Adolescents' Social Media Disorder in Relation to Sensory Processing Sensitivity: Examining the Role of Positive Parenting

Universiteit Utrecht

Judith de Boer

Master Youth Studies

Faculty of Social and Behavioural Sciences

Student number: 5866790

Supervisor: Gaëlle Ouvrein

June 10, 2022

Abstract (Dutch)

Problematisch gebruik van sociale media wordt in verband gebracht met verschillende negatieve gevolgen, zoals verslavend gebruik (social media disorder; SMD). Eerdere onderzoekers hebben aangetoond dat sensorische verwerking en gezinsomstandigheden behoren tot de factoren die bijdragen aan SMD bij kinderen. Het doel van de huidige studie is om de relaties tussen sensorische verwerkingsgevoeligheid (SPS), positief ouderschap (PP) en SMD bij specifiek adolescenten te onderzoeken, om zo predisponerende factoren bloot te leggen. De resultaten zijn gebaseerd op een online enquête onder adolescenten met een gemiddelde leeftijd van 14,30 jaar (N = 318) in Nederland. Scores van SPS zijn vergeleken tussen adolescenten met en zonder SMD, met verdere verkenning van de rol van PP. Tegen de verwachting in was een hogere SPS niet gerelateerd aan SMD. Echter, gemiddelde en hoge niveaus van PP leken een beschermende factor te zijn voor SMD (p < .05). De huidige studie benadrukt de invloed van positief ouderschap op SMD. Meer onderzoek is nodig om de waargenomen associatie tussen PP en specifieke elementen van sociale mediagebruik te onderzoeken. Bovendien is breder onderzoek nodig naar hoe verschillende aspecten van SPS het sociale mediagebruik beïnvloeden om zo bij te dragen aan een betere behandeling voor SMD. Dit kan de kwaliteit van leven onder adolescenten en hun verzorgers verhogen.

Trefwoorden: Sociale media disorder, sensorische verwerkingsgevoeligheid, positief ouderschap, adolescenten, beschermende factor

Abstract

Problematic social media use is associated with a wide variety of outcomes, such as addictive use (social media disorder; SMD). Previous researchers have shown that sensory processing and family factors are among the contributing factors to SMD in children. The aim of the present study is to examine the relationships between sensory processing sensitivity (SPS), positive parenting (PP) and SMD in specifically adolescents, to uncover predisposing factors. The results are based on an online survey among adolescents with a mean age of 14.30 years (N = 318) in the Netherlands. We compared scores of SPS between adolescents with and without SMD, with further exploration of the role of PP. Against what was expected, higher SPS was not related to SMD. However, average and high levels of PP seemed to be a protective factor for SMD ($p < .05$). The current study highlights the influence of positive parenting on SMD. More research is needed to investigate the observed association between PP and specific elements of social media use. Furthermore, a broader investigation of how different aspects of SPS influence social media use may facilitate better treatment for SMD. This can increase the quality of life among adolescents and their caregivers.

Keywords: Social media disorder, sensory processing sensitivity, positive parenting, adolescents, protective factor

Adolescents' Social Media Disorder in Relation to Sensory Processing Sensitivity: Examining the Role of Positive Parenting

Online communication services, referred to as 'social media', had more than 4.5 billion users in October 2021 (Global Social Media Statistics, 2022). European research among adolescents shows that 77% of 15- and 16-year-olds reported daily social media use (SMU) in 2019 (Smahel et al., 2020). Social media enables us to stay connected with friends, find information easily and add our own personalities to the online world via ever-evolving platforms (e.g. Facebook, Instagram, Twitter, Snapchat, TikTok and Reddit) (Bányai et al., 2017; Nguyen, 2021). Given that interpersonal connections are one of the drivers of happiness (Argyle, 2001; Chopik, 2017; Myers 2000; Reis, Collins, et al., 2000), social media could be expected to bring large improvements to individuals well-being. Nevertheless, there are concerns about the disordered (addictive) use of social media (social media disorder; SMD) and its potential negative effect on adolescents' development (La Barbera & La Paglia, 2009).

Research indicated that problematic social media use (SMU) can interfere with physical and psychological health and other life domains, such as work, education and family relationships (Andreassen, 2015; Kwon, Kim, Cho& Yang, 2013; Sozańska, 2018). Students who overuse social media, consequently devote insufficient time to studying or reading books, leading to low academic achievement (Al-Menayes, 2015; Ennemoser & Schneider, 2007; Salmela-Aro, Upadyaya, Hakkarainen, Lonka & Alho, 2016). In addition, Huang (2018) studied academic performance of 1549 adolescents in relation to SMU. They found a very weak correlation between SMU and test scores in mathematics, Chinese and English (r = 0.01). Additionally, a Finnish study using two longitudinal data waves gathered among adolescents (N = 1702), revealed that problematic Internet use can be a cause of school burnout that can later lead to depressive symptoms (Salmela-Aro et al., 2017).

Nevertheless, research into this topic is limited, possibly due to the absence of consensus about the definition of problematic SMU. This translates into confusion about the classification and may hinder research on the prevalence of this type of disordered behaviour, thereby also limiting important next steps in the research field of social media dependency. Diagnostic manuals including the DSM-5 do not yet contain social media addiction (Inchley et al., 2020; Wegmann, Stodt & Brandt, 2015). While early research often used 'Internet addiction' or 'problematic SMU' to describe the condition, the World Health Organisation (WHO) now most often uses the term 'social media disorder' (SMD) (Brand, Young, Laier, Wölfling, & Potenza, 2016). Other than adolescents who merely show *intense* SMU by spending a lot of time on social media, adolescents with *problematic*

SMU, or SMD, typically have a diminished ability to regulate impulses from social media, feel discomfort such as stress or anxiety when SMU is restricted, and have social media on top of their mind constantly (Boer et al., 2021; Griffiths, Kuss & Demetrovics, 2014; Piteo & Ward, 2020;).

Irrespective of the definition of problematic SMU, understanding which factors are related to SMD is a complex but important step toward diminishing the negative impact of SMU and promoting positive outcomes (Andreassen, 2015; James et al., 2017). Nowadays developmental research is adopting an interdisciplinary approach by taking on multidirectional perspectives, where it is assumed that individual behaviour changes both biological and social circumstances and vice versa (Sameroff, 2010). To identify influencing factors of SMD on a broader level, the current study aims to focus on the interplay between SMD, individual characteristics and the context (Ceci, 2006; Bronfenbrenner, 1980).

Processing Sensory Stimuli

One individual factor that may be related to the development of SMD is the response to sensory stimuli. To explain individual differences in the processing of environmental input, Zuckerman (1979) invented the personality trait 'sensation seeking'. This can be defined as the search for experiences and feelings that are intense, novel and complex (Masson, Lamoureux & de Guise, 2019; Zuckerman, 2009). People who are high sensation seekers need more stimulation to reach their optimal level of stimulation (Zuckerman, 2009, 2014). Their research found that high sensation seekers are more likely to use social media for playing games. This relationship may be explained by the fact that playing games, as one element of SMU, can fulfil their need for stimulating experiences (Wang, Jackson, Zhang & Su, 2012). Investigation of Lin and Tsai's (2002) compared sensation-seeking scores among Internet-dependent and non-dependent students at a Taiwanese high school. It was found that Internet-dependent students obtained significantly higher scores on the overall sensation seeking than Internet non-dependents.

Elaborating on Zuckerman (1979), Dunn (2001) developed a Model of Sensory Processing in which he described four sensory processing styles: sensory sensitivity, sensory avoidance, sensory seeking, and low registration of stimuli. Sensory seeking and low registration reflect high neurological thresholds (personal range for noticing and responding to sensory events), with sensory seekers actively seeking stimulation and people with low registration using passive responses (Brown, Tollefson, Dunn, Cromwell, & Filion, 2001). Sensory sensitivity and avoidance reflect low neurological thresholds. As a result, highly sensitive people can experience distress from loud noises, intense moods, bright lighting and busy or chaotic environments (Dunn, 2001). Consequently, these individuals may organise their environments and routines to avoid or minimise stimulation (Branjerdporn, Meredith, Strong & Green, 2019). In line with this theory, Choi and Jung (2021)

found that adolescents with a higher sensory processing sensitivity (SPS), had a lower preference for activities that involve different sensory stimuli (dancing, singing or participating in community organisations). Additionally, they suggest that adolescents with SPS and sensation-avoiding patterns often prefer leisure activities by themselves at home that require less cognitive strength (Choi & Jung, 2021).

Sensory Processing Sensitivity

Children who are over-responsive to stimuli seem to be at increased risk for developing social and emotional problems (Ben-Sasson, Carter & Briggs-Gowan, 2009). For instance, compared with their peers, people high in SPS reported poorer health conditions (Benham, 2006), more anxiety and depression symptoms (Liss, Timmel, Baxley & Killingsworth, 2005) and lower life satisfaction (Booth, Standage & Fox, 2015). The impact of SPS may also translate into media-related activities. Sensory curation theory posits that media devices can help people construct temporary environments-within-environments to maintain a comfortable balance of sensory input to support sensory regulation (Seckman et al., 2017).

Confirming this idea, Harrison (2019) observed that children with sensory processing problems spent more time using media devices. It is stated that the use of a device helps them with sensory regulation since focussing on a screen limits the sensory impact of environmental stimuli (Harrison, 2019). Lastly, two Korean survey studies found that smartphone addiction was associated with high SPS in college students (Hong & Lee, 2018; Park & Chang, 2015). The relationships between smartphone addiction, high school students' Internet addictions, SMD and smartphone use are positive and highly significant (Ramazanoglu, 2020). Therefore, a positive association between SPS and SMD may also exist. In sum, being more sensitive to stimuli from the environment could be a predisposing factor for the development of SMD.

Positive Parenting

The development of SMD may also be influenced by family factors. Likewise, the nature of a child and environmental circumstances (nurture) are strongly related when it comes to declaring behaviour (Bronfenbrenner, 1980; Sameroff, 2010). Parents are the first people in the environment that influence various aspects of children’s development (Miller, 1995). The combination of parental attitudes, communication, cohesion and atmosphere that determine the family environment, has regularly been conceptualized as a ‘parenting style’ (Baumrind, 1980). Seay, Freysteinson and McFarlane (2014) defined positive parenting styles through a careful review of the existing literature. They suggest that positive parenting (PP) is the relationship between a parent and child that includes caring, teaching, leading, communicating, and providing for the needs of a child consistently and unconditionally (Seay et al., 2014). The styles of parenting that are associated with positive

outcomes are parental *responsiveness* (warmth and involvement), *demandingness* (positive reinforcement and rule setting) and *autonomy–granting* behaviour (respecting child's freedom and own decision making) (Baumrind, 1980; Darling & Toyokawa, 1997; Gray & Steinberg, 1999; Hart, Newell & Olsen, 2003; Kuppens & Ceulemans, 2018; Seay et al., 2014).

Firstly, parents' warmth and responsiveness, as well as a respectful and appropriate level of control are suggested to be optimal for developmental outcomes for children in Western cultures (Baumrind, 1978; Rasmussen, 2009). Second, responsive and demanding parenting styles are related to school attainment and good psychological development (Maccoby & Martin, 1983; Pettit & Bates, 1989). Third, evidence suggests that elements of responsive and demanding parenting can function as a protective factor for developing SMD (Nam, 2002; Park, Kim, & Cho, 2008; Prabandari & Yuliati, 2016). Lastly, Valcke, Bonte, de Wever and Rots (2010) state that especially parental control, warmth and support are very important when it comes to preventing social media dependency. An explanation for this could be that positive parenting styles may help children to understand the risks of the Internet, resulting in safer and healthier Internet use (Fleming, Greentree, Cocotti-Muller, Elias & Morrison, 2006; Lwin, Stanaland & Miyazaki 2008; Valcke et al., 2010).

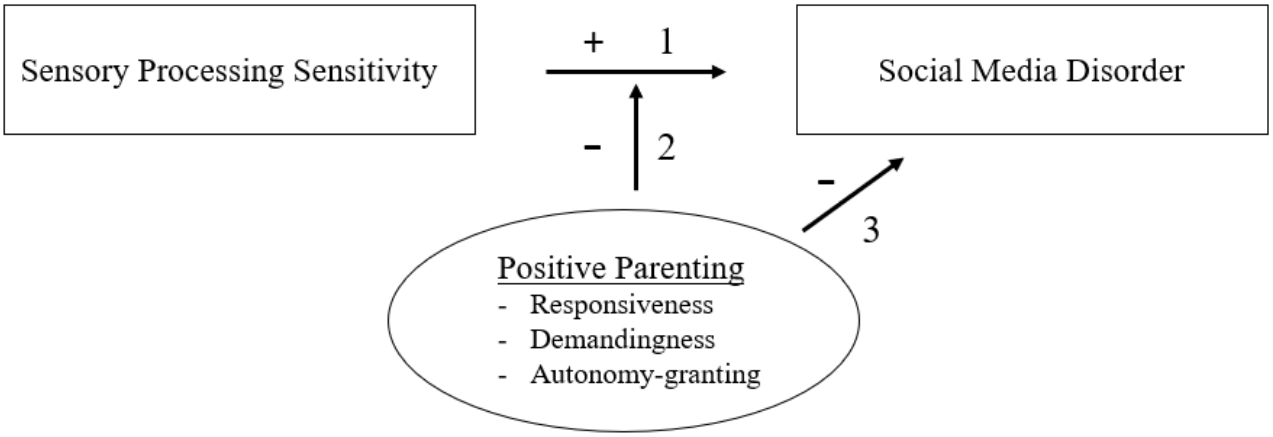
In addition to the suggested relationship between PP and SMD, preliminary evidence points out an association between parenting styles and SPS. For example, it is suggested that parental over-protection is related to sensory sensitivity (Liss et al., 2005). This study shows that parents of highly sensitive children may see their children as particularly sensitive and fragile and react accordingly (Liss et al., 2005). Additionally, over a series of seven quantitative and qualitative studies, Aron and Aron (1997) noted that the relationship between having a negative parental environment and psychological problems was stronger in highly sensitive individuals. They measured the parental environment with questions about parental warmth and involvement, resembling a responsive parenting style (Aron & Aron, 1997; Seay et al., 2014). Lastly, research suggested that children using media devices to regulate sensory stimuli, were more likely to display problematic media use and also had more conflicts with their parents (Harrison, Vallina, Couture, Wenhold & Moorman, 2018).

Present Study

Based on these empirical findings, the interconnectedness of SPS (nature) and PP (nurture) should be considered when investigating the relationship between SPS and SMD (Bronfenbrenner, 1986; Sameroff, 2010). Recent studies have mainly described the relationship between SPS and parenting styles in small children or college students. The purpose of this study is to examine how SPS of adolescents in secondary school interacts with PP in its relationship with the occurrence of SMD (Figure 1). The first hypothesis is that adolescents with a higher SPS are more likely to have SMD (1). Second, we expect that adolescents within a PP environment (responsive, demanding, and

autonomy-granting parents) are less likely to have SMD (2). Third, it is hypothesised that PP moderates the relationship between SPS and SMD, and therefore functions as a protective factor for SMD (3). Examining how sensory processing and parental influences are related to SMD may contribute to a deeper understanding of the underlying factors of SMD. Consequently, it can help to identify particular at-risk groups and to prevent the development of addictive forms of use.

Figure 1. *Theoretical Model of the Relationship between Sensory Processing Sensitivity and a Social Media Disorder with the role of Positive Parenting.*



Note. Hypotheses 1, 2 and 3 are indicated alongside the arrows. The + indicates a positive relationship, and the - indicates a negative relationship.

Method

The current study started in October 2020 and is an ongoing Dutch longitudinal study called the 'Digital Family Project'. The study has been approved by the research ethics board of the Faculty of Social and Behavioural Sciences of Utrecht University (FETC20-192). The age of the final sample (N = 318) varies between 11 and 19 years old (M = 14.30, SD = 1.63). The sample consists of 54.6% females and 45.4% males. It appeared that the majority (76.7%) of the participants are pursuing secondary education at HAVO, VWO, or gymnasium level. Furthermore, most of the participants reported the Netherlands as their country of birth (96.4%). Missing data (N = 7) was very minimal and was randomly distributed across the variable and unrelated to other variables.

Sampling and Data Collection

The current study has a cross-sectional study design. Data were collected from April-July 2020 among Dutch adolescents and their parents. However, this study used self-report data from adolescents. All adolescents included attended secondary school, so contextual changes related to the transition from primary to secondary school were not affecting the results. Participants were

recruited through contact with schools and sports clubs, advertisement on social media and websites, word of mouth, and door-to-door brochure distribution in several places in the Netherlands. Adolescents were asked to independently fill in an online questionnaire at home. Before the questionnaire assessment, participants were informed about the topic and purpose of the study, that participation was voluntary and anonymous, and that they could resign participation whenever they wished. Participants provided active informed consent for their participation at the beginning of the questionnaire. Active parental informed consent for child participation was obtained through the online registration form before participation. Completion of the questionnaire approximately took 30-45 minutes. Families were compensated with a gift card (€5 per participating family member) and were eligible to win a voucher for a Dutch family theme park (Efteling).

Social Media Disorder

The outcome variable in this study is adolescents' at-risk/problematic social media use filled in by the adolescent. This was measured using the validated 9-item 'Social Media Disorder Scale' (Van Den Eijnden, Lemmens & Valkenburg 2016). The used scale consists of eight items displayed in Table 1, measuring symptoms of addiction regarding social media, including preoccupation, withdrawal, tolerance, persistence, displacement, conflict, deception, escape, and problems (α = .66). Item seven (*During the past year, have you often used social media to escape from negative feelings?*) was removed since it negatively influenced the internal validity of the scale. Response scales were dichotomous, indicating whether the symptom was present or not in the past year (1 = yes and 0 = no). To classify the participants as normative or at-risk/problematic social media users, the sum score (range 0-8) on the Social Media Disorder Scale (Van den Eijnden et al., 2016) will be calculated, where after the variable will be dichotomized into 0 = normative users (score of 0 or 1) and 1 = problematic users (score of ≥ 2; Boer et al., 2021).

Sensory Processing Sensitivity

Sensory Processing Sensitivity was measured using the validated eight-item 'Highly Sensitive Child Scale' displayed in Table 1, filled in by the adolescent (Pluess et al., 2018; Weyn et al., 2019). The response options ranged from 1 (totally disagree) to 5 (totally agree). All eight items combined represent a sum score for SPS (α = .77) No items needed to be reverse coded. Higher scores indicate a higher level of sensory processing sensitivity.

Table 1. Overview of Items in the Questionnaire for measuring SMD, SPS and PP.

Social Media Disorder (SMD)	**Sensory Processing Sensitivity (SPS)**	**Positive Parenting (PP)**
During the past year, have you… 1. … regularly neglected other activities (e.g. hobbies, sports) because you wanted to use social media?	1. I find it unpleasant to have a lot going on at once	1. I can count on my parent(s) (or caregivers) to help me out if I have a problem. (*Responsiveness*)
2. … regularly found that you can't think of anything else but the moment that you will be able to use social media again?	2. Loud noises make me feel uncomfortable	2. My parent(s) (or caregivers) hardly ever praise me for doing well. (*Responsiveness, recoded*)
3. … to spend less time on social media?	3. I am annoyed when people try to get me to do too many things at once	3. My parent(s) (or caregivers) and I do things that are fun together. (*Responsiveness*)
4. … often felt bad when you could not use social media?	4. I feel rushed when I have to do a lot in little time	4. My parent(s) (or caregivers) expect me to follow family rules. (*Demandingness*)
5. … regularly felt dissatisfied because you wanted to spend more time on social media?	5. I do not like watching TV programs that have a lot of violence in them	5. My parent(s) (or caregivers) let me get away with things. (Demandingness, recoded)
6… . regularly lied to your parents or friends about the amount of time you spend on social media?	6. I do not like loud noises	6. My parent(s) (or caregivers) point out ways I could do better. (*Demandingness*)
7. ... regularly had arguments with others because of your social media use?	7. I do not like it when things change in my life	7. My parent(s) (or caregivers) respect my privacy. (*Autonomy-granting*)
8. … had a serious conflict with your parents, brother(s) or sister(s) because of your social media use?	8. When someone observes me, I get nervous. This makes me perform worse than normal.	8. My parent(s) (or caregivers) give me a lot of freedom. (*Autonomy-granting*)
		9. My parent(s) (or caregivers) make most of the decisions about what I can do. (*Autonomy-granting, recoded*)
		10. My parent(s) (or caregivers) believe I have a right to my point of view. (*Autonomy-granting*)

Positive Parenting

Ten items of the validated 'Parenting Style Inventory II' were used to measure PP, displayed in Table 1. The inventory included three core dimensions of positive parenting; responsiveness, demandingness and autonomy-granting (Darling & Toyokawa, 1997; $\alpha = .71$). Item six (*If I don't behave myself, my parent(s) (or caregivers) will punish me.*) was removed to create higher internal validity. For all three subscales, the response options ranged from 1 (totally disagree) to 5 (totally agree). Before calculating the total score of PP items 2, 5 and 9 were reversed coded (depending on the wording of the items), so that a higher score indicates higher PP.

Statistical Analyses

In the current study, IBM SPSS statistics Version 25 was used to analyse the data. Descriptive analyses were conducted to sum the demographic variables of the adolescent sample. Adolescents' SMD use was used as a dichotomous outcome variable and gender and age as control variables. Scores of PP were used as a categorical variable (low, middle and high PP), by dividing the scores into three even groups of 33.33% based on the frequencies. SPS was included as a continuous predictor variable in the analysis. To get a first impression of the relationship between SPS, PP and SMD, Spearman correlations were calculated. Then, using Logistic Regression Analysis, it was investigated how the independent variable (SPS) is related to the dependent variable (SMD) (H1). Chi-square analysis and One-way ANOVA analysis were used to investigate the occurrence of SMD between the different PP groups (H2). At last, the moderating role of PP in the relationship between SPS and SMD (H3) was investigated using logistic regression analysis.

Results

Descriptive results

Considering the maximum score on the Social Media Disorder Scale is 8, participants' average score on the items of SMD was low ($M = 1.08$, $SD = 1.04$). The distribution of the scores were right-skewed, with 26.3% meeting criteria for a SMD (score ≥ 2). Scores on the SPS scale, were normally distributed (min: 9.00 – max: 37.00, $M = 23.78$, $SD = 5.68$). A T-test ($F = 2.47$, df = 311, $p < .001$) displayed that scores on SPS were significantly higher for females ($M = 25.38$, $SD = 5.15$) compared to males ($M = 21.86$, $SD = 5.71$). The PP scores were also normally distributed ($M = 40.38$, $SD = 4.22$), with the scores in the low PP group ranging from 22 to 38, the middle PP group from 39 to 42 and the high PP group from 43 to 50.

Correlations

In Table 2, Spearman correlations between all variables are depicted. Gender seems to be related to SPS, indicating that SPS scores of female adolescents are significantly higher compared to male adolescents. The relationship between PP and SMD is also significant. This means that there is a significant difference in the occurrence of SMD between the low, middle and high PP groups. No significant relationship between SPS and SMD was found (H1).

Table 2. Spearman Correlation Matrix of Age, Gender, Social Media Disorder, Sensory Processing Sensitivity and Positive Parenting, *N* = 312.

Variable	1	2	3	4	5
1. Age	-				
2. Gender	.03	-			
3. Social Media Disorder	-.03	.06	-		
4. Sensory Processing Sensitivity	-.01	.31**	.07	-	
5. Positive Parenting	-.08	.06	-.20**	-.07	-

Note. Gender: male = 1, female = 2, SMD: healthy = 0, disorder = 1, Positive Parenting: low = 0, middle = 1, high = 2. Age and Sensory Processing Sensitivity are continuous variables.
***p* <.001.

Social Media Disorder between Groups

Basic assumptions for Logistic Regression Analysis; the independence of errors, linearity for continuous variables, absence of multicollinearity and strongly influential outliers were checked and not violated. In Table 3 the frequencies and percentages of healthy adolescents and adolescents with SMD, within the three PP groups and between male and female adolescents are displayed. A Chi-square test was performed to examine the relationship between SMD and PP (H2). This relationship was significant, (N = 315); X^2 (2) = 13.63, $p < .05$. One-way ANOVA analysis showed that there is a statistically-significant difference in SMD between the three PP groups (N = 314); $F(2) = 7.052$, $p < .05$). Post-hoc analyses using Bonferroni correction indicated that there are significantly more adolescents with SMD in the low PP group compared to the high PP group ($p < .05$) and significantly more adolescents with SMD in the middle PP groups compared to the high PP group.

Table 3. Frequencies and Percentages of Social Media Disorder, Positive Parenting and Gender.

		Social Media Disorder		
		Healthy	Disorder	Total
		N (%)	*N* (%)	*N* (%)
Positive Parenting	Low	53 (16.8)	30 (9.5)	83 (26.3)
	Middle	98 (31.1)	40 (12.7)	138 (43.8)
	High	82 (26.0)	12 (3.8)	94 (29.8)
	Total	233 (74.0)	82 (26.0)	315 (100)
Gender	Male	111 (34.9)	34 (10.7)	145 (45.6)
	Female	123 (38.7)	50 (15.7)	173 (54.4)

Positive Parenting as Moderator

Logistic regression was used to test the hypotheses of PP acting as a moderator in the relationship between SPS and SMD (H3). In Block 1 of the model, the control variables age and gender were entered, which did not lead to a significant model ($p > .05$). Next, the predictor SPS was added in Block 2 (H1), followed by the PP groups (low, middle and high) in Block 3 (H2). To test the third hypothesis, SPS and PP were standardized and combined in an interaction term. This variable was entered in Block 4. The Logistic Regression coefficients for each separate block of the model can be found in Table 4. There is no main effect of SPS on SMD and PP does not moderate this relationship, since models two and four were not significant. Only the change in explained variance (ΔR^2) between models two and three, after PP was added, was significant ($p < .05$). This means that when the predictor PP was added the model best predicted SMD. In Block four low PP ($OR = 4.07$, $CI = 1.89, 8.78$, $p = .00$) and middle PP ($OR = 3.01$, $CI = 1.47, 6.19$, $p = .00$) were significant predictors of SMD. The analysis indicated that the odds of having SMD are 4.07 times higher in the low PP group compared to the high PP group and that the odds of having SMD in the middle PP group are 3.01 times higher compared to the high PP group.

Table 4. Logistic Regression Analysis of the Influence of Sensory Processing Sensitivity and Positive Parenting on the Occurrence of a Social Media Disorder (*N* = 312).

	Social Media Disorder					95% CI	
	Model fit	R^2	ΔR^2	β	Odds ratio	*Lower*	*Upper*
BLOCK 1: Control variables	$X^2(2) = 1.25, p > .05$	.01					
Age				-.03	.97	.83	1.14
Gender				-.28	.76	.45	1.27
BLOCK 2: Predictor variable	$X^2(3) = 2.31, p > .05$	.01	1.06				
Age				-.03	.97	.83	1.14
Gender				.28	.83	.48	1.42
SPS				.02	1.03	.98	1.08
BLOCK 3: Moderator	$X^2(5) = 17.69, p < .05$*	.08	15.38				
Age				-.06	.94	.80	1.12
Gender				-.30	.74	.42	1.29
SPS				.02	1.02	.97	1.07
Low PP				1.39	4.01	1.87	8.62
Middle PP				1.10	2.99	1.46	6.13
High PP				-	-	-	-
BLOCK 4: Interaction term	$X^2(6) = 17.90, p > .05$	.08	0.22				
Age				-.06	.94	.80	1.11
Gender				-.30	1.35	.77	2.35
SPS				.02	1.02	.97	1.08
Low PP				1.40**	4.07	1.89	8.77
Middle PP				1.10*	3.01	1.46	6.19
High PP				-	-	-	-
SPS x PP				.07	1.07	.81	1.42

Note. Reference category = Healthy. R^2 = Nagelkerke R Square. SPS = Sensory Processing Sensitivity, PP = Positive Parenting, reference category = high PP, CI = Confidence Interval of Odds ratio
*$p < .05$, **$p < .001$

Discussion

In this study, we investigated how social media disorder (SMD) is related to sensory processing sensitivity (SPS) and what the role of positive parenting (PP) is. No influences of SPS on SMD of the adolescent were found (Figure 2). Furthermore, PP did not moderate this relationship but seemed to directly influence the occurrence of SMD. The results did not support our first hypothesis, stating that adolescents with higher SPS were more likely to have SMD. This was not expected based on the Korean studies in which an association between SPS and smartphone addiction was found (Hong & Lee, 2018; Park & Chang, 2015). The first explanation of the differences with current results could be the cultural differences in problematic mobile phone use in Korea compared to the Netherlands. Some studies have indicated a higher prevalence of mobile phone dependency in East Asian populations compared to Western countries (Shin, 2014). The large supply of mobile phones and the high percentage of young people using them could be the cause of this (Gutiérrez, De Fonseca & Rubio, 2016). Specifically, in Korea, university students showed a greater level of mobile phone dependence (11.15%) compared to American students (6.36%) (Shin, 2014). Mobile phone use and the prevalence of SMD may also be lower in the Netherlands compared to Korea (Schwanen & Kwan, 2008). Nevertheless, Cross-cultural studies are needed to make systematic comparisons to understand variations of social media use as it is influenced by cultural context.

Second, the results were not in line with Ben-Sasson and colleagues (2009), who suggest that SPS is associated with psychological problems. Their sample consisted of younger children (ages 7–11 years) instead of adolescents. Age-related changes in global sensory processing may be the underlying reason for these different results. Implying that growing older decreases the ability to extract sensory information from the environment (Ueno, Takahashi & Oshio, 2019; Humes, Busey, Craig & Kewley-Port, 2013). This could mean that younger children with high SPS are more susceptible to developing a dependency on media devices (Harrison et al., 2019). Third, their use of another inventory to measure SPS could explain their observed relationship between SPS and SMD. They used an extensive scale with 76 items was used (Sensory Over-Responsivity Scales; Schoen et al. 2008) to investigate sensations in all sensory domains that may bother a child (Ben-Sasson et al., 2009).

Additionally, the complexity of SPS as one construct can also explain the current non-significant relationship between SPS and SMD. Recent studies have proposed and empirically verified that SPS is composed of three dimensions of constructs (Pluess et al., 2018; Smolewska, McCabe & Woody, 2006): 1) aesthetic sensitivity (AES) refers to the depth of aesthetic experiences; 2) low sensory threshold (LST) refers to the sensitivity to external stimuli, and 3) ease of excitation (EOE) refers to the susceptibility to internal and external stimuli. Each of them is linked to different

personality characteristics and outcomes. More specifically, EOE and LST relate to some negative outcomes, such as negative emotionality, anxiety, or depression (Evers, Rasche & Schabracq., 2008; Liss et al., 2005). Whereas, AES was related to positive outcomes, such as stronger well-being (Liss et al., 2005; Sobocko & Zelenski, 2015). Therefore, compared with AES, EOE and LST may only be associated with SMD. In future research, distinguishing between these three components can provide more specific results.

Positive Parenting

In line with the second hypothesis, the findings show that adolescents who reported average and high levels of PP were less likely to have SMD (Figure 2). PP may function as a protective factor regarding the development of SMD. This is consistent with Park, Kim & Cho (2008), who stated that an adolescent's family environment is highly predictive of Internet addiction. These findings are also consistent with an empirical study showing that positive parent-child interaction can assist in reducing problematic Internet Use (Boniel-Nissim & Sasson, 2018). However, as the current cross-sectional design has no dimension of time, it cannot support conclusions on the risk of developing SMD. Nor can any statement be made about causality or the direction of the relationship between SMD and PP. Longitudinal or experimental research is needed to further investigate the direction of this relationship.

The third hypothesis stating that the association between high SPS and SMD is moderated by PP, cannot be assumed (Figure 2). This contradicts studies describing that highly sensitive individuals are more likely to report negative affectivity as a result of adverse childhood environments compared to less sensitive individuals (Aron, Aron & Davies, 2005). Current results are also not in line with a study suggesting that highly sensitive individuals were more depressed in the context of low parental care (Liss et al., 2005). The suggested relationship between SPS, media device dependency and parent-child conflict can also not be confirmed (Harrison et al., 2018). Alongside the age-related cognitive changes regarding SPS (Ueno, Takahashi & Oshio, 2019), changes in parent-child interactions during adolescence may also explain the difference in results (Valkenburg, 2002). The desire for autonomy increases in adolescence and many more contextual factors (e.g. teachers, peer groups) influence development compared to younger children (Sameroff, 2010). Additionally, the adolescent will take on more and more responsibility for his or her well-being. This can explain why studies with smaller children found an association between parenting, SPS and media dependency (Sameroff, 2010; Harrison et al., 2018).

Future research should further explore parental influences during adolescence on SPS and SMD. Investigating the moderating role of specific media-related parental practices such as Internet rule-setting, mediation and monitoring could further clarify differences between children and

adolescents (Beyens & Valkenburg, 2019; Valcke et al., 2010). Furthermore, all directions of the relationships between SPS, SMD and PP should be explored. Individuals who have parents that communicate the message that they cannot take care of themselves and need to be protected may, for instance, become more highly sensitive. Thus, the sensitivity of the adolescent may lead to particular parenting behaviours that enhance that sensitivity (Liss et al., 2005).

Strengths and Limitations

A strength of this study is the large sample with a wide variety of ages. Another strength is the use of validated scales to measure SMD, SPS and PP. However, some study limitations should be noted. First of all, the results of the current study can be explained by the low prevalence rate of adolescents with SMD (26.4 %). Research within a clinical sample of adolescents with diagnosed SMD can further improve our knowledge about its influencing factors. Second, the sample consisted of adolescents in mainly the higher education groups (Havo, Vwo, and Gymnasium, 2020). The lower education groups are not represented enough to match the true characteristics of the population, meaning that we cannot generalize findings to adolescents with all different educational backgrounds. In the future, data collection should be random and organized in multiple ways to include all societal layers. Third, the report bias of adolescents may have influenced our results, since the items are self-report questions. Future studies could compare answers of adolescents with answers of their caregivers to control for this.

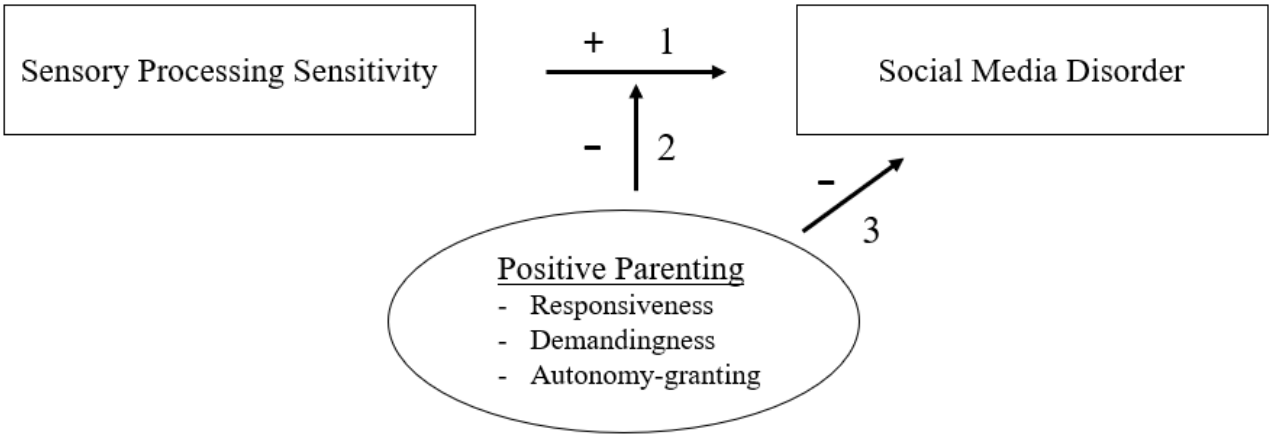
Conclusion and Implications

This study emphasized the protective role of PP concerning the occurrence of SMD in adolescents. Additionally, SPS does not seem to fully explain disordered social media use in adolescents. This suggests that both adolescents with high and low sensory processing sensitivity can be at risk of developing a social media disorder. Although the construct of SPS is relatively new to the literature and rarely measured in clinical settings, it may be an important predisposing factor for psychological difficulties. A different component of sensory processing, sensation seeking, has received more scientific attention and is known to be related to Internet addiction (Wang, Jackson, Zhang & Su, 2012; Lin & Tsai, 2002). However, from a clinical perspective, patients with Internet addiction have been described in terms of high harm avoidance, shyness, and social insecurity (Ko et al., 2006; Ha et al., 2006, Müller, Glaesmer, Brähler, Woelfling & Beutel 2014), which seems to poorly fit the description of sensation seekers. Further research should therefore focus on the similarities and differences between SPS, sensation seeking and other related constructs such as behavioural inhibition and shyness in relation to SMD.

A more comprehensive study is needed to describe the association between different aspects of sensory processing and how it is related to contextual factors that enhance problematic social

media use. Examining how individual characteristics and parental influences are related to SMD may contribute to a deeper understanding of the underlying factors of SMD. This could support the development of interventions and prevention programs for SMD within health institutions. Health professionals need to be aware of the effects of today's developing technologies on young people's health and should teach adolescents about the consequences of heavy use of the Internet. A preliminary study suggests that a psychoeducation program based on Acceptance and Commitment Therapy to raise awareness can effectively reduce social media impairment (Ercengiz, 2019). Results may also assist parents to understand and manage their children's sensory patterns to prevent undesirable outcomes such as SMD. This may improve the quality of life of children and adolescents growing up in this era that is highly influenced by technology.

Figure 2. *Theoretical Model of the Relationship between Sensory Processing Sensitivity and a Social Media Disorder with the role of Positive Parenting.*



Note. Hypotheses 1, 2 and 3 are indicated alongside the arrows. The + indicates a positive relationship, the - indicates a negative relationship.

References

Al-Menayes, J. J. (2015). Social Media Use, Engagement and Addiction as Predictors of Academic Performance. *International Journal of Psychological Studies*, *7*(4), 86. https://doi.org/10.5539/ijps.v7n4p86

Andreassen, C. S. (2015). Online Social Network Site Addiction: A Comprehensive Review. *Current Addiction Reports*, *2*(2), 175–184. https://doi.org/10.1007/s40429-015-0056-9

Argyle, M. (2001). The Psychology of Happiness. *London: Routledge* https://www.cis.org.au/wp-content/uploads/2015/04/images/stories/policy-magazine/2002-autumn/2002-18-1-richard-tooth.pdf

Aron, E. N., & Aron, A. (1997). Sensory-processing sensitivity and its relation to introversion and emotionality. *Journal of Personality and Social Psychology*, *73*(2), 345–368. https://doi.org/10.1037/0022-3514.73.2.345

Aron, E. N., Aron, A., & Davies, K. M. (2005). Adult Shyness: The Interaction of Temperamental Sensitivity and an Adverse Childhood Environment. *Personality and Social Psychology Bulletin*, *31*(2), 181–197. https://doi.org/10.1177/0146167204271419

Bányai, F., Zsila, G., Király, O., Maraz, A., Elekes, Z., Griffiths, M. D., Andreassen, C. S., & Demetrovics, Z. (2017a). Problematic Social Media Use: Results from a Large-Scale Nationally Representative Adolescent Sample. *PLOS ONE*, *12*(1), e0169839. https://doi.org/10.1371/journal.pone.0169839

Barbera, L. D., Paglia, L. F., & Valsavoia, R. (2009). Social network and addiction. *Stud Health Technol Inform*, *144*, 33-36. https://www.researchgate.net/profile/Brenda-Wiederhold/publication/26661683_Next_generation_stress_inoculation_training_for_life_saving_skills_using_prosthetics/links/569eaee508ae4af525449607/Next-generation-stress-inoculation-training-for-life-saving-skills-using-prosthetics.pdf#page=45

Baumrind, D. (1978). Parental Disciplinary Patterns and Social Competence in Children. *Youth & Society*, *9*(3), 239–267. https://doi.org/10.1177/0044118x7800900302

Baumrind, D. (1980). New directions in socialization research. *American Psychologist*, *35*(7), 639–652. https://doi.org/10.1037/0003-066x.35.7.639

Benham, G. (2006). The Highly Sensitive Person: Stress and physical symptom reports. *Personality and Individual Differences*, *40*(7), 1433–1440. https://doi.org/10.1016/j.paid.2005.11.021

Ben-Sasson, A., Carter, A. S., & Briggs-Gowan, M. J. (2009). Sensory Over-Responsivity in Elementary School: Prevalence and Social-Emotional Correlates. *Journal of Abnormal Child Psychology*, *37*(5), 705–716. https://doi.org/10.1007/s10802-008-9295-8

Beyens, I., & Valkenburg, P. M. (2019). Parental Media Mediation in Adolescence: A Comparative Study of Parent and Adolescent Reports. *Journal of Broadcasting & Electronic Media*, *63*(4), 716–736. https://doi.org/10.1080/08838151.2019.1680071

Boer, M., Stevens, G., Finkenauer, C., & Eijnden, R. (2019). Attention Deficit Hyperactivity Disorder-Symptoms, Social Media Use Intensity, and Social Media Use Problems in Adolescents: Investigating Directionality. *Child Development*, *91*(4). https://doi.org/10.1111/cdev.13334

Boer, M., Stevens, G. W. J. M., Finkenauer, C., Koning, I. M., & van den Eijnden, R. J. J. M. (2021). Validation of the Social Media Disorder Scale in Adolescents: Findings From a Large-Scale Nationally Representative Sample. *Assessment*, 107319112110272. https://doi.org/10.1177/10731911211027232

Boniel-Nissim, M., & Sasson, H. (2018). Bullying victimization and poor relationships with parents as risk factors for problematic internet use in adolescence. *Computers in Human Behavior*, *88*, 176–183. https://doi.org/10.1016/j.chb.2018.05.041

Booth, C., Standage, H., & Fox, E. (2015). Sensory-processing sensitivity moderates the association between childhood experiences and adult life satisfaction. *Personality and Individual Differences*, *87*, 24–29. https://doi.org/10.1016/j.paid.2015.07.020

Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience & Biobehavioral Reviews*, *71*, 252–266. https://doi.org/10.1016/j.neubiorev.2016.08.033

Branjerdporn, G., Meredith, P., Strong, J., & Green, M. (2019). Sensory sensitivity and its relationship with adult attachment and parenting styles. *PLOS ONE*, *14*(1), e0209555. https://doi.org/10.1371/journal.pone.0209555

Bronfenbrenner, U. (1980). Ecology of Childhood. *School Psychology Review*, *9*(4), 294–297. https://doi.org/10.1080/02796015.1980.12086568

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, *22*(6), 723–742. https://doi.org/10.1037/0012-1649.22.6.723

Brown, C., Tollefson, N., Dunn, W., Cromwell, R., & Filion, D. (2001). The Adult Sensory Profile: Measuring Patterns of Sensory Processing. *The American Journal of Occupational Therapy*, *55*(1), 75–82. https://doi.org/10.5014/ajot.55.1.75

Ceci, S. J. (2006). Urie Bronfenbrenner (1917–2005). *American Psychologist*, *61*(2), 173–174. https://doi.org/10.1037/0003-066x.61.2.173

Choi, Y. E., & Jung, H. (2021). Sensory Processing as a Predictor of Leisure Participation in Early Adolescents. *Children*, *8*(11), 1005. https://doi.org/10.3390/children8111005

Chopik, W. J. (2017). Associations among relational values, support, health, and well-being across the adult lifespan. *Personal Relationships*, *24*(2), 408–422. https://doi.org/10.1111/pere.12187

Darling, N., & Toyokawa, T. (1997). Construction and validation of the parenting style inventory II (PSI-II). Unpublished manuscript, 89. https://www.researchgate.net/profile/Nancy-Darling/publication/341909949_Construction_and_Validation_of_the_Parenting_Style_Inventory_II_PSI-II/links/5ed9027792851c9c5e7bc63d/Construction-and-Validation-of-the-Parenting-Style-Inventory-II-PSI-II.pdf

del Boca, F. K., & Darkes, J. (2003). The validity of self-reports of alcohol consumption: state of the science and challenges for research. *Addiction*, *98*, 1–12. https://doi.org/10.1046/j.1359-6357.2003.00586.x

De-Sola Gutiérrez, J., Rodríguez De Fonseca, F., & Rubio, G. (2016). Cell-Phone Addiction: A Review. *Frontiers in Psychiatry*, *7*. https://doi.org/10.3389/fpsyt.2016.00175

Dunn, W. (2001). The Sensations of Everyday Life: Empirical, Theoretical, and Pragmatic Considerations. *The American Journal of Occupational Therapy*, *55*(6), 608–620. https://doi.org/10.5014/ajot.55.6.608

Van Den Eijnden, R. J., Lemmens, J. S., & Valkenburg, P. M. (2016). The social media disorder scale. *Computers in Human Behavior, 61*, 478-487. https://doi.org/10.1016/j.chb.2016.03.038

Ennemoser, M., & Schneider, W. (2007). Relations of television viewing and reading: Findings from a 4-year longitudinal study. *Journal of Educational Psychology*, *99*(2), 349–368. https://doi.org/10.1037/0022-0663.99.2.349

Ercengiz, M. (2019). The Effectiveness of ACT based Psycho-Education Program on Social Media Disorder. *International Online Journal of Educational Sciences*, *11*(1). https://doi.org/10.15345/iojes.2019.01.002

Evers, A., Rasche, J., & Schabracq, M. J. (2008). High sensory-processing sensitivity at work. *International Journal of Stress Management*, *15*(2), 189–198. https://doi.org/10.1037/1072-5245.15.2.189

Fleming, M. J., Greentree, S., Cocotti-Muller, D., Elias, K. A., & Morrison, S. (2006). Safety in Cyberspace. *Youth & Society*, *38*(2), 135–154. https://doi.org/10.1177/0044118x06287858

Global Social Media Statistics. (2022, April). DataReportal – Global Digital Insights. https://datareportal.com/social-media-users

Gray, M. R., & Steinberg, L. (1999). Unpacking Authoritative Parenting: Reassessing a Multidimensional Construct. *Journal of Marriage and the Family*, *61*(3), 574. https://doi.org/10.2307/353561

Griffiths, M. (2013). Social Networking Addiction: Emerging Themes and Issues. *Journal of Addiction Research & Therapy*, *04*(05). https://doi.org/10.4172/2155-6105.1000e118

Ha, J. H., Yoo, H. J., Cho, I. H., Chin, B., Shin, D., & Kim, J. H. (2006). Psychiatric Comorbidity Assessed in Korean Children and Adolescents Who Screen Positive for Internet Addiction. *The Journal of Clinical Psychiatry*, *67*(05), 821–826. https://doi.org/10.4088/jcp.v67n0517

Harrison, K. (2019). Rude or shrewd? Reframing media devices as care structures and child use as accommodation. *Journal of Children and Media*, *13*(3), 367–375. https://doi.org/10.1080/17482798.2019.1628192

Harrison, K., Vallina, L., Couture, A., Wenhold, H., & Moorman, J. D. (2018). Sensory curation: theorizing media use for sensory regulation and implications for family media conflict. *Media Psychology*, *22*(4), 653–688. https://doi.org/10.1080/15213269.2018.1496024

Hart, C. H., Newell, L. D., & Olsen, S. F. (2003). Parenting skills and social-communicative competence in childhood. https://doi.org/10.4324/9781410607133

Hong, E., & Lee, H. (2018). The Correlation Between Smartphone Addiction and Sensory Processing Feature Depending on Gender in College Students. *Journal of Korean Society of Sensory Integration Therapists*, *16*(3), 1–10. https://doi.org/10.18064/jkasi.2018.16.3.001

Huang, C. (2018). Social network site use and academic achievement: A meta-analysis. *Computers & Education*, *119*, 76–83. https://doi.org/10.1016/j.compedu.2017.12.010

Inchley, J., Currie, D., Budisavljevic, S., Torsheim, T., Jåstad, A. & Cosma, A. (2020). Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. *International report, vol. 2*. Key data. Geneva, Switzerland: World Health Organization https://apps.who.int/iris/bitstream/handle/10665/332104/9789289055017-eng.pdf?sequence=1&isAllowed=y

James, C., Davis, K., Charmaraman, L., Konrath, S., Slovak, P., Weinstein, E., & Yarosh, L. (2017). Digital Life and Youth Well-being, Social Connectedness, Empathy, and Narcissism. *Pediatrics*, *140*(Supplement_2), S71–S75. https://doi.org/10.1542/peds.2016-1758f

Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., Wu, K., & Yen, C. F. (2006). Tridimensional Personality of Adolescents with Internet Addiction and Substance Use Experience. *The Canadian Journal of Psychiatry*, *51*(14), 887–894. https://doi.org/10.1177/070674370605101404

Koning, I. M., Harakeh, Z., Engels, R. C. M. E., & Vollebergh, W. A. M. (2010). A comparison of self-reported alcohol use measures by early adolescents: Questionnaires versus diary. *Journal of Substance Use*, *15*(3), 166–173. https://doi.org/10.3109/14659890903013091

Kuppens, S., & Ceulemans, E. (2018a). Parenting Styles: A Closer Look at a Well-Known Concept. *Journal of Child and Family Studies*, *28*(1), 168–181. https://doi.org/10.1007/s10826-018-1242-x

Kuppens, S., & Ceulemans, E. (2018b). Parenting Styles: A Closer Look at a Well-Known Concept. *Journal of Child and Family Studies*, *28*(1), 168–181. https://doi.org/10.1007/s10826-018-1242-x

Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents. *PLoS ONE*, *8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Lin, S. S., & Tsai, C. C. (2002). Sensation seeking and internet dependence of Taiwanese high school adolescents. *Computers in Human Behavior*, *18*(4), 411–426. https://doi.org/10.1016/s0747-5632(01)00056-5

Liss, M., Timmel, L., Baxley, K., & Killingsworth, P. (2005b). Sensory processing sensitivity and its relation to parental bonding, anxiety, and depression. *Personality and Individual Differences*, *39*(8), 1429–1439. https://doi.org/10.1016/j.paid.2005.05.007

Lwin, M., Stanaland, A., & Miyazaki, A. (2008). Protecting children's privacy online: How parental mediation strategies affect website safeguard effectiveness. *Journal of Retailing*, *84*(2), 205–217. https://doi.org/10.1016/j.jretai.2008.04.004

Maccoby, E.E., & Martin, J.A. (1983). Socialization in the context of the family: Parent–child interaction. In P. Mussen and E.M. Hetherington, editors, Handbook of Child Psychology, volume IV: *Socialization, personality, and social development*. New York: Wiley.

Masson, M., Lamoureux, J., & de Guise, E. (2020). Self-reported risk-taking and sensation-seeking behavior predict helmet wear amongst Canadian ski and snowboard instructors. *Canadian*

Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement, *52*(2), 121–130. https://doi.org/10.1037/cbs0000153

Miller, S. A. (1995). Parents' Attributions for Their Children's Behavior. *Child Development*, *66*(6), 1557. https://doi.org/10.2307/1131897

Müller, K. W., Glaesmer, H., Brähler, E., Woelfling, K., & Beutel, M. E. (2013). Prevalence of internet addiction in the general population: results from a German population-based survey. *Behaviour & Information Technology*, *33*(7), 757–766. https://doi.org/10.1080/0144929x.2013.810778

Myers, D. G. (2000). The funds, friends, and faith of happy people. *American Psychologist*, *55*(1), 56–67. https://doi.org/10.1037/0003-066x.55.1.56

Nam, Y. O. (2002). A study on the psychosocial variables of the youth's addiction to internet and cyber sex and their problematic behavior. *Korean Journal of Social Welfare, 50*, 173-207. https://www.koreascience.or.kr/article/JAKO200203553208703.pdf

Nguyen, M. H. (2021). Managing Social Media Use in an "Always-On" Society: Exploring Digital Wellbeing Strategies That People Use to Disconnect. *Mass Communication and Society*, *24*(6), 795–817. https://doi.org/10.1080/15205436.2021.1979045

Park, Y., & Chang, M. (2015). The Correlation Between Smartphone Addiction and Sensory Processing Feature, Self-Efficacy in College Students. *Journal of Korean Society of Sensory Integration Therapists*, *13*(2), 43–51. https://doi.org/10.18064/jkasi.2015.13.2.043

Park, S. K., Kim, J. Y., & Cho, C. B. (2008). Prevalence of Internet addiction and correlations with family factors among South Korean adolescents. *Adolescence*, *43*(172). https://web.s.ebscohost.com/ehost/detail/detail?vid=2&sid=6f5e4aa3-29c1-42eb-9de3-7f73f7a4740f%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl

Pettit, G. S., & Bates, J. E. (1989). Family interaction patterns and children's behavior problems from infancy to 4 years. *Developmental Psychology*, *25*(3), 413–420. https://doi.org/10.1037/0012-1649.25.3.413

Piteo, E. M., & Ward, K. (2020). Review: Social networking sites and associations with depressive and anxiety symptoms in children and adolescents – a systematic review. *Child and Adolescent Mental Health*, *25*(4), 201–216. https://doi.org/10.1111/camh.12373

Pluess, M., Assary, E., Lionetti, F., Lester, K. J., Krapohl, E., Aron, E. N., & Aron, A. (2018). Environmental sensitivity in children: Development of the Highly Sensitive Child Scale and identification of sensitivity groups. *Developmental Psychology*, *54*(1), 51–70. https://doi.org/10.1037/dev0000406

Prabandari, K., & Yuliati, L. N. (2016a). The Influence of Social Media Use and Parenting Style on Teenagers' Academic Motivation and Academic Achievement. *Journal of Child Development Studies*, *1*(01), 39. https://doi.org/10.29244/jcds.1.01.39-53

Ramazanoglu, M. (2020). The Relationship between High School Students' Internet Addiction, Social Media Disorder, and Smartphone Addiction. *World Journal of Education, 10*(4), 139-148. https://files.eric.ed.gov/fulltext/EJ1266945.pdf

Rasmussen-Torvik, L. J., Pankow, J. S., Jacobs, D. R., Steinberger, J., Moran, A., & Sinaiko, A. R. (2008). The association of SNPs in ADIPOQ, ADIPOR1, and ADIPOR2 with insulin sensitivity in a cohort of adolescents and their parents. *Human Genetics*, *125*(1), 21–28. https://doi.org/10.1007/s00439-008-0595-4

Reis, H. T., Collins, W. A., & Berscheid, E. (2000). The relationship context of human behavior and development. *Psychological Bulletin*, *126*(6), 844–872. https://doi.org/10.1037/0033-2909.126.6.844

Salmela-Aro, K., Upadyaya, K., Hakkarainen, K., Lonka, K., & Alho, K. (2016b). The Dark Side of Internet Use: Two Longitudinal Studies of Excessive Internet Use, Depressive Symptoms, School Burnout and Engagement Among Finnish Early and Late Adolescents. *Journal of Youth and Adolescence*, *46*(2), 343–357. https://doi.org/10.1007/s10964-016-0494-2

Sameroff, A. (2010). A Unified Theory of Development: A Dialectic Integration of Nature and Nurture. *Child Development*, *81*(1), 6–22. https://doi.org/10.1111/j.1467-8624.2009.01378.x

Schoen, S. A., Miller, L. J., & Green, K. E. (2008). Pilot Study of the Sensory Over-Responsivity Scales: Assessment and Inventory. *The American Journal of Occupational Therapy*, *62*(4), 393–406. https://doi.org/10.5014/ajot.62.4.393

Seay, A., Freysteinson, W. M., & McFarlane, J. (2014). Positive Parenting. *Nursing Forum*, *49*(3), 200–208. https://doi.org/10.1111/nuf.12093

Seckman, A., Paun, O., Heipp, B., van Stee, M., Keels-Lowe, V., Beel, F., Spoon, C., Fogg, L., & Delaney, K. R. (2017). Evaluation of the use of a sensory room on an adolescent inpatient unit and its impact on restraint and seclusion prevention. *Journal of Child and Adolescent Psychiatric Nursing, 30*(2), 90–97. https://doi.org/10.1111/jcap.12174

Shin, L. Y. (2014). A Comparative Study of Mobile Internet Usage between the U.S. and Korea. *Journal of European Psychology Students, 5*(3), 46–55. https://doi.org/10.5334/jeps.cg

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E. & Olafsson, K. et al. (2020). *Kids Online 2020: survey results from 19 countries*. Available at: https://doi.org/10.21953/lse.47fdeqj01ofo (last accessed 8th May, 2022)

Smolewska, K. A., McCabe, S. B., & Woody, E. Z. (2006). A psychometric evaluation of the Highly Sensitive Person Scale: The components of sensory-processing sensitivity and their relation to the BIS/BAS and "Big Five." *Personality and Individual Differences*, *40*(6), 1269–1279. https://doi.org/10.1016/j.paid.2005.09.022

Sobocko, K., & Zelenski, J. M. (2015). Trait sensory-processing sensitivity and subjective well-being: Distinctive associations for different aspects of sensitivity. *Personality and Individual Differences*, *83*, 44–49. https://doi.org/10.1016/j.paid.2015.03.045

Sozańska, D. (2018). Recenzja: Jean M. Twenge (2017) iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood – and What That Means for the Rest of Us, Atria Books: New York, London, Toronto, New Delhi [Kindle edition]. *Homo et Societas*, *3*, 124–126. https://doi.org/10.4467/25436104hs.18.011.12312

Schwanen, T., & Kwan, M. P. (2008). The Internet, mobile phone and space-time constraints. Geoforum, 39(3), 1362–1377. https://doi.org/10.1016/j.geoforum.2007.11.005

Ueno, Y., Takahashi, A., & Oshio, A. (2019). Relationship between sensory-processing sensitivity and age in a large cross-sectional Japanese sample. *Heliyon*, *5*(10), e02508. https://doi.org/10.1016/j.heliyon.2019.e02508

Valcke, M., Bonte, S., de Wever, B., & Rots, I. (2010). Internet parenting styles and the impact on Internet use of primary school children. *Computers & Education*, *55*(2), 454–464. https://doi.org/10.1016/j.compedu.2010.02.009

Wang, J. L., Jackson, L. A., Zhang, D. J., & Su, Z. Q. (2012). The relationships among the Big Five Personality factors, self-esteem, narcissism, and sensation-seeking to Chinese University students' uses of social networking sites (SNSs). *Computers in Human Behavior*, *28*(6), 2313–2319. https://doi.org/10.1016/j.chb.2012.07.001

Wegmann, E., Stodt, B., & Brand, M. (2015). Addictive use of social networking sites can be explained by the interaction of Internet use expectancies, Internet literacy, and psychopathological symptoms. *Journal of Behavioral Addictions*, *4*(3), 155–162. https://doi.org/10.1556/2006.4.2015.021

Weyn, S., van Leeuwen, K., Pluess, M., Lionetti, F., Greven, C. U., Goossens, L., Colpin, H., van den Noortgate, W., Verschueren, K., Bastin, M., van Hoof, E., de Fruyt, F., & Bijttebier, P. (2019). Psychometric properties of the Highly Sensitive Child scale across developmental stage, gender, and country. *Current Psychology*, *40*(7), 3309–3325. https://doi.org/10.1007/s12144-019-00254-5

Zuckerman, M. (2014). *Sensation Seeking (Psychology Revivals)*. Taylor & Francis.

Zuckerman, M., & Neeb, M. (1979). Sensation seeking and psychopathology. *Psychiatry Research*, *1*(3), 255–264. https://doi.org/10.1016/0165-1781(79)90007-6

Appendix I:

Information about your thesis

Please save this form, modify it and e-mail it to your supervisor together with the digital final version of your thesis. For further questions see:
http://studion.fss.uu.nl/helpdesk/student/scrol

Student nummer:	5866790
Initials & prefixes:	J.M. de
Family name:	Boer
Master:	Youth Studies

Begeleider

Name supervisor/assesor: *	Gaëlle Ouvrein
Name 2th assesor:	

Scriptie

Title thesis: *	Adolescents' Social Media Disorder in Relation to Sensory Processing Sensitivity: Examining the Role of Positive Parenting
Language thesis: *	English
Abstract:	Problematic social media use is associated with a wide variety of outcomes, such as addictive use (social media disorder; SMD). Previous researchers have shown that sensory processing and family factors are among the contributing factors to SMD in children. The aim of the present study is to examine the relationships between sensory processing sensitivity (SPS), positive parenting and SMD in specifically adolescents, to uncover predisposing factors. The results are based on an online survey among adolescents with a mean age of 14.30 years (N = 404) in the Netherlands. We compared scores of SPS between adolescents with and without SMD, with further exploration of the role of PP. Against what was expected, higher SPS was not related to SMD. However, average and high levels of PP seemed to be a protective factor for SMD ($p < .05$). The current study highlights the influence of positive parenting on SMD. More research is needed to investigate the observed association between PP and specific elements of social media use. Furthermore, a broader investigation of how different aspects of SPS influence social media use may facilitate better treatment

	for SMD. This can increase quality of life among adolescents and their caregivers.
Key words: (seperated by ;)	Keywords: Social media disorder, sensory processing sensitivity, positive parenting, adolescents, protective factor
Make public: *	**Yes**/ No
Make public after date:	1th of july

Ingevuld op: * 09-06-2022

Door: * Judith de Boer

Appendix II: Syntax

Syntax Masterthesis Judith de Boer (5866790)

****RECODING VARIABLES

*Parenting style

RECODE PR39_2 (1=5) (2=4) (3=3) (4=2) (5=1) INTO T_PR39_2.

EXECUTE.

RECODE PD39_5 (1=5) (2=4) (3=3) (4=2) (5=1) INTO T_PD39_5.

EXECUTE.

RECODE PA39_10 (1=5) (2=4) (3=3) (4=2) (5=1) INTO T_PA30_10.

****RELIABILITY OF POSITIVE PARENTING

RELIABILITY

/VARIABLES=PR39_1 T_PR39_2 PR39_3 PD39_4 T_PD39_5 PD39_6 PD39_7 PA39_8 PA39_9 T_PA30_10 PA39_11

/SCALE('Positive Parenting') ALL

/MODEL=ALPHA

/SUMMARY=TOTAL.

*Computing Positive Parenting

EXECUTE.

COMPUTE PositiveParenting=PR39_1 + T_PR39_2 + PR39_3 + PD39_4 + T_PD39_5 + PD39_7 + PA39_8 + PA39_9

+ T_PA30_10 + PA39_11 .

EXECUTE.

****RELIABILITY OF SENSORY PROCESSING SENSITIVITY

RELIABILITY

/VARIABLES=SS48_1 SS48_2 SS48_3 SS48_4 SS48_5 SS48_6 SS48_7 SS48_8

/SCALE('Sensory sensitivity') ALL

/MODEL=ALPHA

/STATISTICS=DESCRIPTIVE SCALE CORR

/SUMMARY=TOTAL MEANS CORR.

* Computing Sensoring Processing Sensitivty

```
COMPUTE SensorySensitivity_Sum=SS48_1 + SS48_2 + SS48_3 + SS48_4 + SS48_5 + SS48_6 +
SS48_7 +
    SS48_8.
EXECUTE.
*RELIABILITY Social media disorder
RELIABILITY
  /VARIABLES=SMD16_1 SMD16_2 SMD16_3 SMD16_4 SMD16_5 SMD16_6 SMD16_7
SMD16_8 SMD16_9
  /SCALE('Social media disorder') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
  /SUMMARY=TOTAL MEANS CORR.
*Computing Social media disorder sum of items
COMPUTE SumSocialMediaDisorder=SMD16_1 + SMD16_2 + SMD16_3 + SMD16_4 +
SMD16_5 + SMD16_6 + SMD16_8 + SMD16_9.
EXECUTE.
*Recoding into 0 and 1
EXECUTE.
RECODE SMD16_1 SMD16_2 SMD16_3 SMD16_4 SMD16_5 SMD16_6 SMD16_7 SMD16_8
SMD16_9 (1=1) (2=0).
EXECUTE.
COMPUTE SocialMediaDisorderYes=SocialMediaSum >= 2.
EXECUTE.
------------------------------------------------------------------------------------------------------------------
****DESCRIPTIVE STATISTICS
DESCRIPTIVES VARIABLES=Age SensorySensitivity_Sum PositiveParentingNew
SumSocialMediaDisorder
  /SAVE
  /STATISTICS=MEAN STDDEV MIN MAX.
CROSSTABS
  /TABLES=SocialMediaDisorderNew BY Gender GroupsPositiveParenting
  /FORMAT=AVALUE TABLES
```

```
SOCIAL MEDIA DISORDER IN RELATION TO SENSORY PROCESSING SENSITIVITY
  /STATISTICS=CORR
  /CELLS=COUNT ROW COLUMN TOTAL
  /COUNT ROUND CELL.
```

**ASSUMPTIONS

**Multicollinearity

```
CORRELATIONS
  /VARIABLES=Age Gender SensorySensitivity_Sum PositiveParentingNew
  /PRINT=TWOTAIL NOSIG FULL
  /MISSING=PAIRWISE.
NONPAR CORR
  /VARIABLES=Age Gender SensorySensitivity_Sum PositiveParentingNew
  /PRINT=SPEARMAN TWOTAIL NOSIG FULL
  /MISSING=PAIRWISE.
```

**Outliers

```
DESCRIPTIVES VARIABLES=Age SensorySensitivity_Sum PositiveParentingNew
SumSocialMediaDisorder
  /SAVE
  /STATISTICS=MEAN STDDEV MIN MAX.

EXAMINE VARIABLES=Age SensorySensitivity_Sum SumSocialMediaDisorder
PositiveParentingNew
  /PLOT BOXPLOT STEMLEAF
  /COMPARE GROUPS
  /PERCENTILES(5,10,25,50,75,90,95) HAVERAGE
  /STATISTICS DESCRIPTIVES EXTREME
  /CINTERVAL 95
  /MISSING LISTWISE
```

```
  /NOTOTAL.
```

**linearity of independent variable to the logodds

```
COMPUTE LnSensorySensitivity=LN(SensorySensitivity_Sum).
EXECUTE.

COMPUTE SSxLnSS=SensorySensitivity_Sum * LnSensorySensitivity.
EXECUTE.

LOGISTIC REGRESSION VARIABLES SocialMediaDisorderNew
  /METHOD=ENTER Age Gender
  /METHOD=ENTER SensorySensitivity_Sum
  /METHOD=ENTER SensorySensitivity_Sum DummyPositiveParenting_1
DummyPositiveParenting_2
    DummyPositiveParenting_3 DummyPositiveParenting_4
  /METHOD=ENTER DummyPositiveParenting_1 DummyPositiveParenting_2
DummyPositiveParenting_3 SSxPP
    SensorySensitivity_Sum DummyPositiveParenting_4 SSxLnSS
  /CONTRAST (Gender)=Indicator
  /CONTRAST (DummyPositiveParenting_1)=Indicator
  /CONTRAST (DummyPositiveParenting_2)=Indicator
  /CONTRAST (DummyPositiveParenting_3)=Indicator
  /CONTRAST (DummyPositiveParenting_4)=Indicator
  /SAVE=PRED
  /PRINT=ITER(1) CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

***Normality of data

```
EXAMINE VARIABLES=Age SensorySensitivity_Sum SumSocialMediaDisorder
PositiveParentingNew
  /PLOT BOXPLOT HISTOGRAM NPPLOT
  /COMPARE GROUPS
  /PERCENTILES(5,10,25,50,75,90,95) HAVERAGE
  /STATISTICS DESCRIPTIVES EXTREME
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

***Linearity Test

CORRELATIONS
  /VARIABLES=Age SensorySensitivity_Sum PositiveParentingNew
  /PRINT=TWOTAIL NOSIG FULL
  /MISSING=PAIRWISE.
NONPAR CORR
  /VARIABLES=Age SensorySensitivity_Sum PositiveParentingNew
  /PRINT=SPEARMAN TWOTAIL NOSIG FULL
  /MISSING=PAIRWISE.
GGRAPH
  /GRAPHDATASET NAME="graphdataset"
    VARIABLES=SensorySensitivity_Sum[LEVEL=nominal] Age[LEVEL=scale]
    MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=VIZTEMPLATE(NAME="Scatterplot"[LOCATION=LOCAL]
    MAPPING( "x"="Age"[DATASET="graphdataset"]
    "y"="SensorySensitivity_Sum"[DATASET="graphdataset"]))
    VIZSTYLESHEET="Traditional"[LOCATION=LOCAL]
    LABEL='SCATTERPLOT: SensorySensitivity_Sum-Age'
    DEFAULTTEMPLATE=NO.
GGRAPH
```

```
  /GRAPHDATASET NAME="graphdataset"
    VARIABLES=PositiveParentingNew[LEVEL=nominal] Age[LEVEL=scale]
    MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=VIZTEMPLATE(NAME="Scatterplot"[LOCATION=LOCAL]
    MAPPING( "x"="Age"[DATASET="graphdataset"]
"y"="PositiveParentingNew"[DATASET="graphdataset"]))
    VIZSTYLESHEET="Traditional"[LOCATION=LOCAL]
    LABEL='SCATTERPLOT: PositiveParentingNew-Age'
    DEFAULTTEMPLATE=NO.
GRAPH
  /SCATTERPLOT(BIVAR)=SensorySensitivity_Sum WITH PositiveParentingNew
  /MISSING=LISTWISE.
GRAPH
  /SCATTERPLOT(BIVAR)=SumSocialMediaDisorder WITH PositiveParentingNew
  /MISSING=LISTWISE.
GRAPH
  /SCATTERPLOT(BIVAR)=SumSocialMediaDisorder WITH SensorySensitivity_Sum
  /MISSING=LISTWISE.
------------------------------------------------------------------------------------------------------------------------
----------------------------------------
```

****LOGISTISCHE REGRESSIE (Socialmedia disorder, sensory sensitivity, positive parenting)

**1. Centering Sensory sensitivity and Positive parenting groups

```
COMPUTE Z_SensorySensitivity=(SensorySensitivity_Sum - 24.2222) / 5.68597.
EXECUTE.
COMPUTE Z_GroupsPositiveParenting=(GroupsPositiveParenting - 1.0376) / 0.75428.
EXECUTE.
COMPUTE Z_SocialMediaDisorder=(SocialMediaDisorderNew - 0.2618)/0.44019.
EXECUTE.
```

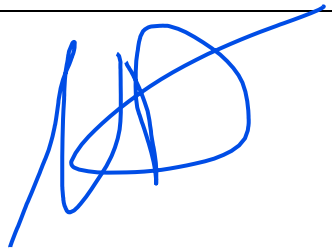
```
**2. Interaction Term
COMPUTE SSxPP=ZSensorySensitivity_Sum * ZGroupsPositiveParenting.
EXECUTE.
***3. Dummy variables groups parenting
SPSSINC CREATE DUMMIES VARIABLE=GroupsPositiveParenting
ROOTNAME1=DummyPositiveParenting
/OPTIONS ORDER=A USEVALUELABELS=YES USEML=YES OMITFIRST=NO.

**4. Binary Logistic Regression
LOGISTIC REGRESSION VARIABLES SocialMediaDisorderNew
  /METHOD=ENTER Age Gender
  /METHOD=ENTER Age Gender SensorySensitivity_Sum
  /METHOD=ENTER Age Gender SensorySensitivity_Sum GroupsPositiveParenting
  /METHOD=ENTER Age Gender SensorySensitivity_Sum GroupsPositiveParenting NewSPSxPP
  /CONTRAST (Gender)=Indicator
  /CONTRAST (GroupsPositiveParenting)=Indicator
  /PRINT=CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
ONEWAY SocialMediaDisorderNew BY GroupsPositiveParenting
  /MISSING ANALYSIS
  /CRITERIA=CILEVEL(0.95)
  /POSTHOC=BONFERRONI ALPHA(0,05).
```

Appendix III:

Registration Form: Research Activities for TED-students (in total 60 hrs)

Judith de Boer 5866790

Research Activities	**Total number of Hours**	**Signature YS staff**
Dataverzameling LEF project op school in Volendam. Vragenlijsten afnemen bij meerdere klassen en ondersteunen bij de presentatie.	10 hours	
Lesgeven en voorbereiden Leeronderzoek ISW	30 hours	
Extra begeleiding na de lessen leeronderzoek, cursushandleiding doorlezen en evalueren onder masterstudenten en equêtes afnemen.	20 hours	

Total	**60 hours**	