness. This indicates a mediational function of similarity in the genetic relatedness-emotional closeness-relationship and is topic of the next subsection.

Psychological similarity as mediator of the genetic relatedness-emotional closeness-relationship. The previously reported decrease of the slope of genetic relatedness through the introduction of similarity was a first confirmation that similarity mediates parts of the genetic relatedness – emotional closeness – relationship. Stronger evidence is provided by the multilevel mediation approach by Bauer and colleagues (2006), although these analyses are rather new and not fully established yet. In principle, mediation analyses are performed while taking the dependencies between data points into account, which produces less biased estimates of effects. For applying the approach by Bauer and colleagues, the data file needed to be restructured (for detailed information see Bauer et al., 2006), what has been done accordingly for each sample and for each of the three proposed mediators, i.e., subjective similarity, physical similarity, and skill similarity, separately. The prerequisites for applying multilevel mediation analyses (Bauer et al., 2006, p. 144-145) were tested and were given.

The most important coefficients of the mediational analyses in table 14 are in rows “Indirect effect” and “c’ Direct effect”. The indirect effect specifies the indirect path from genetic relatedness over similarity to emotional closeness. The direct effect c’ represents the effect of genetic relatedness on emotional closeness while taking the mediating function of similarity into account. The sum of the indirect and the direct effect is the total effect, which corresponds to the observed, unmediated effect of genetic relatedness on emotional closeness and thus did not vary between the three mediators (except for rounding errors). Subjective similarity mediated most of the association between genetic relatedness and emotional closeness, because the indirect effect from genetic relatedness on emotional closeness (over subjective similarity) was much larger (YAS: 0.24; FS: 0.50) than the direct effect (YAS: 0.05; FS: 0.28) and therefore almost as large as the unmediated total effect. The mediational effect was even stronger for physical similarity (YAS: 0.58; FS: 0.71), whereas skill similarity mediated only about half of the genetic relatedness – emotional closeness relationship in the Young adult study and somewhat less in the Family study.

Table 14

Young adult and Family study: multilevel mediation analyses with genetic relatedness as predictor and emotional closeness as criterion

Mediator:	Young adult study						Family study					
	Subjective similarity		Physical similarity		Skill similarity		Subjective similarity		Physical similarity		Skill similarity	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
c': Direct effect	0.05 (0.05)	1.02	-0.30 (0.07)	-3.97**	0.14 (0.06)	2.18*	0.28 (0.06)	4.93**	0.09 (0.08)	1.18	0.56 (0.06)	9.15**
Indirect effect ^a	0.24		0.58		0.15		0.50		0.71		0.21	
σ_{ab}	-0.02		-0.01		0.01		-0.01		-0.001		0.03	
d_m Intercept of each similarity mediator	2.96 (0.03)	92.12**	1.51 (0.03)	53.26**	2.78 (0.03)	91.10**	3.26 (0.08)	40.87**	1.47 (0.06)	25.30**	3.27 (0.07)	48.45**
d_y Intercept of emotional closeness	1.46 (0.04)	38.71**	2.35 (0.03)	77.33**	1.83 (0.04)	42.42**	1.84 (0.04)	42.45**	2.48 (0.03)	81.90**	2.03 (0.04)	45.42**
a: Slope genetic relatedness - similarity	0.67 (0.11)	6.01**	3.48 (0.11)	23.29**	0.49 (0.09)	5.14**	2.02 (0.20)	10.32**	5.06 (0.20)	25.64**	1.09 (0.16)	6.73**
b: Slope similarity - emotional closeness	0.39 (0.01)	37.14**	0.17 (0.01)	14.30	0.28 (0.01)	22.21**	0.25 (0.01)	28.77**	0.14 (0.01)	14.05**	0.19 (0.01)	18.47**

Note. ^a Indirect effect = $ab + \sigma_{ab}$; Total effect = $ab + \sigma_{ab} + c'$; * $p < .05$, ** $p < .01$.

Although there were some non-significant direct effects, conclusions of full mediation should be drawn carefully, because of the novelty of this analytic approach and the inconsistency between samples. To sum up, subjective similarity, physical similarity and skill similarity were differently related with genetic relatedness and emotional closeness. Physical similarity was the strongest cue for genetic relatedness, whereas subjective similarity showed great conceptual (and empirical) overlap with emotional closeness. Hence, both were the strongest mediators of the genetic relatedness – emotional closeness relationship, but for different reasons. Self-rated similarity in skills was a weaker, but across both studies still important mediator. All three were positively related with genetic relatedness as well as emotional closeness and mediated that relationship to a certain extent. The results were consistent with and confirmed the previously presented results from the stepwise multilevel regressions. They complemented the foregone results insofar as they allowed a comparison of the different types of similarity.

The function of similarity in closeness regulation has been examined so far, now its role in the association between age parity and perceived reciprocity is addressed.

Prediction of perceived reciprocity. Identical to the models with emotional closeness as criterion, multilevel random coefficient models with perceived reciprocity as criterion were specified and a stepwise procedure with an above-and-beyond logic was applied: 1) the competing predictor variable –genetic relatedness- was entered, 2) the assumed predictive variable –age parity- was added and 3) similarity variables were included to inspect the incremental value of these predictors. In the Young adult study, age parity explained additional 4 % of variance in perceived reciprocity after genetic relatedness was added as predictor (cf. table 15). The average association between age parity and perceived reciprocity was $b = 0.26$ -almost one standard deviation ($SD = 0.29$)- on a z-standardized scale, while controlling for effects of genetic relatedness. People perceived relationships as more balanced with increasing level of parity in age between relationship partners. Mean reciprocity was below the average (-0.16) for relationships least equal in age and above average for same-aged relationships ($0.10 = -0.16 + 1 * 0.26$), while controlling for effects of genetic relatedness. When comparing those two coefficients, one has to keep in mind, that although both parameters were equally scaled, ranging from zero to one, relationships in this sample only achieved values of 0.5 for genetic relatedness. This means, than one has to bisect the coefficient of genetic relatedness ($-0.41 * 0.5 = -0.21$) and conclude, that both effects on perceived reciprocity were about the same size in the Young adult study.

Table 15

Young adult study: multilevel stepwise model building for regressing perceived reciprocity on genetic relatedness, age parity, and psychological similarity (level 1)

Effect	Step 1		Step 2		Step 3	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
Intercept	0.07 (0.02)	3.29**	-0.16 (0.05)	-3.26**	-0.14 (0.05)	-2.85**
Slope of genetic relatedness	-0.69 (0.07)	-9.55**	-0.41 (0.08)	-5.15**	-0.37 (0.10)	-3.78**
Slope of age parity	/	/	0.26 (0.05)	5.10**	0.21 (0.04)	4.04**
Slope of subjective similarity	/	/	/	/	0.11 (0.02)	6.47**
Slope of physical similarity	/	/	/	/	-0.04 (0.02)	-2.42*
Slope of skill similarity	/	/	/	/	0.02 (0.02)	1.03
Random effect	0.70		0.67		0.60	
Additionally explained variance	6%		4%		12%	
Model improvement	$X^2 = 162.35, df = 4, p < .01$		$X^2 = 75.25, df = 3, p < .01$		$X^2 = 1248.56, df = 18, p < .01$	

Note. * $p < .05$, ** $p < .01$.

The effect of age parity was slightly larger in the Family study ($b = 0.35$, cf. table 16), while the effect of genetic relatedness was controlled for and was comparable in size to the Young adult study. The inclusion of age parity in the prediction of perceived reciprocity significantly improved the model and explained additional 8% of variance in perceived reciprocity. Relationships with persons unequal in age were below average reciprocal (-0.19), whereas relationships with equal persons were above average in reciprocity ($0.16 = -0.19 + 1 * 0.35$). This difference was larger than one standard deviation ($SD = 0.29$). Again, the more parity in age existed between relationship partners the more the target perceived the relationship as balanced. Hence, results of both studies validated that perceived reciprocity increased with increasing level of age parity, even when controlling for competing predictors. The substantial association between age parity and perceived reciprocity showed that reciprocity not only differentiated between romantic partners, kin and cooperative relationships, but also differs within the categories of cooperative partners and kin.

Table 16

Family study: multilevel stepwise model building for regressing perceived reciprocity on genetic relatedness, age parity, and psychological similarity (level 1)

Effect	Step 1		Step 2		Step 3	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
Intercept	0.09 (0.02)	3.79**	-0.19 (0.05)	-3.55**	-0.15 (0.05)	-2.92**
Slope of genetic relatedness	-0.74 (0.08)	-9.59**	-0.44 (0.08)	-5.35**	-0.58 (0.09)	-6.21**
Slope of age parity	/	/	0.35 (0.06)	6.06**	0.29 (0.05)	5.28**
Slope of subjective similarity	/	/	/	/	0.08 (0.01)	6.15**
Slope of physical similarity	/	/	/	/	-0.02 (0.01)	-1.41
Slope of skill similarity	/	/	/	/	0.05 (0.01)	3.59**
Random effect	0.65		0.60		0.51	
Additionally explained variance	8%		8%		15%	
Model improvement	$X^2 = 186.06, df = 5, p < .01$		$X^2 = 168.67, df = 7, p < .01$		$X^2 = 355.53, df = 33, p < .01$	

Note. * $p < .05$, ** $p < .01$.

As a first test of the hypothesized mediational function of psychological similarity, all three items were entered simultaneously into the models in a third step (cf. last columns in table 15 and 16). They significantly improved the models and increased the explained variance by 12% (Young adult study) and 15% (Family study). Subjective and skill similarity were positively related to perceived reciprocity (the latter was not significantly different from zero, though, in the Young adult study), when controlling for effects of genetic relatedness, age parity and physical similarity. Physical similarity was negatively related to perceived reciprocity (being only marginally significant in the Family study). Positive associations among age parity, perceived reciprocity and subjective as well as skill similarity stood in contrast to unanimous negative associations among physical similarity and age parity and perceived reciprocity (cf. table 15 and 16 and zero-order correlations³³). Very small changes in the coefficients of age parity and genetic relatedness through the insertion of similarity indicated that similarity mediated the age parity-perceived reciprocity-association only weakly. This

³³ Bivariate associations between age parity and each of the three similarity items were: subjective similarity YAS $r = .01$; FS $r = -.06$, physical similarity YAS $r = -.31$; FS $r = -.29$, and skill similarity YAS $r = -.01$; FS $r = .01$. Bivariate associations between each of the three similarity items and perceived reciprocity were: subjective similarity YAS $r = .11$; FS $r = .13$, physical similarity YAS $r = -.09$; FS $r = -.05$, and skill similarity YAS $r = .04$; FS $r = .13$.

was further pursued with the multilevel mediation approach by Bauer and colleagues (2006).

Consistently across both studies, all three kinds of similarity did not mediate the age parity – perceived reciprocity relationship (cf. table 17). The indirect effects hardly differed from zero. Thus, the direct effects were almost identical with the total, i.e., unmediated effects. As indicated by the bivariate zero-order correlations (see footnote 33) and confirmed in the multilevel models in paths *a* and *b*, age parity was unrelated to subjective and skill similarity and physical similarity nearly unrelated to perceived reciprocity. These types of similarity shared some variance with perceived reciprocity and age parity, respectively, but they did not share the unique variance between age parity and perceived reciprocity. Age parity as well as skill similarity and subjective similarity were positively but independently from each other related to perceived reciprocity. Hence, similarity could not be confirmed as cue of age parity or mediator of the age parity-perceived reciprocity association.

Combining the results of the stepwise and the mediation models for emotional closeness and perceived reciprocity, I conclude that physical, skill and subjective similarity were positively related to genetic relatedness and emotional closeness and mediated part of their relationship. However, physical similarity was negatively related to age parity and perceived reciprocity, whereas subjective and skill similarity were weakly positively related to reciprocity, but all three types of similarity did not mediate the age parity-perceived reciprocity-relationship. This led to the conclusions, that:

- subjective, physical, and skill similarity covary with emotional closeness
- but subjective and skill similarity are positively related to reciprocity, whereas physical similarity is negatively correlated
- physical similarity is a cue for genetic relatedness, only
- though subjective and skill similarity are also cues for genetic relatedness, they correlate positively with reciprocity and therefore possess a complex role in personal relationships.

Table 17

Young adult and Family study: multilevel mediation analyses with age parity as predictor and perceived reciprocity as criterion

Mediator:	Young adult study						Family study					
	Subjective similarity		Physical similarity		Skill similarity		Subjective similarity		Physical similarity		Skill similarity	
	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio	Coefficient (SE)	t-ratio
c': Direct effect	0.32 (0.04)	8.47**	0.31 (0.04)	8.03**	0.33 (0.04)	8.59**	0.38 (0.05)	8.19**	0.35 (0.05)	7.64**	0.37 (0.04)	8.16**
Indirect effect ^a	0.00		0.01		0.00		0.00		0.00		-0.02	
σ_{ab}	0.002		-0.00		-0.004		0.02		0.02		0.02	
d_m Intercept of each similarity mediator	3.05 (0.05)	57.53**	2.98 (0.06)	48.10**	2.90 (0.05)	60.05**	3.77 (0.10)	39.25**	3.30 (0.11)	31.42**	3.42 (0.09)	38.64**
d_y Intercept of perceived reciprocity	2.80 (0.05)	52.97**	3.09 (0.05)	65.41**	2.85 (0.05)	53.47**	2.83 (0.06)	50.56**	3.11 (0.05)	65.21**	2.85 (0.05)	52.62**
a: Slope age parity - similarity	0.02 (0.06)	0.33	-1.23 (0.07)	-18.80**	-0.06 (0.05)	-1.21	-0.29 (0.10)	-2.89**	-1.52 (0.10)	-14.52**	0.03 (0.09)	0.37
b: Slope similarity - perceived reciprocity	0.09 (0.01)	7.28**	-0.01 (0.01)	-0.99	0.07 (0.01)	5.57**	0.07 (0.01)	6.82**	-0.01 (0.01)	-0.93	0.07 (0.01)	7.49**

Note. ^a Indirect effect = $ab + \sigma_{ab}$; Total effect = $ab + \sigma_{ab} + c'$, * $p < .05$, ** $p < .01$.

Family and gender effects. The before reported results described general mechanisms of relationship regulation. This section addresses individual differences through the examination of different family types and the comparison of men and women. A two level random coefficient model was specified to address family and gender differences in one step. First, emotional closeness was predicted by gender-specific coefficients of genetic relatedness, subjective and skill similarity on level 1. On level 2, five dummy coded variables for the five family types *motivated childless*, *involuntarily childless*, *patchwork family without a common child*, *patchwork family with a common child*, and *traditional family* were included as moderators of the level-1 effects (cf. appendix F.3 for the model equations). Only the fixed coefficients of this model are reported (table 18). Although post-hoc comparison of coefficients were carried out, family differences should be interpreted cautiously, because of complexity of the model and the multitude of estimated coefficients (Raudenbush & Bryk, 2002; J. B. Nezlek, personal communication, April 2007). In general, women's mean emotional closeness seemed somewhat lower than men's, however this effect was not statistically significant ($X^2=2.61$, $df=1$ $p > .10$).

Table 18

Family and gender differences in associations among subjective similarity, skill similarity, genetic relatedness, and emotional closeness

Predictors	Motivated childless		Involuntarily childless		Patchwork without common child		Patchwork with common child		Traditional	
	M	W	M	W	M	W	M	W	M	W
Intercept	0.15	-0.07	-0.15	0.16	0.28*	0.03	0.16	0.00	0.22**	-0.19*
Subjective similarity	0.24**	0.24**	0.24**	0.21**	0.27**	0.19**	0.23**	0.28**	0.24**	0.30**
Skill similarity	-0.01	0.07**	0.04	0.06*	-0.04	0.05	0.09*	0.04	0.06*	0.10**
Genetic relatedness	-0.01	-0.24	0.42**	0.37 [†]	-0.01	0.10	0.29*	0.43**	0.47**	0.23

Note. Coefficients represent unstandardized slope coefficients (*SE* are not reported for the sake of clarity) for subjective similarity, skill similarity, and genetic relatedness, emotional closeness was z-standardized, thus non-significant intercepts were expected, M = men, W = women, [†] $p < .10$, * $p < .05$, ** $p < .01$.

Motivated childless persons and persons in patchwork families without a common child showed the smallest (and not significantly different from zero) association between genetic relatedness and emotional closeness, while controlling for effects of similarity. On the other hand, the slope of subjective similarity on emotional closeness

did not differ between family types or sexes or interactions of both and was stronger than the slope of skill similarity.

To illustrate these findings, figure 5 (for men) and 6 (for women) show the predicted values of emotional closeness for kin and non-kin and compare relationships being one standard deviation below the mean subjective similarity and one standard deviation above the mean. The predicted scores of kin and non-kin did not differ for motivated childless persons and people in patchwork families without a common child. This illustrates the non-significant slope coefficients for genetic relatedness (cf. table 18) and means that these two groups did not differentiate between kin and non-kin once similarity was taken into account. All family types showed differences in predicted closeness between similar and dissimilar relationship persons, exemplifying the significant effect of subjective similarity shown in table 18. Emotional closeness of relationships in traditional families, patchwork families with a common child and involuntarily childless persons differed by genetic relatedness and subjective similarity (as indicated by the significant slope coefficients in table 18). Relationships with similar kin were rated closest, whereas relationships with dissimilar non-kin were rated least close. Interestingly, relationships with similar non-kin were consistently closer than relationships with dissimilar kin. This hints the possibility that similar non-kin can become as close as kin, implying that perception of similarities can substitute relatedness. As in previous analysis, involuntarily childless persons, patchwork families with a common child and traditional families were rather similar to each other. On the other hand, motivated childless couples and patchwork families without a common child were comparable in perceiving kin and non-kin as equally close.

Men and women from patchwork families with a common child and both kinds of childless couples were comparable as indicated by the same patterns in figure 5 and 6 and similar regression coefficients (cf. table 18). The differences between men and women in patchwork families without a common child and traditional families were unexpected, especially that women from traditional families did not differentiate kin from non-kin by emotional closeness. The emotional closeness in their relationships was more strongly correlated to subjective and skill similarity which might have mediated most of the effect of genetic relatedness.

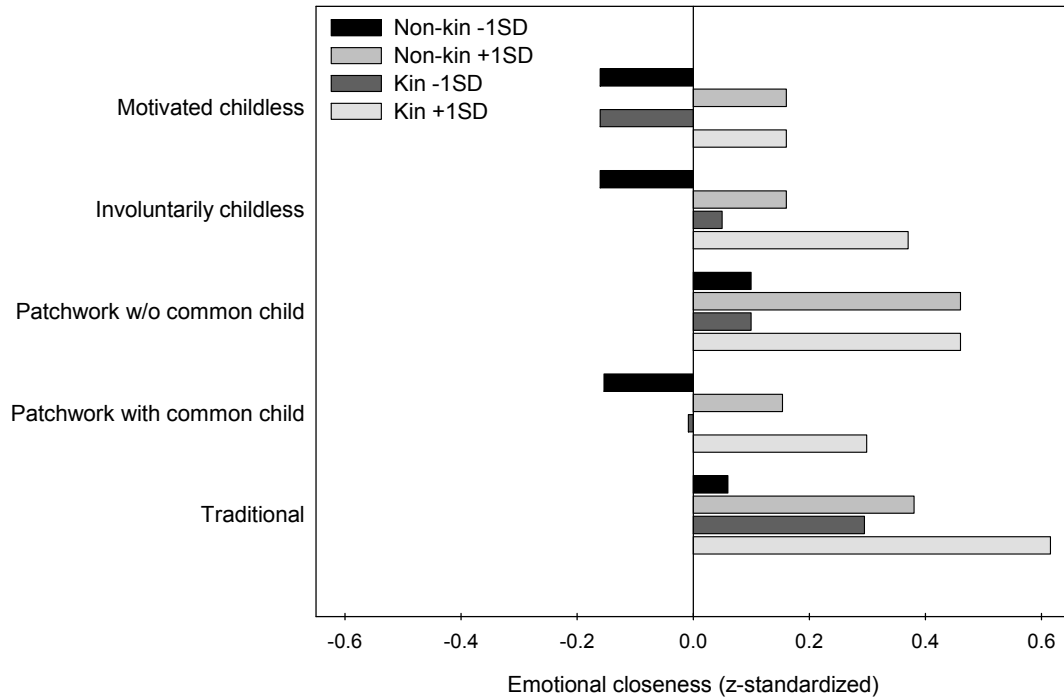


Figure 5. Family type differences in predicted scores of emotional closeness (men)

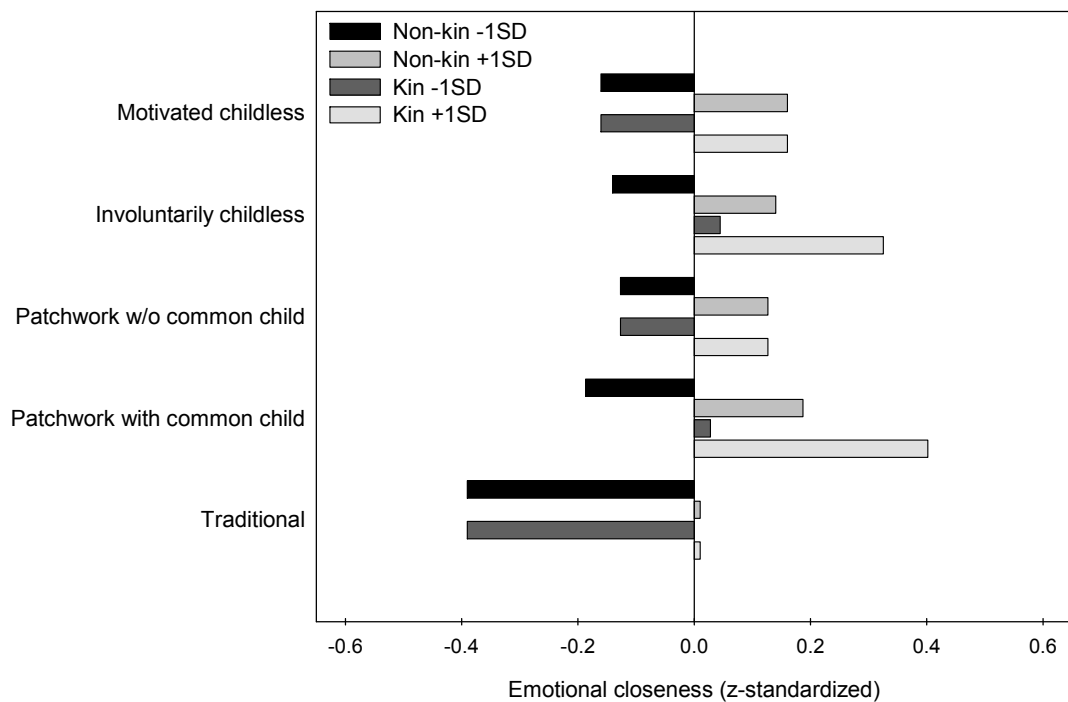


Figure 6. Family type differences in predicted scores of emotional closeness (women)

In a second model, perceived reciprocity was predicted by gender-specific coefficients of age parity, subjective, physical and skill similarity on level 1. On level 2, five dummy coded variables for the five family types were included as moderators of the level-1 effects (cf. appendix F.4 for the model equations). All three facets of similarity were related to perceived reciprocity in the predicted direction and the strength of the association differed between the family types and men and women (table 19). The clustering of effects in certain family types replicated previous patterns. Participants from involuntarily childless couples, patchwork families with a common child, and traditional families perceived relationships as more reciprocal the more similar they were in age with the relationship person. This did not apply for participants from motivated childless couples and patchwork families without a mutual child (except for men from the latter). Regarding the effects of the three facets of similarity the results were somewhat more heterogeneous and are illustrated for subjective similarity in figure 7 and 8.

Table 19

Family and gender differences in associations among subjective similarity, physical similarity, skill similarity, age parity, and perceived reciprocity

Predictors	Motivated childless		Involuntarily childless		Patchwork without common child		Patchwork with common child		Traditional	
	M	W	M	W	M	W	M	W	M	W
Intercept	-0.16	0.13	-0.03	-0.30*	-0.23*	-0.38*	-0.08	-0.23	-0.13	-0.20
Subjective similarity	0.05	0.09*	0.12**	0.14**	0.09	0.13*	0.07*	0.05	0.06	0.06 [†]
Physical similarity	-0.03	-0.09**	-0.11**	-0.05	-0.06	-0.09 [†]	-0.04*	-0.10*	-0.07*	-0.07**
Skill similarity	0.05	0.01	0.04	0.07	-0.01	0.02	0.04	0.08*	0.08**	0.09**
Age parity	0.07	0.17	0.26**	0.24*	0.42**	0.26	0.21 [†]	0.31*	0.22**	0.28**

Note. Coefficients represent unstandardized slope coefficients (*SE* are not reported for the sake of clarity) for subjective similarity, physical similarity, skill similarity, and age parity, perceived reciprocity was z-standardized, thus non-significant intercepts were expected, M = men, W = women, [†] $p < .10$, * $p < .05$, ** $p < .01$.

Comparable to the predicted scores of emotional closeness, relationships in traditional families, patchwork families with a common child and involuntarily childless couples differed in perceived reciprocity by age parity and subjective similarity. Relationships were most balanced if the relationship partner was perceived as equal in

age and subjectively similar. On the other hand, relationships were least balanced with dissimilar and unequal relationship partners. Again, motivated childless persons and persons in patchwork families without a common child “used” only one characteristic of the relationship, to establish the level of reciprocity. This became apparent in the equally sized bars in figure 7 and 8. In case of motivated childless men, neither age parity nor subjective similarity correlated with perceived similarity, all relationships were seen as average reciprocal (the value 0 represents average reciprocity on the z-standardized scale, thus no bars were plotted, cf. figure 7).

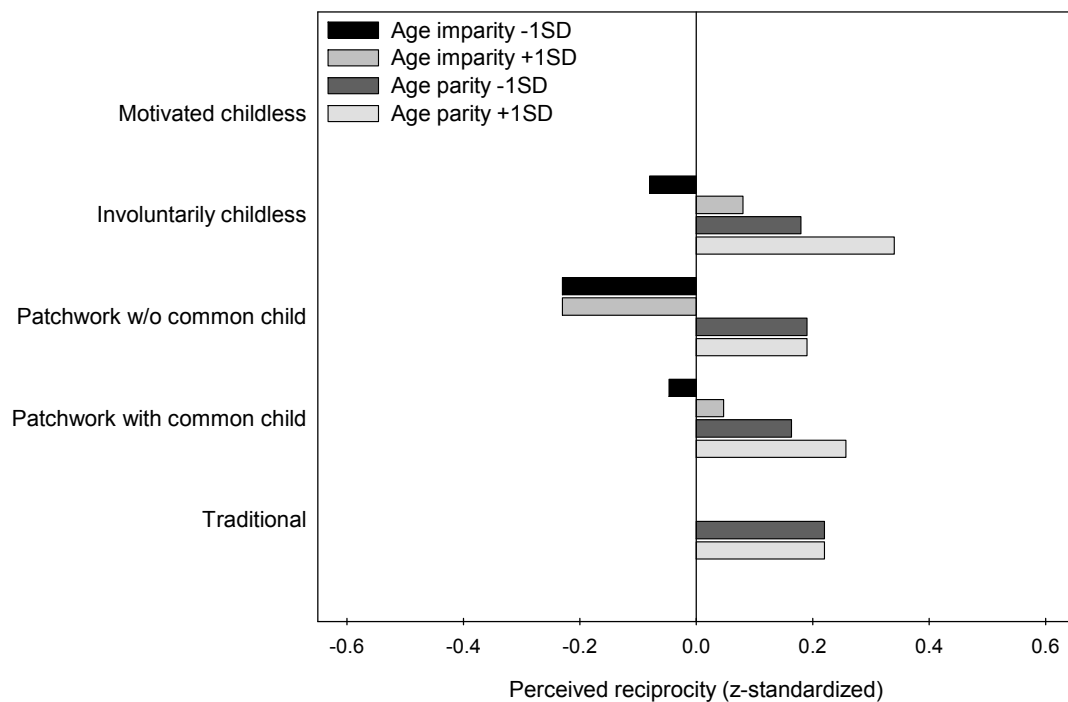


Figure 7. Family type differences in predicted scores of perceived reciprocity (men)

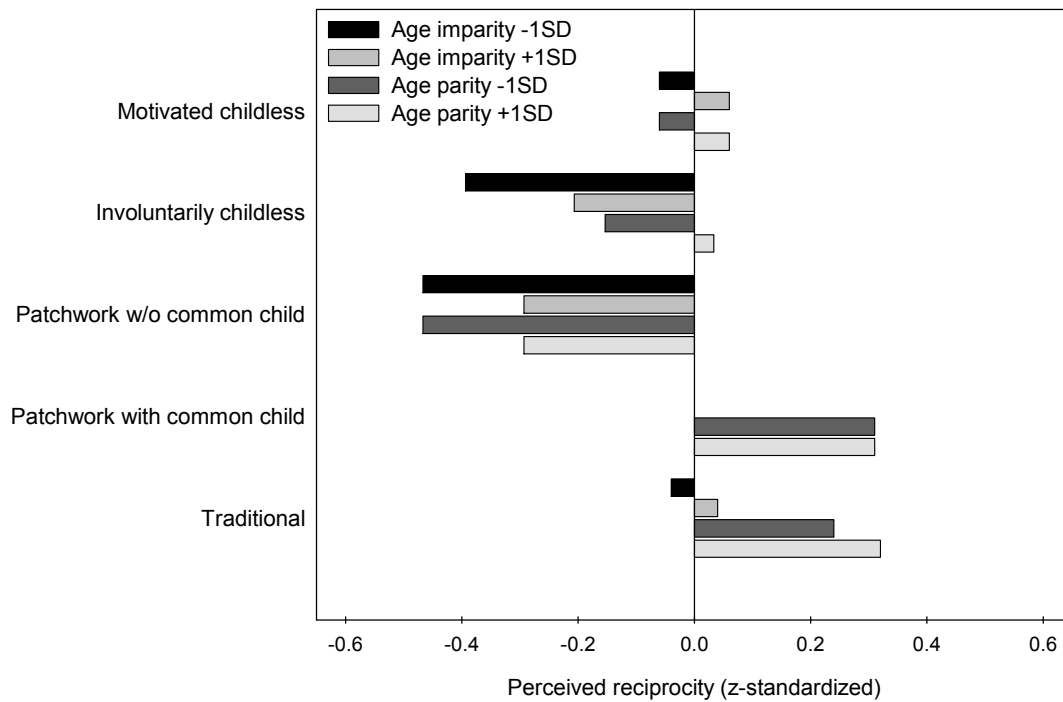


Figure 8. Family type differences in predicted scores of perceived reciprocity (women)

In sum, the general associations among genetic relatedness, psychological similarity, and emotional closeness on the one hand and age parity, psychological similarity, and perceived reciprocity on the other hand were further qualified by addressing family type and gender differences. Men and women did not differ much in the associations (slopes) with or the mean levels (intercepts) of emotional closeness and perceived reciprocity. However, there were consistent differences between persons living in different family types. In general, persons in traditional families were comparable to persons in patchwork families **with** a common child and involuntarily childless families. Patchwork families **without** a common child were similar to motivated childless families. Relationships from persons from the first three family types differed in emotional closeness and perceived reciprocity through genetic relatedness **and** subjective similarity or age parity **and** similarity, respectively. Relationships from the latter two groups differed in emotional closeness and perceived reciprocity only by similarity or by age parity, respectively. Hence, again a reliable clustering of the family types occurred and will be discussed in the last part of the thesis.

Social similarity. The associations among gender homogeneity, similarity of parental or marital status and emotional closeness and perceived reciprocity, respectively were analyzed with multilevel models using dummy coded homogeneity variables (1 = homogeneous relationship in the particular characteristic) as predictors and unstandardized outcome variables emotional closeness and perceived reciprocity (range 1 – 4, as before). In the Young adult study, same-sex relationships were not emotionally closer ($b = -0.02$, $SE = 0.02$, $p > .05$), but more reciprocal ($b = 0.10$, $SE = 0.02$, $p < .01$) than relationships heterogeneous in gender (average closeness 2.67 ($SE = 0.02$); average reciprocity 3.26, $SE = 0.02$). Men and women differed in emotional closeness in same-sex relationships, but not in opposite-sex relationships. While men were less close (-0.19 , $SE = 0.05$, $p < .01$), women felt closer (0.22 , $SE = 0.05$, $p < .01$) in same-sex relationships. Thus, both men and women were closer in relationships with females ($b = 0.07$, $SE = 0.02$, $p < .01$) No differences between men and women occurred for the association between gender homogeneity and perceived reciprocity. Parental and marital status was not assessed in the Young adult study.

Participants of the Family study reported less close relationships with same-sex persons ($b = -0.12$, $SE = 0.02$, $p < .01$) and persons with the same parental status ($b = -0.09$, $SE = 0.03$, $p < .01$). Relationships were closer, if the relationship partner had the same marital status like they did ($b = 0.09$, $SE = 0.03$, $p < .01$). However, homogeneous relationships were perceived as more reciprocal (gender $b = 0.04$, $SE = 0.02$, $p = .08$, parental status $b = 0.10$, $SE = 0.03$, $p < .01$, marital status $b = 0.09$, $SE = 0.03$, $p < .01$). Considering both studies, hypotheses were confirmed that (a) social similarity was positively associated with the amount of perceived reciprocity in a relationship and (b) similarity in one facet of the life style, i.e., being married or not, was positively related to emotional closeness. However, same-sex relationships were less close and this might be attributable to the fact that both men and women report generally closer relationships with females. This gender effect and effects of the family type were tested using gender specific predictors and including the type of family as level 2 moderator of the level 1 associations (cf. p. 96 in methods section).

Men in all family types were less close in same-sex relationships (table 20), which confirmed the finding of the Young adult study. No other differences between men and women were detected, but family type differences occurred for relationship similarity in parental and marital status. Childless persons were closer with childless relationship partners, while persons from families with children were less close with persons sharing the same parental status. This unexpected finding indicates that people feel closer to persons without a child irrespective whether they have a child on their own or not. Since this result contradicts environmental assortment and social

homophily theory, further confirmation will be needed. Similarity in marital status was related to greater emotional closeness for childless persons and persons in patchwork families without a common child. Since the percentage of married participants differed considerably between family types (see methods section), this effect is not attributable to higher assortment in any of the family types (cf. table 10).

Table 20
Family and gender differences in the prediction of emotional closeness by social similarity characteristics

Predictors	Motivated childless		Involuntarily childless		Patchwork without common child		Patchwork with common child		Traditional	
	M	W	M	W	M	W	M	W	M	W
Intercept	2.70**	2.58**	2.58**	2.77**	3.00**	2.84**	3.18**	3.16**	3.14**	2.96**
Similar										
Gender	-0.22**	-0.05	-0.21**	-0.04	-0.22**	0.09	-0.16*	-0.14*	-0.21**	0.06
Parental status	0.19**	0.12	0.15 [†]	0.16*	-0.16	-0.23 [†]	-0.27**	-0.43**	-0.20**	-0.32**
Marital status	0.21**	0.23**	0.22*	0.14*	0.22 [†]	0.22*	0.06	0.09	-0.04	-0.02

Note. Coefficients represent unstandardized slope coefficients (*SE* are not reported for the sake of clarity) for social similarity characteristics, M = men, W = women, [†] $p < .10$, * $p < .05$, ** $p < .01$.

The general positive association between social similarity and perceived reciprocity was not meaningfully moderated by type of family. No consistent gender or family type differences were found (table 21). This led to the conclusion that people varied in their preference of relationships with people similar in life style, but this preference was not well explained by the rather coarse grained distinction by family type or gender.

Table 21
Family and gender differences in the prediction of perceived reciprocity by social similarity characteristics

Predictors	Motivated childless		Involuntarily childless		Patchwork without common child		Patchwork with common child		Traditional	
	M	W	M	W	M	W	M	W	M	W
Intercept	3.15**	3.32**	3.20**	3.29**	2.94**	3.21**	3.10**	3.10**	3.23**	3.23**
Similar										
Gender	-0.01	0.03	0.06	-0.02	0.20 [†]	-0.02	0.08	0.08	-0.00	0.04
Parental status	0.27*	0.10	0.07	-0.03	0.23 [†]	0.10	0.20 [†]	0.22	-0.06	0.04
Marital status	0.06	0.17**	0.13	0.08	0.11	-0.05	0.15 [†]	0.01	0.20**	0.04

Note. Coefficients represent unstandardized slope coefficients (*SE* are not reported for the sake of clarity) for social similarity characteristics, M = men, W = women, [†] $p < .10$, * $p < .05$, ** $p < .01$.

3.1.3 Addressing the question of causality

The so far reported results from both cross-sectional studies do not allow causal interpretation. The question of causality in the associations among psychological similarity, emotional closeness, and perceived reciprocity was addressed in two experimental studies and a longitudinal extension of the Family study. First, results from both experiments manipulating skill similarity between and within individuals are presented. In Similarity study A, siblings, friends, and colleagues were compared, while friends with strangers were contrasted in Similarity study B. Within every study, analyses from the between-subjects design precede the results from the within-subjects design. Second, causal inferences are drawn from longitudinal network analyses in the Family study.

Study A The experimental manipulation of skill similarity in siblings, friends and colleagues: Between-subject differences. A 3 x 3 mixed between-within subjects multivariate³⁴ analysis of variance was performed on three dependent variables: emotional closeness, negative emotions after non-reciprocity and subjective similarity. Between-subject factor was experimental condition (likeness condition, difference condition and control condition) and within-subjects factor was type of relationship (friend, sibling, and colleague). SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The dependent variables met the prerequisites of normality³⁵, linearity, homogeneity of the variance-covariance, multicollinearity and reliability. With the use of Wilks' criterion there was a significant main effect of the type of relationship, $F(6, 461) = 85.03, p < .01$, but not of the experimental condition, $F(6, 928) = 0.94, p > .05$, or the interaction of relationship type and experimental condition, $F(12, 922) = 0.71, p > .05$ (table 22 provides means and standard deviations). Virtually identical results were achieved, when controlling for possible effects of age of participant, gender of participant or sex homogeneity of the relationship. In addition, the order of the relationships, i.e., friend, sibling, colleague or sibling, friend, colleague, and so on, did not affect ratings of emotional closeness, negative emotions or similarity either.

That means, there was no effect of the manipulation, but across all three conditions friends were rated as emotionally closer, more similar and with less negative emotions after non-reciprocity than siblings and colleagues and siblings were evaluated emotionally closer, more similar and with less negative emotions after non-reciprocity than colleagues (all comparisons significant at $p < .01$, except for the comparison of siblings and colleagues on similarity and friends and siblings on negative emotions). Figure 9 illustrates the main effect of relationship type for similarity, emotional closeness and negative emotions.

³⁴ A multivariate analysis of variance was chosen, because emotional closeness, similarity and negative emotions were mostly moderately correlated (correlation between emotional closeness and similarity $r_{\text{sibling}} = .54, r_{\text{friend}} = .40, r_{\text{colleague}} = .44$; emotional closeness and negative emotions $r_{\text{sibling}} = -.21, r_{\text{friend}} = -.19, r_{\text{colleague}} = -.21$; similarity and negative emotions $r_{\text{sibling}} = -.16, r_{\text{friend}} = -.09, r_{\text{colleague}} = -.08$) and to decrease Type I error. Univariate analysis of variance showed the same results.

³⁵ Emotional negativity was slightly left-skewed with skewness $< .61$ and kurtosis $< .89$, which is acceptable according to Tabachnick and Fidell (2007). Q-Q-diagrams were satisfactory.

Table 22

Similarity study A: means and standard deviations of similarity, emotional closeness and negative emotion at T1

	Friends			Siblings			Colleagues		
	L	D	C	L	D	C	L	D	C
Dependent variables									
Similarity	4.27 (1.20)	4.37 (1.36)	4.28 (1.19)	3.49 (1.46)	3.57 (1.37)	3.46 (1.42)	3.63 (1.22)	3.70 (1.14)	3.53 (1.38)
Emotional closeness	4.74 (1.14)	4.90 (1.09)	4.69 (1.37)	4.31 (1.47)	4.31 (1.44)	4.20 (1.55)	3.46 (1.16)	3.34 (1.07)	3.41 (1.32)
Negative emotions after non-reciprocity	2.94 (1.57)	3.08 (1.83)	2.88 (1.75)	2.95 (1.75)	2.99 (1.85)	2.96 (1.66)	3.41 (1.67)	3.36 (1.63)	3.24 (1.72)

Note. L = Likeness condition, D = Difference condition, C = Control condition.

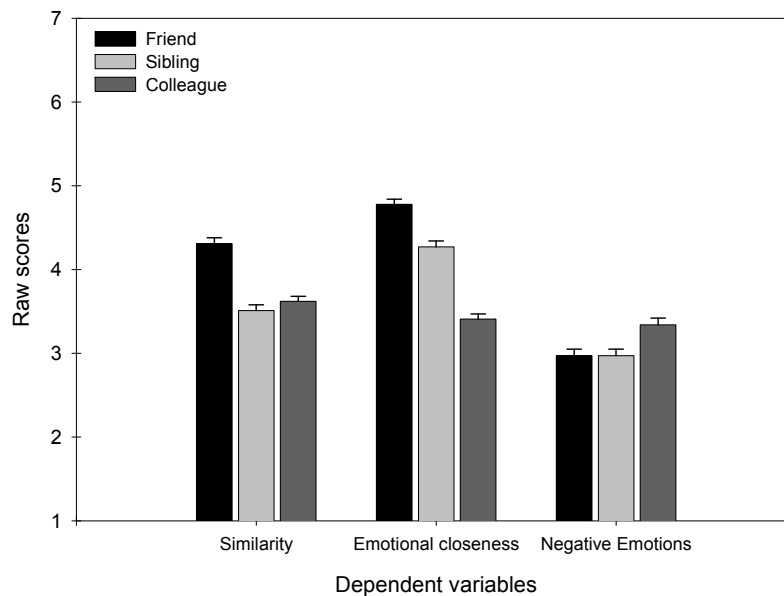


Figure 9. Means of similarity, emotional closeness, and negative emotions for friends, siblings and colleagues

The expectations of reciprocal behavior were analyzed using cross tabulations separate for each relationship type. Again, there were no differences between experimental conditions (friend $X^2 = 0.78$, $df = 4$, $p > .05$; sibling $X^2 = 5.06$, $df = 4$, $p > .05$; colleague $X^2 = 4.46$, $df = 4$, $p > .05$). In all three conditions, the least compensation was expected most often as return for a favor (on average in 56% of relationships) and the quid pro quo option was chosen in 28% of the relationships.

Since no differences between the three experimental groups were found in similarity, manipulating similarity with a between-subject approach in relationships with siblings, in relationships with colleagues, and in friendships had to be judged as unsuccessful. No differences between manipulation conditions were found for emotional closeness, negative emotions after non-reciprocity or expectations of reciprocal behavior. Although the instruction did not ask for the best friend (just for a residential proximal friend), probably the best friend was chosen in this experiment. Contrary to the evolutionary model of relationship regulation, friends, and not siblings, were rated closest, most similar and experiencing the least negative emotions towards them. Still, siblings were closer, more similar and less emotionally negative than unrelated colleagues.

Study A The experimental manipulation of skill similarity in siblings, friends and colleagues: Within-subject differences. While focusing on similarities or differences varied between persons before, it now varied within-person and across time. First, a 3 x 3 x 2 mixed between-within subjects repeated measure univariate analysis of variance was performed on self-rated similarity to check the success of the experimental manipulation. Between-subject factor was experimental condition (likeness condition at T1, difference condition at T1 and control condition at both times), within-subjects factors were type of relationship (friend, sibling, and colleague) and measurement point (T1 and T2). SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The aggregated similarity construct met the prerequisites of normality, linearity, homogeneity of the variance-covariance, and reliability.

The results contradicted the effectiveness of the manipulation. With the use of Wilks' criterion there were no significant main effects, $F(2, 292) = 0.91, p > .05$, or interactions of experimental condition (experimental condition x measurement point: $F(2, 292) = 0.80, p > .05$, experimental condition x type of relationship: $F(4, 584) = 0.68, p > .05$).³⁶ There was a significant main effect of relationship type $F(2, 291) = 40.04, p < .01; \eta^2 = .22$, and a significant interaction between measurement point and relationship type, $F(2, 291) = 7.12, p < .01; \eta^2 = .05$, but these effects are not further pursued, because they were not central for these analyses.

³⁶ Descriptive values are not reported, because the manipulation showed no significant main or interaction effect. Paired t-tests of changes in perceived similarity revealed no significant effects, except for one interesting and unexpected finding: after thinking about similarities with friends, friends were rated less similar ($M = 4.11, SD = 1.30$) than after thinking about differences ($M = 4.41, SD = 1.30, t(93) = -2.92, p < .01$). This effect was only found, when participants thought about difference first.

Although the manipulation check was discouraging, hypotheses were tested with a 3 x 3 x 2 mixed between-within subjects repeated measure multivariate³⁷ analysis of variance. The two dependent variables were emotional closeness and negative emotions after non-reciprocity. Again, between-subject factor was experimental condition (likeness condition at T1, difference condition at T1 and control condition at both times), within-subjects factors were type of relationship (friend, sibling, and colleague) and measurement point (T1 and T2). Once more, SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The dependent variables met the prerequisites of normality³⁸, linearity, homogeneity of the variance-covariance, multicollinearity and reliability.

With the use of Wilks' criterion there were a significant main effect of relationship type, $F(4, 290) = 89.93, p < .01; \eta^2 = .55$, and a significant interaction between measurement point, experimental condition and relationship type, $F(8, 580) = 2.82, p < .05; \eta^2 = .04$, on the combined DVs. No other main effects or interaction terms approached statistical significance³⁹. Univariate tests confirmed a main effect of relationship type on emotional closeness, $F(2, 586) = 120.53, p < .01; \eta^2 = .29$, and negative emotions, $F(2, 586) = 12.32, p < .01; \eta^2 = .04$. The univariate test of the three-way interaction showed an effect for emotional closeness, $F(4, 586) = 4.64, p < .01; \eta^2 = .03$, but not for negative emotions, $F(4, 586) = 0.74, p > .05$.

A repeated measures ANOVA with relationship type as within-subjects factor and emotional closeness as dependent variable confirmed the main effect of relationship type. Pairwise comparisons showed that across both measurement points friendships were rated significantly closer (estimated $M = 4.78, SE = 0.06$) than sibling (estimated $M = 4.25, SE = 0.08$) and colleague relationships (estimated $M = 3.38, SE = 0.06$), relationships with siblings were in turn emotionally closer than relationships with colleagues (all comparisons $p < .01$). This analysis was repeated with negative emotions after non-reciprocity as dependent variable. Pairwise comparisons verified that negative emotions were stronger towards colleagues (estimated $M = 3.34, SE = 0.09$) than towards siblings (estimated $M = 3.03, SE = 0.10$) or friends (estimated $M = 2.96, SE = 0.10$, both comparisons $p < .01$).

³⁷ A multivariate analysis of variance was chosen, because emotional closeness and negative emotions were not uncorrelated ($r_{\text{sibling}} = -.21, r_{\text{friend}} = -.19, r_{\text{colleague}} = -.21$) and for minimizing Type I error. Univariate analysis of variance showed the same results.

³⁸ Emotional negativity was slightly left-skewed with skewness $< .61$ and kurtosis $< .89$, which is acceptable according to Tabachnick and Fidell (2007). Q-Q-diagrams were satisfactory.

³⁹ Analyses with age and gender of participant as covariates showed the same pattern of results.

To clarify the three-way interaction, the sample was split into the three experimental groups and separate paired t-tests were conducted with relationship specific T1 - T2 - variable pairs. As predicted, emotional closeness with siblings was lower at T2 ($M = 4.08$, $SD = 1.68$) than at T1 ($M = 4.32$, $SD = 1.49$), when focusing on differences at T2, $t(94) = 2.14$, $p < .05$. It was also lower in relationships with colleagues when focusing on differences at T1 ($M = 3.26$, $SD = 1.07$) compared to focusing on likeness at T2 ($M = 3.48$, $SD = 1.01$, $t(93) = -2.45$, $p < .05$). Contrary to the hypothesis, emotional closeness with friends was higher when focusing on differences (T1 ($M = 5.02$, $SD = 1.06$) compared to focusing on likeness (T2 $M = 4.67$, $SD = 1.08$, $t(93) = 3.59$, $p < .01$). No differences between T1 and T2 in emotional closeness were found for the control group. Although negative emotions towards friends were weaker at T1 ($M = 2.69$, $SD = 1.70$) than at T2 ($M = 2.92$, $SD = 1.75$, $t(106) = -2.21$, $p < .05$) in the control group, the result has little weight, because of the non-significant overall test reported before. Figure 10 illustrates these findings for emotional closeness. Only the two experimental condition are displayed because no effects were found in the control condition and the clearer, more economical presentation of result was chosen.

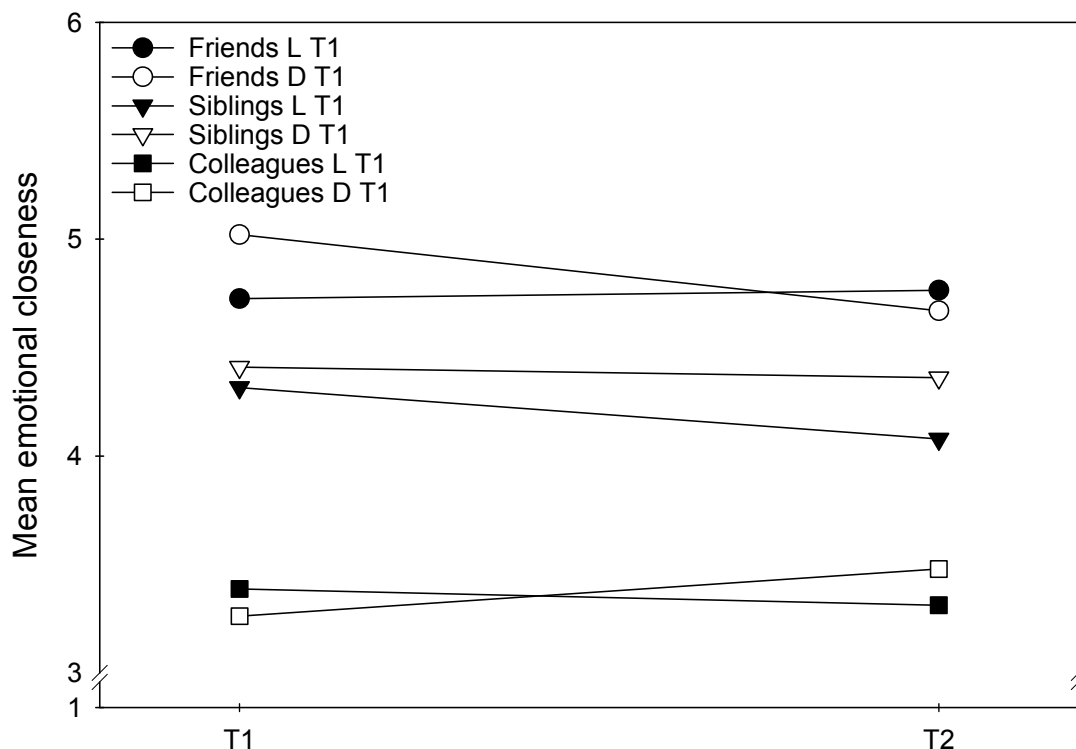


Figure 10. Mean emotional closeness for friends, siblings and colleagues when focusing at likeness (L) or differences (D)

To test the effect of the experimental manipulation on the expectation of reciprocal behavior, the categorical variables for friends, siblings and colleagues at T1 and T2 were analyzed with separate cross tabulation for each relationship. Table 23 shows the percentages and absolute values of changes in expected reciprocation between the measurement points. Most participants (54%) in all three conditions did not expect a reciprocal favor from their friend at both times. About one fourth in every experimental condition expected reciprocity at both times. Therefore the overall pattern in friendships did not differ significantly between the three experimental groups ($X^2 = 6.98$, $df = 6$, $p > .05$). More interesting are the cells in bold type in table 23: the percentage of participants expecting more return when focusing on differences in friends compared to focusing on likeness (15% and 12%) exceeded the proportion of participants, who expected less return when focusing on differences compared to focusing on likeness (7% and 5%; $X^2 = 4.56$, $df = 1$, $p < .05$). In relationships with siblings, the experimental manipulation did not affect the expected reciprocity; neither in the overall pattern ($X^2 = 3.97$, $df = 6$, $p > .05$), nor in the specific comparison of the boldly framed cells ($X^2 = 0.16$, $df = 1$, $p > .05$). The same was true for relationships with colleagues. Neither the overall pattern ($X^2 = 1.60$, $df = 6$, $p > .05$), nor the specific comparison ($X^2 = 0.59$, $df = 1$, $p > .05$) showed differences between experimental conditions.

Table 23

Similarity study A: percentages and absolute values of participant who changed in their expected return between T1 and T2

	Friends			Siblings			Colleagues		
	Differences at T2	Likeness at T2	Control	Differences at T2	Likeness at T2	Control	Differences at T2	Likeness at T2	Control
Change; More return expected at T2	15% (n=14)	5% (n=5)	16% (n=17)	8% (n=8)	8% (n=8)	10% (n=11)	13% (n=12)	15% (n=14)	11% (n=12)
Change; Less return expected at T2	7% (n=7)	12% (n=11)	8% (n=9)	11% (n=10)	14% (n=13)	16% (n=17)	19% (n=18)	15% (n=14)	15% (n=16)
No change; No expected return at T1 & T2	52% (n=49)	57% (n=54)	54% (n=56)	36% (n=34)	44% (n=41)	38% (n=41)	42% (n=40)	40% (n=38)	44% (n=47)
No change; Return expected at T1 & T2	26% (n=25)	26% (n=24)	23% (n=25)	45% (n=43)	34% (n=32)	36% (n=38)	26% (n=25)	30% (n=28)	30% (n=32)

Note. Bold percentages and numbers represent participants who changed their expectation of return according to the experimental manipulation; see explanation in the text.

In addition, there was a significant main effect of relationship type on the expected reciprocity between measurement points ($X^2 = 24.58$, $df = 6$, $p < .01$). Consistent across time, reciprocation was more often expected from siblings and colleagues than from friends (see table 23).

The second experimental study replicated the results for friendships and compared these with assumed strangers. Again, the results of between-person manipulation of similarity precede the results for within-person manipulation.

Study B The experimental manipulation of skill similarity in friends and strangers: Between-subjects differences. A $2 \times 2 \times 2$ mixed between-within subjects multivariate⁴⁰ analysis of variance was performed on three dependent variables: emotional closeness, negative emotions after non-reciprocity and subjective similarity. Between-subject factors were experimental condition (likeness and difference condition) and manipulation (evaluated stranger vs. bogus stranger) and within-subjects factor was type of relationship (friend and stranger).

SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The dependent variables met the prerequisites of normality, linearity, homogeneity of the variance-covariance, multicollinearity and reliability. With the use of Wilks' criterion the main effects of experimental condition, $F(3, 796) = 11.61$, $p < .01$, $\eta^2 = .05$, manipulation condition, $F(3, 796) = 12.96$, $p < .01$, $\eta^2 = .05$, and type of relationship, $F(3, 796) = 432.79$, $p < .01$, $\eta^2 = .62$, and the interaction of experimental condition and relationship type, $F(3, 796) = 33.62$, $p < .01$, $\eta^2 = .11$, were statistically significant (table 24 provides means and standard deviations).

⁴⁰ A multivariate analysis of variance was chosen, because emotional closeness, similarity and negative emotions were mostly moderately correlated (correlation between emotional closeness and similarity $r_{\text{friend}} = .22$, $r_{\text{stranger}} = .42$; emotional closeness and negative emotions $r_{\text{friend}} = -.11$, $r_{\text{stranger}} = -.25$; similarity and negative emotions $r_{\text{friend}} = -.02$, $r_{\text{stranger}} = -.11$) and to decrease Type I error. Univariate analysis of variance showed the same results.

Table 24

Similarity study B: means and standard deviations of similarity, emotional closeness and negative emotion at T1

	Friends		Stranger		Bogus stranger	
	Likeness	Difference	Likeness	Difference	Likeness	Difference
Similarity	4.27 (1.21)	4.49 (1.12)	3.97 (1.20)	3.47 (1.17)	3.83 (1.04)	2.67 (1.07)
Emotional closeness	4.75 (1.12)	4.72 (1.12)	3.26 (1.29)	2.78 (1.27)	2.68 (1.02)	2.15 (0.93)
Negative emotions after non-reciprocity	2.80 (1.46)	2.88 (1.64)	3.82 (1.67)	4.10 (1.72)	3.78 (1.67)	4.49 (1.65)

Univariate ANOVAs confirmed the interaction of experimental condition and relationship type for similarity, $F(1, 798) = 98.16, p < .01, \eta^2 = .11$, emotional closeness, $F(1, 798) = 16.36, p < .01, \eta^2 = .02$, and negative emotions after non-reciprocity, $F(1, 798) = 9.51, p < .01, \eta^2 = .01$. Manipulating similarity had an effect on strangers, but not on friends. Thinking about similarity led to perceiving strangers as more similar to one self ($t(528) = 4.85, p < .01$), feeling closer towards them ($t(528) = 4.31, p < .01$) and having less negative emotion ($t(528) = -1.88, p = .06$) as opposed to thinking about possible differences. Also, reading about a similar bogus stranger led to perceiving this strangers as more similar to one self ($t(270) = 9.05, p < .01$), feeling closer towards them ($t(270) = 4.49, p < .01$) and having significant less negative emotion ($t(270) = -3.54, p < .01$) as opposed to reading about being different. The main effect of relationship type was significant in similarity, $F(1, 798) = 218.80, p < .01, \eta^2 = .22$, emotional closeness, $F(1, 798) = 1093.51, p < .01, \eta^2 = .58$, and negative emotions after non-reciprocity, $F(1, 798) = 409.81, p < .01, \eta^2 = .34$. As table 24 shows, overall friends were rated more similar, closer and less negative after non-reciprocity than strangers or bogus strangers. Figures 11 a and b illustrate the main effect of relationship type and the interaction effect for emotional closeness and negative emotions.

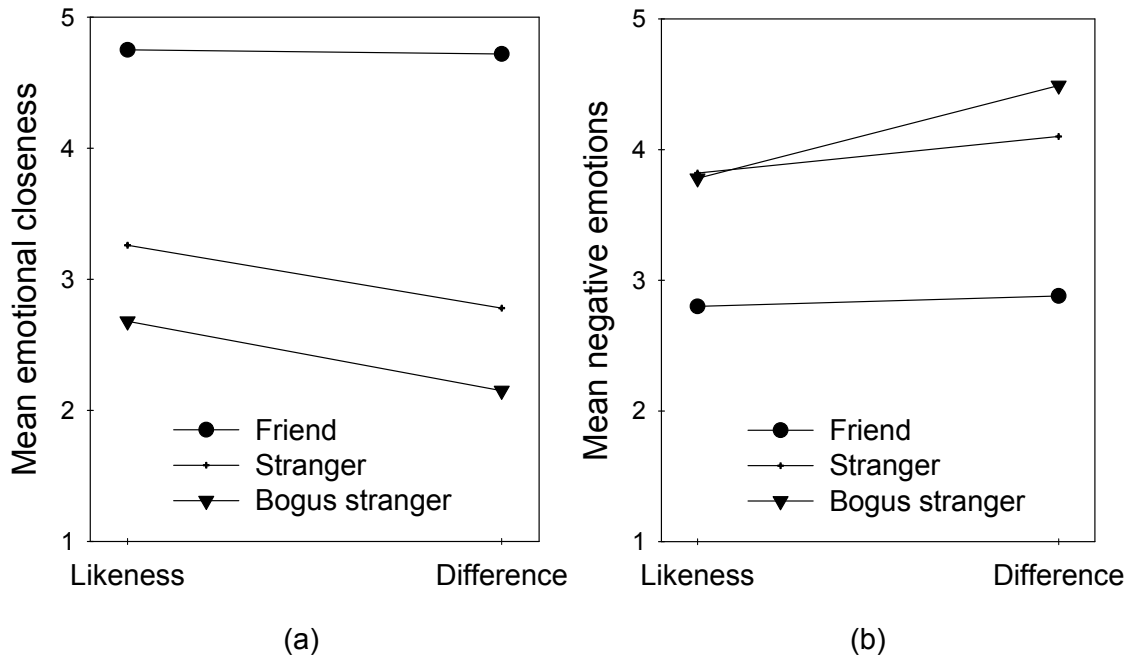


Figure 11. Means of emotional closeness (a) and negative emotions (b) for friends and strangers

Independent from focusing on similarity or dissimilarity, friends were closer and evoked less negative emotions after assumed non-reciprocity than strangers and bogus strangers. Focusing on similarities did not change the relationship qualities for friends, but for strangers and bogus stranger.

The expectations of reciprocal behavior were analyzed using cross tabulation separate for friends, stranger and bogus stranger. There was a difference between the experimental conditions for bogus stranger ($X^2 = 7.41$, $df = 2$, $p < .05$), but not for friend ($X^2 = 2.03$, $df = 2$, $p > .05$) or strangers ($X^2 = 4.68$, $df = 2$, $p > .05$). The least reciprocation was more often sufficient for similar bogus strangers (57%) than for dissimilar bogus stranger (44%). In addition, quid pro quo was less often expected from similar bogus stranger (14% of participants) than from dissimilar bogus stranger (26%). For friends, the least compensation was expected most often as return for a favor, regardless of the manipulation (in 69% in the likeness condition, 68% in the differences condition) and the other two options were chosen almost equally often. For strangers, a coffee was expected more often in the likeness condition (53%) compared to the differences condition (46%) and the quid pro quo option was chosen less often (27% vs. 36%). Although these last differences point into the right direction, they lack statistical significance.

The between person approach on manipulating similarity replicated the non-significant effects of Similarity study A for friendships and showed that the manipulation worked for unestablished relationships. For strangers thinking about similarities increased the perception of similarity and feelings of emotional closeness. In tendency, it decreased the expectations of reciprocity and the negative emotions after non-reciprocity. The internal replication of the results with an adapted bogus stranger paradigm confirmed the interpretation that similarity in unestablished relationships increased emotional closeness and decreases expectations of reciprocity and negative emotions after non-reciprocity, whereas dissimilarity led to less emotional closeness and higher expectations of reciprocity and stronger anger and disappointment after non-reciprocity. The within-person analyses circumvented the difficulties and allowed for a stronger test of the assumed effects of manipulating perceived similarity. The previous results showed effects the experimental condition as between-person factor. Next, the results with focusing on likeness or differences as within-person factor are presented.

Study B The experimental manipulation of skill similarity in friends and strangers: Within-subject differences. First, a 2 x 2 x 2 mixed between-within subjects repeated measure univariate analysis of variance was performed on self-rated similarity to check the success of the experimental manipulation. Between-subject factor was manipulation condition (evaluated stranger vs. bogus stranger), within-subjects factors were experimental condition (likeness vs. differences) and type of relationship (friend and stranger). SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The aggregated similarity construct met the prerequisites of normality, linearity, homogeneity of the variance-covariance, and reliability.

The results confirmed the effectiveness of the manipulation for unestablished relationships and replicated the unexpected contrast effect on friendships. With the use of Wilks' criterion there was a significant main effect of experimental condition, $F(1, 342) = 15.51, p < .01; \eta^2 = .04$. Also, there was main effect of relationship type, $F(1, 342) = 168.01, p < .01; \eta^2 = .33$, and an interaction effect of experimental condition and relationship type, $F(1, 342) = 132.37, p < .01; \eta^2 = .28$. As depicted in figure 12, stranger were rated more similar after thinking or reading about similarity ($t(343) = 8.23, p < .01$), while friends were rated more dissimilar after thinking about similarities ($t(343) = -4.80, p < .01$).

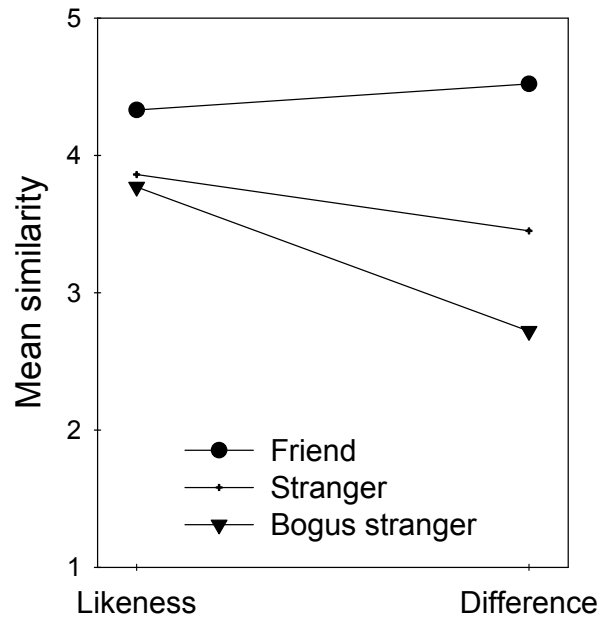


Figure 12. Within-person change in perceived similarity for friends and strangers

The manipulation check suggested that the manipulation was successful for strangers, but not for friends. Hence, the effects of manipulation similarity and dissimilarity within person across time were tested with a 2 x 2 x 2 mixed between-within subjects repeated measure multivariate analysis of variance. The two dependent variables were emotional closeness and negative emotions after non-reciprocity. Again, between-subject factor was manipulation condition (evaluated stranger vs. bogus stranger), within-subjects factors were experimental condition (likeness vs. differences) and type of relationship (friend and stranger). Once more, SPSS general linear model for repeated measures was used and Type III for the estimation of sum of squares in the model. The dependent variables met the prerequisites of normality⁴¹, linearity, homogeneity of the variance-covariance, multicollinearity and reliability.

With the use of Wilks' criterion there were significant main effects of experimental condition, $F(2, 340) = 8.30, p < .01; \eta^2 = .05$, of relationship type, $F(2, 340) = 450.55, p < .01; \eta^2 = .73$, and a significant interaction between experimental condition and relationship type, $F(2, 340) = 7.85, p < .01; \eta^2 = .04$, on the combined DVs. Univariate tests confirmed the main effects of experimental condition and relationship type, which are depicted in figure 13. In general, relationships were rated as emotionally closer ($F(1,341) = 7.29, p < .01; \eta^2 = .04$) and with less negative emotions after assumed non-reciprocity ($F(1,341) = 4.41, p < .01; \eta^2 = .01$) when focusing on similarities instead of

⁴¹ Emotional negativity was slightly left-skewed with skewness $< .51$ and kurtosis $< .75$, which is acceptable according to Tabachnick and Fidell (2007). Q-Q-diagrams were satisfactory.

differences. Independent from the experimental condition friends were rated emotionally closer ($F(1,341) = 749.00, p < .01; \eta^2 = .69$) and less negative feelings towards them were aroused after non-reciprocity ($F(1, 341) = 267.36, p < .01; \eta^2 = .44$) in comparison to strangers. The univariate test of the two-way interaction showed an effect for emotional closeness, $F(1, 341) = 8.21, p < .01; \eta^2 = .04$, and a somewhat weaker effect for negative emotions, $F(1, 341) = 2.12, p = .053; \eta^2 = .01$. Separate *t*-tests were conducted to clarify the interaction and are reported for emotional closeness first, before turning to negative emotions after assumed non-reciprocity. Emotional closeness towards strangers was greater ($M = 3.02, SD = 1.25$) after thinking about similarities compared to thinking about differences ($M = 2.75, SD = 1.16, t(223) = 3.35, p < .01$). The same was true, even if the participants only read about similarities and differences (bogus stranger condition: $M_{\text{likeness}} = 2.60, SD = 0.97$ vs. $M_{\text{differences}} = 2.24, SD = 0.93, t(119) = 3.73, p < .01$). For friends⁴², thinking about differences did not change the ratings of emotional closeness ($M_{\text{likeness}} = 4.75, SD = 1.04$ vs. $M_{\text{differences}} = 4.76, SD = 1.04, t(343) = -0.29, p > .05$). Negative emotions towards strangers were smaller after thinking about similarities ($M = 4.06, SD = 1.64$) compared to thinking about differences ($M = 4.15, SD = 1.62$), but the difference failed to reach statistical significance ($t(223) = -0.93, p > .05$). Reading about similarities with a bogus stranger led to experiencing less negative emotions ($M = 4.16, SD = 1.60$) compared to reading about differences ($M = 4.49, SD = 1.70, t(119) = -2.88, p < .01$). For friends, thinking about similarities or differences did not alter the assumed experience of negative emotions ($M_{\text{likeness}} = 3.00, SD = 1.52$ vs. $M_{\text{differences}} = 3.01, SD = 1.59, t(343) = -0.28, p > .05$). Figure 13 a and b display the within-person effects of the manipulation of similarity for friends, strangers and bogus stranger.

⁴² The results were nearly identical in the two manipulation conditions, which only varied in the manipulation towards strangers. Therefore combined results for friendships are reported.

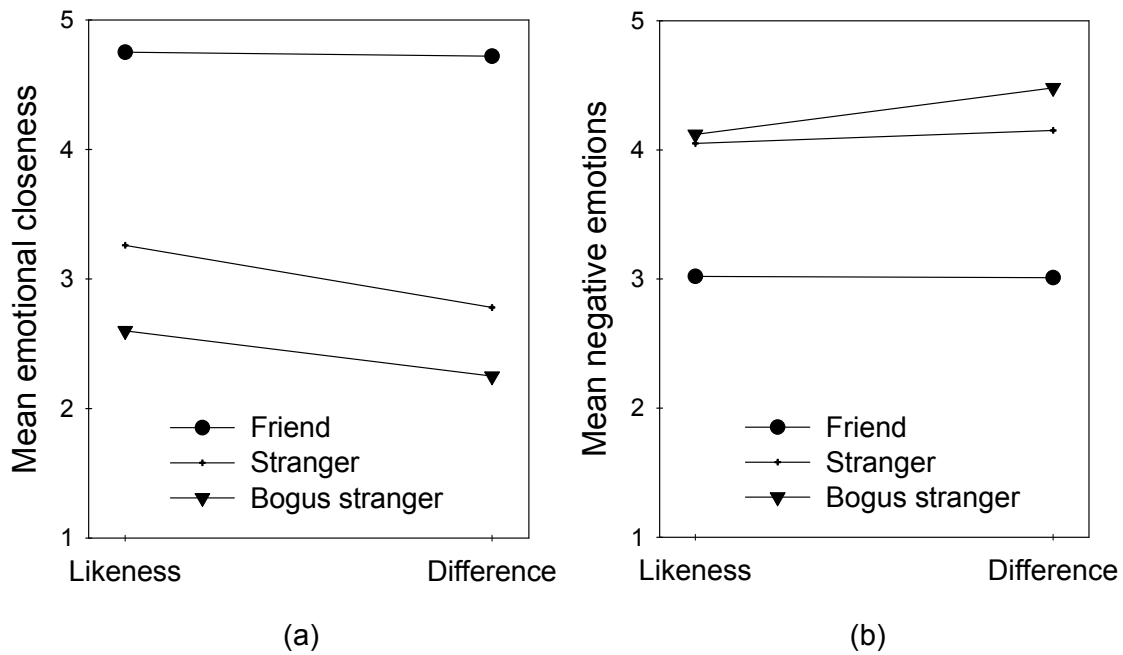


Figure 13. Means of emotional closeness (a) and negative emotions (b) for friends and strangers

To test the effect of the experimental manipulation on the expectation of reciprocal behavior, the categorical variables for friends and strangers at T1 and T2 were analyzed using cross-tables. Table 25 shows percentages and absolute values of changes in expected of reciprocation between the two measurement points. The expected effect of the manipulation, i.e., a within-person decrease of reciprocity expectation when focusing on similarities as opposed to focusing on differences, did not occur for either strangers ($X^2 = 1.56$, $df = 1$, $p > .05$), bogus stranger ($X^2 = 0.20$, $df = 1$, $p > .05$) or friends ($X^2 = 0.29$, $df = 1$, $p > .05$). Mainly, the expectations of reciprocal behavior did not change between the experimental conditions (for strangers 67% unchanged, for bogus strangers 83% unchanged, for friendships 80% unchanged). In addition, expectations of reciprocity were differently distributed for strangers, bogus strangers and friends ($X^2 = 167.05$, $df = 6$, $p < .01$). Compensation was more often expected from strangers and bogus strangers.

Table 25

Similarity study B: percentages and absolute values of participant who changed in their expected return between T1 and T2

	Stranger		Bogus stranger		Friends	
	Differences at T2	Likeness at T2	Differences at T2	Likeness at T2	Differences at T2	Likeness at T2
Change; More return expected at T2	21% (n=22)	21% (n=25)	10% (n=5)	6% (n=4)	8% (n=13)	9% (n=17)
Change; Less return expected at T2	9% (n=9)	16% (n=19)	10% (n=5)	9% (n=6)	12% (n=18)	10% (n=18)
No change; No expected return at T1 & T2	33% (n=35)	31% (n=36)	56% (n=29)	41% (n=28)	58% (n=90)	61% (n=113)
No change; Return expected at T1 & T2	38% (n=40)	32% (n=38)	25% (n=13)	44% (n=30)	22% (n=35)	20% (n=38)

The experimental manipulation of skill similarity in both studies A and B can be summarized as follows. In the between- as well as the within-subjects designs, the manipulation of similarity in established relationships failed: people did not perceive siblings, friends or colleagues as more similar to themselves after focusing on likeness than after focusing on differences. In addition, no effects of manipulating similarity were found for either of the three dependent variables emotional closeness, expectance of reciprocity or negative emotions after non-reciprocity in the between-subjects design. Between person variability in these relationship qualities was by far larger than the effect of the experimental manipulation. Within-person modification of similarity was chosen as a next step to avoid the problems of existing large between-person variance in relationship qualities and to draw different conclusions about the nature of the concept *similarity* by having a within person approach. Although the manipulation check in the within-subjects design was disappointing, some hypotheses were confirmed in the subsequent analyses. In one of the two experimental conditions relationships with siblings and colleagues were rated as emotionally closer after focusing on likeness compared to focusing on differences. However, friendships were rated as emotionally closer after focusing on differences than after focusing on likeness; again for only one experimental group. Both experimental groups showed an effect on the expectancy of reciprocity in friendships in the hypothesized direction: people expected less reciprocity after focusing on likeness than after focusing on differences. However, no such effect occurred for siblings or colleagues, and for

hypothetical negative emotions after non-reciprocity for all three kinds of relationships. Participants in the control group did not rate their relationships differently at the two time points, thus ruling out a general change of relationships over time.

The scarcity and the inconsistency of effects over both experimental groups, which differed only in sequence of focusing on differences or similarities, hinders the evaluation of the effects. In combination with the failing of the manipulation check, there are three possible conclusions from the results of study A. (1) the reported results are chance findings and established relationships have rather settled relationship qualities, which cannot be changed much by experimental manipulation. Previous findings in vignette or zero-acquaintance studies have to be judged as not being transferable to established relationships. This conclusion has to be addressed in a replication of the null findings and in comparison with a stranger paradigm. (2) the perception of similarity has different effects in different relationships. Similarity in sibling and colleague relationships is related to emotional closeness, whereas similarity in friendships affects expectations of reciprocity. (3) the effect of the manipulation was either moderated by a third variable, which has not been included in the study, because controlling for common covariates, age, gender, education, did not change the results or produced an unsystematic contrast effect for some participants, but not for others. The last two explanations will be seized again in the next chapter 4.2 and the discussion section. The first explanation was addressed with study B, which replicated the null findings for friendships and proved the effect of the manipulation for strangers. Both manipulating similarity between and within persons, affected the emotional closeness and the assumed negative emotions after non-reciprocal behavior towards strangers. Similar strangers were rated as emotionally closer and with less negative feelings after non-reciprocity than dissimilar strangers. The identical manipulation, which failed to affect friendships, influenced perceptions of strangers. The effects were comparable and partly stronger, when similarity was manipulated even more strictly with vignettes which described the level of similarity/dissimilarity instead of letting the participants think about possible similarities. This internal replication confirmed that although the manipulation succeeded, it only affected unestablished or prospective relationships.

Across both studies and the between- as well as the within-subjects designs, the effect of the relationship type was consistently and strongly found for all outcome variables. In study A participants felt closest towards friends, expected least reciprocity from them and felt least negative emotions after hypothetical non-reciprocity. Sibling relationships were somewhere in the middle between friends and colleagues, in general. Emotional closeness was lowest towards colleagues, whereas negative

emotions after hypothetical non-reciprocity were strongest towards colleagues. These results confirm the differentiation of relationships in emotions and behavioral expectations found in the network studies even on a small scale like three relationships, that hardly differ in important variables, e.g., age, residential proximity, or contact frequency. In study B, as to be expected, participants perceived friends as more similar, felt closer towards them, expected less reciprocity from them and felt less negative emotions after hypothetical non-reciprocity than towards strangers. These findings indicate the validity of the study and answer possible objections, questioning the quality of the online data received from volunteers.

Predicting change in emotional closeness and perceived similarity. Longitudinal path analyses were conducted while taking the multilevel structure of relationships nested within individuals into account. Figure 2 (p. 98) shows the general model. Separate models for the three facets of psychological similarity (subjective similarity, physical similarity, and skill similarity) were tested. No model fit indices are reported, because saturated models were conducted. In general, the stability of the relationship qualities (direct paths within one construct between the first and the second measurement point) was moderate to high. Rank-order stability of emotional closeness in relationships ranged⁴³ from .72 to .76. Perceived reciprocity was moderately stable (.52). The three facets of similarity differed slightly in rank-order stability with physical similarity being most stable (.77), and subjective as well as skill similarity being moderately stable (.57 and .54, respectively).

Four kinds of effects describe the temporal dynamics among psychological similarity, emotional closeness and perceived reciprocity (table 26). The cross-sectional correlations describe the concurrent associations (path a, figure 2). Relationships were perceived as closer and more reciprocal the more similar the relationship partners were with respect to subjective and skill similarity. Physical similarity was negatively related to perceived reciprocity, but unrelated with emotional closeness within the restricted network.

The cross-lagged effects which indicate the direct effects of similarity on closeness and reciprocity over time (paths b, figure 2) and of closeness and reciprocity on similarity (paths c, figure 2) were rare. Higher subjective similarity predicted an increase in emotional closeness and perceived reciprocity (this effect being only marginally significant). On the other side, higher initial emotional closeness predicted

⁴³ Stability coefficients for emotional closeness and perceived reciprocity differed slightly between the three models because they partly depended on the estimated coefficients of the other paths.

an increase in the perception of subjective and skill similarity, but not physical similarity.

Last, there was little concurrent change of relationships in psychological similarity, emotional closeness, and perceived reciprocity (paths d, figure 2). Only change in subjective similarity occurred simultaneously with change in emotional closeness ($r = .38$), reflecting that relationships that increased in subjective similarity also increased in emotional closeness.

All in all, the pattern of rank-order stability, cross-lagged effects, and correlated change suggest that the stability of relationship qualities in established relationships is larger than the predictive effects of similarity on emotional closeness and perceived reciprocity, or vice versa.

Table 26

Cross-lagged effects and correlated change between psychological similarity, emotional closeness, and perceived reciprocity

		Model 1 Subjective similarity	Model 2 Physical similarity	Model 3 Skill similarity
Cross-sectional correlation				
Similarity	↔ Closeness	.42**	.07 [†]	.19**
Similarity	↔ Reciprocity	.14**	-.11*	.15**
Closeness	↔ Reciprocity	.21**	.21**	.21**
Cross-lagged effect				
Similarity	→ Closeness	.09*	.02	-.02
Similarity	→ Reciprocity	.07 [†]	-.04	.03
Closeness	→ Similarity	.08*	-.03	.10**
Reciprocity	→ Similarity	.01	-.00	.01
Correlated change				
Similarity	↔ Closeness	.38**	.30	.07
Similarity	↔ Reciprocity	.17	.19	.07
Closeness	↔ Reciprocity	-.02	-.06	-.01

Note. Coefficients are standardized β s for cross-lagged effects and correlations for the cross-sectional correlation and the correlated change parameters, [†] $p < .10$, * $p < .05$, ** $p < .01$.

3.2 Relationship specificity

The general role of similarity in personal relationships was examined in the previous chapter. The relationship specificity is addressed now by focusing on two groups of relationships. The first section concentrates on parent-child relationships. They can vary in genetic relatedness, while holding other influencing factors of relationship qualities, e.g., contact frequency or residential proximity, nearly constant. Relationships between spouses are not examined, because spouses are generally genetically unrelated and therefore associations among genetic relatedness, similarity, emotional closeness and perceived reciprocity cannot be analyzed. The second section focuses on friendships; although they occur by definition (p. 61) between genetically unrelated people, they can be perceived as quasikin and be as important and close as family members. Furthermore, the relationship qualities of friendships vary largely within and between persons and thus provide a rich basis for analyzing the covariation between similarity, emotional closeness and perceived reciprocity in friendships.

3.2.1 *Who belongs to the family? - A comparison of parent – child relationships in patchwork and traditional families*

This section has the following structure. First, the parent-child relationships are described regarding genetic relatedness, age and gender composition before addressing differences in emotional closeness and perceived reciprocity due to varying genetic relatedness and family type. Then, the effects of similarity in diminishing these differences is analyzed for the first measurement point. Last the predicted change in emotional closeness and perceived reciprocity across time is addressed.

From 449⁴⁴ relationships with children in the household, 333 were named in the ego-centered networks at T1. Relationships with social children were more often unmentioned (51% unmentioned) than relationships with biological children (21% unmentioned; $X^2 = 28.98$, $df = 1$, $p < .01$). Although relationships with all children were explicitly inquired at the second measurement point, social children were less often named: from 38 possible relationships with social children only 25 (66%) were rated, whereas from 216 possible relationships with biological children 189 (88%) were rated at T2, ($X^2 = 11.48$, $df = 1$, $p < .01$). The percentages of unmentioned relationships with social or biological children did not differ between the three family types ($ps > .05$) at both measurement points. Descriptive information in table 27 refers to the relationships mentioned in the ego-centered networks. Although the age of the children differed due

⁴⁴ Number was obtained from the demographic questionnaire.

to family type (T1: $F(2, 323) = 9.81, p < .01; \eta^2 = .06$; T2: $F(2, 209) = 0.94, p > .05; \eta^2 = .01$), genetic relatedness (T1: $F(1, 323) = 5.13, p < .05; \eta^2 = .02$; T2: $F(1, 209) = 3.76, p = .054; \eta^2 = .02$) and the interaction of both (T1: $F(1, 323) = 6.17, p < .05; \eta^2 = .02$; T2: $F(1, 209) = 8.19, p < .01; \eta^2 = .04$), the gender composition did not differ significantly. Age of the child was statistically controlled in the following analyses.

Table 27

Description of the parent-child dyads in patchwork and traditional families at T1 and T2

	Patchwork family without a common child		Patchwork family with a common child		Traditional family
	r = .5	r = 0	r = .5	r = 0	r = .5
Number of parent-child dyads at T1	32	18	113	19	151
Number of parent-child dyads at T2	23	11	44	14	122
Mean age of child at T1	13.45 (4.52)	13.24 (4.18)	7.38 (5.25)	12.00 (3.74)	8.30 (5.09)
Mean age of child at T2	12.13 (3.56)	11.00 (3.44)	7.56 (5.69)	13.43 (5.93)	8.91 (5.17)
Percentage of daughters at T1	55%	61%	45%	37%	61%
Percentage of daughters at T2	56%	50%	33%	31%	64%
Percentage of gender homogeneous parent-child relationships at T1	58%	50%	44%	74%	51%
Percentage of gender homogeneous parent-child relationships at T2	64%	39%	46%	63%	50%

Though the number of participants and as a result the number of analyzable parent-child relationships decreased from the first to the second measurement point and individuals in patchwork families with a common child (PcK) were less likely to participate at the second measurement [36% compared to 57% of participant in patchwork families without a common child (PwoK) and 60% of individuals from traditional families (T), $X^2 = 9.58, df = 2, p < .01$], the attrition was hardly selective in respect of the central variables perceived similarity, emotional closeness and perceived reciprocity. A 3 (family type) x 2 (drop out) MANOVA with subjective, physical and skill similarity at T1 as dependent variables revealed no significant main effect of not participating at T2 ($F(2, 323) = 2.59, p > .05$) and no significant interaction with the type

of family ($F(2, 323) = 1.07, p > .05$). Three univariate 3 (family type) \times 2 (drop out) ANOVAs were carried out for emotional closeness, perceived reciprocity, and age of the child at T1 as dependent variables. Parent-child relationships rated only at the first measurement did not differ in perceived reciprocity from relationships judged at both measurement points ($F(1, 325) = 0.31, p > .05$) and there was no interaction with the type of the family ($F(2, 325) = 1.63, p > .05$). Although relationships rated at both measurement points did also not differ in emotional closeness from relationships rated only at T1 ($F(1, 325) = 0.01, p > .05$), there were differences between families ($F(2, 325) = 5.12, p < .01; \eta^2 = .03$): parents in Pck, who rated the relationships with their children at both measurement points, perceived the relationships as closer ($M = 3.77, SD = 0.35$) than parents in Pck, who rated the relationships only at T1 ($M = 3.56, SD = 0.54; t(131) = 2.33, p < .05$). This was not true for parents in T ($t(147) = 1.28, p < .05$) or PwoK ($t(47) = 1.24, p > .05$). Interestingly, parents, who also participated at T2 and reported on the parent-child relationship had younger children ($M = 8.19, SD = 5.29$) than parents, who did not participate at T2 ($M = 9.59, SD = 5.39; F(1, 322) = 8.61, p < .01; \eta^2 = .03$). This effect was not specific to a certain family type ($F(2, 325) = 2.13, p > .05$). In addition, neither the gender of the child ($X^2 = 0.13, df = 1, p > .05$) nor the gender homogeneity between child and rater ($X^2 = 1.35, df = 1, p > .05$) were selective for the parental participation at T2.

Thus, relationships with children rated at both measurement points did not differ from relationships not reported at the second measurement point (almost exclusively because the parents did not participate) in gender of the child, gender homogeneity between child and rater, perceived subjective, physical, and skill similarity or perceived reciprocity. The parent-child relationships did not differ in emotional closeness either, but there was a family specific drop out: parents in patchwork families with a common child with emotionally closer relationships were more likely to participate at the second measurement point than parents reporting less emotional closeness with their children at T1. In addition, parents with younger children were more likely to participate at the second measurement. These findings were taken into account by controlling for the age of the child and also during the interpretation of the effect in emotional closeness.

Before analyzing changes in parent-child relationships across time, effects of the family type and of genetic relatedness were addressed with the data from the first measurement point.

The relationship between emotional closeness, genetic relatedness and family type was analyzed with random coefficient multilevel modeling. The model where emotional closeness was predicted by genetic relatedness (dummy coded, 1 = social

child) and age of the child as control variable, both at level 1, and dummy coded family types at level 3 showed that at the first measurement point relationships with social children were rated less close than biological children in both types of patchwork families (PwoK $\pi_1 = -0.28$, t -ratio = -2.20 , $p < .05$; Pck $\pi_1 = -0.32$, t -ratio = -2.45 , $p < .05$, figure 14a). This slope variable can be directly interpreted as difference in emotional closeness between social and biological children in patchwork families, because it was dummy coded. The parameters of -0.28 and -0.32 almost correspond in size to the standard deviation of 0.33 , which was derived from the empty model. The family specific intercepts (where the dummy coded variable equals zero) can be interpreted as estimated mean closeness to the biological child controlled for age differences of the children⁴⁵. Family types did not differ in the average emotional closeness to biological children (all $X^2 < 0.91$, $dfs = 1$, $ps > .05$). Also, there was no significant cross-level interaction between family type and genetic relatedness ($X^2 = 0.05$, $df = 1$, $p > .05$).

The same multilevel model as before was set up with perceived reciprocity as criterion. As figure 14b illustrates, parents in traditional families perceived their relationships with biological children as more reciprocal than parents in PwoK ($X^2 = 4.62$, $df = 1$, $p < .05$). No significant differences in perceived reciprocity with biological children emerged between Pck and PwoK or Pck and Traditional families. Parents in Pck perceived their relationships with social children as significantly more reciprocal ($\pi_1 = 0.24$, t -ratio = 2.24 , $p < .05$) than their relationships with biological children, whereas parents in PwoK did not show such a differentiation ($\pi_1 = 0.05$, t -ratio = 0.69 , $p > .05$). Here, the parameter estimates indicated a cross-level interaction between genetic relatedness and family type, which missed statistic significance ($X^2 = 2.15$, $df = 1$, $p = .13$). Again, all results were controlled for the age of the child and therefore age of the child⁴⁶. cannot explain the unexpected result of relationships with biological children being perceived as more reciprocal in traditional families than in patchwork families (Pwok $X^2 = 4.62$, $df = 1$, $p < .05$; Pck $X^2 = 1.32$, $df = 1$, $p > .05$) This result is also not attributable to a contrast effect between biological and social children because no such contrast was found for PwoK.

⁴⁵ Parents rated relationships with older children less close than relationships with younger children ($\pi = -0.02$, t -ratio = -4.21 , $p < .05$). With every additional year of age, closeness ratings decreased by 0.02 points on the $1-4$ scale.

⁴⁶ Age of the child was not significantly related to parents perceiving the relationship as reciprocal ($\pi = 0.004$, t -ratio = 0.56 , $p > .05$).

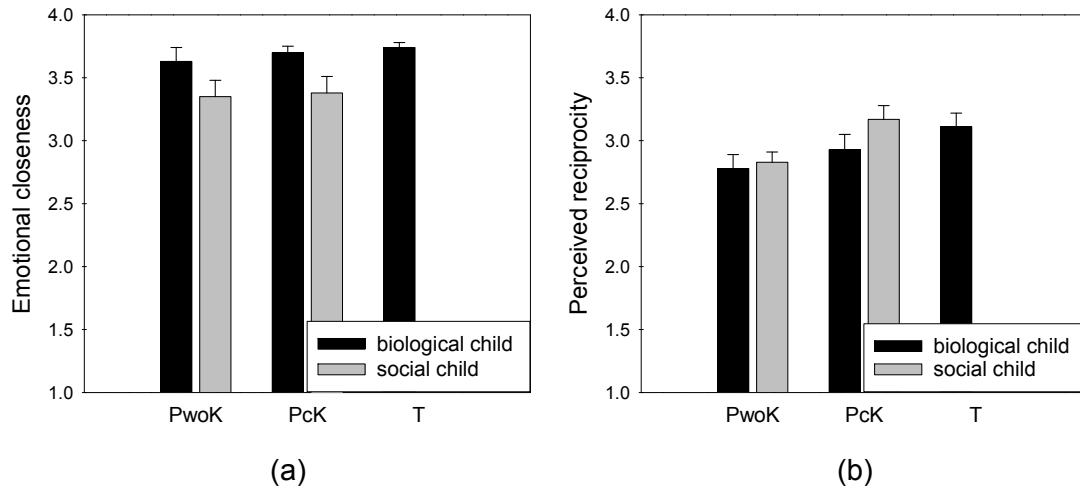


Figure 14. Estimated mean emotional closeness (a) and estimated mean perceived reciprocity (b) in parent-child relationships at T1

The preceding results replicated the well-documented difference between relationships with social children and with biological children in emotional closeness, and extended them to the construct of perceived reciprocity. Similarity was assumed to mediate and perhaps buffer the effects of the missing genetic link. Therefore, before including similarity into the before presented models, its relationship with genetic relatedness and emotional closeness needed to be tested. As expected, parents perceived biological children as more similar to themselves than social children (cf. figure 15). There were no differences between families (all $X^2 < 3.33$, $dfs = 1$, $ps > .05$). The difference in perceived similarity between biological and social children was largest regarding physical similarity ($\pi_1 = -2.62$, $SE = 0.30$, $t\text{-ratio} = -8.62$, $p < .01$) somewhat smaller in subjective similarity ($\pi_1 = -1.97$, $SE = 0.30$, $t\text{-ratio} = -6.63$, $p < .01$) and smallest, but still statistically highly significant for similarity in skills ($\pi_1 = -1.20$, $SE = 0.26$, $t\text{-ratio} = -4.53$, $p < .01$) (cf. figure 8). Again, all results were controlled for the age of the child.

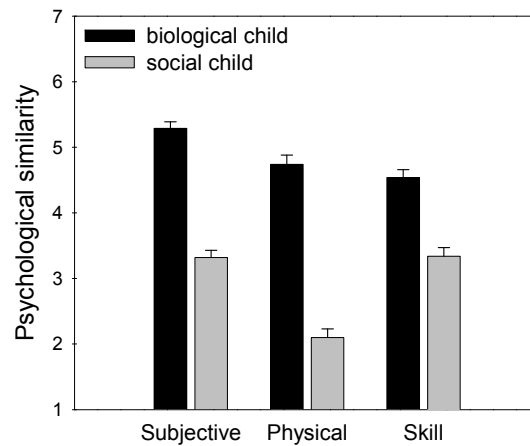


Figure 15. Estimated mean psychological similarities in parent-child relationships at T1

The relationship between emotional closeness and the three facets of psychological similarity was analyzed using separate models with emotional closeness as criterion and one similarity items as predictor⁴⁷. All three kinds of perceived similarity were positively related to emotional closeness, if analyzed family unspecific. Table 28 displays these relationships (slopes) separately for the three family types, after type of family was added as level 3 predictor. The family specific intercepts (i.e., emotional closeness to an averagely similar child) were almost identical in all three similarity models: PwoK $\pi_0 = 3.48$, $SE = 0.06$, $t\text{-ratio } 54.25^{**}$; PcK $\pi_0 = 3.64$, $SE = 0.06$, $t\text{-ratio } 63.93^{**}$, T $\pi_0 = 3.77$, $SE = 0.04$, $t\text{-ratio } 103.46^{**}$ (all post-hoc comparisons $ps < .06$). Similarity was group-mean centered for these analyses to account for individual differences in perceiving similarity. Consistently across all three items, similarity was positively related to emotional closeness only for parent-child dyads in patchwork families with a common child. This finding indicates a stronger association between emotional closeness and psychological similarity in parent-child relationships in PcK, but not in traditional families and PwoK; a difference readdressed later. Emotional closeness to a child with mean perceived similarity, regardless of the kind of similarity, was largest in traditional families, somewhat smaller in patchwork families with a common child and smallest in patchwork families without a common child. These family differences in intercepts can be explained by taking the results from figures 14 and 15 into account: social children were perceived as less close and as less similar compared to biological children. Traditional families consist of only biological children, whereas patchwork families without a common child have the most parent-social child

⁴⁷ Separate models were formulated to assess the zero-order relationship between emotional closeness and the respective similarity item instead of including all three similarity items in one model, where the relative predictive power of the items would be assessable.

relationships. Thus, although no family differences emerged, when comparing relationships between parents and biological children in all three family types and relationships with social children in patchwork families, when analyzing all parent-child dyads together family differences occurred. The effects of additionally including genetic relatedness are shown following the analyses of perceived similarity and reciprocity.

Table 28

Prediction of emotional closeness by psychological similarity (level 1) and family type (level 3) in parent-child dyads at T1

	Patchwork family without a common child	Patchwork family with a common child	Traditional family
Slope subjective similarity	0.05 _a (0.06)	0.20** _b (0.03)	0.01 _a (0.01)
Slope physical similarity	0.02 _a (0.04)	0.12** _b (0.03)	-0.01 _a (0.01)
Slope skill similarity	0.08 _a (0.06)	0.22** _b (0.04)	-0.00 _a (0.01)

Note. Unstandardized slope coefficients (*SE* in brackets) from MRCM, coefficients with different subscripts are significantly different with $p < .06$, ** $p < .01$.

Perceived physical similarity was slightly negatively related to perceived reciprocity (intercept $\pi_0 = 3.04$, $SE = 0.07$, t -ratio 42.75**, slope $\pi_1 = -0.04$, $SE = 0.02$, t -ratio -1.89[†]), whereas subjective similarity and skill similarity were unrelated to perceived reciprocity (both slopes $\pi_1 < 0.01$, t -ratios < 0.20). There were no differences between the family types neither in mean reciprocity nor in the relationship between perceived reciprocity and the three similarity items (all X^2 s < 2.97 , $ps > .05$).

For testing the combined effect of genetic relatedness and similarity in predicting emotional closeness between parents and (social) children, multilevel models were built using the following strategy. Models were specified for each similarity item separately, because the limited number of observations demanded parsimonious models. First, level 1 variables were introduced into the model stepwise in the following order: genetic relatedness as dummy coded variable (1 = social child), perceived similarity, and last the interaction term between genetic relatedness and similarity to address possible moderator effects. The significance of the slope coefficients and the model improvement were tested as described in the method part, page 96. Next, type of family was included into the models on level 3 using three dummy coded variables for each family type. Differences between families were tested using post-hoc

comparisons. First, analyses separate for each similarity item are briefly summarized before describing the final model.

Entering the similarity items into the separate models improved each of the three models significantly and slope coefficients of similarity were significantly different from zero (*subjective similarity*: slope: $\pi_1 = 0.06$, $SE = 0.03$, $t\text{-ratio} = 2.10$, $p < .05$; model improvement: $X^2 = 72.42$, $df = 7$, $p < .01$; *physical similarity*: slope: $\pi_1 = 0.03$, $SE = 0.02$, $t\text{-ratio} = 1.44$, $p > .05$; model improvement: $X^2 = 8.61$, $df = 7$, $p > .05$; *skill similarity*: slope: $\pi_1 = 0.07$, $SE = 0.02$, $t\text{-ratio} = 2.99$, $p < .01$; model improvement: $X^2 = 49.52$, $df = 7$, $p < .01$). Additionally including the interaction term in each model did not improve them significantly (all X^2 s < 6.43 , $df = 5$, $ps > .10$) and interaction coefficients were not significantly different from zero⁴⁸ (all $ps > .10$). This means, all three kinds of similarity were partial mediators of the genetic relatedness–emotional closeness relationship. They were positively related to genetic relatedness and to emotional closeness separately and remained significant in the biological model. However, the kinds of similarity can be classified only as partial mediators, because the slope coefficient of genetic relatedness, although reduced, remained significant in all three models. The non-significant interaction terms indicated that similarity had a positive main effect in both types of parent-child relationships and not an especially pronounced effect in relationships with social children or biological children. Family effects were consistent across all three separate models and to judge the relative effect of the three kinds of similarity, a combined model with all three similarity items and family effects was tested and is reported in table 29.

Depending on the order of entering the similarity items, the amount of model improvement varied. Because all three items were theoretically important and showed significant relationships in the separate models, they all remained in the final model. As can be seen in table 29, mean emotional closeness towards biological children (intercept) was slightly lower in Pck compared to traditional families (if controlling for all three kinds of similarity and age differences between families⁴⁹). There was no estimated slope for genetic relatedness for traditional families, because their parent-child relationships did not vary on genetic relatedness. The effect of genetic relatedness was highly significant in patchwork families **without** a common child and not significant in patchwork families **with** a common child (post-hoc comparison of slopes $X^2 = 7.47$, $df = 1$, $p < .01$). Complementing this picture, skill similarity and subjective similarity showed significant positive associations with emotional closeness

⁴⁸ In addition, the interaction terms did not differ significantly between family types.

⁴⁹ Age of the child was significantly negatively related to emotional closeness in all family types (see. p. 40, footnote 12).

only in patchwork families with a common child. This hints that the difference between biological and social children in emotional closeness is less pronounced in patchwork families with a common child, whereas perceiving similarity increases the feeling of emotional closeness. The perception of similarity was unrelated to emotional closeness in traditional families and patchwork families without a common child. In other, more technical, words the mediational effect of perceived similarity is moderated by the type of family.

Table 29

Prediction of emotional closeness by psychological similarity, relatedness (level 1), and family type (level 3) in parent-child dyads at T1

	Patchwork family without a common child	Patchwork family with a common child	Traditional family
Intercept	3.69** _{ab} (0.14)	3.62** _a (0.06)	3.77** _b (0.04)
Slope subjective similarity	-0.12 _a (0.11)	0.13* _b (0.05)	0.02 _a (0.02)
Slope physical similarity	-0.08 (0.05)	-0.01 (0.05)	-0.01 (0.02)
Slope skill similarity	0.03 _{ab} (0.08)	0.11** _a (0.04)	-0.00 _b (0.01)
Dummy coded relatedness (1 = social child)	-0.44** _a (0.17)	0.08 _b (0.08)	

Note. Unstandardized coefficients (*SE* in brackets) from MRCM, coefficients with different subscripts are significantly different with $p < .06$, * $p < .05$, ** $p < .01$.

Figure 16a illustrates the effects of genetic relatedness and similarity and the differences between the three families. In traditional families and patchwork families without a common child, there were no differences in emotional closeness between less similar and more similar children. However, in PwoK relationships with social children were less close than relationships with biological children. In contrast, no difference between social and biological children was found in Pck, but relationships with children, who were perceived as more similar in skills were rated as emotionally closer than relationships with less similar children.

The testing of similarity effects in predicting perceived reciprocity in social and biological children followed the same structure as in the prediction of emotional closeness: genetic relatedness was entered first as dummy coded variable (1 = social child), before including one similarity item (thus there were three different models for the three kinds of similarity) and the interaction term between genetic relatedness and

the similarity item last. Although the analytic strategy was the same, the focus in these analyses was on the interaction terms. Similarity was not expected to mediate the relationship between genetic relatedness and perceived reciprocity, because the three similarity items showed no relevant relationship with perceived reciprocity - a precondition necessary for mediation, but not for moderation analyses (Holmbeck, 1997; Rose, Holmbeck, Coakley, & Franks, 2004). In the family unspecific analyses, neither the main effects of similarity (slopes $|\pi_2| < 0.04$, $|t\text{-ratios}| < 1.72$) nor the interaction terms (slopes $|\pi_3| < 0.09$, $|t\text{-ratios}| < 1.42$) were significantly different from zero. In addition, the models did not improve significantly (all X^2 s < 3.60 , $ps > .05$) after entering the respective similarity item in separate models or after including the interaction term. Exceptions were the models with main effect subjective similarity and skill similarity as level 1 predictor, which significantly improved ($X^2 = 66.04$ and $X^2 = 44.06$, $df = 7$, $p < .01$), although the effects of similarity were not significantly different from zero.

Families differed in these relationships between perceived reciprocity, genetic relatedness, subjective similarity, physical similarity and skill similarity and the respective interaction terms between genetic relatedness and the different kinds of similarity. One overall model was formulated which included genetic relatedness, subjective similarity, skill similarity and the both interaction terms of the similarity items with genetic relatedness as level 1 predictors of perceived reciprocity and age of the child as control variable. On level 3, differences between families were modeled with three dummy coded variables for the three family types. Physical similarity and the interaction term were not included, because they did not show significant family differences in a separate model and excluding them downsized the number of estimated parameters. On the other hand, one overall model was preferred to estimating three separate models for the three kinds of similarity to judge the relative effect of the different kinds of similarity. The final model is shown in table 30 and figure 16b depicts the family differences through predicted values.

The parental perception of reciprocity in their relationship with a biological child (of mean similarity and controlled for age of the child) did hardly differ between the families (see intercepts in table 30). Neither subjective nor or skill similarity showed a significant main effect in one of the three family types. However, the interaction between genetic relatedness and similarity was related to the perception of reciprocity. As expected persons in Pck perceived their relationships with social children as less reciprocal (i.e., more kin like) with increasing perception of skill similarity. Individuals in PwoK perceived their relationships with social children in general as less reciprocal, but as more reciprocal with increasing perception of subjective similarity. This finding as

well as all the findings regarding the effects on reciprocity have to be treated cautiously, because interaction terms are difficult to find in non-experimental settings (McClelland & Krull, 1993) and the models reported here were on the limit of the data quality. This means the number of level 1 observations was relatively small in relation to the number of estimated coefficients and the overall number of social children in the data file was moderate, having an effect on the stability of the interaction terms including social child status.

Table 30

Prediction of perceived reciprocity by psychological similarity, relatedness, the interactions between similarity and relatedness (level 1), and family type (level 3) in parent-child dyads at T1

	Patchwork family without a common child	Patchwork family with a common child	Traditional family
Intercept	2.66** _a (0.21)	2.97** _{ab} (0.13)	3.17** _b (0.12)
Slope subjective similarity	-0.25 (0.18)	0.03 (0.06)	0.03 (0.02)
Slope skill similarity	0.18 (0.12)	-0.03 (0.04)	-0.02 (0.03)
Dummy coded relatedness (1 = social child)	-0.53* _a (0.25)	0.23 _b (0.35)	
Interaction between subjective similarity and relatedness	0.40* _a (0.17)	0.09 _b (0.06)	
Interaction between skill similarity and relatedness	-0.22 (0.15)	-0.18** (0.05)	

Note. Unstandardized coefficients and SE in brackets, coefficients with different subscripts are significantly different with $p < .10$, * $p < .05$, ** $p < .01$.

Figure 16b illustrates the coefficients from table 30. Full children one standard deviation below mean similarity did not differ in perceived reciprocity from biological children one standard deviation above the mean; an effect consistently found in all three family types. In patchwork families **with** a common child, relationships with social children perceived as more similar in skills were rated as less reciprocal than relationships with less skill similar children. The previously significant difference between biological and social children in perceived reciprocity (see p. 156 and figure 14b) became non-significant through the inclusion of similarity. Unexpectedly in patchwork families **without** a common child, relationships with subjectively similar social children were perceived as reciprocal as relationships with biological children

(independently from the perceived similarity), but relationships with social children perceived as dissimilar were viewed as least reciprocal.

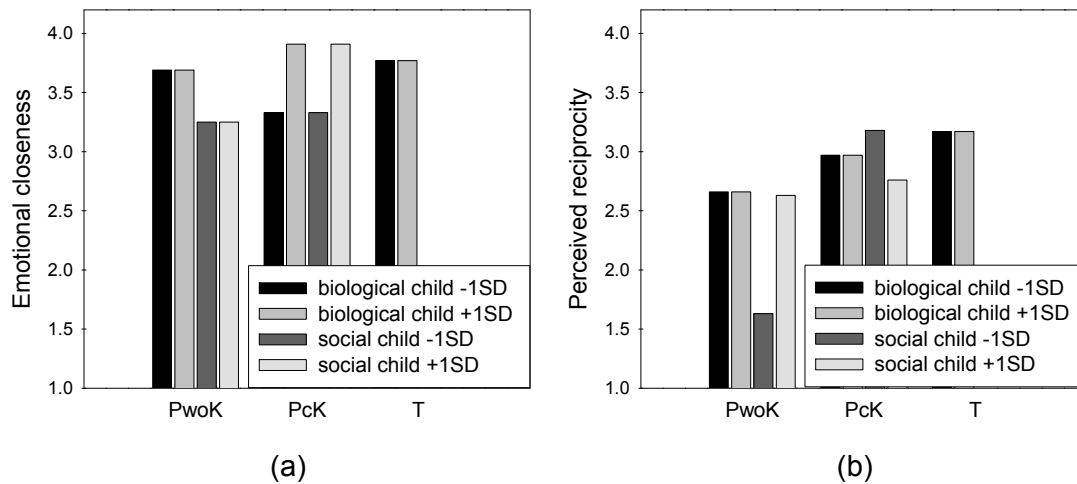


Figure 16. Predicted values of emotional closeness (a) and perceived reciprocity (b) in parent-child relationships at T1

Additionally, effects of gender homogeneity of the parent-(social)child dyads were tested as another kind of similarity. Results can be briefly described. Parents did not rate relationships with same-sex children significantly differently in emotional closeness or perceived reciprocity than opposite-sex relationships. There were no moderating or mediating effects on level 1 (age of the child, genetic relatedness, the interaction between gender homogeneity and genetic relatedness), on level 2 (gender of the parent) or level 3 (family type).

The summarized results of the examination of the parent - (social) child relationships at the first measurement point allow the following résumé. Previous findings were replicated when characteristics of the individual and of the family/couple were accounted for in multilevel modeling:

- parent - social child relationships were rated as less emotionally close than parent - biological child relationships
- biological children were rated as more similar in appearance, skills and subjective feeling than social children⁵⁰
- emotional closeness decreased with the age of the child

⁵⁰ Although it remains unclear, whether this effect is a result of the knowledge of (un)relatedness or the actual perception.

These replication were extended by showing that parent - social child relationships were also perceived as more reciprocal than parent - biological child relationships. However, perceived reciprocity did not increase with increasing age of the child. A likely explanation is that although children differed largely in age, there was still a generation discrepancy between them and their parents in addition to the normative social role of parent and “dependent” underage child, which lived in the household.

Further advancements were achieved by examining the possible mediating function of similarity, i.e., subjective similarity, physical similarity, skill similarity, and similarity in gender, and through the comparison of two types of patchwork families with traditional families. The different kinds of similarity showed distinctive associations with emotional closeness and perceived reciprocity in the three types of families. In traditional families, neither emotional closeness nor perceived reciprocity was significantly related to the perception of similarity in the parent-child relationship. In patchwork families **with** a common child, the inclusion of similarity as further predictor of emotional closeness and perceived reciprocity reduced the previously significant difference between biological and social parent-child relationships to statistical non-significance. Specifically, the perception of similarities in skills remained a significant predictor of emotional closeness and perceived reciprocity. In patchwork families **without** a common child, the difference between biological and social parent-child relationships in emotional closeness persisted and perceptions of similarity were unrelated to emotional closeness. Parent-social child relationships in PwoK were also distinct from parent-social child relationships in Pck regarding perceived reciprocity. Contrary to relationships in Pck, the perception of subjective similarity in social children was related to higher levels of reciprocity. This indicates that the distinction between biological and social children was even increased in PwoK through the perception of subjective similarity, whereas it was decreased in Pck.

Finally, although the type of family had effects on parent-social child relationships, there were (almost) no effects on the relationships with biological children regarding emotional closeness or perceived reciprocity. This family specificity for parent-social child relationships will be readdressed in the discussion of the findings.

The longitudinal analyses of relationship change in parent-child dyads were carried out exploratively because of the small number of parent-social child relationships. The predicted change in emotional closeness and perceived reciprocity across time was addressed with two approaches. It was assumed that the relationship quality with social children, who are perceived as similar by the parent, will change towards being comparable to biological children at the second measurement point. This was tested first with MRCM where the emotional closeness and the perceived reciprocity of the relationship at the second measurement point were predicted by relatedness, psychological similarity and the interaction term between relatedness and similarity, while controlling for the stability of the criterion. Since there were only 25 relationships between parents and social children rated at both measurement points and 48 relationships judged at one measurement point, the result have to be interpreted carefully. Mean level change in emotional closeness and perceived reciprocity is depicted on a descriptive level because the significance testing in repeated measures ANCOVA (the WS-factor is the measurement point, the BS factors are relatedness and extreme groups of similarity, covariate is age of the child) would provide biased results. The bias would be attributable to the neglect of the nested structure and the very small group sizes that resulted from splitting 25 parent-social child relationships in two extreme groups of very dissimilar and very similar dyads.

After taking the stability of emotional closeness over one year into account (time 1 emotional closeness: $b = 0.94$, $SE = 0.22$, $t\text{-ratio} = 4.29$, $p < .01$), the genetic relatedness of the child did not predict change in emotional closeness significantly (table 31). Hence, the parental relationship with social children did not change differently over one year than the relationship with biological children. The perceived similarity at T1 positively predicted change. The more similar a child was at T1 the closer the parent-child relationship became over one year, relative to the other parent-child relationships. This effect was (marginally) significant for all three kinds of similarity. The significant interaction term between subjective similarity and genetic relatedness indicates that the more subjectively similar a social child was at T1, the closer the parent-social child relationship became over one year. This effect was two and a half times as large as the main effect of subjective similarity and points to a relationship improvement through the perception of subjective similarity especially pronounced for social children. Differences between family types were not tested because of the too small sample size of patchwork families.

Table 31

Prediction of emotional closeness at T2 by psychological similarity and relatedness, while controlling for emotional closeness at T1 (level 1)

	Model 1 Subjective similarity	Model 2 Physical similarity	Model 3 Skill similarity
Intercept	3.39** (0.05)	3.39** (0.06)	3.38** (0.05)
Slope similarity T1	0.10 [†] (0.05)	0.10* (0.04)	0.06 [†] (0.03)
Dummy coded relatedness T1 (1 = social child)	-0.04 (0.12)	-0.03 (0.17)	-0.16 (0.16)
Interaction between similarity and relatedness T1	0.24** (0.07)	-0.08 (0.22)	-0.16 (0.16)
Emotional closeness T1 (stability)	0.69** (0.16)	0.58** (0.21)	0.88** (0.16)

Note. Unstandardized coefficients and SE in brackets, [†] $p < .10$, * $p < .05$, ** $p < .01$.

Figure 17a exemplifies the change in emotional closeness for extreme groups⁵¹ of similar and dissimilar biological and social children. Regardless of the perceived similarity and the genetic relatedness mean emotional closeness decreased between the two measurement points. This decrease is attributable to an increasing age of the children and replicates the decrease in emotional closeness with increasing age of the children found in the cross-sectional analyses. Dissimilar social children show the strongest decrease, whereas similar social children blend in with both groups of biological children.

Mean level change in perceived reciprocity was less strong and the rank-order stability was lower ($b = 0.40$, $SE = 0.20$; t -ratio = 1.96, $p = .053$) than for emotional closeness. This indicated a much more heterogeneous pattern of change and stability in perceived reciprocity. Again, genetic relatedness did not significantly predict change in perceived reciprocity over one year (table 32). As predicted, relationships with more skill-similar social children decreased in perceived reciprocity (i.e., became more kin like) relative to the other parent-social child relationships. Figure 17b shows this effect descriptively. Relationships with similar social children showed a slight decrease in perceived reciprocity, but relationships with dissimilar social children slightly increased

⁵¹ The lower and the upper third in similarity were considered extreme. The cut-off values for the extreme groups were determined separately for social and biological children, because they differed in similarity by definition. Thus, an extremely similar social child is perceived as very similar compared to other social children.

in perceived reciprocity. Interestingly, the effects of subjective similarity pointed in the opposite direction; an effect also found cross-sectionally for parent-child relationships in PwoK.

Table 32

Prediction of perceived reciprocity at T2 by psychological similarity and relatedness, while controlling for perceived reciprocity at T1 (level 1)

	Model 1 Subjective similarity	Model 2 Physical similarity	Model 3 Skill similarity
Intercept	2.96** (0.09)	2.96** (0.09)	2.98** (0.09)
Slope similarity T1	0.17* (0.07)	0.13* (0.06)	0.09 (0.08)
Dummy coded relatedness T1 (1 = social child)	0.21 (0.21)	0.15 (0.24)	-0.29 (0.23)
Interaction between similarity and relatedness T1	0.26* (0.11)	-0.00 (0.23)	-0.46 [†] (0.24)
Emotional closeness T1 (stability)	0.22 (0.27)	0.67** (0.23)	0.34 (0.23)

Note. Unstandardized coefficients and SE in brackets, [†] $p < .10$, * $p < .05$, ** $p < .01$.

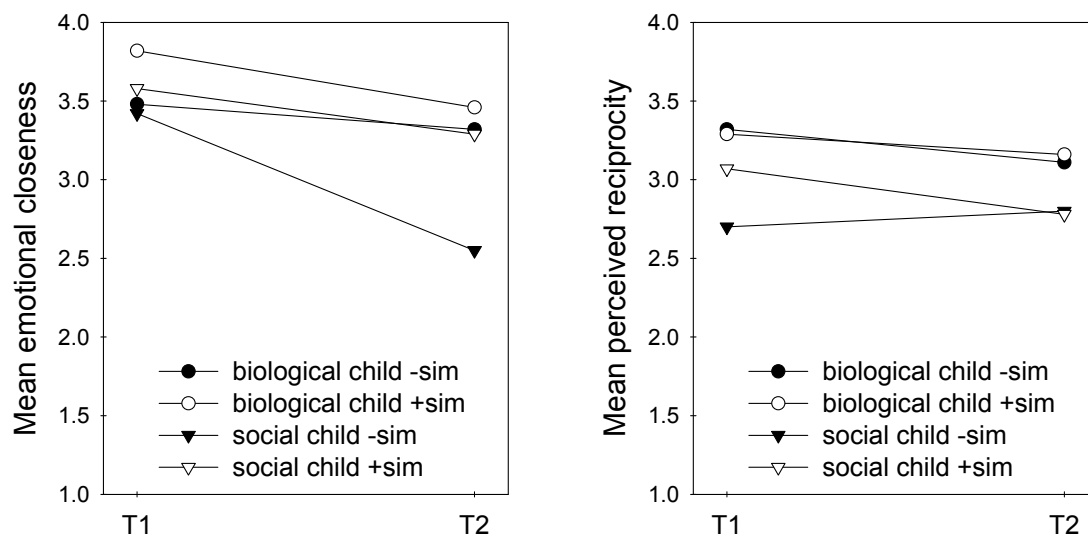


Figure 17. Change in emotional closeness (a) and perceived reciprocity (b) for dissimilar and similar social and biological children

In all, preliminary conclusions can be drawn about the effects of parental perceptions of similarity with social children. Perceiving a social child more similar to oneself increases kin-like feeling of emotional closeness and less reciprocity of

exchange. This confirms the cross-sectional findings and extends them to the within-relationship level. Presumably, emotional closeness and perceptions of similarity mutually influence each other over time. so far the convergence of parents and social children in certain characteristics like skills, interests, or attitudes has not been studied.

3.2.2 *Why do we have friends?*

Friendships were chosen as second specific relationship type, where effects of similarity were expected to play a major role for the relationship qualities *emotional closeness* and *perceived reciprocity*. This section is divided into three parts. First, the importance of friends in adult ego-centered networks was explored and friendships were compared with family relationships regarding the central relationship qualities *emotional closeness* and *perceived reciprocity*. Second, the associations among different kinds of similarity, emotional closeness, and perceived reciprocity in friendships and in horizontal family relationships (siblings, cousins, etc.) were analyzed. Last, associations between friendship quality and the availability as well as the quality of family relationships were examined to address the question, whether and under which circumstances friends can substitute family.

From all 5385 relationships in the Young adult study, 2508 were classified (see methods part for details on the classification) as friends, 604 as good friends, 613 as horizontal family relationships and 1927 as family relationships (including horizontal family members). In the Family study, from 4561 relationships 1084 were categorized as friends, 690 as good friends, 727 as horizontal family members and 2286 as general family relationships (table 33 provides an overview of the observed numbers in each category and its relative proportion in the network).

In both studies, relationships with friends and good friends accounted for large proportions of the ego-centered networks; on average 55% in the Young adult and 38% in the Family study, respectively. However, there were large individual differences in these proportions with people having solely friendship-based networks and individuals having networks without any friends. The mean proportions of good friends and horizontal family were alike within and between both studies. This implied a good comparability of these two groups because of their equal prevalence within the network.

Table 33
Means and standard deviation of the number and proportion of friends and family members in the personal networks

	Young adult study		Family study	
	Absolute number	Proportion from total network	Absolute number	Proportion from total network
Network size	11.79 (6.06)	/	13.34 (8.24)	/
Regular friends	5.50 (4.42)	44% (24 – 63%)	3.17 (3.33)	22% (4 – 40%)
Good friends	1.32 (1.95)	11% (0 – 26%)	2.02 (2.18)	16% (0 – 33%)
Horizontal family	1.34 (1.13)	12% (2 – 22%)	2.13 (1.97)	16% (3 – 29%)
Family member	4.23 (2.43)	38% (22 – 55%)	6.68 (4.71)	51% (28 – 73)

Note. The range in percentages indicates $M \pm 1SD$.

Friends were compared with family members regarding their structural and qualitative relationship characteristics in two ways. First, a general comparison was carried out through contrasting friends with family members. Second, more specifically, good friends and regular friends were compared with horizontal family members. The mean genetic relatedness of horizontal family members in the networks of young adults was $r = .43$; 75% of the horizontal family members were full siblings with $r = .5$. In the Family study, 44% of horizontal family members were siblings and another 34% were siblings-in-law, which amounted to an average genetic relatedness of $r = .25$. Thus, horizontal family members were generally close relatives.

The structural characteristics of friends and family members varied only slightly between the Young adult and the Family study (cf. estimated means⁵² in table 34). Friends lived significantly closer to the participants of the Family study than family members. This is also reflected in the narrow categories: both good friends and regular friends lived closer to the participant than horizontal family members. This was not found in the Young adult study, except for regular friends living somewhat closer than horizontal family members. All other effects were nearly identical and are therefore reported without distinguishing between studies. Although there were no overall differences in frequency of contact with family members or friends, contact frequency was higher with both kinds of friends than with horizontal family members. In general,

⁵² Estimation of means and differences between groups was conducted with Multilevel models instead of ANOVAs, because the assumption of independence of observations was violated and would have biased the significance testing of group differences (Krull & MacKinnon, 2001). In addition, multilevel regressions with dummy variables allowed controlling for residential proximity and frequency of contact when comparing emotional closeness and perceived reciprocity between the different groups of friends and family members.

frequency of conflicts was lower in friendships than in family relationships. However, conflicts occurred less often between good friends than between regular friends. Since there were some differences between friends and family members in frequency of contact and residential proximity and both are known to be related to relationship qualities (Korchmaros & Kenny, 2006; Neyer & Lang, 2003), these effects were controlled when comparing emotional closeness and perceived reciprocity between friends and family members. As predicted by the evolutionary model of relationship regulation, relationships with unrelated friends were somewhat less emotionally close, but perceived as more reciprocal than relationships with family members. However, good friends were not only as close, but closer than horizontal family members (table 34).

Unexpectedly, relationships with good friends were also perceived as more reciprocal than relationships with horizontal family members. Regular friendships were less close and less reciprocal than relationships with good friends. These effects were consistent in both studies and were almost the same when controlling for residential proximity and frequency of contact.

In sum, one special group of friendships was perceived as closer, but still more reciprocal than relationships with horizontal family members, while at the same time the other group of relationships with unrelated others was less close and also more reciprocal than the relationships with siblings, siblings-in-law and cousins. This already indicated that good friends are a special group within personal networks. Although good friends are not genetically related and usually not known as long as horizontal family members, good friendships are emotionally closer than relationships with family members. This effect remained unchanged, if effects of residential proximity and frequency of contact were controlled. It has to be noted that horizontal family members were the same age⁵³ and usually considered as close relatives (mostly siblings). This was supported by the finding that horizontal family relationships were significantly closer than the regular friendships.

⁵³ The mean age difference between participants and their horizontal family members (YAS: $M = 5.39$, $SE = 0.18$, FS: $M = 5.71$, $SE = 0.23$) was not different from age differences with good friends (YAS: $M = 4.56$, $SE = 0.44$, FS: $M = 4.13$, $SE = 0.23$) and regular friends (YAS: $M = 4.02$, $SE = 0.18$, FS: $M = 5.70$, $SE = 0.28$, all post-hoc comparisons $p > .05$, except for regular friends and horizontal family in YAS and good friends and horizontal family in FS).

Table 34

Estimated means of structural and qualitative characteristics of relationships with family members and friends

	Young adult study						Family study					
	General categories			Narrow categories			General categories			Narrow categories		
	Friends	Family	Good friends	Regular friends	Horizontal family	Friends	Family	Good friends	Regular friends	Horizontal family		
Residential proximity	3.13 (0.03)	3.19 (0.07)	2.86 _a (0.06)	3.19 _b (0.04)	2.90 _a (0.08)	3.24 _a (0.04)	2.93 _b (0.06)	3.04 _a (0.06)	3.37 _b (0.05)	2.28 _c (0.06)		
Contact frequency	2.90 (0.04)	2.91 (0.05)	3.00 _a (0.07)	2.88 _a (0.04)	2.51 _b (0.07)	2.35 (0.05)	2.36 (0.05)	2.35 _a (0.06)	2.31 _a (0.06)	1.59 _b (0.04)		
Conflict frequency	1.75 _a (0.02)	2.29 _b (0.03)	1.61 _a (0.04)	1.78 _b (0.03)	2.12 _c (0.05)	1.60 _a (0.03)	2.01 _b (0.03)	1.46 _a (0.04)	1.70 _b (0.04)	1.78 _b (0.04)		
Emotional closeness	2.58 _a (0.02)	2.70 _b (0.03)	3.06 _a (0.05)	2.46 _b (0.02)	2.68 _c (0.04)	2.74 _a (0.03)	2.83 _b (0.03)	3.09 _a (0.03)	2.49 _b (0.03)	2.58 _c (0.04)		
Perceived reciprocity	3.54 _a (0.02)	3.33 _b (0.02)	3.63 _a (0.03)	3.51 _b (0.02)	3.44 _b (0.03)	3.50 _a (0.02)	3.19 _b (0.03)	3.56 _a (0.03)	3.45 _b (0.03)	3.30 _c (0.04)		
Emotional closeness ^a	2.32 _a (0.05)	2.43 _b (0.05)	2.94 _a (0.06)	2.37 _b (0.03)	2.59 _c (0.06)	2.25 _a (0.04)	2.31 _b (0.04)	3.01 _a (0.05)	2.44 _b (0.05)	2.51 _c (0.04)		
Perceived reciprocity ^a	3.52 _a (0.04)	3.30 _b (0.04)	3.52 _a (0.05)	3.41 _b (0.03)	3.34 _b (0.05)	3.54 _a (0.05)	3.22 _b (0.04)	3.43 _a (0.06)	3.33 _b (0.05)	3.22 _c (0.05)		

Note: Unstandardized intercept coefficients (SE in brackets) from MRCM, closeness and reciprocity ranged 1-4, see methods part for further information of analyses, ^a controlled for residential proximity and contact frequency, coefficients with different subscripts are differently from each other at $p < .05$ within general or narrow categories, * $p < .05$; ** $p < .01$.

It was assumed that the perception of similarity is related to greater emotional closeness in good friendships. On the other side, similarity was supposed to be irrelevant for reciprocity in good friendships, because they reside in a “quasi-kin” status, where similarity is related to emotional closeness, but not collaboration and cooperation (and therefore the surveillance and perception of reciprocity). First, good friends were compared with regular friends and horizontal family members regarding their mean similarities. Second, emotional closeness and perceived reciprocity was predicted by psychological and social similarity.

In the Young adult and the Family study, good friends were perceived as significantly more similar in skills than horizontal family members or regular friends (figure 18). Also, participants felt more similar to good friends than to the latter. As expected, horizontal family members were perceived as being physically more similar than genetically unrelated friends (all post-hoc comparisons $p < .05$). This indicates, that perceived similarity is not only an indicator of relationship quality or positivity, but a construct of its own, which was distinctively appraised by the participants. As expected, good friends were perceived as more similar than regular friends, even in physical appearance.

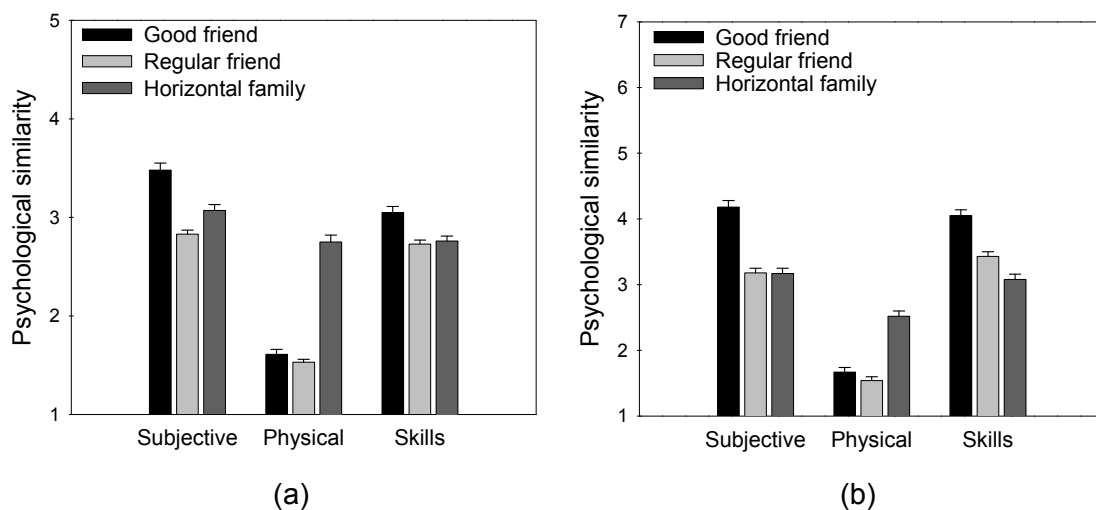


Figure 18. Means of psychological similarity facets for good friends, regular friends and horizontal family in the Young adult study (a) and the Family study (b)

The preference of similar friends was also observable in characteristics of social similarity. Friendships were more often homogeneous in gender, marital and parental status than relationships with horizontal family (figure 19). Although the amount of active selection and availability due to belonging to a certain social environment cannot be distinguished, it can be concluded that people similar in gender and life style

(married, having children) were preferred over people dissimilar in these characteristics, because either value was well represented in the population as well as in the sample and the amount of homogeneous relationships differed significantly from chance (50%, dotted line in figure 19).

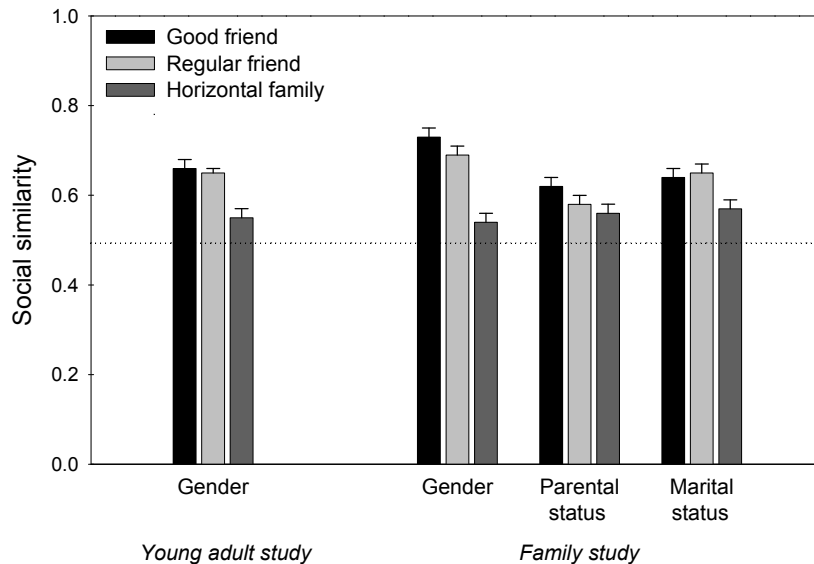


Figure 19. Average percentage of relationships in personal networks similar in social characteristics

The interplay of similarity, emotional closeness, and perceived reciprocity was analyzed by predicting emotional closeness and perceived reciprocity through psychological similarity. For that purpose, a latent factor “perceived similarity” was modelled with the three different kinds of perceived similarity as indicators (see methods section 2.4.3 for detailed description of model specification).

The mean differences in emotional closeness and in perceived reciprocity between good friends, regular friends and horizontal family (table 35) were sustained (compare with table 34). More interesting, the latent similarity factor significantly predicted emotional closeness for good friends, regular friends, and horizontal family in both studies. Participants felt emotionally closer towards good friends, regular friends and horizontal family members the more similar they perceived them. As predicted, psychological similarity was not related to perceived reciprocity for good friends, but for regular friends and unexpectedly for horizontal family members. Whereas the relationships with more similar regular friends and horizontal family members were perceived as more reciprocal, the degree of similarity did not relate to the perception of reciprocity in good friendships. The differences between good friends, regular friends, and horizontal family in association among psychological similarity and emotional

closeness or perceived reciprocity, respectively, could not be tested on statistical significance (please refer to section 2.4.3) and are therefore not interpreted.

The structure of the latent factor “psychological similarity” was very similar across samples and relationship types (table 35, bottom). The factor loadings for the item of subjective similarity were always the highest. The item “skill similarity” loaded second highest on the latent factor. As expected, the item for perceived physical similarity generally loaded higher on the latent similarity factor for the subgroup of horizontal family members than for the two friendship subgroups. Although the latent factor of psychological similarity can be conceived as mostly subjective, the item of skill similarity also loaded significantly and often almost as strong as the item of subjective similarity on the latent factor. In addition, the item of physical similarity had significant factor loadings in every model, but was substantially more important in relationships with horizontal family members, which indicates the validity of the self-reported measures of similarity.

Table 35

Prediction of closeness and reciprocity in horizontal family relationships and friendships by psychological similarity

	Young adult study			Family study		
	Good friend	Regular friend	Horizontal family	Good friend	Regular friend	Horizontal family
Mean closeness	3.00** (0.05)	2.44** (0.03)	2.70** (0.04)	3.07** (0.03)	2.50** (0.03)	2.63** (0.04)
Slope similarity factor	0.43** (0.04)	0.43** (0.02)	0.47** (0.04)	0.20** (0.04)	0.30** (0.02)	0.48** (0.03)
Mean reciprocity	3.67** (0.04)	3.52** (0.02)	3.44** (0.04)	3.56** (0.03)	3.47** (0.03)	3.31** (0.04)
Slope similarity factor	0.07 (0.04)	0.07** (0.02)	0.10* (0.04)	0.03 (0.03)	0.13** (0.03)	0.18** (0.04)
Factor loadings						
Subjective similarity ¹	1.08** (0.08)	0.94** (0.02)	1.05** (0.05)	1.53** (0.18)	1.25** (0.07)	1.55** (0.06)
Physical similarity ¹	0.37** (0.05)	0.32** (0.03)	0.77** (0.06)	0.50** (0.08)	0.50** (0.07)	1.06** (0.07)
Skill similarity ¹	0.65** (0.05)	0.65** (0.03)	0.75** (0.05)	1.04** (0.11)	0.93** (0.06)	1.19** (0.06)

Note. Unstandardized coefficients (SE in brackets) from MRCM, closeness and reciprocity ranged 1-4, psychological similarity ranged 1-5 in YAS and 1-7 in FS, * $p < .05$; ** $p < .01$.

The effects of social similarity, i.e., homogeneity in gender, marital and parental status were analyzed in two ways. Gender homogeneity was included as further predictor in the afore described model. This allowed the combined testing of gender homogeneity effects on psychological similarity and the dependent measures emotional closeness and perceived reciprocity. Second, emotional closeness and perceived reciprocity were predicted by homogeneity in marital and parental status.

Effects of gender homogeneity were very rare. Including gender homogeneity as dummy coded variable did not change the coefficients reported in table 35. Same-sex regular friends were perceived as more similar (YAS: $b = 0.23$, $SE = 0.04$, $z = 5.56$; FS: $b = 0.16$, $SE = 0.07$, $z = 2.10$), but partly less close (YAS: $b = 0.02$, $SE = 0.01$, $z = 1.85$; FS: $b = -0.08$, $SE = 0.03$, $z = -2.62$) and more reciprocal (YAS: $b = 0.09$, $SE = 0.03$, $z = 2.89$; FS: $b = -0.05$, $SE = 0.04$, $z = -1.22$). In addition, horizontal family members of the same gender were perceived as more similar in the Family study ($b = 0.20$, $SE = 0.09$, $z = 2.14$), but no direct effect on emotional closeness or perceived reciprocity occurred.

Effects of similarity in marital or parental status on emotional closeness and perceived reciprocity occurred even less. There were no general associations between marital or parental homogeneity and emotional closeness or perceived reciprocity. The only significant relationship-specific effect occurred for relationships with horizontal family members: people felt closer towards horizontal family members that shared the same marital and parental status ($b = 0.11$, $SE = 0.03$, $z = 3.28$ and $b = 0.11$, $SE = 0.05$, $z = 2.55$, respectively⁵⁴). No significant effects of marital or parental status homogeneity were found for the perception of reciprocity.

So far, it can be concluded that good friends were not only as emotionally close but closer than horizontal family members, but the relationship with them was not perceived as unreciprocal. Good friends were more similar in gender, marital status, parental status, skills, and subjective appraisal than horizontal family members. Perceived similarity in skills, physical appearance and subjective appraisal was positively related to emotional closeness for good friends, friends and horizontal family members. On the other side, perceived similarity was positively related to perceived reciprocity for regular friends and family members, but not for good friends. This indicates that while similarity is associated with emotional closeness for all relationships, it only relates to reciprocity for less close, more cooperative

⁵⁴ Marital and parental status were assessed only in the Family study.

relationships⁵⁵. Similarity in demographic variables was unrelated to emotional closeness or perceived reciprocity in good friendships, suggesting that although this similarity/homophily existed for good friends, it did not relate to relationship specific variance in relationship quality. These results were consistent for the Young adult and the Family study.

Good friends can be as close and similar as horizontal family, even closer and more similar than those. Thus, can they substitute family relationships?

The proportion⁵⁶ of family members in the network was negatively related to the proportion of good friends within the network (YAS: $r = -.30, p < .01$; FS: $r = -.48, p < .01$). This also applied for horizontal family members. The smaller the proportion of horizontal family members was within the network the higher was the proportion of good friends (YAS: $r = -.13, p < .01$; FS: $r = -.24, p < .01$). These correlations indicate that already on a structural level good friendships substituted horizontal family members.

The hypothesis that emotional closeness in friendships is correlated with the availability and relationship quality of horizontal family relationships was tested with multilevel models. Emotional closeness to good friends and regular friends relative to horizontal family members (level 1) was predicted by mean psychological similarity, emotional closeness, perceived reciprocity, and contact frequency with horizontal family members (see appendix F.5 for model equations). Results are jointly described for the Young adults and the Family study and discrepancies between the studies are addressed afterwards.

Good friends were emotionally closer (compared to horizontal family members) if horizontal family was on average⁵⁷ less close, less similar, and less often contacted (table 36). However, the mean level of reciprocity of support was unrelated to feeling closer to good friends. This was also true for regular friendships. These effects differed in statistical significance in the two studies, although the effects showed the predicted direction.

⁵⁵ The peculiarities of comparing good friends and sibling relationships will be discussed in the next part and related to the differences between both types of relationships found in the Similarity study A.

⁵⁶ Although the absolute numbers of family members, horizontal family and good friends were skewed, the proportion of these relationships relative to the whole network were nearly normally distributed.

⁵⁷ A threshold model was tested as alternative. The assumption was that the minimum of family availability and relationship quality was more predictive than the mean availability. The results favored of the model of mean family relationship quality over the threshold model.

Table 36

Prediction of emotional closeness in friendships by the relationship quality with horizontal family members

	Good friends		Regular friends	
	Young adult study	Family study	Young adult study	Family study
Difference to horizontal family (level 1 slopes)	1.75** (0.37)	2.28** (0.20)	1.44** (0.25)	1.41** (0.23)
Effects of family relationships				
Mean psychological similarity	-0.28** (0.08)	-0.13** (0.03)	-0.26** (0.05)	-0.09** (0.03)
Mean emotional closeness	-0.20 [†] (0.11)	-0.31** (0.07)	-0.08 (0.05)	-0.35** (0.08)
Mean perceived reciprocity	-0.03 (0.11)	-0.09 (0.06)	-0.12 (0.07)	-0.02 (0.05)
Mean contact frequency	0.01 (0.04)	-0.18** (0.04)	-0.11** (0.03)	-0.17** (0.05)

Note. Unstandardized coefficients (*SE* in brackets) from MRCM, [†] $p < .10$, * $p < .05$; ** $p < .01$.

So far, it can be concluded that friends are closer the less available and the poorer the relationships with horizontal family members were. If family members were perceived as less similar to oneself, friendships were emotionally closer. However, the amount of reciprocal support with family members was unrelated to emotional closeness in friendships. This argues for a partial substitution of the emotional function of family relationships, but not of an instrumental function. This general finding of substitution was further analyzed with respect to family type and gender specificity.

In the Young adult study, the friendships of women were more closely connected to their relationships with horizontal family (see table 37, only statistically significant coefficients are listed). Women had emotionally closer friendships, if they perceived their horizontal family members as less similar, less close, and had less often contact with them. Men's friendships on the other side were not emotionally closer than relationships with horizontal family member. However, if they perceived their horizontal family members as less similar, then they felt closer to both types of friends. This gender difference was not found in the Family study. Both men and women felt closer to good friends, if their horizontal family members were less similar, less close, and were less often talked to. This also applied to regular friends with few exceptions (table 37). This difference between the Young adult and the Family study might indicate the beginning shift of the role of friendships.

Exploratively, family type differences in the substitutional effects of friendships were tested with multigroup models, but model fit was unexceptionable (condition number 0.13 e-19) and did not allow the interpretation of the coefficients (Muthén & Muthén, 1998-2006).

Table 37

Gender differences in the prediction of emotional closeness in friendships by the relationship quality with horizontal family members

	Good friends		Regular friends	
	Young adult study	Family study	Young adult study	Family study
Female participants				
Difference to horizontal family (level 1 slopes)	2.02** (0.44)	2.33** (0.26)	1.67** (0.31)	1.27** (0.35)
Effects of family relationships				
Mean perceived similarity	-0.26** (0.09)	-0.09* (0.04)	-0.25** (0.06)	
Mean emotional closeness	-0.24* (0.12)	-0.28** (0.10)		-0.34** (0.11)
Mean contact frequency		-0.24** (0.06)	-0.15** (0.04)	-0.26** (0.07)
Male participants				
Difference to horizontal family (level 1 slopes)		2.19** (0.34)		1.30** (0.24)
Effects of family relationships				
Mean perceived similarity	-0.45** (0.21)	-0.16** (0.04)	-0.31** (0.13)	-0.13** (0.04)
Mean emotional closeness		-0.36** (0.09)		-0.28** (0.10)
Mean contact frequency		-0.14* (0.07)		

Note. Unstandardized coefficients (*SE* in brackets) from MRCM, only significant coefficients are reported, * $p < .05$; ** $p < .01$.

4 Discussion

The starting point of the present study were two distinct perspectives on similarity in personal relationships: an evolutionary psychological and a social psychological perspective. Similarity in personal relationships and its relevance for kin selection and cooperation were examined within the framework of the Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005; Neyer et al., 2008). Different kinds of social and psychological similarity were found to have general and relationship-specific functions, i.e., associations with reciprocity and emotional closeness in relationships. First, the general dynamics of and among structural and qualitative relationship characteristics are critically examined and related to the existing (empirical) literature. The relationship specificity of different kinds of similarity is addressed afterwards. This dissertation ends with final conclusions about *Similarity in personal relationships, its associations with relationship regulation on the between-person, the between-relationship, and the within-relationship level*, the limitations of the adopted approaches, and future directions as well as practical applications.

4.1 Similarity, emotional closeness, and reciprocity across the network

4.1.1 *The structure of personal relationship networks in adulthood*

The analyzed networks in the young adult and the family study are comparable to previous network studies with respect to size, composition and structural variables. Previous studies (Doherty & Feeney, 2004; Gerich & Lehner, 2006; Neyer & Lang, 2003) reported network sizes for (young) adults that closely matched the average network size found in the two studies reported here. Also, as to be expected (Marsden, 1987), the number of kin and non-kin was on average balanced, with pronounced individual differences. The composition of the networks did not differ strongly between both studies and can largely be attributed to differences in samples; e.g., participants in the family study named more often children and a romantic partner as part of the network. This was expected because participants in steady partnerships were recruited, and three of five groups (PwoK, PckK, T) were chosen based on the presence of children living in the household. Participants in the family study named fewer friends than participants in the young adult study. This difference might be attributable either to slight differences in asking for friends in both studies and/or changes in the relevance of friends during the transition of starting a family of one's own (Blieszner & Roberto, 2004; Collins & Madsen, 2006). In the young adult study, the category *friend* was less differentiated than in the family study where participants were explicitly asked to indicate from where they know the relationship person (e.g. work, neighborhood, sports

club, etc.). Apart from this methodological explanation, the negative correlation between number of friends and age was also shown within the young adult study, which showed a small overlap in age with the family study. Thus, it is likely that the difference found between the studies in number of friends is attributable to methods and age-related changes. The observed differences between family types in the network composition were small, with one exception. Motivated childless participants named fewer core and distant family members than participants from other family types. This finding is in line with sociological hypotheses about childlessness, which claim that less dependable, supportive, and warm family relationships are antecedents of devaluing family as life goals and deciding against having children (Callan, 1987; Carl et al., 2000).

The mean structural characteristics of the relationships (e.g., residential proximity, contact frequency, duration, age, marital and parental status of the relationship partner) were largely comparable between the young adult and the family study as well as between family types. An expected exception was that participants in the family study, who were on average ten years older than participants in the young adult study, had older relationship partners and their relationships lasted slightly longer. The frequency of contact within specific relationships was related to residential proximity and type of relationship. People had slightly more contact with closer living people. Contact frequency with romantic partners, who mostly live close, was higher than with kin or cooperative relationships. This general finding was qualified by the result that for men and women from motivated childless couples or patchwork families without a mutual child, higher residential proximity to cooperative relationships was related to higher contact frequency. Since this broad category of cooperative relationships included colleagues, neighbors, and friends, it is not possible to determine which specific relationships account for the difference. It is important to note that cooperative relationships were not contacted more often in these two family types compared to the other types. The finding indicates that environmental constraints (i.e., proximity) have a stronger effect on non-kin relationships for participants from these two family types. These participants might share characteristics in their relationship regulation and management, which distinguishes them from the other family types—an assumption that will be readdressed later.

On a structural level, participants in young and middle adulthood show more commonalities than differences. From a life span perspective, they are rather similar because they are close in age, both left the family of origin, and have not yet experienced the transition to “empty nest”, retirement, or physical impairment—factors that are related to changes in the social network (Neyer & Lang, 2003; van Tilburg,

1992). Thus, for the interrelations of similarity, emotional closeness, and reciprocity, no large differences were expected between the two age groups and almost none were found.

4.1.2 *The relevance of similarity for kin selection and for cooperation*

The Evolutionary Model of Relationship Regulation (Lang & Neyer, 2005; Neyer et al., 2008) predicted that kin relationships, romantic partnerships, and cooperative relationships can be distinguished through emotional closeness and reciprocity. This prediction was confirmed in both the young adult and the family study. High emotional closeness is a strong positive predictor of partnerships and a moderate positive predictor of kin relationships. High perceived reciprocity is a moderate negative predictor of kin relationships and scarcely distinguishes partnerships from cooperative relationships. In general, people perceive relationships with kin as emotionally closer than relationships with non-kin (Korchmaros & Kenny, 2006; Neyer & Lang, 2003), which in turn enhances costly helping in kin relationships (Burnstein et al., 1994; Daly et al., 1997; Stewart-Williams, 2007). Romantic partners pose a minor exception because although they are genetically unrelated, they are emotionally closest in general (Grau, 2003; Neyer & Lang, 2003; 2004). This does not contradict the assumption that emotional closeness correlates positively with genetic relatedness and is a mean for promoting help in related kin because high emotional closeness in partnerships appears in combination with high levels of reciprocity. Contrary to kin relationships, where help is not expected to be reciprocated and relationships can thus be unbalanced with respect to exchanged support, exchange in partnerships is expected to be reciprocal (Grau & Döll, 2003; Lang & Neyer, 2005; Thibaut & Kelley, 1959; Walster et al., 1978). The present results confirm this by demonstrating that relationships with kin are generally less reciprocal than romantic partnerships or cooperative relationships. Cooperative relationships are based on direct and reciprocated exchange. Tit-for-tat behavior is not coercively necessary because there can be a time lag between exchanges and exchanged resources might differ (Sprecher, 2001; Stewart-Williams, 2007; Teichman & Foa, 1975). However, some relationships with non-kin can be as close as and incorporate as much help as kin relationships (Kruger, 2003; Silk, 2003; Stewart-Williams, 2007; Widdig, Nürnberg, Krawczak, Streich, & Bercovitch, 2001) and the question is: what qualifies these relationships?

Similarity of relationship partners was offered as an answer, and different kinds of psychological similarity were examined in combination with emotional closeness, the perception of reciprocity, genetic relatedness and age parity. Subjective and skill

similarity were positively related to emotional closeness, even after effects of genetic relatedness and age parity were taken into account. These effects were robust across both the young adult and the family study and are in line with the findings by Korchmaros and Kenny (2006). They view similarity as mediator (among others) of the genetic relatedness–emotional closeness–willingness to help link. The two studies reported here provide even stronger evidence because a network approach was chosen and similarity was assessed with more than one variable. Studies with similar non-kin (DeBruine, 2002, 2004; Krupp, DeBruine, & Barclay, 2008) showed that the perception of facial similarity enhances positive emotions, trust, and helping behavior. Thus, although direct means of assessing genetic relatedness occurs in nature, animals and people probably do not have these (Queller, Ponte, Bozzaro, & Strassmann, 2003), but rely on kinship cues like similarity or familiarity. Self-rated physical similarity was related strongest to genetic relatedness, although the knowledge of relatedness and the actual perception of physical resemblance cannot be distinguished in the present studies. Previous studies showed, however, that although judgments of resemblance are partly affected by knowledge of relatedness, actual resemblance serves as a further cue for kinship (Bressan & Dal Martello, 2002, Oda et al., 2005). In addition, comparative studies with primates showed effects of kin preference that are likely attributed to similarity in personality (Widdig et al., 2001), ruling out the explanation of knowledge of relatedness. A direct test of the mediational function of similarity with multilevel mediation analyses confirmed the assumption for all three kinds of similarity, i.e., subjective, physical, and skill similarity. Physical similarity showed the strongest mediating effect in both studies because it was most strongly related to genetic relatedness. Subjective and skill similarity consistently were mediators of the genetic relatedness–emotional closeness association with skill similarity being a slightly less powerful mediator. In sum, perceiving others as similar in partly heritable characteristics is related to kin-like feelings of emotional closeness. The evaluation of subjective closeness is likely affected by feeling emotionally close and might be a conglomeration of various perceived similarities, e.g. values, personality, interests, appearance, but also a biased relationship evaluation (Morry, 2005). Similarity in skills is not necessarily a cue for kinship because it can be a product of assortment (Pepper, 2007) and might also be related to cooperation among non-kin.

The results regarding similarity as a predictor of reciprocity in relationships confirmed the before-expressed considerations. Whereas physical similarity was negatively related to perceptions of reciprocity, over and above competing predictors, subjective and skill similarity positively predicted perceived reciprocity. These effects were somewhat less consistent in the young adult and the family study, with skill

similarity being a nonsignificant predictor in the young adult study. This difference is likely attributable to the fact that the three facets of psychological similarity were much weaker predictors of reciprocity than of emotional closeness. Possibly, other facets of similarity, e.g., goals, interests, or values (Cole & Teboul, 2004), are more important for exchange and collaboration and as a result the balance in relationships. The multilevel mediation analyses corroborated the nonsignificance of subjective, physical, and skill similarity in mediating the association of age parity and perceived reciprocity. Consistent across both studies, none of the three facets proved to be a significant mediator. The direct effect between age parity and perceived reciprocity remained highly significant, whereas the indirect (mediated) effect was almost always zero. This finding was somewhat unexpected because perceiving others as similar subjectively and in skills was related to experiencing that relationship as more reciprocal. Furthermore, more coeval relationship partners were also perceived as more similar subjectively and in skills. The multilevel mediation analyses indicate that the associations of these similarity facets with age parity and reciprocity related to nonshared variance in the latter constructs. Although similarity is related to both it does not mediate the shared variance between age parity and perceived reciprocity. As already mentioned, different kinds of similarity might prove to be more fruitful to grasp what is similar about people of the same age, e.g., interests, values or goals and how that relates to balanced relationships.

The association of age parity and reciprocity in relationships is addressed finally, although it is not central in this work. Age parity was hypothesized to be an indicator (among others) of resource parity. Individuals roughly the same age should possess an equal amount of physical, material, and social resources (Neyer, 2006) compared to individuals explicitly younger or older. Previous work stated that a variety of resources covary with biological age (Heckhausen et al., 1989; Keith, 1983; Schulz & Heckhausen, 1996) and people of similar age are likely to be equally “needy” (Stewart-Williams, 2007). This argument possesses face-validity when looking at parent-child relationships. In the beginning, parents possess much more resources and children are in need of support and help. As parents age, this relationship reverses, with old parents depending on and receiving much more help from their children than vice versa (Aartsen et al., 2004; van Tilburg, 1998). Further studies are necessary to confirm or correct the proposed coefficient of age parity and investigate its dependency on age of the target or its general applicability across all age groups, respectively.

People differ in how they satisfy their innate need for affiliation (Baumeister & Leary, 2005). So far, no systematic review of whether men and women differ in relationships in general, in specific relationships, and/or specific relationship cognitions and behavior has been published. While some researchers argue that there is a fundamental difference between men and women with respect to relationships (Ackerman et al., 2007; Cross, Bacon, & Morris, 2000; Cross & Madsen, 1997; Pinker, 2002), others adopt the position that differences within genders are larger than between men and women and might show only in specific relationship behaviors (Barnett et al., 1993; Barnett, Raudenbush, Brennan, & Pleck, 1995; Barnett & Rivers, 2005; Baumeister & Sommer, 1997). The present results have to be carefully compared with previous findings because the network approach as well as the dyadic design are factors that differ from earlier studies. Whereas Neyer and Lang (2003) found a gender difference in the association between genetic relatedness and emotional closeness, none was found in the family study. The fact that the gender difference was smallest in the younger sample (Neyer & Lang, 2003) and that the previous study did not use dyadic data could account for this discrepancy. Since dyadic designs control parts of the variance between men and women through within-couple comparison, gender differences might be smaller in dyadic designs for certain phenomena. Although Cross and colleagues (2000) found consistent gender differences in explicit self-reports of relationship interdependence, this concept is probably not comparable to relationship regulation, which was defined and conceptualized as within-person differentiation of relationships. Relationship regulation is a broader, more general concept of relationship management. No strong gender differences were expected because relationship regulation was derived from ultimate mechanisms of kin selection and cooperation that applied to men and women likewise. The same reasoning applies to missing gender differences in the associations among psychological similarity, emotional closeness, and perceived reciprocity. Perceiving similarities in other people and feeling and behaving differently to similar people than to dissimilar people does not depend on gender⁵⁸, but rather on individual dispositions or environmental constraints and opportunities that are addressed in the next paragraph.

Environmental constraints were operationalized through different family types. Childless individuals should differ in the interplay of emotional closeness, reciprocity, and genetic relatedness, depending on their effort and volition to have children. People in families with varying degrees of relatedness within the families (i.e., patchwork vs.

⁵⁸ It has been assumed that men are better at distinguishing related children from unrelated children because this could reduce paternity uncertainty (Smith, 1988), but this has not been validated yet (DeBruine, 2004).

traditional families) were assumed to focus differently on indicators of relatedness and balance. The results cannot be related to earlier work because no previous study addressed these questions. Their consistency across different analyses and agreement with theoretical considerations argue for their reliability, although further replications are desirable. People in involuntary childless partnerships, patchwork families with a common child, and traditional families are highly comparable with respect to their tendency of kin preference (i.e., stronger emotional closeness to closer-related relationship partners). They are in contrast to individuals in motivated childless partnerships and patchwork families without a common child, who show no significant kin preference. This difference between family types is even more noteworthy because almost no family differences occurred with respect to the compositions of the network. The positive association between psychological similarity and emotional closeness was consistent across all types of families. People generally perceived their relationship partners as differently similar to themselves and this covaried with the amount of emotional closeness in their relationship. This also applied for the association with perceived reciprocity, however more strongly for women. Especially the negative association between physical similarity and perceived reciprocity was stronger for female participants, which relates to the work by Ackerman and colleagues (2007), who argue that women treat non-kin more easily like kin. In this case, having less reciprocal relationships –probably because reciprocity was less expected and demanded- with physically similar others, who are not necessarily kin, point into the same direction.

All in all, people differentiate their relationship partners through emotional closeness and reciprocity. Perceiving similarity in relationship partners is related to increasing feelings of emotional closeness, partly as a mediator of the genetic relatedness–emotional closeness link. Perceiving relationship partners as more similar subjectively and in skills is only weakly related to balance in this relationship, likely because other areas of interpersonal similarity are more relevant for cooperative and collaborative behavior. These general associations among relationship characteristics do not differ for men and women, but show some consistent deviations, depending on contextual constraints connected to reproduction and inclusive fitness. Since the mediational results for the two cross-sectional studies did not allow for causal interpretations that the perception of similarity increases emotional closeness and decreases the expectations for reciprocal behavior in relationships, two other pathways were chosen: (1) experimentally manipulating similarity and (2) tracking changes in similarity, emotional closeness, and perceived reciprocity over time.

4.1.3 *Causal relationships among psychological similarity, emotional closeness, and perceived reciprocity*

The results of experimentally manipulating similarity are discussed first, before addressing longitudinal effects of perceiving similarity in others.

The experimental manipulation of perceiving similar skills in friends, siblings, and colleagues yielded two surprising findings. First, consistent across the measurement points and the experimental conditions, participants reported feeling closer to friends, perceiving them as more similar and experiencing less negative emotions after imagined nonreciprocal behavior compared to siblings. Although this result contradicts kin selection theory, it replicates earlier studies exactly (Kruger, 2003; Stewart-Williams, 2007). Siblings and friends might be special cases of kin and non-kin relationships that defys comparison. Sibling relationships are mostly competitive in nature (Anderson, 1999; Buss, 1999a) and the given genetic relatedness with its innate “baseline” similarity perhaps fosters the accentuation of differences. When being asked about one friend, people likely chose the closest one (even if not directly asked) and this best friend is mostly closer, more similar, and more familiar than other friends. Hence, both relationships are not representative for kin and non-kin relationships, leading to findings that seemingly contradict Inclusive Fitness Theory (Hamilton, 1964) and previous studies (Floyd, 1995; Neyer & Lang, 2003). The assumption that best friends are an exception within people’s networks was addressed separately, will be discussed in section 4.1.2, and showed that friends are a very heterogeneous group of relationships that cannot be aggregated or generalized from assessing one specific friendship. Regarding the contradiction of Inclusive Fitness Theory, it has been argued that willingness to help, expecting reciprocation, and monitoring reciprocity do not necessarily correlate with actual helping behavior and reciprocation (Korchmaros & Kenny, 2006; Silk, 2003; Stewart-Williams, 2007). In addition, the costs of help need to be taken into account and the exchange addressed in these studies related to favors instead of help in life-threatening situations. If costly help is focused, helping kin without reciprocation is more pronounced (Burnstein et al., 1994; Stewart-Williams, 2007).

Second and more important are the mostly nonsignificant effects of the experimental manipulation of skill similarity. After thinking about similarities, people did not feel more similar, closer, or less angry and disappointed following assumed non-reciprocity than after thinking about dissimilarity. This was not ascribable to individual differences in perceiving similarities with relationship partners because the null effect also occurred in the within-person approach. There were two alternative explanations. On the one hand, the manipulation of similarity might not work because of methodological errors: e.g., the manipulation was not strong enough or people did not

follow the instructions. On the other hand, the manipulation might not work in established relationships and previous results from studies with zero-acquaintances or bogus strangers are not directly applicable to existing relationships (Sunnafank, 1983a, 1983b). These explanations were tested in a second experiment, where friends were compared to strangers while the experimental manipulation and materials remained unchanged. The results clearly supported the latter explanation. The manipulation worked as predicted for strangers, but again not for friends. Thinking about similarities with a stranger leads to perceiving this stranger as more similar, feeling closer towards him and experiencing less negative emotions after hypothetical nonreciprocation compared to thinking about differences. This effect occurred in the between- as well as the within-person design. Again, no such effects emerged for friendships. These results question the transferability of conclusions about relationships drawn from studies with zero-acquaintances to existing relationships, where emotional closeness and the recognition of similarities are relatively stable. With regard to the correlational results of psychological similarity, emotional closeness, and perceived reciprocity discussed earlier, it can be concluded that while there are differences between relationships (and individuals) in similarity, closeness, and reciprocity, there likely seems to be little change within established relationships. This point was further pursued in the longitudinal examination of relationships.

Though the longitudinal analyses address only parts of the network, relationships were diverse enough to model within-person, within-relationship change. No study that has examined similarity, closeness, and reciprocity in specific relationships (not relationship categories) within the whole network longitudinally is so far known. The present results prove the moderate to high rank-order stability of relationships within a person. There were few significant cross-lagged effects of the three kinds of similarity, emotional closeness or perceived reciprocity over time. Although psychological similarity, emotional closeness, and perceived reciprocity were correlated at the first measurement point, they hardly caused reciprocal relationship change and showed no co-occurring change, except for subjective similarity and emotional closeness. The finding that subjectively more similar relationships were rated as closer and more balanced at the second measurement point can be carefully viewed as a sign that subjective similarity might increase feelings of closeness in relationships. However, this does not apply to physical or skill similarity. The longitudinal findings on skill similarity agree with the experimental results where no effect of skill similarity was found for established relationships, either. Interestingly, feeling closer in a specific relationship increased the perception of skill similarity one year later. The perception of physical

similarity was most stable and together with the findings that there were no time-related changes between physical similarity, emotional closeness, and perceived reciprocity, it can be concluded that physical similarity is a stable relationship characteristic that relates to between-relationship differences but not to within-relationship change. Other facets of similarity might be related to subtle changes in relationship characteristics and might be the subject of slight change as well. A larger number and more proximal data points in combination with small- and large-scale situational changes (e.g., starting a new hobby, joining a different party, marrying, becoming parents) are needed to study the recursive and reciprocal influences among perceiving similarity and affective as well as behavioral consequences in relationships (e.g. Sutor, 1987; Sutor et al., 1995).

4.2 Similarity, emotional closeness, and reciprocity in parent-child relationships and friendships

Two specific relationship types were chosen to ensure that the general effects apply to specific relationships as well. Parent-child relationships were examined because genetic relatedness and the perception of kinship cues, such as similarity or familiarity, can be contradictory. These relationships allow the assessment of the unique associations of relatedness and kinship cues with measures of relationship quality. Friendships were chosen as a second example because kin-like emotions and behavior can take place between friends, although this relationship occurs between genetically unrelated persons.

4.2.1 Parent-child relationships

The analyses of the parent-child relationships in the family study replicated former findings regarding mean differences in emotional closeness and similarity (Bray & Berger, 1993; Henderson & Taylor, 1999; Horn, 1983; Huesmann et al., 1984) and extended the existing literature with respect to reciprocity and the interrelations among similarity, closeness, and reciprocity in social and biological parent-child relationships. Biological children were seen as emotionally closer, more similar subjectively, in appearance and in skills. This main effect of genetic relatedness arose though parent-(social) child relationships were heterogeneous with respect to the age of the child and the relationship duration⁵⁹ (which equaled the age of the child for biological children). In agreement with previous findings, parent-child relationships became less emotionally

⁵⁹ Although the age of the child and the relationship duration should have been more restricted, but were not for practical reasons of recruiting participants, this did not impose a problem for the analyses. However, future study should restrict age of the child and duration within the family more strongly to achieve a more homogeneous sample regarding developmental stage of the child and the relationship.

close the older the child became and especially in adolescence (Collins & Laursen, 2006; Hofer & Pikowski, 2002; Repinski & Zook, 2005). Former studies did not focus on perceived reciprocity between parents and children and assessed support only unilaterally provided by the parents (Anderson, Kaplan, & Lancaster, 2007). Corresponding to the Evolutionary Model of Relationship Regulation, relationships with social children were rated as more reciprocal than relationships with biological children in patchwork families. Unexpectedly, relationships with biological children in traditional families were judged most balanced. This finding is not attributable to age differences in children between the family types, but might relate to measurement difficulties of reciprocity (see *Limitations*).

The cross-sectional results suggest that an increased perception of similarity is related to greater emotional closeness in patchwork families with a common child. The difference between social and biological children in emotional closeness of the parental relationship disappears when the perception of similarities is taken into account. However, this effect applies only to patchwork families with a common child. In patchwork families without a common child, genetic relatedness remains a significant predictor and similarity cannot level out this difference. Previous theoretical work suggested that family dynamics differ in families with and without a common child (Ihinger-Tallman, & Pasley, 1987). Families with a common child show stronger commitment and belongingness among family members. The present results support these assumptions with the facts that partners in patchwork families with a common child have longer relationships and are more often married than partners in patchwork families without a common child. Likely, families need time to stabilize (Bray & Berger, 1993; Visher et al., 2003) before deciding to get married and to have another child. The birth of another child, on the other hand, stabilizes the family, increases the sense of belongingness, and decreases the risk of partnership dissolution (Ihinger-Tallman, & Pasley, 1987). Longitudinal studies would be necessary to assess which factors are stronger and how they exert mutual influence over time.

Recognitions of similarity were related to perceptions of reciprocity only for social parent-child relationships. In patchwork families with a common child, recognition of similar skills in the social child was related to perceiving this relationship as more kin-like, i.e., less reciprocal. In patchwork families without a common child, on the other hand, higher subjective similarity with a social child was correlated with increased perceived reciprocity. This unexpected finding needs further replication with larger samples of patchwork families without a common child before initiating speculations about possible explanations.

In addition to the cross-sectional correlations among similarity, closeness, and reciprocity, which refer to between-relationship differences, longitudinal analyses were conducted to test the within-relationship assumption that similarity might increase emotional closeness and decrease reciprocal behavior in social parent-child relationships. Higher similarity at the first measurement point predicted an increase in emotional closeness between the first and the second measurement point relative to other relationships, although this effect was only marginally significant for subjective and skill similarity. The small effects of similarity are likely attributable to the relatively high stability of emotional closeness over one year. Comparisons of extreme groups (extremely similar and dissimilar social children and biological children) illustrated these results. Although relationships decreased in emotional closeness in general, the decrease was less strong for biological children and similar social children, but more pronounced for dissimilar social children.

Reciprocity within parent-child relationship increased over one year, relative to other relationships, if children were perceived as more similar subjectively and in appearance initially. However, higher perceived skill similarity with social children predicted a decrease in reciprocity, which would agree with the assumption that kin-like feelings and behavior include less reciprocal exchange of support, but support depending on the needs of the relationship partners (Clark & Mills, 1979; Lang & Neyer, 2005). The extreme group comparison support this finding by showing that while all parent-child relationships remain stable or decrease in perceived reciprocity, relationships with dissimilar social children increase in reciprocal exchange of support. Although these longitudinal analyses provide first support for the assumed causal relationships, they have to be treated very carefully because of the small sample sizes.

The findings presented for parent-(social) child relationships with children in childhood and adolescence can be extended to other family relationships and different age groups. The main effect of genetic relatedness on relationship quality has been shown for sibling relationships (Anderson, 1999; Deater-Deckard, Dunn, & Lussier, 2002; Jankowiak & Diderich, 2000; Segal, 2000) and for relationships across the life span (Harris, Hilton, Rice, & Eke, 2007; Love & Murdock, 2004; Pollett, 2007; Segal, 2003). Although some differences are to be expected for different relationship types and different developmental stages, the general associations among similarity, closeness, and reciprocity are expected to be consistent. Family members who are perceived as more similar are emotionally closer and should receive more help without expectations of direct reciprocation (thus tolerating temporal imbalance) than less similar family members. For example, newly-married persons judged similar fathers-in-law as closer than less similar fathers-in-law (Santos & Levitt, 2007). Hamilton and

colleagues (2007) showed that adoptive parents invest as much in genetically unrelated children and thus refute biological predispositions and kin investment theory, but did not examine the mediating psychological factors, e.g., perception of similarities. So far, no other published study is known which examines the buffering effect of similarity in genetically unrelated family members. With respect to relationship development, conclusions have to be drawn carefully. The presented results of similarity increasing the feeling of closeness over time should be examined in future studies which incorporate newly formed patchwork families and maybe use interventions (see *Future directions and practical applications*).

To finally answer the question of who belongs to the family: not only biological children and kin belong to the family. Similar, genetically unrelated family members can be perceived like kin, but only if the social context as the melting pot has been on the stove long enough, i.e., if the social context has been stabilized.

4.2.2 *Friendships*

The findings on friendships in adult personal networks are important for two reasons: (1) they show that the interrelations of similarity, closeness, and reciprocity, proposed before as general mechanism, apply to specific relationships which are more restricted, e.g., in age, genetic relatedness, and relationship duration as well; and (2) they demonstrate the relative importance of friendships in adulthood within individual's ego-centered networks and the compensatory function of friendships. The consistent results found in the young adult and the family study strengthen the reliability of the findings.

Comparisons between friends and kin confirmed previous studies by showing that cooperative relationships, i.e., friendships, are in general less close, but more reciprocal than kin relationships (Clark & Mills, 1979; Neyer & Lang, 2003; Neyer et al., 2008). This is consistent with the evolutionary perspective that kin are on average emotionally closer and provide more unreciprocated support than unrelated persons. A special kind of unrelated person, i.e., good friends, can be closer than same-aged horizontal kin, albeit highly reciprocal (Floyd, 1995; Kruger, 2003; Stewart-Williams, 2007). Compared to regular friends and horizontal kin, friends were perceived as more similar subjectively and in skills, which agrees with previous literature conceding good friends more similarities than acquaintances (Planalp, 1993; Selfhout et al., 2007). The expected result that horizontal kin are perceived as more similar in appearance than both good friends and regular friends indicates the validity of the self-reported similarity judgments to a certain extent. If self-reported similarity were only another measure for relationship quality (e.g., Morry, 2005, 2007), the three measures of similarity would

have been more strongly correlated and would have shown the same pattern in mean differences. These mean level differences between good friends and horizontal kin match the main effect of relationship type in the similarity study A nicely. As was argued (p. 186), horizontal kin (who were mostly siblings) are a special type of kin relationships because conflict and competition may account for the more distant relationship compared to good friendships. However, horizontal kin were still emotionally closer than regular friends, thus restoring the evolutionary proposed difference between kin and non-kin. The assumption that perceptions of similarity are differently related to emotional closeness and perceived reciprocity in good friendships, regular friendships, and horizontal kin relationships was partly confirmed. The latent factor *perceived similarity* was positively related to emotional closeness in all three kinds of relationships. As predicted, higher perceptions of similarity were related to increased reciprocity in regular friendships (Cole & Teboul, 2004) and also in horizontal kin relationships. The latter result cannot be easily labeled a chance finding because it occurred consistently in the young adult and the family study. In addition, it is not ascribable to larger heterogeneity in age differences of horizontal kin because age differences were comparable to friends. Perhaps horizontal kin were slightly more heterogeneous with respect to similarity; however, following kin recognition and inclusive fitness theory increased similarity should have been negatively related to reciprocity in horizontal kin relationships. The hypothesis that greater similarity in good friends is unrelated to reciprocity was confirmed. Perceived similarity in good friends is related to greater emotional closeness, but it is unrelated to exchange of support and balancing exchanged support. Thus, similarity relates more to the emotional characteristic of satisfaction and closeness, but not to the functional characteristic of cooperative exchange and collaboration. Once the psychological similarity was taken into account, social similarity, i.e., homogeneity in gender, marital and parental status, showed almost no association with emotional closeness and perceived reciprocity. Since this is a more general issue, it will be addressed in the next section. So far, it has been shown that friends are a heterogeneous group of personal relationships that is diverse in the degree of similarity, closeness, and reciprocity as well as in the interrelations among these three variables. Heterogeneity in function was addressed as further step.

Individual differences in the number of good friends and regular friends within the network were large. Some participants reported networks which consisted exclusively of friends and good friends, whereas others named solely family members and their spouse as network persons. On a structural level, the proportion of family members was negatively related to the percentage of good friends. In addition, the smaller the

proportion of horizontal family members was within the personal network, the larger the percentage of good friends was. This compensatory function, which already appeared on the structural level, was confirmed when addressing interdependencies between relationship qualities. Although the consideration of contextual factors in studying friendship relationships has often been called for (e.g., Adams & Blieszner, 1994; Blieszner & Adams, 1992; Feld & Carter, 1998; Mollenhorst, Völker, & Flap, 2008; Ueno & Adams, 2006) and has been conceptualized as contextual opportunities, norms or generally social entity, other relationships are contextual factors as well (Asendorpf, 2004; Lehnart, Wrzus, & Neyer, in press). Whereas the mere existence of other relationships (e.g., romantic partners, Doherty & Feeney, 2004) correlates with the quality of friendships, qualitative characteristics were assumed to be an even stronger contextual force (e.g., van Aken & Asendorpf, 1997). The present study tested the hypothesis that friends substitute unavailable or insufficient relationships with horizontal kin. This assumption was largely confirmed for good friends as well as regular friends in the young adult and the family study. Less similarity, less emotional closeness, and less contact with horizontal kin were related to closer relationships with good friends and regular friends. Interestingly, the amount of perceived reciprocity in kin relationships was unrelated to emotional closeness in friendships. These findings indicate that friends compensate family relationships emotionally, but not instrumentally. Previous studies on the kind of support provided by friends and family members concur with this assumption and showed that friends mostly provide emotional support, while family members yield instrumental support (Argyle & Furnham, 1983; Hays, 1989; van Tilburg, 1998).

Individual differences in the compensatory function of friendships were examined with respect to gender as a first step. Young women's friendships were more closely linked to their horizontal kin relationships. For young men, only perceiving horizontal kin as less similar was related to greater emotional closeness with friends. Ackerman and colleagues (2007) argue that women experience and treat friends more like kin. Taking this reasoning even further, women should compensate family more easily with friends, as is suggested by the present findings. However, gender differences have to be treated carefully until the mediating mechanisms are understood. Associations between insufficient family relationships and emotionally closer friendships were stronger for the slightly older participants of the family study. Although rather speculative, perhaps younger people pursue a two-track policy, while people with an own family detach from insufficient family relationships and invest their time and attention in more emotionally rewarding relationships with friends, i.e., the family of choice or "Wahlverwandschaft".

Though the current cross-sectional findings do not allow for causal interpretations, it is assumed that friendships more easily compensate family relationships than vice versa. Family relationships are mostly seen as given and indissoluble (Lang, 1994). Friendships, on the other hand, possess more degrees of freedom with respect to selection, maintenance, management, and dissolution due to their voluntariness (see definition on p. 61). Whereas the maintenance of family relationships is relatively restricted because of legal and normative constraints, friendships are more easily adapted to specific and/or changing situations.

Finally, the puzzling question of why we do have friends has been answered with two arguments. Similar and close good friends may be comparable to kin relationships with respect to emotions, but they are nonetheless reciprocal regarding help. The need of direct reciprocation may be removed through the stability and dependability of close, trustful bonds (Brown & Brown, 2006) and people may deny keeping track (Silk, 2003); nonetheless, friendships are cooperative, reciprocal relationships that do not necessarily pose a puzzle. In addition, friends can compensate insufficient family relationships and are positively related to subjective well-being and health (Argyle, 1999; Hartup & Steven, 1997; Nezlek & Allen, 2006)

4.3 Conclusions

4.3.1 Limitations

Methodological shortcomings of the studies are discussed first, before addressing a more general, theoretical drawback.

Samples. Although all samples were large and comprised only a negligible portion of students, samples are not representative for the German population because three of four were biased with respect to gender and all samples were better educated than the general population (Konsortium Bildungsberichterstattung, 2006). The high consensus between the young adult and the family study and the nearly absent gender differences in the gender balanced family study support the conclusion that selectivity in the samples with respect to gender was no problem. The larger proportion of women in both experimental studies does not limit the conclusions drawn from these studies very much, because no gender effects were found, either. Across all samples, participants were well educated and had on average three or more years training in addition to ten to twelve years of school education. So far, no known study has shown differences in personal relationships due to education or social class, although some theoretical works address differences in specific relationship, e.g., friendships (Adams & Blieszner,

1994; Allan, 2008; Blieszner & Adams, 1992). I assume that differences are not so much related to social class but to individual dispositions that further qualify the general, universal tendencies in relationship formation and regulation (Baumeister & Leary, 1995; Neyer & Lang, 2003). A second critical point is the data collection using Internet studies. The representativeness of the Internet sample and the quality of the data were questioned, but extensive work proved that for personality research, Internet studies largely provide reliable and valid data from samples more representative than student samples (e.g., Gosling et al., 2004; Hertel, Naumann, Konradt, & Batinic, 2002; Krantz & Dalal, 2000; Riva et al., 2003; Tuten et al., 2002). This also applies to Internet studies of personal networks (Coromina & Coenders, 2006). At least for the young adult study, it was demonstrated that the results are comparable to the family study, which was conducted with paid participants in a controlled setting. Thus, results can be generalized to well-educated adults with and without Internet experience.

Measures. The assessment of an ego-centered network differs from assessing a complete network (i.e., round robin-design). Complete networks provide relationship information from the perspective of both partners and allow a distinction of effects of the actor (or target), effects of the perceiver, and effects of the unique relationship between a target and a perceiver (Kenny, 1988). However, for the purpose of this study, a complete assessment was unnecessary and not possible. Though it would have been possible to ask one ego to name his/her alters and then interview all alters on their relationship with ego and the other alters, this would not have resulted in complete networks for all alters. This is clarified by imagining the incomplete overlap between the networks of spouses. Including all relationship partners of one spouse the other spouse did not mention extends the network, and doing this for every alter results in unrestricted networks (for more explanation, see van Duijn & Vermunt, 2006).

Although the ego-centered network approach does not enforce using self-report measures, it recommends so for similar reasons as mentioned for the assessment of complete network, i.e., obtaining information/behavioral data from all alters. Assessing similarity not as *perceived* similarity but objectively by, e.g., physical similarity rating of photographs from ego and alters or measuring specific characteristics in ego and alters and comparing them (e.g., Back, 2007; Selfhout, Denissen, Branje, & Meeus, 2008) would have provided a basis for a different argumentation. However, actual similarity is not as strongly related to relationship quality as perceived similarity (Back, 2007; Montoya et al., in press; Selfhout et al., 2008 ; Sunnafrank, 1992). This discrepancy has large theoretical implications, which will be addressed in a moment.

The measurement of reciprocity monitoring and reciprocal exchange poses a challenge throughout the empirical literature on exchange, support, and equity. People perceive most relationships as balanced and deny monitoring exchange (Gouldner, 1960; Silk, 2003). As a result most relationships are perceived as balanced, because people set off different benefits against each other and re-evaluate the individual costs and benefits (see also p. 39). This might explain the findings of relatively reciprocal relationships even with dependent children where an equal, reciprocal exchange of support seems unlikely. Separate assessment of provided and received help could lessen the measurement problem in future studies (Mendelson & Kay, 2003; Thomése, van Tilburg, & Knipscheer, 2003). Additionally, the measures used did not allow for the distinction between balanced relationships, where a high amount of exchanged help and support occurred, and balanced relationships, where no help was provided and reciprocated. The applied graphical measures were a first approach of assessing within-person differences, i.e., a within-person monitoring of differently balanced relationships, within his/ her network, of reciprocity. For the assessment of expectations and surveillance of reciprocation, behavioral measures (Clark et al., 1986), affective measures (such as used in the similarity studies A and B; also Keller et al., 1994) or cognitive indicators (O’Gorman, Wilson, & Miller, 2008) seem a promising approach. An explicit assessment of the monitoring process seems inapplicable because people adhere to the strong moral norm of reciprocity (Gouldner, 1965) and the monitoring process might occur out of conscious awareness.

Causality. The longitudinal analyses and the experimental studies provide some evidence that in established relationships the effects of perceiving similarity on changes in relationship quality are rather small, but not always zero. Still, the opposite influential direction needs to be tested carefully. Perceptions of similarity can be heightened after relationship quality has been manipulated (Morry, 2005; 2007). The longitudinal analyses conducted with the restricted network suggest that this is the case (although to a smaller extent) and the effect might depend on the kind of similarity under focus. More visible kinds of similarity (e.g., appearance, music preference) are probably less influenced than perceptions of similarities, which are more difficult to detect and to verify (Morry, 2007).

Theoretical background. The choice of studying similarity in personal relationships from an evolutionary psychological perspective and incorporating social psychological theories into this perspective led to a slight neglect of alternative factors related to relationship research. Sociological approaches accentuate environmental and societal

constraints more strongly (Adams & Blieszner, 1994; Allan, 2008; Mollenhorst et al., 2007) and demand taking roles and cultural norms more into account. The quality of specific relationships, e.g., parent-child relationships, is of course not only influenced by genetic relatedness, support, and the amount of similarities between parents and children. It is also affected by role expectations, parental experiences, previous parent-child interactions and other factors (e.g., Hamilton et al., 2007). Evolutionary psychological informed theories offer, however, explanations for universal mechanisms—and partly individual deviations from these universalities—related to the basic architecture of (human) behavior, cognition, and affect. They do not stop at claiming that interactions with attitudinally similar people are preferred because they validate one's beliefs, are experienced as pleasant, and therefore reinforce beliefs, but offer explanations of how interactions with similar people might have been advantageous regarding reproduction and survival (in a literal as well as a figurative sense).

4.3.2 *What can be taken home?*

The conclusions derived from this thesis relate to three different levels of examining similarity in personal relationships: the between-person, the between-relationship, and the within-relationship perspective. The applied study designs addressed all three levels, with higher focus on the first two. In addition to the network approach, which allows the examination of differences and similarities among a variety of relationships, causal predictions were investigated with two experimental studies and a longitudinal extension of one network study. Results receive further weight through the internal replications with two independent, large samples each and application of sophisticated and appropriated statistical methods, i.e., multilevel analyses combined with structural equation models, mediation analyses, and cross-lagged models.

A theoretical strength of this thesis is the connection of social and evolutionary psychological perspectives on similarity in relationships and the quest of the general meaning of similarity for relationship regulation. These general associations with relationship regulation were then investigated in two specific relationships, parent-child relationships and friendships, to encounter the common criticism to network approaches of comparing apples and oranges.

The relationships between different facets of similarity, emotional closeness, and perceived reciprocity varied on the within-relationship and the between-relationship level. While perceiving or manipulating similarity had almost no effect on emotional closeness and reciprocity within established relationships, e.g., a specific friendship, different facets covaried consistently and moderately across different relationships, but

within the individual. This points out the fundamental difference between intra-relational and inter-relational relationships and demonstrates that associations on one level might not exist on the other. Similarity may be important for relationship change at the beginning of relationships (e.g., friendship development, Back, 2007; Hays, 1985; Selfhout et al., 2008) and if critical life experiences elicit changes in similarity and/or other relationship characteristics (e.g., getting divorced, going to college, Albeck & Kaydar, 2002; Sutor, 1987).

The finding that relationships within one individual differ persistently and covary meaningfully with genetic relatedness and indicators of resource parity indicates that theories of inclusive fitness and cooperation apply to human social behavior. Different kinds of similarity might facilitate the differentiation of relationships and are theoretically related to inclusive fitness and cooperation. The development of altruism is likely based on kin recognition, independent from the assumption of individual or group selection processes (Grafen, 2007; Lehmann, Keller, West, & Roze 2007). More complex forms of cooperation perhaps root in kin altruism (Krupp et al., 2008). However, other routes for the development of cooperation are cogitable. Cooperative behavior that benefits the individual and others without imposing costs on the individual (that outweigh the benefits) might have fostered cooperative tendencies as well (Krupp et al., 2008). Again, similarity between cooperative partners may have been beneficial for this type of behavior (Cole & Teboul, 2004). Social studies on social projection (e.g., Riketta & Sacramento; 2008; Robbins & Krueger, 2005) supply an indirect support for this hypothesis. Social projection is larger towards the ingroup and might be related to cooperation because it aids the assessment of the likelihood of reciprocation (Robbins & Krueger, 2005). Perceiving others as similar to oneself ascribes them similar goals, motives, and abilities to reciprocate. Thus, similarity seems to be an important characteristic of kin and non-kin relationships and is related to helping behavior for both; still the main distinction between kin and non-kin remains. Similarity in kin and non-kin has different “sources”, i.e., common ancestry vs. assortment. Although similarity may relate to the same concepts, e.g., skills, personality, or attitudes, correlate with similar emotional responses of closeness or liking, and elicit comparable helping behavior, the fundamental distinction of kin and non-kin remains (Irons, 2005). This distinction may be difficult to observe in single observations or cross-sectional interviews, but it likely shows in the expectation of reciprocation and the emotions associated with failure to do so. For example, although similar good friends are experienced as closer than siblings, similarity is not a cue for kinship and extensive support may be less freely given to friends than to siblings.

This difficult topic is complicated even more by the fact that actual and perceived similarity show different associations with liking (Montoya et al., in press) and cooperative behavior. Actual similarity hardly predicts liking in existing relationships, whereas perceived similarity does (Montoya et al., in press; Sunnafrank, 1992). Sunnafrank (1983 a, b) showed that before people interact for the first time, similarity (or assumed similarity) predicts liking, but after a brief encounter there is no difference in liking between similar and dissimilar dyads. Though he states people's goal of achieving predictable, manageable situations as a reason for the extinguished effect of similarity, I propose another explanation. Actual similarity is often analyzed unidimensionally, i.e., only specific characteristics, e.g., personality traits, scale means of attitudes, are used to predict attraction one at a time; perceived similarity is probably much more heavily influenced by similarities in other characteristics as well, which are used as "weighting" factors. Though people are asked about how similar they perceive the other person with respect to their attitude towards raising the federal budget for education and science, they probably take into account how similar one is with respect to financial and political knowledge, how much one agrees on current politics, etc. The initially stated fact that similarity is always a relative measure, i.e., being similar with respect to some characteristics but not regarding others, has different implications for assessing actual and perceived similarity and their relationship with emotional closeness. Perceived similarity, even it is restricted to special characteristics, is more a global measure of similarities in general because of the before described effects of weighting and taking into account. Actual similarity is a much stricter criterion, neglecting other areas where people can be highly similar while focusing on one area of similarity the researcher is interested in. The first support of this argument is shown in the result that profile-based similarity indices are a better predictor of marital satisfaction (Luo & Klohnen, 2005). This argument also explains why people perceive other people as more similar than they "actually" are on specific traits or dimensions; since the concept of perceived similarity applies a more holistic perspective on the fit and complementarity of the relationship dyad, the ratings of perceived similarity contain other attributes not taken into account by the actual similarity. Another associated explanation of the larger relationship between attraction and perceived similarity (Montoya et al., in press; Neyer, 2003) relates to a "delusional" similarity. Though perceived similarity may be only weakly related to actual similarity (e.g., Selfhout et al., 2008), it might still be related to attraction, because "[i]f men define situations as real, they are real in their consequences" (Thomas & Thomas, 1928; p. 572). The same reasoning should apply to the associations of actual and perceived similarity and cooperation. Although actual similarity should enhance cooperation and collaboration,

stronger effects are expected for perceived similarity because expectations are developed on the basis of perceived similarities and outcomes and the perception of the outcomes (e.g., how equal the exchange was, how well the collaboration went) are affected by the expectations (e.g., Rosenthal, 1994; 1997).

The negligible effects of actual similarity in gender, marital, and parental status in relation to the relationship qualities might be explained by the before explained differences between actual and perceived similarity. Although voluntary relationships are selected with respect to these similarities (in the present studies, also McPherson et al., 2001) and these similarities are seen as “tags” for cooperative behavior (Masuda & Ohtsuki, 2007), they are unrelated to relationship qualities. Perhaps simple dichotomies in gender or marital status do not strongly relate to relationship quality because they are too distal. More proximal, psychological measures are more strongly related to relationship qualities because less intermediate steps are necessary to translate distal similarities into relationship relevant interactions.

Finally, what can be concluded from the comparison of the five family types? They share more commonalities than differences. Reoccurring across the analyses, individuals from involuntarily childless couples, from patchwork families with a common child, and from traditional families were similar to each other. Although this has not been addressed in the family study, perhaps these three family types share similar values or life goals. Though purely speculative, involuntarily childless individuals, who long for having a common child, and patchwork families, who are comprised of two families merged through a common child, might be on their way to becoming traditional families. Motivated childless couples and patchwork families without a common child, on the other hand, may pursue other life styles or have different goals and values. These individual differences in relationship pursuit relate to the third level (between-person differences). Significant variance in the multilevel slopes (i.e., associations between two variables) indicate that people differ in their within-person associations among similarity, emotional closeness, and reciprocity, and the variables analyzed so far—family type and gender—were far from explaining this variance completely. Hence, future analyses and studies could focus on explaining these individual differences.

4.4 Future directions and practical applications

Two possible directions are seen for the study of similarity in personal relationships. First, individual differences in relationship regulation could be related to and explained by, and explain other individual dispositions. Individual differences in keeping track of exchanges could be related to injustice sensitivity (Ashton, Paunonen,

Helmes, Jackson, 1998; Baumert & Schmitt, 2007); paying attention to similarities in others might be correlated with self-monitoring (Jamieson, Lydon, Zanna, 1987) or competitiveness (Stapel & Koomen; 2005) and differentiating between relationships might covary with indices of psychological and physical health.

In addition, the scope of facets of similarity could be enlarged and/or changed. Physical similarity is a strong covariate of genetic relatedness and thus indicative of kinship, but negatively or unrelated to reciprocity (depending on the type of relationship). Skill similarity relates to heritable similarities, but also to common skills due to selection and assortment. A “purer” indicator of cooperation would be desirable. Although reliable and largely valid measures of personality assessment within personal network approaches have been developed (Denissen, Geenen, Selfhout, & van Aken, 2008; Selfhout et al., 2008), the concept of personality similarity and its relations to kin recognition and cooperation remains open. Personality similarity is moderate between relatives (Loehlin, 1992; McCartney, Harris, & Bernieri, 1990) and slightly lower between unrelated spouses and friends (Luo & Klohnen, 2005; Selfhout et al., 2007; Watson et al., 2004). Like skill similarity, this concept is a hybrid because it can result from common ancestry as well as assortment and selection of relationship partners. It could be worthwhile to establish an index of general similarity that combines many relevant characteristics and weighs them with the individual importance (Lutz-Zois et al., 2006). For example, for some people similar attitudes towards increasing the federal budget for education and science might not be related to the relationship quality because the political debates involving budgets and finances are not important to them. The studied concepts might be extended to different relationship phases as well as life transitions and could be combined with intervention studies. For example, an intervention study could be conducted in cooperation with a family counseling center working with reconstituted or patchwork families. The intervention program could include the discovering and strengthening of similarities in skills and interests between social parents and the children. Here, the within-relationship change, which was small in this study with established patchwork relationships, could be the point of focus.

If the reported associations generalize across further concepts, comparative and cross-cultural studies could be informative regarding the universal nature of the posed associations. For example, although friendship among animals has not been researched much yet, first studies indicate that there are friendship relationships among animals that cannot be explained by kinship, dominance or mating behavior. Closeness is an indicator of friendship between animals, too, though it is physical closeness (e.g., Harcourt & De Waal, 1992; Wasilewski, 2003; Widdig et al., 2001).

In addition to the proposed application of the conclusions about similarities fostering the relationship development of new relationship in patchwork families, other utilizations are possible and have been carried out. Marriage bureaus and dating agencies match interested persons on a general similarity principle and apply complex formulas with weighted coefficients of similarities in personality, attitude, demographic, interests and many more. As a continuative idea, marriage and family counselors could focus on and strengthen existing similarities in problematic relationships. In all, it seems to be a general characteristic to seek similar others and perceive similarity in others, and this characteristics provides advantages for the quality of personal relationships.

- Aartsen, M. J., van Tilburg, T., Smits, C. H. M., & Knipscheer, K. C. P. M. (2004). A longitudinal study of the impact of physical and cognitive decline on the personal network in old age. *Journal of Social and Personal Relationships, 21*, 249-266.
- Ackerman, J. M., Kenrick, D. T., & Schaller, M. (2007). Is friendship akin to kinship? *Evolution and Human Behavior, 28*, 365-374.
- Adams, R. G., & Blieszner, R. (1994). An integrative conceptual framework for friendship research. *Journal of Social and Personal Relationships, 11*, 163-184.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression : testing and interpreting interactions*. Newbury Park, Calif.: Sage.
- Albeck, S., & Kaydar, D. (2002). Divorced mothers: Their network of friends pre- and post-divorce. *Journal of Divorce & Remarriage, 36*, 111-138.
- Alexander, R. D. (1987). *Biology of moral systems*. New York: Aldine de Gruyter.
- Allan, G. (2001). Personal relationships in late modernity. *Personal Relationships, 8*, 325-339.
- Allan, G. (2008). Flexibility, friendship, and family. *Personal Relationships, 15*, 1-16.
- Alvergne, A., Faurie, C., & Raymond, M. (2007). Differential facial resemblance of young children to their parents: who do children look like more? *Evolution and Human Behavior, 28*, 135-144.
- Amato, P. R., & Keith, B. (1991a). Parental Divorce and Adult Well-being: A Meta-analysis. *Journal of Marriage and the Family, 53*, 43-58.
- Amato, P. R., & Keith, B. (1991b). Parental Divorce and the Well-Being of Children: A Meta-Analysis. *Psychological Bulletin, 110*, 26-46.
- Anderson, E. R. (1999). Sibling, half sibling, and stepsibling relationships in remarried families. In E. M. Hetherington, S. H. Henderson & D. Reiss (Eds.), *Adolescent Siblings in Stepfamilies: Family Functioning and Adolescent Adjustment* (pp. 101-126). Malden, Mass.: Blackwell.
- Anderson, K. G., Kaplan, H., & Lancaster, J. B. (2007). Confidence of paternity, divorce, and investment in children by Albuquerque men. *Evolution and Human Behavior, 28*, 1-10.
- Antonucci, T. C. (1986). Hierarchical mapping technique. *Generations: Journal of the American Society on Aging, 10*, 10-12.
- Argyle, M. (1999). Causes and Correlates of Happiness. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being : the foundations of hedonic psychology* (pp. 353-373). New York: Sage.

- Argyle, M., & Furnham, A. (1983). Sources of Satisfaction and Conflict in Longterm Relationships. *Journal of Marriage and the Family*, 45, 481-493.
- Argyle, M., & Henderson, M. (1986). *Die Anatomie menschlicher Beziehungen: Spielregeln des Zusammenlebens* [The anatomy of human relationships: Rules of cohabitation]. Paderborn: Junfermann Verlag.
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the Structure of Interpersonal Closeness. *Journal of Personality and Social Psychology*, 63, 596-612.
- Aron, A., Aron, E. N., Tudor, M., & Nelson, G. (1991). Close Relationships as Including Other in the Self. *Journal of Personality and Social Psychology*, 60, 241-253.
- Asendorpf, J. B. (2004). *Psychologie der Persönlichkeit* (3rded.). Berlin: Springer.
- Asendorpf, J. B. (2005). Umwelteinflüsse auf die Entwicklung aus entwicklungs-genetischer Sicht [Environmental influences on development from a developmental genetic perspective]. *Zeitschrift für Soziologie der Erziehung und Sozialisation*, 25, 118-132.
- Asendorpf, J. B. (2006). Entwicklungsgenetik [Developmental genetics]. In W. Schneider & F. Wilkening (Eds.), *Enzyklopädie der Psychologie. C: Theorie und Forschung, V: Entwicklungspsychologie. Band 1: Theorien, Modelle und Methoden der Entwicklungspsychologie* (pp. 461-507). Göttingen: Hogrefe.
- Asendorpf, J. B. (2007). *Psychologie der Persönlichkeit* [Personality psychology] (4th ed.). Berlin: Springer.
- Asendorpf, J., & Banse, R. (2000). *Psychologie der Beziehung* [Psychology of relationships]. Bern: Huber.
- Asendorpf, J. B., Banse, R., Wilpers, S. & Neyer, F.J. (1997). Beziehungsspezifische Bindungsskalen für Erwachsene und ihre Validierung durch Netzwerk- und Tagebuchverfahren [Relationship specific attachment scales for adults and their validation through network and diary methods]. *Diagnostica*, 43, 289-313.
- Asendorpf, J.B. & Wilpers, S. (1998). Personality effects on social relationships. *Journal of Personality and Social Psychology*, 74, 1531-1544.
- Ashton, M. C., Paunonen, S. V., Helmes, E., & Jackson, D. N. (1998). Kin Altruism, Reciprocal Altruism, and the Big Five Personality Factors. *Evolution and Human Behavior*, 19, 243-255.
- Auhagen, A. E. (1993). Freundschaft unter Erwachsenen [Friendship among adults]. In A. E. Auhagen & M. v. Salisch (Eds.), *Zwischenmenschliche Beziehungen* (pp. 215-233). Göttingen: Hogrefe.
- Avlund, K., Damsgaard, M. T., & Holstein, B. E. (1998). Social relations and mortality. An eleven year follow-up study of 70-year-old men and women in Denmark. *Social Science & Medicine*, 47, 635-643.

- Axelrod, R. (1984). *The evolution of co-operation*. New York: Basic Books.
- Axelrod, R., & Hamilton, W. (1981). The evolution of cooperation. *Science*, *211*, 1390-1396.
- Back, M. (2007). *Spontane interpersonelle Attraktion und Persönlichkeit: Eine längsschnittliche Social Relations Analyse* [Personality and interpersonal attraction at zero-acquaintance: A longitudinal Social Relations Analysis]. Unpublished doctoral dissertation, University of Leipzig, Germany.
- Barnett, R. C., Marshall, N. L., Raudenbush, S. W., & Brennan, R. T. (1993). Gender and the relationship between job experiences and psychological distress: A study of dual-earner couples. *Journal of Personality and Social Psychology*, *64*, 794-806.
- Barnett, R. C., Raudenbush, S. W., Brennan, R. T., & Pleck, J. H. (1995). Change in job and marital experiences and change in psychological distress: A longitudinal study of dual-earner couples. *Journal of Personality and Social Psychology*, *69*, 839-850.
- Barnett, R. C., & Rivers, C. (2005). *Same Difference: How Gender Myths Are Hurting Our Relationships, Our Children, and Our Jobs*. New York, NY: Basic Books.
- Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Barrett, H. C., & Kurzban, R. (2006). Modularity in Cognition: Framing the Debate. *Psychological Review*, *113*, 628-647.
- Barth, R. J., & Kinder, B. N. (1988). A theoretical analysis of sex differences in same-sex friendships. *Sex Roles*, *19*, 349-363.
- Bartholomew, K. (1990). Avoidance of intimacy: An attachment perspective. *Journal of Social and Personal Relationships*, *7*, 147-178.
- Batson, C. D. (2006). SIT or STAND? *Psychological Inquiry*, *17*, 30-35.
- Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and Testing Random Indirect Effects and Moderated Mediation in Multilevel Models: New Procedures and Recommendations. *Psychological Methods*, *11*, 142-163.
- Baumann, U., & Laireiter, A. (1996). Individualdiagnostik interpersoneller Beziehungen [Individual diagnostics of personal relationships]. In K. Pawlik (Ed.), *Enzyklopädie der Psychologie. Band C/VIII/1: Differentielle Psychologie und Persönlichkeitsforschung: Grundbegriffe, Fragestellungen, Systematik* (pp. 609-643). Göttingen: Verlag für Psychologie.
- Baumeister, R. F. (2007, August). *Is There Anything Good About Men?* Invited talk given at the APA annual convention, San Francisco, CA.
- Baumeister, R. F., & Leary, M. A. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Psychological Bulletin*, *117*, 497-529.

- Baumeister, R. F., & Sommer, K. L. (1997). What do men want? Gender differences and two spheres of belongingness: Comment on Cross and Madson (1997). *Psychological Bulletin*, *122*, 38-44.
- Baumert, A., & Schmitt, M. (2007, September). *Justice Sensitivity: Personality-congruent attention and memory*. Paper presented at the 9. Arbeitstagung der Fachgruppe für Differentielle Psychologie, Persönlichkeitspsychologie und Psychologische Diagnostik, Wien, Austria.
- Beck, U. (1996). *Risikogesellschaft : auf dem Weg in eine andere Moderne* [Risk society: on the way to a new modernity]. Frankfurt am Main: Suhrkamp.
- Beer, W. R. (Ed.). (1988). *Relative strangers: Studies of stepfamily processes*. Totowa, NJ: Rowman & Littlefield.
- Berg, J. H., & McQuinn, R. D. (1986). Attraction and Exchange in Continuing and Noncontinuing Dating Relationships. *Journal of Personality and Social Psychology*, *50*, 942-952.
- Bergeman, C. S., Chipuer, H. M., Plomin, R., Pedersen, N. L., McClearn, G. E., Nesselroade, J. R., Costa, P.T., & McCrae, R. R. (1993). Genetic and environmental effects on openness to experience, agreeableness, and conscientiousness: An adoption/twin study. *Journal of Personality*, *61*, 159-179.
- Berscheid, E. (2006). SIT: An Exercise in Theoretical Multitasking. *Psychological Inquiry*, *17*, 35-38.
- Berscheid, E., & Regan, P. (2005). *The Psychology of Interpersonal Relationships*. Upper Saddle River, NJ: Pearson Education.
- Berscheid, E., Snyder, M., & Omoto, A. M. (1989). The Relationship Closeness Inventory: Assessing the Closeness of Interpersonal Relationships. *Journal of Personality and Social Psychology*, *57*, 792-807.
- Biblarz, T. J., & Raftery, A. E. (1999). Family structure, educational attainment, and socioeconomic success: Rethinking the 'pathology of matriarchy.' *American Journal of Sociology*, *105*, 321-365.
- Bjorklund, D. F., & Pellegrini, A. D. (2002). *The origins of human nature: evolutionary developmental psychology*. Washington, DC: APA.
- Blieszner, R., & Roberto, K. A. (2004). Friendship across the Life Span: Reciprocity in Individual and Relationship Development. In F. R. Lang & K. L. Fingerman (Eds.), *Growing Together: Personal relationships across the Life span* (pp. 159-182). Cambridge: University Press.
- Blieszner, R., & Adams, R. G. (1992). *Adult friendship*. Newbury Park, CA: Sage.
- Blieszner, R., & Roberto, K. A. (2004). Friendship across the Life Span: Reciprocity in Individual and Relationship Development. In F. R. Lang & K. L. Fingerman (Eds.),

- Growing Together: Personal relationships across the Life span* (pp. 159-182). Cambridge: University Press.
- Bloom, B., & Dawson, D. (1991). Family Structure and Child Health. *American Journal of Public Health, 81*, 1526-1528.
- Bott, E. (1957). *Family and Social Network: Roles, Norms, and External Relationships in Ordinary Urban Families*. London: Tavistock Publications Limited.
- Bowlby, J. (1991). Attachment and loss. Vol. 1. Attachment. London: Penguin Books. (Original work published 1969).
- Brähler, C. (1990). *Familie, Kinderwunsch, Unfruchtbarkeit: Motivation und Behandlungsverläufe bei künstlicher Befruchtung* [Family, wish to have children, infertility: motivation and treatment progress of artificial insemination]. Opladen: Westdeutscher Verlag.
- Bray, J. H., & Berger, S. H. (1993). Developmental Issues in StepFamilies Research Project: Family relationships and parent-child interactions. *Journal of Family Psychology, 7*, 76-90.
- Bray, J. H., & Hetherington, E. M. (1993). Families in transition: Introduction and overview. *Journal of Family Psychology, 7*, 3-8.
- Bressan, P., & Dal Martello, M. F. (2002). Perceived Resemblance and the Belief in Genetic Relatedness. *Psychological Science, 13*, 213-218.
- Bronfenbrenner, U. (1989). *Die Ökologie der menschlichen Entwicklung: Natürliche und geplante Experimente* [The ecology of human development: Experiments by nature and design]. Frankfurt am Main: Fischer. (Original work published in 1979)
- Brosnan, S. F., & de Waal, F. B. M. (2002). A Proximate Perspective on Reciprocal Altruism. *Human Nature, 13*, 129-152.
- Brown, S. L., & Brown, R. M. (2006). Selective Investment Theory: Recasting the Functional Significance of Close Relationships. *Psychological Inquiry, 17*, 1-29.
- Bugental, D. B. (2000). Acquisition of the algorithms of social life: A domain-based approach. *Psychological Bulletin, 126*, 187-219.
- Burch, R. L., & Gallup, G. G. J. (2000). Perceptions of paternal resemblance predict family violence. *Evolution and Human Behavior, 21*, 429-435.
- Burnstein, E., Crandall, C., & Kitayama, S. (1994). Some Neo-Darwinian Decision Rules for Altruism: Weighing Cues for Inclusive Fitness as a Function of the Biological Importance of the Decision. *Journal of Personality and Social Psychology, 67*, 773-789.
- Buss, D. M. (1999a). *Evolutionary psychology: the new science of the mind*. Boston: Allyn & Bacon.

- Buss, D. M. (1999b). Human nature and individual differences: The evolution of human personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of Personality* (2nd ed., pp. 31-56). New York: Guilford Press.
- Buss, D. M. (2004). *Evolutionäre Psychologie* [Evolutionary psychology]. München: Pearson Studium.
- Buss, D. M., & Greiling, H. (1999). Adaptive individual differences. *Journal of Personality*, *67*, 209-242.
- Bussell, D. A., Neiderhiser, J. M., Pike, A., Plomin, R., Simmens, S., Howe, G. W., Hetherington, E. M., Carroll, E., & Reiss, D. (1999). Adolescents' relationships to siblings and mothers: A multivariate genetic analysis. *Developmental Psychology*, *35*, 1248-1259.
- Buunk, B. P., Doosje, B. J., Jans, L. G. J. M., & Hopstaken, L. E. M. (1993). Perceived Reciprocity, Social Support, and Stress at Work: The Role of Exchange and Communal Orientation. *Journal of Personality and Social Psychology*, *65*, 801-811.
- Buunk, B. P., & Prins, K. S. (1998). Loneliness, exchange orientation, and reciprocity in friendships. *Personal Relationships*, *5*, 1-14.
- Byrne, D. (1971). *The attraction paradigm*. New York: Academic.
- Byrne, D. (1997). An overview (and underview) of research and theory within the attraction paradigm. *Journal of Social and Personal Relationships*, *14*, 417-431.
- Byrne, D., Griffitt, W., & Stefaniak, D. (1967). Attraction and similarity of personality characteristics. *Journal of Personality and Social Psychology*, *5*, 82-90.
- Byrne, D., & Nelson, D. (1965). Attraction as a linear function of proportion of positive reinforcements. *Journal of Personality and Social Psychology*, *1*, 659-663.
- Caldwell, M. A., & Peplau, L. A. (1982). Sex Differences in Same-Sex Friendship. *Sex Roles: A Journal of Research*, *8*, 721.
- Callan, V. J. (1987). The Personal and Marital Adjustment of Mothers and of Voluntarily and Involuntarily Childless Wives. *Journal of Marriage and the Family*, *49*, 847-856.
- Cappella, J. N., & Palmer, M. T. (1990). Attitude Similarity, Relational History, and Attraction: The Mediating Effects of Kinesic and Vocal Behaviors. *Communication Monographs*, *57*, 161-183.
- Carl, C., Bengel, J., & Strauß, B. (2000). Gewollte Kinderlosigkeit aus psychologischer Perspektive [Voluntary childlessness from a psychological perspective]. *Reproduktionsmedizin*, *16*, 28-36.
- Caspi, A., Herbener, E. S., & Ozer, D. J. (1992). Shared Experiences and the Similarity of Personalities: A Longitudinal Study of Married Couples. *Journal of Personality and Social Psychology*, *62*, 281-291.

- Charlesworth, W. R. (1996). Co-operation and Competition: Contributions to an Evolutionary and Developmental Model. *International Journal of Behavioral Development, 19*, 25-38.
- Clark, M. S. (1984). Record Keeping in Two Types of Relationships. *Journal of Personality and Social Psychology, 47*, 549-557.
- Clark, M. S., & Grote, N. K. (1998). Why aren't Indices of Relationship Costs Always Negatively Related to Indices of Relationship Quality? *Personality and Social Psychology Review, 2*, 2-17.
- Clark, M. S., & Mills, J. (1979). Interpersonal Attraction in Exchange and Communal Relationships. *Journal of Personality and Social Psychology, 37*, 12-24.
- Clark, M. S., & Mills, J. (1993). The Difference Between Communal and Exchange Relationships: What It Is and Is Not. *Personality and Social Psychology Bulletin, 19*, 684-691.
- Clark, M. S., Mills, J., & Powell, M. C. (1986). Keeping Track of Needs in Communal and Exchange Relationships. *Journal of Personality and Social Psychology, 51*, 333-338.
- Clark, M. S., Ouellette, R., Powell, M. C., & Milberg, S. (1987). Recipient's Mood, Relationship Type, and Helping. *Journal of Personality and Social Psychology, 53*, 94-103.
- Clark, M. S., & Reis, H. T. (1988). Interpersonal Processes in Close Relationships. *Annual Review of Psychology, 39*, 609-672.
- Clark, H. H., Schreuder, R., & Buttrick, S. (1983). Common ground and the understanding of demonstrative reference. *Journal of Verbal Learning and Verbal Behavior, 22*, 245-258.
- Clawson, J., & Ganong, L. (2002). Adult stepchildren's obligations to older stepparents. *Journal of Family Nursing, 8*, 50-72.
- Clingempeel, W. G., Brand, E., & Ievoli, R. (1984). Stepparent-Stepchild Relationships in Stepmother and Stepfather Families: A Multimethod Study. *Family Relations, 33*, 465.
- Cole, T., & Teboul, J. B. (2004). Non-zero-sum collaboration, reciprocity, and the preference for similarity: Developing an adaptive model of close relational functioning. *Personal Relationships, 11*, 135-160.
- Collins, W. A., & Laursen, B. (2006). Parent-Adolescent Relationships. In P. Noller & J. A. Feeney (Eds.), *Close Relationships: Functions, Forms and Processes* (pp. 111-125). New York: Psychology Press.
- Collins, W. A., & Madsen, S. D. (2006). Personal Relationships in Adolescence and Early Adulthood. In A. L. Vangelisti & D. Perlman (Eds.), *Cambridge Handbook of Personal Relationships* (pp. 191-209). Cambridge: University Press.

- Collins, W. E., Newman, B. M., & McKenry, P. C. (1995). Intrapyschic and Interpersonal Factors Related to Adolescent Psychological Well-Being in Stepmother and Stepfather Families. *Journal of Family Psychology, 9*, 433-445.
- Connolly, J., Furman, W., & Konarski, R. (2000). The role of peers in the emergence of heterosexual romantic relationships in adolescence. *Child Development, 71*, 1395-1408.
- Coromina, L., & Coenders, G. (2006). Reliability and validity of egocentered network data collected via web: A meta-analysis of multilevel multitrait multimethod studies. *Social Networks, 28*, 209-231.
- Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition, 31*, 187-276.
- Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. Barkow, L. Cosmides & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163-228). New York: Oxford University Press.
- Cosmides, L., Tooby, J., & Barkow, J. (1992). Introduction: Evolutionary psychology and conceptual integration. In J. Barkow, L. Cosmides & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 19-136). New York: Oxford University Press.
- Coventry, W. L., Gillespie, N. A., Heath, A. C., & Martin, N. G. (2004). Perceived social support in a large community sample: Age and sex differences. *Social Psychiatry and Psychiatric Epidemiology, 39*, 625-636.
- Cross, S. E., Bacon, P. L., & Morris, L. (2000). The Relational-Interdependent Self-Construal and Relationships. *Journal of Personality and Social Psychology, 78*, 791-808.
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin, 122*, 5-37.
- Curley, J. P., & Keverne, E. B. (2005). Genes, brains and mammalian social bonds. *Trends in Ecology and Evolution, 20*, 561-567.
- Daly, M., Salmon, C., & Wilson, M. (1997). Kinship: The Conceptual Hole in Psychological Studies of Social Cognition and Close Relationships. In J. Simpson & P. T. Kenrick (Eds.), *Evolutionary Psychology* (pp. 265-296). Mahwah, NJ: Erlbaum.
- Daly, M., & Wilson, M. I. (1982). Whom Are Newborn Babies Said to Resemble? *Ethology and Sociobiology, 3*, 69-78.
- Davey, A., & Norris, J. E. (1998). Social networks and exchange norms across the adult life-span. *Canadian Journal on Aging, 17*, 212-233.
- Davis, J. N., & Daly, M. (1997). Evolutionary Theory and the Human Family. *The Quarterly Review of Biology, 72*, 407-435.

- Davis, M. H., Morris, M. M., & Kraus, L. A. (1998). Relationship-Specific and Global Perceptions of Social Support: Associations With Well-Being and Attachment. *Journal of Personality and Social Psychology, 74*, 468-481.
- Dawkins, R. (1999). *The selfish gene*. Oxford: Oxford University Press. (Original work published 1989)
- Dawson, D. A. (1991). Family structure and children's health and well-being: Data from the 1988 National Health Interview Survey on Child Health. *Journal of Marriage & Family, 53*, 573-584.
- Deater-Deckard, K., Dunn, J., & Lussier, G. (2002). Siblings-Relationships and Social-emotional Adjustment in Different Family Contexts. *Social Development, 11*, 571-590.
- DeBruine, L. M. (2002). Facial Resemblance Enhances Trust. *Proceedings: Biological Sciences (The Royal Society), 269*, 1307-1312.
- DeBruine, L. M. (2004). *Facial Resemblance Affects Behaviour and Attributions*. Unpublished Doctoral Thesis, McMaster University, Hamilton, Ontario.
- Denissen, J. J. A., Geenen, R., Selfhout, M. H. W., & van Aken, M. A. G. (2008). Single-item Big Five Ratings in Social Network Design. *European Journal of Personality, 22*, 37-54.
- Deutsch, F. M., Sullivan, L., Sage, C., & Basile, N. (1991). The Relations among Talking, Liking, and Similarity between Friends. *Personality and Social Psychology Bulletin, 17*, 406-411.
- Doherty, N. A., & Feeney, J. A. (2004). The composition of attachment networks throughout the adult years. *Personal Relationships, 11*, 469-488.
- Duck, S. (Ed.). (1988). *Handbook of personal relationships: Theory, research, and interventions*. New York: Wiley.
- Dunham, P., & Dunham, S. L. (1983). Resemblance in Motor Skill Performance of Sixth Graders and their Parents. *The Journal of Psychology, 115*, 193-197.
- Dunn, J. (2002). The Adjustment of Children in Stepfamilies: Lessons from Community Studies. *Child and Adolescent Mental Health, 7*, 154-161.
- Dunn, J., Deater-Deckard, K., & Pickering, K. (1999). Siblings, Parents, and Partners: Family Relationships within a Longitudinal Community Study. *Journal of Child Psychology and Psychiatry, 40*, 1025-1037.
- Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*, 121-138.
- Engstler, H., & Menning, S. (2003). *Die Familie im Spiegel der amtlichen Statistik: Lebensformen, Familienstrukturen, wirtschaftlich Situation der Familien und familiendemographische Entwicklung in Deutschland* [The family in light of governmental statistic: Life styles, family structures, economic situation of families

- and family development in Germany]. Berlin: Bundesministerium für Familie, Senioren, Frauen und Jugend.
- Feeney, J. A., Hohaus, L., Noller, P., & Alexander, R. P. (2001). *Becoming parents: Exploring the bonds between mothers, fathers, and their infants*. Cambridge, England: Cambridge University Press.
- Fehr, B. (2000). The Life Cycle of Friendship. In C. Hendrick & S. S. Hendrick (Eds.), *Close Relationships* (pp. 71-82). Thousand Oaks, CA: Sage.
- Fehr, E., & Gächter, S. (2000). Cooperation and Punishment in Public Goods Experiments. *The American Economic Review*, *90*, 980-994.
- Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature*, *415*, 137-141.
- Fehr, E., & Fischbacher, U. (2004). Third-party punishment and social norms. *Evolution and Human Behavior*, *25*, 63-87.
- Fehr, E., & Rockenbach, B. (2004). Human altruism: economic, neural, and evolutionary perspectives. *Current Opinion in Neurobiology*, *14*, 784-790.
- Feld, S., & Carter, W. C. (1998). Foci of activity as changing contexts for friendship. In R. G. Adams & G. Allan (Eds.), *Placing Friendship in Context* (pp. 136-152). Cambridge: University Press.
- Felmlee, D. H. (2001). No couple is an island: A social network perspective on dyadic stability. *Social Forces*, *79*, 1259-1287.
- Fessler, D. M. T., & Haley, K. J. (2003). The Strategy of Affect: Emotions in Human Cooperation. In P. Hammerstein (Ed.), *Genetic and Cultural Evolution of Cooperation* (pp. 9-36). Cambridge, Mass.: The MIT Press.
- Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups: A study of human factors in housing*. New York: Harper.
- Fetchenhauer, D., & Bierhoff, H.-W. (2004). Altruismus aus evolutionstheoretischer Perspektive [Altruism from an evolutionary perspective]. *Zeitschrift für Sozialpsychologie*, *35*, 131-141.
- Fine, M. A., & Kurdek, L. A. (1995). Relation Between Marital Quality and (Step)Parent-Child Relationship Quality for Parents and Stepparents in Stepfamilies. *Journal of Family Psychology*, *9*, 216-223.
- Fine, M. A., Voydanoff, P., & Donnelly, B. W. (1993). Relations between parental control and warmth and child well-being in stepfamilies. *Journal of Family Psychology*, *7*, 222-232.
- Fingerman, K. L., & Hay, E. L. (2002). Searching under the streetlight?: Age biases in the personal and family relationships literature. *Personal Relationships*, *9*, 415-433.

- Fingerman, K. L., Hay, E. L., & Birditt, K. S. (2004). The best of ties, the worst of ties: Close, problematic, and ambivalent social relationships. *Journal of Marriage and Family*, 66, 792-808.
- Fingerman, K. L., & Lang, F. R. (2004). Coming Together: A Perspective on Relationships across the Life span. In F. R. Lang & K. L. Fingerman (Eds.), *Growing Together: Personal relationships across the Life span* (pp. 1-23). Cambridge: University Press.
- Fiske, A. P. (1992). The Four Elementary Forms of Sociality: Framework for a Unified Theory of Social Relations. *Psychological Review*, 99, 689-723.
- Fiske, A. P., & Haslam, N. (1996). Social cognition is thinking about relationships. *Current Directions in Psychological Science*, 5, 137-142.
- Fiske, A. P., & Haslam, N. (1997). The structure of social substitutions: A test of relational models theory. *European Journal of Social Psychology*, 27, 725-729.
- Fiske, A. P., Haslam, N., & Fiske, S. T. (1991). Confusing one person with another: What errors reveal about the elementary forms of social relations. *Journal of Personality and Social Psychology*, 60, 656-674.
- Floyd, K. (1995). Gender and Closeness Among Friends and Siblings. *Journal of Psychology*, 129, 193-202.
- Fowler, J. H. (2005). Altruistic punishment and the origin of cooperation. *Proceedings of the National Academie of Sciences of the USA*, 102, 7047-7049.
- Fraley, R. C., Brumbaugh, C. C., & Marks, M. J. (2005). The Evolution and Function of Adult Attachment: A Comparative and Phylogenetic Analysis. *Journal of Personality and Social Psychology*, 89, 731-746.
- Frank, R. H. (1988). *Passions within reasons: The strategic role of the emotions*. New York: Norton.
- Gall, J. A. (2000). *Kin selection: A study of odor recognition, preference, and emotional closeness as a function of genetic similarity*. Unpublished doctoral dissertation, Wayne State University, US.
- Geary, D. C. (2000). Evolution and Proximate Expression of Human Paternal Investment. *Psychological Bulletin*, 126, 55-77.
- Gerich, J., & Lehner, R. (2006). Collection of Ego-Centered Network Data with Computer-Assisted Interviews. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 2, 7-15.
- Gintis, H., Bowles, S., Boyd, R., & Fehr, E. (2003). Explaining altruistic behavior in humans. *Evolution and Human Behavior*, 24, 153-172.
- Gintis, H., Smith, E. H., & Bowles, S. (2001). Costly signaling and cooperation. *Journal of Theoretical Biology*, 213, 103-119.

- Goethe, J. W. (1972). *Die Wahlverwandtschaften* [The family by choice]. Frankfurt am Main: Insel Verlag. (Original work published 1809)
- Golding, J., & ALSPAC Study Team (1996). Children of the Nineties: A resource for assessing the magnitude of long-term effects of prenatal, perinatal and subsequent events. *Contemporary Reviews in Obstetrics and Gynaecology*, 8, 89-92.
- Gonzaga, G. C., Campos, B., & Bradbury, T. (2007). Similarity, convergence, and relationship satisfaction in dating and married couples. *Journal of Personality and Social Psychology*, 93, 34-48.
- Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions About Internet Questionnaires. *American Psychologist*, 59, 93-104.
- Gouldner, A. W. (1960). The Norm of Reciprocity: A Preliminary Statement. *American Sociological Review*, 25, 161-178.
- Grafen, A. (2007). Detecting kin selection at work using inclusive fitness. *Proceedings: Biological Sciences*, 274, 713-719.
- Graham-Bermann, S. A. (1991). Siblings in Dyads: Relationships Among Perception and Behaviour. *The Journal of Genetic Psychology*, 152, 207-216.
- Grau, I. (2003). Emotionale Nähe [Emotional closeness]. In H.-W. Bierhoff & I. Grau (Eds.), *Sozialpsychologie der Partnerschaft* (pp. 285-314). Berlin: Springer.
- Grau, I., & Döll, J. (2003). Effects of attachment styles on the experience of equity in heterosexual couples relationships. *Experimental Psychology*, 50, 298-310.
- Grau, I., Mikula, G., & Engel, S. (2001). Skalen zum Investitionsmodell von Rusbult [Scales for the investment model of Rusbult]. *Zeitschrift für Sozialpsychologie*, 32, 29-44.
- Grotevant, H. D., Scarr, S., & Weinberg, R. A. (1977). Patterns of interest similarity in adoptive and biological families. *Journal Of Personality And Social Psychology*, 35, 667-676.
- Hall, E. T. (1966). *The Hidden Dimension*. Garden City, N.Y.: Anchor Books.
- Hamilton, W. D. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, 7, 1-16.
- Hamilton, L., Cheng, S., & Powell, B. (2007). Adoptive Parents, Adaptive Parents: Evaluating the Importance of Biological Ties for Parental Investment. *American Sociological Review*, 72, 95-116.
- Hamm, J. V. (2000). Do Birds of a Feather Flock Together? The Variable Bases for African American, Asian American, and European American Adolescents' Selection of Similar Friends. *Developmental Psychology*, 36, 209-219.

- Hammerstein, P. (2003). Why is Reciprocity So Rare in Social Animals? A Protestant Appeal. In P. Hammerstein (Ed.), *Genetic and Cultural Evolution of Cooperation* (pp. 83-93). Cambridge, Mass.: The MIT Press.
- Harcourt, A. H., & De Waal, F. B. M. (Eds.). (1992). *Coalitions and alliances in humans and other animals*. Oxford: University Press.
- Harknett, K., & Knab, J. (2007). More Kin, Less Support: Multipartnered Fertility and Perceived Support Among Mothers. *Journal of Marriage and the Family*, 69, 237-253.
- Harris, G. T., Hilton, N. Z., Rice, M. E., & Eke, A. W. (2007). Children killed by genetic parents versus stepparents. *Evolution and Human Behavior*, 28, 85-95.
- Hartup, W. W., & Stevens, N. (1997). Friendships and Adaptation in the Life Course. *Psychological Bulletin*, 121, 355-370.
- Haselager, G. J. T., Hartup, W. W., van Lieshout, C. F. M., & Riksen-Walraven, J. M. A. (1998). Similarities between Friends and Nonfriends in Middle Childhood. *Child Development*, 69, 1198-1208.
- Haslam, N., & Fiske, A. P. (1992). Implicit relationship prototypes: Investigating five theories of the cognitive organization of social relationships. *Journal of Experimental Social Psychology*, 28, 441-474.
- Haslam, N., & Fiske, A. P. (1999). Relational Models Theory: A Confirmatory Factor Analysis. *Personal Relationships*, 6, 241-250.
- Hauber, M. E., & Sherman, P. W. (2001). Self-referent phenotype matching: theoretical considerations and empirical evidence. *Trends in Neurosciences*, 24, 609-616.
- Hays, R. B. (1985). A longitudinal study of friendship development. *Journal of Personality and Social Psychology*, 48, 909-924.
- Hazan, C., & Shaver, P. R. (1994). Attachment as an Organizational Framework for Research on Close Relationships. *Psychological Inquiry*, 5, 1-22.
- Heckhausen, J., Dixon, R. A., & Baltes, P. B. (1989). Gains and losses in development throughout adulthood as perceived by different adult age groups. *Developmental Psychology*, 25, 109-121.
- Heckhausen, J., & Schulz, R. (1995). A life-span theory of control. *Psychological Review*, 102, 284-304.
- Henderson, M., & Furnham, A. (1982). Similarity and attraction: The relationship between personality, beliefs, skills, needs and friendship choice. *Journal of Adolescence*, 5, 111-123.
- Henderson, S. H., & Taylor, L. C. (1999). Parent-adolescent relationships in nonstep-, simple step-, and complex stepfamilies. In E. M. Hetherington, S. H. Henderson & D. Reiss (Eds.), *Adolescent Siblings in Stepfamilies: Family Functioning and Adolescent Adjustment* (pp. 79-100). Malden, Mass.: Blackwell.

- Henning, K., & Strauß, B. (2000). Psychologische und psychosomatische Aspekte der ungewollten Kinderlosigkeit: Zum Stand der Forschung [Psychological and psychosomatic aspects of involuntary childlessness: current state of research]. In B. Strauß (Ed.), *Ungewollte Kinderlosigkeit: psychologische Diagnostik, Beratung und Therapie* (pp. 15-33). Göttingen: Hogrefe.
- Hertel, G., Naumann, S., Konradt, U., & Batinic, B. (2002). Personality Assessment via Internet: Comparing Online and Paper-and-Pencil Questionnaires. In B. Batinic, U.-D. Reips & M. Bosnjak (Eds.), *Online Social Sciences* (pp. 115-133). Toronto: Hogrefe & Huber.
- Hetherington, E. M. (1993). An overview of the Virginia Longitudinal Study of Divorce and Remarriage with a focus on early adolescence. *Journal of Family Psychology, 7*, 39-56.
- Hetherington, E. M., Bridges, M., & Insabella, G. M. (1998). What Matters? What Does Not? Five Perspectives on the Association Between Marital Transitions and Children's Adjustment. *American Psychologist, 53*, 167-184.
- Hetherington, E. M., Henderson, S. H., & Reiss, D. (Eds.). (1999). *Adolescent Siblings in Stepfamilies: Family Functioning and Adolescent Adjustment*. Malden, Mass.: Blackwell.
- Hetherington, E. M., & Stanley-Hagan, M. M. (1999). Stepfamilies. In M. E. Lamb (Ed.), *Parenting and child development in "nontraditional" families*. (pp. 137-159). Mahwah, NJ,: Lawrence Erlbaum.
- Hill, C. T., & Stull, D. E. (1981). Sex differences in effects of social and value similarity in same-sex friendship. *Journal of Personality and Social Psychology, 41*, 488-502.
- Hill, R. A., & Dunbar, R. I. M. (2003). Social network size in humans. *Human Nature, 14*, 53-72.
- Hinde, R. (1979). *Towards understanding relationships*. London: Academic Press.
- Hofer, M., & Pikowski, B. (2002). Familien mit Jugendlichen [Families with adolescents]. In M. Hofer, E. Wild & P. Noack (Eds.), *Lehrbuch Familienbeziehungen: Eltern und Kinder in der Entwicklung* (pp. 241-264). Göttingen: Hogrefe.
- Holmbeck, G. N. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology, 65*, 599-610.
- Horn, J. M. (1983). The Texas Adoption Project: Adopted Children and Their Intellectual Resemblance to Biological and Adoptive Parents. *Child Development, 54*, 268-275.
- Huesmann, L. R., Eron, L. D., Lefkowitz, M. M., & Walder, L. O. (1984). Stability of aggression over time and generations. *Developmental Psychology, 20*, 1120-1134.

- Ihinger-Tallman, M. (1987). Sibling and stepsibling bonding in stepfamilies. In K. Pasley & M. Ihinger-Tallman (Ed.), *Remarriage and stepparenting today: Current research and theory*. New York: Guilford.
- Ihinger-Tallman, M., & Pasley, K. (1987). *Remarriage*. Newbury Park: Sage.
- Ikkink, K. K., & van Tilburg, T. (1998). Do older adults' network members continue to provide instrumental support in unbalanced relationships? *Journal of Social and Personal Relationships, 15*, 59-75.
- Irons, W. (2005). How has evolution shaped human behavior? Richard Alexander's contribution to an important question. *Evolution and Human Behavior, 26*, 1-9.
- Jamieson, D. W., Lydon, J. E., & Zanna, M. P. (1987). Attitude and activity preference similarity: Differential bases of interpersonal attraction for low and high self-monitors. *Journal of Personality and Social Psychology, 53*, 1052-1060.
- Jankowiak, W., & Diderich, M. (2000). Sibling Solidarity in a Polygamous Community in the USA: Unpacking Inclusive Fitness. *Evolution and Human Behavior, 21*, 125-139.
- Jeon, J., & Buss, D. M. (2006). Close Relationships and Costly Investment: Some Problems With Selective Investment Theory. *Psychological Inquiry, 17*, 45-48.
- Johnson, D. D. P., Stopka, P., & Knights, S. (2003). The puzzle of human cooperation. *Nature, 421*, 911-912.
- Kalmijn, M., & Vermunt, J. K. (2007). Homogeneity of social networks by age and marital status: A multilevel analysis of ego-centered networks. *Social Networks, 29*, 25-43.
- Keith, P. M. (1983). A Comparison of the Resources of Parents and Childless Men and Women in Very Old Age. *Family Relations, 32*, 403-409.
- Kenny, D. A. (1988). Interpersonal perception: a social relations analysis. *Journal of Social and Personal Relationships, 5*, 247-261.
- Kenny, D. A. (1994a). *Interpersonal perception: A social relations analysis*. New York: Guilford Press.
- Kenny, D. A. (1994b). Using the Social Relations Model to understand relationships. In R. Erber & R. Gilmour (Eds.), *Theoretical frameworks for personal relationships* (pp. 111-127). Hillsdale, NJ: Erlbaum.
- Kenny, D. A., & Acitelli, L. K. (2001). Accuracy and bias in the perception of the partner in a close relationship. *Journal of Personality and Social Psychology, 80*, 439-448.
- Kenny, D. A., & Kashy, D. A. (1994). Enhanced co-orientation in the perception of friends: A social relations analysis. *Journal of Personality and Social Psychology, 67*, 1024-1033.
- Keller, M., Gummerum, M., Tien Wang, X., & Lindsey, S. (2004). Understanding Perspectives and Emotions in Contract Violation: Development of Deontic and Moral Reasoning. *Child Development, 75*, 614-635.

- Kelley, H. H., Berscheid, E., Christensen, A. C., Harvey, J. H., Huston, T. L., Levinger, G., McClintock, E., Peplau, A. P., & Peterson, D. R. (Eds.). (1983). *Close Relationships*. New York: Freeman.
- Klump, K. L., Holly, A., Iacono, W. G., McGue, M., & Willson, L. E. (2000). Physical Similarity and Twin Resemblance for Eating Attitudes and Behaviors: A Test of the Equal Environments Assumption. *Behavior Genetics*, *30*, 51-58.
- Kogovsek, T., & Ferligoj, A. (2005). Effects on reliability and validity of egocentered network measurements. *Social Networks*, *27*, 205-229.
- Konsortium Bildungsberichtserstattung (Eds.). (2006). *Bildung in Deutschland. Ein indikatorengestützter Bericht mit einer Analyse zu Bildung und Migration* [Education in Germany: a report supported by indicators including an analysis of education and migration]. Bielefeld: Bertelsmann.
- Korchmaros, J. D., & Kenny, D. A. (2006). An evolutionary and close-relationship model of helping. *Journal of Social and Personal Relationships*, *23*, 21-43.
- Kosfeld, M., Heinrichs, M., Zak, P. J., Fischbacher, U., & Fehr, E. (2005). Oxytocin increases trust in humans. *Nature*, *435*, 673-676.
- Krackhardt, D., & Kilduff, M. (1999). Whether Close or Far: Social Distance Effects on Perceived Balance in Friendship Networks. *Journal of Personality and Social Psychology*, *76*, 770-782.
- Krantz, J. H., & Dalal, R. (2000). Validity of Web-Based Psychological Research. In M. H. Birnbaum (Ed.), *Psychological Experiments on the Internet* (pp. 35-60). San Diego: Academic Press.
- Krebs, D. L. (2006). The Nature of Altruism: Ultimate Determinants and Proximate Mechanisms. *Psychological Inquiry*, *17*, 48-50.
- Kreft, I., & de Leeuw, J. (1998). *Introducing Multilevel Modeling*. London: Sage.
- Kreft, I., de Leeuw, J., & Aiken, L. S. (1995). The Effect of Different Forms of Centering in Hierarchical Linear Models. *Multivariate Behavioral Research*, *30*, 1-21.
- Kruger, D. J. (2003). Evolution and Altruism: Combining Psychological Mediators with Naturally Selected Tendencies. *Evolution and Human Behavior*, *24*, 118-125.
- Krull, J. L., & MacKinnon, D. P. (2001). Multilevel Modeling of Individual and Group Level Mediated Effects. *Multivariate Behavioral Research*, *36*, 249-277.
- Krupp, D. B., Debruine, L. M., & Barclay, P. (2008). A cue of kinship promotes cooperation for the public good. *Evolution and Human Behavior*, *29*, 49-55.
- Lafreniere, P. J. (1996). Co-operation as a Conditional Strategy among Peers: Influence of Social Ecology and Kin Relations. *International Journal of Behavioral Development*, *19*, 39-52.

- Lang, F. R. (1994). *Die Gestaltung informeller Hilfebeziehungen im hohen Alter – Die Rolle von Elternschaft und Kinderlosigkeit* [The management of informal support relationships in old age – the role of parenthood and childlessness]. Berlin: Edition Sigma.
- Lang, F. R. (2005). Die Gestaltung sozialer Netzwerke im Lebenslauf [The management of social networks across the life span]. In U. Otto & P. Bauer (Eds.), *Mit Netzwerken professionell zusammenarbeiten, Band 1: Soziale Netzwerke in Lebenslauf- und Lebenslagenperspektive* (pp. 41-63). Tübingen: DGVT.
- Lang, F. R., & Carstensen, L. L. (1994). Close emotional relationships in late life: further support for proactive aging in the social domain. *Psychology And Aging, 9*, 315-324.
- Lang, F. R., Featherman, D. L., & Nesselroade, J. R. (1997). Social self-efficacy and short-term variability in social relationships: the MacArthur successful aging studies. *Psychology And Aging, 12*, 657-666.
- Lang, F. R., & Neyer, F. J. (2005). Soziale Beziehungen als Anlage und Umwelt: Ein evolutionspsychologisches Rahmenmodell der Beziehungsregulation [Social relationships as nature and nurture: an evolutionary model of relationship regulation]. *Zeitschrift für Soziologie der Erziehung und Sozialisation, 25*, 162-177.
- Lang, F. R., & Schütze, Y. (2002). Adult Children's Supportive Behaviors and Older Parents' Subjective Well-Being - A Developmental Perspective on Intergenerational Relationships. *Journal of Social Issues, 58*, 661-680.
- Lang, F. R., Staudinger, U. M., & Carstensen, L. L. (1998). Perspectives on socioemotional selectivity in late life: how personality and social context do (and do not) make a difference. *The Journals Of Gerontology. Series B, Psychological Sciences And Social Sciences, 53*, 21-29.
- Laursen, B., Wilder, D., Noack, P., & Williams, V. (2000). Adolescent Perceptions of Reciprocity, Authority, and Closeness in Relationships with Mothers, Fathers, and Friends. *International Journal of Behavioral Development, 24*, 464-471.
- Lehmann, L., Keller, L., West, S., & Roze, D. (2007). Group selection and kin selection: Two concepts but one process. *Proceedings of the National Academy of Sciences of the United States of America, 104*, 6736-6739.
- Leonard, K. E., Kearns, J., & Mudar, P. (2000). Peer networks among heavy, regular and infrequent drinkers prior to marriage. *Journal of Studies on Alcohol, 61*, 669-673.
- Levin, I. (2004). Living Apart Together: A New Family Form. *Current Sociology, 52*, 223–240.
- Lehnart, J., Wrzus, C., & Neyer, F. J. (in press). Dynamische Transaktionen zwischen Persönlichkeit und Beziehungen [Dynamic transactions between personality and relationships]. In F. J. Neyer & F. M. Spinath (Eds.), *Anlage und Umwelt* (pp. 149-172). Stuttgart: Lucius & Lucius

- Loehlin, J. C. (1992). *Genes and environment in personality development*. Newbury Park, CA: Sage.
- Love, K. M., & Murdock, T. B. (2004). Attachment to Parents and Psychological Well-Being: An Examination of Young Adult College Students in Intact Families and Stepfamilies. *Journal of Family Psychology, 18*, 600-608.
- Luo, S., & Klohnen, E. C. (2005). Assortative Mating and Marital Quality in Newlyweds: A Couple-Centered Approach. *Journal of Personality and Social Psychology, 88*, 304-326.
- Lutz-Zois, C. J., Bradley, A. C., Mihalik, J. L., & Moorman-Eavers, E. R. (2006). Perceived similarity and relationship success among dating couples: An idiographic approach. *Journal of Social and Personal Relationships, 23*, 865-880.
- Lydon, J. E., Jamieson, D. W., & Holmes, J. G. (1997). The Meaning of Social Interactions in the Transition From Acquaintanceship to Friendship. *Journal of Personality and Social Psychology, 73*, 536-548.
- MacDonald, K. B. (1988). Socialization in the Context of the Family: A Sociobiological Perspective. In K. B. MacDonald (Ed.), *Sociobiological Perspectives on Human Development* (pp. 320-339). New York: Springer.
- Marsden, P. V. (1987). Core discussion networks of Americans. *American Sociological Review, 52*, 122-131.
- Masuda, N., & Ohtsuki, H. (2007). Tag-based indirect reciprocity by incomplete social information. *Proceedings: Biological Sciences, 274*, 689-695.
- McAnarney, E. R. (1990). Adolescents and Touch. In K. E. Barnard & T. B. Brazelton (Eds.), *Touch: the foundation of experience*. Madison: International Universities Press.
- McCallister, L., & Fischer, C. S. (1978). A Procedure for Surveying Personal Networks. *Sociological Methods & Research, 7*, 131-148.
- McCartney, K., Harris, M. J., & Bernieri, F. (1990). Growing up and growing apart: A developmental meta-analysis of twin studies. *Psychological Bulletin, 107*, 226-237.
- McClelland, G. H., & Judd, C. M. (1993). Statistical difficulties of detecting interactions and moderator effects. *Psychological Bulletin, 114*, 376-390.
- McGraw, K. O., & Wong, S. P. (1996). Forming Inferences About Some Intraclass Correlation Coefficients. *Psychological Methods, 1*, 30-46.
- McLanahan, S. S., Wedemeyer, N. V., & Adelberg, T. (1981). Network Structure, Social Support, and Psychological Well-Being in the Single-Parent Family. *Journal of Marriage and the Family, 43*, 601.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology, 27*, 415-444.

- Mendelson, M. J., & Kay, A. C. (2003). Positive feelings in friendship: Does imbalance in the relationship matter? *Journal of Social and Personal Relationships, 20*, 101-116.
- Mehlbeck, C. (1993). Nachbarschafts- und Bekanntschaftsbeziehungen [Neighbor and acquaintance relationships]. In A. E. Auhagen & M. v. Salisch (Eds.), *Zwischenmenschliche Beziehungen* (pp. 235-256). Göttingen: Hogrefe.
- Mehta, P. D., & Neale, M. C. (2005). People Are Variables Too: Multilevel Structural Equations Modeling. *Psychological Methods, 10*, 259-284.
- Mesch, G., & Talmud, I. (2006). The Quality of Online and Offline Relationships: The Role of Multiplexity and Duration of Social Relationships. *Information Society, 22*, 137-148.
- Mikulincer, M., Florian, V., & Weller, A. (1993). Attachment styles, coping strategies, and posttraumatic psychological distress: The impact of the gulf war in Israel. *Journal of Personality and Social Psychology, 64*, 817-826.
- Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the attachment system in adulthood: Threat-related primes increase the accessibility of mental representations of attachment figures. *Journal of Personality and Social Psychology, 83*, 881-895.
- Miller, R. S., & Lefcourt, H. M. (1982). The Assessment of Social Intimacy. *Journal of Personality Assessment, 46*, 514.
- Moffitt, T. E., Caspi, A., Belsky, J., & Silva, P. A. (1992). Childhood Experience and the Onset of Menarche: A Test of a Sociobiological Model. *Child Development, 63*, 74-58.
- Mollenhorst, G., Völker, B., & Flap, H. (2008). Social contexts and personal relationships: The effect of meeting opportunities on similarity for relationships of different strength. *Social Networks, 30*, 60-68.
- Montoya, R. M., & Horton, R. S. (2004). On the Importance of Cognitive Evaluation as a Determinant of Interpersonal Attraction. *Journal of Personality and Social Psychology, 86*, 696-712.
- Montoya, R. M., Horton, R. S., & Kirchner, J. (in press). Is actual similarity necessary for attraction? A quantitative research synthesis of actual and perceived similarity. *Journal of Social and Personal Relationships*.
- Moreland, R. L., & Beach, S. R. (1992). Exposure Effects in the Classroom: The Development of Affinity Among Students. *Journal of Experimental Social Psychology, 28*, 255-276.
- Morgan, D., Carder, P., & Neal, M. (1997). Are some relationships more useful than others? The value of similar others in the networks of recent widows. *Journal of Social and Personal Relationships, 14*, 745-759.
- Morry, M. M. (2005). Relationship Satisfaction as a Predictor of Similarity Ratings: A test of the Attraction-Similarity Hypothesis. *Journal of Social and Personal Relationships, 22*, 561-584.

- Morry, M. M. (2007). The attraction-similarity hypothesis among cross-sex friends: Relationship satisfaction, perceived similarities, and self-serving perceptions. *Journal of Social and Personal Relationships*, *24*, 117-138.
- Muthén, L. K., & Muthén, B. O. (1998-2006). *Mplus User's Guide*. (4th ed.). Los Angeles: Muthén & Muthén.
- Muthén, L. K., & Muthén, B. O. (2006). *Mplus* (Version 4.1) [Computer software]. Los Angeles: Muthén & Muthén.
- Muthén, L. K., & Muthén, B. O. (2008). *Mplus* (Version 5) [Computer software]. Los Angeles: Muthén & Muthén.
- Myers, D. G. (1999). Close Relationships and Quality of Life. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being : the foundations of hedonic psychology* (pp. 374-391). New York: Sage.
- Neff, L. A., & Karney, B. R. (2005). Gender Differences in Social Support: A Question of Skill or Responsiveness? *Journal of Personality and Social Psychology*, *88*, 79-90.
- Nesse, R. M., Silverman, A., & Bortz, A. (1990). Sex Differences in Ability to Recognize Family Resemblance. *Ethology and Sociobiology*, *11*, 11-21.
- Neuberger, O. (1993). Beziehungen zwischen Kolleg(inn)en. In M. v. S. A. E. Auhagen (Ed.), *Zwischenmenschliche Beziehungen* (pp. 257-278). Göttingen: Hogrefe.
- Newcomb, T. M. (1961). *The acquaintance process*. New York: Holt, Rinehart and Winston.
- Neyer, F. J. (2002). Twin relationships in old age: A developmental perspective. *Journal of Social and Personal Relationships*, *19*, 155-177.
- Neyer, F. J. (2003). Persönlichkeit und Partnerschaft [Personality and partnership]. In H.-W. Bierhoff & I. Grau (Eds.), *Sozialpsychologie der Partnerschaft* (pp. 166-189). Berlin: Springer.
- Neyer, F. J., & Asendorpf, J. B. (2001). Personality-Relationship Transaction in Young Adulthood. *Journal of Personality and Social Psychology*, *81*, 1190-1204.
- Neyer, F. J., Banse, R., & Asendorpf, J. B. (1999). The role of projection and empathic accuracy in dyadic perception between older twins. *Journal of Social and Personal Relationships*, *16*, 419-442.
- Neyer, F. J., & Lang, F. R. (2003). Blood Is Thicker Than Water: Kinship Orientation Across Adulthood. *Journal of Personality and Social Psychology*, *84*, 310-321.
- Neyer, F. J., & Lang, F. R. (2004). Die Bevorzugung von genetischen Verwandten im Lebenslauf: Längsschnittliche Befunde zu Plastizität und Stabilität der nepotistischen Orientierung bei jüngeren und älteren Erwachsenen [The preference of kin across the life span: longitudinal results of plasticity and stability of nepotism of younger and older adults]. *Zeitschrift für Sozialpsychologie*, *35*, 115-129.

- Neyer, F. J., & Lang, F. R. (2007). Psychologie der Verwandtschaft und der Kooperation [Psychology of kinship and cooperation]. In J. F. K. Schmidt, M. Guichard, P. Schuster & F. Trillmich (Eds.), *Freundschaft und Verwandtschaft: Zur Unterscheidung und Verflechtung zweier Beziehungssysteme* (pp. 45-64). Konstanz: UVK Verlagsgesellschaft.
- Neyer, F. J., & Lehnart, J. (2007). Relationships Matter In Personality Development: Evidence From An 8-Year Longitudinal Study Across Young Adulthood. *Journal of Personality, 75*, 535-568.
- Neyer, F. J., & Voigt, D. (2004). Personality and Social Network Effects on Romantic Relationships: A Dyadic Approach. *European Journal of Personality, 18*, 279-299.
- Neyer, F. J., Wrzus, C., Wagner, J., & Lang, F. R. (2008). Shaping Emotional Closeness and Perceived Reciprocity Across Relationships. *Manuscript in preparation*.
- Nezlek, J. B. (1993). The stability of social interaction. *Journal of Personality and Social Psychology, 65*, 930-941.
- Nezlek, J. B. (2001). Multilevel Random Coefficient Analyses of Event- and Interval-Contingent Data in Social and Personality Psychology Research. *Personality and Social Psychology Bulletin, 27*, 771-785.
- Nezlek, J. B. (2005). Distinguishing affective and non-affective reactions to daily events. *Journal of Personality, 73*, 1-30.
- Nezlek, J. B., & Allen, M. R. (2006). Social support as a moderator of day-to-day relationships between daily negative events and daily psychological well-being. *European Journal of Personality, 20*, 53-68.
- Nezlek, J. B., Schröder-Abé, M., & Schütz, A. (2006). Mehrebenenanalysen in der psychologischen Forschung: Vorteile und Möglichkeiten der Mehrebenenmodellierung mit Zufallskoeffizienten [Multilevel analyses in psychological research: Advantages and possibilities of multilevel modeling with random coefficients]. *Psychologische Rundschau, 57*, 213-223.
- Nezlek, J. B., & Zyzanski, L. E. (1998). Using hierarchical linear modeling to analyze grouped data. *Group Dynamics: Theory, Research, and Practice, 2*, 313-320.
- Norton, M. I., Frost, J. H., & Ariely, D. (2007). Less Is More: The Lure of Ambiguity, or Why Familiarity Breeds Contempt. *Journal of Personality and Social Psychology, 92*, 97-105.
- Oda, R., Matsumoto-Oda, A., & Kurashima, O. (2005). Effects of belief in genetic relatedness on resemblance judgments by Japanese raters. *Evolution and Human Behavior, 26*, 441-450.
- O'Gorman, R., Wilson, D. S., & Miller, R. R. (2008). An evolved cognitive bias for social norms. *Evolution and Human Behavior, 29*, 71-78.

- Ostendorf, F., & Angleitner, A. (2004). *NEO-PI-R. NEO-Persönlichkeitsinventar nach Costa und McCrae. Revidierte Fassung* [NEO-PI-R. NEO-personality inventory of Costa and McCrae. Revised version]. Göttingen: Hogrefe.
- Palmer, C. E. (1937). Age Changes in the Physical Resemblance of Siblings. *Child Development, 5*, 351-360.
- Papastefanou, C., & Buhl, H. M. (2002). Familien mit Kindern im frühen Erwachsenenalter [Families with children in early adulthood]. In M. Hofer, E. Wild & P. Noack (Eds.), *Lehrbuch Familienbeziehungen: Eltern und Kinder in der Entwicklung* (pp. 265-289). Göttingen: Hogrefe.
- Park, J. H., & Schaller, M. (2005). Does attitude similarity serve as a heuristic cue for kinship? Evidence of an implicit cognitive association. *Evolution and Human Behavior, 26*, 158-170.
- Pepper, J. W. (2007). Simple models of assortment through environmental feedback. *Artificial Life, 13*, 1-9.
- Perugini, M., Gallucci, M., Presaghi, F., & Ercolani, A. P. (2003). The Personal Norm of Reciprocity. *European Journal of Personality, 17*, 251-283.
- Pfennig, D. W. (2002). Kin recognition. In M. Pagel (Ed.), *Encyclopedia of Evolution*. Oxford: Oxford University Press.
- Pfennig, D. W., & Sherman, P. W. (1995). Kin Recognition. *Scientific American, 272*, 98-103.
- Pinker, S. (2002). *The blank slate : the modern denial of human nature*. New York: Viking.
- Planalp, S. (1993). Friends' and Acquaintances' Conversations II: Coded Differences. *Journal of Social and Personal Relationships, 10*, 339-354.
- Platek, S. M., Burch, R. L., Panyavin, I. S., Wasserman, B. H., & Gallup, G. G. (2002). Reactions to children's faces: Resemblance affects males more than females. *Evolution and Human Behavior, 23*, 159-166.
- Platek, S. M., Critton, S. R., Burch, R. L., Frederick, D. A., Myers, T. E., & Gallup, G. G. (2003). How much paternal resemblance is enough? Sex differences in hypothetical investment decisions but not in the detection of resemblance. *Evolution and Human Behavior, 24*, 81-87.
- Pollet, T. V. (2007). Genetic relatedness and sibling relationship characteristics in a modern society. *Evolution and Human Behavior, 28*, 176-185.
- Porter, R. H. (1987). Kinship Recognition: Functions and Mediating Mechanisms. In C. Crawford (Ed.), *Sociobiology and Psychology: ideas, issues and applications* (pp. 175-203). Hillsdale, NJ: Erlbaum.
- Porter, R. H., Cernoch, J. M., & Balogh, R. D. (1984). Recognition of Neonatales by Facial-Visual Characteristics. *Pediatrics, 74*, 501-504.

- Queller, D. C., Ponte, E., Bozzaro, S., & Strassmann, J. E. (2003). Single-Gene Greenbeard Effects in the Social Amoeba *Dictyostelium discoideum*. *Science*, *299*, 105-106.
- Raudenbush, S., & Bryk, A. (2002). *Hierarchical linear models : applications and data analysis methods* (2nd ed.). Thousand Oaks: Sage Publications.
- Raudenbush, S., Bryk, A., & Congdon, R. (2004). HLM 5: Hierarchical Linear and Nonlinear Modeling (Version 5.64) [Computer software]. Lincolnwood: Scientific Software International.
- Reiss, D., Plomin, R., Hetherington, E. M., Howe, G. W., Rovine, M. J., Tryon, A., & Hagan, M. S. (1994). The separate worlds of teenage siblings: An introduction to the study of the nonshared environment and adolescent development. In E. M. Hetherington & D. Reiss (Eds.), *Separate social worlds of siblings: The impact of nonshared environment on development* (pp. 63-110). Hillsdale, NJ: Lawrence Erlbaum.
- Reis, H. T., & Shaver, P. R. (1988). Intimacy as interpersonal process. In S. Duck (Ed.), *Handbook of personal relationships: Theory, research, and interventions* (pp. 367-389). New York: Wiley.
- Reis, H. T., Wheeler, L., Kernis, M. H., Spiegel, N., & Nezlek, J. (1985). On specificity in the impact of social participation on physical and psychological health. *Journal of Personality and Social Psychology*, *48*, 456-471.
- Reite, M. (1990). Touch, Attachment, and Health: Is There a Relationship? In K. E. Barnard & T. B. Brazelton (Eds.), *Touch: the foundation of experience* (pp. 195-225). Madison: International Universities Press.
- Repinksi, D. J., & Zook, J. M. (2005). Three Measures of Closeness in Adolescents' relationships with parents and friends: Variations and developmental significance. *Personal Relationships*, *12*, 79-102.
- Rhode, P. A. (2005). *Promiscuity, attractiveness, fondness for children, and the postponement of parenthood: An evolutionary (mal)functional analysis*. Kassel: Kassel university press.
- Riketta, M., & Sacramento, C. A. (2008). 'They Cooperate With Us, So They Are Like Me': Perceived Intergroup Relationship Moderates Projection from Self to Outgroups. *Group Processes & Intergroup Relations*, *11*, 115-131.
- Riva, G., Teruzzi, T., & Anolli, L. (2003). The Use of the Internet in Psychological Research: Comparison of Online and Offline Questionnaires. *CyberPsychology & Behavior*, *6*, 73-80.
- Robbins, J. M., & Krueger, J. I. (2005). Social Projection to Ingroups and Outgroups: A Review and Meta-Analysis. *Personality and Social Psychology Review*, *9*, 32-47.

- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of Mean-Level Change in Personality Traits Across the Life Course: A Meta-Analysis of Longitudinal Studies. *Psychological Bulletin, 132*, 1-25.
- Romer, D., Bontemps, M., Flynn, M., McGuire, T., & Gruder, C. L. (1976). The Effects of Status Similarity and Expectation of Reciprocation upon Altruistic Behavior. *Personality and Social Psychology Bulletin, 3*, 103-106.
- Rose, B. M., Holmbeck, G. N., Coakley, R. M., & Franks, E. A. (2004). Mediator and Moderator Effects in Developmental and Behavioral Pediatric Research. *Journal of Developmental & Behavioral Pediatrics, 25*, 58-67.
- Rosenfeld, H. M., & Jackson, J. (1965). Temporal mediation of the similarity-attraction hypothesis. *Journal of Personality, 33*, 649-656.
- Rosenthal, R. (1994). Interpersonal Expectancy Effects: A 30-Year Perspective. *Current Directions in Psychological Science, 3*, 176-179.
- Rosenthal, R. (1997). *Interpersonal Expectancy Effects: A Forty Year Perspective*.
- Rusbult, C. E., & van Lange, P. A. M. (2003). Interdependence, Interaction, and Relationships. *Annual Review of Psychology, 54*, 351.
- Rushton, J. P. (1989). Genetic similarity, human altruism, and group selection. *Behavioral and Brain Sciences, 12*, 503-559.
- Rushton, J. P., & Bons, T. A. (2005). Mate Choice and Friendship in Twins. *Psychological Science, 16*, 555-559.
- Salthouse, T. A., Schroeder, D. H., & Ferrer, E. (2004). Estimating Retest Effects in Longitudinal Assessments of Cognitive Functioning in Adults Between 18 and 60 Years of Age. *Developmental Psychology, 40*, 813-822.
- Santos, J. D., & Levitt, M. J. (2007). Intergenerational Relations with In-Laws in the Context of the Social Convoy: Theoretical and Practical Implications. *Journal of Social Issues, 63*, 827-843.
- Saudino, K. J., McGuire, S., Reiss, D., & Hetherington, E. M. (1995). Parent ratings of EAS temperaments in twins, full siblings, half siblings, and step siblings. *Journal of Personality and Social Psychology, 68*, 723-733.
- Saudino, K. J., Pedersen, N. L., Lichtenstein, P., & McClearn, G. E. (1997). Can personality explain genetic influences on life events? *Journal of Personality and Social Psychology, 72*, 196-206.
- Schmidt-Denter, U., & Spangler, G. (2005). Entwicklung von Beziehungen und Bindungen [Development of relationships and attachment]. In J. Asendorpf (Ed.), *Enzyklopädie der Psychologie, Band C, V, 3: Soziale, emotionale und Persönlichkeitsentwicklung* (pp. 425-523). Göttingen: Hogrefe.

- Schulz, R., & Heckhausen, J. (1996). A life-span model of successful aging. *American Psychologist, 51*, 702-714.
- Schulz, R., Heckhausen, J., & Locher, J. L. (1991). Adult Development, Control, and Adaptive Functioning. *Journal of Social Issues, 47*, 177-196.
- Schütze, Y. (1993). Beziehungen zwischen erwachsenen Kindern und ihren Eltern [Relationships between adult children and their parents]. In A. E. Auhagen & M. v. Salisch (Eds.), *Zwischenmenschliche Beziehungen* (pp. 105-118). Göttingen: Hogrefe.
- Segal, N. L., Hershberger, S. L., & Arad, S. (2003). Meeting One's Twin: Perceived Social Closeness and Familiarity. *Evolutionary Psychology, 1*, 70-95.
- Segal, N. L., Seghers, J., Marelich, W., Mechanic, M., & Castillo, R. (2007). Social Closeness of MZ and DZ Twin Parents Toward Nieces and Nephews. *European Journal of Personality, 21*, 487-506.
- Segrin, C., & Taylor, M. (2007). Positive interpersonal relationships mediate the association between social skills and psychological well-being. *Personality and Individual Differences, 43*, 637-646.
- Selfhout, M. H. W., Branje, S. J. T., & Meeus, W. H. J. (2007). Similarity in adolescent best friendships: The role of gender. *Netherlands Journal of Psychology, 63*, 50-57.
- Selfhout, M. H. W., Denissen, J. J. A., Branje, S. J. T., & Meeus, W. H. J. (2008). In the Eye of the Beholder: Perceived, Actual, and Peer-Rated Similarity in Personality, Communication, and Friendship Intensity During the Acquaintanceship Process. Manuscript submitted for publication.
- Shackelford, T. K., & Buss, D. M. (1996). Betrayal in Mateships, Friendships, and Coalitions. *Personality and Social Psychology Bulletin, 22*, 1151-1164.
- Shaffer, D. R., & Williamson, G. M. (2006). Shall We Select Selective Investment Theory? A Viewpoint From the Informal Care Arena. *Psychological Inquiry, 17*, 51-55.
- Shaver, P. R., & Mikulincer, M. (2006). Attachment Theory, Individual Psychodynamics, and Relationship Functioning. In A. L. Vangelisti & D. Perlman (Eds.), *Cambridge Handbook of Personal Relationships* (pp. 251-271). Cambridge: University Press.
- Shye, D., Mullooly, J. P., Freeborn, D. K., & Pope, C. R. (1995). Gender differences in the relationship between social network support and mortality: A longitudinal study of an elderly cohort. *Social Science in Medicine, 41*, 935-947.
- Silk, J. B. (2003). Cooperation without Counting: The Puzzle of Friendship. In P. Hammerstein (Ed.), *Genetic and Cultural Evolution of Cooperation* (pp. 37-54). Cambridge, Mass.: The MIT Press.
- Silver, N. C., & Dunlap, W. P. (1987). Averaging correlation coefficients: Should Fisher's z transformation be used? *Journal of Applied Psychology, 72*, 146-148.

- Simpson, J. A. (1987). The dissolution of romantic relationships: Factors involved in relationship stability and emotional distress. *Journal of Personality and Social Psychology, 53*, 683-692.
- Simpson, J. A., Collins, W. A., Tran, S., & Haydon, K. C. (2007). Attachment and the Experience and Expression of Emotions in Romantic relationships: A Developmental Perspective. *Journal of Personality and Social Psychology, 92*, 355-367.
- Simpson, J. & Kenrick, P. T. (Eds.) (1997). *Evolutionary Psychology*. Mahwah, NJ: Erlbaum.
- Simpson, J. A., Roles, W. S., & Nelligan, J. S. (1992). Support seeking and support giving within couples in an anxiety-provoking situation: The role of attachment styles. *Journal of Personality and Social Psychology, 62*, 434-446.
- Smith, M. S. (1988). Research in Developmental Sociobiology: Parenting and Family Behavior. In K. B. MacDonald (Ed.), *Sociobiological Perspectives on Human Development* (pp. 271-292). New York: Springer.
- Smith, M. S., Kish, B. J., & Crawford, C. B. (1987). Inheritance of wealth as human kin investment. *Ethology & Sociobiology, 8*, 171-182.
- Snijders, T. A. B., & Bosker, R. J. (2004). *Multilevel Analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.
- Spiel, C., Kreppner, K., & von Eye, A. (1995). Die Familien-Beziehungs-Skalen, FBS: Bericht über die Entwicklung eines Screening-Instruments zur Erfassung von Beziehungen Jugendlicher zu ihren Eltern [Family relationship scales: report on the development of a screening method for the assessment of adolescents' relationships with their parents]. *Diagnostica, 41*, 322-333.
- Spinath, F. M., Wolf, H., Angleitner, A., Borkenau, P., & Riemann, R. (2005). Multimodale Untersuchung von Persönlichkeiten und kognitiven Fähigkeiten. Ergebnisse der deutschen Zwillingsstudien BiLSAT und GOSAT [Multimethod study of personality and cognitive skills. Results of the German twin studies BiLSAT and GOSAT]. *Zeitschrift für Soziologie der Erziehung und Sozialisation, 25*, 146-161.
- Sprecher, S. (1998). Insiders' perspectives on reasons for attraction to a close other. *Social Psychology Quarterly, 61*, 287-300.
- Sprecher, S. (2001). A comparison of emotional consequences of and change in equity over time using global and domain-specific measures of equity. *Journal of Social and Personal Relationships, 18*, 477-501.
- Stapel, D. A., & Koomen, W. (2005). Competition, Cooperation, and the Effects of Others on Me. *Journal of Personality and Social Psychology, 88*, 6, 1029-1038.
- Steinberg, L. (1987). Impact of puberty on family relations: Effects of pubertal status and pubertal timing. *Developmental Psychology, 23*, 451-460.

- Stevens, N., & van Tilburg, T. (2000). Stimulating friendship in later life: A strategy for reducing loneliness among older women. *Educational Gerontology, 26*, 15-35.
- Stewart, S. D. (2001). Contemporary American stepparenthood: Integrating cohabiting and nonresident stepparents. *Population Research and Policy Review, 20*, 345-364.
- Stewart-Williams, S. (2007). Altruism among kin vs. nonkin: effects of cost of help and reciprocal exchange. *Evolution and Human Behavior, 28*, 193-198.
- Strauß, B. (1991). *Psychosomatik der Sterilität und der Sterilitätsbehandlung* [Psychosomatics medicine of infertility and infertility treatment]. Stuttgart: Enke.
- Sun, R. (2002). Old age support in contemporary urban China from both parents' and children's perspectives. *Research on Aging, 24*, 337-359.
- Sundie, J. M., & Kenrick, D. T. (2006). Modular Economics: Different Bonds = Different Investments. *Psychological Inquiry, 17*, 56-59.
- Sunnafrank, M. (1983a). Attitude similarity and interpersonal attraction in communication processes: In pursuit of an ephemeral influence. *Communication Monographs, 50*, 273-284.
- Sunnafrank, M. (1983b). A communication-based perspective on attitude similarity and interpersonal attraction in early acquaintance. *Communication Monographs, 51*, 372-380.
- Sunnafrank, M. (1992). On debunking the attitude similarity myth. *Communication Monographs, 59*, 164-179.
- Suitor, J. J. (1987). Friendship Networks in Transitions: Married Mothers Return to School. *Journal of Social and Personal Relationships, 4*, 445-461.
- Suitor, J. J., Pillemer, K., & Keeton, S. (1995). When Experience Counts: The Effects of Experiential and Structural Similarity on Patterns of Support and Interpersonal Stress. *Social Forces, 73*, 1573.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson.
- Takahashi, K. (2004). Close Relationships across Life Span: Toward a Theory of Relationship Types. In F. R. Lang & K. L. Fingerman (Eds.), *Growing Together: Personal Relationships across the Lifespan* (pp. 130-158). Cambridge: Cambridge University Press.
- Teichman, M., & Foa, U. G. (1975). Effect of Resource Similarity on Satisfaction with Exchange. *Social Behavior and Personality: An International Journal, 3*, 213-224.
- Thibaut, J. W., & Kelley, H. H. (1959). *The Social Psychology of Groups*. New York: Wiley.
- Thomas, W. I., & Thomas, D. S. (1928). *The child in America: Behavior problems and programs*. New York: Knopf.

- Thomése, F., Van Tilburg, T., & Knipscheer, K. C. P. M. (2003). Continuation of exchange with neighbors in later life: The importance of the neighborhood context. *Personal Relationships, 10*, 535-550.
- Thomson, E., Hanson, T. L., & McLanahan, S. S. (1994). Family Structure and Child Well-Being: Economic Resources vs. Parental Behaviors. *Social Forces, 73*, 221-242.
- Thomson, E., McLanahan, S. S., & Curtin, R. B. (1992). Family Structure, Gender, and Parental Socialization. *Journal of Marriage & Family, 54*, 368-378.
- Thomson, E., Mosley, J., Hanson, T. L., & McLanahan, S. S. (2001). Remarriage, Cohabitation, and Changes in Mothering Behavior. *Journal of Marriage & Family, 63*, 370.
- Tooby, J., & Cosmides, L. (1996). Friendship and the banker's paradox: Other pathways to the evolution of adaptations for altruism. In W. G. Runciman, J. M. Smith & R. I. M. Dunbar (Eds.), *Evolution of social behaviour patterns in primates and man*. (pp. 119-143). New York: Oxford University Press.
- Törnblom, K. Y., Fredholm, E. M., & Jonsson, D. R. (1987). New and Old Friendships: Attributed Effects of Type and Similarity of Transacted Resources. *Human Relations, 40*, 337-360.
- Trivers, R. L. (1971). The Evolution of Reciprocal Altruism. *The Quarterly Review of Biology, 46*, 35-57.
- Tschann, J. M. (1988). Self-Disclosure in Adult Friendship: Gender and Marital Status Differences. *Journal of Social and Personal Relationships, 5*, 65-81.
- Tuten, T. L., Urban, D. J., & Bosnjak, M. (2002). Internet Surveys and Data Quality: A Review. In B. Batinic, U.-D. Reips & M. Bosnjak (Eds.), *Online Social Sciences* (pp. 7-26). Toronto: Hogrefe & Huber.
- Uehara, E. S. (1995). Reciprocity reconsidered: Gouldner's 'moral norm of reciprocity' and social support. *Journal of Social and Personal Relationships, 12*, 483-502.
- Ueno, K., & Adams, R. G. (2006). Adult Friendship: A Decade Review. In P. Noller & J. A. Feeney (Eds.), *Close Relationships: Functions, Forms and Processes* (pp. 151-169). New York: Psychology Press.
- Väänänen, A., Buunk, B. P., Kivimäki, M., Pentti, J., & Vahtera, J. (2005). When It Is Better to Give Than to Receive: Long-Term Health Effects of Perceived Reciprocity in Support Exchange. *Journal of Personality and Social Psychology, 89*, 176-193.
- van Aken, M. A. G., & Asendorpf, J. B. (1997). Support by parents, classmates, friends and siblings in preadolescence: Covariation and compensation across relationships. *Journal of Social and Personal Relationships, 14*, 79-93.
- van der Poel, M. G. (1993). Delineating personal support networks. *Social Networks, 15*, 49-70.

- van Duijn, M. A. J., van Busschbach, J. T., & Snijders, T. A. B. (1999). Multilevel analysis of personal networks as dependent variables. *Social Networks*, *21*, 187-210.
- van Duijn, M. A. J., & Vermunt, J. K. (2006). What Is Special About Social Network Analysis? *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, *2*, 2-6.
- Vangelisti, A. L. & Perlman, D. (Eds.) (2006). *Cambridge Handbook of Personal Relationships*. Cambridge: University Press.
- van Groenou, M. I. B., & van Tilburg, T. (2003). Network size and support in old age: Differentials by socio-economic status in childhood and adulthood. *Ageing & Society*, *23*, 625-645.
- van Horn, J. E., Schaufeli, W. B., & Taris, T. W. (2001). Lack of reciprocity among Dutch teachers: Validation of reciprocity indices and their relation to stress and well-being. *Work & Stress*, *15*, 191-213.
- van Lange, P. A. M., de Bruin, E., Otten, W., & Joireman, J. A. (1997). Development of Prosocial, Individualistic, and Competitive Orientations: Theory and Preliminary Evidence. *Journal of Personality and Social Psychology*, *73*, 733-746.
- van Tilburg, T. (1992). Support networks before and after retirement. *Journal of Social and Personal Relationships*, *9*, 433-445.
- van Tilburg, T. (1998). Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*, *53*, 313-323.
- van Vugt, M., & van Lange, P. A. M. (2006). The Altruism Puzzle: Psychological Adaptations for Prosocial Behavior. In M. Schaller, J. Simpson & D. Kenrick (Eds.), *Evolution and Social Psychology* (pp. 237-262). New York: Psychology Press.
- van Yperen, N. W., & Buunk, B. P. (1990). A longitudinal study of equity and satisfaction in intimate relationships. *European Journal of Social Psychology*, *20*, 287-309.
- van Yperen, N. W., & Buunk, B. P. (1991). Equity Theory and Exchange and Communal Orientation From a Cross-National Perspective. *Journal of Social Psychology*, *131*, 5-20.
- Veiel, H. O. F., & Herrle, J. (1991). Geschlechtsspezifische Strukturen sozialer Unterstützungsnetzwerke [Gender specific structures of social support networks]. *Zeitschrift für Soziologie*, *20*, 237-245.
- Visher, E. B., Visher, J. S., & Pasley, K. (2003). Remarriage Families and Stepparenting. In F. Walsh (Ed.), *Normal family processes: growing diversity and complexity* (pp. 153-175). New York: Guilford Press.
- Voland, E. (2000). *Grundriss der Soziobiologie* [Compendium of sociobiology] (2nd ed.). Heidelberg: Spektrum.

- Voorpostel, M., van der Lippe, T., Dykstra, P. A., & Flap, H. (2007). Similar or different? The importance of similarities and differences for support between siblings. *Journal of Family Issues*, 28, 1026-1053.
- Wadsworth, S. J., Corley, R. P., Hewitt, J. K., Plomin, R., & DeFries, J. C. (2002). Parent offspring resemblance for reading performance at 7, 12 and 16 years of age in the Colorado Adoption Project. *Journal of Child Psychology and Psychiatry*, 43, 769-774.
- Walster, E., Walster, G., & Berscheid, E. (1978). *Equity: Theory and research*. Boston: Allyn & Bacon.
- Wan, C. K., Jaccard, J., & Ramey, S. L. (1996). The Relationship Between Social Support and Life Satisfaction as a Function of Family Structure. *Journal of Marriage & Family*, 58, 502-513.
- Wander, K. F. W. (2004). *Deutsches Sprichwörter-Lexikon* [Encyclopedia of German proverbs] [CD]. Berlin: Directmedia Publ.
- Wasilewski, A. (2003). *"Freundschaft" bei Huftieren? - Soziopositive Beziehungen zwischen nicht-verwandten artgleichen Herdenmitgliedern* [„Friendship among ungulates?“ – sociopositive relationships among unrelated herd members]. Unpublished Ph.D., Philipps-Universität, Marburg.
- Watson, D., Klohnen, E. C., Casillas, A., Simms, E. N., Haig, J., & Berry, D. S. (2004). Match Makers and Deal Breakers: Analyses of Assortative Mating in Newlywed Couples. *Journal of Personality*, 72, 1029-1068.
- Wheeler, L., & Nezlek, J. (1977). Sex Differences in Social Participation. *Journal of Personality and Social Psychology*, 35, 742-754.
- White, L. (2001). Growing Up with Single Parents and Stepparents: Long-Term Effects on Family Solidarity. *Journal of Marriage and the Family*, 56, 935-948.
- White, D., & Woollett, A. (1992). *Families: A Context for Development*. London: The Falmer Press.
- Widdig, A., Nürnberg, P., Krawczak, M., Streich, W. J., & Bercovitch, F. B. (2001). Paternal relatedness and age proximity regulate social relationships among adult female rhesus macaques. *Proceedings of the National Academie of Sciences of the USA*, 98, 13769-13773.
- Widmer, E. D. (2006). Who are my family members? Bridging and binding social capital in family configurations. *Journal of Social and Personal Relationships*, 23, 979-998.

OVERVIEW

A:	Instruction for generating the ego-centered network.....	I
B:	Relationship indices for assessing genetic relatedness	II
C:	Graphical items for measuring emotional closeness and perceived reciprocity in the Young adult and the Family study	IV
D:	Vignettes for reciprocity expectation (Similarity studies A and B)	V
E:	Contexts of friendships	VI
F:	Equations of Multilevel Random Coefficients Models.....	VII
	1. <i>Family study: Prediction of contact frequency.....</i>	<i>VII</i>
	2. <i>Multilevel logistic regression.....</i>	<i>VIII</i>
	3. <i>General network: prediction of emotional closeness moderated by type of family. IX</i>	<i>IX</i>
	4. <i>General network: prediction of perceived reciprocity moderated by type of family . X</i>	<i>X</i>
	5. <i>Patchwork families: Prediction of emotional closeness in parent-child relationships</i>	<i>XI</i>
	6. <i>Friendship: Prediction of closeness with friends by family relationship qualities... XII</i>	<i>XII</i>

A: Instruction for generating the ego-centered network

German instruction: Unter *Sozialen Beziehungen* verstehen wir Personen, die Sie schon lange kennen, und/oder mit denen Sie regelmäßig Kontakt haben. Dies umfasst Beziehungen in der Familie, der Verwandtschaft, im Beruf und in der Freizeit, sowohl die belastenden als auch die angenehmen Beziehungen. Wie ist das bei Ihnen? Nennen Sie bitte alle Personen, die Sie schon lange kennen und/oder mit denen Sie regelmäßig Kontakt haben.

Klicken Sie dafür im Menü unten das erste Feld zu der Frage "Woher kennen Sie die Person?". Hier sind verschiedene Personengruppen aufgeführt. Gehen Sie diese Liste von oben nach unten durch, und wählen Sie die erste Gruppe aus, zu der Ihnen eine Person in den Sinn kommt.

Own translation: By *social relationships*, we mean people you have been knowing for a long time and/or are in contact with frequently. These relationships can be in the family, at work or in leisure, and they can provide straining as well as pleasant experiences. How about you? Please name all people you have been knowing for a long time and/or you are in contact with regularly.

Please click at the first question "Where do you know this person from?" from the menu below. Several groups of people are listed there. Please choose the first group, a relationship partner occurs to you.

B: Relationship indices for assessing genetic relatedness

Table 1

Young adult study: Relationship categories and average genetic relatedness

Relationship type	Genetic relatedness index r
Parent	.5
Sibling	.5
Child	.5
Halfsibling	.25
Aunt/uncle	.25
Grandparents	.25
Distant kin	0.125
Partner	0
Stepkin	0
In-laws	0
Colleague	0
Friend	0
Other	0

Table 2

Family study: Relation categories and average genetic relatedness

	Maternal			Paternal		
	biological	in-law	step	biological	in-law	step
Grandfather	0.25	0	0	0.25	0	0
Grandmother	0.25	0	0	0.25	0	0
Mother/father	0.5	0	0	0.5	0	0
Uncle	0.25	0	0	0.25	0	0
Aunt	0.25	0	0	0.25	0	0
Cousin (male)	0.125	0	0	0.125	0	0
Cousin (female)	0.125	0	0	0.125	0	0
	Female			Male		
Child	0.5		0	0.5		0
Sibling	0.5		0	0.5		0
Half sibling			0.25			0.25
Sister-/brother- in-law		0			0	
	Descendants of female relatives (Sister or daughter)			Descendants of male relatives (Brother or son)		
Nephew	0.25	0	0	0.25	0	0
Niece	0.25	0	0	0.25	0	0
Grandson	0.25		0	0.25		0
Granddaughter	0.25		0	0.25		0
Other family member						
Partner/spouse						0
Other kin						0.0625
Other members of the family your are not related to by kinship						0
Other persons: I know X ...						
... from work/from college						0
... from work (supervisor)						0
... from work (subordinate)						0
... through a third person						0
... from the neighborhood						0
... from a sports club, political association, etc.						0
... from the service sector (physician, hairdresser, salesman)						0
... , because he/she is my long-time friend						0

C: Graphical items for measuring emotional closeness and perceived reciprocity in the Young adult and the Family study

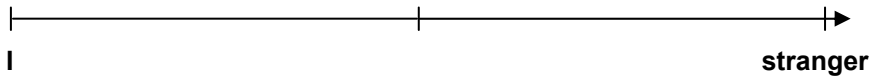


Figure 1. Graphic closeness scale (GCS)

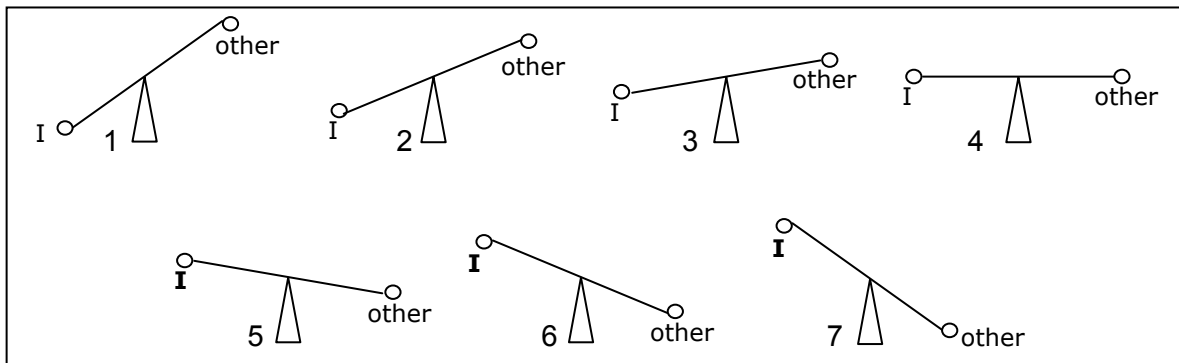


Figure 2. Graphic balance scale (GBS)

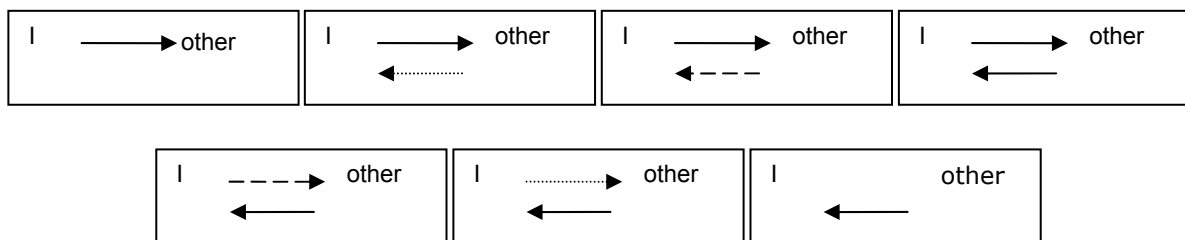


Figure 3. Graphic interdependence scale (GIS)

D: Vignettes for reciprocity expectation (Similarity studies A and B)*German instruction:*

Vignette 1: Stellen Sie sich vor, Sie haben *Name der jeweiligen Person* Ihr Auto geliehen. Für Sie war es ein gewisser Aufwand, weil Sie das Auto eigentlich selbst gebraucht haben. *Name der jeweiligen Person* möchte sich gern revanchieren. Was erwarten Sie am ehesten als Ausgleich?

Vignette 2: Stellen Sie sich vor, Sie haben *Name der jeweiligen Person* beim Umzug geholfen. Ihnen hat das gar nicht gut gepasst, weil Sie eigentlich an diesem Tag einen Aushilfsjob, z.B. kellnern, erledigen wollten, wofür Sie 50 € erhalten hätten. *Name der jeweiligen Person* möchte sich gern revanchieren. Was erwarten Sie am ehesten als Ausgleich?

Vignette 3: Stellen Sie sich vor, Sie haben *Name der jeweiligen Person* einen großen Gefallen getan und zwei Kleidungsstücke aus der Reinigung abgeholt. Dafür haben Sie einen Umweg in Kauf genommen, den unhandlichen Anzug und Mantel transportiert und die Kosten ausgelegt. *Name der jeweiligen Person* möchte sich gern revanchieren. Was erwarten Sie am ehesten als Ausgleich?

Own translation:

Vignette 1: Please imagine you lend your car to *name*. It meant some trouble to you because you would have needed the car yourself. *Name* would like recompense you. What would you expect?

Vignette 2: Please imagine you helped *name* with his/her removal. It did not quite suit you because you planned to work that day temporarily and would have gotten 50€. *Name* would like to recompense you. What would you expect?

Vignette 3: Please imagine you did *name* a favor and picked up two cloths from the dry-cleaner. You had to make a detour, transport the bulky suit and coat, and pay the costs at forehand. *Name* would like to recompense you. What would you expect?

E: Contexts of friendships

Table 3

Percentages (absolute numbers in brackets) of friends coming from different contexts

	<i>Young adult study</i>			<i>Family study</i>		
	Good friends	Regular friends	All Friends	Good friends	Regular friends	All Friends
From work	14% (84)	20% (496)	19% (580)	16% (113)	25% (268)	22% (381)
From work (supervisor)	/	/	/	1% (9)	2% (24)	2% (33)
From work (subordinate)	/	/	/	1% (7)	3% (28)	2% (35)
From the neighborhood	3% (16)	6% (137)	5% (153)	8% (196)	13% (53)	11% (143)
From a club	2% (11)	3% (74)	3% (85)	6% (41)	10% (110)	9% (151)
From the service sector	/	/	/	1% (6)	2% (18)	1% (24)
Through a third person	5% (29)	8% (207)	8% (236)	10% (68)	15% (167)	13% (235)
Friend	77% (464)	64% (1594)	66% (2058)	57% (393)	30% (326)	41% (719)
Total number	604	2508	3112	690	1084	1774

Note. Three categories (/) were not assessed in the Young adult study. The category "friend" was labeled "old friend" in the Family study to achieve a more exclusive category.

F: Equations of Multilevel Random Coefficients Models

1. Family study: Prediction of contact frequency

Level-1:

$$\begin{aligned} \text{Cont} = & \beta_1^*(\mathbf{prox.M}) + \beta_2^*(\mathbf{kin.M}) + \beta_3^*(\mathbf{part.M}) + \beta_4^*(\mathbf{coo.M}) + \beta_5^*(\mathbf{lproki.M}) + \\ & \beta_6^*(\mathbf{lproco.M}) + \beta_7^*(\mathbf{prox.F}) + \beta_8^*(\mathbf{kin.F}) + \beta_9^*(\mathbf{part.F}) + \beta_{10}^*(\mathbf{coo.F}) + \beta_{11}^*(\mathbf{lproki.F}) + \\ & \beta_{12}^*(\mathbf{lproco.F}) + r \end{aligned}$$

Level-2:

$$\begin{aligned} \beta_1 &= \gamma_{11}^*(M) + \gamma_{12}^*(U) + \gamma_{13}^*(T) + \gamma_{14}^*(PcK) + \gamma_{15}^*(PwoK) + u_1 \\ \beta_2 &= \gamma_{21}^*(M) + \gamma_{22}^*(U) + \gamma_{23}^*(T) + \gamma_{24}^*(PcK) + \gamma_{25}^*(PwoK) + u_2 \\ \beta_3 &= \gamma_{31}^*(M) + \gamma_{32}^*(U) + \gamma_{33}^*(T) + \gamma_{34}^*(PcK) + \gamma_{35}^*(PwoK) \\ \beta_4 &= \gamma_{41}^*(M) + \gamma_{42}^*(U) + \gamma_{43}^*(T) + \gamma_{44}^*(PcK) + \gamma_{45}^*(PwoK) + u_4 \\ \beta_5 &= \gamma_{51}^*(M) + \gamma_{52}^*(U) + \gamma_{53}^*(T) + \gamma_{54}^*(PcK) + \gamma_{55}^*(PwoK) + u_5 \\ \beta_6 &= \gamma_{61}^*(M) + \gamma_{62}^*(U) + \gamma_{63}^*(T) + \gamma_{64}^*(PcK) + \gamma_{65}^*(PwoK) + u_6 \\ \beta_7 &= \gamma_{71}^*(M) + \gamma_{72}^*(U) + \gamma_{73}^*(T) + \gamma_{74}^*(PcK) + \gamma_{75}^*(PwoK) + u_7 \\ \beta_8 &= \gamma_{81}^*(M) + \gamma_{82}^*(U) + \gamma_{83}^*(T) + \gamma_{84}^*(PcK) + \gamma_{85}^*(PwoK) + u_8 \\ \beta_9 &= \gamma_{91}^*(M) + \gamma_{92}^*(U) + \gamma_{93}^*(T) + \gamma_{94}^*(PcK) + \gamma_{95}^*(PwoK) \\ \beta_{10} &= \gamma_{101}^*(M) + \gamma_{102}^*(U) + \gamma_{103}^*(T) + \gamma_{104}^*(PcK) + \gamma_{105}^*(PwoK) + u_{10} \\ \beta_{11} &= \gamma_{111}^*(M) + \gamma_{112}^*(U) + \gamma_{113}^*(T) + \gamma_{114}^*(PcK) + \gamma_{115}^*(PwoK) + u_{11} \\ \beta_{12} &= \gamma_{121}^*(M) + \gamma_{122}^*(U) + \gamma_{123}^*(T) + \gamma_{124}^*(PcK) + \gamma_{125}^*(PwoK) + u_{12} \end{aligned}$$

Variables:

cont = contact frequency

prox = residential proximity (group-mean centered)

kin = kinship relationship (dummy coded)

part = romantic relationship (dummy coded)

coo = cooperative relationship (dummy coded)

lproki = interaction term between prox and kin

lproco = interaction term between prox and coo

M = motivated childless (dummy coded)

U = involuntarily childless (dummy coded)

T = traditional family (dummy coded)

PcK = Patchwork family with a common child (dummy coded)

PwoK = Patchwork family without a common child (dummy coded)

Suffixes:

M indicates a male (= husband) & F a female (= wife) variable

2. Multilevel logistic regression

Level 1:

$$\eta_{ij(1)} = \log [\varphi_{ij(\text{partner})} / \varphi_{ij(\text{cooperative})}] = \pi_{0(1)} + \pi_{1(1)} (\text{close}) + \pi_{2(1)} (\text{recip})$$

$$\eta_{ij(2)} = \log [\varphi_{ij(\text{kinship})} / \varphi_{ij(\text{cooperative})}] = \pi_{0(2)} + \pi_{1(2)} (\text{close}) + \pi_{2(2)} (\text{recip})$$

Level 2:

$$\pi_{0(1)} = \beta_{00(1)} + r_{0(1)}$$

$$\pi_{1(1)} = \beta_{10(1)} + r_{1(1)}$$

$$\pi_{2(1)} = \beta_{20(1)} + r_{2(1)}$$

$$\pi_{0(2)} = \beta_{00(2)} + r_{0(2)}$$

$$\pi_{1(2)} = \beta_{10(2)} + r_{1(2)}$$

$$\pi_{2(2)} = \beta_{20(2)} + r_{2(2)}$$

Level 3:

$$\beta_{00(1)} = \gamma_{000(1)} + u_{00(1)}$$

$$\beta_{10(1)} = \gamma_{100(1)} + u_{10(1)}$$

$$\beta_{20(1)} = \gamma_{200(1)} + u_{20(1)}$$

$$\beta_{00(2)} = \gamma_{000(2)} + u_{00(2)}$$

$$\beta_{10(2)} = \gamma_{100(2)} + u_{10(2)}$$

$$\beta_{20(2)} = \gamma_{200(2)} + u_{20(2)}$$

Variables:

close = emotional closeness (group-mean centered)

recip = perceived reciprocity (group-mean centered)

The intercepts π_{01} and π_{02} are the expected log-odds of the relationship being a partnership (or kinship relationship) relative to being a cooperative relationship for a relationship with individual mean emotional closeness and mean perceived reciprocity.

In the Young adult study only the equations on level 1 and 2 were needed.

3. General network: prediction of emotional closeness moderated by type of family

Level 1:

$$\text{Close} = \beta_1^*(\text{husband}) + \beta_2^*(\text{wife}) + \beta_3^*(\text{gr.M}) + \beta_4^*(\text{sim1.M}) + \beta_5^*(\text{sim3.M}) + \beta_6^*(\text{gr.F}) + \beta_7^*(\text{sim1.F}) + \beta_8^*(\text{sim3.F}) + r$$

Level 2:

$$\beta_1 = \gamma_{11}^*(\text{M}) + \gamma_{12}^*(\text{U}) + \gamma_{13}^*(\text{T}) + \gamma_{14}^*(\text{PcK}) + \gamma_{15}^*(\text{PwoK}) + u_1$$

$$\beta_2 = \gamma_{21}^*(\text{M}) + \gamma_{22}^*(\text{U}) + \gamma_{23}^*(\text{T}) + \gamma_{24}^*(\text{PcK}) + \gamma_{25}^*(\text{PwoK}) + u_2$$

$$\beta_3 = \gamma_{31}^*(\text{M}) + \gamma_{32}^*(\text{U}) + \gamma_{33}^*(\text{T}) + \gamma_{34}^*(\text{PcK}) + \gamma_{35}^*(\text{PwoK}) + u_3$$

$$\beta_4 = \gamma_{41}^*(\text{M}) + \gamma_{42}^*(\text{U}) + \gamma_{43}^*(\text{T}) + \gamma_{44}^*(\text{PcK}) + \gamma_{45}^*(\text{PwoK}) + u_4$$

$$\beta_5 = \gamma_{51}^*(\text{M}) + \gamma_{52}^*(\text{U}) + \gamma_{53}^*(\text{T}) + \gamma_{54}^*(\text{PcK}) + \gamma_{55}^*(\text{PwoK}) + u_5$$

$$\beta_6 = \gamma_{61}^*(\text{M}) + \gamma_{62}^*(\text{U}) + \gamma_{63}^*(\text{T}) + \gamma_{64}^*(\text{PcK}) + \gamma_{65}^*(\text{PwoK}) + u_6$$

$$\beta_7 = \gamma_{71}^*(\text{M}) + \gamma_{72}^*(\text{U}) + \gamma_{73}^*(\text{T}) + \gamma_{74}^*(\text{PcK}) + \gamma_{75}^*(\text{PwoK}) + u_7$$

$$\beta_8 = \gamma_{81}^*(\text{M}) + \gamma_{82}^*(\text{U}) + \gamma_{83}^*(\text{T}) + \gamma_{84}^*(\text{PcK}) + \gamma_{85}^*(\text{PwoK}) + u_8$$

Variables:

close = emotional closeness, z-standardized

husband = dummy variable; male intercept

wife = dummy variable; female intercept

gr = genetic relatedness

sim1 = subjective similarity

sim3 = skill similarity

M = motivated childless

U = involuntarily childless

T = traditional family

PcK = Patchwork family with a common child

PwoK = Patchwork family without a common child

Suffixes:

M indicates a male (= husband) & F a female (= wife) variable

4. General network: prediction of perceived reciprocity moderated by type of family

Level 1:

$$\text{Recip} = \beta_1^*(\text{husband}) + \beta_2^*(\text{wife}) + \beta_3^*(\text{ap.M}) + \beta_4^*(\text{sim1.M}) + \beta_5^*(\text{sim2.M}) + \beta_6^*(\text{sim3.M}) + \beta_7^*(\text{ap.F}) + \beta_8^*(\text{sim1.F}) + \beta_9^*(\text{sim2.F}) + \beta_{10}^*(\text{sim3.F}) + r$$

Level 2:

$$\beta_1 = \gamma_{11}^*(\text{M}) + \gamma_{12}^*(\text{U}) + \gamma_{13}^*(\text{T}) + \gamma_{14}^*(\text{PcK}) + \gamma_{15}^*(\text{PwoK}) + u_1$$

$$\beta_2 = \gamma_{21}^*(\text{M}) + \gamma_{22}^*(\text{U}) + \gamma_{23}^*(\text{T}) + \gamma_{24}^*(\text{PcK}) + \gamma_{25}^*(\text{PwoK}) + u_2$$

$$\beta_3 = \gamma_{31}^*(\text{M}) + \gamma_{32}^*(\text{U}) + \gamma_{33}^*(\text{T}) + \gamma_{34}^*(\text{PcK}) + \gamma_{35}^*(\text{PwoK}) + u_3$$

$$\beta_4 = \gamma_{41}^*(\text{M}) + \gamma_{42}^*(\text{U}) + \gamma_{43}^*(\text{T}) + \gamma_{44}^*(\text{PcK}) + \gamma_{45}^*(\text{PwoK}) + u_4$$

$$\beta_5 = \gamma_{51}^*(\text{M}) + \gamma_{52}^*(\text{U}) + \gamma_{53}^*(\text{T}) + \gamma_{54}^*(\text{PcK}) + \gamma_{55}^*(\text{PwoK}) + u_5$$

$$\beta_6 = \gamma_{61}^*(\text{M}) + \gamma_{62}^*(\text{U}) + \gamma_{63}^*(\text{T}) + \gamma_{64}^*(\text{PcK}) + \gamma_{65}^*(\text{PwoK}) + u_6$$

$$\beta_7 = \gamma_{71}^*(\text{M}) + \gamma_{72}^*(\text{U}) + \gamma_{73}^*(\text{T}) + \gamma_{74}^*(\text{PcK}) + \gamma_{75}^*(\text{PwoK}) + u_7$$

$$\beta_8 = \gamma_{81}^*(\text{M}) + \gamma_{82}^*(\text{U}) + \gamma_{83}^*(\text{T}) + \gamma_{84}^*(\text{PcK}) + \gamma_{85}^*(\text{PwoK}) + u_8$$

$$\beta_9 = \gamma_{91}^*(\text{M}) + \gamma_{92}^*(\text{U}) + \gamma_{93}^*(\text{T}) + \gamma_{94}^*(\text{PcK}) + \gamma_{95}^*(\text{PwoK}) + u_8$$

$$\beta_{10} = \gamma_{101}^*(\text{M}) + \gamma_{102}^*(\text{U}) + \gamma_{103}^*(\text{T}) + \gamma_{104}^*(\text{PcK}) + \gamma_{105}^*(\text{PwoK}) + u_8$$

Variables:

recip = perceived reciprocity, z-standardized

husband = dummy variable; male intercept

wife = dummy variable; female intercept

ap = age parity

sim1 = subjective similarity

sim 2= physical similarity

sim3 = skill similarity

M = motivated childless

U = involuntarily childless

T = traditional family

PcK = Patchwork family with a common child

PwoK = Patchwork family without a common child

Suffixes:

M indicates a male (= husband) & F a female (= wife) variable

5. Patchwork families: Prediction of emotional closeness in parent-child relationships

Level 1:

$$\text{close} = \beta_0 + \beta_1^*(\text{socc}) + \beta_2^*(\text{age}) + \beta_3^*(\text{sim1}) + \beta_4^*(\text{sim2}) + \beta_5^*(\text{sim3}) + r$$

Level 2:

$$\pi_0 = \beta_{00} + r_0$$

$$\pi_1 = \beta_{10}$$

$$\pi_2 = \beta_{20} + r_2$$

$$\pi_3 = \beta_{30}$$

$$\pi_4 = \beta_{40}$$

$$\pi_5 = \beta_{50}$$

Level 3:

$$\beta_{00} = \gamma_{001}^*(T) + \gamma_{002}^*(PwoK) + \gamma_{003}^*(PcK) + u_{100}$$

$$\beta_{10} = \gamma_{101}^*(PwoK) + \gamma_{102}^*(PcK) + u_{10}$$

$$\beta_{20} = \gamma_{201}^*(T) + \gamma_{202}^*(PwoK) + \gamma_{203}^*(PcK) + u_{20}$$

$$\beta_{30} = \gamma_{301}^*(T) + \gamma_{302}^*(PwoK) + \gamma_{303}^*(PcK) + u_{30}$$

$$\beta_{40} = \gamma_{401}^*(T) + \gamma_{402}^*(PwoK) + \gamma_{403}^*(PcK) + u_{40}$$

$$\beta_{50} = \gamma_{501}^*(T) + \gamma_{502}^*(PwoK) + \gamma_{503}^*(PcK) + u_{50}$$

Variables:

close = emotional closeness

socc = social child

age = age of the child (grand-mean centered)

sim1 = subjective similarity (group-mean centered)

sim 2= physical similarity (group-mean centered)

sim3 = skill similarity (group-mean centered)

T = traditional family (dummy coded)

PcK = Patchwork family with a common child (dummy coded)

PwoK = Patchwork family without a common child (dummy coded)

6. Friendship: Prediction of closeness with friends by family relationship qualities

Level 1:

$$\text{Close} = \beta_0 + \beta_1^*(\text{goodfri}) + \beta_1^*(\text{friend}) + r$$

Level 2:

$$\beta_0 = \gamma_{01}^*(\text{FamSim}) + \gamma_{02}^*(\text{FamRecip}) + \gamma_{03}^*(\text{FamCont}) + u_0$$

$$\beta_1 = \gamma_{11}^*(\text{FamSim}) + \gamma_{12}^*(\text{FamClose}) + \gamma_{13}^*(\text{FamRecip}) + \gamma_{14}^*(\text{FamCont}) + u_1$$

$$\beta_2 = \gamma_{21}^*(\text{FamSim}) + \gamma_{22}^*(\text{FamClose}) + \gamma_{23}^*(\text{FamRecip}) + \gamma_{24}^*(\text{FamCont}) + u_2$$

Variables:

close = emotional closeness

goodfri = good friend (dummy coded)

friend = regular friend (dummy coded)

FamSim = average similarity with horizontal family

FamClose = average closeness with horizontal family

FamRecip = average reciprocity with horizontal family

FamCont = average contact frequency with horizontal family