Full Length Article

Cyberbullying victimization and substance use among Quebec high schools students: The mediating role of psychological distress

Jude Mary Cénat[a], Martin Blais[a], Francine Lavoie[b], Pier-Olivier Caron[a], Martine Hébert[a], *

[a] Department of Sexology, Université du Québec à Montréal, Québec, Canada
[b] School of Psychology, Université Laval, Québec, Canada

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ABSTRACT

Cyberbullying has become a significant public health issue among youth and is associated with numerous mental health problems. While the majority of studies explored its mental consequences using cross-sectional design, this article aims to investigate direct and indirect links between cybervictimization, psychological distress and substance use among youth, using a longitudinal design. From the representative sample of the Quebec Youth Romantic Relationships Survey, 1540 students aged 14–20 years participated in 3 Waves. A mediated model was used to investigate direct and indirect links between cybervictimization, controlling for exposure to interparental violence, measured at Wave 1, psychological distress at Wave 2, and substance use at Wave 3 (alcohol, marijuana and other drugs). Findings revealed that cyberbullying victims (18.14%, 10.03%, 1.95% respectively for alcohol, cannabis and other drugs) were more likely to consume substances than non-victims (11.37%, 4.95%, 0.8%). They also show that cybervictimization ($\beta = 1.41$, $p < .001$), exposure to interparental violence ($\beta = 0.08$, $p < .001$) and being a girl ($\beta = -3.78$, $p < .001$) were significantly associated to psychological distress. Psychological distress was found to partially mediate the association between cyberbullying victimization and later substance use. By highlighting the role of psychological distress in the association between cyberbullying and substance use, these results are relevant for prevention and treatment for victims. Indeed, findings from this study underline the need to focus primarily on psychological distress among cyberbullying victims, with an emphasis on gender and possible past victimizations such as exposure to interparental violence.

1. Introduction

Cyberbullying has become a major mental health issue among youth and its prevalence is increasing, particularly among the most vulnerable youth (Cénat, Blais, Hébert, Lavoie, & Guerrier, 2015; Gini, Card, & Pozzoli, 2017; Guo, 2016; Kowalski, Giumetti, Schroeder, & Lattanner, 2014). Kowalski and colleagues (Kowalski et al., 2014) defined cyberbullying as an intentional, repetitive, aggressive behavior perpetrated by an individual or group against someone or a group most vulnerable through the use of technologies such as the Internet, social media (Facebook, Twitter, Instagram, Whatsapp, Snapchat, Vine, Ask.fm and others) and mobile phones. Internet has become such a popular tool within the reach of every teenager in developed countries that the prevalence of youth victims of cyberbullying tends to be increasing (Gini et al., 2017; Guo, 2016). According to recent studies, the

prevalence of youth harassed via the web varies between 20 and 40%, with rates up to 70% in some particularly vulnerable groups such as sexual minority teenagers (Kowalski et al., 2014; Tokunaga, 2010). While some recent studies tend to show that girls present a higher prevalence of cybervictimization (Guo, 2016), two recent meta-analyses have shown that research is often contradictory about gender differences (Gini et al., 2017; Kowalski et al., 2014). However, all these studies have shown that girl victims tend to have higher psychological distress and other consequences than boy victims. Indeed, recent studies have documented negative consequences associated with cyberbullying victimization, including psychological distress (Cénat et al., 2014; Litwiller & Brausch, 2013; Schneider, O'Donnell, Stueve, & Coulter, 2012; Sourander et al., 2010).

In response to cyberbullying, youths may isolate themselves and show a high prevalence of mental health impacts (Alwan et al., 2011; Hébert, Cénat, Blais, Lavoie, & Guerrier, 2016). Feelings of social rejec-

tion, social isolation, psychological distress, depression, anxiety, low self-esteem and suicidal ideations are now known as consequences associated to cyberbullying (Cénat et al., 2014, 2015; Kowalski et al., 2014; Litwiller & Brausch, 2013). At the same time, these same variables are also known as risk factors associated with alcohol and substance use (Kramer & Vaquera, 2011). These factors may explain why many youth victims of cyberbullying appear to be seeking refuge in drinking and substance use (Mitchell, Ybarra, & Finkelhor, 2007; Sinclair, Bauman, Poteat, Koenig, & Russell, 2012; Sourander et al., 2010). Indeed, Goebert and colleagues showed a prevalence of alcohol and substance use 2.5 times higher among youth victims of cyberbullying compared to non-victims among Hawaiian youths (Goebert, Else, Matsu, Chung-Do, & Chang, 2011).

However, studies need to investigate whether the relationship between cyberbullying and alcohol and substance use is direct or mediated by crucial intervening variables. Studies have shown, for certain forms of bullying victimization, the mediating role of psychological distress in increasing alcohol and substance use (Strine et al., 2012), however, none has hitherto explored its possible mediating role in the association between cyberbullying and alcohol consumption and substance use. Prior studies have documented the role of cyberbullying victimization to develop internalizing problems on one hand (Cénat et al., 2014, 2015; Kowalski et al., 2014), and cyberbullying to increase alcohol and substance use on the other hand (Gamez-Guadix et al., 2013; Goebert et al., 2011; Wright, 2016). Similarly, if it is known that exposure to interparental violence has an important role in alcohol and substance use among youth (Marschall-Lévesque, Castellanos-Ryan, Vitaro, & Séguin, 2014), the studies reviewed have not explored its possible association with cyberbullying. Yet it is known that exposure to interparental violence is a significant risk factor for experiencing other forms of interpersonal trauma (Ruel, Lavoie, Hébert, & Blais, 2017), including bullying (Sharma, Nam, Kim, & Kim, 2016). These results from recent studies indicate the importance of exploring the links between cyberbullying, psychological distress and alcohol and substance use by controlling for interparental violence.

1.1. Aims and hypotheses of this study

In the province of Quebec (Canada), where more than one out of five adolescent experienced at least one episode of cyberbullying, and where it is associated with a high level of psychological distress (Cénat et al., 2015), it has become essential to study alcohol consumption and substance as possible consequences associated with cyberbullying victimization. It is also important to explore direct and indirect links be-

tween cyberbullying, psychological distress and substance victimization among youth. Using data from *the Quebec Youths' Romantic Relationships Survey* (QYRRS), this paper aims to examine alcohol and substance use related to cyberbullying victimization among teens in Quebec schools. First, we hypothesized that cyberbullying will predict higher levels of substance use. Second, we hypothesized that the relationship between cyberbullying and substance use will be mediated by psychological distress (Fig. 1). Given results of past studies, the model also includes gender, exposure to interparental violence and age as covariates. To test this model, we rely on a longitudinal design in order to answer the limitations generally observed in previous studies where the association between cyberbullying and substance use have generally been studied through cross-sectional studies.

2. Methods and materials

2.1. Participants and study design

Participants were recruited in Fall 2011 through a one-stage stratified cluster sampling of 34 Quebec high schools. The three waves were conducted with six months apart. A total of 1833 students from grade 10 to 12 aged 14–20 years ($\bar{X}$ = 15.81; SE = 0.21) participated in the three waves. A total of 25.78% of the participants were males. For the whole study, the response rates (class and overall student response) were determined by calculating a ratio between the number of students who signed the consent form and the number of who were approached. Most of the classes had a response rate of 100% (320/329 classes), while the remaining classes ranged from 90% to 98%. The overall response rate for the entire set of participant in this study was 99%.

A correction weight was assigned to make up for biases due to sample design. The weight was defined as the inverse of the probability of selecting the given grade in the participant's stratum in the sample multiplied by the probability of selecting the same grade in the same stratum in the population. The final weighted sample comprised of 1540 youths who participated in the 3 waves. The youth signed an informed consent form agreeing to participate in the study. The two first waves of data collection were conducted in schools, while at Wave III participants were invited to complete the survey online via a server secured. The QYRRS project and the research protocol were approved by the research ethic boards of the BLINDED FOR REVIEW. More details on the sampling of the *Quebec Youths' Romantic Relationships Survey* (QYRRS) can be found in our published papers on the same data (Cénat et al., 2014, 2015; Hébert et al., 2016)
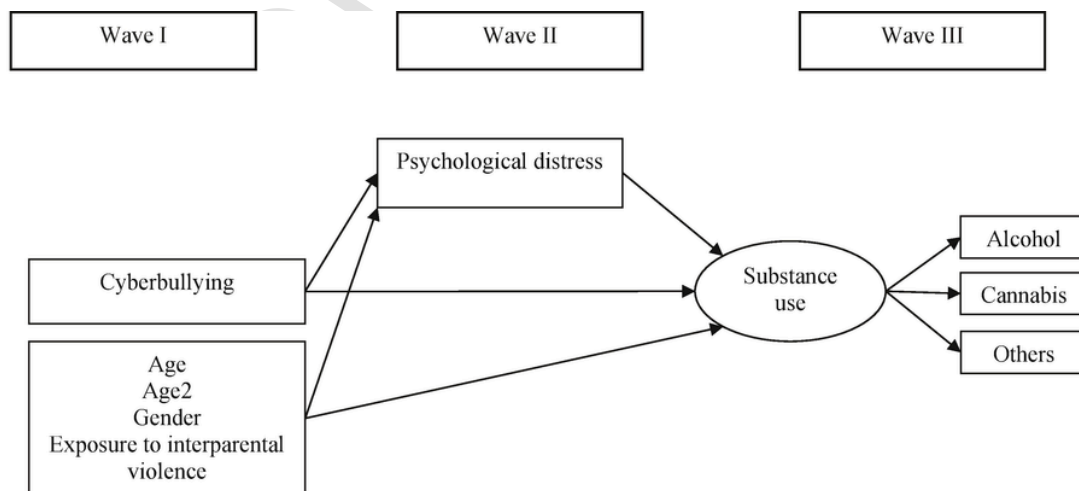

Fig. 1. Conceptual mediated model of Cyberbullying, psychological distress and substance use.

2.2. Measures

At Wave I the questionnaire included a specific question measuring *cyberbullying* victimization occurring in the past 12 months: "*How many times someone has bullied you (rumors, intimidation, threatening, etc.) using internet (Facebook, MySpace, MSN, email, texto, etc.)*". Respondents rated on a 4-point-scale: *Never* (0), *1 to 2 times* (1), *3 to 5 times* (2) and *6 times and more* (3). This item completely covers the definition of the cyberbullying theoretical construct [(1) the intentionality of aggressive behavior, (2) occurs through electronic technologies for cyberbullying (Kowalski et al., 2014). For descriptive analyses, we created a dichotomized score distinguishing participants who had experienced one or more situation of cyberbullying in the last 12 months and those who had not experienced any cyberbullying in the last 12 months.

Exposure to interparental violence was assessed at Wave I using items derived from the *Conflict Tactics Scale* (straus, hamby, Boney-McCoy, & sugarman, 1996). This questionnaire measured separately physical and psychological family violence perpetrated by one of the parents on the other (father on mother and vice versa) using four items each. Items included statements such as *"In a lifetime, I have seen my mother do this to my father …"*: "*insult, swear, shout, yell*"; "*threaten to hit or destroy the other person's belonging*"; "*push, shove, slap, twist the arm, throw something at the other person that could hurt*" and "*threaten with a knife or a weapon, punch or kick, slam the person against a wall*". The four items were rated on a 4-point-scale: *Never* (0), *1 to 2 times* (1), *3 to 5 times* (2) and *6 times and more* (3). We computed a mean score (0–3) accounting for having been witness of family violence. Sociodemographic variables were gender and age (in years).

Psychological distress was assessed at Wave II in reference to the past week using the Kessler Psychological Distress (Kessler et al., 2002). This scale encompasses 10 items rated on a 5-point-scale ranging from 1 (*never*) to 5 (*always*) with a score ranging from 10 to 50 (α = 0.90). A score of 12 and higher was shown to best represent a clinical score of severe psychological distress (Boak et al., 2014).

Substance use was assessed at Wave III using three (3) items from the *Screening Grid for Detection of Alcohol and Drug Problems in Adolescents* measuring *substances* use frequency for *alcohol, cannabis* and *other drugs* such as ecstasy, amphetamine, speed, cocaine and acid (eg. "*In the past 6 months, how many times have you consumed these products?*") (Landry, Tremblay, Guyon, Bergeron, & Brunelle, 2004). Items were rated on a 5-point-scale: 0 = *Not at all*, 1 = *occasionally*, 2 = *about once a month*, 3 = *on weekends or once or twice a week*, 4 = *3 times a week or more*, and, 5 = *every day*. For descriptive analyses, a dichotomized score was computed based on whether participants used the related substance one to two times a week vs. three times a week or more.

2.3. Statistical analysis

Prevalence of each variable with respect to differences between genders was computed. For differences among categorical variables, the Pearson χ^2 statistic is corrected for the survey design with the sec-ond-order correction of Rao and Scott and is converted into an F (Fisher) statistic; thus, an F statistic is reported for difference between categorical indicators (Degenhardt et al., 2008; Lynskey & Strang, 2013; Rao and Scott, 1981, 1984). We defined a latent variable: substance use combining alcohol, cannabis and other drugs use. Structural equation modeling was used to estimate the direct and indirect effects of cyberbullying on substance use through psychological distress. Covariates included gender, exposure to interparental violence, age of participants and the quadratic effects of age. We considered a quadratic term of age in our analyses as previous studies have documented drinking may increase with legal age (Crost & Rees, 2013; Kaestner & Yarnoff, 2009). We assessed the fit measurement of the model using indices fit: non-significant p value of the chi square test as well as RMSEA (value less than 0.06) and CFI (value greater than 0.9) indicate good fit (Hu & Bentler, 1999). Analyses were conducted using the 7th version of M*plus* (Muthén & Muthén, 2012) which allows complex sample; yet, bias corrected confidence intervals are not available for conditional effects with weighted sample. Preliminary analyses were estimated on list wise over the three waves ($n = 1540$). The Full Information Maximum likelihood (FIML) was used for the estimation of parameter and model fit.

3. Results

Overall, 18.90% of youths experienced cyberbullying in the past 12 months. No significant difference was found between girls (19.28%) and boys (17.91%), $p = .54$. Table 1 also presents the substantial overlap between cyberbullying and substance use, with significant differences for all the substances among cyberbullying victims and non-victims. However no significant differences were noted for gender either in young victims of cyberbullying or to those who are not victims, except for Cannabis in no-cyberbullied students (respectively, 4.13% of girls and 7.19% of boys, $p < .05$) and other drugs for cyberbullied students (respectively, 1.03% of girls and 4.76% of boys, $p < .05$). Considering psychological distress at wave II, girls reported significantly higher prevalence (37.75% for girls and 16.26% for boys; $F_{(1, 25)} = 206.31$; $p < .001$) (see Table 2).

The latent variable (substance use) explained 64.83% of the variance in a single factor. The loadings were 0.41 for alcohol, 0.90 for cannabis, and 0.64 for other drugs. The latent variable thus adequately represents the latent construct: substance use.

Results of mediation models are presented in Fig. 2 and Table 1. Fit indices for the model were excellent: $\chi^2 = 12.009$, $p = .445$; CFI = 1.00; RMSEA = 0.001. Cyberbullying victimization was associated positively with psychological distress ($\beta = 1.412$, $p < .001$). Also, exposure to interparental violence ($\beta = 0.080$, $p < .001$) and being a girl ($\beta = -3.738$, $p < .001$) were positively and significantly associated with higher psychological distress. The model explained 10.3% of the variance of psychological distress.

Substance use was significantly associated with psychological distress ($\beta = 0.013$, $p = .003$), gender ($\beta = 0.316$, $p < .001$), age ($\beta = 4.276$, $p = .016$) and the quadratic effect of age ($\beta = -0.132$,

Table 1
Descriptive of measure (n = 1540).

Measures	Cyberbullying victimization %				No Cyberbullying victimization %				p'
	Total	Girl	Boy	p	Total	Girl	Boy	p	
Alcohol	18.14	18.88	15.87	.2	11.37	10.64	13.4	.59	.003
Cannabis	10.03	8.72	14.29	.2	4.95	4.13	7.19	< .05	.003
Other drugs[a]	1.95	1.03	4.76	< .05	0.7	0.8	0.7	.72	< .05

[a] Ecstasy, amphetamine, speed, cocaine, acid p: Difference between genders across cyberbullying victimization categories p': Difference between Cyberbullying victimization and No victimization for substance use.

Table 2
Unstandardized coefficients of the moderated mediated model.

	Coefficient	SE	p value
Psychological distress			
Cyberbullying	1.41	0.32	<.001
Gender	−3.78	0.57	<.001
Exposure to interparental violence	0.08	0.01	<.001
Age	1.70	7.12	= .811
Age^2	−0.05	0.23	= .837
Substance use			
Psychological distress	0.01	0.00	<.001
Cyberbullying	0.20	0.05	<.001
Gender	0.32	0.09	<.001
Exposure to interparental violence	0.00	0.00	= .235
Age	4.28	1.78	= .016
Age^2	−0.13	0.06	= .019

Note: Models included quadratic effect of age i.e. age and squared term (age^2); SE: Standard Error; Coefficient: Unstandardized regression coefficients.

$p = .019$). This positive quadratic effect suggests that substance use tends to increase in young people up to a certain age (the inflection point being 16.2 years), from this point substance use decreases. Results indicated a direct effect of cyberbullying victimization on substance use ($\beta = 0.203$, $p < .001$). There was a positive indirect effect of cyberbullying victimization on substance use through psychological distress ($\beta = 0.018$, $p = .031$), suggesting a partial mediation effect of psychological distress in the relationship between cyberbullying victimization and substance use. The model accounted for 6.9% of the variance and the percent mediation indicated that 8.14% of meaning of substance use is through psychological distress.

4. Discussion

We used data from the representative QYRRS to analyze direct and indirect associations between cyberbullying victimization and alcohol and substance use using a longitudinal design. Results suggest that the relationship between cyberbullying victimization and alcohol and substance use (marijuana and other substances such as ecstasy, amphetamine, speed, cocaine and acid) is partially mediated by psychological distress.

Findings of the present study indicate that youth victims of cyberbullying present more psychological distress and substance use. Previous studies showed that youth victims of cyberbullying may present internalizing problems (Brewer & Kerslake, 2015; Hinduja & Patchin,

2014; Kowalski et al., 2014). Past studies have also suggested social isolation and internalizing problems, such as psychological distress are important vectors for alcohol and substance use (Fergusson, Boden, & Horwood, 2011; Stice, Barrera, & Chassin, 1998). Similarly, studies of (Luk, Wang, & Simons-Morton, 2012) on traditional and cyber forms of bullying (measured in the same construct) had previously shown that internalizing problems such as depression could play a mediating role between victimization and alcohol and substance use (Luk, Wang, & Simons-Morton, 2010). The presence of direct and indirect links between cyberbullying and substance use in our final model does allow confirming our first hypothesis postulated that cyberbullying victimization will predict higher level of substance use.

As assumed in our second hypothesis, the relationship between cyberbullying victimization and substance use is mediated by psychological distress. These results corroborate previous studies that have reported significant association between cyberbullying victimization and alcohol and substance use (Gamez-Guadix et al., 2013; Goebert et al., 2011; Sourander et al., 2010). Indeed, it has frequently been shown that substance use is often associated with psychological distress; and, cyberbullying victimization is often linked to psychological distress. However, knowing that psychological distress has a mediator effect in the association between cyberbullying victimization and alcohol and substance use can provide clinicians an efficient way to address problems of alcohol and substance use associated with cyberbullying victimization. Indeed, these results explore an interesting path to prevent substance use following cyberbullying victimization by working to prevent first psychological distress that can be associated.

Results also show that being a girl and exposure to interparental violence are associated to greater psychological distress. Previous studies have shown that girls develop higher prevalence of psychological distress following victimization of cyberbullying, on the one hand (Schneider et al., 2012); and exposure to interparental violence is associated to development of psychological distress, on the other hand (Jarvis, Gordon, & Novaco, 2005). These results show the need to integrate both gender and exposure to interparental violence (in a revictimisation perspective) into cyberbullying prevention programs and to take into account of theses aspects in interventions with young victims.

It is known that substance use habits tend to continue into adulthood and could be irreversible in many cases (Goebert et al., 2011). As previous study have already shown the quadratic effects of age about alcohol and substance use (Bryant, Schulenberg, Malley, Bachman, & Johnston, 2003), our findings corroborate the fact that although sub-
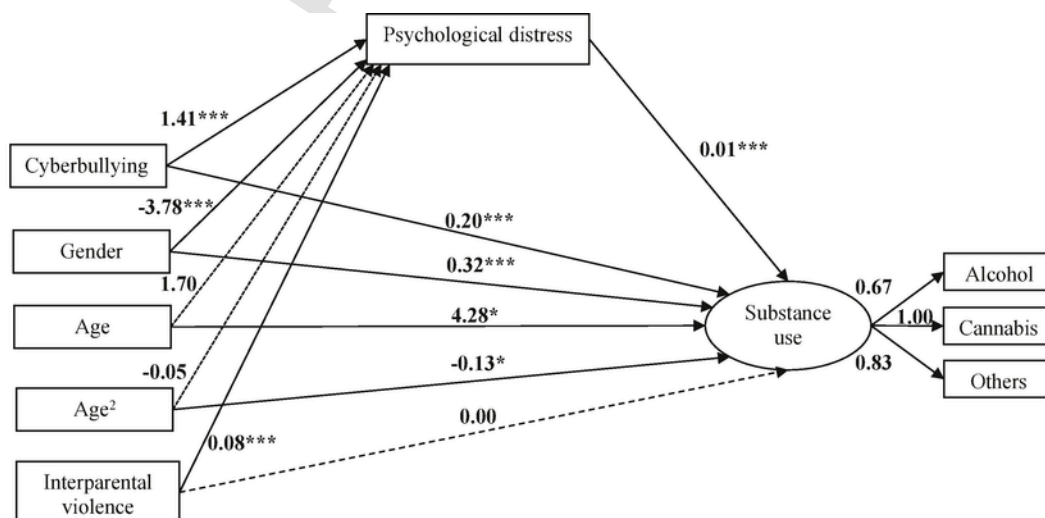

Fig. 2. Statistical mediated model of Cyberbullying, psychological distress and substance use. Dotted lines illustrate non-significant paths while full line stand for significant paths from the estimated model. *p < .05; **p < .01; ***p < .001.

stance use tends to increase with age, then at a certain point (16.2 years old), youth reduce their substance use.

This study presents some limitations. First, we used self-reported data, which might be subject to memory and social desirability bias. Another limitation is related to the fact that our measure did not evaluate different possible cyberbullying experiences, which would have allowed us to compare different types of bullying, nor the specific role of pure cyberbullying victimization in comparison of dual roles of perpetration/victimization related to substance use. Thus, cyberbullying could be a proxy for other forms of bullying. In addition, a limitation is associated to the measure of substance use, which does not refer to the context of substance use.

5. Conclusion

Despite these limitations, by enlightening the mediating effect of psychological distress in the relationship between cyberbullying victimization and alcohol and substance use, this study contributes not only in understanding the process by which cyberbullying victimization may lead to alcohol and substance use, but also by identifying new targets for prevention and intervention programs. Indeed, instead of concentrating efforts to reduce alcohol and substance use that could result from cyberbullying victimization, findings of this study unveiled the need to address psychological distress and other internalizing problems among cyberbullying victims. The replication of this study will also be important to observe the association between cyberbullying and the impact of the coming into force of the law legalizing the recreational use of marijuana in Canada. Future research may also explore different forms of cyberbullying to assess their specific and differentiated consequences on substance use among youth. Finally, future research must also explore protective factors between cybervictimization and substance use that can help in the development of prevention and intervention programs.

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