<u>Master Thesis Camille Thustrup</u>

Social media disorder and its association to self-esteem, the sex differences and the mediating role of negative use of social media.
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<u>Abstract</u>
Background and aims: It has been argued that problematic use of social media is associated with negative psychosocial outcomes such as a lowered self-esteem, especially in adolescents. However, little is known about the mechanism at play between addictive use of social media and low self-esteem, and whether there are significant sex differences. The current cross-sectional study investigates whether negative use of social media (i.e., cyberbullying, negative content and focus on physical appearance) could be mediating the association between social media disorder (SMD) and self-esteem. *Methods:* The study involved 225 high-school students who completed a survey measuring background, SMD symptom severity, and psychosocial outcomes. Dimensional and categorical analyses were used to assess the correlation between both dimensions of SMD (i.e., heavy involvement and negative consequences) and self-esteem, and investigate sex differences. Several mediations were run to examine if negative use of social media mediated the association between both dimensions of SMD and self-esteem. *Results:* Both dimensions of SMD were positively associated to poor self-esteem but no significant sex difference was found for the association between SMD symptoms and self-esteem. However, the associations between cyberbullying and SMD (both heavy involvement and negative consequences), and between negative content and SMD negative consequences were significantly stronger for boys than girls. All three types of negative use of social media meditated the association between SMD heavy involvement and poor self-esteem. However, only focus on physical appearance mediated the association between SMD negative consequences and poor self-esteem. Methodological considerations limiting causal assertions permissible with non-experimental data are discussed.

Social Media Disorder and its association to Self-esteem, the sex differences and the mediating role of Negative use of social media.

Camille Thustrup

For the past decade, several studies have found that social media use can be associated with negative psychosocial outcomes and addictive behaviour (Boer et al., 2022; Cataldo et al., 2022, Farahani et al., 2011; Pontes et al., 2018; Woods, 2016). As such, studies have investigated the construct of Social Media Disorder (SMD) as a representation of addictive and problematic social media use, and its association to poor self-esteem, especially for adolescents (Cleofas, 2022; Fung, 2019; Youssef et al., 2020). However, the above mentioned studies emphasize the need to further investigate the underlying mechanisms that can help us to better understand the association between social media use and self-esteem. The current study therefore wishes to examine this association, the sex differences, and the possible factors which could be explaining the link between SMD and self-esteem, such as the type of use of social media.

Social Media Disorder

Research has indicated that excessive social media use can lead to a behavioral addiction, referred to as "Social Media Disorder" (SMD). In the literature, the terms "social media addiction"; "addictive use of social media" and "social media disorder" are used interchangeably. In this study, we chose to use the term social media disorder as a way to assess and define problematic use of social media. To date, SMD is not officially recognised as an official diagnosis. SMD refers to an individual's excessive attention and investment of time and energy in social media and is associated with negative mental health implications (Cleofas, 2022; Fung, 2019; Youssef et al., 2020, Boer et al., 2022). However, in recent years, there has been relatively large consensus regarding how to operationalize SMD, with many researchers emphasizing that the same criteria that has been presented for Internet Gaming Disorder within the 5th version of Diagnostical and Statistical Manual of Mental Disorders (DSM-5; American Psychological Association, 2013) can also be used for social media if replacing the word gaming with the word social media. This includes symptoms such as tolerance and withdrawal, as well as deception, conflict and problems due to the use of social media (see Table 1 for specific symptom criteria).

Recent studies such as the one by Burén et al. (2023) found that the SMD symptom criteria can be divided into two dimensions referred to as Heavy involvement and Negative consequences (see Table 1). This study, which investigated university students, found that the associations to mental health problems were stronger for Negative consequences compared to Heavy involvement. This underlines the need to distinguish between these two dimensions of SMD and the current study will therefore do so in relation to self-esteem among adolescents.

Regarding the prevalence rate of SMD, a recent meta-analysis conducted by Cheng et al. (2021), found that it varies significantly across different cultural contexts ranging from 14% in individualistic societies to 31% in collectivistic societies. The cultural dimensions contributing to this difference in prevalence are unknown, which underscores the relevance of investigating the mechanisms influencing the development of SMD symptoms.

Table 1

Nine Criteria for SMD, based on the criteria for Internet Gaming Disorder as presented in the DSM–5(APA, 2013)

Criterion	Description
HEAVY INVOLVEMENT	
Preoccupation	Preoccupation relates to being all-absorbed by gaming and spending substantial amounts of time thinking or fantasizing about gaming during times of non-play.
Tolerance	Tolerance is characterized by an increasing amount of time spent on games to feel their desired effects (e.g., excitement, satisfaction).
Withdrawal	Withdrawal refers to symptoms that emerge when unable to play or attempting to cut down or stop gaming. Symptoms typically involve feeling restless, irritated, angry, frustrated, anxious, or sad.
Persistence	Persistence entails an enduring desire for gaming or unsuccessful attempts to stop, control, or reduce gaming.
NEGATIVE CONSEQUENCES	
Escape	Escape relates to engaging in a behavior to escape from or relieve negative mood states, such as helplessness, guilt, anxiety, or depression.
Problems	This criterion refers to continued gaming despite being aware of negative consequences of this behavior for central areas of life.
Deception	Deception refers to individuals lying to others about, or covering up the extent of, their gaming behaviors.
Displacement	The gaming behavior dominates, with a resulting diminishment of other social and recreational activities.
Conflict	This reflects more substantial issues as a result of gaming, referring to losing, or nearly losing, an important relationship or opportunity related to schooling or employment.

Association between SMD and mental health outcomes

        Recent studies have found that SMD is strongly associated with psychosocial difficulties such as depression, loneliness, low self-esteem, poor sleep quality, and low academic performance (Ergun & Alkan, 2020; Burén et al., 2021). Especially for adolescents, one of the strongest associations appear to be to poor self-esteem (Schou Andreassen et al., 2016; Woods, 2016) and this is why the present study has focused on this outcome. Self-esteem can be defined as a personal psychological characteristic which is related to self-judgment and based on one's perceived value (Alesi et al., 2012). It implies an awareness of one's value system as well as an emotional evaluation of one's self-worth (Schunk, 1985), . Lower self-esteem has been associated with higher risk for mental health problems such as depression (Choi, 2019). Furthermore, men tend to generally report higher self-esteem compared to women (Bleidorn et al., 2016). However, whether SMD has a negative impact on self-esteem or whether individuals with a low self-esteem are more at risk of developing SMD remains to be determined. Vogel et al. (2014) found that participants using Facebook more often had a lower self-esteem, both constructs mutually affecting each other. Additionally, greater exposure to social comparison on social media seemed to mediate this association. A previous study by Ma (2022) investigated the association between the use of social media in terms of screen-time and self-esteem, but found, unlike several previous research, no association. This study came to the conclusion that types of use of social media could be more relevant than to look strictly at screen time. This could be a more precise way to determine the impact of social media use amongst adolescents when investing the association between social media use and self-esteem. Ma's study also pointed out the

possible role of sex in this association. In other words, it might not be about how much one uses social media, but rather about personal characteristics (e.g., sex) and if the use leads to negative consequences, which could be related to lower levels of self-esteem (Ma, 2022). To add to these findings, a review by Valkenburg et al. (2021), investigating the association between social media use and adolescent self-esteem, found that this association highly person specific, with 88% of adolescents experiencing no or little effect social media use on self-esteem, 4% experienced positive effects and 8% negative effects.

A previous experimental study by Midgley et al. (2021) found that the association between social media use and self-esteem could be moderated by other constructs than sex, such as social comparison. They found that social media comparisons, when using social media, resulted in a greater decline in self-evaluation compared to social comparisons made in other contexts. Furthermore, individuals with a low self-esteem were more likely to compare themselves to others on social media, which in turn seemed to threaten their low self-esteem. Furthermore, Markey and Daniels (2022) and Cingel et al. (2022) stated that when it comes to social media use, the type of use (i.e., what kind of activity one engages in on social media) might be what matter the most in terms of mental health.

In the current study, rather than investigating the time spend on social medias (i.e., screen time), we chose to focus on the construct of SMD. We chose SMD as it is a more precise and measurable reflection of the type of social media use which can have negative consequences on the user's mental health. We still do not know much about what types of addictive use that are linked to self-esteem (i.e., what variables that mediate the link between addictive social media use and self-esteem), other than sex might play a role. Previous research has investigated sex as a moderator (Ma, 2022), and the current study rather wishes to look at sex differences in the link between SMD and self-esteem. Attention has been paid to previous study investigating moderators rather than mediators. However, as we wish to focus on the content linked to the association between SMD and self-esteem, we chose to investigate a mediation rather than a moderation. By doing so, we hope to add to the theoretical background so that, in the future, clinicians might be able to develop interventions targeting underlying mechanisms.

Sex differences

Recent studies have shown that sex difference exists in SMD symptom severity, with women reporting more severe symptoms compared to men (Boers et al., 2022; Schou Andreassen et al., 2016). Furthermore, as previously mentioned, the study by Ma (2022) found that for adolescents and students, sex moderated the association between social media use and self-esteem, this association being stronger for women than men. However, regarding sex differences in the association between SMD and mental problems, few previous studies have examined this issue, and those who have agreed that further research is needed. A study by Twenge (2020), investigating sex differences in the association between social media use and psychological well-being, found the association between heavy digital media use and low psychological well-being to be stronger for girls than boys. As such, and because of the lack of research on the topic, we decided to examine the sex differences in adolescents, for the association between SMD and self-esteem.

Type of use of social media and association to Self-esteem

There are several types of negative use of social media which can be measured and have been found to be relevant such as active and passive social media use (Thorisdottir et al., 2019). However, more recent studies have found that what might be relevant when looking at psychosocial factors, is whether one uses social media in a "positive" or in a "negative" way, rather than whether they are active or passive in their use (Liu et al., 2022).

Negative use of social media refers to the different types of negative use that have been investigated in previous studies linked to SMD symptoms (i.e., addictive use) and mental health problems. Previous studies have found that cyberbullying (Keles et al., 2023; Olenik-shemesh & Heiman, 2017), and focus on physical appearance (Revranche et al., 2022; Markey and Daniels, 2022) are associated with negative psychosocial outcomes such as a lowered self-esteem and negative body image. Furthermore, receiving and posting negative content could be relevant when considering different types of negative use of social media. However, the literature has not investigated this type of negative use specifically, and we wish to examine its possible relevance.

These types of negative use of social media could be mediating the association between SMD and self-esteem. Based on previous research, the present study chose to investigate specific type of social media use rather than creating one combined variable. We will be focusing on cyberbullying, focus on physical appearance as well as receiving and posting negative content.

Aim of the present study

The overall aim of this study is to provide a better understanding of the underlying mechanism and to what extend there are sex differences in the association between SMD symptom severity and self-esteem for adolescents. More specifically, we examined the following research questions:

1. Is there an association between SMD symptoms and self-esteem and does it differ for boys and girls? We expect that the higher SMD symptoms, the lower one's self-esteem, and that this association is stronger for girls than boys.

2. Does negative use of social media such as cyberbullying, focus on physical appearance and receiving/posting negative content mediate the association between SMD symptoms and self-esteem?

Attention has been paid to the limitations of a cross-sectional model in the context of a mediation analysis and it is important to note that the objective of this study is to investigate a possible association between our main concepts rather than testing causal inferences. As such, the current study may be a step towards future longitudinal studies.

Methods

Design

The current study was cross-sectional, and online self-report questionnaires were used to collect data.

Participants

The sample included a total of 225 participants (27.6% boys and 72.4% girls), age ranging from 15 to 19 years old ($M = 16.64$, $SD = 1.02$). Inclusions criteria were being fluent in Swedish (language of the questionnaire), and being a high school student between 15 and 19 years old. This age criterium was decided for ethical reasons as participants under 15 would need parental consent and the study would have needed to be submitted for ethical review. Participants who left whole sections of the questionnaire unanswered were excluded as well as participants which reported other for sex (i.e., not boy or girl) as this group was too small to analyze separately. 74.2% of our participants reported not being diagnosed with a mental disorder. For further background data see Table 2.

Data collection procedures

Participants were reached through the researcher's social networks and schools (hence our focus on high school students). The data were collected between the 15th of March 2023 and the 17th of April 2023, through an online, self-report questionnaire which took

approximatively 15 minutes to complete. Participants were offered no reward to participate in the study, and given the contact information of two researcher for questions.

Table 2
Descriptive data for the sample

	(n = 225) N (%)
Sex	
Boys	62 (27.6)
Girls	163 (72.4)
Mother's education	
University	184 (81.1)
High school	27 (12.0)
9 years or less	3 (1.3)
Do not know	11 (4.9)
Father's education	
University	164 (72.9)
High school	40 (17.8)
9 years or less	5 (2.2)
Do not know	15 (6.7)
Number of siblings	
No siblings	18 (8.0)
1-2 siblings	171 (76.0)
3 or more siblings	34 (16.0)
Mental health diagnosis	
ADHD	18 (8.0)
Autism	6 (2.7)
Dyslexia	19 (11.8)
Depression	23 (10.2)
Anxiety	26 (11.6)
Eating disorder	12 (5.3)
Other diagnosis	11 (4.9)
No diagnosis	167 (74.2)

Instruments

The full questionnaire consisted of a multitude of different measurement instruments. The questionnaire investigated background, demographics, and mental health of the participants and how they experience their social relationships. Several other factors were also investigated such as how one uses social media and ADHD symptoms. See below for a description of the scales used in the current study.

Social media disorder

Social media disorder symptoms were measured through the 9-item version of the Gaming and Social media Questionnaire (Burén et al., 2023; see also the Appendix). Factor analysis has demonstrated that the GSMQ-9 includes two sub scales: Symptoms of heavy involvement (i.e., Preoccupation, Tolerance, Withdrawal, Unsuccessful attempts to control, and Escape), and negative consequences (i.e.., Loss of interest, Continued excessive use, Deception, and Jeopardizing career/relationships). For each item, participants were

considered to meet a symptom criterion if they obtained a score ≥ 3.0 on a scale ranging from 0 ("Strongly disagree") to 4 ("Strongly agree"). Following the DSM-5 (APA, 2013), a participant exhibiting five out of nine symptoms met the full criteria for SMD. The SMD scale has been often used in recent research and deemed a valid and reliable instrument to measure problematic use of social media (Burén et al., 2021; Burén et al., 2023). The later studies found a good test-retest reliability(0.76 to 0.94) and the internal consistency of both heavy involvement (.79-.86) and negative consequences (.72-.75) was considered acceptable.

Poor self-esteem

Poor self-esteem was measured using the self-concept part of the Weiss Functional Impairment Rating Scale self-report (WFIRS-S; Thompson et al., 2017). The WFIRS-S is a 50-item scale designed to measure the extent to which an individual's ability to function is impaired by any emotional or behavioural problems. The current study used the 5 items sub-scale of the WFIRS-S measuring self-concept (e.g. "feeling bad about yourself") which was scored on a 5-point Likert scale, from 1 ("never or not at all") to 5 ("very often" or very much"). Participants were asked to rate how their emotional or behavioural problems had affected each item in the last month. The items were formulated as follows: "…been feeling bad about yourself". When comparing the items measuring self-concept and questionnaires measuring self-esteem, we found no significant difference in the formulation. It is therefore our impression that they measure the same concept. Furthermore, a study by Coelho et al. in 2020 used the self-concept scale of the WFIRS-S to measure self-esteem in their study. Therefore, in this study, the choice was made to use the WFIRS-S scale to measure self-esteem. Burén et al. (2023) found a good internal consistency for self-concept (a = .91; ω = .91). Previous review by Weiss et al. (2018) also showed a high test-retest reliability.

Negative use of social media

To measure the types of negative use of social media, three scales were included in our analysis as mediators: Focus on physical appearance, cyberbullying, and receiving/posting of negative content. These scales were all developed within the present study and based on past studies (Keles et al., 2023). We used the mean value for each scale in the analysis.

The scale focus on physical appearance includes 7 items, measuring to what extend the participant used social media with a focus on appearance, lifestyles, fashion and style, for themselves and others. Example of items were the following: "In the past 6 months, how often have you... modified photos of yourself before posting them on social media (e.g., use filters)". The internal consistency of this scale showed it is a reliable instrument (α = .88).

The scale negative content includes 6 items. It measured to which extend the participant has received or posted negative content such photos, comments, or likes. Example of items were the following: "during the past 6 months, how often have you... received negative comments on social media". The scale was deemed reliable with a high internal consistency (α = .83).

The scale cyberbullying includes 2 items and measured the extent to which the participants had experienced any kind of bullying via social media. Example of items were the following: "During the past 6 months, how often have you … felt bullied via social media; felt scared/threatened via social media". We considered passive use (being exposed to content) as well as active use, to be a relevant construct when investigating negative use of social media. It was not possible to calculate the internal consistency of this scale, due to the low number of items: However, the correlation between the two items was high ($r = .54, p <$ .001).

Statistical analysis

All analysis were run through IBM SPSS version 26. A Pearson correlation was conducted to test the hypothesis that high SMD symptom severity was positively correlated with poor self-esteem. Then, t-tests were used in order to examine sex differences in SMD symptoms and self-esteem. Correlation analyses were used to investigate associations between SMD symptom severity, the three types of negative use of social media and self-esteem. Sex differences were investigated by conducting separate correlation analyses for boys and girls, and by using regression analyses to examine whether associations were significantly stronger for one of the sexes compared to the other. The predictor and sex were entered in the first step and then the interaction between the predictor and sex in the second step. Finally, we conducted mediation analyses using Preacher and Hayes's (2008) Process method, model 4. The percentage of the total effect explained by each mediator was calculated as a measure of effect size. The three variables measuring negative use of social media (i.e., cyberbullying, negative content and focus on physical appearance), were highly inter-correlated. Therefore, separate analyses were conducted for the two different types of SMD symptoms (i.e., heavy involvement and negative consequences) and each of the three scales measuring negative use of social media.

Ethics

This study was reviewed and approved by the Scientific and ethical review boards (VCWE) at the Utrecht university. All subjects were informed about the study and provided informed consent. No personal, identifiable information were asked, so participants were anonymous. Attention was paid to the sensitivity of the age group of the participants in mind, and questions were chosen accordingly.

Results

Associations between SMD symptoms and Self-esteem, and sex differences

Results showed that SMD negative consequences ($r = 0.50$, $p < .001$) and SMD heavy involvement were positively correlated with poor self-esteem ($r = 0.20$, $p < .01$). As shown in Table 3, girls reported significantly higher levels of focus on physical appearance with a large effect size, but no significant sex differences were found for the other two types of negative use of social media. Results also showed that girls reported more addictive use of social media compared to boys with regard to both SMD negative consequences and SMD heavy involvement, with low to medium effect sizes. Girls also reported significantly poorer self-esteem than boys, with a medium effect size.

The number of participants meeting the symptom criteria for SMD (i.e., those having at least 5 symptoms) and those being in a risk-group (i.e., having 3 or 4 symptoms) were also calculated. The results showed that only one boy (1.6%) met the full symptom criteria, with another two boys (3.2%) being classified as being in the risk group. The corresponding numbers for the girls were 9 girls (5.5%) meeting the full symptom criteria and 33 girls (20.2%) being classified as being in the risk group.

Table 3
Results for t-test examining group differences between males and females

	Boys M (SD) (n = 62)	Girls M (SD) (n = 163)	t-value	Effect size d
SMD symptom severity				
Heavy involvement	2.24 (.65)	2.56 (.86)	2.65**	.40
Negative consequences	1.68 (.67)	2.03 (.69)	3.52***	.52
Negative use of social media				
Physical appearance	1.74 (.77)	2.61 (.88)	6.84***	1.02
Cyberbullying	1.26 (.52)	1.17 (.37)	1.37	.20
Negative content	1.32 (.44)	1.36 (.38)	0.67	.10
Poor Self-esteem	2.11 (1.03)	2.83 (1.07)	4.57***	.68

p < .01,* *p* < .001

Associations between SMD symptom severity, negative content and Self-esteem

Regarding associations between the main variables, results showed that all three subscales for negative use of social media were significantly associated with both heavy involvement and negative consequences (see Table 4). Poor self-esteem was significantly positively correlated with all three types of negative use of social media. Poor self-esteem was also highly correlated physical appearance, physical appearance and negative content were more strongly associated to SMD negative consequences.

Table 4

Correlations between negative use of social media, poor Self-esteem and SMD symptom severity, distinguishing between heavy involvement and negative consequences.

	SMD symptom severity		Poor Self-esteem
	SMD heavy involvement	SMD negative consequences	
Negative use of social media			
Physical appearance	.31***	.45***	.46***
Cyberbullying	.18**	.35***	.28***
Negative content	.29***	.41***	.29***
Poor Self-esteem	.20**	.50***	---

**p < 0.01, ***p < .001

Sex differences for the association between SMD and negative use of social media/poor self-esteem.

To examine these association even further, correlation analyses were conducted separately for boys are girls. The bold-faced numbers in Table 5 indicate significant interaction effects (i.e., significant differences in the associations between boys and girls). Similarly, to the analyses for the whole sample presented above, all associations were significant. However, associations between cyberbullying and both SMD heavy involvement and SMD negative consequences were significantly stronger for boys compared to girls. In addition, associations between negative content and SMD negative consequences were also significantly stronger for boys compared to girls.

Table 5

Correlations between negative use of social media, poor self-esteem and SMD symptom severity for boys and girls separately.

	SMD heavy involvement		SMD negative consequences	
	Boys (n = 62)	Girls (n = 163)	Boys (n =62)	Girls (n = 163)
Negative use of social media				
Physical appearance	.34**	.25***	.50***	.36***
Cyberbullying	**.32***	**.16***	**.64***	**.25***
Negative content	.38**	.27***	**.61***	**.32***
Poor Self-esteem	.31*	.12	.59***	.42***

$* p < .05, ** p < .01, *** p < .001$

Mediation analyses

     The results of the mediation analysis (Table 6 and Figure 1) showed that all three variables measuring negative use of social media (i.e., focus on physical appearance, cyberbullying and negative content) were significant mediators in the association between SMD heavy involvement and poor self-esteem. However, only physical appearance mediated the association between SMD negative consequences and poor self-esteem. In all mediation analysis, the mediator focus on physical appearance explained a much larger proportion of the total effect (i.e., 67 and 42%) compared to cyberbullying (8 and 22%) and negative content (8 and 36%).

Table 6

Results of the mediation analyses investigating the mediating effect of negative use of social media for the association between SMD (distinguishing between heavy involvement and negative consequences) and poor Self-esteem.
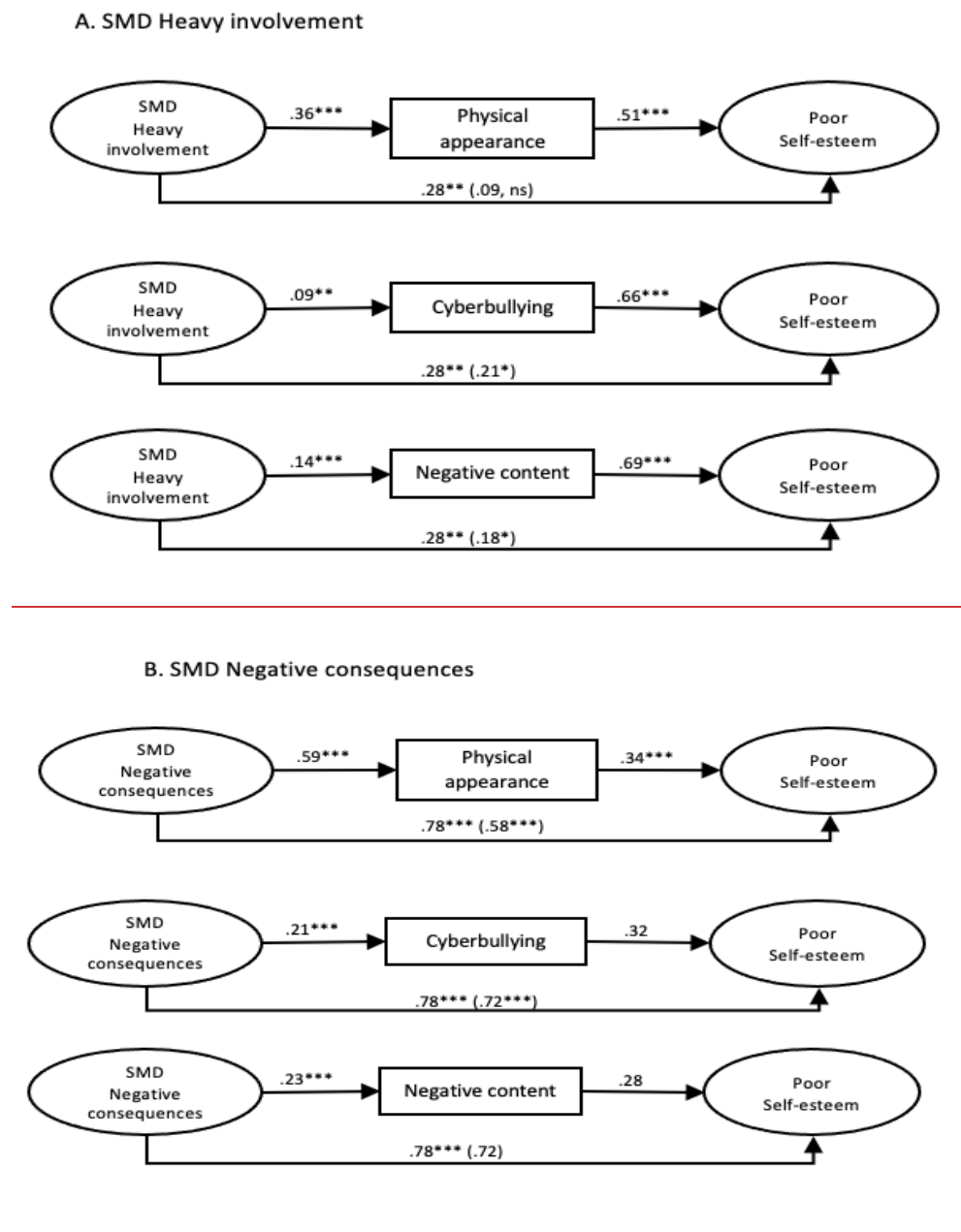
	SMD heavy involvement				SMD negative consequences			
Mediators	Est.	SE	95% CI	Indirect effect %	Est.	SE	95% CI	Indirect effect %
Physical appearance	.18*	.04	.11–.27	67	.20*	.05	.11–.31	42
Cyberbullying	.06*	.03	.01–.13	22	.07	.04	-.01–.15	8
Negative content	.10*	.04	.03–.18	36	.06	.05	-.02–.16	8

Note. SE = standard error; CI = confidence interval.

∗Significant mediator (i.e., zero is not contained within the confidence intervals).

     As shown in Figure 1, the direct effect between heavy involvement and poor Self-esteem was no longer significant when taking the mediator physical appearance into account thus a full mediation was found. However, the other two direct effects for heavy involvement did remain significant, which indicate that only partial mediation was found. For negative consequences, the direct effect to poor self-esteem remained significant when taking the mediator physical appearance into account. Thus, only partial mediation was found here as well.

Figure 1
Direct and indirect effects of mediation analysis

A. SMD Heavy involvement

SMD Heavy involvement → .36*** → Physical appearance → .51*** → Poor Self-esteem
.28** (.09, ns)

SMD Heavy involvement → .09** → Cyberbullying → .66*** → Poor Self-esteem
.28** (.21*)

SMD Heavy involvement → .14*** → Negative content → .69*** → Poor Self-esteem
.28** (.18*)

B. SMD Negative consequences

SMD Negative consequences → .59*** → Physical appearance → .34*** → Poor Self-esteem
.78*** (.58***)

SMD Negative consequences → .21*** → Cyberbullying → .32 → Poor Self-esteem
.78*** (.72***)

SMD Negative consequences → .23*** → Negative content → .28 → Poor Self-esteem
.78*** (.72)

Discussion

    In the current study, high levels of SMD symptom severity (i.e., both heavy involvement and negative consequences) were positively correlated with poor self-esteem. No significant sex differences were found for this association. However, the association between cyberbullying and both dimensions of SMD and between negative content and SMD negative consequences were significantly stronger for boys than girls. All three negative use of social media were significant mediators of the association between SMD heavy involvement and poor self-esteem. However, only focus on physical appearance mediated the association between SMD negative consequences and poor self-esteem. Finally, focus on physical appearance explained a much larger portion of the total effect for SMD heavy involvement compared to SMD negative consequences.

Association between SMD symptom severity, self-esteem and the mediation effect of negative use of social media

Following expectations, results showed that the higher one's SMD symptom severity (both heavy involvement and negative consequences), the lower one's self esteem. These findings were in line with previous studies by Burén et al. (2021) and Saores et al. (2023) who found a positive association between high levels of SMD symptoms severity and poor self-esteem. Our results may reflect a a risk of experiencing lowered self-esteem the higher one's SMD symptoms. However, it could also be the case that there is a vulnerability for developing SMD symptoms when one experiences poor self-esteem. As the present study only included cross-sectional data, the direction of effects cannot be determined. Finally, it should be noted that although both SMD heavy involvement and SMD negatuve consequences were significantly associated with self-esteem, associations were stronger for negative conseqiences (.50) compared to heavy involvement (.20). These findings underline the importance of distinguishing between these two SMD dimensions and also shows that it does not appear to be be time spent or the obsession with social media that is linked to self-esteeem but rather to what extent the adolescent's social media use has negative consequences such as lack of interest in hobbies or negative consequences for friendships or schoolwork.

When investigating the role of negative use of social media (i.e., cyberbullying, focus on physical appearance and negative content), results showed that all three types of negative use of social media were significant mediators of the association between SDM heavy involvement and poor self-esteem. A direct association between SMD heavy involvement and self-esteem was also found. These findings added to the findings of Ma (2022) and Markey and Daniels (2022), which showed that when it comes to social media use, it is not only screen time but the kind of activity one engages in which is relevant with regard to effects on mental health. Furthermore, previous study by Cingel et al. (2022), found that the association between social media use and self-esteem is dependent upon person susceptibility and type of use (especially social comparison). The current study adds something new to the theoretical background, as both dimensions of SMD (i.e., heavy involvement and negative consequences) were studied separately. Previous studies have not done so, and considering our results differed for the two dimensions of SMD, future studies might want to investigate whether these could be replicated.

It is important to note that when taking the mediator focus on physical appearance into account, the association between SMD heavy involvement and self-esteem disappeared, showing a full mediation effect. The other two direct effects for heavy involvement (i.e., cyberbullying and negative content) remained significant, explaining part of the association between SMD heavy involvement and self-esteem thus indicating a partial mediation. These findings concur with the previous study by Revranche et al. (2022) which found focus on physical appearance to by highly related to self-esteem. This high correlation could explain the full mediation effect found. The current study also added to previous study by Soares et al. (2022), who found neuropsychological functions to be mediators of the link between SMD and psychosocial outcomes, by investigating further the mechanisms at play between SMD and self-esteem.

Unlike expected, only focus on physical appearance mediated the association between SMD negative consequences and self-esteem. When taking the mediator into account, direct effect to poor self-esteem remained significant thus showing a partial mediation effect of focus on physical appearance.

Previous studies, such as the one by Burén et al. (2023), which found SMD negative consequences to be strongly associated with negative psychosocial outcomes such as self-

esteem, mostly investigated correlations between variables. Thus, the current study provides new valuable information by conducting a proper mediation analysis.

The lack of mediation effect of cyberbullying could be due to the importance of the direct effect between SMD negative consequences and poor self-esteem and is probably not due to a lack of variance in scores, as showed in results (see Table 3). The lack of mediation effect of negative content could perhaps be explained by the low sample size of our study, which may have had an impact on the power of our study and may have failed to capture small effects. As the specific association between SMD, self-esteem and the mediating role of negative use of social media has never been investigated before in the same study, we can only speculate when explaining our results. Future research is needed in order to investigate these associations further.

Sex differences

In line with previous findings (Bleidorn et al., 2016), results showed that girls exhibited poorer self-esteem compared to boys. This sex difference could be explained by a broad set of socioeconomic, sociodemographic, gender-equality and cultural value indicators, leading to boys being more self-confident and believe in their abilities compared to girls. Unlike expected, no significant sex differences were found for the association between SMD symptoms severity and poor self-esteem. Previous studies by Valkenburg et al. (2021) and Cingel et al. (2021) found the link between social media use and self-esteem to be highly person specific and not solely based on sex, especially for adolescents, generalizing difficult, which could explain our results.

However, results found an interaction effect of sex for the association between cyberbullying and both dimensions of SMD (i.e., heavy involvement and negative consequences), this association being stronger for boys than girls. Perhaps it is not only about the frequency one is bullied, but rather the way one is bullied, boys being bullied in a harsher way compared to girls, which could explain these findings. Reference. Previous studies on the topic are lacking although a study by Mcloughlin et al. (2022) found sex differences in brain region activations when experiencing bullying, with the activation of regions linked to emotions processing for females, and the activation of regions linked to varying aspects of cognitions for males. Future research might want to investigate the way one is cyberbullied rather than only the frequency one experiences cyberbullying.

In addition, associations between negative content and SMD negative consequences were also significantly stronger for boys compared to girls. In other words, the negative content boys create and are exposed to lead to higher negative consequences compared to girls. These findings are surprising considering the lack of sex differences for the association between cyberbullying/negative content and SMD negative consequences. Previous research investigating these sex differences is lacking although we can hypothesis that the way boys post and perceive negative content could be at the origin of this difference. Future studies are needed in order to test this hypothesis and possible alternative explanations.

Strengths, Limitations and Future directions

One major strength of this study was that unlike previous studies, we investigated both dimensions of SMD, negative use of social media and self-esteem in the same study. This allowed us to get a clearer notion of which type of use of social media could be relevant when considering problematic use of social media, and self-esteem. Additionally, current research modestly adds to the scientific background by investigating the two dimensions of SMD (i.e., heavy involvement and negative consequences), which are relatively new in the scienfitic literature (Burén et al., 2023). According to our results, we assume that both dimensions are relevant when investigating SMD symptoms, but this should be investigated

further in future studies. Furthermore, studies investigating SMD, type of social media use and self-esteem for adolescents are scarce. Considering adolescents being more at risk of developing mental problems, the population we decided to focus on was highly relevant in the context of the current study. Future interventions targeting type of use have the potential of having a significant impact for this group. As we chose to exclude all data of poor quality (unfinished questionnaires, biased answers), our sample was one of quality. Although about one fourth of our participants had a clinical diagnosis, we chose not to investigate groups with and without diagnosis. The problematics linked to each clinical diagnosis being very different and complex. As such, combining all diagnosis into one group would not have added much useful information and would have made findings difficulty generalizable.

Some limitations of this study should be acknowledged. First, because of limitations in terms of time and resources, a cross-sectional design was chosen. When interpretating our correlations and mediation results, it should be kept in mind that no causal conclusions can be drawn. Additionally, results of our mediation might be an overestimation and, each factor might be mutually influencing each other. The current study could be a step towards future longitudinal research. Secondly, because of the time limitations, we chose not to investigate background differences between participants, and future studies might want to explore the possible impact of background and mental health on our results. Third, our sample having been recruited through the researcher's network and schools, it might not be a representative sample, and be biased in term of socioeconomical status, clinical diagnosis and sex. Our results should be interpreted with caution and future studies might want to recruit a more representative sample, and decide to also include adolescents younger than 15, to gain a deeper understanding of our population of interest. Future studies might also consider investigating adolescents with a clinical disorder.

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Appendix
9 Criteria from the GSMQ-9 for Social Media Disorder with items.

Criterion	Example item
Preoccupation	"I think or talk about gaming/social media even when I'm doing other things"
Tolerance	"I need to use digital media more and more to feel satisfied."
Withdrawal	"I would feel bad (irritated, sax, anxious) if I was not allowed to/couldn't use digital media for a whole day"
Unsuccessful attempt to control	"I've tried to reduce the time I spend using digital media but I haven't succeeded."
Escape	"I use digital media to avoid difficult feelings."
Loss of interest	"I skip or have quite leisure activities so I can use digital media"
Continued excessive use	"My mental health has been negatively affected by digital media (sleeping problems, anger, loneliness...)"
Deception	"I lie about being sick so I can stay at home and use digital media"
Jeopardizing career/relationship	"My use of digital media has caused problems with my friends"