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Unifying the detrimental and beneficial effects of social network site use on self-esteem: a systematic literature review

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ABSTRACT

Previous research offers equivocal results regarding the effect of social networking site use on individuals' self-esteem. We conduct a systematic literature review to examine the existing literature and develop a theoretical framework in order to classify the results. The framework proposes that self-esteem is affected by three distinct processes that incorporate self-evaluative information: social comparison processes, social feedback processing, and self-reflective processes. Due to particularities of the social networking site environment, the accessibility and quality of self-evaluative information is altered, which leads to online-specific effects on users' self-esteem. Results of the reviewed studies suggest that when a social networking site is used to compare oneself with others, it mostly results in decreases in users' self-esteem. On the other hand, receiving positive social feedback from others or using these platforms to reflect on one's own self is mainly associated with benefits for users' self-esteem. Nevertheless, inter-individual differences and the specific activities performed by users on these platforms should be considered when predicting individual effects.

Introduction

Social networking sites (SNSs) have become a central part of today's life. As of April 2019, Facebook, the most popular SNS, had 2.3 billion users worldwide, while Instagram and Twitter count 1.0 and 0.3 billion users, respectively (Statista, 2019). SNSs allow members to interact with others in a virtual field through messages and shared identity information (Chen, Fan, Liu, Zhou, & Xie, 2016). Motivated by the popularity of these platforms worldwide, the effects of SNS use on users' well-being have been researched (e.g., Burke & Kraut, 2016; Kross et al., 2013; Valkenburg, Peter, & Schouten, 2006) and reviewed (e.g., Huang, 2017) extensively.

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Within this literature, self-esteem, as an important predictor of well-being (Diener & Diener, 1995), has been a topic of interest either on its own (e.g., Gonzales & Hancock, 2011; Vogel, Rose, Roberts, & Eckles, 2014) or as a mediator in the relationship between SNS use and well-being (Chen et al., 2016). Defined as an individual's subjective value judgment of the self (Rosenberg, 1965), self-esteem has important implications for various life outcomes, such as health (e.g., Sowislo & Orth, 2013), relationship satisfaction (Shackelford, 2001), and job performance (Judge & Bono, 2001). Dynamic in nature, self-esteem can be seen as a barometer of individual successes and failures, as well as acceptance and rejection by others (Baldwin & Sinclair, 1996). We denote this dynamic tracking and evaluation process by the term "self-esteem updating". Information about the self, collected both through interactions with the social environment and introspection, serve as a basis for self-esteem updating. This self-evaluative information, processed through individual self-esteem updating, therefore defines the level of a person's self-esteem.

As communication and interaction with other individuals via SNSs play an ever-growing role in peoples' day-to-day lives, the question arises whether these dynamics lead to particular outcomes of self-esteem updating. Indeed, existing empirical research suggests that SNS use is associated with alterations in self-esteem. For example, some studies report a positive association between SNS use and self-esteem (e.g., Gonzales & Hancock, 2011; Valkenburg et al., 2006), while others find negative (e.g., Vogel et al., 2014) or insignificant (Muench, Hayes, Kuerbis, & Shao, 2015) relationships. This ambiguous pattern of results resembles extant research in the area of SNS use and general well-being. Some authors in this field suggest to distinguish different SNS activities (for an overview see Huang, 2017), such as social connection promoting vs. non-promoting activities (Clark, Algoe, & Green, 2018) or active and passive use patterns (e.g., Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017) to analyze the beneficial or harmful effects of SNS use on well-being. However, it remains to be seen if these approaches can be transferred to the concept of self-esteem. Scientific results in the field of SNS use and self-esteem still remain scattered and ambiguous (Liu & Baumeister, 2016), and so far no theory has been established that integrates both social and internal processes to explain these diverging findings.

To close this research gap, we conduct a systematic literature review to make sense of the growing body of research in this area (e.g., Levy & Ellis, 2006; Webster & Watson, 2002). In doing so, we contribute to the existing literature as follows: first, by reviewing the most common self-esteem theories, we propose that self-esteem updating is mainly driven by three processes: (1) *social comparison*, (2) *social feedback processing*, and (3) *self-reflection*. These three processes incorporate self-evaluative information gathered from an individual's social environment or by introspection based on information about the self. Based on our framework, we can explain the equivocal results, unifying the positive and negative findings. Moreover, we are able to depict knowledge gaps and give

recommendations for future research. Second, we contribute to the growing body of research which studies the implications of information technology use for individuals' well-being (e.g., Burke & Kraut, 2016; Krasnova, Widjaja, Buxmann, Wenninger, & Benbasat, 2015; Kross et al., 2013). Specifically, we discuss the role of SNSs as a source of self-evaluative information, driving the association between their use and self-esteem. Third, and on a more global level, our review is in line with the initiative of an Internet-based information and communication technologies (ICT)-enabled "Bright Society" that aims at protecting society from potential risks of technology use (Fedorowicz et al., 2015; Lee, 2015). Indeed, while the use of SNSs has been increasingly associated with "dark sides" (Lee, 2016), our study provides evidence that certain types of SNS use are beneficial for users' self-esteem and should therefore be encouraged.

The paper is structured as follows: first, we provide an overview of theories of self-esteem and derive our theory-driven framework on self-esteem updating. In the next step, we discuss SNSs' potential meaning as a source of self-evaluative information by explaining how their functionalities can determine both the quality and the access to self-evaluative information relevant for self-esteem. This helps us to frame self-esteem updating in the SNS environment in relation to existing SNS functionalities. Based on this, we propose the directionality of the effect of each process on self-esteem updating in the SNS environment. Consequently, we aim to test our propositions based on findings collected through a literature review on the topic of self-esteem and SNS use. After explaining the applied methodology, we continue with the presentation of the results of our review. We show that all three processes have been investigated to a varying extent by research: while processes related to (1) *social comparison* mainly result in adverse effects on self-esteem, (2) *social feedback processing*, and (3) *self-reflective processes* have the potential to increase the self-esteem of an individual. However, there is evidence that personality traits moderate the effect between SNS use and self-esteem, which might explain prevalent contradictory findings. Based on these insights, we discuss our results in the final chapter and provide concluding remarks.

Background and theoretical framework

In this section, we first define the concept of self-esteem and present our general theory-driven framework on self-esteem updating. We then link our framework with existing functionalities on SNSs to highlight the particularities prevalent in the online context, which affect the processes of our framework.

Self-esteem

Dynamic in nature, the concept of self-esteem refers to a subjective value judgment about one's self (Baldwin & Sinclair, 1996; Rosenberg, 1965). While

low self-esteem has been linked to a number of risks for mental health (e.g., Sowislo & Orth, 2013), high self-esteem has been shown to have a protective role, helping people to cope with potential risks, such as negative feedback, setbacks, or other sorts of failures (Dumont & Provost, 1999). Due to the importance of self-esteem as a resource to cope with day-to-day challenges, people have the basic need to maintain and enhance their self-esteem. This need can be fulfilled through continuous processing of information from their social environment (Greenberg, Pyszczynski, & Solomon, 1986). Referred to as self-esteem updating, the formation of self-esteem can therefore be seen as an ongoing dynamic process. Information that is used for this process is called self-evaluative information (e.g., Wayment & Taylor, 1995).

Several theories describe how and which kind of self-evaluative information is processed and ultimately influences individual self-esteem (e.g., Bem, 1967; Festinger, 1954; Leary, 1999). In order to systematically understand the process of self-esteem updating, we review the most common self-esteem theories to our knowledge and group them according to the overall type of self-evaluative information they incorporate (for an overview see Appendix A). By doing so, we are able to identify three routes that individuals might follow when processing information relevant to their self-esteem. Figure 1 illustrates our proposed model of self-esteem updating. It reflects three key processes that take place in the course of self-esteem updating: (1) *social comparison processes*, (2) *social feedback processing*, and (3) *self-reflective processes*.

The first identified process refers to (1) *social comparisons*. This process is based on comparisons of information related to the self and information provided by other individuals. Social comparison theory (Festinger, 1954) proposes that people have an ongoing basic need to evaluate themselves in relation to others in order to get an appropriate assessment of their abilities and qualities. However, individuals do not compare themselves to anybody in their social surroundings. Social comparisons mainly take place if the target of social comparison is not too different from the self and the object of social comparison is of relevance to the subject (Festinger, 1954). Depending on their directionality, social comparison processes could lead

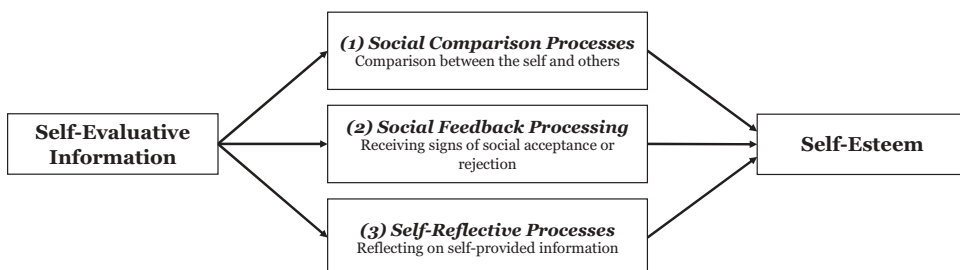


Figure 1. Proposed model of self-esteem updating.

to different outcomes in terms of self-esteem. For example, diminished self-esteem can be observed when individuals compare themselves to others who are better off (upward comparison). At the same time, comparing oneself to others who have lower skills or qualifications (downward comparison) is often associated with an increase in self-esteem (e.g., Morse & Gergen, 1970; Thornton & Moore, 1993).

The second process that determines self-esteem is (2) *social feedback processing*. This process incorporates self-evaluative information that stems from direct interaction with other individuals and may signal either social acceptance or rejection. Individuals highly thrive for reactions from their social environment in order to appropriately estimate the degree to which they are accepted and liked by others which can be seen as one way to satisfy individuals' need of social belonging (Baumeister & Leary, 1995). Sociometer Theory (Leary, 1999) suggests that self-esteem is a barometer reflecting the social acceptance and the social rejection by others. Indeed, receiving negative feedback or any sign of social rejection from others can be seen as a massive threat to self-esteem and has been linked to several negative outcomes to individuals' well-being, such as negative affect, anxiety, and depression (Baumeister & Leary, 1995; Leary, 1990). On the other hand, receiving positive feedback or any sign of social acceptance benefits the evaluation of the self (Leary, 1999).

The third identified process that influences self-esteem is (3) *self-reflection*. While interaction with the social environment is a critical determinant of individual self-esteem; self-esteem can also be derived from more internal aspects. Several theories aim at explaining how the reflection on these facets of the self may influence individual processes of self-esteem updating. For example, the reflection on past behavior (self-perception theory, Bem, 1967), personal standards (control theory of self-regulation, Carver & Scheier, 1981), images of how people would like to see themselves (self-discrepancy theory, Higgins, 1987), important values, or other positive aspects of the self (self-affirmation theory, Steele, 1988) can serve as a basis for self-evaluation and therefore impact individual self-esteem. Research in the field of self-affirmation (Steele, 1988) has shown that when people think about positive facets of their selves they can experience boosts in self-esteem (Koole, Smeets, Van Knippenberg, & Dijksterhuis, 1999). Activities with such self-affirming qualities in the offline context are, for instance, writing about one's most important values or reading self-affirming messages (McQueen & Klein, 2006). Importantly, (3) *self-reflective processes* are not solely based on information about the self in isolation, but can also incorporate information about the self, gained in the course of interaction with others. In this context, it is important to distinguish (3) *self-reflective processes* from (2) *social feedback processing*, as described above. While instances of interpersonal interaction can be reflected on multiple times within the process of self-reflection, processing of social feedback focuses on a single episode of social interaction (e.g., getting complimented by an acquaintance).

Taken together, (1) *social comparison*, (2) *social feedback processing*, and (3) *self-reflection* incorporate self-evaluative information, and therefore influence self-esteem updating in everyday-life.

Our framework on self-esteem updating is grounded in a general perspective in the offline environment. However, as the three processes mainly take place in interactions between individuals, we assume that they also take place in the context of SNSs. Indeed, SNSs are largely based on social interactions, which justify the application of our framework in the online context. Since the SNS environment exhibits specific particularities, certain dynamics of communication and interaction on these platforms and the thus resulting self-evaluative information might uniquely contribute to the three processes of self-esteem updating. In the following section, we will exemplify this assumption in greater detail.

Self-evaluative information in the SNS environment

Due to its dynamic character, individual self-esteem is the result of a constant integration of self-evaluative information as part of three basic processes described above. SNSs can be seen as a rich source of such self-evaluative information. Indeed, SNS platforms allow users to easily share personal information and updates, get in contact with others, and interact with them. As a result, users are motivated to disclose a large amount of personal information, and, in turn, are constantly exposed to an abundance of information about others on the network. Against this background, we presume that the same processes of self-esteem updating mentioned above take place in the context of SNSs. [Figure 2](#) illustrates the presumed operation of the three self-evaluative processes in the context of SNSs.

For example, the information provided by other users in the SNS environment (e.g., in the form of photos, status updates, and profile descriptions) can be used for (1) *social comparison processes*. Users can compare relevant aspects of their selves with the information provided by others and can thus draw conclusions about their own positioning (Krasnova et al., 2015). Users further have the opportunity to interact with each other (e.g., in the form of conversations, giving and receiving likes, and commenting on each other's content). Information stemming from these interactions may be perceived as signals of social acceptance or rejection, thereby initiating (2) *social feedback processing* (Wenninger, Krasnova, & Buxmann, 2019). Finally, by disclosing a myriad of information about their selves on the platforms (e.g., by providing detailed profile descriptions and sharing meaningful moments of their lives in the form of photos, videos, and status updates), (3) *self-reflective processes* are likely to be activated. Specifically, by reflecting on their self-provided information or on former interactions with others on a SNS, users can draw conclusions about how to see and evaluate themselves (Gonzales & Hancock, 2011).

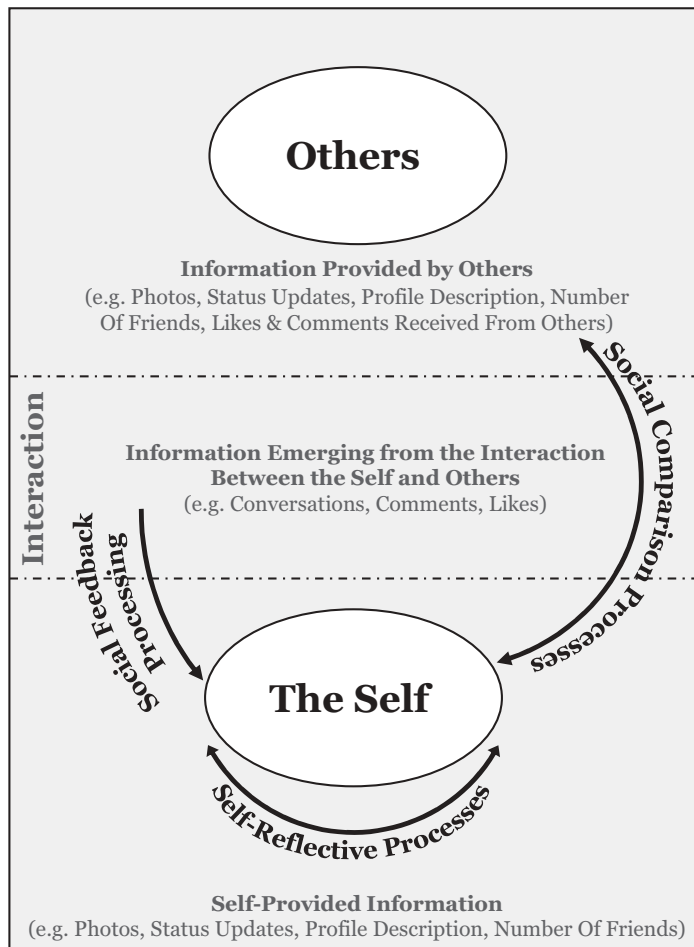


Figure 2. Processes of self-esteem updating in the context of SNSs.

As an exemplary illustration of these processes, imagine an SNS user who is very active in sports. On the one hand, processing information provided by others (e.g., a picture of an acquaintance showing her winning a marathon) could lead this user to the following (1) *social comparison process* outcome: “I am less athletic than my acquaintance”. On the other hand, when this user gets immediate feedback in form of likes after posting her workout picture, a possible outcome of (2) *social feedback processing* could be “Others value that I am active”. Further, browsing her own profile that incorporates photos of her own marathon experience, the same user might conclude: “I think that I am very athletic”; this would be an outcome of a (3) *self-reflective process*. While self-esteem might decrease in the first case, it potentially increases in the latter two.

Importantly, while social encounters may contribute to changes in individual self-esteem online and offline, we propose that there are specific particularities of the SNS environment. These particularities are reflected in the quality and

accessibility of self-evaluative information, and may therefore uniquely affect the three processes of self-esteem updating and their final outcome. Table 1 gives an overview of the particularities of self-evaluative information in the SNSs environment, lists respective enabling SNS features, and empirical evidence.

Specifically, the main particularities of self-evaluative information incorporated in (1) *social comparison processes* are the following: While social comparisons frequently happen in the offline domain as well, users of SNSs have a comparably larger and more accessible pool of subjects to compare with (Smith, 2014). Users can access comparison triggering information easily with information on others' news, status updates, photos, and links always within reach. Furthermore, SNS algorithms selectively present personalized content to users that raise the frequency of seeing information in subjectively relevant comparison domains (Bucher, 2012). This increases the likelihood of comparisons with others (Tesser, 1988). In addition, comparisons in the SNS environment are mostly upward (Vogel et al., 2014). This can be explained by users presenting enhanced versions of themselves, facilitated through asynchronous communication, content selection, and content editing on SNSs (Ellison, Heino, & Gibbs, 2006; Toma, Hancock, & Ellison, 2008). As users mostly use SNS passively (Verduyn et al., 2015), the risk of engaging in social comparison is especially high. Other users' profile pages on SNSs enable passive browsing through large amounts of stored data, thereby yielding frequent grounds for social comparisons. In consideration of these particularities of self-evaluative information on SNSs, we propose that the outcome of (1) *social comparison processes* on users' self-esteem is mainly negative.

With regards to (2) *social feedback processing*, both the tonality and frequency of social feedback on SNSs may cause particular outcomes of users' self-esteem: Similar to most offline social interactions, feedback from others and the tone of general interactions is mostly positive¹ (Barasch & Berger, 2014; Oh, Ozkaya, & LaRose, 2014). However, low effort functionalities such as the "Like-Button" encourage users to feedback on each other not only more easily and frequently but also in a reciprocal way (Burke, Marlow, & Lento, 2010; Wenninger et al., 2019). Additionally, SNSs inherent feedback promoting features such as birthday wishes or friendship reminders prompt users to signal their social appreciation to others. Given these peculiarities, we suggest that (2) *social feedback processing* mainly leads to positive effects on users' self-esteem.

Processes of (3) *self-reflection* in the SNS environment are mainly characterized in terms of two aspects that uniquely contribute to self-esteem. Firstly, self-provided information on SNSs is mainly positive, as SNSs allow their users to carefully select and edit the information disclosed on their own profiles and remove unflattering content shared by others (Ellison et al., 2006; Hum et al., 2011). Secondly, the availability of information used for self-reflective processes is facilitated as it is saved and stored permanently on SNSs. Therefore, users can

Table 1. Particularities of self-evaluative information on SNSs.

Process	Particularities of the Information	Enabling SNS Functionality	Empirical Evidence
Social Comparison Processes	<p>Many information sources (i.e., comparison targets)</p> <p>Facilitated access to others' personal information</p> <p>Mainly upward comparisons inducing information</p>	<p>Friends suggestions, ease of befriending through one click</p> <p>Shared personal content on profiles (status updates, photos)</p> <p>Enhanced content through editing (e.g., photo filters), selecting & removing unpleasant information</p>	<p>Users have >300 friends on average (Smith, 2014)</p> <p>Posts on SNSs are mostly self-focused (Naaman, Boase, & Lai, 2010)</p> <p>Self-disclosed information is selected to represent desired self-image and to impress others (Peluchette, 2009)</p> <p>Profile pictures tend to be staged (Hum et al., 2011)</p> <p>Most interactions on SNSs have positive tonality (Oh et al., 2014; Lenhart et al., 2011)</p>
Social Feedback Processing	<p>Feedback information is mostly positive</p>	<p>Possible inbuilt reactions to others' content promote positive reactions (e.g., liking, favoring)</p>	<p>Feedback on SNSs is mostly positive (Barasch & Berger, 2014)</p> <p>Most frequently used emoticon on FB is "face with tears of joy" (Cohen, 2017)</p> <p>37% of young users daily comment on other's posts (Hampton, Goulet, Rainie, & Purcell, 2011)</p> <p>Average SNS users receive more likes & comments than they give (Hampton et al., 2011)</p> <p>Users perceive pressure to comment on other persons' content (Smith, 2014)</p>
Self-Reflective Processes	<p>Frequent exposure to feedback information</p> <p>Large audience to receive feedback from</p> <p>Facilitated manageability of positive self-reflective information</p> <p>Facilitated access to self-reflective information</p>	<p>Giving feedback encouraged by reminding users of others' birthdays, or life events</p> <p>Reciprocity induced (e.g., ability to comment on comments)</p> <p>Broadcasting of uploaded content to a large audience</p> <p>Content editing and curating (e.g., photo filters, untagging photos) (Ellison et al., 2006)</p> <p>Content is saved permanently (e.g., timeline, photo albums, friends list)</p> <p>Reminders of past events (e.g., "friendship anniversaries" on FB)</p> <p>Search function to more easily spot information</p>	<p>On average, SNS users reach 68% of their friends with their content within one month (Bernstein, Bakshy, Burke, & Karrer, 2013)</p> <p>Users present themselves in a positive light (Denti et al., 2012)</p> <p>Users repress negative information (Leung, 2013)</p> <p>44.5% of SNS users frequently read their own wall posts (Pemppek, Yermolayeva, & Calvert, 2009)</p>

easily reflect upon both self-presentational information in the form of their presented self-image, as well as their interaction with others. SNS functionalities that enable browsing one's own profile site and revisiting former interactions with and reactions from others thus foster (3) *self-reflective processes* by making people aware of positive facets of their self and their relationships (Nabi, Prestin, & So, 2013). Hence, we assume that due to these enabling features of SNSs, (3) *self-reflective processes* mainly lead to increases in users' self-esteem.

Taken together, we assume that the above-mentioned functionalities of SNSs determine the accessibility and quality of available self-evaluative information, which thus results in detrimental effects for self-esteem in case of (1) *social comparison processes* and in more favorable self-esteem outcomes in cases of (2) *social feedback processing*, and (3) *self-reflective processes*. In order to support these propositions and to summarize existing literature, we conducted a systematic literature review in the area of SNS use and self-esteem. We present details of our applied methodology and its results in the following section.

Methodology

To help make sense of the growing body of research that investigates the role of SNSs in the processes of self-esteem updating, we conducted a systematic review of the existing literature and apply our suggested theoretical framework to structure and explain the results. Methodologically, our literature review follows recommendations by Webster and Watson (2002) and Levy and Ellis (2006). As self-esteem is an important predictor of overall well-being (Diener & Diener, 1995), the literature search was targeted at locating all studies within the broader context of well-being and self-esteem. In doing so, we ensured that all studies using self-esteem as a mediator between SNS use and well-being or using self-esteem as an additional independent variable in a well-being setting were included.

Studies were searched in the following online databases: IEEE, Taylor & Francis, Springer Link, Science Direct, Emerald Insight, JSTOR, Wiley Online library, EBSCOHost, Google Scholar, and ACM Digital Library. Search keywords consisted of terms related to SNSs (online social network*, online network* site*, social network* site*, social media, SNS, OSN, Instagram, Facebook, Snapchat) and self-esteem within the broader framework of well-being (self-esteem, wellbeing, well-being, life satisfaction, satisfaction with life, happiness, mood, depression, anxiety, mental health, loneliness, positive effect, negative effect, psychological functioning, eudaimonic, hedonic, depressive symptoms, rumination, burnout, emotion). Search results were limited to studies published in English after 2004, the founding year of Facebook, and retrieved from 02/16/2018 through 02/28/2018.

The search produced 578,052 records, of which we screened 17,271 based on title and abstract (for Taylor & Francis, ACM Digital Library, Springer Link,

Google Scholar, Emerald Insight, and JSTOR entries were screened until at least 100 irrelevant entries followed after the last relevant one), resulting in 821 potentially relevant studies. In order to be included, studies had to (a) be empirical, (b) use the variable “self-esteem” either as the dependent variable or as mediator, (c) apply a measure of SNS use as predictor, and (d) be peer-reviewed. As we were interested in studies examining specific SNS activities and their effects on self-esteem, we considered (e) studies that assume reversed causality (self-esteem predicting SNS use) as being out of our research scope and excluded them from our final analysis. Studies were further excluded if they (f) examine SNS addiction. Applying these criteria produced 30 relevant studies, based on which 19 additional ones were found with the help of a forward and backward search. In the end, a sample of 49 studies was included in the final review.

Of these 49 studies, most use a college student (49%) or adolescent sample (22%). A vast majority of the studies were conducted in the United States (43%). The authors mostly apply cross-sectional research designs (59%), and only a few studies use longitudinal (12%) or experimental designs (18%). The most common measure for self-esteem is the Rosenberg Self-Esteem Scale (65%) either in its original form (Rosenberg, 1965) or in adapted versions. In most cases, SNS use is assessed by frequency of visiting these platforms (18%). Facebook is the most common SNS in the focus of these studies (57%). More fine-grained details on study characteristics can be found in [Table B](#) in the appendix.

The studies were categorized into our theoretical framework of three processes of self-esteem updating: (1) *social comparison process*, (2) *social feedback processing* and (3) *self-reflective process* (see [Figure 1](#)) in a two-step process. We first analyzed whether a study had directly operationalized an SNS activity as one of the three processes. For example, the activity *engaging in social comparison on SNS* (Liu et al., 2017) was mapped to the (1) *social comparison process*, and the activity *receiving birthday wishes on SNS* (Greitemeyer, Mügge, & Bollermann, 2014) was mapped to (2) *social feedback processing*.

If the first criterion was not fulfilled, we checked if a study operationalized an SNS activity that has been associated with one of the three processes according to previous literature. Articles were mapped to the (1) *social comparison process* if they measured being exposed to content provided by others, either by passive use in general (Verduyn et al., 2017) or by browsing others’ profiles (de Vries & Kühne, 2015). Studies were grouped into the process of (2) *social feedback processing* if they measured any form of direct social interaction. This is because social interactions carry signals of social acceptance or social rejection and hence, can be used to form beliefs about how others evaluate the self (Leary, 1999). Finally, for the (3) *self-reflection process*, either being exposed to one’s own SNS content (Steele, 1988), creating own SNS content (McQueen & Klein, 2006), or being exposed to former conversations with others were used as selection criterion.

Sixteen studies in our sample measure general usage of SNSs (i.e., frequency of use, intensity of use, time of use). Hence, it was not possible to assign these studies to a specific process of our self-esteem updating framework. Instead, we present them as exploratory findings. In addition, all studies which could not be mapped directly to one of the three processes and self-evaluative information type but instead measure overarching dimensions of information availability on SNSs were categorized as cross-process findings.

Results

In the following sections, we first present studies that apply general measures of SNS use, focusing mostly on the correlational relationship between SNS use and self-esteem. These are therefore referred to as exploratory findings. In the next step, we present an in-depth exploration of empirical evidence that focuses on the three processes of self-esteem updating. Subsequently, moderating personality traits that affect the link between SNS use and self-esteem are analyzed. The results section closes with studies examining the availability of self-evaluation in general, and therefore interfere with several of the processes. We refer to these as cross-process findings.

Exploratory findings

Sixteen of the 49 included studies report exploratory findings regarding the relationship between SNS use and self-esteem. Authors measure duration, frequency, or intensity of use (e.g., time spent on SNS, daily activity, or investment in SNS) without specifying the activities that users perform. Furthermore, most of these studies do not integrate possible mediators in their analysis but rather focus on the cross-sectional bivariate relationship between SNS use and self-esteem. These studies report mixed findings regarding the association between SNS use and self-esteem with most studies (63%) reporting marginal to intermediate negative effects (Cohen, 1992), 12% reporting small positive effects (Cohen, 1992), and 25% of the studies showing a non-significant effect. An overview of the reported results can be found in [Table 2](#).

In summary, studies that aggregate measures of SNS use into one “general” variable without specifying activities users engage in deliver an ambiguous picture regarding the association between SNS participation and users’ self-esteem. To disentangle ongoing dynamics of self-esteem updating, in the next sections we analyze available findings from the perspective of the three proposed processes (see [Figures 1](#) and [2](#)) that could be at play when it comes to self-esteem updating of SNS users.

Table 2. Main findings of the exploratory studies.

Author (Year)	Type ^a	Age ^b	Measure of SNS Use	SE Scale ^c	Effect ^d
Errasti et al. (2017)	C	14.6	Frequency of use	RSES	-
O’Neal Coleman et al. (2015)	C	10.4	Frequency of use	SPPC	-
Twenge et al. (2018)	C	NA	Frequency of use	RSES	-
Woods and Scott (2016)	C	[11–17]	Frequency of use, nighttime use, emotional investment	RSES	-
O’Dea and Campbell (2011)	C	14.3	Time	RSES	-
Faraon and Kaipainen (2014)	C	38.5	Intensity of use	RSES	-
Blomfield Neira and Barber (2014)	C	14.6	Investment in SNS	self-designed	-
Kalpidou et al. (2011)	C	19.6	Intensity of use	RSES	-
Larose et al. (2011)	C	17.8	Compulsive use	SISE & State SE	-
Błachnio et al. (2016)	C	20.7	Intensity	RSES	-
Brailovskaia and Margraf (2016)	C	23.4	Use (y/n)	SISE	+
Whitman and Gottdiener (2016)	C	[≤32]	Intensity	RSES	+
Longua Peterson et al. (2017)	C	18.7	Nighttime use	RSES	o
Mersin and Acilar (2015)	C	[18–30]	Duration of membership, frequency of use, time & no. of friends	RSES	o
Muench et al. (2015)	C	[18–70+]	Time, frequency of use	RSES	o
Stanton et al. (2017)	C	24.3	Frequency of use	RSES	o

^aStudy design: Cross-sectional survey design (C); ^bMean age of participants, [range] (NA: mean age not reported); ^cSelf-esteem scale: Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), Self-Perception Profile for children (SPPC; Harter, 1985), Single-Item trait Self-Esteem (SISE; Robins et al., 2001), State Self-Esteem (State SE; Heatherton & Polivy, 1991); ^dNegative effect (-), positive effect (+), non-significant effect (o)

Social comparison processes on SNSs

In our self-esteem updating framework, (1) *social comparison processes* refer to activities involving the comparison of information related to the self with information provided by other individuals. In the literature we reviewed, social comparison theory is the most frequently used concept in explaining the relationship between SNS use and self-esteem. Social comparisons serve as a fundamental mechanism for evaluating the self in relation to others (Festinger, 1954), thus providing input for individual processes of self-esteem updating. Nine of the analyzed studies directly test for social comparison (Greitemeyer, 2016; Hanna et al., 2017; Kang, Chung, Mora, & Chung, 2013; Liu et al., 2017; Stapleton, Luiz, & Chatwin, 2017; Vogel, Rose, Okdie, Eckles, & Franz, 2015; Vogel et al., 2014; Wang, Wang, Gaskin, & Hawk, 2017; Yang, Holden, & Carter, 2018). The results of another four studies can be interpreted in the light of social comparison theory (Chen et al., 2016; Gonzales & Hancock, 2011; Strubel, Petrie, & Pookulangara, 2018; Wang, Yang, & Haigh, 2017). Table 3 presents these findings.

Table 3. Main findings of social comparison processes on SNSs.

Author (Year)	Type ^a	Age ^b	SNS Comparison Activity (→Mediator)	SE Scale ^c	Effect ^d	Type of comparison
Gonzales and Hancock (2011)	E	NA	Profile browsing	RSES	-	Upward
Vogel et al. (2014)	E	19.6	Profile browsing	RSES	-	Upward & Downward
Hanna et al. (2017)	C	[17–24]	SNS use (→ comparison)	SSES	-	General
Wang et al. (2017)	C	19.4	Passive use (→ comparison)	RSES	-	Upward
Chen et al. (2016)	C	21.5	Passive use	RSES	-	Upward
Strubel et al. (2018)	C	20.7	Passive use	RSES	-	General
Wang et al. (2017)	C	33.5	Selfie viewing	RSES	-	Upward
Liu et al. (2017)	C	19.9	Upward comparison	RSES	-	Upward
Yang et al. (2018)	C	18.3	Social media social comparison	RSES	-/o	Ability & Opinion
Stapleton et al. (2017)	C	23.1	Instagram use (→ comparison)	RSES	o	General
Vogel et al. (2015)	C	18.9	Profile browsing	SSES	o	General
Greitemeyer (2016)	E	23.0	Profile browsing	SSES	o	Upward & Downward
Kang et al. (2013)	C	15.9	Upward distant/downward close comparison	CSWS	+/+	Upward & Downward

^aCross-sectional correlational study design (C), Experimental design (E); ^bMean age of participants, [range] (NA: mean age not reported); ^cSelf-esteem scale: Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991); Contingent Self-Worth Scale (CSWS; Crocker et al., 2003); ^d negative effect (-), positive effect (+), non-significant effect (o)

Results overwhelmingly show that browsing profiles of others decreases self-esteem, compared to browsing one's own profile on SNSs (Gonzales & Hancock, 2011; Vogel et al., 2015). However, the content on browsed profiles matters: information that yields grounds for upward comparisons in terms of high social status, signaled by a large number of likes and comments on posts, is associated with a decrease in self-esteem compared to content triggering downward comparisons (Vogel et al., 2014). Furthermore, subjects who tend to compare themselves in terms of achievements on SNSs report lower levels of self-esteem (Yang et al., 2018). At the same time, comparisons with regards to opinions of others on SNSs do not impact self-esteem (Yang et al., 2018). Moreover, upward and downward comparisons with profiles displaying information on a user's fitness (Vogel et al., 2014) or the number of friends (Greitemeyer, 2016) are unrelated to self-esteem.

Importantly, the degree to which a person is similar to the target of a social comparison affects whether she identifies or contrasts with the comparison target and therefore the interpretation of the comparison: in case of a having many similarities, downward comparisons on SNSs are related to higher self-worth, or momentary self-esteem (Kang et al., 2013). However, when there are many differences, upward comparisons are also associated with higher self-worth (Kang et al., 2013).

Passive SNS use, characterized by browsing other peoples' profiles without active interaction or participation, is closely linked to social comparisons

(Krasnova et al., 2015). Users who frequently engage in passive SNS use, like viewing selfies of others, report lower levels of self-esteem (Chen et al., 2016; Strubel et al., 2018; R. Wang et al., 2017). Evidence suggests that this relationship is mediated by social comparisons (J. L. Wang et al., 2017).

It can be concluded that SNS use often triggers upward social comparisons, leading to declines in self-esteem. There are differences in the negative relationship between upward social comparisons and self-esteem with regards to the comparison domain (e.g., Yang et al., 2018) and the individual comparison tendency (e.g., Vogel et al., 2015). However, overall studies report negative effects, with the magnitude ranging from insignificant (e.g., Greitemeyer, 2016) to intermediate (Cohen, 1992) effect sizes (e.g., $r = -0.32$; Chen et al., 2016). Hence, it seems evident that the available self-evaluative information used for (1) *social comparison processes* on SNSs mainly leads to negative outcomes in terms of lower self-esteem, which supports our first proposition.

Social feedback processing on SNSs

The second process of our self-esteem updating framework refers to (2) *social feedback processing*. Social feedback, stemming from social interactions, serves as a signal regarding an individual's level of social acceptance by others and is an indication of how others value qualities and attributes presented by a person (Leary, 1999). Four of the included articles look at the positive link between social interactions and users' self-esteem from a more general perspective. These studies report that SNS use indirectly correlates with self-esteem in a positive way by increasing users' general feeling of relatedness (Abellera, Ouano, Conway, Camilotes, & Doctor, 2012) and promoting socializing behavior (Apaolaza, Hartmann, Medina, Barrutia, & Echebarria, 2013). Further, meaningful text-based communication with friends on SNSs (Golub & Miloloža, 2010; Gonzales, 2014) is positively related to users' self-esteem.

On a more specific level, eight studies examine the consequences of certain types of social feedback on users' self-esteem (Table 4). Importantly, these studies mainly focus on the consequences of positive feedback. Available evidence is generally supportive of the hypothesis of a beneficial influence of positive social feedback on users' self-esteem on SNSs. For example, participants in lab settings report elevated levels of self-esteem after being appraised through likes on their photos (Burrow & Rainone, 2017) or favorable ratings on profiles (Thomaes et al., 2010). Other studies in our review corroborate the importance of quality and type of feedback as determinants of users' self-esteem. Specifically, while the mere frequency of feedback on users' posts does not predict self-esteem, positive tonality as well as receiving birthday wishes, which are positive in nature, do so (Greitemeyer et al., 2014; Valkenburg et al., 2006). Furthermore, perceived supportive feedback positively affects self-esteem (Yang & Bradford Brown, 2016). Remarkably, tie

Table 4. Main findings of social feedback on SNSs.

Author (Year)	Type ^a	Age ^b	Interaction Type	SE Scale ^c	Effect ^d
Abellera et al. (2012)	C	17.9	General social interaction	SERS	+
Apaolaza et al. (2013)	C	[12–17]	General social interaction	RSES	+
Golub and Miloloža (2010)	C	20.3	Online communication	RSES	+
Gonzales (2014)	L	22.7	Meaningful text based communication	RSES	+
Burrow and Rainone (2017)	C	32.6	Likes on photos	RSES	+
	E	20.1			
Thomaes et al. (2010)	E	10.8	Jury score on profile	RSES, SPPC	+
Greitemeyer et al. (2014)	C	22.7	Birthday wishes	RSES	+
Valkenburg et al. (2006)	C	14.8	Reactions to profile	RSES	+
Yang and Bradford Brown (2016)	C	18.1	Supportive feedback	RSES	+
	L	18.1			
Valkenburg et al. (2017)	C	12.5	On messages & photos	SPPA	+
	L	12.5			
Metzler and Scheithauer (2017)	L	16.7	Likes on photos	RSES	-
Clerkin et al. (2013)	L	18.7	Reassurance seeking	RSES	-

^aCross-sectional survey design (C), Experimental design (E), Longitudinal survey design (L); ^bMean age of participants, [range] (NA: mean age not reported); ^cSelf-esteem scale: Self-Esteem Rating Scale (SERS; Nugent & Thomas, 1993), Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), Self-Perception Profile for Children (SPPC; Harter, 1988), Self-Perception Profile for Adolescents (SPPA; Harter, 1988); ^dNegative effect (-), positive effect (+), non-significant effect (o)

strength between recipient and sender of social feedback does not impact the effect on self-esteem: feedback on photos or messages from both friends and acquaintances enhances self-esteem (Valkenburg, Koutamanis, & Vossen, 2017). Results further show that the effect of (2) *social feedback processing* is contingent on the type of social feedback users receive, as negative feedback decreases self-esteem (Thomaes et al., 2010).

Even though the evidence for momentary increases in self-esteem through positive SNS feedback is strong, the stability of this positive effect is less sustainable: while positive self-presentation drives positive feedback and enhances self-esteem in the present, this leads to lower self-esteem in the future (Metzler & Scheithauer, 2017). Moreover, users who actively seek social feedback on an SNS for reassurance exhibit decreased self-esteem over time (Clerkin, Smith, & Hames, 2013). Other studies, however, do not find any long-term relationship between receiving SNS feedback and self-esteem (Yang & Bradford Brown, 2016), as well as social self-esteem, defined as the level of perceived peer acceptance and success in maintaining relationships (Valkenburg et al., 2017).

Overall, it can be concluded that for positive and supportive social feedback, the momentary outcome of social feedback processing on self-esteem updating is positive with authors reporting small to intermediate (Cohen, 1992) effects (e.g., $r = 0.27$, Burrow & Rainone, 2017; $r = 0.32$; Valkenburg et al., 2017). Therefore, evidence from our literature review partially supports our second proposition. However, the long-term stability of this effect remains less clear

(e.g., Yang & Bradford Brown, 2016). This suggests that the positive impact of favorable feedback wears off quickly.

Self-reflective processes on SNSs

The third process of the self-esteem updating framework is (3) *self-reflection* and centers on the reflection of facets of the self. Eight of the 49 included articles investigate the role of (3) *self-reflective processes* on SNSs (Table 5). Four of these studies use self-affirmation theory (Steele, 1988) as a theoretical framework to explain their findings. Following these studies, looking at one’s own SNS profile enhances participants’ self-esteem compared to SNS-unrelated offline activities (Gonzales & Hancock, 2011) or viewing other people’s profiles (Toma, 2013; Toma & Hancock, 2013). Additionally, editing one’s own SNS profile and writing about it afterward has the potential to raise users’ self-esteem (Gentile, Twenge, Freeman, & Campbell, 2012). Possible reasons might be that the act of engaging with one’s self-created image on these sites raises self-awareness in users, making them more aware of positive information about the self which reinforces positive self-perceptions (Denti et al., 2012). In line with this potential of SNSs in the self-affirmation domain, individuals prefer using a SNS over other activities (e.g., watching YouTube videos) in order to boost their self-esteem after a potential self-esteem threatening event, like receiving negative feedback from others (Toma & Hancock, 2013).

Four other studies look at self-reflective processes with regards to users’ self-presentation style on SNSs and, within this context, which kind of

Table 5. Main findings of self-reflective processes on SNSs.

Author (Year)	Type ^a	Age ^b	SNS Use	SE Scale ^c	Effect ^d
Gonzales and Hancock (2011)	E	NA	Browsing own profile	RSES	+
Gentile et al. (2012)	E	[18–22]	Editing & writing about own profile	RSES	+
Metzler and Scheithauer (2015)	C	15.7	Congruent self-presentation	BFW	+
Toma (2013)	E	19.8	Browsing own profile	IAT	+
Toma and Hancock (2013)	E	19.8	Browsing own profile	DRP	+
Wilcox and Stephen (2013)	E	32.3	Browsing SNS feed and focusing on own self-presentation	RSES	+
Yang and Bradford Brown (2016)	L	18.1	Intentional self-presentation	RSES	+
Shin et al. (2017)	E	NA	Taking a self-photograph and uploading it to SNSs	Indirect Measure	o

^a Experimental Design (E), Cross-sectional survey design (C), Longitudinal survey design (L); ^b Mean age of participants, [range] (NA: mean age not reported); ^c Self-esteem scale: Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), Bern subjective well-being questionnaire (BFW; Grob et al., 1991), Implicit Association Test (IAT; Greenwald & Farnham, 2000), Defensiveness-reducing paradigm (DRP; McQueen & Klein, 2006); ^d positive effect (+), non-significant effect (o)

information users reveal and save on these platforms. For example, intentionally revealing certain information about oneself on these sites indirectly benefits self-esteem, as it leads to more self-reflection (Yang & Bradford Brown, 2016). Further, browsing one's SNS feed with a focus on one's self-presentation on this platform leads to higher self-esteem (Wilcox & Stephen, 2013). Importantly, however, in order to increase self-esteem, the information revealed about one's self has to be in line with users' actual self-concept, as the positive relationship between engaging in self-reflection on SNSs and self-esteem depends on showing a congruent self-presentation style (Metzler & Scheithauer, 2015). Nevertheless, not all self-revealed information on these platforms directly affects self-esteem. For instance, merely taking a self-photograph and uploading it is not associated with users' self-esteem (Shin, Kim, Im, & Chong, 2017). This indicates that the actual process of reflecting on one's self-presentation or at least the motive behind it might be of crucial importance.

Taken together, scientific results are in accordance with our third proposition. Indeed, authors consistently report small to medium (Cohen, 1992) positive effects (e.g., $r = 0.24$, Gentile et al., 2012; $r = 0.51$; Toma & Hancock, 2013) indicating that using SNSs to reflect on positive aspects of the self has the potential to increase users' self-esteem, as long as this self-provided information fits users' actual self-concept.

Cross-process findings

All of the studies mentioned above focus on specific types of self-evaluative information. However, two additional studies were included that do not focus on a specific type of such information but rather on their general availability on SNSs. Results suggest that a surplus of information (e.g., in the form of communication overload, Chen & Lee, 2013) as well as feelings of missing out on rewarding experiences on those sites, hence being in a state of lacking information, are related to lower self-esteem (Buglass, Binder, Betts, & Underwood, 2017). Therefore, it can be concluded that not just specific characteristics of self-evaluative information but also their general availability could play an additional role in self-esteem updating in the context of SNSs.

Moderators

Nine studies examine different personality traits as moderators in the relationship between SNS use and self-esteem (see Table 6). Among those traits, "attachment avoidance" (Mikulincer, Shaver, & Pereg, 2003), "narcissism" (Thomaes, Stegge, Bushman, Olthof, & Denissen, 2008), and "social comparison orientation" (Gibbons & Buunk, 1999) reinforce the negative association between SNS use and self-esteem. People who are attachment avoidant and

Table 6. Main findings on the role of moderators in the process of self-esteem updating.

Author (Year)	Moderator	SNS Activity (Independent Variable)	Dependent Variable (DV)	Effect on DV Level of Moderator ^a :	
				Low	High
Longua Peterson et al. (2017)	Attachment avoidance	Nightly time on SNSs	Self-Esteem	o	-
Thomaes et al. (2010)	Narcissism	Receiving negative feedback	Self-Esteem	NA	-
Vogel et al. (2015)	Social comparison orientation	Viewing acquaintances profiles (vs. own profile)	State Self-Esteem	o	-
Wang et al. (2017)	Social comparison orientation	Passive use	Upward Social Comparison	o	+
Stapleton et al. (2017)	Contingent self-worth on the approval of others	Intensity of Instagram use	Social Comparison	+	++
Liu et al. (2017)	Optimism	Upward social comparison	Self-Esteem	-	o
Chen et al. (2016)	Effortful control	Passive use	Self-Esteem	--	-
Wang et al. (2017)	Need for popularity	Viewing selfies of others	Self-Esteem	o	+
Burrow and Rainone (2017)	Purpose in life	Receiving likes on photos	Self-Esteem	+	o

^aLevel of moderator: not significant (o), negative effect (-), positive effect (+), effect not reported (NA); stronger/weaker effect compared to other level (++/- -)

use SNSs at night without much active interaction (Longua Peterson et al., 2017), or who have high narcissistic tendencies and receive negative feedback (Thomaes et al., 2010) show lower levels of self-esteem than people without these characteristics. The same is true for individuals who are prone to social comparisons and viewing profiles of others’ or use SNSs passively (Vogel et al., 2015; J. L. Wang et al., 2017). For passive use, the effect is mediated by engaging in upward social comparisons (J. L. Wang et al., 2017). Both Vogel et al. (2015) and J. L. Wang et al. (2017) find that individuals who are not social comparison oriented do not experience a decline in self-esteem when using SNSs. Individuals whose self-worth is largely dependent on the approval of others also tend to compare themselves online more often, which then predicts lower self-esteem (Stapleton et al., 2017).

Some traits can be regarded as serving as a buffer in the relationship between SNS use and self-esteem. Optimistic peoples’ self-esteem is not negatively affected by engaging in upward social comparison (Liu et al., 2017). Similarly, individuals with the ability to moderate their attention as well as emotional and cognitive reactions to the environment, hence exerting “effortful control” (Valiente et al., 2003), show a less pronounced negative relationship between passive SNS use and self-esteem than those without this ability (Chen et al., 2016).

Two of the studies that include moderators report a positive association between viewing other peoples’ selfies (R. Wang et al., 2017) or receiving likes

on photos (Burrow & Rainone, 2017) and self-esteem. However, this applies only to people who have a high “need for popularity” (R. Wang et al., 2017) or little “purpose in life” respectively (Burrow & Rainone, 2017). The latter place low value on perusing personal achievements (Scheier et al., 2006), presumably resulting in receiving little positive social feedback outside of SNSs.

In summary, the results show that specific traits influence the relationship between SNS use and self-esteem. While some traits accentuate how and to what extent self-evaluative information gathered by using social media is incorporated into self-esteem updating, others lessen it. Individual traits might therefore indicate which users are prone to the risks and benefits of SNS use for their self-esteem.

Discussion

Based on a review of the most prominent self-esteem theories in the field of psychology, we developed an overarching framework which poses that self-esteem updating (i.e., the process of short-term changes in self-esteem of an individual) is based on three different processes that incorporate self-evaluative information gathered from an individuals’ environment. The three processes we were able to identify are (1) *social comparison*, (2) *social feedback processing*, and (3) *self-reflection*. We presume that self-evaluative information in the SNS domain shows certain particularities regarding its accessibility and quality. In this environment, SNS users usually have access to a vast amount of positive-shifted content provided by an enormously large circle of individuals. This in turn might lead to specific dynamics of the three processes of individuals’ self-esteem updating.

Processes of (1) *social comparison* frequently take place on SNSs and are mostly upward, triggered by other users’ positive self-presentation and an ease to access others’ private information in relevant comparison domains (Vogel et al., 2014). Nevertheless, the results suggest that the effect of these comparisons is bound to the same restrictions as in the offline context: relational closeness to the comparison target, as well as relevance of the comparison domain determines the extent to which the outcome of the comparison is integrated into self-esteem updating (Tesser, 1988). Hence, results linking upward comparisons to self-esteem increases can be explained by close relational ties to the comparison target, which can attenuate or reverse the effect of upward comparison (Tesser, 1988).

However, caution must be paid when making assumptions on the stability of observed effects, as none of the reviewed studies applied a longitudinal design. While the experimental results offer ground for assuming causality, long-term effects cannot be inferred and ask for future analysis. A further important aspect that has not been investigated thoroughly in all studies on social comparison is whether comparisons are upward or downward. This distinction, however, is of high importance, as the direction of comparison

can lead to diverging outcomes for self-esteem (Buunk, Collins, Taylor, VanYperen, & Dakof, 1990). Research found that social media mostly triggers upward comparisons, as many users depict an overly positive image of themselves online (Qiu, Lin, Leung, & Tov, 2012). While some studies clearly report a negative correlation between upward comparison and self-esteem (Liu et al., 2017; J. L. Wang et al., 2017), others only refer to online social comparisons in general (Stapleton et al., 2017; Vogel et al., 2015).

Regarding (2) *social feedback processing*, the results show that receiving feedback from others on SNS is associated with elevated state self-esteem if it is perceived as supportive and positive in tonality (Greitemeyer et al., 2014). However, these effects do not seem to persist over time (Valkenburg et al., 2017) or are even reversed when users excessively seek positive feedback (e.g., by presenting an unrealistically idealized version of themselves) (Metzler & Scheithauer, 2017). Possible reasons for the ephemerality of positive effects are twofold. First, users may think that feedback is not authentic, as there is an inflation of positive communication on SNSs (Barasch & Berger, 2014). Second, feedback given on unrealistic self-presentations may trigger feelings of self-discrepancy that lower self-esteem (Strauman & Higgins, 1988). Therefore, studying long-term effects of social feedback and understanding why only certain kinds are significant are subjects to future work.

Clearer results were found for (3) *self-reflective processes*. Almost all of the included studies analyzing self-affirmation and the reflection on one's self-presentation in the SNS environment conclude that certain SNS activities can have self-affirming properties. Self-affirming activities were mainly studied in the laboratory before and results thus show less ecological validity (McQueen & Klein, 2006). The findings therefore offer a first insight into self-affirming processes taking place outside of the lab. Users emphasize positive aspects of their selves when interacting with SNS platforms (Denti et al., 2012) storing this information and making it accessible with just a few clicks. The clear result that a mere look onto one's own profile raises users' self-esteem (Gentile et al., 2012; Gonzales & Hancock, 2011; Toma, 2013) thus does not come as a surprise. In summary, reflecting on self-revealed information or interactions with others on SNSs benefits users' self-esteem by raising awareness to positive aspects of their self.

Unifying the interplay of the three processes that drive self-esteem updating, it seems that they differ with regards to both impact direction and strength. Indeed, the magnitude of effect size varies between intermediate negative effects to strong positive effects (Cohen, 1992) between these processes. Especially, considering the rather high stability of self-esteem (Trzesniewski, Donnellan, & Robins, 2003), these results seem striking and emphasize the importance of looking at users' specific behavior to derive conclusions about SNSs' impact on self-esteem. It seems that engaging with self-disclosed information or absorbing feedback from others triggers (3) *processes of self-reflection* and (2) *social*

feedback processing, which can elevate self-esteem. Browsing others' profiles, however, frequently leads to self-esteem lowering (1) *social comparison processes*.

Our theoretical model resembles other SNS activity-focused approaches in the field of SNS use and general well-being. However, previous theoretical conceptualizations either merely focus on a broad distinction of activities without specifically considering underlying processes (e.g., Verduyn et al., 2017), exclusively focus on social influences without considering self-reflective processes (Clark et al., 2018), or consider other user-focused activities solely as harmful (Vogel & Rose, 2016). Our framework is thus the first to our knowledge that offers a more differentiated view on a broader range of activities as well as both internal and social underlying processes to understand the effects of SNS use on self-esteem. Future research is nevertheless needed to determine if our approach can be transferred to the broader context of SNS use and well-being.

However, reviewing the research body within our framework suggests that the overall outcome of SNS use on self-esteem depends on inter-individual differences of users. While some individual traits increase possible negative effects of self-esteem updating in the SNS context (e.g., trait social comparison orientation, Vogel et al., 2015), others counterbalance or attenuate their outcomes (e.g., trait "purpose in life", Burrow & Rainone, 2017). For example, "social comparison orientation" is linked to more frequent online comparisons for those scoring high (J. L. Wang et al., 2017). Similarly, when self-worth is strongly dependent on the approval of others online, social comparisons occur more often (Stapleton et al., 2017). In both cases, these comparisons enhance the negative relationship between SNS use and self-esteem. Further, traits such as "optimism", "purpose in life", "effortful control", "need for popularity", and "narcissism" interfere with the magnitude of the relationship between different SNS activities and self-esteem. For optimists, contrary to pessimists, there is no significant relationship between online upward social comparison and self-esteem (Liu et al., 2017). What is more, the impact of receiving positive feedback in the form of likes is non-significant for persons scoring high on "purpose in life" (Burrow & Rainone, 2017). These findings indicate that though engaging in self-evaluation through social comparisons or social feedback on SNS, for some individuals, this does not result in a change in their self-esteem.

To summarize, when researching the relationship between SNS use and self-esteem, inter-individual differences should be emphasized. As this review suggests, not all people experience the same effects on self-esteem through SNS use. The implication of this is twofold: first, ambiguous and diverging findings of past studies could be explained by the lack of a moderator analysis; second, further research should focus on investigating especially those traits that have been found to enhance negative effects of social media use in order to efficiently identify individuals that are of high risk when using SNSs. In addition, it seems promising to investigate the role of traits that have been shown to intervene with other well-being related concepts (e.g., loneliness, anxiety, or depression).

Finally, the proposed model so far solely considers self-esteem as an outcome of SNS use. However, it is possible that an individual's pre-existing level of self-esteem interacts with the proposed three processes. Indeed, existing research considers self-esteem not only as a potential outcome (e.g., Vogel et al., 2014) but also as a determinant of different social comparison dynamics (e.g., Ahadzadeh, Pahlevan Sharif, & Ong, 2017; Aspinwall & Taylor, 1993). Hence, it seems plausible to assume that one's pre-existing level of self-esteem might alter the dominance or the outcome of either of the three proposed processes in our model. This notion is in line with the Differential Susceptibility to Media Effects Model (Valkenburg & Peter, 2013), which proposes that pre-existing dispositional factors can moderate the relationship of media use and its effects. However, future work is needed to test if such dynamics can be integrated into our model.

Limitations and future research

The present study has several limitations. The choice of keywords might have been too narrow. However, extensive forward and backward searches balanced out this potential shortcoming. In addition, we excluded studies assuming the reversed causality (i.e., self-esteem predicting SNS use), as we were mainly interested in research examining the effect of specific SNS activities on SNS. However, in case of cross-sectional research designs, findings of authors assuming reversed causality might still have yielded evidence for our research question. Since only studies written in English were included, findings could further be culturally biased. However, a few studies in our sample originate from non-English speaking countries (e.g., Apaolaza et al., 2013).

Additionally, most of the studies included in this systematic review investigated the effects of SNS use in the context of Facebook, while only few (35%) considered other SNSs. The results should therefore be interpreted cautiously with regards to their generalizability to other SNSs. While we assume that functionalities of other SNSs that are similar to Facebook equally determine the availability of self-evaluative information and therefore its outcome on self-esteem, we cannot rule out that certain peculiarities of other SNSs lead to different self-esteem outcomes. Indeed, extant research for instance discusses the role of higher social presence in picture-based SNSs (e.g., Instagram) in affecting users' well-being (Pittman & Reich, 2016). However, future research is needed to specifically grasp the role of such peculiarities in the relationship between SNS use and self-esteem.

Importantly, as we were only able to examine published studies, publication bias might distort the conclusions drawn in this review.

A vast amount of integrated studies applied cross-sectional research designs that neither allow for causal conclusions nor for assessment of the stability of reported effects, future research should put more emphasis on applying

experimental or longitudinal research designs. This particularly concerns studies investigating the effect of social comparison processes (in case of longitudinal designs) and social feedback processes (in case of experimental designs). Future studies could, for instance, analyze the changes in self-esteem over time as a function of the amount of encountered information on SNS triggering social comparisons to test the stability of the proposed effects. With regards to social feedback processing, future studies should focus on the experimental manipulation of different types of feedback (e.g., likes, comments, direct messages, feedback of different valence) and its effect on self-esteem to further strengthen existing causal evidence (e.g., Burrow & Rainone, 2017) for the proposed outcomes of this process. Finally, exact user activities on SNSs should be differentiated and users' traits should be considered. Analyzing the existent research body within the proposed framework showed that most findings can be explained by processes of (1) *social comparison*, (2) *social feedback processing*, and (3) *self-reflective processes* in the SNS environment. As this review is narrative in nature, another direction for future research is to empirically test the entire proposed framework. One way of doing this could be to apply appropriate operationalizations of the proposed three processes in a cross-sectional survey design and to analyze the entire model fit. This would further allow for quantifying the effects and determining if all three processes equally influence users' self-esteem or if specific processes might be of particular importance in this regard.

Conclusion

In conclusion, SNS use affects users' self-esteem in multiple and complex ways. Using SNS for social comparison is mainly related to negative effects on users' self-esteem, whereas receiving positive feedback or engaging in self-reflection is associated with elevated self-esteem. The overall outcome of SNS use on self-esteem then depends on individual predispositions as well as usage patterns.

Note

1. Although negative feedback in forms of cyberbullying, hate speech or gossiping is a phenomenon that is present on SNSs (e.g., Smith et al., 2008), research suggests that it is rare compared to feedback with positive tonality (Lenhart et al., 2011).

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Appendices

Appendix A. Reviewed Self-Esteem Theories

Process	Theory	Description
Social Comparison Processes	Social Comparison Theory (Festinger, 1954)	People have an ongoing need to evaluate themselves in comparison to others. Social Comparison Theory proposes three different types of comparisons that influence self-esteem. (1) Upward social comparison: A comparison drawn between one self and another person that shows higher ability. (2) Downward social comparison: A comparison drawn between the self and another person that shows lower ability. (3) Lateral social comparison: A comparison drawn between the self and another person that has the same ability.
Social Feedback Processing	Sociometer Theory (Leary, 1999)	Self-Esteem can be seen as a monitor that tracks signs of social acceptance or rejection. Receiving signs of social inclusion or exclusion has a direct effect on people's self-esteem.
	Looking-Glass Self (Cooley, 1902)	Other peoples' reactions to one's own self serve as a source of self-knowledge which is of special importance for people uncertain about their actual self-concept.
	Outer Self-Esteem (Franks & Marolla, 1976)	Proposes two qualitatively different forms of self-esteem. Outer self-esteem stems from the reaction and opinions others have about one's self.
Self-Reflective Processes	Inner Self-Esteem (Franks & Marolla, 1976)	Proposes two qualitatively different forms of self-esteem. Inner self-esteem stems from feelings of one's own capacity, competence and potency mainly resulting from one's own actions and the rewards following them.
	Self-Perception Theory (Bem, 1967)	People gain self-knowledge by observing their own behavior.
	Self-Discrepancy Theory (Higgins, 1987)	Proposes that self-knowledge is structured into three types of self-schemata: (1) the real self; (2) the ought self and (3) the ideal self. Comparisons between these schemata lead to different types of discrepancies which result in miscellaneous emotional and motivational outcomes.



Appendix B. Reviewed Studies on SNS Use and Self-Esteem

Author (Year)	Sample					Moderator	SE scale ^b	SNS use/comparison activity/ feedback type (→ mediator)	Effect ^h
	Type ^a	N ^b	Type ^c	Age ^d	Country ^e				
Exploratory Studies									
Blachnio, Przepiorka, and Pantic (2016)	C	381	FB users	20.7	PL	FB	RSES	Intensity	-
Blomfield Neira and Barber (2014)	C	1,819	GE	14.6	AU	NA	Self-designed	Investment in SNS	-
Brailovskaia and Margraf (2016)	C	945	ST	23.4	DE	FB	SISE	Use (y/n)	+
Errasti, Amigo, and Villadangos (2017)	C	503	GE	14.6	ES	FB, TW	RSES	Frequency of use	-
Faraon and Kaipainen (2014)	C	107	ST, Seniors	38.5	SE	FB	RSES	Intensity of use	-
Kalpidou, Costin, and Morris (2011)	C	70	ST	19.6	US	FB	RSES	Time	-
Larose, Wohn, Ellison, and Steinfield (2011)	C	364	ST	17.8	US	FB	SISE & State SE	Compulsive use	-
Longua Peterson et al. (2017)	C	115	ST	18.7	US	FB	Attachment avoidance	Nighttime use	o
Mersin and Acliar (2015)	C	789	ST	[18-30]	TR	FB	RSES	Duration of membership, Frequency of use, Time & No. of friends	o
Muench et al. (2015)	C	489	GE (Internet users)	18-70 +	US	FB	RSES	Time, Frequency of use	o
O'Dea and Campbell (2011)	C	400	GE	14.3	AU	SNS	RSES	Time	-

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		Sample						SNS use/comparison activity/ feedback type (→ mediator)		Effect ^h
Author (Year)	Type ^a	N ^b	Type ^c	Age ^d	Country ^e	Platform ^f	Moderator	SE scale ^g	Frequency of use	
O'Neal Coleman, Hale, Cotten, and Gibson (2015)	C	1,202	School students	10.4	US	SNS		SPCC	Frequency of use	-
Stanton, Jerald, Ward, and Avery (2017)	C	412	Black women, Mturk, ST	24.3	NA	FB, TB, TW, IG, Blogs		RSES	Frequency of use	o
Twenge, Martin, and Campbell (2018)	C	1,1 Million	ST	NA	US	SNS		RSES	Frequency of use	-
Whitman and Gottliener (2016)	C	446	Internet users	[≤ 32]	NA	FB		RSES	Intensity	+
Woods and Scott (2016)	C	467	Secondary school pupils	[11–17]	UK	SNS		RSES	Frequency of use, Nighttime use, Emotional investment	-
Social Comparison Processes										
Chen et al. (2016)	C	451	ST	21.5	CN	SNS	Effortful control	RSES	Passive use	-
Gonzales and Hancock (2011)	E	63	ST	NA	US	FB		RSES	Profile browsing	-
Greitemeyer (2016)	E	509	ST	23.0	AT	FB		SSES	Profile browsing (no. friends)	o
Hanna et al. (2017)	C	479	GE	26.1				SSES	Facebook use (→ comparison)	-
	C	1,104	ST	[17–24]	NA	FB		SSES	Up distant/down close	+/-
Kang et al. (2013)	C	366	ST	15.9	US	FB		CSWS	Upward comparison	-
Liu et al. (2017)	C	1,205	ST	19.9	CN	SNS	Optimism	RSES		-

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Author (Year)	Type ^a	Sample			Platform ^f	Moderator	SE scale ^g	SNS use/comparison activity/ feedback type (→ mediator)	Effect ^h	
		N ^b	Type ^c	Age ^d						Country ^e
Stapleton et al. (2017)	C	237	FB users	23.1	NA	IG	Contingent self-worth on the approval of others	RSES	Instagram use (→ comparison)	o (-)
Strubel et al. (2018)	C	796	ST (female)	20.7	US	FB		RSES	Passive use	-
Vogel et al. (2014)	E	145	ST	19.6	US	FB		RSES	Profile browsing (upward content)	-
Vogel et al. (2015)	C	120	ST	18.9	US	FB	Social comparison orientation	SSES	Profile browsing	o (-)
Wang et al. (2017)	C	696	SNS users	19.4	CN	Qzone, WeChat	Social comparison orientation	RSES	Passive use (→ comparison)	-
Wang et al. (2017)	C	275	SNS users	33.5	NA	SNS	Need for popularity	RSES	Selfie viewing	-
Yang et al. (2018)	C	219	UG	18.3	US	NA		RSES	Ability/opinion	-/o
Social Feedback Processing										
Abellera et al. (2012)	C	467	UG	17.9	PH	FB		SERS	Social interaction (relatedness)	+
Apalaza et al. (2013)	C	344	GE	[12–17]	ES	Tuenti		1) RSES 2) Well-Being (Satisfaction with life scale)	Social interaction	+
Burrow and Rainone (2017)	C	300	MTurk, ST	32.6	US	SNS	Purpose in life	RSES	Likes on photos	+
Clerkin et al. (2013)	L	319	ST	18.7	US	FB		RSES	Reassurance seeking	-
Golub and Miloloža (2010)	C	277	ST	20.3	HR	FB		RSES	Online communication	+
Gonzales (2014)	EMA/ DS	76	GE	25.0	US	NA		RSES	Meaningful text based communication	+

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Author (Year)	Sample				Platform ^f	Moderator	SE scale ^g	SNS use/comparison activity/ feedback type (→ mediator)	Effect ^h
	Type ^a	N ^b	Type ^c	Age ^d					
Greitemeyer et al. (2014)	C	458	ST	22.7	AT	FB	RSES	Birthday wishes	+
Metzler and Scheithauer (2017)	L	217	GE	16.7	DE	FB	RSES	Likes on photos	-
Thomas et al. (2010)	E	333	GE	10.8	NL	SNS	RSES, SPPC	Jury score on profile	+
Valkenburg et al. (2006)	C	881	GE	14.8	NL	CU2	RSES	Reactions to profile	+
Valkenburg et al. (2017)	C	852	GE	12.5	NL	SNS	SPPA	On messages & photos	+
Yang and Bradford Brown (2016)	L	852	ST	12.5	US	FB	RSES	Supportive feedback	o
Yang and Bradford Brown (2016)	C	218	ST	18.1	US	FB	RSES	Supportive feedback	+
Yang and Bradford Brown (2016)	L	18.1	ST	18.1	US	FB	RSES	Supportive feedback	o
Self-Reflective Processes									
Gentile et al. (2012)	E	72	ST	[18–22]	US	FB	RSES	Editing & writing about own profile	+
Gonzales and Hancock (2011)	E	63	ST	NA	US	FB	RSES	Browsing own profile	+
Metzler and Scheithauer (2015)	C	143	GE	15.7	DE	FB	BFW	Congruent self-presentation	+
Shin et al. (2017)	E	78	ST	NA	KR	FB	Indirect measure	Taking a self-photograph and uploading it to SNSs	o
Toma (2013)	E	159	ST	19.8	US	FB	IAT	Browsing own profile	+
Toma and Hancock (2013)	E	86	ST	19.8	US	FB	DRP	Browsing own profile	+
Wilcox and Stephen (2013)	E	108	FB users	32.3	US	FB	RSES	Reading SNS feed & focus on strong ties	+

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Author (Year)	Sample				Moderator	SE scale ^g	SNS use/comparison activity/ feedback type (→ mediator)	Effect ^h	
	Type ^a	N ^b	Type ^c	Age ^d					Country ^e
Yang and Bradford Brown (2016)	L	218	ST	18.1	US	FB	RSES	Intentional self-presentation	+
Cross-Process Findings									
Buglass et al. (2017)	C	489	FB user	20.6	UK	FB	RSES	Frequency of use (→FOMO)	-
	L	175		20.5					-
Chen and Lee (2013)	C	513	ST	NA	US	FB	RSES	SNS interaction (→ Communication overload)	-

^aCross-sectional survey design (C), Experimental design (E), Longitudinal survey design (L), Ecological Momentary Assessment (EMA), Diary Study (DS)

^bNumber of participants

^cType of participants: Amazon Mechanical Turk Sample (MTurk), Facebook user (FB user), General Sample (GE), Student Sample (ST)

^dMean age of participants, [range] (NA: mean age not reported)

^eMain Country of Sample: Australia (AU), Austria (AT), China (CN), Croatia (HR), Germany (DE), Netherlands (NL), Philippines (PH), Poland (PL), South Korea (KR), Spain (ES), Sweden (SE), Turkey (TR), United Kingdom (UK), United States (US)

^fSNS Platform: SNS in General (SNS), Facebook (FB), Instagram (IG), Tumblr (TB), Twitter (TW), Not specified (NA)

^gSelf-esteem scale: Bern Subjective Well-Being Questionnaire (BFW; Grob et al., 1991), Contingent Self-Worth Scale (CSWS; Crocker, Luhtanen, Cooper, & Bouvrette, 2003), Defensiveness-Reducing Paradigm (DRP; McQueen & Klein, 2006), Implicit Association Test (IAT; Greenwald & Farnham, 2000), Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), Self-Esteem Rating Scale (SERS; Nugent & Thomas, 1993), Self-Perception Profile for Adolescents (SPPA; Harter, 1988), Self-Perception Profile for Children (SPPC; Harter, 1988), Single-Item trait Self-Esteem (SISE; Robins, Hendin, & Trzesniewski, 2001), State Self-Esteem (State SE; Heatherton & Polivy, 1991), State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991)

^hNegative effect (-), positive effect (+), non-significant effect (o)