Joint Trajectories of Peer Cyber and Traditional Victimization in Adolescence: A Look at Risk Factors

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Acknowledgments

We are grateful to the parents and teachers in the Quebec Longitudinal Study of Child Development (QLSCD). We thank the Quebec Institute of Statistics and the GRIP staff for data collection and management, as well as Hélène Paradis for assistance with statistical analyses.

Funding

This research was supported by grants from the Quebec Government's Ministry of Health, Fonds de la Recherche Québécois sur la Société et la Culture (FRQSC), Canada's Social Science and Humanities Research Council (SSHRC), Canadian Institutes for Health Research (CIHR), Ste. Justine's Hospital Research Center, Fondation Lucie et André Chagnon, and University of Montreal. Michel Boivin and Richard E. Tremblay are supported by the Canada Research Chair Program.

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Submission date: June 28 2019

Abstract

This study aimed to identify joint trajectories of peer cyber and traditional victimization from ages 13 to 17 and individual, family, peer, and school risk factors associated with group membership. The sample was composed of 1194 adolescents (54.2% girls). Cyber and traditional victimization were assessed at ages 13, 15 and 17. The results first revealed a low/increasing and a high/decreasing trajectories for cybervictimization and a low/decreasing and a moderate/chronic for traditional victimization. Conditional probabilities suggested that cybervictims had a high probability of being victims on school grounds, whereas traditional victims were not necessarily the target of cybervictimization. Four joint trajectory groups were also identified. With the low victimization group as the reference category, the results revealed that different sets of predictors were associated with membership in the three other joint trajectory groups. The results are discussed in relation to intervention and prevention strategies.

Keywords: cybervictimization, peer victimization, developmental trajectories, adolescents, risk factors

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Peer victimization occurs when a peer uses aggression intentionally to inflict harm or discomfort on other peers of a similar age or social position (Fisher, Gardella, Teurbe-Tion, 2016). It can take various forms, such as face-to-face or direct aggression (e.g., insulting a peer, hitting a peer) or indirect aggression (e.g., saying negative things about a peer behind his/her back, spreading rumors about a peer) (Hawker & Boulton, 2000). Recently, with greater access to the Internet and electronic devices and the proliferation of social media, a new form of victimization, cybervictimization, has gained attention (Chen, Ho, & Lewin, 2017; Smith, 2009). Peer cybervictimization refers to peer victimization in an electronic context, including text messages, emails, chat groups, social networking sites or online games (Kowalski, Giumetti, Schroeder, & Lattanner, 2014; Tokunaga, 2010). Sending someone insulting cell phone messages or intentionally harming their reputation by posting rumors on social media are examples of this form of aggression (Willard, 2007). Both cyber and traditional victimization are associated with a number of negative outcomes in terms of psychological health, social functioning and behavior (for a review, see Gini & Pozzoli, 2009; Gini et al., 2018; Kowalski et al., 2014; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Reijntjes et al., 2011; Tokunaga, 2010).

Cybervictimization is likely to be part of a general pattern of peer victimization. Indeed, some researchers suggest that, for aggressors, cyberspace may simply represent an extension of the school grounds or another means through which victimization can occur (Jose, Kljakovic, Scheib, & Notter, 2012; Juvonen & Gross, 2008). In other words, as youths interact more and more frequently with peers on the Internet, those who tend to be victimized on school grounds are likely to become victims in cyberspace as well. In their meta-analysis, Modecki, Minchin, Harbaugh, Guerra, and Runions (2014) reported a correlation of .40 between cyber and

traditional victimization. Yet, peer cybervictimization may differ from traditional victimization by occurring more covertly, spreading more easily among a wider audience, and persisting for longer than traditional victimization (Gini et al., 2018; Kowalski et al., 2014). Cybervictimization is also less common than traditional peer victimization, with estimated rates of 15% and 36% for cyber and traditional victimization, respectively (Modecki et al., 2014). Despite these differences, their development is likely to co-occur over time. However, our knowledge of the overlap between developmental trajectories of cyber and traditional victimization remains limited.

Trajectories of Peer Cyber and Traditional Victimization

Looking at the developmental trajectories of cyber and traditional victimization is important in order to better understand how these phenomena evolve over time for different groups of youths and to identify whether particular subgroups of adolescents are more likely to follow severe or chronic victimization trajectories. Although victimization is likely to occur during childhood and to be moderately stable over time (e.g., Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008), early adolescence is a developmental period characterized by multiple changes in youths' social contexts that could impact their victimization trajectories, such as the transition to middle school, when new peer groups are usually formed and the overall importance of peer relationships is enhanced (Hardy, Bukowski, & Sippola, 2002; Rubin, Bukowski, & Parker, 2006). Early adolescence also represents a sensitive period during which victimization in cyberspace is more likely to occur, since early adolescents have often just gained more access to online technology without adult supervision. They also spend an increasing amount of time on social media, keeping in touch with their peers and developing a social identity (Twenge, Martin, & Spitzberg, 2018; Valkenburg & Peter, 2011). However, this puts them at risk of being cybervictimized.

While prior research has identified distinct groups of young people with regard to their experience of traditional victimization, little is known about the way peer cybervictimization evolves among different groups of adolescents. Moreover, to our knowledge, only one study has investigated the joint development of cyber and traditional victimization in adolescence (i.e., Sumter, Baumgartner, Valkenburg, & Peter, 2012). Such information is important for understanding whether traditional victimization increases the likelihood of cybervictimization over the course of the adolescent years, or vice-versa. Given the prevalence rates and different timing of the emergence of cyber and traditional victimization, a plausible scenario is that most cybervictims will also be victimized on school grounds, whereas a smaller proportion of traditional victims will also be victimized online. The extent to which traditional victimization increases the likelihood of cybervictimization more strongly than cybervictimization increases the likelihood of traditional victimization was examined in this study. The results will shed light on the developmental course of the cyber-traditional group of victims. These issues are also important for building effective intervention strategies that take into account the developmental relations between cyber and traditional victimization.

Studies on traditional victimization usually report between two and four trajectories across the late elementary and high school years (Barker et al., 2008; Brendgen, Girard, Vitaro, Dionne, & Boivin, 2016; Geoffroy et al., 2018; Haltigan & Vaillancourt, 2014; Sheppard, Giletta, & Prinstein, 2019; Sumter et al., 2012). A first trajectory usually includes youths who show low levels of peer victimization (between 26% and 85%), a second trajectory usually includes youths who show moderate and increasing or decreasing levels of victimization (between 10% and 59%) and a third trajectory usually includes youths who show chronic and/or severe levels of victimization (approx. 6%). To our knowledge, only one study has examined trajectories of cybervictimization over time (Sumter et al., 2012). In this study, a representative sample of 1762

adolescents aged 12 to 17 years were longitudinally assessed four times at six-month intervals, bringing out two trajectories across this period: one including the majority of participants (78%), who experienced little or no cybervictimization, and the other (22%) including youths who experienced moderate levels of cybervictimization. In the latter trajectory, cybervictimization was highest at age 14, and then gradually decreased.

Among longitudinal studies that have examined the overlap between cyber and traditional victimization, Jose et al. (2012) found that, over a two-year period, traditional victimization predicted cybervictimization, but not the reverse. Sumter et al. (2012) examined the joint probabilities of online and offline victimization group membership and their results first revealed a strong relationship between cyber and traditional victimization. For instance, adolescents who were moderately victimized online were also moderately victimized offline and adolescents who were not victimized online were also not victimized offline. They also found four joint trajectory groups out of six possibilities: low offline/low online (59%), moderate offline/low online (12%), moderate offline/moderate online (23%) and high offline/moderate online (6%). No youths were classified in a trajectory characterized by moderate online or high offline victimization in isolation (i.e., there was no low offline/moderate online or high offline/low online group), suggesting that these two forms of victimization are usually experienced together.

Although these two studies are highly informative, the first one only included two measurement points, while the second one used an accelerated cohort-sequential design, in which different youths contributed to different parts of the developmental trajectories. To overcome these limitations, the first objective of the present study was to examine joint trajectories of cyber and traditional victimization using a prospective longitudinal design with three measurement points over the high school years (ages 13, 15 and 17). The second objective was to predict membership in these joint trajectory groups based on potential risk factors assessed at age 13.

This study aimed to better inform prevention and intervention strategies during this critical developmental transition period. For instance, it could inform practitioners as to whether different prevention or intervention strategies should be provided for youths who follow a severe or chronic trajectory of cyber and/or traditional victimization during the high school years.

Risk Factors Associated with Peer Cyber and Traditional Victimization

A great deal of research has been published on the risk factors associated with traditional peer victimization, and more recently, cybervictimization. For an overview of this research and to identify the most important risk factors, we consulted systematic reviews and meta-analyses published in recent years that included multiple factors (e.g., Ang, 2015; Chen, Low, & Lwin, 2017; Cook, Williams, Guerra, Kim, & Sadek, 2010; Guo, 2016; Kowalski et al., 2014; Zych, Farrington, & Ttofi, 2019). Given the multifactorial nature of peer victimization, an ecological framework guided our theoretical rationale for this study (Baldry, Farrington, Sorrentino, 2015; Bronfenbrenner, 1979; Ettekal, Kochenderfer-Ladd, & Ladd, 2015; Hong & Espelage, 2012; Zych et al., 2019). Such a framework is frequently used as a model when seeking to understand the predictors of cyber and traditional victimization, since the risk of being a victim of peer aggression is likely to take root in youths' multiple systems or contexts. Consequently, in this study, we classified risk factors as individual, family, peer, and school variables to obtain an overall picture of the factors within the onto- and micro- systems that could predict membership in joint trajectory groups of cyber and traditional victimization.

In their systematic review of meta-analyses, Zych et al. (2019) classified various individual, family, peer, and school factors according to their odds ratios. Based on their results, and our own analysis of the other meta-analyses and systematic reviews, we chose a set of robust predictors that were also available in our dataset. For individual factors, sex, low self-esteem, reactive aggression, indirect aggression, and depressive symptoms were selected. Although boys

are usually more likely to be victims of peer traditional victimization, and girls, of cybervictimization, findings on sex differences have been mixed or have revealed small differences (Baldry et al., 2015; Cook et al., 2010; Guo, 2016; Hong & Espelage, 2012; Kowalski et al., 2014). Girls' more frequent use of social networks to communicate with peers has been underlined as an explanation for their greater tendency to experience cybervictimization (Barker, 2009). Low self-esteem has been found to be a robust predictor of both cyber and traditional victimization. The odds ratio for this factor oscillated between 1.13 and 4.65 in Zych et al. (2019)'s study. Researchers have suggested that youths with low self-esteem project the image of being less able to effectively defend themselves and less likely to retaliate, making them easy targets for aggressors (Hong & Espelage, 2012; Tsaousis, 2016; van Geel, Goemans, Zwaanswijk, Gini, & Weber, 2018). The same explanation has been put forward with regard to internalizing problems such as depressive symptoms, which have also consistently been associated with both cyber and traditional victimization (Baldry et al., 2015; Kowalski et al., 2014; Reijntjes et al., 2010). Another explanation regarding depressive symptoms is that adolescents with depressive symptoms can lack prosocial skills and their depressive mood may irritate their peers and provoke victimization. Externalizing problems, such as aggressive behaviors, have also been found to be a risk factor for cyber and traditional peer victimization (Cook et al., 2010; Guo, 2016; Kowalski et al., 2014; Reijntjes et al., 2011). The poor social skills and hostile social-cognitive biases associated with externalizing problems may explain this finding. Youths who display aggressive behaviors may also irritate or provoke others, thereby increasing their chances of being the target of aggressors (Reijntjes et al., 2011). Internet use was also included as a predictor in our study since it has consistently been associated with cybervictimization (Baldry et al., 2015, Kowalski et al., 2014; Zych et al., 2019) and could be specific to this form of victimization.

As for family factors, parents' socioeconomic status and youths' negative relationship with their parents were selected. Zych et al. (2019)'s study suggests that low parental involvement and support and negative parental interactions are among the important predictors of cyber and traditional victimization. To a lesser extent, low SES has also been linked to peer victimization. Among the explanations regarding negative experiences in the family, such experiences could result in the development of negative interactions with peers (Hong & Espelage, 2012). Concerning peer factors, the adolescents' level of conflict with their best friend was selected. Youths who report peer relationship problems have been found to be more likely to be victims offline and online (Zych et al., 2019; odds ratios of 3.9 for peer status and victimization and 2.3 for peer influence and cybervictimization). Given the importance of peers as a source of social support during adolescence, it is not surprising that negative peer relationships have been found to be a significant risk factor for cyber and traditional victimization (Hong & Espelage, 2012). Finally, regarding school factors, a negative perception of the school climate has been found to be an important predictor of cyber and traditional peer victimization in meta-analyses (Zych et al., 2019; odds ratios between 1.7 and 4.4). Lower perceptions of school connectedness or belonging, which include perceptions of school safety, have also been associated with a greater risk of being victimized, at least in cyberspace (Zych et al., 2019; odds ratio equal to 2.3 for school safety). Overall, these results suggest that peer victimization, online or offline, is predicted by numerous factors across different systems in adolescents' ecology.

Study Objectives

The first objective of this study was to examine the longitudinal evolution of cyber and traditional victimization across three measurements points during the high school years (ages 13, 15, and 17), as well as their developmental relationships. Based on prior studies, we expected to find at least two trajectories for both cyber and traditional victimization. For traditional

victimization, a high/chronic trajectory and a low/decreasing trajectory were expected, whereas for cybervictimization, a high/decreasing trajectory and a low/stable trajectory were expected. We also expected that most cybervictims would also be victimized on school grounds, but not necessarily that most traditional victims would be victimized in cyberspace. The second objective was to identify which individual (sex, low self-esteem, reactive aggression, indirect aggression, depressive symptoms, and internet use), family (low SES and negative relationship with parents), peer (conflict with best friend) and school (negative school climate and low sense of school belonging) factors, assessed at age 13, predicted membership in the joint trajectory groups. For this objective, no specific hypotheses were formulated given that no study to our knowledge has examined predictors of membership in joint trajectory groups of cyber and traditional victimization. This objective was thus exploratory in nature.

Method

Participants and Procedure

The participants were part of the Quebec Longitudinal Study of Child Development (QLSCD), a longitudinal follow-up of a representative sample of children born between 1997 and 1998 in the province of Quebec, Canada. The sample was drawn from the Quebec Birth Registry, using a stratified procedure based on living area and birth rate, excluding children living in Cree or Inuit territories, Indian reserves, or northern Quebec. Initially, 2940 households were selected for the QLSCD. Some families were subsequently excluded, in particular because they could not be reached or refused to participate. Thus, 2120 families were ultimately included in this large-scale longitudinal study (Institut de la Statistique du Québec [ISQ], 2000).

Cybervictimization was assessed over three waves of data collection, when the participants were 13, 15 and 17 years of age. Written informed parental consent was obtained at

each measurement time using a consent form approved by the ethics committee of the *Santé Québec* division of the ISQ. For the purpose of this study, only participants who had completed the cyber and traditional victimization measures at a minimum of two out of three measurement times were included in the analyses (n = 1194, 56% of the original sample). Analyses were conducted to test for differences between the retained (n = 1194) and non-retained samples (n = 926). The results indicated that the retained sample included more girls than boys, $\chi^2(1, N = 2120) = 28.80$, $p = .000$, and that the participants in the retained sample were less likely to come from single-parent families, $\chi^2(2, N = 2112) = 15.93$, $p = .000$. The participants in the retained sample were also more likely to come from families with a higher income, $\chi^2(2, N = 2082) = 47.35$, $p = .000$). Overall, it thus appears that the youths retained in this study came from a more privileged socio-economic and family background than the initial sample, which is often the case in large-scale longitudinal studies.

Measures

Descriptive statistics and Cronbach's alphas for all the scales are presented in Table 1. To facilitate comparison, the total score for the items of most of the measures used in the QLSCD was converted to a scale of 0 to 10 in our study. The following equation was used to transform the scores: new scores = 10 * ([mean of the scores - lowest possible score for the scale] / [highest possible score for the scale – lowest possible score for the scale]). Only the measures of cybervictimization, Internet use, and socio-economic status were exempt from this rule.

Cybervictimization (ages 13, 15 and 17). The frequency of cybervictimization was reported by the participants at ages 13, 15 and 17, using a single item. This item reported how often the participant had been the victim of cyberbullying since the beginning of the school year and was based on items taken from the Quebec Health Survey of High School Students (EQSJS;

ISQ, 2016). The item was: "Since the beginning of this school year, at school, how often… have you been a victim of cyberbullying (insults, threats, intimidation, etc.) on the internet or by cell phone (perpetrated by other students)." Response options were: (1) Never, (2) Once, (3) A few times, (4) Often, or (5) Very often.

Traditional victimization (ages 13, 15, and 17). Traditional victimization was reported by the participants at ages 13, 15 and 17. This instrument included six items adapted from the Social Experiences Questionnaire (SEQ; Crick & Bigbee, 1998), measured on a 5-point Likert scale: (1) Never, (2) Once, (3) A few times, (4) Often, or (5) Very often. Items assessed verbal, physical, and indirect victimization: "Since the beginning of this school year, how many times has the following situation happened to you… Someone called me names, insulted me or said mean things to me; Someone pushed, shoved, hit or kicked me; Someone didn't let me be part of his or her group when I wanted to."

Sex. Participants' sex was coded 0 for boys (n = 547) and 1 for girls (n = 647).

Low self-esteem (age 13). Self-esteem was measured using five items rated on a 5-point Likert scale: (1) False, (2) Mostly false, (3) Sometimes false, sometimes true, (4), Mostly true, or (5) True. Samples items included "When you do something, you do it well" and "Overall you have a lot to be proud of." The items were adapted from the Self-Description Questionnaire II (SDQ-II; Marsh, 1990). The scale was reversed such that higher scores reflect lower levels of self-esteem.

Depressive symptoms (age 13). The presence of depressive symptoms over the previous two weeks was measured using eight items adapted from the Children's Depression Inventory (CDI; Kovacs, 1985). Items included perceptions of guilt, loneliness, or worries. Response options varied by item and were rated 1, 2, or 3, based on the severity of the response. A sample

item was: "(1) I have no one that I can talk to, (2) I have some people that I can talk to, (3) I have many people that I can talk to."

Reactive aggression (age 13). Reactive aggression in the past six months was measured using three items rated by the participant's teacher. Sample items included: "This student… reacted in an aggressive manner when teased (e.g., hit or pushed another student)." The items were drawn from the Ontario Child Health Study (OCHS; Statistics Canada, 2007) and Montreal Longitudinal and Experimental Study (MLES). They were rated on a 3-point Likert scale: (1) Never or not true, (2) Sometimes or somewhat true, or (3) Often or very true.

Indirect aggression (age 13). Indirect aggression in the past six months was measured using three items rated by the participant's teacher (e.g., "This student… when mad at somebody, tried to get others to dislike that person"). The items were drawn from Lagerspetz, Björkqvist and Peltonen (1988). The same Likert scale as that used to assess reactive aggression was used for this measure.

Internet use (age 13). Time spent on the Internet was measured using a single item: "Over the previous three months, in a typical week, when you spent time on a computer, how much time did you usually spend on the Internet (playing games, doing research for school, or chatting?). Do not include time spent on a computer at school." Response options ranged from (1) None to (8) More than 20 hours a week.

Low socioeconomic status (age 13). The family's socio-economic status was calculated based on a combination of measures including the parents' level of education, the prestige of the parents' occupations, and household income (Willms & Shields, 1996). A continuous score was used reflecting standard deviations (mean adjusted to 0). It was reversed such that higher scores reflect a lower socioeconomic status.

Negative relationship with parents (age 13). The adolescents' relationship with their parents was measured using three items rated on a 5-point Likert scale: (1) Never, (2) Rarely, (3) Sometimes, (4) Often, or (5) Always: "In the past six months, my parent(s)… have listened to my ideas and opinions; and I have solved problems together whenever we have disagreed about something; have made sure I know I am appreciated." Items were taken from the Socio-educational Environment Questionnaire (SEQ; Janosz, Bowen, Chouinard, & Desbiens, 2004). The scale was reversed such that higher scores reflect a more negative relationship.

Conflict with best friend (age 12). The level of conflict between the participants and their best friend in their classroom over the previous six months was self-reported using four items (e.g., "Have you sometimes disagreed or quarreled with your best friend?"). Response options were: (1) A little or not at all, (2) A little, (3) A lot, (4) Quite a bit, or (5) Most of the time. This measure was not available at age 13, which is why the scores at age 12 were used in the analyses.

Negative school climate (age 13). Five items were used to measure the adolescents' perceptions of their school climate: "Since the beginning of the school year, how often have you observed or been informed of the following problems at your school… theft; vandalism (graffiti, broken glass or objects, etc.); students insulting each others; students insulting teachers; students threatening each other (bullying, harassment, etc.)." Response options were: (1) Never, (2) Several times during the school year, (3) Several times during the last month, (4) Several times a week, or (5) Almost every day. The items were taken from the SEQ (Janosz et al., 2004).

Low school belonging (age 13). Participants reported on their sense of school belonging using five items rated on a 5-point Likert scale: (1) Strongly disagree, (2) Disagree, (3) Unsure, (4) Agree, (5) Strongly agree. The items included "I'm proud that I go to this school," "I feel safe

at my school," and "I like my school." These items were taken from the SEQ (Janosz et al., 2004). The scale was reversed such that higher scores reflect a lower sense of school belonging.

Statistical Analyses

All analyses were performed in Mplus version 7.4 (Muthén & Muthén, 2012), in which missing data are handled with Full Information Maximum Likelihood (FIML; on average, 6% of the data were missing across the 17 variables of interest; the variables with the most missing data were those reported by teachers; see Table 1). Given that the scores for some variables were not normally distributed, we used robust maximum likelihood estimation to obtain unbiased standard errors for the parameter estimates. Overall, the models that fit the data well were those that had a non-significant chi-square value, a comparative fit index (CFI/TLI) greater than .95, and a root mean square error of approximation (RMSEA) of less than .06 (Hu & Bentler, 1999).

Analyses were conducted in three steps. In Step 1, models for the developmental trajectories were estimated separately for cyber and traditional victimization using latent class growth analysis (LCGA). These models address the unobserved heterogeneity within data by extracting the number of latent classes and classifying individuals in distinct trajectories based on their posterior probability of class membership (Muthén & Muthén, 2000). Using these trajectories, it was possible to describe both the shape and proportion of participants estimated to follow the trajectories. A series of models was fitted, moving from a one-trajectory model to a three-trajectory model. To choose the optimal model, the models were compared using the following criteria: (a) the Bayesian Information Criterion (BIC; the lowest possible value), (b) the Vuong-Lo Mendell-Rubin (LMR) Likelihood Ratio Test, which assesses the fit between two nested models that differ by one class or trajectory (in this test, significant *p* values indicate that the solution with one more class or trajectory provides a better fit than the solution with one less

class or trajectory [e.g., 2 *vs*. 1; 3 *vs*. 2, etc.]), and (c) the entropy (values closer to or equal to 1 indicate a better classification).

In Step 2, the joint trajectories of cyber and traditional victimization were estimated using the best fitting models from Step 1 as the starting point for the joint models. This analysis provided the joint probabilities and conditional probabilities, which are key to a joint model. Conditional probabilities (e.g., the probability of following a high/decreasing cybervictimization trajectory conditional on following a high/chronic traditional victimization trajectory) and joint probabilities (e.g., the probability of following both a low cyber and low traditional victimization trajectory) are useful for describing the developmental overlap between two types of distinct but related phenomena (Barker et al., 2008; Nagin, 2005). In Step 3, a multinomial regression was conducted to predict joint trajectory group membership based on the various individual, family, peer, and school risk factors. To avoid shifts in profiles due to the inclusion of predictors, the conditional model was estimated using the starting values of the unconditional model and zero random starts. More details on this strategy can be found in Morin and Litalien (2017).

Results

Descriptive Analyses

The number of respondents, mean, standard deviation and distribution indexes for each variable are reported in Table 1. Correlations between the variables are also reported in this table. As can be seen in this table, most of the variables under study showed a distribution that was skewed to the left, particularly for cybervictimization. Correlations between measurement points for cybervictimization ranged from .13 to .29, and from .34 to .46 for traditional victimization. In addition, at the same measurement point, correlations between cyber and traditional victimization were .41, .48, and .47 at age 13, 15, and 17, respectively. Overall, the correlations between both forms of peer victimization and the predictors were small to moderate. The same was true for the

correlations between the predictors themselves, with the exception of low self-esteem and depressive symptoms (r = .66) and reactive and indirect aggression (r = .62). With respect to sex, a few correlations were significant across the variables, but they were small in size. Overall, girls reported higher levels of cybervictimization at ages 13 and 15, lower levels of self-esteem, and higher levels of depressive symptoms than boys, whereas boys reported higher levels of traditional victimization at age 13, showed higher levels of reactive aggression as reported by teachers, and reported higher levels of conflict with their best friend, and lower levels of school belonging than girls. Yet, the pattern of correlations between both forms of victimization and the various predictors was similar for boys and girls. Consequently, sex was treated as an independent variable in the subsequent analyses.

Objective 1: Development of and Relationships between Cyber and Traditional Victimization from Ages 13 to 17

The results of the LCGA are presented in Table 2. The two-class model proved to be the optimal model for both forms of peer victimization, according to the significant LMR Likelihood Ratio Test comparing the 1-class versus 2-class solution (p = .000 for both forms) and the 2-class versus 3-class solution (p = .572 and p = .194 for cyber and traditional victimization, respectively). In addition, given that the slope of the second class of the 2-class solution was not significant for traditional victimization, the 2-class solution with the estimation of the intercept only for the second class was chosen for parsimony. The entropy measure was similar across solutions.

For cybervictimization, 96.2% of the adolescents (n = 1149) followed a low/increasing trajectory (intercept = 1.06, slope = 0.02, p = .000), whereas 3.8% of the adolescents (n = 45) followed a high/decreasing trajectory (intercept = 3.35, slope = -0.49, p = .000). The posterior probabilities indicated that the adolescents were well matched to their trajectory group (1.00 for

the low/increasing and 1.00 for the high/decreasing). For traditional victimization, 89.2% of the adolescents (n = 1065) followed a low/decreasing trajectory (intercept = 1.11, slope = -0.12, p = .000) and 10.8% of the adolescents (n = 129) followed a moderate/chronic trajectory (intercept = 3.45). The posterior probabilities indicated that the adolescents were well matched to their trajectory group (.87 for the low/decreasing and .99 for the moderate/chronic).

The trajectories for cyber and traditional victimization are presented in Figures 1a and 1b, respectively. It can be seen from these figures that even though the best fitting model for both forms of peer victimization was the 2-class solution, cyber and traditional victimization did not evolve in the same way over time for different groups of youths. For instance, cybervictimization decreased over time for youths in the high-risk trajectory. By age 17, these youths dropped to almost the same levels of cybervictimization as the other group. However, for traditional victimization, the gap remained between the high-risk trajectory and the other group at age 17. This form of victimization thus appears more chronic than cybervictimization.

The results for the joint trajectories are presented in Table 3. The top part of Table 3 presents adolescents' conditional probabilities of cybervictimization given their traditional victimization trajectory. When the adolescents followed a low trajectory of traditional victimization, their probabilities of following a low cybervictimization versus a high/decreasing cybervictimization trajectory were .99 and .01, respectively. When the adolescents followed a moderate/chronic trajectory of traditional victimization, their probabilities of following a low cybervictimization versus a high/decreasing cybervictimization trajectory were .79 and .21, respectively.

The middle part of Table 3 presents the adolescents' conditional probabilities of traditional victimization given their cybervictimization trajectory. When the adolescents followed a low trajectory of cybervictimization, their probabilities of following a low traditional

victimization versus a moderate/chronic traditional victimization trajectory were .90 and .10, respectively. When the adolescents followed a high/decreasing trajectory of cybervictimization, their probabilities of following a low traditional victimization versus a moderate/chronic traditional victimization trajectory were .29 and .71, respectively.

Overall, the conditional probability results suggest that when youths are victimized online, they have a high probability of being victimized on school grounds as well, whereas when youths are victimized on school grounds, they are not necessarily victimized online. During the adolescent years, a pathway from cybervictimization to traditional victimization thus appears more likely than a pathway from traditional victimization to cybervictimization. An alternative interpretation is that, at the beginning of the high school years, victims are victimized in both contexts, but over time, cybervictimization decreases whereas traditional victimization remains.

For the joint trajectory groups, there were four possible groups (2 x 2) and, indeed, four groups with distinct developmental patterns of cyber and traditional victimization were identified. The bottom part of Table 3 shows the number and proportion of adolescents in each group. Group 1 represents adolescents who experienced low levels of cyber and traditional victimization from ages 13 to 17 (low cyber/low trad; 87% of the sample). Group 2 represents adolescents who experienced low levels of cybervictimization, but moderate and chronic levels of traditional victimization from ages 13 to 17 (low cyber/chronic trad; 9% of the sample). Group 3 represents adolescents who experienced low levels of traditional victimization, but high and decreasing levels of cybervictimization from ages 13 to 17 (high cyber/low trad; 1% of the sample). Group 4 represents adolescents who experienced the highest levels of cyber and traditional victimization at age 13, then saw their levels of cybervictimization decrease but their levels of traditional victimization remain stable over time, suggesting a sort of cyber-to-traditional victimization pathway (high cyber/chronic trad; 3% of the sample). It thus appears that few youths are

victimized only in cyberspace during the adolescent years, whereas more youths are victimized only on school grounds, with the number of these latter youths being higher than that of those who are victimized in both contexts.

Objective 2: Predicting Membership in the Joint Trajectory Groups

For this analysis, we used the low cyber/low trad group as the reference category. The results are presented in Table 4. First, it can be seen that coming from a family with a lower SES, having higher levels of conflict with one's best friend, perceiving a negative school climate and having a lower sense of school belonging predicted membership in the high cyber/chronic trad joint trajectory group relative to the low cyber/low trad group. Second, presenting lower levels of reactive aggression and having a higher sense of school belonging, but using Internet more frequently and perceiving a negative school climate, predicted membership in the high cyber/low trad joint trajectory group relative to the low cyber/low trad group. Third, being a boy, reporting higher levels of depressive symptoms, presenting higher levels of indirect aggression, having a lower quality relationship with one's parents, having higher levels of conflict with one's best friend, and perceiving a negative school climate predicted membership in the low cyber/chronic trad joint trajectory group relative to the low cyber/low trad group. Different sets of predictors thus appeared to be associated with membership in the three joint trajectory groups compared to the low cyber/low trad victimization group. Overall, the effect sizes were small when taking into account all the predictors in the model.

Discussion

This study examined the development of and relationships between cyber and traditional victimization during the adolescent years, as well as the predictors of group membership in the joint trajectory groups. Two sets of trajectories were identified for both cyber and traditional victimization, revealing a distinct pattern of change over time. Adolescents experienced a steady

decrease in cybervictimization, but chronicity in traditional victimization. Dual trajectory modeling also revealed four joint trajectory groups, underlying the low prevalence of cybervictimization in isolation and a both contexts-to-mostly traditional victimization pathway over time. With respect to the predictors, compared to the low cyber/low trad joint trajectory group, different sets of predictors predicted membership in the other three joint trajectory groups. Moreover, perceiving a negative school climate was the only risk factor consistently associated with experiencing cyber and/or traditional victimization, whatever their associations over time.

Developmental Relationships between Cyber and Traditional Victimization

Approximately 90% of the adolescents in our sample followed a low increasing or decreasing trajectory of both cyber and traditional victimization over time. Yet, two other groups emerged from the analyses, revealing different patterns of change for cyber versus traditional victimization. Whereas cybervictimization steadily decreased across the adolescent years, traditional victimization remained moderate and chronic between the ages of 13 and 17 for a subgroup of youths. Our results regarding the cybervictimization trajectories are in line with, although more moderate than the previous results by Sumter et al. (2012). Whereas they found that approximately one adolescent in five followed a high and decreasing trajectory of cybervicimization from ages 12 to 19, only 4% of our sample followed such as trajectory from ages 13 to 17. Our results regarding the traditional victimization trajectories are also in line with those reported by Haltigan and Vaillancourt (2014) for a sample of youths followed from ages 11 to 15. They found two trajectories of traditional peer victimization (low/declining [86%] and moderate/declining [14%]). However, whereas victimization decreased over time in their more high-risk trajectory, it remained stable in our sample. In addition, prior studies have usually reported three rather than two trajectories for this form of victimization (e.g., Barker et al., 2008;

Brendgen et al., 2016; Sumter et al., 2012), which was not the case in our study. One possibility for these discrepancies is the different age ranges used in the cited studies (e.g., ages 13 to 17, 9 to 15 or 12 to 19). More importantly, our results highlight the different developmental course of cyber versus traditional victimization during the high school years among the high-risk trajectories, revealing a fading versus chronic trajectory of cyber and traditional peer victimization, respectively. Our next set of analyses revealed that it might in fact not be a question of a fading trajectory, but rather a transition from being bullied both online and offline at the beginning of the high school years to being bullied mostly offline, for at least a subgroup of adolescents.

Our conditional probability results suggest that the youths who followed a high and decreasing trajectory of cybervictimization were more likely to be classified in a moderate and chronic trajectory of traditional victimization. Those who followed a moderate and chronic trajectory of traditional victimization, however, appeared more likely to be classified in the low rather than the high and decreasing cybervictimization trajectory. These joint analyses thus suggest that, whereas almost all cybervictims are likely to be bullied offline, not all traditional victims will be bullied online. There appears to be a transition from being initially victimized in both contexts to being victimized mostly on school grounds rather than the reverse. These results diverge from those reported by Jose et al. (2012) and Sumter et al. (2012). Over a two-year period, Jose et al. (2012) found that traditional victimization predicted cybervictimization but not the reverse among adolescents aged 11 to 16 years at the first point of assessment. In addition, in Sumter et al. (2012)'s study, the developmental relationships between cyber and traditional victimization appeared to be quite bidirectional. For instance, when adolescents followed a moderate online trajectory, their probability of following a moderate offline trajectory was .81,

whereas when they followed a moderate offline trajectory, their probability of following a moderate online trajectory was .66.

Moreover, in our study, four distinct subgroups were identified through the dual-trajectory analyses. The vast majority of adolescents followed a low cyber/low trad victimization trajectory (no victims). Still, one subgroup of adolescents followed a low cyber/chronic trad victimization trajectory (traditional victims). Another subgroup followed a high cyber/low trad victimization trajectory (cyber victims), whereas a last group followed a high cyber/chronic trad victimization trajectory (cyber and traditional victims or both contexts-to-mostly offline victims). Some of these results are consistent with Sumter et al. (2012). For instance, they found that following a high and decreasing cybervictimization trajectory while experiencing no or low traditional victimization was very rare (in fact, nonexistent in their study), whereas following a high and decreasing trajectory of traditional victimization while experiencing little or no cybervictimization was more plausible, with a similar proportion to that in our study (12% and 9%, respectively).

Overall, the finding that cybervictimization was almost always accompanied by traditional victimization, more than the reverse, was expected given that traditional victimization is more usual than cybervictimization in adolescence. Accordingly, in line with Sumter et al. (2012), we believe that the Internet does not necessarily create new victims but is rather another tool that bullies use to victimize their peers. However, the emergence of an apparent pathway from being victimized in both contexts at age 13 to reporting a decrease in cybervictimization while remaining chronically victimized on school grounds was more surprising. Even though cybervictimization occurs more covertly, spreads more easily among a wider audience, and persists for longer than traditional victimization (Gini et al., 2018; Kowalski et al., 2014), it may be that nothing beats victimizing a peer before the eyes of other students. In addition, in our

study, the students were asked to report their cybervictimization experiences at school only, which may have underestimated the frequency of cybervictimization and intertwined the two forms of victimization when the students reported them. Nonetheless, it would be important to assess both forms of peer victimization at younger ages to observe the emergence of cybervictimization and its association with traditional victimization. For instance, there could be a transition from traditional to cybervictimization by the end of the elementary school years, with another transition from cyber to traditional victimization during the high school years among a subgroup of youths. Future studies are thus needed to replicate and extend these findings over a longer period of time.

Risk Factors Predicting Membership in the Joint Trajectory Groups

In addition to documenting the joint trajectories of cyber and traditional victimization, it is important to better understand the way these joint patterns develop. Consistent with other researchers in the field, we examined risk factors across different contexts in the youths' ecology (e.g., Baldry et al., 2015; Ettekal et al., 2015; Hong & Espelage, 2012). Our findings support the importance of this approach when seeking to better understand what puts youths at risk of following different trajectories of cyber and traditional victimization. Individual, familial, peer, and school factors all contributed to predicting membership in the different joint trajectory groups to some extent.

Overall, our findings suggest that it was easier to get a snapshot of the risk factors associated with being a victim of traditional peer victimization compared to not being a victim of either form of victimization. Being a boy, showing both internalizing (depressive symptoms) and externalizing (indirect aggression) problems, having poor quality relationships with parents and friends, and perceiving school violence all increased the likelihood of following a joint trajectory of mostly chronic traditional victimization relative to experiencing low levels of both cyber and

traditional victimization. This snapshot is consistent with past research on traditional victimization (e.g., Zych et al., 2019), except with regard to low self-esteem, which was not a significant predictor in our study. However, it should be noted that low self-esteem and depressive symptoms were highly correlated, which may explain this finding. What our study contributes to previous research is that when cybervictimization comes into play, the snapshot becomes somewhat blurred. For instance, no individual risk factors increased the likelihood of belonging to the small joint trajectory group including youths who experienced high and decreasing cybervictimization and moderate and chronic traditional victimization, compared to the trajectory including youths who experienced low levels of both cyber and traditional victimization. Moreover, counterintuitive results emerged for the very small joint trajectory group including youths who experienced mostly cybervictimization, suggesting that lower levels of reactive aggression and a higher sense of school belonging predicted membership in this group compared to the group who experienced low levels of both cyber and traditional victimization.

Given the exploratory nature of this objective, as well as the small groups that emerged from the joint trajectory analyses and the small effect sizes, we believe that caution is called for when interpreting these findings. Overall, it can be concluded that, compared to youths who experience low levels of victimization both in cyberspace and on school grounds, youths who only experience cybervictimization and those who only experience traditional victimization do not share many risk factors, except for the perception of a negative school climate. When these two forms of victimization co-occur, it also appears that family, peer, and school factors are especially important to consider, notably the low socioeconomic status of the family. Yet, these results need to be replicated in future studies.

Study Limitations

This study is not without limitations. First, only one item was used to measure cybervictimization. One-item measures are less reliable and less valid for measuring victimization (Kowalski et al., 2014). Future studies should thus assess the frequency of cybervictimization using validated measures that include several items. Second, only three measurement points were available for estimating cyber and traditional trajectories. Yet, the figures suggest that some of the trajectories might have been better estimated with a quadratic slope (e.g., high/decreasing cybervictimization). Our results thus need to be replicated with more than three time points over the adolescent years. Third, due to attrition, the sample used in the present study did not have the same characteristics as the initial QLSCD sample with regard to sex, family structure, and income adequacy. Boys and youths from non-intact and less privileged families were more likely to have dropped out of the larger longitudinal study from which our sample was drawn. Given that youths from lower SES backgrounds are more likely to be victimized than youths from higher SES backgrounds (Zych et al., 2019), this attrition may have affected the representativeness and generalizability of our findings. Despite these limitations, this study provides new insight into the developmental relationships of cyber and traditional victimization over the course of the adolescent years. Moreover, examining several risk factors simultaneously allowed us to identify the most robust risk factors that should be targeted in prevention and intervention strategies.

Implications and Conclusion

Our results highlight the co-occurrence of cyber and traditional victimization during the adolescent years. Thus, intervention programs should jointly address both cyber and traditional bullying, as do, for example, the ViSC Social Competence Program (Gradinger, Yanagida, Strohmeier, & Spiel, 2015), the Cyber Friendly Schools program (Cross et al., 2016) and the KiVa Antibullying Program (Williford, Elledge, Boulton, DePaolis, Little, & Salmivalli, 2013).

All of these programs are based on a systemic ecological approach and target risk and protective factors located at the individual, family, peer, and school level. Practitioners should also be concerned with cybervictims at the beginning of the high school years since reporting high levels of cybervictimization at this time increased the likelihood of following a moderate and chronic trajectory of traditional victimization in our sample, more than the reverse. Cybervictimization is a serious concern world-wide given the explosion of social media use among adolescents. The individual and societal consequences of cybervictimization, including suicide, are serious (Gámez-Guadix et al., 2015). What our results suggest is that even if cybervictimization decreases over time, cybervictims are likely to remain chronic victims on school grounds, which underlines the importance for public policy makers of remaining highly vigilant with regard to this issue.

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Table 1

Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. CYBER – 13	-																
2. CYBER – 15	.25*	-															
3. CYBER – 17	.13*	.29*	-														
4. TRAD – 13	.41*	.28*	.20*	-													
5. TRAD – 15	.22*	.48*	.32*	.45*	-												
6. TRAD – 17	.20*	.25*	.47*	.34*	.46*	-											
7. SEX	.08*	.13*	.06	-.14*	-.04	-.04	-										
8. ESTEEM	.19*	.22*	.11*	.32*	.18*	.11*	.17*	-									
9. DEP	.22*	.21*	.14*	.44*	.24*	.19*	.10*	.66*	-								
10. REACTIVE	.10*	.10*	.09*	.24*	.15*	.11*	-.18*	.13*	.15*	-							
11. INDIRECT	.14*	.16*	.17*	.23*	.17*	.16*	-.01	.15*	.21*	.62*	-						
12. INTERNET	.16*	.07*	.03	.13*	.03	.07*	.04	.19*	.13*	.01	.01	-					
13. LOW SES	.07*	.11*	.11*	.10*	.07*	.09*	.01	.00	.02	.21*	.21*	.00	-				
14. NEGREL	.13*	.19*	.15*	.28*	.19*	.17*	-.02	.38*	.45*	.17*	.23*	.17*	.13*	-			
15. CONFLICT	.07*	.06*	.05	.19*	.15*	.13*	-.06*	.12*	.16*	.05	.02	.05	.07*	.13*	-		
16. CLIMATE	.14*	.08*	.04	.25*	.15*	.13*	.05	.16*	.12*	.05	.02	.18*	.01	.13*	.04	-	
17. BELONG	.12*	.11*	.08*	.29*	.14*	.16*	-.18*	.36*	.33*	.24*	.24*	.15*	.09*	.31*	.12*	.14*	-
N	1194	1161	1010	1194	1163	1010	1194	1194	1193	910	795	1136	1191	1193	1136	1189	1193
Mean	1.14	1.24	1.11	1.36	1.22	0.94	-	2.25	1.56	0.55	0.74	3.99	0.02	2.70	1.10	2.73	2.52
SD	0.51	0.63	0.44	1.52	1.48	1.25	-	1.88	1.63	1.51	1.81	1.68	1.00	2.37	1.21	2.30	1.92
Min	1	1	1	0	0	0	0	0	0	0	0	1	-2.72	0	0	0	0
Max	5	5	5	10	10	8.9	1	10	10	10	10	8	3.01	10	9.4	10	10
S	4.26	3.21	4.41	1.67	1.87	1.97	-	0.99	1.46	3.41	2.78	0.59	0.14	0.92	1.57	0.88	1.16
K	19.87	11.74	26.12	3.53	4.75	5.57	-	0.89	2.48	12.32	7.65	-0.14	-0.23	0.33	4.13	0.24	1.58
Alpha	-	-	-	.81	.82	.79	-	.86	.78	.91	.88	-	-	.79	.67	.74	.85

Table 2

Model Fit Indices for One-to-Three Latent Class Solutions for Peer Cyber and Traditional Victimization

	AIC	BIC	Entropy	LMR	BLRT
Cybervictimization					
1-class solution (1)	5275.40	5300.83	-	-	-
2-class solution (1 1)	**3939.07**	**3979.75**	**1.00**	**.000**	**.000**
3-class solution (1 1 1)	2625.05	2680.98	1.00	.572	.000
Traditional victimization					
1-class solution (1)	11924.92	11950.34	-	-	-
2-class solution (1 1)	11184.08	11224.76	.908	.000	.000
2-class solution (1 0)	**11186.84**	**11222.44**	**.910**	**.000**	**.000**
3-class solution (1 1 1)	10994.98	11050.92	.907	.194	.000

Note. Bold indicates best fit. The order between parentheses reflects whether the model was fitted with the intercept only (0) or the linear (1) growth function.

Table 3

Joint and Conditional Probabilities of Peer Cyber and Traditional Victimization

Victimization groups	Traditional Low/decreasing	Traditional Moderate/chronic
Probabilities of cybervictimization conditional on traditional victimization[a]		
Cyber Low/increasing	.987	.787
Cyber High/decreasing	.013	.213
Probabilities of traditional victimization conditional on cybervictimization[b]		
Cyber Low/increasing	.897	.103
Cyber High/decreasing	.291	.709
Joint probability of cyber and traditional trajectory groups[c]		
Cyber Low/increasing	Low cyber/low trad	Low cyber/chronic trad
	.870 (*n* = 1039)	.092 (*n* = 110)
Cyber High/decreasing	High cyber/low trad	High cyber/chronic trad
	.011 (*n* = 13)	.027 (*n* = 32)

[a] Columns total 1.
[b] Rows total 1.
[c] Cells total 1.

Table 4

Prediction of Membership in the Joint Trajectory Groups with the "No/Low Victimization" Group as the Reference Category

Predictors	High cyber/chronic trad relative to low group			High cyber/low trad relative to low group			Low cyber/chronic trad relative to low group		
Individual	OR	*p*	95%CI	OR	*p*	95%CI	OR	*p*	95%CI
Sex	1.08	.874	0.42, 2.74	2.42	.314	0.43, 13.38	0.50*	.011	0.29, 0.86
Low self-esteem	1.10	.277	0.92, 1.32	1.25	.320	0.81, 1.93	0.94	.491	0.79, 1.12
Depressive symptoms	1.29	.057	0.99, 1.68	1.12	.686	0.66, 1.89	1.50***	.000	1.25, 1.81
Reactive aggression	0.91	.575	0.64, 1.28	0.20***	.000	0.09, 0.42	0.97	.782	0.80, 1.18
Indirect aggression	1.29	.068	0.98, 1.70	1.15	.580	0.70, 1.90	1.23*	.019	1.03, 1.46
Internet use	1.20	.117	0.96, 1.50	1.65**	.002	1.20, 2.26	0.90	.121	0.79, 1.03
Familial									
Low SES	2.05**	.001	1.34, 3.16	0.86	.677	0.44, 1.72	1.25	.084	0.97, 1.62
Negative relationship with parents	1.07	.442	0.90, 1.28	0.90	.477	0.69, 1.19	1.11*	.046	1.00, 1.23
Peer									
Conflict with best friend	1.39**	.003	1.12, 1.72	0.99	.960	0.60, 1.62	1.31**	.006	1.08, 1.58
School									
Negative school climate	1.20*	.039	1.01, 1.44	1.46**	.004	1.13, 1.89	1.20**	.001	1.08, 1.33
Low school belonging	1.19*	.022	1.03, 1.39	0.64*	.020	0.45, 0.93	0.99	.889	0.86, 1.14

Note. OR = Odds ratio.

Figure 1a. Observed and predicted peer cybervictimization trajectories at ages 13, 15, and 17

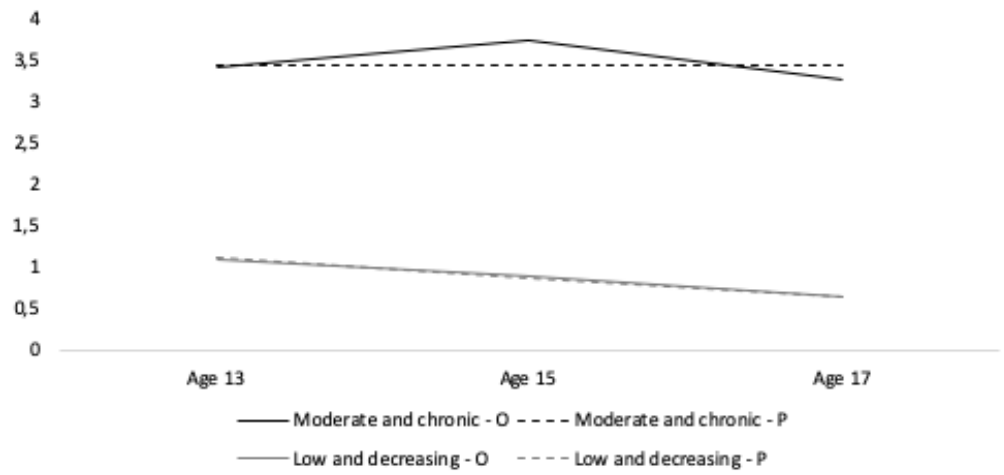

Figure 1b. Observed and predicted peer traditional victimization trajectories at ages 13, 15, and 17