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BoPo online, BoPo offline? Engagement with body positivity posts, positive appearance comments on social media, and adolescents' appearance-related prosocial tendencies

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ABSTRACT

Encouraging prosocial tendencies toward others' physical appearance is crucial for promoting a positive body image during adolescence. Social media content that highlights positive appearance messages can significantly influence these tendencies. Hence, this three-wave panel study explored the impact of exposure to and the posting of Body Positivity (BoPo) posts and positive appearance comments on social media upon adolescents' offline prosocial behavioral tendencies towards others' appearances, as mediated by appearance-related prosocial reasoning. Using a sample of adolescents aged 12 to 18 ($N = 496$, $M_{age} = 15.05$, $SD = 1.49$; 67.9% girls), the hypotheses received partial support. At the between-person level, adolescents who more often viewed BoPo and posted positive appearance comments also reported higher appearance-related prosocial tendencies. Nonetheless, on the within-person level, only more often posting positive appearance comments predicted a change to more appearance-related prosocial reasoning from T2 to T3. Notably, the mediation pathways from exposure to and the posting of BoPo and positive appearance comments to appearance-related prosocial tendencies through prosocial reasoning were not significant. Such findings suggest the presence of more significant sources for appearance-related prosocial tendencies than social media during adolescence. Still, the between-person findings can be valuable for peer-led campaigns that aim to foster a positive body image. Such campaigns could identify adolescents with heightened appearance-related prosocial tendencies who tend to engage with body positivity posts and positive appearance comments on social media.

1. Introduction

The development of a positive body image is a key factor in adolescents' psychosocial well-being (Frisén & Holmqvist, 2010; Urke et al., 2021). A positive body image is a multidimensional construct that contains components directed towards oneself versus others (Maes et al., 2021). During the last decade, the scholarly knowledge on positive body image components directed towards oneself (e.g., appreciating one's own appearance) has accumulated (Tylka & Wood-Barcalow, 2015). However, prosocial reasoning and behavioral tendencies directed towards others' appearance have not yet been investigated. This research gap is crucial to address because prosocial reasoning and behaviors concerning others' appearances are essential for creating environments that support a positive body image for all adolescents. Such environments are particularly important because adolescents often encounter body shaming and experience body dissatisfaction (Bucchianeri et al., 2016; Gam et al., 2020). Considering this developmental context, insights into the factors that promote prosocial reasoning and behavior toward others' appearances help to stimulate a positive body image in adolescents and their peers.

One of these factors might be social media, especially visual-oriented platforms, which many adolescents use on a daily basis (Pew Research Center, 2023). More specifically, these platforms allow adolescents to engage with so-called Body Positivity content (BoPo) (Cohen et al., 2021). Such content promotes acceptance and kindness towards all bodies, irrespective of their inconsistencies with beauty ideals (Cohen et al., 2021), encouraging prosocial reasoning and actions towards everyone's bodies. Similarly, positive appearance comments (e.g., "You

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look great!") (Fatt & Fardouly, 2023) represent another form of prosocial-oriented appearance-related activity.

Drawing on Social Cognitive Theory (Bandura, 2001) and Self-effects Theory (Valkenburg, 2017), we propose that engaging with BoPo and positive appearance comments on social media may promote prosocial reasoning and subsequent prosocial tendencies towards others' appearance. Yet, so far, no research has explored these assumptions. Hence, this three-wave panel study explores the links among exposure to and the posting of BoPo and positive appearance comments on social media upon adolescents' appearance-related prosocial reasoning and intentions. The potential reciprocity and gendered nature of these relationships will be examined further.

Understanding whether and how engagement with BoPo and positive appearance comments can foster prosocial reasoning and behavior is especially crucial during adolescence. Adolescence is a formative period marked by significant physical, emotional, and social changes, making it a critical time for the development of body image and interactions with others. The findings of this study will be particularly valuable for intervention efforts aimed at promoting a prosocial approach to others' bodies, thereby contributing to the creation of safe and supportive environments for adolescents. Such environments are essential for helping adolescents navigate appearance-related challenges and developing a positive body image, ultimately enhancing their overall well-being. Moreover, it may stimulate discussions with policy makers and social media companies on whether such positive appearance content needs to be labelled as preferred content in the algorithms that order adolescents' social media environment. Especially in view of the recently adopted Digital Services Act (2022), such questions have raised scholarly attention.

1.1. Appearance-related prosocial reasoning and tendencies

During adolescence, prosocial reasoning skills increase as part of general cognitive development (Mestre et al., 2019). As such, adolescents transit from adhering to externally defined moral values to autonomously regulating their behavior (Paciello et al., 2013). Prosocial (moral) reasoning can be defined as a "concern for others and values consistent with caring for others" (Knight et al., 2015, p. 718), and prosocial behaviors are described as actions that benefit others (Mestre et al., 2019). Yet, prosocial reasoning and tendencies have not been yet explored within the context of body image, which is how individuals perceive, think, and feel about their physical appearance and other bodily attributes (e.g., functions) (Grogan, 2021). Alongside the development in prosocial skills, adolescents experience substantial shifts in body image. Their body weight and shape changes (Choukas-Bradley et al., 2022): girls gain weight and boys become more muscular (Markey, 2010). These body changes are coupled with a heightened awareness of bodies in the adolescents' environment and an increased sensitivity to peer norms for physical appearance (Choukas-Bradley et al., 2022). Consequently, social interactions during adolescence frequently revolve around the topic of appearance, such as one's attraction to others and the perceptions of "ideal" bodies characterized by excessive thinness and muscularity (Webb & Zimmer-Gembeck, 2014).

Prosocial reasoning and behavioral tendencies oriented to others' appearances especially align with the principles of the Body Positivity movement, which promotes acceptance and kindness towards all bodies (Cohen et al., 2021), as well as with the concept of positive body image. Positive body image encompasses the appreciation and acceptance of one's body, including its health, functions, and aspects not consistent with beauty ideals, feeling beautiful, feeling confident, taking care of the body, and embracing positive body-related messages while rejecting the negative ones (Tylka & Wood-Barcalow, 2015). While this definition pertains to adults, adolescents seem to experience positive body image similarly. Among adolescents, a positive body image is characterized by appreciating one's and others' bodies, showing resilience to negative appearance messages from the media and significant others (Maes et al., 2021), viewing the body in a functional way, and accepting its perceived imperfections (Frisén & Holmqvist, 2010). Maintaining a positive body image is crucial because it is linked to intuitive eating, healthy exercise habits, self-compassion, and resilience against harmful appearance pressures (Tylka & Wood-Barcalow, 2015). Although much research has been conducted on the self-oriented components of positive body image (Webb et al., 2015), the components oriented towards others' bodies presumably play important roles in adolescents' lives. Alongside the broad conceptualization of beauty (Tylka & Iannantuono, 2016) and body-other appreciation (Maes et al., 2021), appearance-related prosocial reasoning and tendencies form crucial other-oriented component of adolescents' positive body image.

Drawing on the positive body image and prosocial behavior literature (Eisenberg et al., 1987; Knight et al., 2015; Mestre et al., 2019; Paciello et al., 2013), this study conceptualizes appearance-related prosocial reasoning as adolescents' cognitive abilities to reason in a concerned and caring way when others face appearance-related challenges and problems (e.g., receiving negative appearance remarks). Appearance-related prosocial tendencies refer to the actual tendency to engage in helpful behaviors when others face appearance-related challenges, such as encouraging others to feel good about their bodies, motivating others to place importance on characteristics other than physical appearance (e.g., abilities and personality), and highlighting the relevance of addressing the needs of one's own and others' bodies.

Within this so-called appearance culture (Jones & Crawford, 2006), prosocial reasoning and tendencies towards others' physical appearance might be key to alleviating body image concerns. In the peer, family, and media contexts, many adolescents face pressure to conform to unrealistic beauty standards and report heightened body dissatisfaction (Choukas-Bradley et al., 2022). Hence, it is crucial to create a supportive environment, which promotes body confidence and challenges unattainable beauty ideals. Despite the limited evidence in this particular area, research has noted that adolescents with visible differences struggle less with accepting their appearance when they feel socially supported (Feragen, Kvalem, Rumsey, & Borge, 2010). Similarly, a study of adolescent girls found that supportive social environments in terms of physical appearance help build protective strategies against negative appearance feedback and help maintain positive body image (Burnette et al., 2017). Together, this research indicates that prosocial appearance behaviors (e.g., making your friend feel beautiful) help adolescents to cope with appearance challenges. Such prosocial appearance behavior can especially be expected from adolescents who have endorsed prosocial appearance reasoning, drawing upon the notion that prosocial cognitions determine prosocial behaviors (Knight et al., 2015; Mestre et al., 2019).

1.2. Body positivity posts and positive appearance comments

One potential source of socialization for appearance-related prosocial reasoning and behavior in adolescence is social media. Adolescents, on average, spend 4.8 h a day on social media (Rothwell, 2023) to interact with peers, to be entertained, to express their identity, to be informed, and to receive self-validation (Rodgers et al., 2021). When scrolling through social media, adolescents often engage with appearance-focused content, such as selfies (Boursier & Manna, 2018), and they comment on the appearances of others online (Schreurs & Vandenbosch, 2022).

Two types of appearance cues on social media may especially be imperative for the development of appearance-related prosocial reasoning and tendencies: BoPo posts and positive appearance comments. First, BoPo promotes the notion that all bodies are beautiful beyond the narrowly defined beauty ideals (Rodgers et al., 2022). This content typically presents more realistic portrayals of bodies and advocates for the recognition of essential bodily attributes beyond physical appearance, such as bodily functions and abilities (Cohen et al., 2021). A

content analysis of popular BoPo accounts revealed that BoPo mirrors the theoretical aspects of positive body image, including inner positivity, the protective filtering of appearance-related cues, and adaptive investment in body care (Cohen, Irwin, et al., 2019). Research shows that adolescents are regularly exposed to content posted by BoPo influencers (Vranken et al., 2022). By evoking acceptance and kindness towards all bodies, irrespective of the potential flaws (Cohen, Irwin, et al., 2019), BoPo may especially inspire adolescents to adopt appearance-focused prosocial reasoning and tendencies.

Second, receiving and posting comments that compliment others' appearances on social media might further foster the development of appearance-related prosocial reasoning and tendencies in adolescents. Appearance-related feedback forms a significant part of adolescents' social media activity, where positive comments, such as "You look great!", regularly appear and tend to outweigh the negative ones (Fatt & Fardouly, 2023).

1.3. Exposure to BoPo and receipt of positive appearance comments

Social Cognitive Theory (Bandura, 2001) may explain how exposure to BoPo on social media and the receipt of positive appearance comments influence appearance-related prosocial reasoning and subsequent intentions. According to Bandura (2001), individuals learn both by direct experience and by observing and imitating others. Seeing behavior being rewarded or punished can lead to behavioral changes (Bandura, 2001). Existing literature has already hinted at the positive socializing potential of media. Coyne et al. (2018), for instance, found how mere exposure to prosocial media messages relate to users' empathetic concerns and offline prosocial behaviors. In this view, adolescents could learn that kindness and acceptance towards all bodies and appearances (Cohen et al., 2021) can be socially rewarded (e.g., through likes), which in turn can lead to engagement in appearance-related prosocial reasoning and tendencies.

Similar to BoPo, positive comments about appearance could offer another venue for enhancing adolescents' prosocial tendencies related to appearance. Positive appearance comments frequently appear in social media posts (e.g., "You look great!"), praising the displayed bodies, facial features (e.g., eyes, smile), or overall style (e.g., clothing, makeup). It is important to recognize that the compliments often highlight the importance of attractiveness. Receiving them may reinforce negative self-attitudes (Slater & Tiggemann, 2015). Nonetheless, in terms of intentions towards others, positive appearance comments foster encouragement and positive feelings about others' bodies. Therefore, adolescents who receive them might learn to engage in a similar positive and prosocial approach. As such, the receipt of positive appearance comments models a positive attitude toward another person's appearance and thus models prosocial appearance behavior. Prosocial literature has indicated that observing and, in particular, experiencing prosocial treatment reinforces prosocial behaviors (Stotsky et al., 2020). However, the role of positive appearance-related content on social media in fostering appearance-related prosocial reasoning and tendencies remains to be investigated.

1.4. Posting BoPo and giving positive appearance comments

According to Valkenburg (2017, p. 478), so-called *self-effects* refer to "the effects of messages on the cognitions (knowledge or beliefs), emotions, attitudes, and behavior of the message creators/senders themselves". The self-effects theory was originally developed to explain self-effects in offline settings, but it is applicable in social media contexts (Valkenburg, 2017). Social media may even amplify the self-effects because these platforms have features that invite users to share personal information and receive feedback (Valkenburg, 2017). Moreover, self-effects literature on social media (Schreurs & Vandenbosch, 2022; Valkenburg, 2017) reasons that when adolescents share a post (e.g., BoPo) or respond to others (e.g., give positive appearance feedback on a post by a peer), their posting/responding behavior will affect their identity beliefs such that they are more consistent with their online behavior. This is the result of self-perception and self-presentation processes, because individuals strive for consistency between their offline attitudes (e.g., prosocial reasoning and tendencies) and online actions (e.g., posting BoPo and appearance compliments) (Valkenburg, 2017).

Applied to the active posting of BoPo and comments that praise the appearances of others, this would imply that adolescents develop stronger beliefs in line with BoPo and being positive about other's appearances. Such beliefs are typical for prosocial appearance reasoning and behavior. In general, the research on self-effects on social media is scarce and, relatedly, missing in the context of prosocial appearance reasoning and behavior. Nonetheless, research on self-effects on social media did support that social media posting and commenting behavior predicted shifts in users' own cognitions and behaviors in line with the beliefs they exemplified in their online posting/commenting behavior (Bij de Vaate et al., 2024; Geusens & Beullens, 2018).

1.5. Attention to reciprocity in social media research

Self-effects Theory (Valkenburg, 2017), Social Cognitive Theory (Bandura, 2001), and prosocial reasoning literature (Mestre et al., 2019) point to reciprocity in the links between exposure to social media (appearance) content and the posting of social media (appearance) content and (appearance) outcomes (e.g., prosocial appearance reasoning and behavior). Self-effects Theory reasons that posting behaviors affect the poster's cognitions and behaviors. Bandura (2001) adds that observing role models interacts with cognitive and affective states, contributing to the adoption of witnessed behaviors. Such bidirectional relationships between one's own posting/commenting behavior versus exposure to social media behavior and one's offline beliefs and behaviors have been documented in some research (Valkenburg & Peter, 2013). Yet, overall research is lacking because of the general gap in longitudinal studies in social media research.

Furthermore, it is important to consider how appearance-related prosocial reasoning and tendencies influence engagement with BoPo and positive appearance comments. The selective exposure and gratification perspectives suggest that individuals tailor their media consumption to align with their motives and needs (Rodgers, 2016). As such, users may deliberately control their self-presentation and the appearance-focused content to which they are exposed (Rodgers, 2016). Therefore, BoPo and positive appearance commentary might not only precede appearance-related prosocial reasoning and tendencies, as expected by the Social Cognitive Theory (Bandura, 2001) and the Self-effects Theory (Valkenburg, 2017), but adolescents may actively seek out social media accounts that feature BoPo or post images that are likely to elicit positive feedback as a consequence of the heightened appearance-related prosocial reasoning and tendencies. Alternatively, they may engage with users on social media who are more inclined to provide positive appraisals. The increased appearance-related prosocial reasoning and tendencies may also motivate and encourage the more frequent posting of BoPo and positive comments.

1.6. Sex differences

For decades, gender socialization processes have typically socialized girls to attach relevance to appearance and adhere to societal beauty standards to a higher extent than boys (Choukas-Bradley et al., 2022). Accordingly, BoPo is often created by and directed towards girls on social media (Cohen, Irwin, et al., 2019). Consequently, girls might be more inclined to feel similar to and identify with the actors of BoPo, which leads to the greater adoption of its promoted appearance goals. Similarly, positive appearance comments appear to have a more pronounced influence on the body image of girls, because girls tend to engage with appearance comments on social media more frequently and

more seriously (Paddock & Bell, 2021). Furthermore, research suggests that girls tend to exhibit more prosocial behaviors (Van der Graaff et al., 2018). This tendency toward prosocial acts could potentially extend to the domain of physical appearance, where exposure to BoPo and positive appearance comments may prompt girls to adopt heightened prosocial reasoning and intentions. Additionally, girls, as compared to boys, might be more susceptible to the effects of BoPo and positive comments due to the increased unattainability of a thin-ideal body and the more intense body image concerns they typically experience (Choukas-Bradley et al., 2022). While the up-to-now research has generally supported gender equivalence in the social media effects on body image (Saiphoo & Vahedi, 2019), this rationale suggests potential differences in appearance-related prosocial reasoning and intentions between girls and boys.

1.7. Present study

Altogether, this study provides insights into the relationships between engagement with BoPo and positive appearance comments on social media and appearance-related prosocial reasoning and tendencies. In general, there is a lack of robust longitudinal research on how social media use affects adolescents' body image, with cross-sectional studies predominating (e.g., Saiphoo & Vahedi, 2019). Particularly, the impact of engaging with BoPo content and positive appearance comments on users' appearance-related prosocial reasoning and tendencies has not yet been studied. A prosocial approach to others' bodies not only characterizes an individual's own positive body image, but it also helps to develop a body positive environment in which, for instance, encouraging positive appearance interactions among adolescents are common (Burnette et al., 2017). By utilizing three-wave longitudinal data, this study disentangles the within-person reciprocal connections between BoPo, positive appearance comments, and appearance-related prosocial reasoning and tendencies over time. Specifically, we hypothesize.

H1a. Exposure to body positive posts on social media positively relates to higher prosocial tendencies towards others' physical appearance, mediated by prosocial appearance-related reasoning over time.

H1b. Receiving positive appearance comments on social media positively relates to higher prosocial tendencies towards others' physical appearance, mediated by prosocial appearance-related reasoning over time.

H2a. The posting of body positive posts on social media positively relates to higher prosocial tendencies towards others' physical appearance, mediated by prosocial appearance-related reasoning over time.

H2b. The posting of positive appearance comments on social media positively relates to higher prosocial tendencies towards others' physical appearance, mediated by prosocial appearance-related reasoning over time.

Furthermore, we explore the reciprocity and gender differences in the associations between the engagement with BoPo and positive appearance comments and appearance-related prosocial reasoning and tendencies over time. We formulate the following research questions.

RQ1. Are the relationships between exposure to and the posting of body positivity posts and positive appearance comments on social media, appearance-related prosocial reasoning, and tendencies reciprocal?

RQ2. Are the relationships between exposure to and the posting of body positivity posts and positive appearance comments on social media, appearance-related prosocial reasoning, and tendencies stronger for girls compared to boys?

The study aims to offer valuable knowledge on the factors that foster adolescents' appearance-related prosocial reasoning and behavioral tendencies, useful to future research work, as well as for interventions aimed at promoting positive body image during adolescence.

2. Methods

2.1. Sample and procedure

This study is part of a larger project on adolescents and their media use, body image, and sexuality.[2] The project has received the approval of the ethical review board of KU Leuven, Belgium (ref. number G-2018081296). A three-wave panel study with five-month intervals was set up in 16 secondary schools in Flanders, Belgium. The data were collected between January and October 2020.

In the first wave, 872 respondents filled in the variables of interest on a pencil-and-paper survey at school, during school hours. For the second and third waves, 406 and 380 respondents, respectively, filled in an online survey at home, after school hours. The drop-out rate reflects the change in the data collection methods as a response to the physical distancing measures that were in place in 2020 because of COVID-19. Respondents were included in the analytical sample when they participated in at least two of the three waves. There were 496 adolescents in the analytical sample (Mage = 15.05, SD = 1.49, range from 12 to 18). Of this sample, 67.9% were girls. Also, 89.1% had a Western European background, 4% had a mixed background, 2.2% had an African background, 1% had an Eastern European background, .4% had an Asian background, and .2% had a North American background. On average, respondents had a BMI of 20.4. The majority were on a general education trajectory (54%), or in programs for technical education (38.3%) and practical education (5.8%).

Using a multivariate logistic regression analysis with two groups of participants as dependent variables (1 = *included in this study, filled in the variables of interest in at least two waves*; 0 = *excluded from this study, filled in the variables of interest at only one wave or in none of the waves*). The variables used in the current study measured in W1, allowed for the assessment of a possible attrition bias. Specifically, respondents who used more social media in W1, $exp(B) = 1.49$, $B = .39$, $p < .05$, and those with lower levels of prosocial reasoning at W1, $exp(B) = .73$, $B = -.32$, $p < .05$, filled in the variables of interest in at least two waves.

Written active parental consent (i.e., from parents whose adolescents were older than 16) and passive parental consent (i.e., from parents whose adolescents were younger than 16) was obtained. Given the change in the data collection method from W1 to W2 and W3, parents were asked to give additional passive consent for W2 and W3. The respondents were assured that the survey would be confidential and anonymous. Active consent was obtained at the outset of the survey. The respondents received a monetary incentive for their participation: 5 and 7 euros at W2 and W3, respectively, in the form of a gift certificate.

2.2. Measures

Socio-demographics. Respondents' age, sex (0 = *boy*, 1 = *girl*), educational level (1 = *general education trajectory*, 2 = *practical education*, 3 = *technical education*), and BMI (all measured in the first wave) were included as controls. BMI was calculated by dividing the weight in kilograms by the height in meters squared.

General Social Media Use. Respondents' general social media use was assessed by asking respondents how long they used (1) Facebook, (2) Instagram, (3) YouTube, (4) Snapchat, and (5) TikTok on a daily basis in the preceding five months. A 7-point Likert scale was used (1 = *Never*, 7 = *More than 3 h*). The measure was stable across waves, $r = .67$-$.75$, $p < .001$. Mean scores were calculated, with higher scores representing higher social media use, $M_{w1} = 3.99$, $SD_{w1} = 1.70$; $M_{w2} = 3.67$, $SD_{w2} = 1.09$; $M_{w3} = 3.93$, $SD_{w3} = 1.13$. General social media use was included as

[2] See the Positive Body & Sex Project via OSF (https://osf.io/mj2ue/).

a control variable.

Exposure to Body Positive Posts on Social Media. At W1, W2, and W3, respondents were asked to indicate how often they encountered the following or similar hashtags in the preceding five months: (1) #bodypositivity, #bodyacceptance, or #selflove; and (2) #healthybody or #selfcare. A 5-point scale was used (1 = *[almost] never,* 5 = *[almost] always*), rW1 = .77, $p < .001$, rW2 = .82, $p < .001$, rW3 = .81, $p < .001$. The measure was stable across the three waves, r = .48-.55, $p < .001$. Mean scores were calculated, with higher scores representing the more frequent exposure to body positive posts on social media, $M_{w1} = 2.08$, $SD_{w1} = 1.14$; $M_{w2} = 2.09$, $SD_{w2} = 1.17$; $M_{w3} = 2.06$, $SD_{w3} = 1.86$.

Posting of Body Positive Posts on Social Media. At W1, W2, and W3, respondents were asked to indicate how often they posted the following or similar hashtags in the preceding five months: (1) #bodypositivity, #bodyacceptance, or #selflove; and (2) #healthybody or #selfcare. A 5-point scale was used (1 = *[almost] never,* 5 = *[almost] always*), rW1 = .64, $p < .001$, rW2 = .79, $p < .001$, rW3 = .90, $p < .001$. The measure was stable across the three waves, r = .30-.36, $p < .001$. Mean scores were calculated, with higher scores representing the more frequent posting of body positive posts on social media, $M_{w1} = 1.05$, $SD_{w1} = 0.28$; $M_{w2} = 1.11$, $SD_{w2} = 0.48$; $M_{w3} = 1.11$, $SD_{w3} = 0.47$.

Receiving Positive Appearance Comments on Social Media. Three out of seven items of the positive appearance-related commentary scale (Feltman & Szymanski, 2018) were used. At W1, W2, and W3, respondents were asked to indicate how often the following things happened to them when they used social media over the preceding five months: (1) "I got positive comments on shared photos about my appearance (e.g., "Your hair looks good," "Nice smile," "Nice eyes")"; (2) "I got positive comments on shared photos about my clothing style (e.g., "Your outfit is nice", "You look good in those jeans")"; and (3) "I got positive comments on shared photos about my body (e.g., "Beautiful legs", "Your body is incredible")". The response scale ranged from 1 (=*[almost] never*) to 5 (=*[almost] always*). A Principal Components Analysis (PCA) supported the one-dimensional factor structure of the items (range-explained variance W1-W3 = 70.20%–77.71%). In this study, the Cronbach's coefficients alpha's were .79, .83, and .86 for W1, W2, and W3, respectively. The measure had strong stability across the three waves, r = .59-.61, $p < .001$. Mean scores were used, with higher scores representing the more frequent receipt of positive appearance comments on social media, $M_{W1} = 2.57$, $SD_{w1} = 0.99$, $M_{W2} = 2.47$, $SD_{w2} = 1.11$, $M_{W3} = 2.40$, $SD_{w3} = 1.08$.

Posting Positive Appearance Comments on Social Media. Three out of seven items of the positive appearance-related commentary scale (Feltman & Szymanski, 2018) were used. At W1, W2, and W3, respondents were asked to indicate how often they commented in the following ways on other people's posts on social media over the preceding five months: (1) "I gave positive comments on shared photos about someone else's appearance (e.g., "Your hair looks good," "Nice smile," "Nice eyes")"; (2) "I gave positive comments on shared photos about someone else's clothing style (e.g., "Your outfit is nice", "You look good in those jeans")"; and (3) "I gave positive comments on shared photos about someone else's body (e.g., "Beautiful legs", "Your body is incredible")". The response scale ranged from 1 (=*[almost] never*) to 5 (=*[almost] always*). A Principal Components Analysis (PCA) supported the one-dimensional factor structure of the items (range-explained variance W1-W3 = 74.11% - 79.30 %). In this study, the Cronbach's coefficients alpha's were .82, .84, and .87 for W1, W2, and W3, respectively. The measure had a strong stability across the three waves, r = .45- .60, $p < .001$. Mean scores were used, with higher scores representing the more frequent posting of positive appearance comments on other people's social media posts, $M_{W1} = 2.73$, $SD_{w1} = 1.09$, $M_{W2} = 2.69$, $SD_{w2} = 1.15$, $M_{W3} = 2.61$, $SD_{w3} = 1.17$.

Appearance-related Prosocial Reasoning. A measure of appearance-related prosocial reasoning was developed, inspired by the Prosocial Moral Reasoning scale (PROM; Carlo et al., 1992). At W1, W2, and W3, two stories were introduced: first, "Lukas has sports class today. A boy is being laughed at by his classmates because he can't perform the gymnastics exercises and because he is a bit heavier. Do you think Lukas should support the boy?"; and, the second, "Anneleen hears girls behind her in class making fun of another girl because her breasts haven't grown yet and she has acne. The girl is crying. Do you think Anneleen should support the girl?" Adolescents answered "Yes" (=1), "No" (=0), or "I do not know" (=−999). Then, for each scenario, they were asked to what degree the following factors were deemed important in Lukas' and Anneleen's decision: (1) the relationship between Lukas/Anneleen and their classmates; (2) who is being bullied (e.g., how popular the boy/girl is); (3) the opinion of the parents of Lukas/Anneleen; (4) the opinions of the friends of Lukas/Anneleen; (5) the appropriateness of starting a discussion about this topic; and (6) the degree to which Lukas/Anneleen would feel bad if they did not support the person being bullied. Respondents rated these factors with a 5-point scale (1 = *Not important at all*, 5 = *Highly important*). In this study, the Cronbach's coefficients alpha's were .61 and .65, .69 and .70, and .72 and .75, for W1, W2, and W3, respectively (for the six items per scenario). Mean scores of the items about the deciding factors in their choice were calculated per scenario. For respondents who indicated that Lukas/Anneleen should not support the boy/girl (i.e., those who said no to the first question), these scores were recoded to represent negative scores such that the higher the negative score, the lower one's prosocial reasoning (as they had a higher mean score on the different factors that affected their decision). For respondents who indicated that Lukas/Anneleen should support the boy/girl (i.e., those responding yes to the first question), these scores were reverse coded to make sure that higher mean scores represent that the different factors did not affect their decision. Thus, the higher the scores, the higher one's prosocial reasoning. This resulted in a measure with values that ranged from −6 to 6 per scenario. In each wave, a mean score was then calculated from the combined scores of the two scenarios. Negative scores represent lower prosocial reasoning, while positive scores represent higher prosocial reasoning, exact $\min_{w1} = -3.75$, exact $\min_{w2} = -4$, exact $\min_{w3} = -4.17$; exact $\max_{w1} = 5$, exact $\max_{w1} = 4$, exact $\max_{w1} = 5$; $M_{W1} = 3.07$, $SD_{w1} = 0.96$, $M_{W2} = 2.87$, $SD_{w2} = 0.95$, $M_{W3} = 3.21$, $SD_{w3} = 0.96$.

Appearance-related Prosocial Behavioral Intentions. The scale was developed following the Measure of Prosocial Tendencies for Adolescents (Carlo et al., 2003). AT W1, W2, and W3, adolescents answered five items: "When someone is sad because of their appearance, I often try to comfort that person"; "I try to encourage my friend(s) to take care of their bodies"; "When someone is being bullied or teased because of their appearance, I try to stand up for that person"; "I emphasize to my friend (s) that a person is beautiful because of their personality, not their appearance"; and "When my friends feel insecure or sad about their physical changes during puberty (e.g., they gained weight), I try to comfort them" using a 7-point Likert scale (1 = *completely disagree*, 7 = *completely agree*). A Principal Components Analysis (PCA) supported the one-dimensional factor structure of the items (range-explained variance W1-W3 = 61.52%–65.14%). In this study, the Cronbach's coefficient alpha's were .84, .86, and .85 for W1, W2, and W3, respectively. The measure had a strong stability across the three waves, r = .56 - .60, $p <$ .001. Mean scores were used, with higher scores representing more prosocial behavioral intentions, $M_{W1} = 5.06$, $SD_{w1} = 0.91$, $M_{W2} = 5.17$, $SD_{w2} = 0.98$, $M_{W3} = 5.25$, $SD_{w3} = 0.97$.

2.3. Analyses

Descriptive statistics, zero-order correlations, and intra-class correlations were calculated. A high ICC (>.50) indicates proportionately higher between-group variance. A low ICC (<.50) indicates a proportionately higher within-person variance. Additionally, longitudinal measurement invariance was tested for a latent variable of appearance-related prosocial tendencies by comparing the model fit of the configural (i.e., fixed factor structure), metric (i.e., fixed factor loadings), and scalar (i.e., fixed intercepts) models within a multi-group confirmatory

factor analysis. For the configural model, we followed the criteria of a good/acceptable model fit to decide if the invariance was supported: RMSEA ≤.06/.08, SRMR ≤.08, TLI/CFI ≥.95/.90 (Hu & Bentler, 1999). In comparing the configural and metric models, we followed the delta measure of change ΔCFI ≤.01, ΔRMSEA ≤.015, and ΔSRMR ≤.030 as an indication of the supported invariance (Chen, 2007). For comparing the scalar model to the metric model, it was ΔCFI ≤.01, ΔRMSEA ≤.015, and ΔSRMR ≤.015.

To test H1a-H2b, a random intercept cross-lagged panel model (RI-CLPM) in Mplus 8.10 was set up (Hamaker et al., 2015), with a full information maximum likelihood estimation (FIML) to handle missingness. The RI-CLPM allowed us to separate the total variation in the observed scores into between-person and within-person variations. Within-person relations reflect fluctuations in the level of an outcome for a single person over time. Between-person effects are then more stable, with trait-like differences between individuals. Due to the non-normal distributions of several variables, we used the Robust Maximum Likelihood (MLR) estimation, except for the bootstrapping of indirect effects, which does not permit robust estimators. The significance of potential mediation effects was tested with a bootstrapping procedure (1000 bootstrap samples): the given sample size was randomly resampled 1000 times with replacements, and then 1000 estimations of the mediation effect were calculated. If the 95% confidence interval for the indirect effect estimate did not include zero, we concluded that the indirect effect was statistically significant at the .05 level. Control variables were also included in the bootstrapping analyses.

Model fit was evaluated with three goodness-of-fit-indices: the root mean square error of approximation (RMSEA), the Bentler Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI) (Hu & Bentler, 1999). CFI and TLI values between .90 and .95 and RMSEA values between .05 and .08 indicate an acceptable model fit. CFI and TLI values larger than .95 and RMSEA values smaller than .05 indicate good model fit (Kline, 2012). Additionally, we also inspected the standardized root mean square residual (SRMR). The hypotheses and analysis plan were preregistered on OSF after the data collection took place. The syntaxes and data can also be found on OSF: https://osf.io/jdbcy.

2.4. Deviations from preregistration

Above the preregistration, we added an exploratory research question for the reciprocity in the examined associations (RQ1). Furthermore, although we initially planned to explore sex differences with a multi-group RI-CLPM (Mulder & Hamaker, 2021), this model failed to converge, likely due to the limited sample size, particularly within the boys' group. Alternatively, we attempted to perform this analysis by incorporating interaction terms and by examining separate subsamples of girls and boys. Neither of these solutions resulted in a converging model. Therefore, the examination of sex differences in the associations between engagement with BoPo, positive appearance comments, appearance-related prosocial reasoning, and appearance-related prosocial tendencies (RQ2) must be left to future research.

3. Results

3.1. Descriptive statistics

Means, standard deviations, and zero-order correlations are presented in Table 1. While 42% of adolescents reported (almost) never viewing BoPo, 30% reported viewing it sometimes and more often, and 96% said they (almost) never posted BoPo. Thus, posting BoPo exhibited a strong floor effect because only a few adolescents posted it actively on social media. Regarding positive appearance comments, 42% of adolescents received them at least sometimes and 10% often or (almost) always, while 48% posted them at least sometimes and 17% often or (almost) always.

The variables were significantly correlated over the measurement points (i.e., same variable over time) and with each other. The ICCs for exposure to BoPo, posting BoPo, receiving positive appearance comments, posting positive appearance comments, appearance-related prosocial reasoning, and appearance-related prosocial tendencies were .51, .28, .62, .62, .31, and .56, respectively, indicating both within-person and between-person variability.

3.2. Longitudinal measurement invariance

Across the time points, measurement invariance for appearance-related prosocial tendencies was achieved. The configural model (i.e., fixed factor structure) showed excellent fit: $\chi2$ (75) = 134.05, $p < .001$, CFI = .972, RMSEA = .042 (90% CI = .030; .053), SRMR = .059. Additionally, the model fit did not substantially change when testing the metric model (i.e., fixed factor loadings): $\chi2$ (83) = 141.91, $p < .001$, CFI = .972, RMSEA = .040 (90% CI = .028; .051), SRMR = .072; or when testing the scalar model (i.e., fixed intercepts): $\chi2$ (93) = 170.79, $p < .001$, CFI = .963, RMSEA = .043 (90% CI = .033; .053), SRMR = .067. These results indicate that the scale structure of appearance-related prosocial tendencies did not significantly change between waves, allowing RI-CLPM to examine the relationships between engagement with BoPo (i.e., exposure and posting), positive appearance comments (i.e., receiving and posting), and appearance-related prosocial reasoning and tendencies.

3.3. RI-CLPM

The RI-CLPM, as hypothesized in the current study, showed a good fit to the data, $\chi2$ (410) = 829.55, $p < .001$, CFI = .923, RMSEA = .045 (90% CI = .041; .050), SRMR = .042. The variances of random intercepts were statistically significant, indicating stable between-person differences in appearance-related prosocial tendencies ($B = .56$, $p < .001$), appearance-related prosocial reasoning ($B = .37$, $p = .001$), exposure to BoPo ($B = .47$, $p < .001$), receiving positive appearance comments ($B = .56$, $p < .001$), and posting positive appearance comments ($B = .40$, $p = .002$), except for random intercept for posting BoPo ($B = .04$, $p = .106$).

Between-person relationships (i.e., correlations of random intercept factors) are displayed in Table 2. Across the three measurement points, exposure to BoPo correlated significantly with posting BoPo ($r = .32$, $p = .023$), positive appearance comments ($r = .43$, $p = .010$), and appearance-related prosocial tendencies ($r = .28$, $p = .002$). This result means that, across waves, adolescents who were more often than average exposed to BoPo on social media more often posted BoPo and positive appearance comments and showed more appearance-related prosocial tendencies. Further, posting positive appearance comments significantly correlated with receiving positive appearance comments ($r = .85$, $p < .001$) and appearance-related prosocial tendencies ($r = .35$, $p = .001$). Thus, adolescents who more often than average posted positive appearance comments, also received more positive appearance comments and showed more appearance-related prosocial tendencies. Lastly, appearance-related prosocial reasoning significantly correlated with appearance-related prosocial tendencies ($r = .37$, $p < .001$), suggesting that adolescents who engage in more than average appearance-related prosocial reasoning also showed more appearance-related prosocial tendencies. Yet, appearance-related prosocial reasoning did not correlate with any of the social media variables ($p > .05$).

At the within-person level, we observed significant auto-regressive paths for posting positive appearance comments from T1 to T2 ($B = .31$, $\beta = .27$, $p = .015$) and from T2 to T3 ($B = .54$, $\beta = .53$, $p < .001$), indicating that, for adolescents who experienced an increase in their personal level of posting positive appearance comments at T1 and T2, this further increased at T2 and T3, respectively. An autoregressive path was further observed for appearance-related prosocial reasoning from T1 to T2 ($B = -.66$, $\beta = -.69$, $p = .002$), implying that adolescents who

Table 1
Zero-order correlations.

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. ARPST (T1)	5.10	0.91	–																								
2. ARPST (T2)	5.17	0.98	.59[a]	–																							
3. ARPST (T3)	5.25	0.97	.60[a]	.56[a]	–																						
4. ARPSR (T1)	3.07	0.96	.29[a]	.17[a]	.10	–																					
5. ARPSR (T2)	2.87	0.95	.19[a]	.18[a]	.14[a]	.06	–																				
6. ARPSR (T3)	3.22	0.96	.30[a]	.22[a]	.17[a]	.45[a]	.30[a]	–																			
7. Exposure to BoPo (T1)	2.08	1.14	.20[a]	.20[a]	.17[a]	.01	.04	.13[a]	–																		
8. Exposure to BoPo (T2)	2.09	1.17	.21[a]	.20[a]	.15[a]	.07	.10	.15[a]	.49[a]	–																	
9. Exposure to BoPo (T3)	2.06	1.19	.18[a]	.27[a]	.27[a]	.11	.11[a]	.12[a]	.48[a]	.55[a]	–																
10. Posting BoPo (T1)	1.05	0.28	.08	.02	.03	−.01	−.11	−.02	.17[a]	.08	.10	–															
11. Posting BoPo (T2)	1.11	0.48	.04	.02	.07	.02	−.15	.08	.09	.24[a]	.17[a]	.31[a]	–														
12. Posting BoPo (T3)	1.11	0.48	.01	.003	.01	.02	.01	.01	.10	.12[a]	.30[a]	.30[a]	.36[a]	–													
13. Receiving PAC (T1)	2.57	1.00	.16[a]	.13[a]	.14[a]	.02	−.04	.06	.24[a]	.18[a]	.15[a]	.07	.10[a]	.09	–												
14. Receiving PAC (T2)	2.47	1.11	.07	.15[a]	.10	.04	−.03	.04	.16[a]	.19[a]	.17[a]	.05	.14[a]	.11[a]	.59[a]	–											
15. Receiving PAC (T3)	2.41	1.08	.20[a]	.09	.25[a]	.01	−.02	−.02	.11[a]	.21[a]	.13[a]	.08	.16[a]	.22[a]	.62[a]	.62[a]	–										
16. Posting PAC (T1)	2.73	1.09	.28[a]	.22[a]	.21[a]	.06	−.07	.07	.27[a]	.20[a]	.20[a]	.16[a]	.17[a]	.09	.63[a]	.41[a]	.51[a]	–									
17. Posting PAC (T2)	2.69	1.15	.22[a]	.28[a]	.23[a]	.07	−.03	.19[a]	.27[a]	.22[a]	.21[a]	.12[a]	.14[a]	.15[a]	.49[a]	.63[a]	.57[a]	.60[a]	–								
18. Posting PAC (T3)	2.61	1.17	.25[a]	.21[a]	.33[a]	.03	.03	.04	.21[a]	.28[a]	.19[a]	.05	.16[a]	.18[a]	.48[a]	.50[a]	.73[a]	.53[a]	.68[a]	–							
19. Sex (T1)			.26[a]	.25[a]	.28[a]	−.03	.19[a]	.22[a]	.26[a]	.21[a]	.30[a]	.03	−.01	.03	.18[a]	.1**	.21*	.16	.17[a]	.19[a]	–						
20. Age (T1)	15.1	1.5	−.03	.02	−.02	−.03	−.07	.04	.17[a]	.23[a]	.15[a]	.04	.10[a]	.02	.03	.13[a]	.04	−.01	−.01	.02	.05	–					
21. BMI (T1)	20.4	3.53	.07	.05	.08	−.09	−.10	.03	.02	.08	.04	.04	.13[a]	.03	−.03	−.01	−.00	.10	.03	.03	.07	.32[a]	–				
22. Education (T1)	1.84	0.96	−.08	.01	−.00	−.04	−.10[a]	−.07	−.02	−.03	−.06	.07	.07	.07	.08	.09	.13[a]	.10[a]	−.02	.12[a]	.003	.35[a]	.25[a]	–			
23. SMU (T1)	3.67	1.09	.08	.01	.13[a]	−.10	−.8	.003	.20[a]	.18[a]	.14[a]	.07	.15[a]	.13[a]	.41[a]	.37[a]	.39[a]	.41[a]	.35[a]	.37[a]	.15[a]	.10[a]	.09	.18[a]	–		
24. SMU (T2)	3.99	1.17	.01	−.07	−.02	−.04	−.05	−.04	.20[a]	.21[a]	.13[a]	.03	.14[a]	.08	.33[a]	.34[a]	.34[a]	.34[a]	.32[a]	.31[a]	.12[a]	.17[a]	.17[a]	.15[a]	.69[a]	–	
25. SMU (T3)	3.93	1.13	.10	.01	−.02	−.05	−.03	.04	.14[a]	.18[a]	.13[a]	−.05	.06	.06	.36[a]	.35[a]	.40[a]	.35[a]	.30[a]	.33[a]	.14[a]	.10[a]	.11	.22[a]	.67[a]	.75[a]	–

Notes.
[a] < .05; ARPST = Appearance-related Prosocial Tendencies, ARPSR = Appearance-related Prosocial Reasoning, PAC = Positive Appearance Comments, SMU = Social Media Use; Sex was coded as 1 = girls, 0 = boys.

Table 2
Correlations of random intercepts (i.e., between-person relationships).

	ARPST	ARPSR	BoPo exposure	BoPo posting	PAC receiving	PAC posting
ARPST	–					
ARPSR	.37***	–				
BoPo exposure	.28**	.11	–			
BoPo posting	−.03	−.14	.32*	–		
PAC receiving	.12	−.13	.12	.06	–	
PAC posting	.35**	−.10	.43*	−.04	.85***	–

Notes: ARPST = Appearance-related Prosocial Tendencies, ARPSR = Appearance-related Prosocial Reasoning, PAC = Positive Appearance Comments.

experienced an increase in their personal level of appearance-related prosocial reasoning at T1 had this level decreased at T2.

Shedding light on the hypothesized cross-lagged pathways between exposure to BoPo (H1a), the receipt of positive appearance comments on social media (H1b), the posting of BoPo (H2a), and the posting of positive appearance comments (H2b) with prosocial reasoning and, subsequently, prosocial tendencies, most of the expected cross-lagged pathways were not significant (see Table 3). Most of the significant associations appeared only from T2 to T3, and were thus inconsistent across waves. Specifically, appearance-related prosocial tendencies at T2 were associated with exposure to BoPo at T3 ($B = .34$, $\beta = .22$, $p = .049$), although with a borderline p-value. Thus, for adolescents who experienced an increase in their personal level of appearance-related prosocial tendencies at T2, their personal level of exposure to BoPo at T3 increased. Further, posting positive appearance comments at T2 positively predicted appearance-related prosocial reasoning at T3 ($B = .26$, $\beta = .34$, $p = .003$). As such, for adolescents who experienced an increase in their personal level of posting positive appearance comments at T2, their personal levels of appearance-related prosocial reasoning at T3 increased. This finding partially confirms H2b at a within-person level. Also, posting positive appearance comments at T2 positively predicted posting BoPo at T3 ($B = .10$, $\beta = .22$, $p = .008$) and receiving positive appearance comments at T3 ($B = .31$, $\beta = .38$, $p = .002$). The latter means that, for adolescents who experienced an increase in their personal levels of posting positive appearance comments at T2, their personal level of posting BoPo and receiving positive appearance comments at T3 increased. Finally, the more frequent posting of BoPo at T2 predicted the more frequent posting of positive appearance comments at T3 ($B = .35$, $\beta = .16$, $p = .001$).

Table 3
Cross-lagged and auto-regressive effects (i.e., within-person relationships).

	T1 → T2			T2 → T3		
	B	β	*p*	*B*	β	*P*
ARPST						
BoPo exposure	.02	.03	.845	−.02	−.04	.799
BoPo posting	.39	.12	.542	.01	.01	.972
PAC receiving	.13	.14	.396	.003	.004	.981
PAC posting	.15	.22	.153	.16	.27	.188
ARPSR	−.05	−.06	.790	−.15	−.18	.280
ARPST	−.43	−.31	.288	−.16	−.17	.370
ARPSR						
BoPo exposure	−.11	−.13	.288	.09	.11	.279
BoPo posting	.33	.08	.680	.02	.01	.905
PAC receiving	.10	.09	.640	−.10	−.10	.423
PAC posting	.03	.03	.835	**.26**	**.34**	**.003**
ARPSR	**−.66**	**−.69**	**.002**	−.11	−.10	.557
ARPST	−.26	−.15	.523	−.13	−.10	.573
BoPo exposure						
BoPo exposure	.02	.02	.908	.14	.14	.152
BoPo posting	−.78	−.16	.569	.23	.11	.190
PAC receiving	.07	.15	.287	.07	.06	.511
PAC posting	−.09	−.03	.804	−.09	−.10	.392
ARPSR	.05	.04	.667	−.07	−.06	.507
ARPST	.14	.07	.728	**.34**	**.22**	**.049**
BoPo posting						
BoPo exposure	−.03	−.06	.593	<.001	−.001	.990
BoPo posting	−.36	−.15	.751	.30	.29	.090
PAC receiving	.01	.02	.904	<.001	−.001	.992
PAC posting	.11	.21	.161	**.10**	**.22**	**.008**
ARPSR	.05	.08	.457	−.01	−.01	.860
ARPST	.08	.08	.722	−.09	−.12	.175
PAC receiving						
BoPo exposure	.06	.06	.582	.14	.16	.052
BoPo posting	−.01	−.002	.989	.23	.13	.068
PAC receiving	.06	.05	.715	−.01	−.01	.895
PAC posting	.01	.001	.948	**.31**	**.38**	**.002**
ARPSR	.23	.22	.124	−.14	−.13	.114
ARPST	−.12	−.07	.720	−.05	−.04	.736
PAC posting						
BoPo exposure	.03	.03	.759	.11	.10	.169
BoPo posting	.89	.17	.165	**.35**	**.16**	**.001**
PAC receiving	.13	.08	.452	−.06	−.05	.518
PAC posting	**.31**	**.27**	**.015**	**.54**	**.53**	**< .001**
ARPSR	.12	.10	.280	−.06	−.05	.449
ARPST	−.08	−.04	.810	−.03	−.02	.873

Notes: ARPST = Appearance-related Prosocial Tendencies, ARPSR = Appearance-related Prosocial Reasoning, PAC = Positive Appearance Comments. Dependent variables are in bold.

The mediating effects are depicted in Fig. 1. After incorporating the mediating effects of appearance-related prosocial reasoning in the relationships of exposure to BoPo, posting BoPo, receiving positive appearance comments, and posting positive appearance comments with appearance-related prosocial tendencies, the RI-CLPM fit still showed a good model fit, $\chi 2\ (410) = 842.27$, $p < .001$, CFI = .928, RMSEA = .046 (90% CI = .042; .051), SRMR = .042. However, none of the expected mediating effects proved significant, because their magnitude was negligible and 95% confidence intervals included 0, which contradicted H1a for exposure to BoPo ($B = .02$, $\beta = .02$, 95% CI: −.03; .25), H1b for posting BoPo ($B = -.05$, $\beta = -.02$, 95% CI: −.33; .08), H2a for receiving positive appearance comments ($B = -.02$, $\beta = -.02$, 95% CI: −.35; .05), and H2b for posting positive appearance comments ($B = -.004$, $\beta = -.01$, 95% CI: −.16; .01).

4. Discussion

Following Social Cognitive Theory (Bandura, 2001) and Self-effects Theory (Valkenburg, 2017), this study investigated whether exposure to and the posting of Body Positivity posts (BoPo), and the receiving and posting of positive appearance comments on social media, promote adolescents' appearance-related prosocial tendencies, as mediated by appearance-related prosocial reasoning. Additionally, given the reciprocity in the media effects literature (Valkenburg & Peter, 2013), we delved into the reciprocal relationships between engagement with BoPo, positive appearance comments, and appearance-related prosocial reasoning and tendencies.

Results showed that few adolescents reported viewing BoPo on social media. Thus, despite the availability of BoPo on social media nowadays (Graham et al., 2023), unattainable beauty ideals likely continue to dominate social media platforms. Given the pervasive endorsement of mainstream beauty standards both online and offline, adolescents may

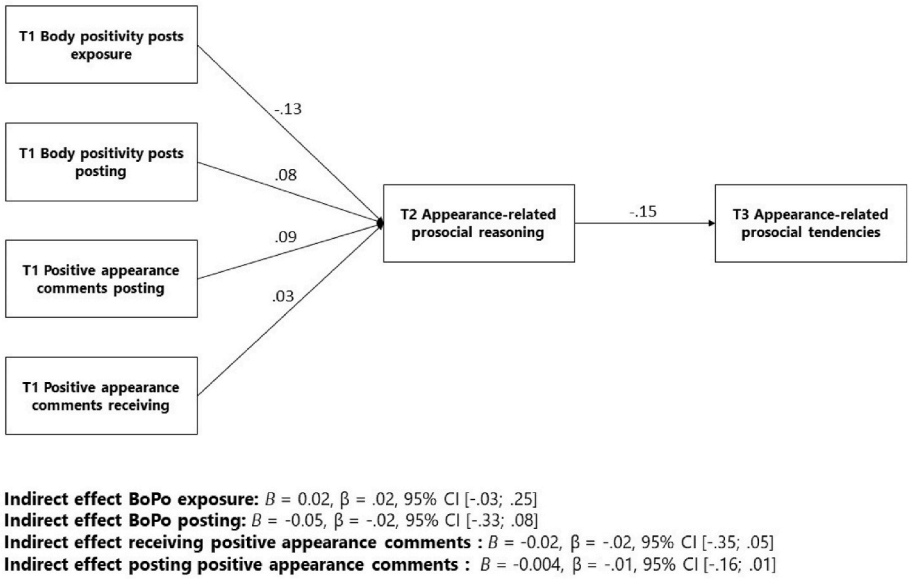

Fig. 1. The mediation models.

be more likely to consume idealized content rather than BoPo. Another explanation for the low prevalence of youth's exposure to BoPo might be that youth struggle with identifying such content. More specifically, BoPo content on social media does not always convey body-positive messages. Some of it still displays thin-ideal and encourages weight-loss, particularly within the broader Instagram community (Lazuka et al., 2020), in contrast to popular BoPo Instagram accounts that align more closely with positive body image principles as defined in academic literature (Cohen, Irwin, et al., 2019).

Further, an even smaller number of youth reported posting BoPo content themselves, potentially because they do not identify with the values of the Body Positivity movement. Perhaps, adolescents reason that idealized content gains more likes and comments, and therefore avoid posting BoPo content. The latter reflections have been found in prior qualitative research that explored adolescents' posting behaviors (Baker et al., 2019; Bell, 2012). Future research is encouraged to employ data donation methods in combination with daily diary research to enhance the accuracy of adolescents' actual engagement with BoPo content. This approach can help overcome the limitations associated with adolescents' potential underestimation or misidentification of BoPo content due to their limited familiarity with or recognition of such content.

Not surprisingly, adolescents did receive and post positive appearance comments relatively frequently, which corresponds to the observation of prior research that positive comments dominate the current social media landscape (Fatt & Fardouly, 2023). Given the high representation of appearance content on social media (e.g., posting and viewing selfies) and adolescents' frequent engagement with it (Schreurs & Vandenbosch, 2022), it is no surprise that the positive appearance comments constitute a regular part of adolescents' social media routine.

Delving into the observed relations between the two appearance-related social media interactions and adolescents' appearance-related prosocial reasoning and behavioral tendencies, several interesting findings emerged. Particularly, exposure to BoPo was associated with more appearance-related prosocial tendencies, but not reasoning, at the between-person level. Nonetheless, the latter was associated with increased appearance-related prosocial tendencies, which is consistent with prior research that indicates that general prosocial reasoning is positively associated with prosocial behaviors (Knight et al., 2015; Mestre et al., 2019). The findings suggest that while exposure to BoPo content relates to appearance-related prosocial actions, it may not be linked to the way adolescents reason about these actions. This points to the possibility that the influence of BoPo on behavior might be more about reinforcing certain actions rather than being linked to underlying thought processes. Yet, general prosocial reasoning may perhaps lead to greater appearance-related prosocial tendencies, which indicates that efforts to enhance how adolescents think about helping others could be beneficial.

Furthermore, adolescents who posted positive appearance comments more frequently showed greater appearance-related prosocial tendencies, which mirrors an earlier finding that prosocial media exposure is associated with general prosocial behaviors (Coyne et al., 2018). Thus, as expected, when adolescents engage in positive and supportive interactions on social media, these actions are also present in the offline context through prosocial tendencies. In contrast to our expectations, though, posting BoPo content and receiving positive appearance comments did not relate to appearance-related prosocial reasoning and tendencies.

Within-person level estimates shed additional and unexpected light on these findings. None of the examined positive appearance-related activities online (i.e., exposure to BoPo, posting BoPo, receiving positive appearance comments, posting positive appearance comments) consistently related to individual fluctuations in appearance-related prosocial reasoning or tendencies, neither directly nor indirectly. These results diverge from the expectations rooted in Social Cognitive Theory (Bandura, 2001) and Self-effects Theory (Valkenburg, 2017), which propose that adolescents, through their involvement with prosocial messages centered on physical appearance on social media, would observe, learn, and adjust their attitudes and behaviors to be more prosocial towards others' physical appearance.

Notably, adolescents who increased their personal levels for posting positive appearance comments at T2 also experienced a rise in the levels of appearance-related prosocial reasoning at T3. Yet, this finding should be interpreted with caution because this dynamic did not consistently manifest over the three waves. In addition, individual fluctuations towards greater appearance-related prosocial tendencies predicted subsequent fluctuations towards more frequent exposure to BoPo. This result might point to youths' curation of their social media environments in line with their appearance-related attitudes and beliefs (Rodgers, 2016). Yet, again, these relations were not stable. They were observed only from T2 to T3.

Moreover, we uncovered within-person relationships among various forms of engagement with positive appearance content on social media. Specifically, we noticed a reciprocal association between posting BoPo

and sharing positive appearance comments, with each social media behavior reinforcing the other over time. Furthermore, the more frequent posting of positive appearance comments predicted a higher likelihood for receiving such comments. These observations suggest a convergence in adolescents' interactions with BoPo and appearance-related compliments on social media, potentially driven by their shared aim of enhancing body confidence in others. However, these associations were only evident from T2 to T3, which limits our ability to establish conclusive links between the fluctuations in engagement with BoPo content and positive appearance comments.

Notably, the anticipated relations were primarily evident at the between-person level, rather than at the within-person level. These findings suggest the involvement of other influential factors (i.e., third variables) that likely drive prosocial-oriented reasoning and intentions towards others' appearance. For instance, Burnette et al. (2017) highlighted the significance of a supportive school environment and positive parental influence in fostering body confidence and resilience towards negative appearance-related experiences. Similarly, perceived body acceptance acts as an important precursor for body and functionality appreciation (Avalos & Tylka, 2006). While these studies mainly addressed the self-oriented aspects of a positive body image, prosocial tendencies towards others' bodies could also be significantly shaped by these previously identified positive socialization factors. Future research is encouraged to explore the potential of offline supportive factors in fostering prosocial appearance-related reasoning and behaviors.

From a theoretical perspective, delving deeper into the underlying mechanisms of self-effects and social learning could offer valuable insight into the role of BoPo content and positive appearance commentary in appearance-related prosocial reasoning and tendencies. For instance, Valkenburg (2017) suggests that self-effects stem from self-perception processes that aim to maintain consistency between online and offline behavior. Moreover, the self-effects likely depend on the extent to which the self-presenter thinks it is important to appear consistent in front of their peers both online and offline (Valkenburg, 2017). Future research may refine our ability to unravel the impact of posting positive appearance comments and BoPo on prosocial outcomes by including such motivations.

Similarly, social learning is contingent upon person-environment interactions, which encompass cognitive, emotional, and motivational states (Bandura, 2001). Bandura (2001) highlights the importance of "salience" and "affective valence" in learning experiences. Following this, the degree to which adolescents perceive BoPo content as personally relevant (i.e., salience indicator) and whether they subsequently feel good or bad (i.e., affective valence indicator) could, for instance, be a crucial moderator in its impact on their prosocial reasoning and intentions. Such moderators may also be relevant in the effects of positive appearance comments. For instance, the emotional response that follows the reception of such comments may partly determine subsequent body image outcomes (Calogero et al., 2009; Herbozo et al., 2017).

On a related note, appearance compliments have the potential to elicit notably negative reactions. Paradoxically, although intended to promote positive body image, positive appearance comments often perpetuate unattainable beauty standards and emphasize physical appearance that reinforce self-objectification and negative body image (Calogero et al., 2009; Slater & Tiggemann, 2015). If adolescents encounter these adverse effects, it could diminish the presumed ability of such comments to enhance prosocial tendencies and reasoning toward others' physical appearance. In this context, specific comment types, such as those endorsing thinness, may pose greater harm for one's body image compared to others that, for instance, focus on clothing or overall style. Concerns regarding the adverse effects have even been raised for BoPo content, as some of these posts still depict idealized characteristics and objectifying/sexualizing practices, and a heightened focus on appearance (Cohen et al., 2021). Hence, such posts might potentially undermine the potential beneficial effect of BoPo content, including the development of appearance-related prosocial reasoning and tendencies. Considering this heterogeneity, future research should consider exploring various BoPo categories and evaluating the emotional responses to the compliments. Recent research has identified different BoPo subtypes, including posts that depict bodies and encourage body acceptance, that convey happy emotions, that are sexualized, that are posed versus unposed posts, that focus on appearance versus being appearance-neutral, that provide "Instagram versus reality" comparisons, and that are text-only posts (Rodgers et al., 2023, 2024). Some of these BoPo types appear to be more beneficial to body image than the others. For instance, exposure to text-only BoPo was found to evoke more positive feelings towards the body than the other subtypes mentioned above (Rodgers et al., 2024). Also, exposure to BoPo content that emphasizes appearance (e.g., challenging beauty ideals and celebrating diverse bodies as beautiful) has been found to lead to increased self-objectification (Cohen, Fardouly, et al., 2019), compared to BoPo that shifts the focus away from appearance and emphasizes inner positivity, self-care, and body functionality. It is likely that some types of posts, particularly those oriented towards others, have a more pronounced impact on appearance-related prosocial reasoning and tendencies compared to others.

Methodologically speaking, an alternative explanation that is consistent with recent findings in media effects research (Maes & Vandenbosch, 2023; Schreurs et al., 2024) could be that the five-month intervals were insufficient to capture the variations in the appearance-related prosocial tendencies that result from increased engagement with BoPo content and positive appearance commentary. While recent meta-analyses of longitudinal research suggest that the long-term effects of social media use on body image are not contingent upon the duration of time intervals (de Valle et al., 2021), these analyses predominantly focused on the cognitive and evaluative aspects of body image (e.g., body dissatisfaction), rather than the behavioral dimensions. Plausibly, appearance-related prosocial tendencies may necessitate a longer period to manifest, given that they involve active behaviors directed towards others. With that in mind, Orth et al. (2021) noted that, while RI-CLPM is effective in detecting temporary within-person effects, its capability to identify the effects that occur over longer time periods is limited. This study, to the best of our knowledge, represents the first endeavor to explore prosocial behavior within the appearance domain. Further research is warranted to explore its dynamics during adolescence and to deepen our understanding of its associations with appearance-related social media use.

4.1. Limitations

The current study is not without limitations. The first limitation relates to our operationalization of appearance-related prosocial reasoning and tendencies. Given the lack of research in this area, we adapted scales to measure general prosocial reasoning and tendencies (Carlo et al., 1992, 2003). However, future studies would benefit from a more systematic approach to understanding the *appearance*-related prosocial reasoning and tendencies, such as exploring the various dimensions of prosociality in the context of physical appearance for adolescents and developing scales accordingly. For instance, Carlo et al. (2003) uncovered the emotional, compliant, public, anonymous, dire, and altruistic dimensions of adolescents' general prosocial behavior, which tend to be differently associated with prosocial reasoning, perspective-taking, and empathy. Therefore, future research should dedicate more attention to prosocial tendencies for physical appearance, including examining whether they align with similar dimensions observed in general prosocial tendencies.

The second limitation is the predominantly female sample from Flanders, Belgium, which limits the generalizability of our findings for boys and different sociocultural contexts. Recognizing the importance of including boys in research on social media effects on body image, we advise future studies to anticipate a potential shortfall of male respondents and actively recruit more boys to participate. Consequently,

we were unable to explore sex differences in our analysis, though the correlational analysis showed that girls scored higher on appearance-related prosocial reasoning and tendencies and on all four social media content variables (i.e., exposure to BoPo, posting BoPo, receiving positive appearance comments, posting positive appearance comments). Further uncovering sex differences in the associations between the engagement with BoPo and positive appearance comments and appearance-related prosocial intentions would be valuable. Given that girls are typically socialized to care more about appearance, they also tend to engage more with appearance comments (Paddock & Bell, 2021). Accordingly, the majority of BoPo content is targeted towards them (Cohen, Irwin, et al., 2019). Hence, we might expect girls to benefit to a higher extent from BoPo and appearance compliments in terms of their prosocial approach towards others' appearance.

Taking into account the floor effect for exposure and the posting of BoPo, using a self-report approach may have led adolescents to underestimate their interaction with BoPo content. To address this limitation in future studies, collecting objective data through daily diary studies or by implementing a data donation approach could offer more accurate insights. Relatedly, this study captured only a limited range of BoPo hashtags. Future research may need to recognize a wider variety of BoPo types (Rodgers et al., 2023, 2024). A final recommendation for future research is to consider the potential differences between the individual social media platforms, such as Instagram, TikTok, and BeReal, in shaping adolescents' appearance-related prosocial reasoning and behavioral intentions. Given that platforms can vary in the amount of body positivity and idealized content they display (Stevens & Griffiths, 2020), it would be worthwhile to explore whether these differences translate into different impacts on the prosocial approach toward others' appearances.

4.2. Practical implications

The current study helps to understand how exposure to and the posting of BoPo and positive appearance comments on social media relates to adolescents' appearance-related prosocial reasoning and intentions. The results of our between-person links suggest that adolescents with positive body image as indicated by appearance-related prosocial reasoning and intentions may be identified by their social media behaviors and, in particular, their exposure to and posting of BoPo and positive appearance comments on social media. Such knowledge can be useful for future peer-led campaigns for adolescents who aim to foster a positive body image as they inform on who likely shares the campaign aims and is willing to share the campaign material among peers. Peer-led campaigns are considered highly effective in enhancing well-being among teens (Vangeepuram et al., 2020) and they could serve as a valuable approach for promoting appearance-related prosocial behaviors in adolescents.

As we did not find within-person links among the exposure to and the posting of BoPo and positive appearance comments on social media and adolescents' appearance-related prosocial reasoning and intentions, our results currently do not warrant actions related to urging companies to change their current social media environments (e.g., change algorithms in order to increase the likelihood that adolescents encounter BoPo while scrolling). Therefore, future research should identify which (social media) factors significantly influence adolescents' prosocial attitudes toward others' bodies and provide guidance for future actions and interventions in this area.

4.3. Conclusions

Exploring the role of BoPo posts and positive appearance comments in adolescents' prosocial reasoning and tendencies towards others' physical appearances, this study revealed somewhat mixed findings. At the between-person level, adolescents who were frequently exposed to BoPo content and engaged in the regular posting of positive appearance commentary on social media demonstrated greater appearance-related prosocial tendencies. However, these online activities did not correlate with higher or lower levels of appearance-related prosocial reasoning. The within-person analysis provided additional insights, revealing that individual increases or decreases in positive appearance-related activities online—such as exposure to BoPo, posting BoPo content, receiving positive appearance comments, and posting positive appearance comments—did not consistently correspond with fluctuations in appearance-related prosocial reasoning or tendencies. Other factors likely influence the between-person associations, such as having a supportive environment. Future research is recommended to further differentiate between- and within-person level relationships when investigating the connections between social media and body image development in adolescents. Nonetheless, following the between-person results, peer-led campaigns on encouraging a positive body image can benefit from identifying adolescents with strong appearance-related prosocial tendencies, because they are likely to share body positivity posts and positive appearance comments.

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CRediT authorship contribution statement

Nikol Kvardova: Writing – original draft, Methodology, Formal analysis, Conceptualization. **Chelly Maes:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Laura Vandenbosch:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data are freely available at: https://osf.io/mj2ue/.

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