Exposure to the Positivity Bias and Adolescents' Differential Longitudinal Links with Social Comparison, Inspiration and Envy Depending on Social Media Literacy

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Abstract

Social media literacy is assumed to protect adolescents from negative social media effects, yet research supporting this is lacking. The current three-wave panel study with a four-month interval among $N = 1,032$ adolescents tests this moderating role of social media literacy. Specifically, we examine between- vs. within-person relations of exposure to the positivity bias on social media, social comparison, envy, and inspiration. We find significant positive relations between these variables at the between-person level. At the within-person level, a different pattern of results occurred: higher exposure to others' perfect lives on social media was related to increased inspiration, and higher social comparison was related to increased envy, yet both associations only occurred in one of the two time intervals. Additionally, no within-person associations between exposure to positive content and envy were significant, nor between exposure and social comparison or social comparison and inspiration. These results thus seem more complex than traditional paradigms of selective and transactional media effects assume. Furthermore, multiple group tests showed that the within-person cross-lagged relation between social comparison and envy only occurred for adolescents with low affective social media literacy. The moderating role of social media literacy was not supported in any other instances. The results overall point at the need to instruct affective social media literacy to help adolescents navigate positively biased social media platforms in a healthy way.

Keywords Social media literacy · Inspiration · Envy · Social comparison · Adolescence · Panel study

Introduction

Following the tenets of Goffman's (1959) self-presentation theory, research has shown that social media users aim to convey a favorable self-image online (Yau & Reich, 2019).

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This tendency is labeled the social media positivity bias (from now on referred to as 'positivity bias') (Schreurs & Vandenbosch, 2021b). As adolescents spend large amounts of time on social media, they are regularly exposed to others' seemingly perfect lives and appearances (Bell, 2019). Yet, adolescents' affective responses to such content are diverse and contradictive in terms of well-being.

On the one hand, such content may induce a negative affective response such as envy (e.g., Chae, 2018). On the other hand, users may react positively, for instance, by being inspired (Meier & Johnson, 2022). The occurrence of these positive and negative responses differs from adolescent to adolescent (Valkenburg et al., 2022). Currently, it is highly unclear for whom and how often social media-induced envy vs. inspiration occurs. One key individual difference variable may be social media literacy (Schreurs & Vandenbosch, 2021b).

One study supports this idea. Tamplin et al. (2018) demonstrated in an experiment that young women experienced a reduction in body satisfaction after being exposed to

idealized appearances in social media content. This negative impact did not occur for women with high social media literacy levels. Yet, research investigating social media literacy in domains other than body image or studying how it may empower adolescents in their social media experiences is lacking. Therefore, in a three-wave panel study among adolescents, we aim to explore the moderating role of social media literacy in the potential relations between exposure to positively biased content and social media-induced envy vs. inspiration, respectively.

Moreover, social comparisons may occur when being exposed to positively biased content and may partly determine how people react to this content (Verduyn et al., 2020). Accordingly, the potential empowering role of social media literacy may also manifest itself by contributing to a more positive rather than a negative social comparison process (Schreurs & Vandenbosch, 2021b). A second aim of this study is thus to examine how adolescents' social media literacy interacts with social comparison processes.

The present study explores these processes as within- and between-person associations. Too often, studies adopt an exclusively between-person perspective (Orben et al., 2019). Yet, (social) media effects are typically assumed to occur within individuals; failing to distinguish within- and between-person associations may result in erroneous conclusions (Beyens et al., 2020; Orben et al., 2019).

The positivity bias on social media and users' envy vs. inspiration

Compared to face-to-face interactions and due to the platforms' features and affordances, social media self-presentations are more selective and thus optimized (Krasnova et al., 2015; Kross et al., 2021). Computer-mediated self-presentations are constructed in an asynchronous mode, can be edited and archived, are permanently online, and are distributed to rather large, self-selected audiences (Krasnova et al., 2015).

Such favorable public self-presentations are frequent on social media, where the audience is typically large and partly unknown to the user. Favorable self-presentations manifest themselves in a wide variety of life domains and are best documented for physical appearance. Here, users often show off a trained, lean, fit and/or thin body, thereby conveying idealized appearance content (Mahon & Hevey, 2021). Social media facilitate the construction of such idealized appearances by providing build-in tools to retouch pictures before posting, which are regularly used (Bell, 2019). Beyond physical appearance, users also aim to convey a socially attractive image by displaying their general lifestyle favorably. Users mainly share content of pleasurable and nice moments spent with their friends or a romantic

partner. They typically also show off with immaterial (e.g., vacations, trips) or material possessions (Bell, 2019).

Researchers have explored the diverse and contradicting affective response states that may occur when being exposed to the positivity bias. On the one hand, social media may induce *envy*. Envy is typically defined as "an unpleasant, often painful emotion characterized by feelings of inferiority, hostility, and resentment caused by an awareness of a desired attribute enjoyed by another person or group of persons" (Smith & Kim, 2007, p. 46). Some studies which specifically consider exposure to the positivity bias support a link with envy (e.g., Bell, 2019). Krasnova and colleagues (2015), for instance, showed that especially posts concerning travel and leisure related to feelings of envy. Being exposed to influencers' luxurious lives has also been linked to envy (Chae, 2018). Yet, other research does not find conclusive links between social media use and envy, pointing to inconsistent operationalizations and an unclear role for users' well-being (Meier & Johnson, 2022).[1]

On the other hand, social media may induce *inspiration*. Inspiration has been defined as a motivational state brought about by an evocative stimulus, like positive social media content (Meier et al., 2020), and is characterized by an awareness of new or better possibilities (Thrash et al., 2014). Meier and colleagues (2020) demonstrated in two experiments that young adults reacted to positively biased travel content with inspiration. Qualitative research further described how adolescents perceive the idealistic pictures on Instagram as a source of inspiration for their activities and interests (Bell, 2019). However, so far there have been only few studies with rather small samples suggesting a link between social media use and inspiration. Hence, a more rigorous test with a larger sample is needed.

Both envy and inspiration might occur when passively browsing (positively biased) social media feeds. The rather contradictive results patterns described above have almost exclusively been found at the between-person level. Such a between-person perspective overlooks that media effects are theorized to take place *within* individuals; it thus fails to disentangle between- and within-person levels (Beyens et al., 2020; Orben et al., 2019). A recent study showed that the impact of passively browsing posts differs from adolescent to adolescent: some adolescents felt worse, some felt better, and others (in fact, most) experienced no effects (Beyens et al., 2020). Moreover, research argues that both social media-induced envy and inspiration can occur within the

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[1] This inconsistency in research findings may be partly due to common problems characterizing social media effects research such as a tendency to interpret effects supporting hypotheses while ignoring effects that do not, weak effect sizes and likely publication bias (Dienlin et al., 2021).

same individual (Valkenburg et al., 2022). Envy and inspiration in reaction to social media browsing should thus not be considered mutually exclusive (Valkenburg et al., 2022).

Currently, it remains unclear when and why social media-induced envy vs. inspiration occurs, yet this most likely depends on *who* uses social media and *how* they are used (Kross et al., 2021; Valkenburg et al., 2022). To this end, the Social Media Literacy-model, a recent theoretical framework that integrates media effects and media literacy literature, argues to consider social media literacy in the relations between social media usage and affective responses (Schreurs & Vandenbosch, 2021b).

Social media literacy and adolescents' responses towards the positivity bias

Defining social media literacy

Media literacy has been defined as the ability to access, analyze, evaluate, and communicate messages in a variety of forms, with the ultimate aim to help people have a critical autonomy in relation to all types of media (Aufderheide, 1993). Traditionally, this definition understands media literacy as the ability to critically evaluate mass media (Vanwynsberghe, 2014). Yet, this perspective is not applicable to the current media landscape which is characterized by the proliferation of digital media (Vanwynsberghe, 2014). Therefore, scholars have been using the term digital literacy which accounts for the interactive and convergent nature of digital media. Digital literacy focuses on the unique aspects, possibilities, and risks of the entire spectrum of digital media and includes, next to the ability to use digital devices in a proficient way, a cognitive and an affective component (Martin & Grudziecki, 2006; Vanwynsberghe, 2014). Yet, as not all digital media are social media, the concept of digital literacy is too broad to be applicable to social media alone. As such, scholars conceptualize *social media literacy* under the umbrella term of digital literacy and define it as "the extent to which cognitive and affective structures are present among users to ensure the risks of interactions with social media content are mitigated and the opportunities are maximized" (Schreurs & Vandenbosch, 2021b, p. 321). Following this definition, social media literacy is a variable that consists of two subcomponents: cognitive and affective structures (Schreurs & Vandenbosch, 2021b).

The *cognitive structures* draw on Potter's (2004) processing model. They refer to organized knowledge in the user's memory that guides the creation and interpretation of social media posts (Schreurs & Vandenbosch, 2021b). Within the context of the positivity bias, these structures include (a) adolescents' ability to recognize the presence of the positivity bias; they are thus aware of the unrealistic nature of social media content and other users' motivation to mainly display positive aspects (Schreurs & Vandenbosch, 2021b; Tamplin et al., 2018). These structures are further characterized by (b) a thorough understanding of how such content can potentially negatively affect users (Schreurs & Vandenbosch, 2021b).

Affective structures are closely intertwined with cognitive structures and generally refer to being in control over the (spontaneous) affective responses that occur when using social media (Zarouali et al., 2019). Such affective structures draw on emotion regulation literature which generally distinguishes between adaptive and maladaptive strategies for one's mental well-being (Cracco et al., 2017). Within the context of the positivity bias, affective structures concern the ability to apply adaptive, rather than maladaptive, strategies to deal with affective responses that may occur when interacting with positively biased content (Schreurs & Vandenbosch, 2021b). Adaptive strategies include, for instance, revaluation and cognitive reappraisal of the situation that triggered negative affect. Examples of maladaptive strategies are rumination and self-devaluation (Cracco et al., 2017) and are likely detrimental for adolescents' well-being (Verduyn et al., 2020).

The empowering role of social media literacy

Cognitive and affective social media literacy may partially determine how frequently adolescents experience envy and inspiration when being exposed to positively biased content. Less literate users may experience envy more frequently and deal with it by using maladaptive strategies. For example, they may gossip about what they have seen or post similarly biased content (Verduyn et al., 2020). In contrast, as users with high social media literacy are aware of the artificiality and unrealistic nature of positively biased posts, these posts are likely to clash with their critical cognitions (Burnette et al., 2017). These users can also adaptively manage their spontaneous affective responses towards such content (Schreurs & Vandenbosch, 2021b). Adolescents with elaborated cognitive and affective social media literacy are thus expected to experience envy less frequently when being exposed to the positivity bias. They can even experience inspiration more often, as these users are able to focus on the constructive, and thus the inspiring aspects of the posts (Schreurs & Vandenbosch, 2021b). Therefore, they may capitalize on the positive impacts of social media (Kross et al., 2021).

Research partly substantiates this reasoning. Several literate girls indicated that idealized appearances on social media rarely made them feel envious (Burnette et al., 2017). They also displayed more signs of positive responses after viewing such content. In one experiment, Tamplin and colleagues (2018) further showed that young women with high levels of social media literacy did not experience a reduction in body satisfaction after exposure to idealized appearances on social media whereas this negative effect was found for those women with low levels of social media literacy. It should be noted though that the evidence for social media effects on body image is inconclusive as some studies find direct relations, such as the Tamplin study, whereas others do not (e.g., Hendrickse et al., 2017). Furthermore, the role of social media literacy within the social media context is unclear and the distinction of within- and between-person associations has not been considered.

Given the potential of social media use to elicit both envy and inspiration in adolescents (Valkenburg et al., 2022), it is implausible that social media literacy ensures that *only* inspiration and *no* envy is experienced. Social media literacy more likely acts as a contributory divergent positive moderator. In this way, social media literacy reduces the strength of the potential within-person relation between exposure to positive content and social media-induced envy while increasing the strength of the potential within-person relation between exposure and social media-induced inspiration. Therefore, we predict:

> H1: Adolescents with high levels of (H1a) cognitive (i.e., knowledge on the presence and the effects of the positivity bias) and (H1b) affective social media literacy experience a less strong within-person association between exposure to positive social media content and social media-induced envy than adolescents with lower levels of cognitive and affective social media literacy.
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> H2: Adolescents with high levels of (H2a) cognitive (i.e., knowledge on the presence and the effects of the positivity bias) and (H2b) affective social media literacy experience a stronger within-person association between exposure to positive social media content and social media-induced inspiration than adolescents with lower levels of cognitive and affective social media literacy.

Social media literacy and social comparisons

The potential empowering role of social media literacy may partly manifest itself through social comparisons. Social comparison refers to the use of information on other people to evaluate how oneself is doing on a certain criterion (Festinger, 1954). Social comparisons have been identified

as a fundamental human drive and are an overall frequently, spontaneously, and unintentionally experienced social cognition that shows both between- and within-person variability (Gibbons & Buunk, 1999). Most informative are comparisons with someone who is perceived similar to the self (Verduyn et al., 2020). Importantly, many comparison targets on social media are 'similar' peers (Krasnova et al., 2015). Against this background, social media literacy may shape adolescents' social comparisons in two ways (Kross et al., 2021; Schreurs & Vandenbosch, 2021b). First, social media literacy may relate to how *frequently* adolescents compare themselves to others on social media and, second, it may relate to the *affective responses* resulting from these comparisons.

Social media literacy and comparison frequency

Cognitive social media literacy may reduce the frequency of social comparison by decreasing the perceived similarity with comparison targets. Social comparisons are most informative for people when they perceive themselves to be similar to a target (Verduyn et al., 2020). Higher similarity thus breeds more frequent comparisons (Festinger, 1954). Adolescents' cognitive social media literacy makes them aware of the unrealistic nature of positively biased self-presentations; they are thus less likely to perceive others as similar and, therefore, as adequate social comparison targets (Schreurs & Vandenbosch, 2021b).

Additionally, affective social media literacy may reduce comparison frequency as it ensures that users are in control over their responses to positive social media content. As affective social media literacy correlates with cognitive social media literacy (Schreurs & Vandenbosch, 2021b), adolescents with high affective social media literacy can use their knowledge about the presence of the positivity bias, but also about its potential effects, to control how they react. Social comparison literature explains that people who are aware of the potential negative consequences, such as experiencing envy that may result from comparisons, will compare themselves less frequently (Gibbons & Buunk, 1999). Accordingly, adolescents with high affective social media literacy may experience less frequent social comparison. Indeed, not engaging in comparisons when being exposed to positive social media is considered a useful affect regulation strategy (Verduyn et al., 2020).

Some initial evidence for this reasoning exists in the research of Burnette and colleagues (2017). The respondents who were aware of the artificial nature of celebrities' social media posts indicated to be less prone to compare themselves to these celebrities. Yet, given how deeply engrained social comparison is in the human psyche, it is implausible that adolescents can simply avoid comparing to others altogether. Social media literacy probably operates as

a contributory divergent positive moderator. That is, social media literacy should reduce the strength of the potential association between passive social media usage and social comparison frequency or intensity (e.g., Verduyn et al., 2020). Literate users may thus engage in *fewer* online social comparisons than those with lower social media literacy. Together, we predict:

> H3: Adolescents with high levels of (H3a) cognitive (i.e., knowledge on the presence and the effects of the positivity bias) and (H3b) affective social media literacy experience a less strong within-person association between exposure to positive social media content and engaging in social comparisons than adolescents with lower levels of cognitive and affective social media literacy.

Social media literacy and inspiration vs. envy responses to comparisons

Next to comparison frequency, social media literacy may relate to the extent to which adolescents experience envy or inspiration as a result from these comparisons. Social comparisons may elicit both responses. The outcome largely depends on whether individuals assimilate or contrast themselves to the comparison target (Smith, 2000; Verduyn et al., 2020). When individuals' self-evaluation changes *towards* the "better off" comparison target by focusing on their similarities (i.e., assimilation), the comparison will trigger self-improvement motivations such as inspiration (Meier & Johnson, 2022; Smith, 2000). Yet, when the self-evaluation changes *away* from the "better off" comparison target by focusing on differences (i.e., contrast), the comparison may make the individual believe that she/he is underachieving, which could trigger envy (Meier & Johnson, 2022; Smith, 2000). Empirical research, including a Facebook study on over 38,000 users (Burke et al., 2020), suggests that social comparison processes may underlie both the reactions of envy and inspiration after being exposed to positively biased content (e.g., Chae, 2018; Meier et al., 2020). A recent review further concluded that "the same process may have positive and negative effects on well-being depending on the context in which they are engaged" (Kross et al., 2021, p. 56). One important variable that may determine this context is social media literacy.

More specifically, literate users may more frequently engage in comparisons which are favorable to themselves and thus more often respond with inspiration to it. Buunk and colleagues (1990) explained that individuals are more likely to assimilate with an upward comparison target, and thus experience positive affective responses, when they are in control over their personal outcomes. People who feel in control are more likely to interpret the information retrieved from the comparison in a self-improving way. Per

definition, social media literacy typifies being in control over one's social media environment and the affective responses one experiences within this environment (Schreurs & Vandenbosch, 2021b). Literate adolescents are thus likely to more often assimilate with users who seem to have a very attractive appearance and/or a perfect life on social media. Accordingly, they may use this content more frequently as a source of inspiration, which can contribute to their well-being (Meier et al., 2020).

Less literate users, in contrast, are less in control over their social media experience and their affective responses (Schreurs & Vandenbosch, 2021b). They may not as easily assimilate with the comparison target or even make contrastive comparisons more often. Social comparison literature explains that individuals who have low perceived control over their personal situation do not believe that the gap between themselves and the "better off" person can be narrowed by their own doing (Buunk et al., 1990; Smith, 2000). Such individuals are thus likely to engage in contrastive upward comparisons more frequently (Smith, 2000). Contrastive comparisons focus on how one differs from the superior comparison target, making the relative shortcomings more salient and thus resulting in envious feelings (Smith, 2000). Less literate adolescents may therefore more often contrast their own appearances and lives to the seemingly perfect ones displayed on social media. Therefore, these users might experience more frequently social media-induced envy (Smith, 2000).

Together, social media literacy is expected to set the stage for more assimilative and less contrastive social comparisons with "better off" social comparison targets, which is beneficial for well-being. Social media literacy may thus act as a contributory divergent positive moderator:

> H4: Adolescents with high levels of (H4a) cognitive (i.e., knowledge on the presence and the effects of the positivity bias) and (H4b) affective social media literacy experience a less strong within-person association between engaging in social comparisons and social media-induced envy than adolescents with lower levels of cognitive and affective social media literacy.
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> H5: Adolescents with high levels of (H5a) cognitive (i.e., knowledge on the presence and the effects of the positivity bias) and (H5b) affective social media literacy experience a stronger within-person association between engaging in social comparisons and social media-induced inspiration than adolescents with lower levels of cognitive and affective social media literacy.

A conceptual overview of all hypotheses can be found in Fig. 1.

Fig. 1 Conceptual overview of the hypotheses
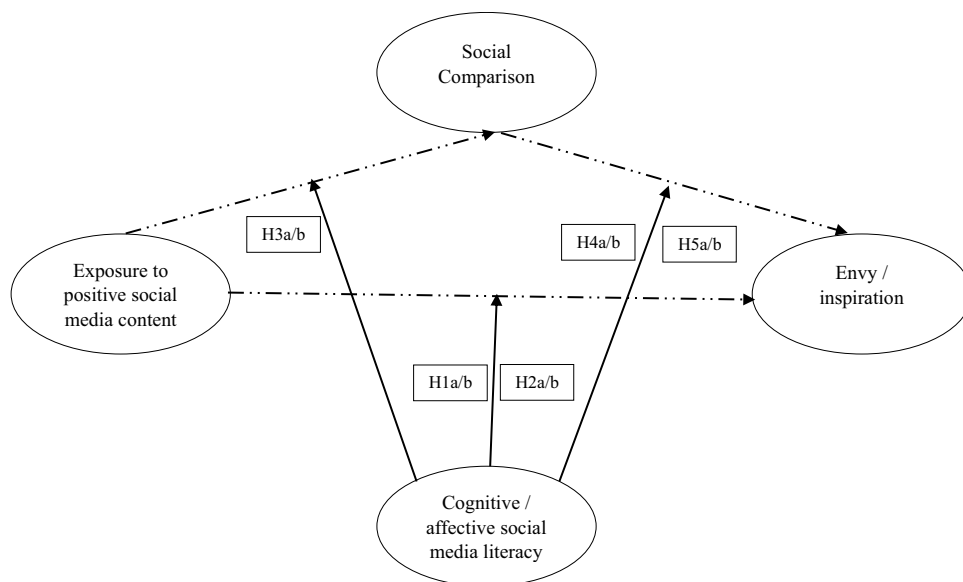
The current study

To adequately test the full set of hypotheses, three things will be taken into account. First, a within- vs. between-person perspective will be adopted. Within-person associations concern differences in an outcome over time for a single individual, so how scoring above or below a person-level average relates to an outcome (Mulder & Hamaker, 2021). Between-person associations concern trait-like differences between individuals, thus how scoring relative to the mean of the group relates to an outcome (Mulder & Hamaker, 2021).

The main relations are considered at the within-person level in random-intercept cross-lagged panel models (RI-CLPMs). First, direct within-person relations between exposure and inspiration/envy will be considered. That is, it will be explored whether an adolescent who is more/less exposed to positive social media content than they are on average experiences subsequent changes in social media-induced envy/inspiration. Additionally, social comparison will be modelled as a mediator in the links between exposure and envy/inspiration and the within-person relations between social comparison frequency and exposure and between social comparison frequency and inspiration/envy will be considered. Note that also indirect paths at the within-person level will be examined which assess whether the direct within-person relations between exposure and inspiration/envy partly go through changes in social comparison frequency.

To test the moderating role of social media literacy (H1-H5), these associations at the within-person level will be compared *between* individuals with different levels of social media literacy by performing multiple group analyses in the main RI-CLPMs (Mulder & Hamaker, 2021).

Second, reciprocal relations between the variables of interest will be estimated to check for the common assumption of reciprocity in media effects research and to explore the reinforcing spirals model that links media usage and cognitions in a reoccurring chain of events (Slater, 2017). As too little is currently known on reciprocal within-person relations between our study variables, this is purely exploratory.

Finally, age and gender will be controlled for as the literature suggests they may relate to adolescents' exposure to positive social media content, social comparison frequency, social media-induced envy/inspiration, and/or their social media literacy (e.g., Burnette et al., 2017; Krasnova et al., 2015; Meier & Schäfer, 2018; Meier et al., 2020; Tamplin et al., 2018).

Method

Sample and procedure

The present study uses data from a larger project[2] for which ethical approval was received. A three-wave panel survey was conducted in 24 schools in Belgium with a four-month interval. Passive parental consent and active consent of the

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[2] The larger project examines social media use and social media literacy among adolescents. More information can be retrieved from the corresponding author.

adolescents themselves was obtained and respondents were told that their answers would be processed confidentially. In Wave 1 (W1) and Wave 2 (W2), respondents completed an online questionnaire during school hours in the presence of a researcher. Reward cards of €50 were distributed via a lottery. Due to the COVID-19 pandemic, respondents completed the questionnaire of Wave 3 (W3) at home. Researchers were present online to answer all questions. More information on this deviation can be found in the Online Supplementary Materials (OSM) which can be found on the (OSF: https://osf.io/q3c5j/).

There were 1,895, 1,677 and 966 adolescents that participated in W1, W2 and W3. Respondents were retained when they participated in at least two waves ($N = 1,607$; 812 participated in all three waves, 795 in two of the three waves). Each wave included an attention check which are known to increase data quality, yet also cause more respondents to be omitted from the sample. Respondents who failed or missed a check in one of the waves in which they participated were excluded. Accordingly, the final sample included 1,032 adolescents ($M_{age} = 14.55$, $SD = 1.65$, range from 11 to 22, 42.2% boys and 57.8% girls). Most respondents (92.2%) were born in [deleted], 65% received a general education, 7.3% a profession-oriented education, and 27.7% a technical education. Finally, we inquired socio-economic status by asking how well off they think their family is compared to other families ($M = 7.63$, $SD = 1.40$, range = 1–10; Goodman et al., 2001).

Analyses to explore missing data patterns (see OSM on OSF: https://osf.io/q3c5j/) first showed that younger adolescents and girls were more likely to have participated in at least two waves. Younger adolescents were more likely to have missing data on the variables that were questioned near the end of the W1/W2 surveys. Additionally, boys and older adolescents were more likely to have a missing value at all W3 variables which had to be completed due to COVID-19 at home. Full information maximum likelihood in *Mplus* handled these missing data.

Measures

Socio-demographics

Age and gender were included as controls. Age was calculated by subtracting the birth year from the year in which the first data collection wave took place, i.e., 2019.

Exposure to positive social media content

We used the short exposure scale of interactions with positive social media content, which has a bi-dimensional factor structure (see Appendix). Adolescents indicated how often they were exposed to posts of others on "mostly public social media applications"[3] in which the poster, for example, (a) looks beautiful and (b) shows that he/she has a lot of fun. Nine items ranged from never (1) to very often (5). Two items of the scale were slightly reworded in W3 to fit the COVID-19 circumstances (see OSM on OSF).

Two items form the factor 'exposure to attractive appearances' (rW1 = 0.46, $p < 0.001$, rW2 = 0.52, $p < 0.001$, rW3 = 0.44, $p < 0.001$), whereas the other seven items reflect the factor 'exposure to a perfect life in general' (αW1 = 0.83, αW2 = 0.84, αW3 = 0.84, ωW1 = 0.83, ωW2 = 0.84, ωW3 = 0.84). The factor structure of this scale was determined in previous research based on the W1 data and is described in greater detail in a previous paper (see Schreurs & Vandenbosch, 2022).

Social media-induced envy

Adolescents evaluated their intensity of envy when using a mostly public social media application, using a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7): "Sometimes I feel jealous[4] when I see social media posts which display other users who look extremely good or seem to have a lot of fun" and "When I see on social media how much fun peers are having, I can feel unhappy" (rW1 = 0.67, $p < 0.001$, rW2 = 0.71, $p < 0.001$, rW3 = 0.69, $p < 0.001$).[5]

Social media-induced inspiration

Two items assessed adolescents' intensity of inspiration (Meier & Schäfer, 2018) using a 5-point Likert scale ranging from never (1) to very often (5): "When I use a mostly public social media application …", (a) "I experience inspiration" and (b) "I am inspired by the posts of other users to do something [new]" (rW1 = 0.68, $p < 0.001$, rW2 = 0.71, $p < 0.001$, rW3 = 0.74, $p < 0.001$).

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[3] Instructions were given to the adolescent respondents on what was meant with "mostly public social media applications". More specifically, it was explained orally in the classroom as well as in written form in the questionnaire that such applications allow content to be viewed by a rather large audience that is for some part unknown. One's profile on Instagram was given as an example. Please see the Appendix document on OSF for the exact instructions.

[4] In the language in which the research was conducted, there is no distinction between the terms "envy" and "jealousy" and the top dictionary treats them as synonyms. As the term "jealousy" is more common among adolescents, specifically in the context of social media usage, we used this term to measure envy (Valkenburg et al., 2022).

[5] Note that we preregistered to work with a 5-item scale of social media-induced negative response states more broadly. Due to problems with model convergence in the multiple group RI-CLPM, we deviated from this decision and performed all final analyses with two items of the original scale. For a detailed explanation see the Deviation from the Preregistration document on OSF.

Social comparison on social media

Respondents evaluated the statement "I think I often compare myself with others on a mostly public social media application when I am reading news feeds or checking out others' photos" (Lee, 2014) on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

Cognitive social media literacy in the area of the positivity bias

Six self-developed items (see Appendix) assessed the first facet of cognitive social media literacy, knowledge on the presence of the positivity bias. Another set of six self-developed items reflected the second facet, knowledge on the potential effects of the positivity bias. All items were answered on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). This bi-dimensional structure was established in a previous paper based on the W1/W2 data (see Schreurs & Vandenbosch, 2021a) and the instrument was first tested in a pilot survey study (see OSF for construct validity tests).

Affective social media literacy in the area of the positivity bias

Five self-developed items (see Appendix) assessed affective social media literacy when interacting with the positivity bias based on emotion regulation literature (Cracco et al., 2017). A 5-point Likert scale ranging from never (1) to very often (5) was used. In case the respondent indicated to have never felt bad due to the positivity bias, the same items were questioned yet framed in a hypothetical way. The answers of these adolescents were then merged with the answers of the adolescents who got the other items. Previous research based on the W1/W2 data established a one-dimensional structure (see Schreurs & Vandenbosch, 2021a) and the instrument was first tested in a pilot survey study (see OSF for construct validity tests).

Analytical strategy

First, descriptive statistics, zero-order correlations, and intra-class correlations (ICC) were calculated. Then, eight main models were constructed using RI-CLPM in *Mplus* as outlined by Mulder and Hamaker (2021). Specifically, separate main models were estimated for each outcome and each predictor, resulting in four different main models (Model$_1$ = exposure appearance and inspiration, Model$_2$ = exposure appearance and envy, Model$_3$ = exposure life and inspiration, Model$_4$ = exposure life and envy). Models$_{5-8}$ were run the same as Models$_{1-4}$ but additionally included the social comparison variable (e.g.,

Model$_5$ = exposure appearance, social comparison, and inspiration).

For each main model, the following procedure was implemented. Mean scores of the included variables over time were used as manifest variables to reduce model complexity. Each manifest variable was regressed on a corresponding latent factor (with loadings constrained at 1) which represents the within-person variance. Autoregressive, cross-lagged, and concurrent paths were estimated between these within-person latent factors. These represent the within-person relations. Afterwards, latent random intercept factors (RI) were estimated for each main variable; the manifest variables of all time points were indicators of these factors, all loadings constrained at 1. Correlations between the RIs were estimated, representing the between-person relations, that is, the associations among people's trait scores. All error variances of the manifest variables were constrained to zero, so that all variance in the variables could be attributed to the within-person latent factors and the between-person RIs. Gender and age were controlled for by modelling predictive paths to the observed variables (Mulder & Hamaker, 2021).[6]

When each main model was constructed, it was checked whether means could be constrained over time. If the model with mean constraints did not have a significantly worse model fit than the model without, we used the more parsimonious model. Afterwards, we checked whether the variances of the RIs were significantly different from 0 which was true for all models. This indicated stable, trait-like differences between persons for that variable meaning that RI-CLPM was an adequate technique for these data.

Finally, the moderating role of social media literacy and thus H1-H5 were tested. An extension of the RI-CLPM, the multiple group RI-CLPM allows to test for moderation effects by comparing the RI-CLPM in which the lagged regression coefficients are constrained to be identical across the groups with a model in which there are no group constraints (Mulder & Hamaker, 2021). The extension thus requires a categorical variable that identifies the different groups. Accordingly, three categorical variables were created around the scales' medians, one for cognitive social media literacy reflecting knowledge on the presence of the positivity bias with 438 adolescents scoring below the median of 5.00 (i.e., low social media literacy) and 557 adolescents scoring > = 5.00

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[6] On request of the editor, additional OLS regression analyses were conducted to explore the relations between the study variables at the interindividual level by controlling for age, gender, SES, family type, communication with parents, communication with peers, peer influence, life satisfaction, self-esteem and the outcome variable measured at the previous waves. Please find a table representing standardized coefficients with an indication of significance for these regressions in the Appendix.

(i.e., high social media literacy). One for cognitive social media literacy reflecting knowledge on the effects of the positivity bias (median = 4.83, 444 adolescents with low social media literacy and 551 adolescents with high social media literacy) and the third one for affective literacy (median = 3.40, 406 adolescents with low social media literacy and 538 adolescents with high social media literacy). A series of $\chi 2$ difference tests were performed comparing the unconstrained with the constrained model. When the test indicated that the constraint could not be imposed, it was explored with difference parameters on which paths the groups significantly differed from each other.

Model fit was evaluated as follows: $\chi^2/df < 3.00$, CFI > = 0.90, RMSEA < = 0.08, 90%CI for RMSEA upper limit < = 0.10, and SRMR < = 0.09. Hypotheses and the analytical strategy were preregistered (https://osf.io/bpqjz) after the data collection took place but before investigating the links between the study variables. All data and analyses can be found on the OSF.

Results

Descriptive statistics

Table 1 shows the zero-order correlations, means, and standard deviations for all variables across the three waves (within-person correlations can be found on the OSF). The ICC for exposure to attractive appearances was 0.51, meaning that 51% of the variance in this variable can be explained by between-person differences. The ICC for exposure to perfect lives was 0.54, 0.48 for inspiration, 0.60 for envy, and 0.60 for social comparison. Thus, a substantial amount of variance in these variables cannot be attributed to between-person differences, supporting the use of within-person analyses such as RI-CLPM.

Testing the main models

Table 2 shows fit indices of the eight main models. All had excellent model fit. For models 1 and 5, constraining the means did not result in a significantly worse model fit so we kept the constraints to have a more parsimonious model.

Between-person level

We found positive significant relations at the between-person level. Correlations between the RIs in all eight models were significant (Table 3), Thus, higher trait-like levels of one measure related to higher trait-like levels of the other measures in the model.

Within-person level

All parameter estimates of the cross-lagged, autoregressive, and concurrent paths at the within-person level can be found in Table 3 for all eight models. First, a positive significant cross-lagged relation occurred between exposure to perfect lives (W1) and inspiration (W2). This pattern did not emerge between W2/W3. Also, a significant positive relation emerged between social comparison (W2) and envy (W3) but not between W1/W2. Additionally, some evidence was found for reciprocal relations, as the cross-lagged relations between (a) social comparison (W1) and exposure to attractive appearances (W2) and (b) inspiration (W1/W2) and exposure to attractive appearances (W2/W3) were significant. Also, the relation between envy (W1) and social comparison (W2) was significant. Finally, for Models_{5-8}, indirect paths from the exposure variables (W1) to envy/inspiration (W3) were calculated to consider the mediation of social comparison (W2) (and vice versa, from inspiration/envy (W1) to the exposure variables (W3)), yet none of these were significant. See OSF for a visual representation of the eight models.

Hypotheses tests: moderation of social media literacy

To test H1-H5, it was explored whether the cross-lagged paths of the eight RI-CLPMs could be constrained to be identical among adolescents with high vs. low (a) knowledge on the presence of the positivity bias, (b) knowledge on the effects of the positivity bias and (c) affective social media literacy. For main Model_2 (i.e., exposure appearance and envy), the $\chi 2$-difference test showed that the fit of the unconstrained model for affective social media literacy $\chi^2(2) = 2.533$, $p = 0.282$, CFI = 1.00, RMSEA = 0.024, 90%CI = [0.00/0.098], SRMR = 0.009, $\chi^2/df = 1.267$ was significantly better than the fit of the constrained model $\chi^2(6) = 16.410$, $p = 0.012$, CFI = 0.993, RMSEA = 0.061, 90%CI = [0.026/0.097], SRMR = 0.021, $\chi^2/df = 2.735$, $\Delta\chi^2(4) = 13.88$, $p = 0.008$. Thus, imposing the constraints was not tenable, which suggests that the within-person cross-lagged relations were different between adolescents with high vs. low levels of affective social media literacy. However, none of the difference parameters in the path-by-path analysis was significant, indicating that the differences between the groups are negligible.

Also for Model_6 (i.e., exposure appearance, social comparison, and envy), the $\chi 2$ difference test showed that the fit of the unconstrained model for affective social media literacy $\chi^2(6) = 5.128$, $p = 0.527$, CFI = 1.00, RMSEA = 0.000, 90%CI = [0.00/0.055], SRMR = 0.007, $\chi^2/df = 0.855$ was significantly better than the fit of the constrained model $\chi^2(18) = 30.718$, $p = 0.031$, CFI = 0.996, RMSEA = 0.039,

Table 1 Descriptive statistics and zero-order correlations

	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Ex—A (W1)	3.80	.95	.55**	.49**	.61**	.41**	.40**	.17**	.14**	.20**	.19**	.24**	.26**	.23**	.23**	.26**	.19**	.18**	-.02	.05	.32**
2. Ex—A (W2)	3.87	.95	-	.54**	.43**	.63**	.41**	.15**	.18**	.15**	.25**	.30**	.23**	.31**	.31**	.28**	.21**	.22**	-.01	.02	.30**
3. Ex—A (W3)	3.96	.92		-	.40**	.41**	.63**	.11*	.17**	.19**	.18**	.28**	.27**	.25**	.31**	.31**	.18**	.20**	.00	.03	.39**
4. Ex – PL (W1)	3.60	.68			-	.52**	.54**	.22**	.15**	.19**	.23**	.27**	.25**	.23**	.21**	.27**	.22**	.19**	.01	-.05	.24**
5. Ex – PL (W2)	3.66	.73				-	.60**	.17**	.19**	.20**	.20**	.29**	.17**	.26**	.28**	.23**	.25**	.25**	.01	.03	.24**
6. Ex – PL (W3)	3.68	.72					-	.14**	.15**	.13**	.20**	.25**	.19**	.19**	.22**	.21**	.20**	.18**	-.05	.07	.33**
7. Envy (W1)	2.84	1.52						-	.62**	.57**	.23**	.15**	.06	.58**	.55**	.41**	.16**	.37**	-.04	-.07	.27**
8. Envy (W2)	2.83	1.56							-	.62**	.17**	.22**	.08	.51**	.60**	.51**	.13**	.31**	-.11**	-.03	.26**
9. Envy (W3)	2.97	1.56								-	.22**	.18**	.15**	.52**	.59**	.65**	.12**	.29**	-.19**	.06	.32**
10. Insp (W1)	3.01	.96									-	.48**	.46**	.25**	.24**	.26**	.14**	.18**	.11**	-.05	.20**
11. Insp (W2)	3.05	.96										-	.49**	.26**	.27**	.24**	.16***	.19**	.09*	-.00	.22**
12. Insp (W3)	3.19	.90											-	.17**	.18**	.25**	.19**	.16**	.03	-.01	.28**
13. SC (W1)	3.50	1.90												-	.63**	.56**	.20**	.35**	-.04	.06	.34**
14. SC (W2)	3.47	1.92													-	.59**	.21**	.34**	-.04	.01	.35**
15. SC (W3)	3.69	1.98														-	.12**	.30**	-.13**	.02	.35**
16. CSML – P (W1)	5.04	.95															-	.52**	.17**	.14**	.20**
17. CSML – E (W1)	4.83	1.09																-	.11**	.09**	.27**
18. ASML (W1)	3.35	.89																	-	-.01	.06
19. age (W1)	14.55	1.65																		-	.02
20. gender (W1)	-	-																			-

** $p < .01$; * $p < .05$. The dichotomous variable gender is coded as follows: boy = 1, girl = 2. W1 = Wave 1, W2 = Wave 2, W3 = Wave 3. Ex—A = exposure to attractive appearances, Ex – PL = exposure to perfect lives, Insp = social media-induced inspiration, SC = social comparison, CSML – P = cognitive social media literacy, knowledge on the presence, CSML – E = cognitive social media literacy, knowledge on the effects, ASML = affective social media literacy

Table 2 Model fit information for the eight main models

Model	χ^2	df	χ^2/df	p	CFI	RMSEA	90%CI RMSEA	SRMR
Model 1. Ex – A (W1-W3) and Insp (W1-W3)	4.162	5	.832	.526	1.00	.000	[.000/.039]	.011
Model 2. Ex – A (W1-W3) and Envy (W1-W3)	.985	1	.985	.321	1.00	.000	[.000/.082]	.006
Model 3. Ex – PL (W1-W3) and Insp (W1-W3)	.505	1	.505	.477	1.00	.000	[.000/.073]	.005
Model 4. Ex – PL (W1-W3) and Envy (W1-W3)	.211	1	.211	.646	1.00	.000	[.000/.064]	.003
Model 5. Ex – A (W1-W3) and SC (W1-W3) and Insp (W1-W3)	12.367	9	1.374	.193	.999	.019	[.000/.043]	.013
Model 6. Ex – A (W1-W3) and SC (W1-W3) and Envy (W1-W3)	2.543	3	.848	.468	1.00	.000	[.000/.049]	.006
Model 7. Ex – PL (W1-W3) and SC (W1-W3) and Insp (W1-W3)	7.710	3	2.570	.052	.998	.039	[.000/.074]	.014
Model 8. Ex – PL (W1-W3) and SC (W1-W3) and Envy (W1-W3)	4.119	3	1.373	.249	1.00	.019	[.000/.059]	.009

Age and gender controlled for. For model 1 and 5 means were constrained. W1 = Wave 1, W2 = Wave 2, W3 = Wave 3. Ex—A = exposure to attractive appearances, Ex – PL = exposure to perfect lives, Insp = social media-induced inspiration, SC = social comparison

90%CI = [0.012/0.062], SRMR = 0.023, χ^2/df = 1.707, $\Delta\chi^2(12)$ = 25.59, p = 0.012. Further exploration of significant difference parameters showed that the within-person relation between social comparison (W2) and envy (W3) was significant and positive for the low affective social media literacy group (β = 0.358, B = 0.298, SE = 0.096, p < 0.01) yet for the high affective social media literacy group this relation was not significant (β = 0.062, B = 0.046, SE = 0.079, p > 0.05), partially supporting H4b. Also, the reciprocal within-person relation between envy (W1) and social comparison (W2) was significant for the low affective social media literacy group (β = 0.417, B = 0.482, SE = 0.130, p < 0.001), whereas for the high affective social media literacy group this relation did not occur (β = -0.079, B = -0.104, SE = 0.141, p > 0.05).

Finally, for Model$_8$ (i.e., exposure life, social comparison, and envy) the χ^2-difference test showed that the fit of the unconstrained model for affective social media literacy $\chi^2(6)$ = 6.912, p = 0.329, CFI = 1.00, RMSEA = 0.018, 90%CI = [0.00/0.064], SRMR = 0.012, χ^2/df = 1.152 was significantly better than the fit of the constrained model $\chi^2(18)$ = 32.652, p = 0.018, CFI = 0.995, RMSEA = 0.042, 90%CI = [0.017/0.064], SRMR = 0.022, χ^2/df = 1.814, $\Delta\chi^2(12)$ = 25.74, p = 0.012. Further exploration of significant difference parameters showed that the reciprocal within-person relation between envy (W1) and social comparison (W2) was significant for the low affective social media literacy group (β = 0.396, B = 0.469, SE = 0.130, p < 0.01), whereas for the high affective social media literacy group this relation did not occur (β = -0.057, B = -0.074, SE = 0.138, p > 0.05).

All other χ^2-difference tests were not significant, leading to a rejection of H1, H2, H3, H4a, H5. Please see Table 4 for an overview.

Discussion

The current study explored the role of social media literacy in diminishing negative and strengthening positive outcomes of exposure to the social media positivity bias. In

doing so, we followed current recommendations to separate within-person from between-person variance (Orben et al., 2019). Specifically, it was explored whether potential within-person associations between exposure to positively biased content, social comparison, envy, and inspiration were different for adolescents with varying levels of social media literacy. Below, we discuss the most important findings, their implications for researchers and practicioners, and the study limitations.

Main models results

The between-person results showed positive links between trait-like levels of exposure to the positivity bias (i.e., attractive appearances and a 'perfect' life), social comparison and both inspiration and envy. Yet, the within-person analyses yield a somewhat different pattern of results: not all relations found at the between-level were replicated here. This aligns with other social media research adopting a within person-perspective (e.g., Orben et al., 2019) and illustrates once again the importance of separating these variances in (future) social media effects research.

At the within level, it was found that an increase in exposure to perfect lives at W1 related to an increase in inspiration four months later but not to an increase in envy. This finding is rather striking as the social media/well-being field has predominantly focused on negative well-being outcomes (cf. Meier & Schäfer, 2018). Inspiration, in contrast, is known to be conducive for well-being (Meier et al., 2020). The finding thus resonates with a positive media psychology perspective and implies for future research to put more focus on the positive side of (social) media use (Raney et al., 2021).

However, the relation between exposure to perfect lives and inspiration only occurred in one of the two time intervals, which merits some caution in interpreting this result. The within-person relation between exposure to attractive appearances and inspiration was also not significant. Neither were any of the within-person relations between exposure

Table 3 Parameter estimates for the eight main models

Model 1. Ex – A (W1-W3) and Insp (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within				
Autoregressive paths	**Ex – A (W1) → Ex – A (W2)**	.195**	.195**	.070
	Ex – A (W2) → Ex – A (W3)	.116	.105	.074
	Insp (W1) → Insp (W2)	.120	.120	.078
	Insp (W2) → Insp (W3)	.095	.082	.077
Within				
Cross-lagged paths	Ex – A (W1) → Insp (W2)	.075	.079	.068
	Ex – A (W2) → Insp (W3)	.004	.003	.068
	Insp (W1) → Ex – A (W2)	.136*	.130*	.060
	Insp (W2) → Ex – A (W3)	.168*	.145*	.064
Within				
W1 correlation	Ex – A (W1) with Insp (W1)	-.015	-.008	.034
Within				
R-square	Ex – A (W2)	.056	/	/
	Ex – A (W3)	.048	/	/
	Insp (W2)	.020	/	/
	Insp (W3)	.009	/	/
Between	**RI – Ex A with RI – Insp**	.375***	.125***	.030

Model 3. Ex – PL (W1-W3) and Insp (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within				
Autoregressive paths	Ex – PL (W1) → Ex – PL (W2)	.055	.064	.101
	Ex – PL (W2) → Ex – PL (W3)	.209**	.193**	.068
	Insp (W1) → Insp (W2)	.120	.121	.079
	Insp (W2) → Insp (W3)	.130	.112	.078
Within				
Cross-lagged paths	**Ex – PL (W1) → Insp (W2)**	.181*	.294*	.117
	Ex – PL (W2) → Insp (W3)	-.067	-.082	.087
	Insp (W1) → Ex – PL (W2)	.050	.036	.048
	Insp (W2) → Ex – PL (W3)	.114	.076	.047
Within				
W1 correlation	Ex – PL (W1) with Insp (W1)	.091	.031	.025
Within				
R-square	Ex – PL (W2)	.006	/	/
	Ex – PL (W3)	.067	/	/
	Insp (W2)	.051	/	/
	Insp (W3)	.018	/	/
Between	**RI – Ex PL with RI – Insp**	.330***	.091***	.023

Model 2. Ex – A (W1-W3) and Envy (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within				
Autoregressive paths	**Ex – A (W1) → Ex – A (W2)**	.185**	.184*	.072
	Ex – A (W2) → Ex – A (W3)	.135	.122	.075
	Envy (W1) → Envy (W2)	.147	.155	.092
	Envy (W2) → Envy (W3)	.126	.118	.085
Within				
Cross-lagged paths	Ex – A (W1) → Envy (W2)	.009	.013	.099
	Ex – A (W2) → Envy (W3)	-.044	-.062	.108
	Envy (W1) → Ex – A (W2)	.002	.001	.050
	Envy (W2) → Ex – A (W3)	-.002	-.001	.048
Within				
W1 correlation	Ex – A (W1) with Envy (W1)	.036	.025	.049
Within				
R-square	Ex – A (W2)	.034	/	/
	Ex – A (W3)	.018	/	/
	Envy (W2)	.022	/	/
	Envy (W3)	.017	/	/
Between	**RI – Ex A with RI – Envy**	.153*	.094*	.047

Model 4. Ex – PL (W1-W3) and Envy (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within				
Autoregressive paths	Ex – PL (W1) → Ex – PL (W2)	.025	.029	.109
	Ex – PL (W2) → Ex – PL (W3)	.223**	.206**	.068
	Envy (W1) → Envy (W2)	.155	.164	.089
	Envy (W2) → Envy (W3)	.123	.115	.084
Within				
Cross-lagged paths	Ex – PL (W1) → Envy (W2)	.038	.089	.175
	Ex – PL (W2) → Envy (W3)	.072	.135	.138
	Envy (W1) → Ex – PL (W2)	.062	.033	.041
	Envy (W2) → Ex – PL (W3)	-.063	-.029	.035
Within				
W1 correlation	Ex – PL (W1) with Envy (W1)	.112	.051	.035
Within				
R-square	Ex – PL (W2)	.005	/	/
	Ex – PL (W3)	.050	/	/
	Envy (W2)	.027	/	/
	Envy (W3)	.023	/	/
Between	**RI – Ex PL with RI – Envy**	.162*	.084*	.035

Table 3 (continued)

Model 5. Ex – A (W1-W3) and SC (W1-W3) and Insp (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within Autoregressive paths	Ex – A (W1) → Ex – A (W2)	.198**	.197**	.070
	Ex – A (W2) → Ex – A (W3)	.116	.105	.086
	SC (W1) → SC (W2)	.163	.166	.086
	SC (W2) → SC (W3)	.058	.059	.106
	Insp (W1) → Insp (W2)	.083	.083	.100
	Insp (W2) → Insp (W3)	.088	.076	.096
Within Cross-lagged paths	Ex – A (W1) → Insp (W2)	.075	.078	.069
	Ex – A (W2) → Insp (W3)	.033	.030	.071
	Ex – A (W1) → SC (W2)	-.006	-.011	.124
	Ex – A (W2) → SC (W3)	.068	.129	.149
	SC (W1) → Insp (W2)	.116	.066	.047
	SC (W2) → Insp (W3)	-.138	-.068	.045
	Insp (W1) → Ex – A (W2)	.121	.117	.063
	Insp (W2) → Ex – A (W3)	.169*	.148*	.075
	Insp (W1) → SC (W2)	.058	.102	.141
	Insp (W2) → SC (W3)	.031	.056	.145
	SC (W1) → Ex – A (W2)	.135*	.075*	.036
	SC (W2) → Ex – A (W3)	-.001	.000	.038
Within W1 correlations	Ex – A (W1) with Insp (W1)	-.021	-.011	.033
	Ex – A (W1) with SC (W1)	-.005	-.004	.058
	Insp (W1) with SC (W1)	.110	.102	.072
Within R-square	Ex – A (W2)	.074	/	/
	Ex – A (W3)	.049	/	/
	Insp (W2)	.028	/	/
	Insp (W3)	.024	/	/
	SC (W2)	.032	/	/
	SC (W3)	.011	/	/
Between	RI – Ex A with RI – Insp	.371***	.126***	.031
	RI – Ex A with RI – SC	.339***	.242***	.061
	RI – Insp with RI – SC	.330***	.249***	.067

Model 7. Ex – PL (W1-W3) and SC (W1-W3) and Insp (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within Autoregressive paths	Ex – PL (W1) → Ex – PL (W2)	.032	.038	.127
	Ex – PL (W2) → Ex – PL (W3)	.214*	.200*	.085
	SC (W1) → SC (W2)	.162*	.164	.085
	SC (W2) → SC (W3)	.047	.048	.109

Model 6. Ex – A (W1-W3) and SC (W1-W3) and Envy (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within Autoregressive paths	Ex – A (W1) → Ex – A (W2)	.191**	.190*	.074
	Ex – A (W2) → Ex – A (W3)	.127	.115	.088
	SC (W1) → SC (W2)	.100	.103	.089
	SC (W2) → SC (W3)	.030	.031	.099
	Envy (W1) → Envy (W2)	.147	.153	.103
	Envy (W2) → Envy (W3)	.055	.051	.095
Within Cross-lagged paths	Ex – A (W1) → Envy (W2)	.008	.012	.101
	Ex – A (W2) → Envy (W3)	-.090	-.126	.105
	Ex – A (W1) → SC (W2)	-.022	-.040	.124
	Ex – A (W2) → SC (W3)	.068	.130	.143
	SC (W1) → Envy (W2)	.037	.031	.067
	SC (W2) → Envy (W3)	.186*	.143*	.063
	Envy (W1) → Ex – A (W2)	-.029	-.020	.049
	Envy (W2) → Ex – A (W3)	-.012	-.007	.049
	Envy (W1) → SC (W2)	.140	.117	.093
	Envy (W2) → SC (W3)	.083	.106	.111
	SC (W1) → Ex – A (W2)	.143*	.081*	.036
	SC (W2) → Ex – A (W3)	.015	.008	.038
Within W1 correlations	Ex – A (W1) with Envy (W1)	.047	.034	.051
	Ex – A (W1) with SC (W1)	-.027	-.024	.056
	Envy (W1) with SC (W1)	.255**	.320**	.113
Within R-square	Ex – A (W2)	.054	/	/
	Ex – A (W3)	.017	/	/
	Envy (W2)	.026	/	/
	Envy (W3)	.046	/	/
	SC (W2)	.037	/	/
	SC (W3)	.015	/	/
Between	RI – Ex A with RI – SC	.351***	.256***	.059
	RI – Ex A with RI – Envy	.164	.101*	.050
	RI – SC with RI – Envy	.829***	1.135***	.115

Model 8. Ex – PL (W1-W3) and SC (W1-W3) and Envy (W1-W3)

		Standardized Coeff	Unstandardized Coeff	SE
Within Autoregressive paths	Ex – PL (W1) → Ex – PL (W2)	.004	.004	.140
	Ex – PL (W2) → Ex – PL (W3)	.223*	.209*	.087
	SC (W1) → SC (W2)	.101	.103	.087
	SC (W2) → SC (W3)	.019	.020	.102

Table 3 (continued)

	Standardized Coeff	Unstandardized Coeff	SE		Standardized Coeff	Unstandardized Coeff	SE
Within				*Within*			
Cross-lagged paths				*Cross-lagged paths*			
Insp (W1) → Insp (W2)	.089	.089	.098	Envy (W1) → Envy (W2)	.145	.151	.099
Insp (W2) → Insp (W3)	.123	.106	.097	Envy (W2) → Envy (W3)	.050	.047	.094
Ex – PL (W1) → Insp (W2)	.170*	.276*	.125	Ex – PL (W1) → Envy (W2)	.040	.094	.184
Ex – PL (W2) → Insp (W3)	-.059	-.071	.104	Ex – PL (W2) → Envy (W3)	.052	.098	.134
Ex – PL (W1) → SC (W2)	-.050	-.142	.230	Ex – PL (W1) → SC (W2)	-.066	-.187	.237
Ex – PL (W2) → SC (W3)	-.008	-.020	.217	Ex – PL (W2) → SC (W3)	-.017	-.043	.212
SC (W1) → Insp (W2)	.113	.066	.047	SC (W1) → Envy (W2)	.059	.050	.064
SC (W2) → Insp (W3)	-.128	-.064	.045	**SC (W2) → Envy (W3)**	.186*	.144*	.063
Insp (W1) → Ex – PL (W2)	.026	.019	.056	Envy (W1) → Ex – PL (W2)	.058	.030	.040
Insp (W2) → Ex – PL (W3)	.119	.080	.053	Envy (W2) → Ex – PL (W3)	-.032	-.015	.040
Insp (W1) → SC (W2)	.056	.098	.139	**Envy (W1) → SC (W2)**	.161*	.203*	.092
Insp (W2) → SC (W3)	.049	.087	.149	Envy (W2) → SC (W3)	.107	.134	.115
SC (W1) → Ex—PL (W2)	.097	.041	.032	SC (W1) → Ex—PL (W2)	.072	.030	.033
SC (W2) → Ex—PL (W3)	-.085	-.033	.029	SC (W2) → Ex—PL (W3)	-.071	-.027	.030
Within				*Within*			
W1 correlations				*W1 correlations*			
Ex – PL (W1) with Insp (W1)	.066	.022	.026	Ex – PL (W1) with Envy (W1)	.118	054	.038
Ex – PL (W1) with SC (W1)	.030	.017	.047	Ex – PL (W1) with SC (W1)	.018	.010	.047
Insp (W1) with SC (W1)	.107	.100	.071	**Envy (W1) with SC (W1)**	.275***	.348**	.109
Within				*Within*			
R-square				*R-square*			
Ex – PL (W2)	.012	/	/	Ex – PL (W2)	.011	/	/
Ex – PL (W3)	.070	/	/	Ex – PL (W3)	.051	/	/
Insp (W2)	.055	/	/	Envy (W2)	.032	/	/
Insp (W3)	.029	/	/	Envy (W3)	.049	/	/
SC (W2)	.033	/	/	SC (W2)	.047	/	/
SC (W3)	.005	/	/	SC (W3)	.013	/	/
Between				*Between*			
RI – Ex PL with RI – SC	.318***	.196***	.047	**RI Ex – PL with RI Envy**	.164*	.086*	.036
RI – Ex PL with RI – Insp	.343***	.098***	.023	**RI Ex – PL with RI SC**	.323***	.203***	.047
RI – SC with RI – Insp	.329***	.245***	.067	**RI Envy with RI SC**	.812***	1.106***	.112

*** < .001; ** p < .01; * p < .05. For clarity, relations with control variables and correlations between error terms are not reported and significant relations are displayed in bold. For model 1 and 5, means were constrained. W1 = Wave 1, W2 = Wave 2, W3 = Wave 3. Ex—A = exposure to attractive appearances, Ex – PL = exposure to perfect lives, Insp = social media-induced inspiration, SC = social comparison

For meta-analyses on the within-person level with these data, please use the standardized coefficient estimates of the within-person cross-lagged paths for each of the models

Table 4 Overview of the unsupported and supported hypotheses

Hypothesis	Supported/ Unsupported
H1a: Adolescents with high levels of <u>cognitive</u> social media literacy experience a less strong within-person association between <u>exposure</u> to positive social media content and social media-induced <u>envy</u> than adolescents with lower levels of cognitive social media literacy	Unsupported
H1b: Adolescents with high levels of <u>affective</u> social media literacy experience a less strong within-person association between <u>exposure</u> to positive social media content and social media-induced <u>envy</u> than adolescents with lower levels of affective social media literacy	Unsupported
H2a: Adolescents with high levels of <u>cognitive</u> social media literacy experience a stronger within-person association between <u>exposure</u> to positive social media content and social media-induced <u>inspiration</u> than adolescents with lower levels of cognitive social media literacy	Unsupported
H2b: Adolescents with high levels of <u>affective</u> social media literacy experience a stronger within-person association between <u>exposure</u> to positive social media content and social media-induced <u>inspiration</u> than adolescents with lower levels of affective social media literacy	Unsupported
H3a: Adolescents with high levels of <u>cognitive</u> social media literacy experience a less strong within-person association between <u>exposure</u> to positive social media content and engaging in <u>social comparisons</u> than adolescents with lower levels of cognitive social media literacy	Unsupported
H3b: Adolescents with high levels of <u>affective</u> social media literacy experience a less strong within-person association between <u>exposure</u> to positive social media content and engaging in <u>social comparisons</u> than adolescents with lower levels of affective social media literacy	Unsupported
H4a: Adolescents with high levels of <u>cognitive</u> social media literacy experience a less strong within-person association between engaging in <u>social comparisons</u> and social media-induced <u>envy</u> than adolescents with lower levels of cognitive social media literacy	Unsupported
H4b: Adolescents with high levels of <u>affective</u> social media literacy experience a less strong within-person association between engaging in <u>social comparisons</u> and social media-induced <u>envy</u> than adolescents with lower levels of affective social media literacy	Partially supported
H5a: Adolescents with high levels of <u>cognitive</u> social media literacy experience a stronger within-person association between engaging in <u>social comparisons</u> and social media-induced <u>inspiration</u> than adolescents with lower levels of cognitive social media literacy	Unsupported
H5b: Adolescents with high levels of <u>affective</u> social media literacy experience a stronger within-person association between engaging in <u>social comparisons</u> and social media-induced <u>inspiration</u> than adolescents with lower levels of affective social media literacy	Unsupported

and envy. This could be explained by a kind of desensitization process due to the continuous exposure to positively biased content. Desensitization, also called emotional habituation, refers to the idea that repeated exposure to a certain stimulus reduces affective responsiveness to it (Rule & Ferguson, 1986). Accordingly, it could be that adolescents become gradually accustomed to positively biased content when they are repeatedly exposed to it.

While our longitudinal study did not capture a within-person relation between exposure frequency and envy, a more indirect process did seem to occur: social comparison was related to envy at the within-person level. If adolescents compared more to others on social media than they typically do, this was related to increases in envy four months later, yet also only in one of the two time intervals. While mere exposure to social media content did not seem to result in envy, responding to such content with social comparison did, at least in one time interval. As adolescents are almost constantly exposed to such content (Yau & Reich, 2019), it may

be that it is not exposure frequency but how they respond psychologically to this content that determines how envious they feel. As such, it is potentially not social media use in itself but rather internal predispositions such as a tendency to make social comparisons when using social media that may cause effects (Meier & Johnson, 2022).

No within-person link between social comparison and inspiration was found. It should be noted that the current paper employed a non-directional measure of social comparison as the current existing measures for upward comparison all imply a negative outcome (e.g., "When I was on Facebook, I felt less confident about what I have achieved compared to other people"; Steers et al., 2014). Assimilative processes, which are theoretically expected to precede inspiration, are thus not covered by our social comparison measure. It could be that our non-directional measure relates more to a contrastive process, which may be why only a link between social comparison and envy was found. This result implies for future research to

construct reliable and valid measures for upward social comparison that allow for more nuance in investigating the different types of social comparison processes (see also Meier & Johnson, 2022).

Finally, some interesting reciprocal relations were found. Increases in social comparison and inspiration beyond adolescents' typical levels related to increases in exposure to attractive appearances on social media four months later. These reciprocal paths even seemed more consistent than the paths representing media-effect processes (i.e., inspiration predicted exposure to attractive appearances at both time intervals). These findings seem to substantiate the selectivity paradigm, and specifically Knobloch-Westerwick's SESAM model (2015) which postulates that "media users select messages to manage and regulate their self-concept along with affective and cognitive states and behaviors" (p. 965) and considers social comparison a key process in this regard. So, the adolescents in our study seemed to specifically select social media content in which other users are attractively displayed in response to their psychological states of social comparison/inspiration. However, social media users seem to have little agency in controlling the content that appears on their feeds as this depends on a complex interaction between the workings of opaque algorithms and befriending/following choices. Accordingly, selective exposure in social media likely manifests itself at the level of attention attributed to posts while scrolling (Schreurs & Vandenbosch, 2021b), which could be assessed in future research by applying eye-tracking software.

Together, the inconsistent significance of the within-person results which model media-effect and selection processes seems to paint a more complex picture than what the dominant media effect paradigms of transactionality and selectivity typically assume (Valkenburg et al., 2016). To further contextualize the found (null) results concerning adolescents' social media use, social comparison, and envy vs. inspiration, it is important to consider *who* uses social media and how they are used (Kross et al., 2021). In this regard, the current paper suggested to look at adolescents' social media literacy.

Moderating role of social media literacy

To test H1-H5, the moderating role of social media literacy was explored in the within-person associations between exposure to the positivity bias, social comparison, and envy vs. inspiration. Interestingly, support was found for H4b as the within-person relation between social comparison and envy only occurred for adolescents with low affective social media literacy. Where a contributory moderating role was

hypothesized (i.e., social media literacy was expected to lower the strength of the relation), support for a contingent moderator was found as the relation was not significant for adolescents with high affective social media literacy. No moderating role was found for cognitive social media literacy, so H4a was rejected.

This aligns with current insights from disclaimer research in that knowledge on the unrealistic nature of the social media images (provided through the disclaimer) is not sufficient to ward off negative outcomes of idealized social media content (Naderer et al., 2021). Additionally, health communication research has come to a similar conclusion. Interventions that merely focus on cognitions are often ineffective in changing health risk behavior and should thus instead target adolescents' affective attitudes (e.g., Boers et al., 2018). As affective social media literacy seems more effective in preventing negative social comparison outcomes, social media literacy programs in schools' curricula, but also parents and educators in general should focus more on 'teaching' adolescents these skills.

However, neither for cognitive nor for affective social media literacy was a moderating role found in all other tested relations, so H1a/b, H2a/b, H3a/b and H5a/b were rejected. Other moderating factors besides social media literacy may be more important to consider in the future. For instance, adolescents' general adaptive emotion regulation capabilities strengthen their psychological heath in a variety of life domains (Cracco et al., 2017). Additionally, the current study used a sample of Western and educated adolescents which displayed overall high social media literacy levels. It might be interesting for future research to examine the moderating role of social media literacy in more socially diverse samples with more heterogeneous social media literacy levels. Adolescents who are economically and/or educationally disadvantaged are less likely to have access to resources teaching them how to use social media and/or to articulate thoughts and understandings about social media dynamics (e.g., Zilka, 2019). Future research should thus strive for more population heterogeneity and consider less privileged adolescents when investigating social media literacy.

In samples where social media literacy levels are overall high, adolescents' affective responses to social media content and related psychological processes do not seem to depend on *possessing* this social media literacy. In this regard, research finds that a higher level of advertising social media literacy is not necessarily protective of advertising effects, as young people might not *activate* and apply their advertising literacy when needed (Hoek et al., 2020). The moderating role of social media literacy may thus be largely unsupported in this study because 'passive' awareness of the positivity bias was assessed instead of 'active' social media

literacy application. For future research, this implies that the activation of social media literacy should be considered, simultaneously with potential personal and situational factors which may hinder or facilitate this activation (e.g., Hoek et al., 2020). Such insights will be valuable to create more personalized social media literacy programs that focus on the activation of social media literacy under specific conditions. Such programs may empower all adolescents in their social media use and thus correspond to scholars' call to let go of the one size fits all approach in media literacy interventions (Hoek et al., 2020).

Implications for practitioners

The current study also carries practical implications. In particular, the findings underline the need to instruct affective social media literacy among adolescents as such skills may guide them towards a healthy use of positively biased social media platforms. Accordingly, social media literacy education programs and intervention packages should combine the dominant knowledge-transmission approach with a focus on adolescents' emotions in their social media interactions and help them manage these in an adaptive way.

Moreover, the unsupported empowering role of cognitive social media literacy seems to substantiate the existence of a third-level digital divide in one important domain of social media effects, i.e., the positivity bias in social media content (Livingstone et al., 2021). The adolescents in our sample seem to have the knowledge that is theoretically expected to bring about beneficial outcomes of their social media use (i.e., high levels of cognitive social media literacy). Yet, they do not seem able to deploy this knowledge and thus actually have such positive outcomes. Therefore, adolescents should not be considered as digital natives that spontaneously develop and use the social media literacy skills needed. Instead, resource-intensive interventions are needed for this developmental group which focus on the instruction of activating and deploying the gained knowledge in everyday social media interactions (Livingstone et al., 2021).

Limitations

While the study design, preregistration, and analysis plan represent key strengths of this research, several limitations need to highlighted. First, we relied on adolescents' self-reports of their social media literacy. This is a typical approach in (social) media literacy research, yet it may result in post-hoc realizations about the nature of the media content in question (Hoek et al., 2020). The survey questions might have triggered a more conscious and elaborative

evaluation of positively biased content compared to what happens during 'real life' processing of such content. Indirect measures that unobtrusively assess one's social media literacy (and social media literacy activation) are needed, yet, to our knowledge only exist for advertising literacy at present (Hoek et al., 2020). Such instruments will also prove relevant from a practical point of view; the effectiveness of (social) media literacy interventions and trainings can be better determined by assessing social media literacy activation improvements and adolescents' social media literacy competencies in an indirect way.

Additionally, between W2 and W3, the COVID-19 pandemic hit Belgium. Because of this, adolescents completed the W3 questionnaire online at home. Unfortunately, this resulted in a relatively high drop-out in respondents. Moreover, these social circumstances may have impacted adolescents' responses to the questionnaire, as social media took up a unique position in coping with social isolation during the pandemic. This might explain why several within-person results were not consistent across the waves. The findings of the current study should thus be interpreted against the backdrop of these specific circumstances.

Despite these limitations, the present study advances our understanding of how adolescents process the positively biased content on social media by going beyond the dominant, yet limited, between-person perspective in social media research. Most importantly, our findings underline the need to instruct affective social media literacy among adolescents as such skills may guide them towards a healthy use of positively biased social media platforms. The insights provided by our study results may further inspire research questions on the role of social media literacy in other important social media domains, such as privacy concerns and cyberbullying.

Appendix

Measure of exposure to positive social media content

The following questions concern posts of other people that you encounter when you are using a mostly public social media application. Think about the application you use most often. Indicate how often you **see** such posts.

Posts on which the one who posted it …

– … looks beautiful*
– … shows that he/she has a lot of fun
– … shows that he/she has many friends

- … looks successful (e.g., that he/she achieved something at school or in a hobby)
- … shows how great a friendship is (e.g., that it is clear they have much fun together)
- … does nice things (e.g., go to the movie theaters or to the zoo, have something to drink/eat with a friend)
- … shows a nice clothing style*
- … shows that he/she is happy
- … shows a nice holiday he/she has done

A 5-point Likert scale was used (1 = never, 5 = very often). Items indicated with an asterisk form the 'exposure to attractive appearances' factor of the scale, the other items form the 'exposure to a perfect life in general' factor.

Measure of cognitive social media literacy

Please indicate to what extent you agree with the following statements about posts on mostly public social media applications. While filling in your answer, please think about the application you use most often.

- I think that some people only post a picture/video on social media displaying their friends when they look good on this picture/video or when they seem to have much fun
- It strikes me that many social media posts only show the most beautiful and cool moments
- I think that many social media posts that look perfect are edited
- I think that some people think a lot about the type of picture/video they can post on social media before they go somewhere
- For pictures that seem perfect, others' opinion has often been asked before the picture got posted
- When I see a picture on social media in which people seem to have fun, I wonder whether they had the time to take that picture if it was truly fun over there
- I think you can feel bad when you see on social media how happy other people are
- I believe you can feel unhappy by comparing yourself with the things you see on social media
- By posting pictures/videos which are not spontaneous, you can feel bad about yourself
- I think many boys and girls doubt their own appearance when they look at social media posts
- You can feel unhappy when you do not show your real self on social media
- I think some boys and girls are jealous on the people who seem to have a perfect life on social media

A 7-point Likert scale was used (1 = strongly disagree, 7 = strongly agree). The first six items form the 'knowledge on the presence of the positivity bias' factor of the scale, the other items form the 'knowledge on the potential effects of the positivity bias' factor.

Measure of affective social media literacy

What do you think or do when you feel bad when seeing perfect posts of other people on mostly public social media applications. There is no right or wrong answer. Please pick the answer that describes best how you would respond.

- When I feel (a little bit) bad about posts of other people on social media, I can easily take my mind off it and think about something else than those specific posts
- When I feel (a little bit) bad about posts of other people on social media, I say to myself that social media, and certainly those specific posts, are not important

What do you think or do when you feel bad because of a post you posted yourself on mostly public social media applications. There is no right or wrong answer. Please pick the answer that describes best how you would respond.

- When I feel (a little bit) bad about a post of myself on social media, I can easily take my mind off it and think about something else than that specific post
- When I feel (a little bit) bad about a post of myself on social media, I say to myself that my social media post is not so important
- When I feel (a little bit) bad about a post of myself on social media, I do something that I like so I am not thinking about that post on my social media profile for a moment

A 5-point Likert scale was used (1 = never, 5 = very often). Note that the respondents had to indicate before answering these questions whether they ever felt bad due to the positivity bias (1 = never, 5 = a lot). In case the respondent indicated to have never felt bad due to the positivity bias, the same items were questioned yet framed in a hypothetical way (e.g., "If I would feel (a little bit) bad about posts of other people on social media, I would say to myself that social media, and certainly those specific posts, are not important"). The answers of these respondents were then merged with the answers of the adolescents who got the other items.

OLS Regressions

Table. OLS Regressions

Outcomes										
	Envy (W2)	Insp (W2)	SC (W2)	Ex - A (W2)	Ex - PL (W2)	Envy (W3)	Insp (W3)	SC (W3)	Ex - A (W3)	Ex - PL (W3)
Predictors										
Age	-.004	.011	-.009	-.045	.039	.074*	-.060	-.001	.014	.063
Gender	.085*	.068	.131***	.103**	.085*	.156***	.246***	.189***	.256***	.231***
SES	-.015	.053	-.019	.000	.013	.020	-.094*	-.030	.020.	-.020
BMI (W1)	-.007	.014	-.040	.070*	.019	-.008	.042	.031	-.022	-.032
Family type: dummy separated parents	.023	-.006	-.025	-.015	.004	-.055	-.018	-.001	.074	.084*
Family type: dummy deceved parents	-.024	-.030	-.003	.000	-.050	.022	.043	.005	-.054	.004
Communication parents (W1)	-.071*	.071	.004	-.017	.063	/	/	/	/	/
Communication parents (W2)	/	/	/	/	/	-.076*	-.047	-.040	.006	-.023
Communication peers (W1)	.005	.003	.054	.010	-.010	/	/	/	/	/
Communication peers (W2)	/	/	/	/	/	-.020	-.016	.019	-.002	-.027
Peer influence (W1)	.054	-.059	.032	-.016	-.034	/	/	/	/	/
Peer influence (W2)	/	/	/	/	/	.103**	.029	.125**	.024	-.011
Self-esteem (W1)	.062	.018	-.028	.014	-.027	/	/	/	/	/
Self-esteem (W2)	/	/	/	/	/	.033	.049	-.006	-.046	-.015
Life satisfaction (W1)	-.081*	.072	.001	-.030	-.052	/	/	/	/	/
Life satisfaction (W2)	/	/	/	/	/	-.096*	.085	.040	.115*	.081
Envy (W1)	.450***	/	.229***	-.105*	-.033	/	/	/	/	/
Envy (W2)	/	/	/	/	/	.325***	/	.174***	.013	-.010
Insp (W1)	/	.391***	.037	.130***	.053	/	/	/	/	/
Insp (W2)	/	/	/	/	/	/	.466***	.060	.075	.074
Ex – A (W1)	.015	.043	.069	.466***	/	/	/	/	/	/
Ex – A (W2)	/	/	/	/	/	.116**	.067	.020	.413***	/
Ex - PL (W1)	.020	.107*	-.028	/	.479***	/	/	/	/	/
Ex - PL (W2)	/	/	/	/	/	.081	.033	.012	/	.536***
SC (W1)	.167***	.122**	.406***	.174***	.084	/	/	/	/	/
SC (W2)	/	/	/	/	/	.309***	-.053	.363***	.032	-.002

Note. * p < 0.05, ** p < 0.01, *** p < 0.001 Reference category family type dummies is parents who live together. The dummy variable separated parents is coded as separated parents = 1, all other family types = 0. The dummy variable deceived parents is coded as deceived parents = 1, all other family types = 0. The dichotomous variable gender is coded as follows: boy = 1, girl = 2. W1 = Wave 1, W2 = Wave 2, W3 = Wave 3. Ex—A = exposure to attractive appearances, Ex – PL = exposure to perfect lives, Insp = social media-induced inspiration, SC = social comparison

Declarations

References

Aufderheide, P. (1993). *Media literacy: A report of the national leadership conference on media literacy.* Aspen Institute.

Bell, B. T. (2019). '"You take fifty photos, delete forty nine and use one"': A qualitative study of adolescent image-sharing practices on social media. *International Journal of Child-Computer Interaction, 20*, 64–71. https://doi.org/10.1016/j.ijcci.2019.03.002

Beyens, I., Pouwels, J. L., van Driel, I. I., Keijsers, L., & Valkenburg, P. M. (2020). The effect of social media on well-being differs from adolescent to adolescent. *Scientific Reports, 10*, 10763. https://doi.org/10.1038/s41598-020-67727-7

Boers, E., Zebregs, S., Hendriks, H., & Van Den Putte, B. (2018). Is it more feeling or thinking? The influence of affective and cognitive attitude on adolescents' intention to engage in binge drinking. *Journal of Health Communication, 23*(5), 430–434. https://doi.org/10.1080/10810730.2018.1461960

Burke, M., Cheng, J., & de Gant, B. (2020). Social comparison and Facebook: Feedback, positivity, and opportunities for comparison. In R. Bernhaupt, F. Mueller, D. Verweij, J. Andres, J. McGrenere, A. Cockburn, I. Avellino, A. Goguey, P. Bjørn, S. Zhao, B. P. Samson, & R. Kocielnik (Eds.), *Proceedings of the 2020 CHI conference on human factors in computing systems* (Article 355). ACM. https://doi.org/10.1145/3313831.3376482

Burnette, C. B., Kwitowski, M. A., & Mazzeo, S. E. (2017). "I don't need people to tell me I'm pretty on social media:" A qualitative study of social media and body image in early adolescent girls. *Body Image, 23*, 114–125. https://doi.org/10.1016/j.bodyim.2017.09.001

Buunk, B. P., Collins, R. L., Taylor, S. E., VanYperen, N. W., & Dakof, G. A. (1990). The affective consequences of social comparison: Either direction has its ups and downs. *Journal of Personality and Social Psychology, 59*, 1238–1249.

Chae, J. (2018). Explaining females' envy toward social media influencers. *Media Psychology, 21*(2), 246–262. https://doi.org/10.1080/15213269.2017.1328312

Cracco, E., Goossens, L., & Braet, C. (2017). Emotion regulation across childhood and adolescence: Evidence for a maladaptive shift in adolescence. *European Child & Adolescent Psychiatry, 26*, 909–921. https://doi.org/10.1007/s00787-017-0952-8

Dienlin, T., Johannes, N., Bowman, N. D., Masur, P. K., Engesser, S., Kümpel, A. S., Lukito, J., Bier, L. M., Zhang, R., Johnson, B. K., Huskey, R., Schneider, F. M., Breuer, J., Parry, D. A., Vermeulen, I., Fisher, J. T., Banks, J., Weber, R., Ellis, D. A., … de Vreese, C. (2021). An agenda for open science in communication. *Journal of Communication, 71*(1), 1–26. https://doi.org/10.1093/JOC/JQZ052

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140. https://doi.org/10.1177/001872675400700202

Gibbons, F. X., & Buunk, B. P. (1999). Individual differences in social comparison: Development of a scale of social comparison orientation. *Journal of Personality and Social Psychology, 76*(1), 129–142. https://doi.org/10.1037/0022-3514.76.1.129

Goffman, E. (1959). *The presentation of self in everyday life.* Anchor.

Goodman, E., Adler, N. E., Kawachi, I., Frazier, A. L., Huang, B., & Colditz, G. A. (2001). Adolescents' perceptions of social status: Development and evaluation of a new indicator. *Pediatrics, 108*(2), 1–8. https://doi.org/10.1542/peds.108.2.e31

Hendrickse, J., Arpan, L. M., Clayton, B. R., & Ridgway, J. L. (2017). Instagram and college women's body image: Investigating the roles of appearance-related comparisons and intrasexual competition. *Computers in Human Behavior, 74*, 92–100. https://doi.org/10.1016/j.chb.2017.04.027

Hoek, R. W., Rozendaal, E., van Schie, H. T., & Buijzen, M. (2020). Inhibitory control moderates the relation between advertising literacy activation and advertising susceptibility. *Media Psychology, 1–31.* https://doi.org/10.1080/15213269.2020.1856685

Knobloch-Westerwick, S. (2015). The selective exposure self- and affect-management (SESAM) model: Applications in the realms of race, politics, and health. *Communication Research, 42*(7), 959–985. https://doi.org/10.1177/0093650214539173

Krasnova, H., Widjaja, T., Buxmann, P., Wenninger, H., & Benbasat, I. (2015). Why following friends can hurt you: An exploratory investigation of the effects of envy on social networking sites among college-age users. *Information Systems Research, 26*(3), 585–605. https://doi.org/10.1287/isre.2015.0588

Kross, E., Verduyn, P., Scheppes, G., Costello, C. K., Jonides, J., & Ybarra, O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Science, 25*(1), 55–66. https://doi.org/10.1016/j.tics.2020.10.005

Lee, S. Y. (2014). How do people compare themselves with others on social network sites?: The case of Facebook. *Computers in Human Behavior, 32*, 253–260. https://doi.org/10.1016/j.chb.2013.12.009

Livingstone, S., Mascheroni, G., & Stoilova, M. (2021). The outcomes of gaining digital skills for young people's lives and wellbeing: A systematic evidence review. *New Media & Society, 1–27.* https://doi.org/10.1177/14614448211043189

Mahon, C., & Hevey, D. (2021). Processing body image on social media: Gender differences in adolescent boys' and girls' agency and active coping. *Frontiers in Psychology, 12*, 1–11. https://doi.org/10.3389/fpsyg.2021.626763

Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and tools for digital literacy development. *Innovation in Teaching and Learning in Information and Computer Sciences, 5*(4), 249–267. https://doi.org/10.11120/ital.2006.05040249

Meier, A., & Johnson, B. K. (2022). Social comparison and envy on social media: A critical review. *Current Opinion in Psychology, 45*, 101302. https://doi.org/10.1016/j.copsyc.2022.101302

Meier, A., & Schäfer, S. (2018). The positive side of social comparison on social network sites: How envy can drive inspiration on Instagram. *Cyberpsychology, Behavior, and Social Networking, 21*(7), 411–418. https://doi.org/10.1089/cyber.2017.0708

Meier, A., Gilbert, A., Börner, S., & Possler, D. (2020). Instagram inspiration: How upward comparison on social network sites can contribute to well-being. *Journal of Communication, 1–23.* https://doi.org/10.1093/joc/jqaa025

Mulder, J. D., & Hamaker, E. L. (2021). Three extensions of the random intercept cross-lagged panel model. *Structural Equation Modeling: A Multidisciplinary Journal, 28*(4), 638–648. https://doi.org/10.1080/10705511.2020.1784738

Naderer, B., Peter, C., & Karsay, K. (2021). This picture does not portray reality: Developing and testing a disclaimer for digitally enhanced pictures on social media appropriate for Austrian tweens and teens. *Journal of Children and Media.* https://doi.org/10.1080/17482798.2021.1938619

Orben, A., Dienlin, T., & Przybylski, A. K. (2019). Social media's enduring effect on adolescent life satisfaction. *PNAS, 116*(21), 10226–10228. https://doi.org/10.1073/pnas.1902058116

Potter, W. J. (2004). *Media literacy.* Sage.

Raney, A. A., Janicke-Bowles, S. H., Oliver, M. B., & Dale, K. R. (2021). *Introduction to positive media psychology.* Taylor & Francis.

Rule, B. G., & Ferguson, T. J. (1986). The effects of media violence on attitudes, emotions, and cognitions. *Journal of Social Issues, 42*(3), 29e50. https://doi.org/10.1111/j.1540-4560.1986.tb00241.x

Schreurs, L., & Vandenbosch, L. (2021a). The role of active parental and peer mediation in adolescents' social media literacy on the positivity bias: Testing reciprocal relations [Paper presentation].

71th Annual Conference of the International Communication Association, Online edition

Schreurs, L., & Vandenbosch, L. (2021b). Introducing the Social Media Literacy (SMILE) model with the case of the positivity bias on social media. *Journal of Children and Media, 15*(3), 320–337. https://doi.org/10.1080/17482798.2020.1809481

Schreurs, L., & Vandenbosch, L. (2022). The development and validation of measurement instruments to address interactions with positive social media content. *Media Psychology, 25*(2), 262–289. https://doi.org/10.1080/15213269.2021.1925561

Slater, M. D. (2017). Reinforcing spirals model. In P. Rössler, C. A. Hoffner, & L. van Zoonen (Eds.), The international encyclopedia of media effects. Wiley. https://doi.org/10.1002/9781118783764.wbieme0118

Smith, R. H., & Kim, S. H. (2007). Comprehending envy. *Psychological Bulletin, 133*(1), 46–64. https://doi.org/10.1037/0033-2909.133.1.46

Smith, R. H. (2000). Assimilative and contrastive emotional reactions to upward and downward social comparisons. In Suls, J., & Wheeler, L. (Eds.), *Handbook of social comparison: Theory and research* (pp. 173–200). Springer.

Steers, M. N., Wickham, R. E., & Acitelli, L. K. (2014). Seeing everyone else's highlight reels: How Facebook usage is linked to depressive symptoms. *Journal of Social and Clinical Psychology, 33*(8), 701–731. https://doi.org/10.1521/jscp.2014.33.8.701

Tamplin, N. C., McLean, S. A., & Paxton, S. J. (2018). Social media literacy protects against the negative impact of exposure to appearance ideal social media images in young adult women but not men. *Body Image, 26*, 29–37. https://doi.org/10.1016/j.bodyim.2018.05.003

Thrash, T. M., Moldovan, E. G., Oleynick, V. C., & Maruskin, L. A. (2014). The psychology of inspiration. *Social and Personality Psychology Compass, 8*, 495–510. https://doi.org/10.1111/spc3.12127

Valkenburg, P. M., Peter, J., & Walther, J. B. (2016). Media effects: Theory and research. *Annual Review of Psychology, 67*, 315–338. https://doi.org/10.1146/annurev-psych-122414-033608

Valkenburg, P. M., Beyens, I., Pouwels, L., van Driel, I. I., & Keijsers, L. (2022). Social media browsing and adolescent well-being: Challenging the "passive social media use hypothesis." *Journal of Computer-Mediated Communication, 27*(1), 1–19. https://doi.org/10.1093/jcmc/zmab015

Vanwynsberghe, H. (2014). *How users balance opportunity and risk: A conceptual exploration of social media literacy and measurement* [Unpublished doctoral dissertation]. Ghent University.

Verduyn, P., Gugushvili, N., Massar, K., Täht, K., & Kross, E. (2020). Social comparison on social networking sites. *Current Opinion in Psychology, 36*, 32–37. https://doi.org/10.1016/j.copsyc.2020.04.002

Yau, J. C., & Reich, S. M. (2019). "It's just a lot of work": Adolescents' self-presentation norms and practices on Facebook and Instagram. *Journal of Research on Adolescence, 29*(1), 196–206. https://doi.org/10.1111/jora.12376

Zarouali, B., de Pauw, P., Ponnet, K., Walrave, M., Poels, K., Cauberghe, V., & Hudders, L. (2019). Considering children's advertising literacy from a methodological point of view: Past practices and future recommendations. *Journal of Current Issues & Research in Advertising, 40*(2), 196–213. https://doi.org/10.1080/10641734.2018.1503109

Zilka, G. C. (2019). The digital divide: Implications for the eSafety of children and adolescents. *International Journal of Technology Enhanced Learning, 11*(1), 20–35. https://doi.org/10.1504/IJTEL.2019.096736