

Bidirectional effects of Internet-specific parenting practices and compulsive social media and Internet game use

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(Received: July 31, 2017; revised manuscript received: July 25, 2018; accepted: July 28, 2018)

Introduction: This two-wave prospective study investigated the bidirectional relation between Internet-specific parenting (reactive restrictions, Internet-specific rules, and frequency and quality of communication about Internet) and adolescents' symptoms of social media disorder (SMD) and Internet gaming disorder (IGD). In addition, we investigated whether this relation was different for boys and girls. *Methods:* A sample of 352 adolescents (48.9% boys, $M_{\text{age}} = 13.9$, $SD_{\text{age}} = 0.74$, range: 11–15) completed questionnaires at two waves. Zero-inflated cross-lagged analyses in Mplus were performed to predict the level of IGD and SMD symptoms by Internet-specific parenting practices and vice versa, while controlling for age, level of education, and outcome at T_1 . *Results:* More frequent parent–adolescent communication about Internet predicted more IGD ($\beta = 0.26$, $p = .03$) and SMD symptoms among boys, and more restrictive rules predicted fewer SMD symptoms among girls ($\beta = -0.23$, $p = .08$). More IGD symptoms predicted more reactive rules ($\beta = 0.20$, $p = .08$) among boys and girls and a higher frequency ($\beta = 0.16$, $p = .02$) and lower quality of communication ($\beta = -0.24$, $p < .001$) among boys and girls, respectively. *Conclusions:* This study demonstrates bidirectional relations between Internet-specific parenting and IGD symptoms, but not SMD symptoms. Displaying IGD symptoms seems to elicit ineffective parental responses, which may further exacerbate problematic involvement in gaming. With respect to problematic social use media among girls, this study suggests that parents should set strict rules regarding Internet use, prior to problematic use of social media. Longitudinal studies on the role of parenting in development of Internet-related disorders would be promising in enhancing our understanding of how parents can effectively prevent problematic involvement in online behaviors among their children.

Keywords: Internet-specific parenting, compulsive social media use, compulsive gaming, adolescents

INTRODUCTION

Online social media and games play an important role in adolescents' lives. Nearly all high-school adolescents (98.6%) have (daily) contact with friends through social media (Van Dorsselaer et al., 2016), and almost one third spend at least 3 hr per day on social media (Kloosterman & Van Beuningen, 2015). In addition, about a quarter of high-school adolescents (23%) play games on a daily basis (Wennekers, van Troost, & Wiegman, 2016). Strong involvement in online activities may increase the risk of using social media and games in a problematic manner; display characteristics of addiction are described for Internet gaming disorder (IGD) in the Appendix of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) (e.g., tried to spend less time on gaming/social media, but failed). However, little is known about parental predictors of problematic social media and game use and how this problematic use in turn influences parental characteristics.

The rapid increase in use of online devices has raised concerns in the public area and among parents specifically (Terras & Ramsay, 2016). While several studies have

investigated how parents should guide their children to safely use the Internet (see, for example, the review study of Collier et al., 2016), much remains unknown about how these parenting practices can prevent *problematic* social media and game use. These outcomes are particularly important as the use of social media and games is normative behavior, but parents want to prevent the problematic aspect of use. In line with the transactional model, child development reflects continuous dynamic interactions of the child and his/her social settings, such as their interactions with parents. Core of this model is the bidirectional effects of the child and his/her social environment (Sameroff, 2009). That is, parents' socialization not only influences their child's behavior, but the behavior of the child also affects parents' behavior in relation to socialization. In the current longitudinal study, we will therefore examine the bidirectional relations between Internet-specific parenting practices and adolescents' problematic social media and game use.

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A further specification of restrictive mediation and active mediation practices (cf. Symons, Ponnet, Walrave, et al., 2017; Van den Eijnden, Spijkerman, Vermulst, van Rooij, & Engels, 2010) will be considered in relation to adolescents' compulsive social media and game use and vice versa (cf. participatory learning).

Parenting in relation to online behavior

Following up on the parental mediation theory, generally three parenting practices are distinguished in studies on media use and online behaviors, i.e., *active mediation* (i.e., having conversations about the use of Internet and share experiences), *restrictive mediation* (i.e., allowance to use particular online applications), and *social co-use* (i.e., watch the screen together; Nathanson, 1999; Nikken & Jansz, 2014; Valkenburg, Kremer, Peeters, & Marseille, 1999).

Restrictive mediation. Most commonly, restrictive mediation is operationalized as whether or not adolescents are allowed to use particular online applications or activities (e.g., instant messaging, download music/films, and have your own social networking profile; Kalmus, Blinka, & Ólafsson, 2015; Livingstone & Helsper, 2008; Notten & Nikken, 2016; Sonck, Nikken, & de Haan, 2013). Empirical findings regarding the relationship between restrictive mediation and online behaviors show an inconsistent pattern. In line with the review study of Collier et al. (2016), several cross-sectional studies show that restrictive mediation is associated with less excessive Internet use (Kalmus, et al., 2015; Lee, 2012; Van Rooij & Van den Eijnden, 2007) and a lower level of problematic Internet use (Li, Li, & Newman, 2013) and Internet addiction (Chang et al., 2015). On the contrary, other cross-sectional studies showed no (Daud, Omar, Hassan, Bolong, & Teimouri, 2014; Kalmus et al., 2015; Law, Shapka, & Olson, 2010; Lee, 2012; Lee & Chae, 2007) or even a negative predictive value (Nathanson, 2002; Sasson & Mesch, 2014) of restrictive mediation on adolescents' online behaviors, such as excessive Internet use (Kalmus et al., 2015) and risky online behavior (Sasson & Mesch, 2014). The only available longitudinal study (Van den Eijnden et al., 2010) suggested that strict rules about the time of Internet use predicted a higher level of subsequent compulsive Internet use among adolescents. However, after statistically controlling for the previous level of compulsive Internet use, this longitudinal association was no longer significant. Thus, the empirical literature, which mainly consists of cross-sectional studies, seems to be fairly inconsistent with regard to the role of restrictive parental mediation in preventing a variety of online risk behaviors.

A similar inconsistent pattern of results emerges with respect to cross-sectional studies addressing online gaming. These studies demonstrated that restrictive mediation related to more frequent online gaming (Shin & Huh, 2011) and problematic online gaming in adolescents (Benrazavi, Teimouri, & Griffiths, 2015). Only one study showed that restrictive mediation related to less game playing (Martins, Matthews, & Ratan, 2015) and two other studies revealed no significant relations of parental restrictions with number of hours gaming cross-sectionally (Smith, Gradisar, & King, 2015; Smith, Gradisar, King, & Short, 2017). Moreover, as to our knowledge, the only longitudinal study on

problematic video gaming showed no effect of parental restrictions on pathological symptoms of video gaming (Choo, Sim, Liao, Gentile, & Khoo, 2015).

Finally, with respect to social media use, a cross-sectional study by Wisniewski, Xu, Jia, Rosson, and Carroll (2015) showed that restrictive mediation is related to less risky social media use regarding privacy issues. Yet, Shin and Ismail (2014) showed in their cross-sectional study that more restrictive parental mediation related to young adolescents taking more risks on social network sites, which can be considered a precursor of problematic social media use. Thus, on the basis of the state-of-the-art, which mainly consists of cross-sectional studies, we have to conclude that empirical evidence for the preventive role of restrictive mediation in preventing adolescents' problematic gaming and social media use is highly inconsistent, and that the few existing longitudinal studies generally found no effects.

Active mediation. Parent-adolescent conversations regarding online activities are commonly referred to as *active mediation*. This way of parenting is related to lower involvement in problematic gaming (Kwon, Chung, & Lee, 2009; Punamaki, Wallenius, Holtto, Nygard, & Rimpela, 2009) and taking fewer risks on social network sites (Wisniewski et al., 2015). However, several cross-sectional studies have reported no (preventive) effects of active mediation in relation to online risks (Livingstone & Helsper, 2008; Notten & Nikken, 2016), pathological Internet use (Chng, Li, Liao, & Khoo, 2015; Kalmus, et al., 2015; Lee, 2012), time spent on the tablet (Beyens & Buellens, 2016), and time spent with media (Collier et al., 2016). However, it is important to note that the latter studies tested the role of active mediation in a multivariate model, which also included restrictive mediation. This may point at the inferior role of active mediation compared to restrictive mediation. In the validation study of Symons, Ponnet, Emmery, et al. (2017), discussing online safety was also distinguished as a separate parenting strategy. However, no distinction is made between the quality and frequency of these parent-child conversations. A further specification of the active parental mediation strategy may provide more insight into the role of active mediation in adolescents' online behaviors.

We would like to make the claim that the inconsistent findings, to some extent, result from the fact that parental mediation is sometimes used to prevent future problems, but is also frequently used to deal with already existing problems. Symons Ponnet, Emmery, et al. (2017) demonstrated in their validation study that in the assessment of restrictive mediation, three strategies could be distinguished based on former studies, i.e., rules about appropriate behavior on social network sites, ad-hoc checking of online behavior, and rules about access to online platforms. This underlines that parenting may vary as a function of the extent to which the adolescents' online behaviors are considered problematic by parents.

As repeatedly highlighted, most of the studies on parenting practices are cross-sectional by nature, which makes it impossible to draw conclusions about the direction of the relation between parenting and problematic social media and game use. It is therefore imperative to apply a longitudinal design that also enables the study of the bidirectional relationships between parenting practices in relation to

online behavior (i.e., Internet-specific parenting) and adolescents' problematic social media and game use (cf. the transactional approach; Sameroff, 2009). Moreover, Clark (2011) argues for an extension of the traditional parental mediation theory by adding a fourth strategy, a *strategy of participatory learning*. This fourth strategy places parental mediation more, for example, in context of the behavior of the child and gives a more prominent role to children's input in parent-child interactions and therefore bidirectional relations between parenting and adolescents' online behavior. According to the transactional model, children actively participate in the socialization by their parents due to different characteristics of the child (Sameroff, 2009). This approach corroborates the employment of "participatory learning" (Clark, 2011), which places the use of parental mediation strategies in context, such as the emotions and/or behavior of the child. That is, parents may differ in the use of parenting strategies in response to the behavior of their child in order to meet the needs of the child. To test whether this is the case of parenting in relation to online behavior, the bidirectional relations between parental mediation and problematic social media and game use are investigated. Extending current research on the relation between parenting regarding online media use and adolescents' online behaviors, the traditional restrictive, and active mediation practices will be further specified into two restrictive (reactive mediation and restrictive rules about Internet use) and two active mediation practices (frequency and quality of communication about Internet use). This specification of these parental mediation strategies will provide more insight into the specific aspects of restrictive and active mediation that influence and are influenced by adolescents' problematic social media and game use.

The role of gender

Based on the self-control theory (Gottfredson & Hirschi, 1990), differences in risk behavior among adolescent boys and girls are caused by a higher level of self-control among girls, due to parents keeping girls under more strict supervision compared to boys. For some, but not all online behaviors, boys are at an increased risk compared to girls (Notten & Nikken, 2016; Sasson & Mesch, 2014), such as playing online age-restricted games (Nikken & Jansz, 2007). However, girls are more likely to be involved in more intense social media use compared to boys (Kloosterman & Van Beuningen, 2015). Yet, more importantly, cross-sectional studies suggest a different role of parental mediation among boys and girls, where parents may apply more active mediation regarding the online activities of daughters (Sonck et al., 2013) and apply more restrictive mediation to their sons (Nikken & Jansz, 2014). In general, although the absolute level of parental control may not differ much between boys and girls (Endendijk, Groeneveld, Bakermans-Kranenburg, & Mesman, 2016), the protective impact of parental control and emotional support on behavioral outcomes is stronger for girls (Choquet, Hassler, Morin, Falissard, & Chau, 2008). Van den Bulck and Van den Bergh (2000) demonstrated in their cross-sectional study that verbal parental guidance only had an effect of media use of girls and not boys. Based on these studies, it is expected that

the restrictive and communication parenting practices have a larger protective effect among girls than boys. However, as these studies are all cross-sectional, a longitudinal study investigating the influence of Internet-specific parenting on online behaviors among boys and girls is required to provide more insight into differential effects across gender.

The current study

In this study, we aim to get better insight into the bidirectional relations between restrictive mediation and active mediation on one hand and problematic social media and game use on the other hand. Two types of restrictive mediation will be investigated; reactive restrictions (i.e., ad-hoc restrictive responses of parents to adolescents' social media or game behavior) and Internet-specific rules (i.e., the degree of allowance of access to online devices). In addition, two types of active mediation strategies such as the frequency and quality of communication about online activities will be distinguished. In addition, it is tested whether the bidirectional relations between Internet-specific parenting and adolescents' compulsive social media and game use are moderated by gender. We will do so by applying a longitudinal design including 352 adolescents (age: 12–15 years).

METHODS

Participants

Data for this study were collected as part of the Digital Youth Project, a longitudinal research project on online behaviors of Dutch adolescents. Adolescents in the first and second year of two secondary education schools (grades: 7 and 8) participated in two measurement waves with a 1-year interval between waves. The first measurement (T_1) was conducted in February 2015 and the second (T_2) in February 2016.

Of the 544 participants included at T_1 , 354 (65%) were also included at T_2 . Non-response was mainly due to the dropout of complete classes, because some teachers were not able to schedule classroom time for the online measurement, and some teachers were absent during the measurement days. In addition, individual students dropped out, because they had left school or were absent during the measurement day. Since full classes were missing (declined further participation) and only two waves were available, we decided to perform attrition analyses and only use full information maximum likelihood (FIML) to deal with missing data on specific variables and not on entire waves. This resulted in a sample of 354 adolescents (48.9% boys) averaged 13.90 years of age ($SD = 0.74$, range: 11–15). Only a small portion of the adolescents were in lower levels of education (5.1%). Most participants (82%) had a Dutch background (self and both parents born in the Netherlands).

Compared to participants who completed both waves, participants who dropped out at T_2 were somewhat older [$t_{(558)} = 4.090, p < .001$], had lower education [$t_{(558)} = 4.511, p < .001$], and had a slightly greater number of IGD symptoms at T_1 [$t_{(457)} = 2.122, p = .034$]. No differences were found in ethnicity and social media disorder (SMD).

Adolescents at somewhat higher risk (>IGD symptoms and lower level of education) seem to have dropped out, yet as these differences were minimal, it is not very likely that these have influenced the findings of this study.

Procedure

Adolescents were recruited from two secondary schools in two medium–large cities in the Netherlands. Prior to the measurements, parents received information describing the aims of the study, confidentiality safeguards, and procedures for declining or ending participation. If adolescents wished to participate, their parents could provide passive informed consent (>99% of parents agreed upon participation). At both measurements, adolescents completed a computer-based questionnaire at school during regular school hours. Research assistants were present to supervise data collection, answer student questions, and ensure maximum privacy.

Measures

IGD was measured with nine dichotomous (yes/no) items of the Internet Gaming Disorder Scale (Lemmens, Valkenburg, & Gentile, 2015). These nine items were based on the diagnostic criteria of IGD, i.e., *Persistence*, *Tolerance*, *Withdrawal*, *Displacement*, *Escape*, *Problems*, *Deception*, *Displacement*, and *Conflict*, as described in the Appendix of the DSM-5. A sample item measuring Persistence is, “During the last 12 months . . . were you unable to reduce your time playing games, after others had repeatedly told you to play less?” A sum score was calculated and used as outcome measure in this study. Cronbach’s α s were .74 (T_1) and .77 (T_2).

SMD was measured with the nine dichotomous (yes/no) items of the Social Media Disorder Scale (Van den Eijnden, Lemmens, & Valkenburg, 2016). These nine items measured the same nine criteria that were used to measure IGD, but then applied to social media use, i.e., *Tolerance*, *Withdrawal*, *Displacement*, *Escape*, *Problems*, *Deception*, *Displacement*, and *Conflict*. Adolescents were asked “During the past year, have you . . .” (e.g., “. . . tried to spend less time on social media, but failed). Cronbach’s α s were .59 (T_1) and .72 (T_2).

Internet-specific rules reflect the degree of strict rule setting regarding adolescents’ access to social media or games. This scale is an adapted (updated) version of the scale used by Van den Eijnden et al. (2010). The adolescent indicated for regular school days to what extent he/she is allowed to (a) use the Internet or games as long as he/she wants, (b) use the Internet or games for more than 3 hr, (c) use the Internet or games in the hour before you go to bed, (d) use the Internet or games when your homework is not finished yet, and (e) bring your smartphone to your bedroom when you go to sleep at night. Answer categories ranged from 1 = *never* to 5 = *very often* and were recorded, so that a higher mean score reflects more strict parental rules about Internet use. Cronbach’s α was .74.

Reactive restrictions reflect restrictive responses of parents to adolescents’ social media or game behavior. Reactive

restrictions are characterized by behavior of parents in the presence of social media/game behavior, are an immediate response to this behavior, and are restricting or frustrating the child’s desire to keep on using social media/games. It contains four items with answer categories on a 5-point Likert scale ranging from 1 = (*hardly*) *never* to 4 = *more than 5 times a day*; how often do your parents react if you want to (keep on) using the Internet or playing games . . . (a) that you are not allowed to use the Internet or play games; (b) that you are only allowed to use the Internet or play a game for a short period of time; (c) that you have a certain time (e.g., 5 min) to use the Internet or play the game; and (d) that you have to turn off the computer/tablet or smartphone. A higher mean score of the scale indicates a higher level of reactive restrictions toward adolescents’ social media/game use. Cronbach’s α was .84.

Frequency of communication assesses how often the adolescent communicates about Internet use/games (Van den Eijnden et al., 2010). It contains three items with answer categories on a 5-point Likert scale, ranging from 1 (*never*) to 5 (*very often*); “how often do you talk with your parents about (a) what exactly you have done on the Internet or what games you have played,” (b) “with whom you have had contact through the Internet or a game,” and (c) “the things you like on the Internet or in a game.” The average score was calculated with a higher score indicating a more frequent communication about Internet use. Cronbach’s α was .82.

Quality of communication is assessed by asking adolescents if they (a) feel comfortable, (b) feel understood, and (c) feel taking seriously when he/she talks about Internet use or games with his/her parents (Van den Eijnden et al., 2010). Answer categories were provided on a 6-point Likert scale ranging from 1 (*totally not true*) to 6 (*totally true*). A higher mean score indicates a better quality of communication about Internet use. Cronbach’s α was .90.

Level of education is distinguished into “low” level of education and “high” level of education. In the Netherlands, many high schools distinguish between prevocational and lower secondary education (i.e., lower levels of education) and higher secondary and preuniversity levels of education (i.e., higher levels of education).

Statistical analysis

Descriptive statistics were obtained to describe the demographic variables (gender, age, and level of education), Internet-specific parenting variables (reactive restrictions, Internet-specific rules, and quality and frequency of communication about Internet), and the outcomes of interest (SMD and IGD symptoms).

To examine the bidirectional relations between Internet-specific parenting practices on one hand and IGD and SMD symptoms on the other hand, we used structural equation modeling. Since there were several zero’s on IGD symptoms (69%) and SMD symptoms (54%), a zero-inflated Poisson model (ZIP) was used (Atkins & Gallop, 2007; Peeters et al., 2012). In one model, IGD symptoms and SMD symptoms at T_2 were regressed on Internet-specific parenting practices at T_1 , while controlling for age, level of education, and IGD/SMD symptoms at T_1 . In addition,

Internet-specific parenting practices (reactive restrictions, Internet-specific rules, and frequency and quality about Internet-related issues) at T₂ were regressed on IGD/SMD symptoms at T₁ and the control variables (age and level of education) and Internet-specific parenting practices at T₁. Second, the bidirectional relations were evaluated for boys and girls separately. Because of the use of a ZIP-model, no model fit indicators like the comparative fit index or root means square error of approximation were available (Peeters et al., 2012). Maximum likelihood with robust standard errors was chosen as estimation method and FIML was used to deal with missing data. All analyses were performed using Mplus version 7.3.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the Utrecht University approved the study (FETC16-076; Eijnden). All adolescents and parents were informed about the study and all provided (passive) informed consent.

RESULTS

Descriptive statistics for all study variables and pairwise correlations can be found in Table 1.

Bidirectional relations between Internet-specific parenting and SMD/IGD symptoms

With respect to the influence of Internet-specific parenting on IGD and SMD symptoms, one significant relation was found. That is, more frequent communication about Internet use at T₁ significantly predicted higher levels of IGD symptoms 1 year later ($\beta = 0.26, p = .027$). No other significant effects of Internet-specific parenting on IGD, nor on SMD symptoms were found.

Regarding the influence of IGD and SMD symptoms on Internet-specific parenting practices, two significant relations were found. More IGD symptoms at T₁ predicted more reactive rules ($\beta = 0.22, p = .022$) and a lower quality of communication ($\beta = -0.13, p = .019$) at T₂. No significant effects of SMD symptoms on Internet-specific parenting practices were found (Figure 1).

Gender differences

Among boys (Figure 2), a higher frequency of communication about Internet use at T₁ significantly predicted more IGD ($\beta = 0.64, p < .001$) and SMD symptoms ($\beta = 0.21, p = .079$) at T₂. In addition, boys reporting more IGD symptoms at T₁ reported more reactive parental rules ($\beta = 0.20, p = .081$) and more frequent communication about Internet ($\beta = 0.16, p = .019$) at T₂.

Among girls (Figure 3), more restrictive parental rules at T₁ predicted fewer SMD symptoms at T₂ ($\beta = -0.23, p = .078$). In addition, more IGD symptoms at T₁ predicted more reactive rules ($\beta = 0.30, p = .012$) and a lower quality of communication about Internet ($\beta = -0.24, p < .001$) at T₂.

Table 1. Descriptive statistics and pairwise correlations

Variable	%M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender (% boys)	48.9	-	-.12*	.02	-.19***	.09	.02	.07	-.38***	.04	-.14**	.02	.04	.13*	-.33***	.01
2. Age	13.9 (0.74)		-	.09	-.03	-.10	-.04	-.07	.09	.08	-.08	-.16**	-.03	-.10	.11	.13*
3. Level of education (% low)	5.1			-	-.06	-.02	.07	-.03	.05	.02	.07	.02	-.03	.07	.05	-.03
4. Reactive restrictions T ₁	1.77 (0.77)				-	.21***	.15**	-.17**	.34***	.23***	.42***	.20***	.10	-.17**	.27***	.18**
5. Internet-specific rules (T ₁)	3.41 (0.95)					-	.13*	.12*	-.14**	-.25***	.19***	.54***	.08	.01	-.02	-.16**
6. Frequency of communication (T ₁)	2.30 (0.95)						-	.25***	.06	-.07	.12*	.09	.33***	.09	.14	-.01
7. Quality of communication (T ₁)	3.39 (1.06)							-	-.23***	-.25***	-.17**	.10	.09	.31***	-.14**	-.21***
8. IGD symptoms (T ₁)	9.69 (1.31)								-	.28***	.25***	-.10	.06	-.23***	.46***	.26***
9. SMD symptoms (T ₁)	9.87 (1.26)									-	.10	-.14**	-.03	-.15**	.10	.48***
10. Reactive restrictions (T ₂)	1.61 (0.69)										-	.25***	.12*	-.17**	.33***	.22***
11. Internet-specific rules (T ₂)	3.32 (1.07)											-	.04	.03	-.10	-.16**
12. Frequency of communication (T ₂)	2.22 (0.96)												-	.23***	.20***	.04
13. Quality of communication (T ₂)	3.26 (1.13)													-	-.19**	-.18**
14. IGD symptoms (T ₂)	10.11 (1.75)														-	.36***
15. SMD symptoms (T ₂)	10.29 (1.59)															-

Note. SMD: social media disorder; IGD: Internet gaming disorder. *** $p < .001$. ** $p < .01$. * $p < .05$ (two-tailed).

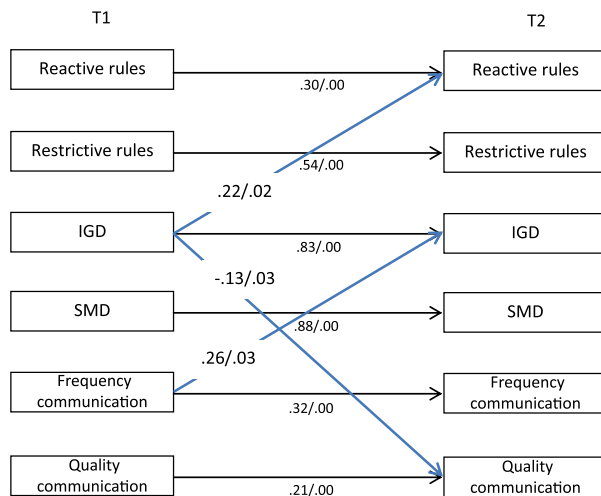


Figure 1. Cross-lagged model of social media disorder (SMD) and Internet gaming disorder (IGD) with Internet-specific parenting practices for the total group. Note. Only significant paths are presented

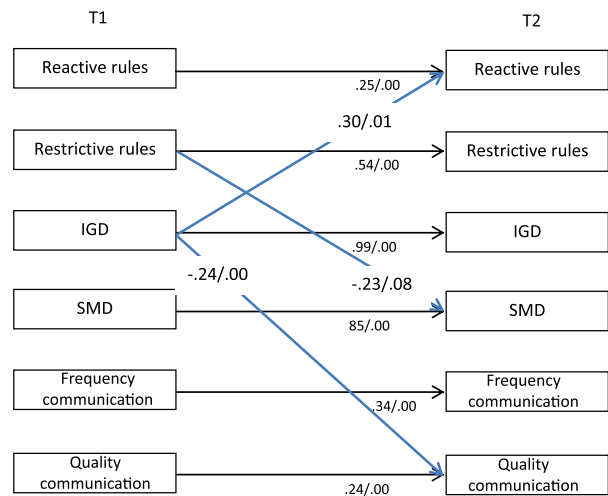


Figure 3. Cross-lagged model of social media disorder (SMD) and Internet gaming disorder (IGD) with Internet-specific parenting practices for girls. Note. Only significant paths are presented. Controlled for age and level of education

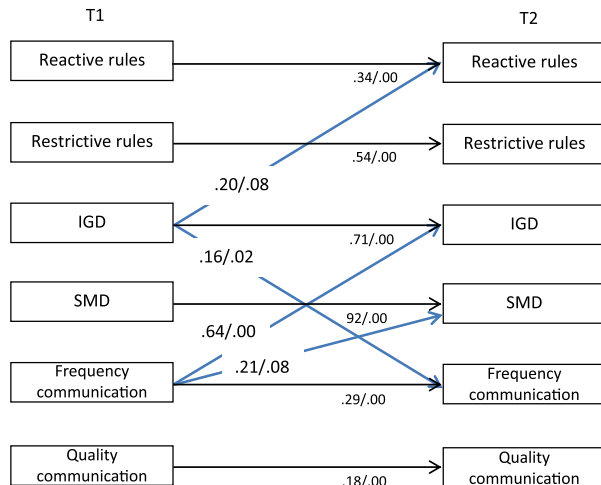


Figure 2. Cross-lagged model of social media disorder (SMD) and Internet gaming disorder (IGD) with Internet-specific parenting practices for boys. Note. Only significant paths are presented. Controlled for age and level of education

CONCLUSIONS AND DISCUSSION

Bidirectional relations between Internet-specific parenting practices and IG D/SMD symptoms were found with different effects for boys and girls. For boys and girls similarly, more IG D symptoms predicted more reactive parental rules and a lower quality (girls) or frequency (boys) of communication about Internet use. In turn, more frequent communication about Internet predicted more IG D and SMD symptoms among boys only. For girls, restrictive parental rules had a protective effect on the SMD symptoms 1 year later. Altogether, current findings indicate that parents seem to respond in an ineffective way to adolescents displaying IG D symptoms, which may exacerbate the further development of IG D symptoms. However, among girls, setting restrictive rules in advance seems to prevent SMD symptoms.

This is one of the first studies to demonstrate that the relation between Internet-specific parenting and IG D symptoms, but not with SMD symptoms, is bidirectional in nature, which is in line with the transactional approach (Sameroff, 2009). In fact, there is more evidence that problematic game use elicits specific parenting practices than the other way around (cf. participatory learning; Clark, 2011). For problematic social media use, unidirectional relations were found showing only effects of Internet-specific parenting practices on problematic social media use. Testing the bidirectional relations between Internet-specific parenting practices and problematic social media and game use revealed important differences for IG D and SMD symptoms between boys and girls, which we will elaborate on.

Both reactive restrictions and Internet-specific rules failed to predict the level of IG D symptoms. This indicates that strict parenting does not seem to be an effective way to lower the risk of IG D, nor does it increase the risk of IG D. This finding is in line with the study of Choo et al. (2015) who found no significant effect of restrictive mediation on problematic gaming 1 year later. Interestingly, among boys, more frequent communication about Internet use predicted more IG D and SMD symptoms, suggesting that too much of communication can do more damage than good. This is in line with research on alcohol use (e.g., Van der Vorst, Burk, & Engels, 2010). That is, a more frequent communication may result in higher drinking levels later in life (Van der Vorst et al., 2010). Corroborating the discussion in alcohol research, for IG D and SMD symptoms, we can also reason that parents start communicating more frequently once there is a reason to do so, when some level of problematic gaming or social media use already exists. As a response to such problematic gaming, parents may desire to know more about the game behavior by asking questions and soliciting information more frequently. Among girls, this may be reflected in the quality of communication as perceived by parents, as this lowered due to the involvement in problematic game use. Therefore, probably as this communication is not likely

to take place in a supportive manner, this may reinforce playing games even more excessively among adolescent boys. This hypothesis is supported by the finding that IGD symptoms elicit more reactive corrective measure as a response to problematic game use among boys and girls. In addition, a more frequent communication related to a lower quality of communication and more reactive parental restrictions. Wisniewski et al. (2015) argue in their cross-sectional study as well that risky online behavior elicits parents to communicate more frequently. Although there is evidence that this reactive parenting is not an effective socialization practice to prevent risk behavior in general (Crandall, Deater-Deckard, & Riley, 2015; Woodward, Taylor, & Dowdney, 1998), as fewer opportunities for learning new ways of controlling their own behavior are provided; reactive restrictions about Internet did not predict the level of IGD and SMD symptoms. Thus, intervening in adolescents' social media and game use, i.e., telling the child not to use the Internet and telling that he/she has only 5 min left, does not seem to be an effective parenting practice to lower the IGD and SMD symptoms among the adolescents. However, setting limits regarding access to Internet in terms of duration and place of use was protective of an increase in SMD symptoms. It seems that, for girls who are more involved in social media use than boys (Muller et al., 2016), limiting access to social media by setting clear restrictive rules is the most prominent way for parents to effectively lower SMD symptoms, much more than applying corrective measures as a response to the social media use of adolescents. Thus, this suggests that rules regarding the use of Internet set in advance are more effective than intervening in response to social media use. Notably, contrary to IGD symptoms, SMD symptoms did not influence their parents' Internet-specific behaviors. This may be due to the fact that playing games more intensively can be considered as more invasive than problematic social media use. For example, adolescents playing games and use headphones are likely to be more excluded from family life and interactions compared to social media use. As a result, adolescents playing games may report more conflict with their parents, also one of the symptoms of IGD, and subsequent attempts of parents to ineffectively prevent further problematic use by applying corrective measures (Yen, Yen, Chen, Chen, & Ko, 2007). Insight into effective parenting strategies to prevent problematic game use is still lacking. More longitudinal research is required into the bidirectional relations between more/other parenting practices and problematic social media and game use among boys and girls separately.

Limitations

Despite the strengths of this study, some limitations of the study should also be acknowledged. First, although the parenting measures reflected a more distinct insight in specific parenting behaviors in relation to Internet use, future research should continue the search to refinement and validation of these parenting measures. In addition, based on research on the role of parents in other risk behaviors (Bandura, 1997), parents' own online behavior should also be considered. Second, replication of this study including a larger sample is required to validate current findings and to

investigate other potential moderating variables such as level of education and personality as the existence of IGD and SMD symptoms, and the influence of Internet-specific parenting may differ across these subgroups. Third, more insight into the reliable assessment of problematic social media and game use is warranted, which is also indicated by the relatively low α s for the outcome measures. Several ongoing discussions on whether or not these specific addictions even exist are present (see, e.g., Van Rooij et al., 2018) and additional research is required to further improve the measurement of IGD and SMD in future. Fourth, some effects were only marginally significant based on a p value of $<.10$. However, we interpreted these effects as the standardized β s were practically meaningful. Future studies should include a larger sample size, including adolescents using social media and games at various levels.

Conclusions and implications

On the whole, current findings point at the awareness about the influence of IGD symptoms on particularly ineffective parenting practices. If parents feel that their child is facing problems due to their gaming behavior, they start intervening while playing games and have the urge to communicate about it. This seems to be an ineffective way that may even further feed the development of IGD symptoms. However, based on this study, knowledge about effective parenting strategies to prevent the development of IGD symptoms is currently lacking.

In addition, current findings imply that the implementation of restrictive rules about Internet before any form of compulsive social media use has developed is relevant. That is, once adolescents are more inclined to use social media compulsively, parents may find it more difficult to act effectively upon this online behavior (i.e., the risk and may be more likely to do so in a negative manner). This is in line with a previous study that has shown that parents who worry about their child's behavior mostly have a reason to do so and act upon this by showing less effective parenting strategies (Koning et al., 2013). Subsequently, these ineffective parenting strategies are found to predict an increase in adolescents' risk behavior. In addition, Van den Eijnden et al. (2010) also demonstrated that compulsive Internet use predicted a decrease in the frequency of communication 6 months later, indicating that parents seem to give up once Internet use has become compulsive. Therefore, this study emphasizes the need for parents to set strict rules regarding adolescents' social media use, prior to the display of any signs of compulsive involvement in this behavior.

Funding sources: No financial support was received for this study.

Authors' contribution: IMK analyzed and interpreted the data, and developed the concept and design of the study. MP and CF supervised the interpretation of the data and design of the study. RJJMvdE supervised the data collection, the data interpretation, and the concept and design of the study. All authors had full access to all data in the study

and take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest: The authors declare no conflict of interest.

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