

Chapter 4

Longitudinal Evidence for a Cyclic Process Model on Victimization, Media Use, and Cyberbullying

4

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Abstract

The present study examined the underlying processes of cyberbullying. A Cyclic Process Model was proposed, in which anger of a bullied adolescent drives him or her to media with antisocial and risk behavior content which further instigates to perform cyberbullying behavior oneself. The adolescent gets caught up in a cyclic loop, since cyberbullies often become victims again. In a longitudinal design with three waves, the model was tested among adolescent participants ($N=1005$, aged 11-17). Results showed that the Cyclic Process Model holds both *within* waves (cross-sectional) and *across* waves (longitudinal). Furthermore, the results provide evidence for the feedback loop from cyberbullying to victimization. This study provides unique insights into the underlying mechanisms of cyberbullying and how it evolves over time.

Keywords:

cyberbullying, victimization, longitudinal, media exposure, adolescents



Longitudinal Evidence for a Cyclic Process Model on Victimization, Media Use, and Cyberbullying

Cyberbullying became a hot topic in research the last few years, possibly due to media coverage of fatal cyberbullying incidents (e.g., see special issues on cyberbullying: Bauman & Bellmore, 2014; Dehue, 2013; Koops, 2012). Scholars, parents, schools, and the media increasingly realize that more insight is needed to find ways to battle this relatively new type of bullying behavior. Being a victim of cyberbullying is related to anxiety, depression, psychosomatic disorders, decreased academic performances, amongst others, and in the most extreme cases suicide (e.g., meta-analysis of Kowalski, Giumetti, Schroeder, & Lattanner, 2014). Above and beyond victimization from traditional bullying, cyberbullying victimization accounts for higher depression rates, stronger negative feelings, and negative health problems (Perren, Dooley, Shaw, & Cross, 2010; Spears, Slee, Owens, & Johnson, 2009). The majority of cyberbullying research focuses on negative consequences for the victims (see meta-analysis of Kowalski et al., 2014), whereas others examine risk factors of becoming a cyberbully (e.g., Patchin & Hinduja, 2010; Pornari & Wood, 2010; Wright & Li, 2013). Research shows that online and offline victimization (being bullied online and offline) relates to becoming a cyberbully oneself and vice versa (Smith et al., 2008; Ybarra & Mitchell, 2004). The current study aims to explain and test the underlying processes in this relation between victimization and cyberbullying behavior with a proposed Cyclic Process Model.

In brief, the Cyclic Process Model assumes two underlying mechanisms in the association between victimization and cyberbullying behavior: 1) feelings of anger or frustration and 2) adolescents' media exposure. The hypotheses following from the Cyclic Process Model are that a victimized adolescent will experience anger and frustration, which will then drive him or her to use media with antisocial and risk behavior content. Subsequently, this media exposure to antisocial behavior will ease the way to perform cyberbullying behavior oneself. Then, the adolescent gets caught up in a cyclic process, because such cyberbullying behavior often results in being bullied again. The current study examined the Cyclic Process Model in a longitudinal research design throughout an academic year. In the next section, we will elaborate our arguments underlying the different steps in the Cyclic Process Model. Then, after outlining our methodological considerations, we will present and discuss the results of the longitudinal study.

The Cyclic Process Model

Many studies showed that being bullied (online or offline) and performing acts of cyberbullying behavior are closely related (Perren & Gutzwiller-Helfenfinger, 2012; Smith et al., 2008; Ybarra & Mitchell, 2004). Some studies suggest that this relation can be explained by the General Strain Theory (Agnew, 1992; Patchin & Hinduja, 2010), which suggests that bullied adolescents experience strain (from anger or frustration: supported by Beran & Li, 2008; Lonigro, Schneider, Laghi, Baiocco, Pallini, & Bruner, 2014; Ortega, Elipe, Mora-Merchán, Calmaestra, & Vega, 2009) and will subsequently be more likely to engage in deviant behavior, such as cyberbullying. Several studies indeed found feelings of anger to be related to cyberbullying (e.g., Lonigro et al., 2014), or found support for the General Strain Theory in relation to being a victim of offline bullying and becoming a cyberbully (Hay, Meldrum, & Mann, 2010; Patchin & Hinduja, 2010). We extend this line of reasoning by suggesting that media exposure plays an important role in this process of being bullied, feeling angry or frustrated and becoming a cyberbully. The argumentation for this preposition is twofold. First, research shows that angry or frustrated adolescents have an increased attraction to media with antisocial (including violent) content (Arnett, 1996; Flammer & Schaffner, 2003; Olson et al., 2007; Olson, Kutner, & Warner, 2008; Plaisier & Konijn, 2013). Angry adolescents turn to this type of media in the belief it helps them to cope with their anger (Olson et al., 2008). Also, negative emotional states lowers moral standards in adolescents thereby increasing their preferences for media with antisocial and risk behavior content (Plaisier & Konijn, 2013).

Second, exposure to this type of media enhances or facilitates antisocial behavior, such as (cyber)bullying (Calvete, Orue, Estévez, Villadrón, & Padilla, 2010; Den Hamer & Konijn, 2015; Den Hamer, Konijn, & Keijer, 2014; Dittrick, Beran, Mishna, Hetherington, & Shariff, 2013; Fanti, Demetriou, & Hawa, 2012; Kuntsche, 2004; Lam, Cheng, & Liu, 2013; Lee & Kim, 2004). This is explained by theories like the Social Cognitive Theory (Bandura, 2001) and the Downward Spiral Model (Slater, Henry, Swaim, & Anderson, 2003). The Social Cognitive Theory claims that people learn vicariously through media exposure, that they model their own behavior in accordance with the behavior shown in the media, especially since this behavior is often rewarded in entertainment media (Bandura, 2001; Dal Cin, Stoolmiller, & Sargent, 2012; Konijn, Nije Bijvank, & Bushman, 2007). The Downward Spiral Model suggests that exposure to violent media and aggressive behavior reinforces each other: Trait

aggressive adolescents show a strong preference for violent media content and high exposure to this type of media reinforces their aggressive behavior. This link is supported by several studies (Slater et al., 2003; Slater, Henry, Swaim, & Cardador, 2004; von Salisch, Vogelgesang, Kristen, & Oppl., 2011). Furthermore, research showed that a relation exists between media exposure and (cyber)bullying. Some studies found positive relations between violent media exposure and *face-to-face* bullying (Dittrick et al., 2013; Kuntsche, 2004; Lee & Kim, 2004), whereas others found support for such a relation between violent media exposure and *cyberbullying* behavior (Calvete et al., 2010; Den Hamer & Konijn, 2015; Den Hamer et al., 2014; Dittrick et al., 2013; Fanti et al., 2012; Lam et al., 2013).

The current study focuses on adolescents' exposure to media portraying antisocial and risk behavior content, which is highly popular among adolescents (Strasburger, 2009; Strasburger, Jordan, & Donnerstein, 2010). This type of media can contain swearing, fighting, substance abuse, etcetera, and is often glorified. Adolescents appear especially susceptible to modeling this type of behavior given their developmental stage in which they look for attractive role models to inspire them for an independent identity (Arnett, 1992; Konijn et al., 2007; Moffitt, 1993; Spear, 2000). Furthermore, adolescents in general show higher levels of sensation seeking and trait aggressiveness (due to hormonal changes) and an increased attraction to deviant, norm-crossing and risk taking behavior (Arnett, 1996; Forbes & Dahl, 2010; Spear, 2000; Steinberg, 2008). Increased attraction to media portraying this type of behaviors thus coincides with their developmental stage.

The last step of the Cyclic Process Model is the feedback loop from cyberbullying to victimization. The bullying adolescent gets caught up in a cyclic loop, since cyberbullies often become victims of bullying again (Livingstone, Haddon, Görzig, & Olafsson, 2010; Vandebosch & Van Cleemput, 2009; Walrave & Heirman, 2011). Therefore, in the current study, we tested whether the final stage of cyberbullying behavior, that is, at the third wave after a repetitive chain of performing cyberbullying behavior, bounced back into being victimized again.

In sum, we argued that the relation between victimization, anger or frustration and cyberbullying will be reinforced by exposure to media with antisocial and risk behavior content. These predictors of cyberbullying behavior are combined in the Cyclic Process Model (Figure 1). This Cyclic Process Model suggests that a bullied adolescent (i.e., victimized) will experience feelings

of anger and frustration, which will in turn drive the victim to media content portraying antisocial and risk behavior and subsequently perform cyberbullying behavior oneself. Hence, getting oneself into cyberbullying behavior is on the one hand due to the anger of being bullied and on the other hand reinforced by the media content. Although most research on cyberbullying behavior is cross-sectional in nature (see meta-analyses Baek & Bullock, 2013; Kowalski et al., 2014), it is important to investigate the processes *over time*, in particular the assumed cyclic part of our model. Therefore, the current study examined the Cyclic Process Model in full in a longitudinal research design.

Method

Participants and procedure. A total of 1005 adolescents participated, aged between 11 and 17 years old ($M\text{-agewave1}=13.43$, $SD_{\text{age-1}}=1.06$; $M\text{-agewave2}=13.62$, $SD_{\text{age-2}}=1.07$; $M\text{-agewave3}=13.89$, $SD_{\text{age-3}}=1.09$). The longitudinal design consisted of three waves, spread over one year in a secondary school. Not all participants were present at each wave, therefore, the response rates were 78.8%, 74.0%, and 75.6%, respectively. Each wave had about 20% missing data because students were absent due to external internships, other school activities, and sickness ($n_{\text{wave1}}=792$; 49% boys; $n_{\text{wave2}}=740$; 49% boys; $n_{\text{wave3}}=762$; 48% boys). Missing data were handled according to recent insights of Hotdeck Imputation (Myers, 2011). Decks used to impute missing data were gender, age, and grade. Most participants were in first-grade (37.5%, aged around 12), 30.0% in second grade (aged around 13), and 32.5% third grade (aged around 14). The majority was White Caucasian (60.2%), others had a Turkish (20.2%), Surinam (4.9%), Moroccan (1.9%), or other background (12.8%). This study used a paper-pencil questionnaire and debriefing in class followed upon completion of the questionnaires. Thanks to the participating schools and class-wise procedure, parental passive consent rate was 100% and none of the students refused to participate in the study.²

Measures. All items as described below were answered using 5-point rating scales (1=*never*, 2=*incidentally*, 3=*several times*, 4=*often*, to 5=*very often*).

² We collected a multi-purpose large longitudinal dataset to be used for several research goals because it is difficult and costly to collect longitudinal data with adolescents. The dataset has also been used in the studies described in Chapter 5 and Chapter 6.

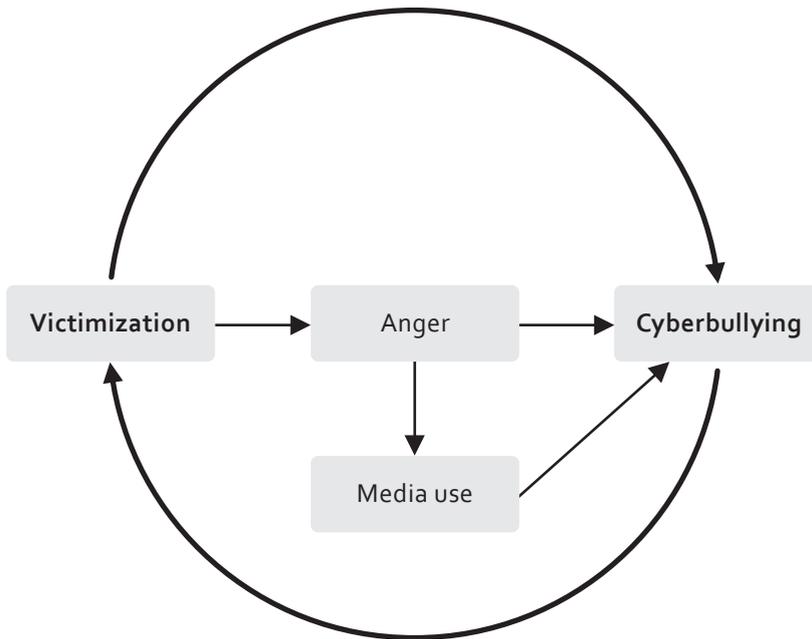


Figure 1. The Cyclic Process Model.

Victimization. Online and offline victimization was measured at wave 1 and 3, by both a condensed 9-item version of the victimization factor of the Cyberbullying Questionnaire (CBQ; Calvete et al., 2010; Den Hamer et al., 2014) and three items measuring offline victimization. Several items of the victimization factor of the original CBQ were combined due to today's mobile technology (e.g., "How often do you receive threatening or insulting messages by e-mail?" was combined with "How often do you receive threatening or insulting messages by cell phone?"). Sample items of online victimization are "How often has someone put humiliating images of you on the Internet?" and "How often has someone put your secrets, compromising information or images broadcasted online?" A sample item of offline victimization is "How often are you being hit, kicked, pushed, or locked-up?" Inspection of items, inter-item correlations, and reliability checks directed to discard one item from further analysis because only 1% of the respondents indicated to have ever experienced this (i.e., "How often has someone made a video or a cell phone picture of you while you performed some kind of sexual behavior?"). The resulting 11 individual item scores were

summed and averaged to create a mean index score for victimization. A higher score indicates a higher level of having been victimized. Furthermore, the scale appeared reliable with an average Cronbach α of .86 (Cronbach $\alpha_{\text{wave-1}} = .82$, $M=1.15$, $SD=0.28$; Cronbach $\alpha_{\text{wave-3}} = .90$, $M=1.21$, $SD=0.50$).

Anger and frustration. Anger and frustration was measured at wave 1 by the anger and frustration-scale (after Brezina, 1996; Patchin & Hinduja, 2010). Sample items of this 10-item scale are "How often do you lose your temper?" and "How often do you stay mad at someone who hurts you?" A mean score index was calculated and the scale was reliable (Cronbach $\alpha = .86$, $M=2.25$, $SD=0.80$).

Exposure to antisocial media content. Exposure to antisocial and risk behavior content was measured at wave 2, with 8-item the Content-based Media Exposure Scale (C-ME: Den Hamer & Konijn, 2015; Den Hamer et al., 2014; Den Hamer, Konijn, Plaisier, Keijer, Krabbendam, & Bushman, under review). This scale not only measures the frequency of media exposure but, importantly, also the particular media content to which one has been exposed. That is, media content portraying various types of antisocial and risk behavior (e.g., fighting, drug abuse, and general antisocial behaviors, such as stealing and destroying someone else's property). The items of the C-ME were based on the extant literature regarding adolescent antisocial and risk behaviors (e.g., Hopf, Huber, & Weiss, 2008). Sample items are: "How often do you watch people who fight (*on the Internet/TV/DVD/in games/mobile phone*)?" and "How often do you watch people who destroy someone else's belongings (*on the Internet/TV/DVD/in games/mobile phone*)?" A mean score index was calculated and the C-ME was reliable (Cronbach $\alpha = .89$, $M=2.17$, $SD=0.82$).

Cyberbullying behavior. Cyberbullying behavior was measured at all three waves, using a condensed 8-item version of the perpetration factor of the Cyberbullying Questionnaire (CBQ; Calvete et al., 2010; Den Hamer & Konijn, 2015; Den Hamer et al., 2014). Several items were combined because of overlap among items given today's smart phone technology (e.g., "Sending threatening or insulting messages by e-mail" and "Sending threatening or insulting messages by cell phone" were combined in one item). Mean scores were calculated and the scale was reliable with an average Cronbach α of .86 (Cronbach $\alpha_{\text{wave-1}} = .80$, $M=1.08$, $SD=0.24$; Cronbach $\alpha_{\text{wave-2}} = .86$, $M=1.11$, $SD=0.30$; Cronbach $\alpha_{\text{wave-3}} = .91$, $M=1.19$, $SD=0.55$).

Results

In order to test the Cyclic Process Model (Figure 1), structural equation modeling (SEM) with robust maximum likelihood (RML) estimation was used. Goodness of fit was assessed by means of Chi Square, including the degrees of freedom (*df*), the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root-mean-square residual (SRMR). A good fit of the empirical data to the theoretical model is indicated by an insignificant Chi-Square, an RMSEA of .06 or lower (RMSEA < .10 indicates adequate fit; Chen, 2007; Cheung & Rensvold, 2002; Hu & Bentler, 1999; Kelloway, 1998), a CFI of .95 or higher, and a SRMR of .08 or lower (Hu & Bentler, 1999; Kline, 2005). Although a non-significant Chi-Square indicates a good fit, with large sample sizes the Chi-Square is often significant and not very useful (Hu & Bentler, 1999). The model was tested in Mplus (version 6.12).

On each wave, the Cyclic Process Model showed a very good fit: wave 1: $\chi^2(1)=0.95$ ($p=.33$), RMSEA=.00 (.00-.09), CFI=1.00, and SRMR=.01; wave 2: $\chi^2(1)=0.29$ ($p=.59$), RMSEA=.00 (.00-.08), CFI=1.00, and SRMR=.01; wave 3: $\chi^2(1)=7.22$ ($p<.01$), RMSEA=.08 (.03-.14), CFI=.93, and SRMR=.03. Moreover, also across the waves, the Cyclic Process Model showed to fit the empirical data perfectly: $\chi^2(9)=10.06$ ($p=.35$), RMSEA=.01 (.00-.04), CFI=.99, and SRMR=.03 (Figure 2).

These results of testing the Cyclic Process Model suggest that, as expected, bullied adolescents (i.e., who are victimized) experience feelings of anger and frustration as a result, which is supported by a significant $\beta=.33$, $p<.01$. Furthermore, we hypothesized that these angry adolescents turn to media with antisocial and risk behavior content, which was also supported: $\beta=.16$, $p<.01$. Subsequently, according to the Cyclic Process Model, this media use is significantly related to the adolescents' cyberbullying behavior, which was supported by $\beta=.12$, $p<.01$. The analysis showed that two relations in the theoretical model were found not to be significant: victimization and anger at wave 1 did not predict cyberbullying at wave 3 ($\beta_{\text{victimization}}=.01$, $p=.81$; $\beta_{\text{anger}}=-.02$, $p=.71$). In fact, the relation between victimization at wave 1 and cyberbullying at wave 3 was fully mediated by anger at wave 1 and media use at wave 2 ($\beta=.01$, $p<.05$), thereby providing important support for the assumed underlying mechanisms according to the Cyclic Process Model.

Finally, we expected adolescents who conducted cyberbullying behavior after the cycle of being victimized, feeling angry or frustrated, and using antisocial media content, ultimately are victimized again. This cyclic element of the model, that is, cyberbullying at wave 3 is related to victimization at wave 3, was indeed significant: $\beta=.32, p<.01$. Hence, the Cyclic Process Model received support from the empirical data as represented by the described results and graphically represented in Figure 2. Importantly, in the above analyses, we controlled for cyberbullying at wave 1 and 2. At wave 1, cyberbullying related significantly to both victimization ($\beta=.45, p<.01$) and anger ($\beta=.16, p<.01$). And, as expected, at wave 2, cyberbullying was related significantly to exposure to media portraying antisocial and risk behavior content ($\beta=.23, p<.01$). Furthermore, cyberbullying at wave 1 predicted cyberbullying at wave 2 ($\beta=.39, p<.01$), which subsequently predicted cyberbullying at wave 3 ($\beta=.33, p<.01$). Finally, we also controlled for victimization at wave 3 with victimization at wave 1 ($\beta=.18, p<.01$). Thus, cyberbullying behavior and victimization at wave 3 were not only explained by the previous cyberbullying and victimization rates, but also by experienced anger and media exposure. This provides important support for the underlying processes of the Cyclic Process Model.

The analyses further showed that the relation between victimization at wave 1 and cyberbullying at wave 3 was fully mediated by anger at wave 1 and media exposure at wave 2 ($\beta=.01, p<.05$). Furthermore, the relation between victimization at wave 1 and victimization at wave 3 was partly mediated by anger at wave 1, media exposure at wave 2, and cyberbullying behavior at wave 3 ($\beta=.002, p<.05$). Finally, the Cyclic Process Model explained 14.0% of the variance in cyberbullying at wave 3 ($p<.05$), and 14.5% of the variance in victimization at wave 3 ($p<.01$).

The feedback loop from cyberbullying behavior to victimization is represented with a correlation coefficient in the model. Obviously, a correlation coefficient is not sufficient as support for the feedback loop. Therefore, additional analyses were conducted, in which cyberbullying served as the starting point of the model, in order to test whether cyberbullying behavior affects victimization over time. The fit of the model was good ($\chi^2(13)=23.44$ ($p=.04$), $RMSEA=.03$ (.01-.05), $CFI=.97$, $SRMR=.06$). Cyberbullying at wave 1 significantly predicted victimization at wave 2 ($\beta=.19, p<.01$). At the subsequent waves, the conclusions of the Cyclic Process Model remained. The findings of testing this model empirically support the assumption that cyberbullies turn into victims over time. In all, the results of testing

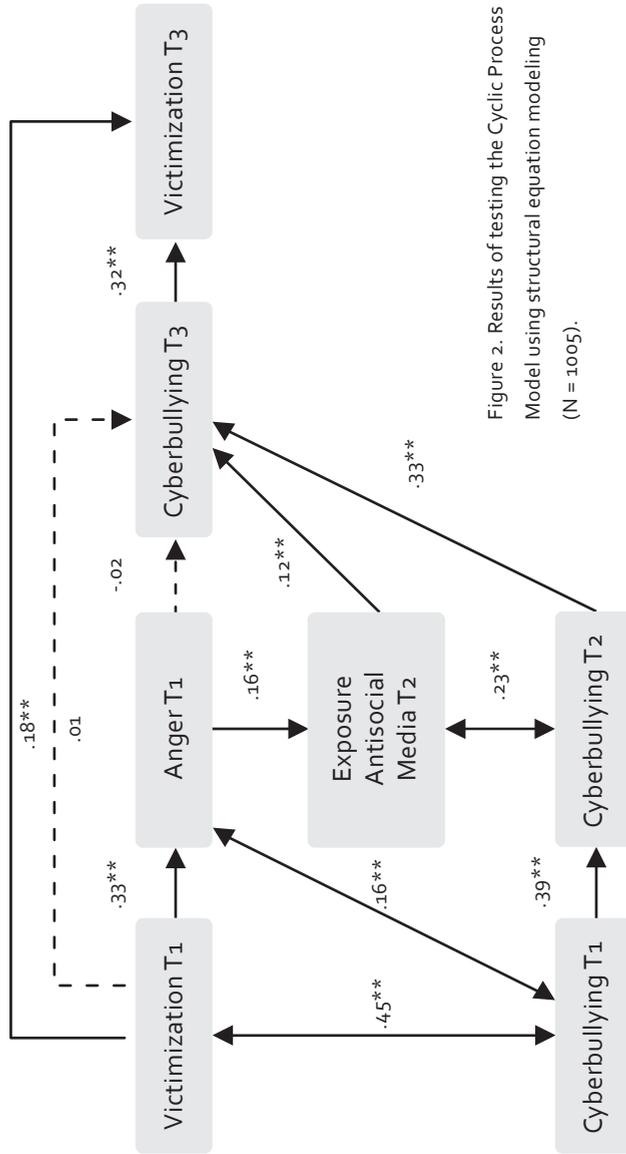


Figure 2. Results of testing the Cyclic Process Model using structural equation modeling (N = 1005).

Fit indices: $\chi^2(9)=10.06$ ($p=.35$), RMSEA=.01 (.00-.04), CFI=.99, and SRMR=.03.

Note. ** $p < .01$. Dotted lines represent insignificant pathways.

both models indicate that the Cyclic Process Model does not only find empirical support *within* each wave (cross-sectional), but also over time *across* the three waves (longitudinal).³

Discussion

The aim of the current study was to find empirical support for our proposed Cyclic Process Model, using longitudinal data. The main findings as reported in the above, support the cyclic process of being bullied (i.e., victimized) evoking increased feelings of anger and frustration, which in turn predicts higher levels of exposure to media portraying antisocial and risk behavior content. Such media use subsequently predicts an increase in cyberbullying behavior. Additionally, the findings show that being a cyberbully relates to being victimized again, which causes adolescents to get caught up in a cyclic process of being a victim, becoming a cyberbully, and becoming a victim again. In fact, the relation between victimization and cyberbullying was fully mediated by anger and media use, thereby providing important support for the assumed underlying mechanisms according to the Cyclic Process Model. Thus, the results support our model in all respects.

The support for the Cyclic Process Model is in line with and unites previous research in important ways. Thus far, numerous studies showed that victimization and cyberbullying behavior are positively related (e.g., Perren & Gutzwiller-Helfenfinger, 2012; Smith et al., 2008; Ybarra & Mitchell, 2004), however, hardly any research tested underlying mechanisms in a process over time. Our findings show that the relation between victimization and cyberbullying is mediated by anger and frustration as well as by media use, which connects previous lines of research. Previous studies have found the role of anger and stress as mediating between victimization and both traditional bullying and cyberbullying (Hay et al., 2010; Patchin & Hinduja, 2010), whereas a few others found that exposure to violent media stimulated cyberbullying (Calvete et al., 2010; Dittrick et al., 2013; Fanti et al., 2012; Lam et al., 2013). The amplifying character of exposure to media portraying violent, antisocial and risk behavior content on cyberbullying behavior further unites the Social

³ Additional analyses were conducted with a more complex cross-lagged panel model including all variables on all waves. The results of those analyses support the conclusions described above. Upon request, the results of these additional analyses can be sent.

Cognitive Theory (Bandura, 2001) and the Downward Spiral Model (Slater et al., 2003), as well as previous research showing that angry adolescents have an increased attraction to media portraying this type of content (Olson et al., 2007; Plaisier & Konijn, 2013). Ultimately, our results suggest that, at the end of this chain, the victimized adolescents who turned into cyberbullies, become victims again, and would therefore end up in a cyclic loop. This further integrates previous research demonstrating that cyberbullying and victimization were significantly related (Livingstone et al., 2010; Vandebosch & Van Cleemput, 2009; Walrave & Heirman, 2011). Hence, the Cyclic Process Model provides an integrated and encompassing theoretical account for a number of key factors underlying the process of how an adolescent may become a cyberbully.

In line, our findings highlight the importance of investigating the underlying mechanisms of cyberbullying behavior and underscore the important role of media exposure herein. Although the relation between media exposure and cyberbullying behavior was found before (Calvete et al., 2010; Dittrick et al., 2013; Fanti et al., 2012; Lam et al., 2013), it had been limited to violent media exposure alone. We broadened the relevance of media exposure to include other types of antisocial and risk behavior content as well, since this type of content is highly popular among adolescents (Strasburger, 2009; Strasburger et al., 2010). Moreover, we developed a more systematic measurement instrument (Den Hamer & Konijn, 2015; Den Hamer et al., 2014; Den Hamer et al., under review) to assess specific content-based media exposure independent of media channel rather than just the frequency of exposure to a particular media channel (e.g., just violent movies). In so doing, our results are based on a more reliable and valid measure of content-based media exposure than in previous media-based studies.

The Cyclic Process Model is the first to integrate media exposure in a theoretical model providing insight into the underlying mechanisms of cyberbullying and how it evolves over time. Although support for parts of the Cyclic Process Model was found in two of our previous studies, the current study provides support for the Cyclic Process Model in full, holding both *within waves* (cross-sectional) and *across waves* (longitudinal). A cross-sectional study provided initial support for the relations between the key variables of the Cyclic Process Model (Den Hamer et al., 2014), whereas a second study provided support for the reinforcing influence of exposure to media portraying antisocial and risk behavior content on cyberbullying behavior over time (Den Hamer & Konijn, 2015). Especially the long-term amplifying cyclic effects as shown in the

current study, contribute in an important and unique way to the extant body of research as most research on cyberbullying behavior is cross-sectional in nature (Baek & Bullock, 2013; Kowalski et al., 2014). Therefore, more research is needed to investigate the processes *over time*, in particular the assumed cyclic part of our model fueled by how the adolescents belief to release anger and frustration through media use portraying antisocial and risk behavior.

The strength of a longitudinal design cannot prevent however that this study also has some limitations. As a point of attention holding for most cyberbullying research, also in our research, cyberbullying behavior was measured using a self-report measure (CBQ: Calvete et al., 2010). Since cyberbullying is a sensitive topic that is open to social desirable answers, the estimation of cyberbullying in this study could well be an underestimation of the true scores of cyberbullying behavior. This possible underestimation of cyberbullying behavior is discussed by other scholars (Dehue, Bolman, & Völlink, 2008; Gradinger, Strohmeier, Schiller, Stefanek, & Spiel, 2012; Kowalski & Limber, 2007; Schoffstall & Cohen, 2011; Walrave & Heirman, 2011). Adding to the validity of our study, the prevalence rate of cyberbullying behavior in the current study does not differ from prevalence rates in other cyberbullying research. The prevalence rate in the current study is even quite high with about 27% of the adolescents admitting to have cyberbullied someone, whereas most prevalence rates are about 20% (see meta-analysis Kowalski et al., 2014).

Another drawback of most longitudinal research is the risk of attrition over time. We could not prevent that part of the adolescents could not participate in each of the three waves. Due to sickness, school activities, and external internships, each wave had about 20% absence of participants. Attrition refers to a deliberate absence or deliberately not participating in subsequent waves, however, the adolescents in our study did not know when we would attend their school for the 2nd and 3rd wave. Therefore, they could not have deliberately dropped out to avoid participation in our study. To account for these missing values, we applied hotdeck imputation which realistically imputes missing data, since the imputations are based on values observed elsewhere (Myers, 2011). Furthermore, whereas all participants were located in one common secondary school, there is no reason to assume that these adolescents would not represent a "general adolescent population". Nevertheless, replication studies are needed to improve the external validity of the Cyclic Process Model. This study has important implications for developing intervention programs that aim to prevent cyberbullying behavior. Since our study shows that media

portraying antisocial and risk behavior content plays an amplifying role in cyberbullying behavior, intervention programs could be developed that address how adolescents deal with this type of media (to our knowledge, such intervention programs do not yet exist). Furthermore, it might be helpful to make adolescents aware that the idea of venting their anger and frustration through media use portraying antisocial and risk behavior content might work adversely. Future research could further investigate how media exposure related to victimization or cyberbullying may differ between adolescents who differ in their ways of coping with anger.

In sum, the current study contributes to the understanding of cyberbullying behavior in a long-term perspective. The Cyclic Process Model explains how bullied adolescents may turn into cyberbullies, reinforced by feelings of anger and frustration and exposure to media portraying antisocial and risk behavior content. These adolescents get caught up in a cyclic loop, since they become victims of bullying again. The major contributions of the current study to the field of cyberbullying research are threefold: 1) This study provides important insights into the underlying mechanisms of cyberbullying and how it evolves over time; 2) Our results highlight how exposure to media content portraying antisocial and risk behavior plays an important role in amplifying the cyclic process from victimization to cyberbullying behavior; and 3) Most studies in cyberbullying research are cross-sectional in nature, whereas the current study contributes to the understanding of the longitudinal influences on cyberbullying. In all, our study demonstrates that the Cyclic Process Model provides unique insights in how a victimized adolescent can turn into becoming a cyberbully over time.

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