

# An Investigation of Short-Term Longitudinal Associations Between Social Anxiety and Victimization and Perpetration of Traditional Bullying and Cyberbullying

Sara Pabian · Heidi Vandebosch

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**Abstract** Previous research has suggested that social anxiety is associated with victimization and perpetration of (cyber)bullying. The direction and causality of this relationship has not yet been empirically supported for both traditional and cyberbullying involvement. This study examined short-term longitudinal associations between feelings of social anxiety and involvement in traditional bullying and cyberbullying among 2128 adolescents aged 10–17 (56.6 % girls). A cross-lagged panel analysis provided evidence for the contribution of social anxiety to later victimization of bullying, both on- and off-line. The possibility of a reciprocal relationship was also examined, although it was not supported. Furthermore, longitudinal bidirectional relationships between social anxiety and the perpetration of bullying were investigated. Only one significant longitudinal association was found: the perpetration of traditional bullying predicted subsequent higher levels of social anxiety. The implications of these findings are discussed.

**Keywords** Traditional bullying · Cyberbullying · Social anxiety · Adolescents · Cross-lagged panel model

## Introduction

Bullying has been defined as “an aggressive, intentional act carried out by a group or individual, repeatedly and over

time against a victim who cannot easily defend him or herself” (Olweus 1993; Smith et al. 2008, p. 376). This definition includes four major components: aggression, intentionality, repetitiveness, and power imbalance (see e.g., Dooley et al. 2009). Researchers differentiate between direct forms of bullying (such as physical or verbal bullying) and indirect forms or relational forms of bullying. Direct forms of bullying include insulting someone face to face and pushing someone. Spreading lies about someone (behind the back of the victim) and trying to get others to exclude a group member are examples of indirect traditional bullying (Slonje and Smith 2008). The adoption of information and communication technologies (ICT), (also) as a means to bully, has stimulated scholars to further distinguish between traditional bullying and cyberbullying. The devices that are used for cyberbullying (such as mobile phones and computers) make it easier for a perpetrator to act anonymously (e.g., by using a nickname) and without directly facing the victim (i.e., there is a “screen” in between) (Slonje et al. 2013; Sticca and Perren 2013). Cyberbullies are less limited in time and space and their acts can easily reach a larger audience (Slonje et al. 2013). Moreover, cyberbullies have less chance of getting caught or being punished, as they can more easily perpetrate without adult supervision (Smith et al. 2008). Because of these characteristics, direct forms of cyberbullying (like insulting someone via chat or threatening someone via a text message) also differ from direct forms of traditional bullying. The same holds for indirect forms of cyberbullying (like posting an embarrassing or suggestive photo of someone on a social networking site that can be viewed by others or secretly breaking into someone’s online profile) compared to indirect forms of traditional bullying.

The literature shows that a meaningful proportion of adolescents has been the victim and/or the perpetrator of

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S. Pabian (✉) · H. Vandebosch  
Department of Communication Studies, Research Group MIOS  
(Media, ICT, and Interpersonal Relations in Organisations and Society), University of Antwerp, Sint-Jacobstraat 2,  
2000 Antwerp, Belgium  
e-mail: Sara.Pabian@uantwerpen.be

H. Vandebosch  
e-mail: Heidi.Vandebosch@uantwerpen.be

traditional and/or cyberbullying recently or in the past. Victimization rates for both traditional and cyberbullying among adolescents tend to range widely between 5.5 and 72 % (Olweus and Limber 2010; Patchin and Hinduja 2012; Tippett and Wolke 2014), whereas perpetration rates vary between 3 and 44 % (Cappadocia et al. 2013; Olweus and Limber 2010; Patchin and Hinduja 2012; Tippett and Wolke 2014). These prevalence rates vary depending on multiple factors, such as the specific study's scope (ranging from one form of (cyber)bullying to all (cyber)bullying behaviors), the time frame being assessed, and the used age span (for an overview of these characteristics, see Heirman et al. 2015). Most research has reported higher prevalence rates of victimization and perpetration for traditional bullying than for cyberbullying (Juvonen and Gross 2008; Kowalski and Limber 2013). Traditional bullying seems to peak during middle school (or the first 2 years of secondary school), whereas cyberbullying peaks somewhat later (for an overview of prevalence rates, see, for instance: Kowalski et al. 2014; Olweus and Limber 2010; Wölfer et al. 2014).

In the past decade, a growing amount of research has focused on the profiles of victims, perpetrators, and bystanders, as well as the outcomes of being involved in (cyber)bullying (e.g., Cappadocia et al. 2013; Slonje et al. 2013; Veenstra et al. 2012; Wright and Li 2013). Previous research has suggested that the victimization of bullying is associated with internalizing problems such as depression, loneliness, low-self-esteem, and school phobia (e.g., Cook et al. 2010; Juvonen et al. 2003; Patchin and Hinduja 2006; Woods et al. 2009). Research has shown that bullies too are confronted with (some of) these internalizing problems (e.g., Baldry 2004; Juvonen et al. 2003; Murray-Close et al. 2007). In this article, we will focus on social anxiety, which has been proposed as a possible predictor of the victimization and perpetration of bullying as well as an outcome of involvement in bullying (e.g., Campbell et al. 2013; Dempsey et al. 2009). This internalizing aspect of mental health is important to study, especially during adolescence, as it may be a precursor of more severe mental disorders (in adulthood) (La Greca and Harrison 2005; Takizawa et al. 2014). Previous research also has shown that (early) adolescents are especially vulnerable to the emergence of social anxiety because of converging challenges in the peer context and social-cognitive developments that can amplify peer relationship stress (Flanagan et al. 2008).

#### Characteristics of Social Anxiety and Socially Anxious Individuals

Social anxiety is a psychosocial problem that is recognized as an important factor for understanding interpersonal

behavior (La Greca and Lopez 1998; van den Eijnden et al. 2014). It consists of different aspects such as “fear of negative evaluation,” “social avoidance and distress,” and “social avoidance specific to new situations or new people” (La Greca and Lopez 1998, p. 83). A defining feature of social anxiety is the fear that one will make a mistake and be criticized (Miller et al. 1972). Socially anxious adolescents may withdraw from social situations or disengage from peer activities that are critical to normal development and socialization (La Greca and Stone 1993). In general, adolescent girls report more social anxiety in comparison to boys (La Greca and Lopez 1998). Research has shown that individuals with higher levels of social anxiety find some aspects of the Internet particularly appealing and use the Internet to form new online relationships (Madell and Muncer 2006). This is supported by research demonstrating that individuals are better able to be their “true selves” online compared to in face-to-face interactions (Bargh et al. 2002). With regard to socializing with known others, research has shown that socially anxious individuals are not necessarily more likely to use the Internet for this purpose (Madell and Muncer 2006).

Although social anxiety is recognized as an important predictor and outcome of bullying involvement (Campbell et al. 2013; Dempsey et al. 2009), few studies have investigated longitudinal associations. The present article is the first to address simultaneously the longitudinal associations of social anxiety as a predictor of victimization of bullying and perpetration of bullying, and of social anxiety as an outcome of victimization of bullying and perpetration of bullying. These associations will be examined at the same time for both traditional bullying and cyberbullying. As noted earlier, both forms of bullying have some similarities as well as some differences.

#### Victimization of (Cyber)Bullying and Social Anxiety

Research has shown that traditional peer victimization is associated with higher levels of social anxiety (Craig 1998; Dempsey et al. 2009; Flanagan et al. 2008; La Greca and Harrison 2005; Richard et al. 2011). Victims of different forms of bullying, such as physical bullying, verbal bullying, and relational bullying are found to be more socially anxious (Craig 1998; Richard et al. 2011). However, some researchers note that victimization of relational bullying is especially associated with higher social anxiety (Dempsey et al. 2009; La Greca and Harrison 2005). With regard to longitudinal associations, several researchers have suggested a negative cycle: socially anxious children may be at risk for victimization and repeated victimization may heighten already high levels of social anxiety (Craig 1998). A preliminary longitudinal examination of 68 early adolescents who had recently moved showed that social

anxiety did not play a significant role in being rejected by others, but social anxiety appeared to change over time in response to rejection experiences (Vernberg et al. 1992).

Consistent with findings in traditional bullying research, cross-sectional cyberbullying studies have found a positive association between adolescents' social anxiety and victimization of cyberbullying (Dempsey et al. 2009; Juvonen and Gross 2008; Kowalski et al. 2008; Navarro et al. 2011). Navarro et al. (2011) suggested that (increasing) worries about others' evaluation makes children (10–12 years old) vulnerable to victimization of cyberbullying. One longitudinal study examined bidirectional relationships between online victimization and psychosocial problems (such as social anxiety) among adolescents. The results indicated a unidirectional relationship whereby social anxiety predicted an increase in later victimization of cyberbullying rather than the reverse (van den Eijnden et al. 2014).

It can be concluded that previous research showed a possible negative relationship between victimization of (cyber)bullying and social anxiety: perpetrators might choose socially anxious individuals as their target, or social anxiety might be a result of being victimized. Although longitudinal examinations are scarce, research has shown that a high level of social anxiety is an outcome of being a victim of traditional bullying, whereas it is rather a predictor for being a victim of cyberbullying.

#### Perpetration of (Cyber)Bullying and Social Anxiety

The possible association between the perpetration of traditional bullying and/or cyberbullying and social anxiety has received less attention in previous research compared to victimization of (cyber)bullying. In a study by Juvonen et al. (2003), traditional bullies had the lowest levels of social anxiety compared to victims, bully-victims, and uninvolved students. Craig (1998) and Baldry (2004) examined the relationship between social anxiety and perpetration of traditional bullying for different forms of bullying. In the first study, offline verbal and relational aggressions were significantly associated with social anxiety in contrast to physical aggression. More precisely, being a perpetrator of verbal aggression was related to lower social anxiety, whereas being a perpetrator of relational aggression was associated with higher social anxiety (Craig 1998). In the second study, indirect perpetration of traditional bullying predicted withdrawn behaviors (comparable to social anxiety). This relationship was not found for direct forms of traditional bullying (Baldry 2004).

With regard to the perpetration of cyberbullying, the results of a study by Kowalski et al. (2008) showed that cyberbullies reported social anxiety scores that were about equal to those who were not involved in cyberbullying. However, other researchers have found a significant

positive relationship between the perpetration of cyberbullying and adolescents' general anxiety (Aoyama 2010; Campbell et al. 2013). Harman et al. (2005) provided a possible explanation for the positive relationship between the perpetration of cyberbullying and social anxiety: Adolescents who are not developing good social skills in face-to-face interactions may escape from their social anxieties by submerging themselves in the online world (Harman et al. 2005). In that world, they might feel less restrained and become engaged with cyberbullying behavior. Harman et al. (2005) suggested that the uninhibited behavior might even be transferred to real-life encounters. Until now, no longitudinal data are available on the contribution of social anxiety in predicting the perpetration of (cyber)bullying or vice versa.

A number of the aforementioned studies on (cyber)bullying involvement have also examined whether being a bully-victim is related to being socially anxious. Results showed that victims of traditional bullying reported the highest levels of social anxiety, bullies reported the lowest levels, and bully-victims generally fell in between (Craig 1998; Juvonen et al. 2003). With regard to cyberbullying, Kowalski et al. (2008) found that victims of cyberbullying reported the highest social anxiety scores, closely followed by cyber bully-victims. However, in their study, frequent cyber bully-victims (involved at least 2–3 times per month) reported the highest social anxiety scores. Also, with regard to general anxiety, bully-victims of cyberbullying were found to have the highest levels of anxiety (Aoyama 2010; Kowalski and Limber 2013) in comparison to “pure” cyber victims, “pure” cyberbullies, and non-involved students. Several researchers (e.g., Craig 1998) have provided an explanation for the association between being both a bully and a victim and having (relatively) high social anxiety. They start from the assumption that victimization precedes the perpetration of cyberbullying, which is supported by longitudinal research (Jose et al. 2012; Hemphill and Heerde 2014). They suggest that victims with social anxiety may engage in cyber aggression (König et al. 2010; Kowalski and Limber 2007; Law et al. 2012), which represents a less confrontational and more anonymous form of retaliation. Socially anxious victims might then choose to cyberbully their on- or offline perpetrator (the “revenge of the nerds hypothesis”) (Chisholm 2006; König et al. 2010). On the other hand, they might release their feelings by bullying someone else. Research shows, for instance, that perpetrators of cyberbullying are more likely to bully peers who have a lower social status than themselves (Wegge et al. 2014b).

In sum, previous research has suggested a possible link between the perpetration of (cyber)bullying and social anxiety, however findings are contradictory and explanations for this relationship are scarce. In this regard, research

has suggested that socially anxious victims of (cyber)bullying are especially more inclined to take revenge online or indirectly offline.

## Current Study

Previous research has provided mainly cross-sectional evidence for the association between (cyber)bullying involvement and social anxiety. Longitudinal research on this topic is scarce, especially research that investigates bidirectional relationships among a large representative sample of an adolescent population. This study investigated how involvement in traditional bullying and cyberbullying corresponded to social anxiety over time (6-month time interval). To the best of our knowledge, this study is the first in the field of (cyber)bullying to relate both traditional and cyber forms of both perpetration and victimization of bullying to social anxiety longitudinally. Social anxiety was examined at the same time as both a predictor and an outcome of perpetration and victimization of (cyber)bullying by using cross-lagged panel analysis. This study also tested earlier suggestions that socially anxious adolescents who have been a victim of traditional or cyberbullying might seek revenge or retaliate online by means of cyberbullying their perpetrator or others.

## Methods

### Participants and Procedure

The data were collected in October 2011 and May 2012 in the context of a large-scale longitudinal study in Belgium among 10–17 year olds. In Belgium, a school year officially begins on September 1st and ends on June 30th. There was a 6-month interval between the two measurements because the study aimed at investigating the link between developmental trajectories of adolescents and involvement in cyberbullying. A random stratified cluster sample with grade and type of schooling (general, technical, and vocational secondary education) as sampling criteria was applied to select the respondents. Informed consent was obtained from the school head, as is customary in Belgium. Students and parents were notified in advance and had the possibility to contact the responsible researcher for further questions or rejections. Students filled in the questionnaire during school time in the presence of a researcher. They were guaranteed verbally and in writing that their responses were confidential.

A total of 2333 students completed the questionnaire at baseline and 2128 students completed the questionnaires for both waves (91.21 % of total). In total, 205 students preferred not to fill in identification information (date of birth

and the first letter of the name of their biological father and mother) during one or both waves, which made it impossible to connect data from all the waves. These students were omitted from further analyses. The mean age of the sample was 13.02 years ( $SD = 1.65$ , range 10–17), and the sample consisted of 56.6 % girls. Most were Belgian (95.5 %). A set of  $\chi^2$ -tests were used to explore whether there were differences between adolescents participating in both waves and those participating in only the first wave with regard to their involvement in (cyber)bullying. The subjects participating in only the first wave were significantly more involved in the perpetration of cyberbullying than those who completed both questionnaires (15.5 vs. 10.0 %),  $\chi^2(5) = 16.05$ ,  $p < .01$ . Furthermore, a  $t$  test revealed no significant difference with respect to social anxiety between adolescents participating in both waves and those who dropped out ( $t(244.03) = -1.305$ ,  $p = .193$ ).

### Measures

The questionnaire consisted of a wide range of existing and newly developed questions and scales concerning cyberbullying, traditional bullying, and personal characteristics. The questionnaire was pilot tested on a small sample ( $N = 47$ ) and minor revisions were made to improve its readability. The measures that were used in the current study are presented below in the same sequence as their appearance in the questionnaire.

### Self-Reported Cyberbullying Behavior

In order to measure victimization and perpetration of cyberbullying, a definition was presented to the respondents. The widely cited definition of Olweus (1993) describes bullying as an aggressive, intentional act or behavior that is carried out by a group or an individual repeatedly and over time against a victim who cannot easily defend him or herself. Following the definition, examples were given: “Bullying can happen in school, on the street, and in youth or sport clubs. Bullying can also happen via the Internet or mobile phone, for instance by texting mean messages via mobile phone or chat, by disseminating hurtful pictures via the Internet or mobile phone, by posting offending reactions on message boards, and by spreading rumors via websites.” Next, adolescents were asked to indicate how often they were bullied via the Internet or mobile phone in the past 6 months. The answer options were “never,” “once in the past 6 months,” “several times in the past 6 months,” “once a month,” “several times per month,” and “several times per week.” Subsequently, adolescents indicated how often they engaged in perpetration of cyberbullying in the past 6 months (*never* (1) to *several times per week* (6)).

### Self-Reported Traditional Bullying Involvement

In line with the measurement of cyberbullying involvement, a definition of traditional bullying was first provided before questioning victimization and perpetration of traditional bullying: “The previous questions involved bullying via the Internet or mobile phones. Bullying can also happen in the ‘real world,’ for example, in school, in the street, in youth movements or in sport clubs. Someone who bullies in the real world can, for example, say mean things, laugh at others, exclude or ignore others, hit or push someone, or tell lies about someone. The next questions involve bullying in the real world.” Respondents were asked how often they were bullied ‘in the real world’ in the past 6 months (*never* (1) to *several times per week* (6)). Subsequently, they were asked how often they have bullied others ‘in the real world’ (*never* (1) to *several times per week* (6)).

### Social Anxiety

Social anxiety was measured using the Social Anxiety Scale for Adolescents (SAS-A) (La Greca and Lopez 1998). This scale consists of three subscales, the FNE (8 items), the SAD-G (4 items), and the SAD-NEW (6 items). These subscales measured “fear of negative evaluation from peers” (FNE), “social avoidance and distress in general” (SAD-G), and “social avoidance specific to new situations or unfamiliar peers” (SAD-NEW), respectively. An example of an FNE item is: “I worry that others don’t like me.” “I feel shy even with peers I know very well” is an example of a SAD-G item. Lastly, “I get nervous when I talk to peers I don’t know very well” is an example of a SAD-NEW item. Answer categories ranged from (1) “totally disagree” to (4) “totally agree.” The SAS-A has demonstrated strong reliability and validity in several studies (e.g., Flanagan et al. 2008; La Greca and Lopez 1998). For further analyses, social anxiety was treated as a second-order latent variable for each wave, defined by the three subscales. Before the structural model was calculated, a measurement model was tested in Mplus 6 (Muthén and Muthén 2010) using confirmatory factor analysis, as suggested by Anderson and Gerbing (1988). Robust maximum likelihood estimation (MLR) was used in order to adjust for deviations due to non-normal outcome variables. One item of the SAD-NEW subscale (“I only talk to peers I know really well”) had a low factor loading for both waves (<.36) and was not included in further analysis. The results indicated a good fit for the measurement model, except for the Chi square test (due to its sensitivity to sample size): CFI = .934, TLI = .927, RMSEA = .041 [.040–.043], SRMR = 0.047,  $\chi^2(506) = 2332.37$ ,  $p < .001$ . The factor loadings are presented in Table 1. In our sample, the

internal consistency at time 1 and 2 (Cronbach’s alpha) was, respectively, .89 and .90 for the FNE scale, .79 and .82 for the SAD-NEW factor, and .74 and .76 for the SAD-G factor.

## Results

### Preliminary Analyses

Table 2 presents the frequencies of the bullying variables at time points 1 and 2. About one out of four students indicated that they had been traditionally bullied in the past 6 months (T1: 27.9 %; T2: 22 %). With regard to the victimization of cyberbullying, about one out of ten students were bullied at least once in the past 6 months via the Internet or mobile phone at time 1 and 2 (11.1 and 10.1 %, respectively). Less than one out of four students (23.1 %) admitted that they had bullied others in real life at time 1 while only about 15 % reported doing so at time 2. For perpetration of cyberbullying, about one out of ten students indicated they had perpetrated in the past 6 months (T1: 10.0 %; T2: 9.6 %). Chi square tests were used to test differences over time for each bullying role. No significant differences were found. Another set of Chi square tests were performed to examine differences between victimization of traditional bullying and cyberbullying on the one hand and perpetration of traditional bullying and cyberbullying on the other hand. No significant differences were found between traditional bullying and cyberbullying for each role during each measurement point.

Table 3 presents the descriptive statistics for the main variables of the study. With regard to the distribution of the scores on the social anxiety scale, the values of skewness were 0.069 at time 1 and 0.102 at time 2, and for kurtosis 0.172 at time 1 and 0.263 at time 2. Skewness of <2 and kurtosis of <7 are considered acceptable for normality (West et al. 1995). Spearman’s correlation coefficients between the main variables of the study are also presented in Table 3. These correlations present small and moderate initial evidence for associations between (cyber)bullying involvement and social anxiety: For social anxiety at baseline, significant positive correlations were found with victimization of traditional bullying (T1:  $r = .30$ ,  $p < .001$ ; T2:  $r = .21$ ,  $p < .001$ ), victimization of cyberbullying (T1:  $r = .14$ ,  $p < .001$ ; T2:  $r = .16$ ,  $p < .001$ ), and perpetration of traditional bullying (T1:  $r = .08$ ,  $p < .001$ ; T2:  $r = .08$ ,  $p < .001$ ). Furthermore, victimization of traditional bullying ( $r = .20$ ,  $p < .001$ ), victimization of cyberbullying ( $r = .09$ ,  $p < .001$ ), and perpetration of traditional bullying ( $r = .08$ ,  $p < .001$ ) at baseline also correlated positively with social anxiety 6 months later.

**Table 1** Unstandardized and standardized regression coefficients for the confirmatory factor analysis of social anxiety

Wave 1					Wave 2				
Latent construct	Observed variable	B	SE	$\beta$	Latent construct	Observed variable	B	SE	$\beta$
FNE	Item 1	1.00		0.72	FNE	Item 1	1.00		0.76
	Item 2	1.11	0.03	0.74		Item 2	1.06	0.02	0.76
	Item 3	0.97	0.04	0.68		Item 3	0.90	0.03	0.66
	Item 4	0.88	0.03	0.62		Item 4	0.82	0.03	0.63
	Item 5	0.93	0.04	0.70		Item 5	0.87	0.03	0.68
	Item 6	1.24	0.04	0.82		Item 6	1.16	0.03	0.83
	Item 7	0.88	0.04	0.63		Item 7	0.80	0.03	0.63
	Item 8	1.22	0.03	0.82		Item 8	1.20	0.03	0.86
SAD-NEW	Item 9	1.00		0.66	SAD-NEW	Item 9	1.00		0.67
	Item 10	0.99	0.03	0.69		Item 10	1.05	0.03	0.76
	Item 11	1.03	0.04	0.75		Item 11	1.04	0.03	0.78
	Item 12	0.88	0.04	0.61		Item 12	0.90	0.04	0.64
	Item 13	0.83	0.04	0.56		Item 13	0.84	0.04	0.60
SAD-G	Item 14	1.00		0.65	SAD-G	Item 14	1.00		0.67
	Item 15	1.08	0.05	0.66		Item 15	1.06	0.05	0.68
	Item 16	0.94	0.05	0.63		Item 16	0.93	0.04	0.64
	Item 17	1.02	0.04	0.62		Item 17	1.00	0.04	0.64
Social anxiety	FNE	0.82	0.04	0.73	Social anxiety	FNE	0.83	0.04	0.73
	SAD-NEW	1.00		0.89		SAD-NEW	1.00		0.90
	SAD-G	0.93	0.05	0.93		SAD-G	0.91	0.04	0.93

**Table 2** Frequencies of perpetration and victimization of (cyber)bullying for each wave

Time	Frequency	TBV (%) (N)	CBV (%) (N)	TBP (%) (N)	CBP (%) (N)
1	Never	72.1 (1514)	88.9 (1867)	76.9 (1604)	90.0 (1889)
	Once in the past 6 months	12.2 (257)	6.8 (142)	13.7 (285)	6.3 (132)
	Several times in the past 6 months	8.8 (184)	2.5 (53)	6.6 (137)	2.6 (54)
	Once a month	1.4 (29)	0.5 (10)	1.0 (20)	0.3 (6)
	Several times per month	3.0 (64)	0.9 (18)	1.2 (24)	0.5 (10)
	Several times a week	2.4 (51)	0.5 (11)	0.7 (15)	0.3 (7)
2	Never	78.0 (1652)	89.9 (1906)	84.3 (1769)	90.4 (1900)
	Once in the past 6 months	8.5 (179)	6.0 (127)	8.6 (181)	5.7 (120)
	Several times in the past 6 months	7.8 (165)	2.9 (61)	5.1 (106)	2.6 (55)
	Once a month	1.2 (26)	0.5 (10)	0.3 (6)	0.3 (7)
	Several times per month	2.4 (50)	0.4 (8)	1.2 (26)	0.5 (11)
	Several times a week	2.1 (45)	0.4 (9)	0.5 (10)	0.4 (9)

% Represents valid percents

TBV traditional bullying victimization, CBV cyberbullying victimization, TBP traditional bullying perpetration, CBP cyberbullying perpetration

In terms of the control variables gender and age, Spearman’s correlation coefficients show that younger adolescents are at greater risk for being victim of traditional bullying (T1:  $r = -.20, p < .001$ ; T2:  $r = -.20, p < .001$ ) and cyberbullying (T1:  $r = -.06, p < .01$ ; T2:

$r = -.11, p < .001$ ), whereas older adolescents are at greater odds of being a cyberbully (T1:  $r = .097, p < .001$ ; T2:  $r = .11, p < .001$ ). A set of Chi square tests explored possible differences in bullying involvement among boys and girls. Girls were more likely to be a victim of

**Table 3** Descriptive statistics and Spearman's correlation coefficients

Variable	1	2	3	4	5	6	7	8	9	10
1.Social anxiety T1										
2.TBV T1	.30***									
3.CBV T1	.14***	.28***								
4.TBP T1	.08***	.31***	.12***							
5.CBP T1	.02	.15***	.29***	.41***						
6.Social anxiety T2	.66***	.20***	.09***	.08***	-.01					
7.TBV T2	.21***	.44***	.21***	.20***	.11***	.21***				
8.CBV T2	.16***	.29***	.34***	.16***	.17***	.13***	.35***			
9.TBP T2	.08***	.21***	.12***	.37***	.23***	.10***	.31***	.21***		
10.CBP T2	-.00	.13***	.18***	.31***	.38***	.03	.17***	.24***	.40***	
M	2.22	1.58	1.19	1.38	1.16	2.21	1.48	1.17	1.27	1.16
SD	.53	1.16	.67	.84	.57	.53	1.09	.60	.75	.60
Range	1–4	1–6	1–6	1–6	1–6	1–4	1–6	1–6	1–6	1–6

TBV traditional bullying victimization, CBV cyberbullying victimization, TBP traditional bullying perpetration, CBP cyberbullying perpetration

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

traditional bullying at time 1 (33.3 % girls; 27.7 % boys;  $\chi^2(1) = 7.53$ ,  $p < .01$ ) and time 2 (26.1 % girls; 22.1 % boys;  $\chi^2(1) = 4.43$ ,  $p < .05$ ). Also for cyberbullying, more girls than boys were victims at time 1 (14.1 % girls; 8.2 % boys;  $\chi^2(1) = 18.31$ ,  $p < .001$ ) and time 2 (13.4 % girls; 8.9 % boys;  $\chi^2(5) = 10.68$ ,  $p < .01$ ). With regard to perpetration, more boys than girls reported that they had bullied someone in real life at both measurement points (Time 1: 21.4 % girls; 27.0 % boys;  $\chi^2(1) = 8.62$ ,  $p < .01$ ; Time 2: 14.5 % girls; 18.0 % boys;  $\chi^2(1) = 4.83$ ,  $p < .05$ ). For perpetration of cyberbullying, boys were found to be more involved in this behavior, however a significant difference was only found for time 2 (Time 1: 9.5 % girls; 11.0 % boys;  $\chi^2(1) = 1.38$ ,  $p = .240$ ; Time 2: 8.8 % girls; 11.9 % boys;  $\chi^2(1) = 5.47$ ,  $p < .05$ ). Finally, two  $t$ -tests revealed that girls (T1:  $M = 2.31$ ,  $SD = .53$ ; T2:  $M = 2.28$ ,  $SD = .56$ ) were, on average, more social anxious compared to boys (T1:  $M = 2.15$ ,  $SD = .54$ ; T2:  $M = 2.14$ ,  $SD = .52$ ) at both time points (T1:  $t(2,070.70) = -6.95$ ,  $p < .001$ ; T2:  $t(2,071.86) = -5.64$ ,  $p < .001$ ).

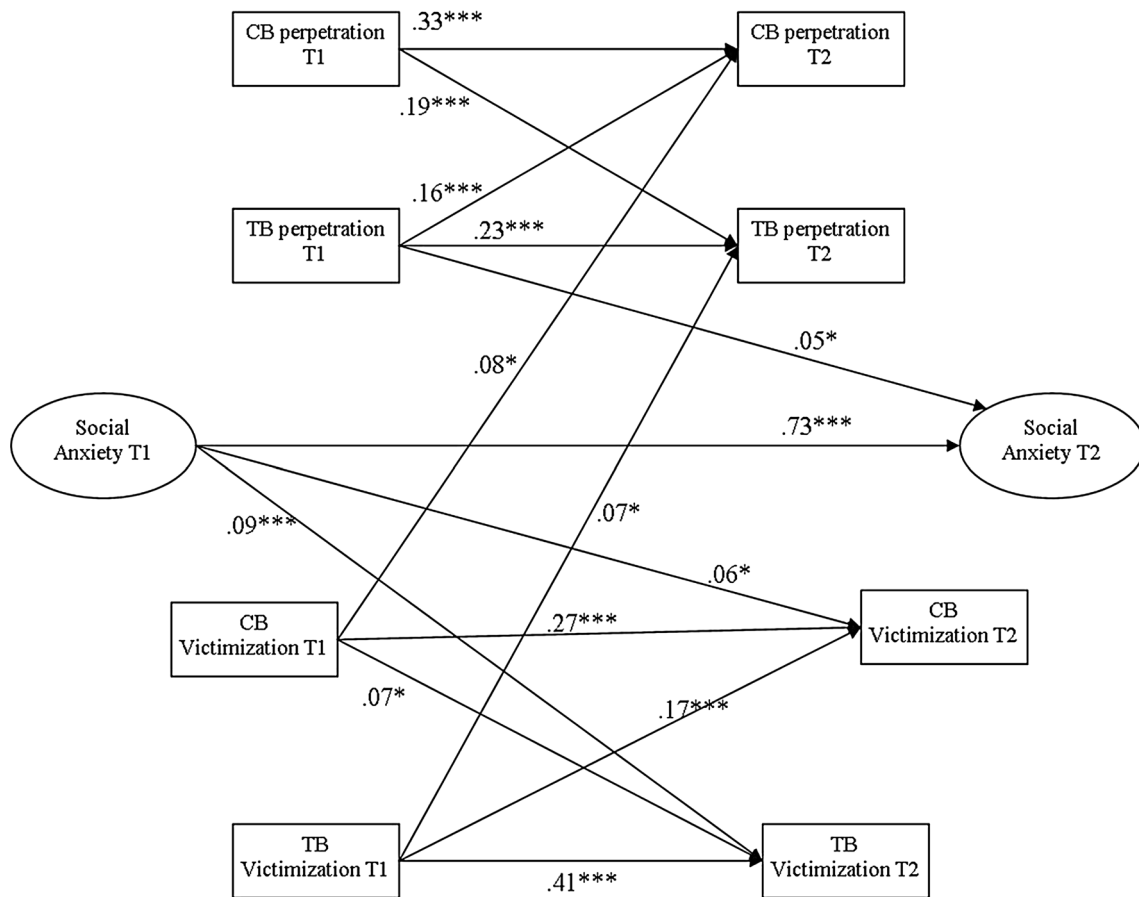
### Structural Model

To test the associations more rigorously, the data were analyzed with cross-lagged structural equation modeling in Mplus, using MLR estimation. This model comprises the following types of paths: (a) stability in all measured variables over time (social anxiety, perpetration of traditional bullying, perpetration of cyberbullying, victimization of traditional bullying, and victimization of

cyberbullying), (b) the associations between bullying involvement at time 1 and social anxiety at time 2, and (c) the associations between social anxiety at time 1 and bullying involvement at time 2. The model allowed correlations between all variables at T1 and T2 to control for cross-sectional relationships. Furthermore, the cross-lagged analysis was performed with all latent and observed variables regressed on the sociodemographic variables gender and age.

Figure 1 presents the significant standardized results. For clarity, the measurement details (such as the error terms and the measurement model of the latent variables), the correlations, and the relationships with gender and age are not shown. Table 4 displays unstandardized and standardized parameter estimates and their two-tailed  $p$  value of the different paths of the structural model. The fit indices showed a good fit for the model, except for the Chi square test (due to its sensitivity to sample size): CFI = .916, TLI = .904, RMSEA = .039 [.037–.040], SRMR = .048,  $\chi^2(826) = 3,394.72$ ,  $p < .001$ .

Social anxiety predicted both victimization of traditional bullying ( $\beta = .09$ ,  $p < .001$ ) and cyberbullying ( $\beta = .06$ ,  $p < .05$ ) 6 months later. Having a higher level of social anxiety seems to be a risk factor for later victimization of bullying. This relationship was somewhat stronger for victimization of traditional bullying compared to victimization of cyberbullying. There was no support for the opposite relationship: victimization of traditional bullying and cyberbullying did not predict later levels of social anxiety. Perpetration of traditional bullying at time 1 predicted later levels of social anxiety ( $\beta = .05$ ,  $p < .05$ ).



**Fig. 1** Cross-lagged structural equation model for the relationships between bullying involvement and social anxiety among adolescents. Note values reflect standardized coefficients. Ellipses represent latent variables.  $*p < .05$ ;  $**p < .01$ ;  $***p < .001$

More specifically, perpetrators of traditional bullying (and not perpetrators of cyberbullying) experienced higher levels of social anxiety 6 months later. Social anxiety did not significantly predict later perpetration of traditional bullying and cyberbullying.

**Test for Interaction Between Victimization and Social Anxiety on Subsequent Perpetration of Cyberbullying**

Two interaction terms were added separately to the above presented model to test the potential moderating role of social anxiety in the relationship between previous victimization of (cyber)bullying and subsequent perpetration of cyberbullying. The results of our main model without interaction terms (cf. Table 4) already showed that victimization of cyberbullying at time 1 predicted perpetration of cyberbullying at time 2 ( $\beta = .08, p < .05$ ). Victimization of traditional bullying at time 1 did not predict later perpetration of cyberbullying at time 2 ( $\beta = .03, p = .307$ ). The addition of the interaction term between victimization of cyberbullying and social anxiety at time 1 to our model decreased the fit of the model (CFI = .786, TLI = .757, RMSEA = .063 [.062–.064],

SRMR = .075,  $\chi^2(867) = 7849.74, p < .001$ ) and the interaction could be considered as not significant ( $B = -0.08, SE = 0.04, p = .083, \beta = -0.22, p = .047$ ). The addition of the second interaction term (between victimization of traditional bullying and social anxiety at time 1) also decreased the model fit (CFI = .775, TLI = .744, RMSEA = .067 [.065–.068], SRMR = .077,  $\chi^2(867) = 8691.41, p < .001$ ) and the interaction term was also not a good predictor ( $B = 0.01, SE = 0.02, p = .656, \beta = 0.06, p = .655$ ) of perpetration of cyberbullying at time 2.

**Discussion**

This study examined short-term longitudinal associations between an internalizing problem, namely social anxiety, and bullying involvement (being a victim of traditional bullying, being a victim of cyberbullying, being a perpetrator of traditional bullying, and being a perpetrator of cyberbullying). Previous research has shown a negative link between victimization of (cyber)bullying and social anxiety (e.g., Craig 1998; Dempsey et al. 2009; Navarro



**Table 4** Unstandardized and standardized parameter estimates of the structural model

Path	B	SE	Two-tailed <i>p</i> value	$\beta$	Two-tailed <i>p</i> value
<i>Stability between variables over time</i>					
Social anxiety T1 to social anxiety T2	0.74	0.04	.000	0.73	.000
TBV T1 to TBV T2	0.38	0.04	.000	0.41	.000
CBV T1 to CBV T2	0.24	0.05	.000	0.27	.000
TBP T1 to TBP T2	0.21	0.04	.000	0.24	.000
CBP T1 to CBP T2	0.34	0.06	.000	0.33	.000
<i>Cross-lagged relations between victimization of bullying and social anxiety</i>					
Social anxiety T1 to TBV T2	0.19	0.05	.000	0.9	.000
Social anxiety T1 to CBV T2	0.06	0.03	.020	0.06	.020
TBV T1 to social anxiety T2	−0.00	0.01	.809	−0.01	.809
CBV T1 to social anxiety T2	−0.01	0.02	.802	−0.01	.802
<i>Cross-lagged relations between perpetration of bullying and social anxiety</i>					
Social anxiety T1 to TBP T2	0.03	0.04	.364	0.02	.362
Social anxiety T1 to CBP T2	−0.05	0.03	.091	−0.04	.082
TBP T1 to social anxiety T2	0.03	0.02	.018	0.05	.018
CBP T1 to social anxiety T2	−0.02	0.02	.314	−0.02	.313
<i>Cross-lagged relations between bullying variables</i>					
TBV T1 to CBV T2	0.09	0.02	.000	0.17	.000
CBV T1 to TBV T2	0.12	0.05	.029	0.07	.030
TBP T1 to CBP T2	0.11	0.03	.000	0.16	.000
CBP T1 to TBP T2	0.25	0.07	.000	0.19	.000
TBV T1 to TBP T2	0.05	0.02	.020	0.07	.020
TBP T1 to TBV T2	0.06	0.04	.081	0.05	.082
CBV T1 to CBP T2	0.07	0.03	.032	0.08	.033
CBP T1 to CBV T2	0.07	0.04	.102	0.06	.091
TBV T1 to CBP T2	0.02	0.02	.312	0.03	.307
CBP T1 to TBV T2	−0.01	0.06	.858	−0.01	.857
CBV T1 to TBP T2	0.07	0.04	.129	0.06	.129
TBP T1 to CBV T2	0.03	0.02	.182	0.04	.185

*TBP* traditional bullying perpetration, *CBP* cyberbullying perpetration, *TBV* traditional bullying victimization, *CBV* cyberbullying victimization

et al. 2011). However, few studies have examined longitudinal associations and bidirectional relationships: perpetrators might choose socially anxious individuals as their target, and/or social anxiety might be a result of being victimized. The association between perpetration of (cyber)bullying and social anxiety has received less attention in previous research, while the results of the few studies were contradictory (Baldry 2004; Juvonen et al. 2003). Furthermore, there was no previous research that empirically tested the (theoretically) suggested moderating role of social anxiety in the link between victimization and later perpetration of cyberbullying (i.e., socially anxious victims of (cyber)bullying could be especially more inclined to take revenge online, as this form of retaliation is less confrontational and more anonymous (Law et al. 2012)).

In order to better understand the (causal) relationships between social anxiety and (cyber)bullying involvement, a longitudinal study was conducted. This study showed that social anxiety is a risk factor for victimization of

(cyber)bullying, rather than an outcome of being victimized. These relationships were significant; however their effect sizes were rather small (Cohen 1988). These results indicate that perpetrators might choose socially anxious peers because they have less developed social skills to interact and communicate with others and/or are less able to defend themselves (La Greca and Stone 1993). For prevention and intervention programs, this indicates that further development of these skills might be a suitable strategy to enhance defensibility and to diminish bullying. Parents and educators should be aware of the importance of providing social skills training to relieve anxiety, to enhance peer relationships, and to handle potentially aggressive behavior offline and online (Navarro et al. 2011).

Our findings also indicate that social anxiety is not a risk factor for subsequent perpetration of (cyber)bullying. Victimization of traditional bullying and cyberbullying, on the other hand, did predict (respectively) later perpetration of traditional bullying and cyberbullying. These results are in accordance with previous longitudinal research on

cyberbullying involvement (Jose et al. 2012; Wright and Li 2013). Contrary to expectations, the relationship between victimization of (cyber)bullying and subsequent perpetration of cyberbullying was not moderated by social anxiety. A possible explanation might be that other emotions predominate and influence the relationship between victimization and perpetration of cyberbullying. Previous research, for instance, has shown the moderating role of anger within this relationship (Pabian and Vandebosch 2015; Runions 2013). Social anxiety might also be of less importance when victims take revenge on someone else than their perpetrator, for instance a person who is lower in the social hierarchy than themselves (Wegge et al. 2014a, b). Furthermore, socially anxious victims might differ from victims low in social anxiety with regard to the specific forms of cyberbullying in which they engage. For instance, socially anxious victims might be more inclined to use only anonymous and private types of cyberbullying instead of all cyberbullying forms.

Finally, the findings suggest that adolescent perpetrators of traditional bullying feel more socially anxious 6 months later. Although this relationship was found to be significant, this effect size, too, was rather small (Cohen 1988). The behavior of traditional bullies might provoke negative reactions from others (Olweus 1997), such as being disliked (Salmivalli 2010). Being disliked by peers is found to be associated with withdrawal from social interactions among adolescents (Coie et al. 1990). The increased level of social anxiety of traditional bullies might, in turn, form a risk factor for being victimized. Future research may explore this possible long-term relationship further. In contrast to perpetration of traditional bullying, the current results do not provide support for social anxiety as an outcome of perpetration of cyberbullying. Among adolescents, cyberbullying might represent a form of bullying that is more accepted than traditional bullying or even increase the popularity of the perpetrator (Wegge et al. 2014a). Moreover, even when cyberbullying evokes negative reactions from others, cyberbullies might be less affected by them because they might have cyberbullied anonymously and did not receive personally addressed negative reactions (Slonje et al. 2013). Additional (longitudinal) research is needed that compares bystanders' and peers' reactions to the perpetration of traditional bullying versus the perpetration of cyberbullying and the influence of these reactions on perpetrators' level of social anxiety.

Despite the above important findings, this study has limitations. First, our study was limited by the self-report method that was used to gather the data. Although students were assured verbally and in writing that their responses were anonymous and confidential, their responses depend on the subjective experience of the respondents and might be skewed due to the respondents' desire to give socially

acceptable answers (Juvonen et al. 2001). For measures of internalizing problems, such as social anxiety, self-report is not as problematic as it is for externalizing problems such as aggression (Craig 1998). Future research may consider using reports from multiple informants (peers, teachers, and parents), or, if it is not possible to attain responses from multiple informants, using a social desirability scale to have an indication of the extent to which the responses are influenced by impression management (Pornari and Wood 2010). Another problem, which might be related to social desirability, is the difference found between students who completed the questionnaire twice and those who dropped out. Those who dropped out of the study were significantly more involved in the perpetration of cyberbullying than those who completed both questionnaires. Therefore, the reported perpetration rates might be underestimated.

Another shortcoming of the current study was the absence of different forms of traditional and cyberbullying in the model, such as the important distinction between indirect and direct aggression. The current study only differentiated by medium (traditional bullying versus cyberbullying). As the literature overview already showed, some researchers did find differences between different traditional bullying forms in the association with social anxiety (Baldry 2004; La Greca and Harrison 2005). Future research may consider comparing not only traditional bullying with cyberbullying, but also indirect and direct forms of traditional and cyberbullying with regard to the longitudinal association with social anxiety.

## Conclusion

This study examined the longitudinal relationships between social anxiety and (cyber)bullying involvement. Social anxiety was found to be a predictor of victimization of (cyber)bullying, rather than an outcome. Socially anxious adolescents are more vulnerable to be a victim of both forms of bullying. This finding suggests that it is important to address this internalizing problem in prevention and intervention studies in order to make adolescents more familiar with diverse social situations and to further develop their social skills and competences. Social anxiety was not found to be a risk factor for the perpetration of (cyber)bullying. Being a perpetrator of traditional bullying, but not of cyberbullying, was related to subsequent higher levels of social anxiety. This longitudinal study furthermore provided support for the link between victimization and later perpetration. Social anxiety did not moderate this relationship. Adolescents who scored higher on social anxiety were equally inclined to bully 6 months later as adolescents who scored lower. Future research might further study whether they perhaps choose other means (e.g.,

indirect forms) or other targets (e.g., not their former bully, but perhaps someone who is less powerful than themselves) to do so.

**Author contributions** In order to give appropriate credit to each author of the article, we would like to specify the individual contributions. HV conceived of the study, participated in its design and interpretation of the data, and helped to draft the manuscript. SP participated in the design of the study and the data collection, performed the statistical analyses and drafted the manuscript. All authors read and approved the final manuscript.

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical standard** Ethical issues were considered in the various phases of the present study. Before the data collection, our longitudinal study among adolescents was approved by the review board of our institution, which seeks advice from internal and external reviewers. In preparation of the collection, the staff members at the selected schools were provided with information regarding the study and were asked to cooperate. Participating schools delivered an informational letter describing the research to the students, and (passive) consent was obtained from their parents. We believe that our work follows the APA General Principles and Ethical Standards.

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**Sara Pabian (M.A.)** is a doctoral researcher at the University of Antwerp, research group MIOS (Media and ICT in Organisations and Society). Her research concerns developmental issues in cyberbullying among adolescents.

**Heidi Vandebosch** is Associate Professor at the Department of Communication Studies at the University of Antwerp. Her main research topic is cyberbullying amongst youngsters. She has published internationally about: the prevalence of cyberbullying; the profiles of bullies, victims and bystanders; the need for prevention, detection and intervention using a multi-stakeholder approach (schools, parents, police, internet service providers...).