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Cybervictimization and mental health among Canadian youth ^C

by Mila Kingsbury and Rubab Arim

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Correction notice

In the article "Cybervictimization and mental health among Canadian youth" published on September 20, 2023, errors were found within the text and in Table 1.

The following corrections has been made:

In the document, the term "identity" has been changed to "diversity".

In Table 1, stub row title has been changed from "Exclusively attracted to the same gender" to "Exclusively attracted to a different gender".

Cybervictimization and mental health among Canadian youth

by Mila Kingsbury and Rubab Arim

ABSTRACT

Background
Cybervictimization has emerged as a potentially serious form of victimization and has been associated with negative mental health outcomes, including depression, anxiety, disordered eating, and suicidality. However, very little research has examined the prevalence and correlates of cybervictimization among diverse subpopulations of youth.

Data and methods
Data from 13,602 adolescents aged 12 to 17 were drawn from the 2019 Canadian Health Survey on Children and Youth. Adolescents reported on their experiences of cybervictimization in the past 12 months, general mental health, and eating disorder symptoms; adolescents aged 15 to 17 reported on suicidal ideation and attempt; and parents reported on problems with depression and anxiety. Logistic regression was used to estimate the odds of experiencing cybervictimization according to characteristics, including gender diversity, population group, same-gender attraction, low family income, and the presence of chronic conditions and digital media habits. Logistic regression models were also used to estimate the odds of experiencing each mental health difficulty by sociodemographic characteristics and experience of cybervictimization.

Results
The odds of experiencing cybervictimization were higher among transgender and non-binary youth, females attracted to the same gender or unsure of their attraction, and adolescents living with chronic conditions (particularly females and those living in low-income households). Cybervictimization was consistently associated with a greater risk of poor general mental health, depression or anxiety, eating disorder symptoms, suicidal ideation, and suicide attempt. These associations did not differ according to the sociodemographic characteristics assessed. In terms of digital media habits, lower frequencies of use were generally associated with a lower likelihood of experiencing cybervictimization.

Interpretation
While certain population groups appear to be at a higher risk of experiencing cybervictimization, the experience of cybervictimization is associated with similar mental health indicators for all adolescents.

Keywords
mental health, cybervictimization, adolescence, intersectionality

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What is already known on this subject?

- Cybervictimization is associated with poorer mental health, including depression, suicidality, and eating disorders.

- Little research has examined differences in the experience of cybervictimization and its correlates among diverse groups of Canadian youth.

What does this study add?

- This study used a nationally representative survey to provide estimates of Canadian adolescents' experience of cybervictimization and several mental health outcomes.

- Cybervictimization was more likely among certain subpopulations, including transgender or non-binary youth, females attracted to the same gender or unsure of their attraction, and youth with chronic conditions.

- Cybervictimization was associated with poorer mental health, eating disorder symptoms, depression, anxiety, suicidal ideation, and suicide attempt. These associations were similar for all youth.

Peer victimization is a well-known risk factor for adolescent mental health problems, including depression, anxiety, suicidal ideation, and suicide attempt.[1,2] With the rise in popularity of communication media among youth, including text messaging and social media, cybervictimization has emerged as a potentially serious form of victimization.[2] Cybervictimization is conceptualized as behaviour carried out via electronic communication media with the intent to harm others.[2] Cybervictimization can take many forms, including threats; harassment; social exclusion; the sharing of personal information online without consent; or other behaviours intended to cause fear, harm, embarrassment, or exclusion.[3,4] When these acts are repeated over time against victims who cannot easily defend themselves, they may constitute cyberbullying.[5] Prevalence estimates vary from study to study, likely depending on specific definitions and methodological differences; however, an average of one in five adolescents is estimated to have experienced cybervictimization.[6] Although cybervictimization often takes place outside school hours, it is usually perpetrated by peers who attend school together and therefore may impact adolescents' "real world" social environment and school climate.[7] Like other forms of peer victimization, cybervictimization has been associated with numerous negative mental health outcomes, including depression,[7,8] anxiety,[9] disordered eating,[10] and suicidality.[2–5] Because of the permeation of cybervictimization into the home lives of victims, i.e., occurring outside school hours and on the victims' personal devices, some authors have argued that cybervictimization may be even more distressing to youth than traditional in-school victimization.[11] Adolescents' media habits may influence their experience of cybervictimization. For example, more frequent use of online media may increase an adolescent's likelihood of experiencing cyberbullying,[12] suggesting that modifiable screen hygiene habits are important factors to examine when considering cybervictimization.

Many studies have examined sex differences in adolescent cybervictimization; a recent meta-analysis suggests that females are at a slightly more elevated risk of experiencing cybervictimization than males.[13] However, given the great diversity of Canadian youth, research must apply multiple lenses on diversity to understand how and to what extent cybervictimization impacts diverse groups of young people. Relatively little is known about potential differences in cybervictimization and its correlates, particularly among marginalized groups.[14] A growing body of research suggests that LGBTQ adolescents are disproportionately at risk of experiencing cybervictimization[15,16] and its negative mental health correlates.[17] Whereas several studies have considered adolescents' sexual orientation, far fewer have considered gender diversity. Moreover, much of this work has been conducted with small samples, underlining the need for population-based research in this area.

Regarding racialized groups in the population, results have been largely mixed, but one review of studies from the United States suggests that non-White adolescents may be at a lower risk of cybervictimization than their White peers.[18] Other studies, however, have suggested that experiences of cybervictimization differ among non-White ethnic groups and that considering diverse ethnicities as a single category is reductive, limiting the conclusions that can be drawn.[19] Recent research also suggests that the mental health correlates of cybervictimization may differ among ethnic groups.[19,20] There is a notable paucity of Canadian research in this area. While studies with smaller samples suggest that rates of cybervictimization may be particularly high among Indigenous adolescents,[21,22] little research has compared the frequency of cybervictimization among Indigenous and non-Indigenous youth from diverse population groups using large, representative samples.

A small body of research suggests that youth with chronic conditions experience cybervictimization more frequently than

their peers.[23] Again, much of the research on this topic has been limited by small sample sizes, the focus on a single chronic condition, and the use of convenience samples with limited generalizability to the population.

Family demographic characteristics, including socioeconomic status and area of residence, may also be important to consider. In the past, these factors have been associated with the use of communication technologies—e.g., youth with lower family income or living in rural areas may have lower levels of access to computers and the Internet.[24,25] More recent data suggest similar levels of home Internet access between youth in the highest and lowest income quartiles;[26] however, Canadians living in rural areas are still less likely to have a home Internet connection and report lower Internet speed than Canadians in urban centres.[27] Regardless of access differences, one Canadian study suggests that adolescents with low family income may be at a greater risk of experiencing cybervictimization.[12] Results from the handful of studies on cybervictimization that compare rural and urban areas have been variable, with no consistent findings regarding differences in the prevalence of cybervictimization.[28,29]

In sum, research on differential experiences of cybervictimization is still in its infancy. There has been very little empirical research on the experience of cybervictimization and its correlates among diverse groups of young people in the population, particularly research employing large, representative samples. Moreover, some authors have argued the importance of examining sociodemographic factors interactively, rather than individually. Indeed, one study of U.S. adolescents reported that race (White or non-White) moderated associations between gender and cybervictimization.[30] The great variability in the results of studies of sociodemographic differences in the experience of cybervictimization may be in part explained by a general lack of consideration of intersectionality.

The present study

The objectives of this study were threefold: (1) to describe the proportion of Canadian adolescents who have experienced cybervictimization, and how this proportion may differ among subpopulations of Canadian adolescents (based on, e.g., gender diversity, ethnicity, and sexual attraction); (2) to examine how these sociodemographic predictors may interact to predict the experience of cybervictimization; and (3) to examine associations between cybervictimization and a set of indicators of adolescent mental health and whether these associations differ among subpopulations.

Method

Data source

The 2019 Canadian Health Survey on Children and Youth (CHSCY) is a national survey of the physical and mental health of Canadian children and youth aged 1 to 17 years. It is generally considered representative of children and youth living in the 10 provinces and three territories, but it excludes those living on First Nations reserves and other Indigenous settlements, in foster homes, and in institutions. For the present study, the CHSCY sample was restricted to adolescents aged 12 to 17 years (N = 13,602; 50% female; mean age = 15.1 years). Details of the survey's methodology can be found in the survey documentation.[31]

Measures

Cybervictimization: Adolescents were asked about their experiences of victimization in the past 12 months, including three items on cybervictimization: "Someone posted hurtful information about you on the Internet;" "Someone threatened or insulted you through email, instant messaging, text messaging or an online game;" and "Someone purposefully excluded you from an online community." Response options for each item ranged from 0 ("never") to 4 ("daily") and were summed to create a total score ranging from 0 to 12. For the present study, adolescents who reported any experience of cybervictimization (score of 1 or greater; 24.9%) were compared with those who reported no experience of cybervictimization.

Traditional victimization: Traditional (i.e., face-to-face) victimization was assessed using seven items. Adolescents were asked to indicate how often they had experienced each type of victimization (e.g., "Someone made fun of you, called you names, or insulted you") in the past 12 months, with response options ranging from 0 ("never") to 4 ("daily").

Mental health indicators: Five indicators of adolescents' mental health were included. General mental health was assessed by the question "In general, how is your mental health?" A binary variable was created comparing optimal mental health (responses of "good," "very good," or "excellent") with suboptimal mental health (responses of "poor" or "fair"), as in previous research.[32]

Eating disorder symptoms were assessed via three questions adapted from the *Eating Attitudes Test – 26 Item* (EAT-26) assessing symptoms in the past 12 months. In accordance with the EAT-26 interpretation guide,[33] respondents were considered to have elevated eating disorder symptoms if they reported being preoccupied with a desire to be thinner, changing their eating habits to manage their weight "daily" or "weekly," or vomiting to lose weight at any point during the past 12 months.

Parent-reported difficulties with depression and anxiety were assessed by the Washington Group/UNICEF Module on Child Functioning. The person most knowledgeable about the adolescent (hereafter referred to as "the parent") was asked, "How often does [your child] seem very anxious, nervous, or worried?" and "How often does [your child] seem very sad or depressed?" Response options ranged from "never" to "daily." Adolescents who experienced the symptom "daily" were considered to have difficulty with anxiety or depression as per the Module on Child Functioning syntaxes.[34] Because of small sample sizes and a large degree of overlap between the two,

depression and anxiety were combined for the analyses; adolescents with difficulties with either depression or anxiety were compared with those with neither difficulty.

Adolescents aged 15 to 17 also reported on suicidal ideation ("In the past 12 months, did you ever seriously consider attempting suicide or taking your own life?") and suicide

attempt ("Have you ever attempted suicide or tried taking your own life?").

Sociodemographic characteristics: Adolescents reported their sex assigned at birth ("male" or "female") and their gender ("male," "female," or "please specify"). Those whose self-reported gender did not match their sex at birth were considered

Table 1
Sociodemographic characteristics, household population aged 12 to 17 years, Canada, 2019

	Weighted %	95% Confidence interval	
		from	to
Full sample aged 12 to 17 years[1]			
Age group			
12 to 14	51.1	50.0	52.2
15 to 17	48.9	47.8	50.0
Sex at birth			
Male	51.3	51.2	51.3
Female	48.7	48.7	48.8
Gender diversity			
Cisgender	99.5	99.3	99.6
Transgender or non-binary	0.5	0.4	0.7
Place of residence			
Population centre	82.0	81.2	82.8
Rural area	18.0	17.2	18.8
Province or territory			
Newfoundland and Labrador	1.3	…	…
Prince Edward Island	0.3	…	…
Nova Scotia	2.4	…	…
New Brunswick	2.0	…	…
Quebec	21.1	…	…
Ontario	40.2	…	…
Manitoba	3.8	…	…
Saskatchewan	3.3	…	…
Alberta	12.5	…	…
British Columbia	12.6	…	…
Territories	0.4	…	…
Population group			
Indigenous			
First Nations	2.1	1.8	2.4
Métis	2.4	2.1	2.8
Inuk	0.3	0.2	0.4
Non-Indigenous			
White	64.3	63.2	65.3
South Asian	7.7	7.2	8.2
Chinese	5.9	5.4	6.4
Black	5.0	4.5	5.6
Filipino	3.8	3.4	4.3
Arab	2.5	2.2	3.0
Latin American	1.2	1.0	1.5
Southeast Asian	1.1	0.9	1.3
West Asian	0.8	0.6	1.1
Korean	0.7	0.5	0.8
Japanese	0.4	0.3	0.5
Other or multiple population groups	1.8	1.5	2.1
Family income			
Above LIM	72.3	71.3	73.3
Below LIM	27.7	26.7	28.7
Chronic condition			
No chronic condition	72.8	68.1	70.2
Chronic condition[2]	27.2	29.8	31.9
Has experienced cybervictimization	24.6	23.7	25.6
General mental health "fair" or "poor"	6.6	6.1	7.1
Depression or anxiety	6.0	5.5	6.5
Eating disorder risk	22.1	21.2	23.0
Subsample aged 15 to 17 years[3]			
Sexual attraction			
Exclusively attracted to a different gender	78.5	77.2	79.8
Same-gender attracted or unsure	21.5	20.2	22.8

… not applicable

1. Sample size is N = 13,602.
2. Excludes diagnoses of depression, anxiety disorder, or eating disorder.
3. Subsample size is n = 6,857.

Note: LIM = Low-income measure.

Source: Statistics Canada, Canadian Health Survey on Children and Youth, 2019.

Table 2
Percentage of household population aged 12 to 17 years who have experienced cybervictimization, by sociodemographic characteristics, Canada, 2019

	% who have experienced cyber victimization	95% Confidence interval	
		from	to
Full sample aged 12 to 17 years[1]			
Age group			
12 to 14[2]	22.1	20.8	23.5
15 to 17	27.2 *	25.8	28.6
Sex at birth			
Male[2]	23.9	22.6	25.2
Female	25.4	24.1	26.8
Gender diversity			
Cisgender[2]	24.5	23.5	25.5
Transgender or non-binary	47.3 *	32.9	62.2
Place of residence			
Population centre	24.6	23.5	25.7
Rural area	24.7	22.7	26.8
Province or territory			
Newfoundland and Labrador	29.5 *	25.0	34.3
Prince Edward Island	25.7 *	21.9	29.9
Nova Scotia	33.7 *	29.0	38.6
New Brunswick	26.2 *	21.9	31.1
Quebec[2]	20.0	17.3	23.0
Ontario	24.9 *	23.6	26.2
Manitoba	21.2	17.4	25.6
Saskatchewan	23.0	19.2	27.3
Alberta	26.3 *	23.4	29.4
British Columbia	28.6 *	25.8	31.6
Territories	30.3 *	25.0	36.1
Population group			
Indigenous			
First Nations	33.8	27.2	41.2
Métis	30.1	24.5	36.3
Inuk	34.5	18.6	54.8
Non-Indigenous			
White[2]	26.2	25.0	27.5
South Asian	16.3 *	13.7	19.3
Chinese	22.2	18.6	26.2
Black	23.6	19.0	28.8
Filipino	18.3 *	14.4	22.9
Arab	19.8	14.2	26.9
Latin American	21.6	13.0	33.8
Southeast Asian	24.4	16.9	33.8
West Asian	21.2	12.2	34.3
Korean	22.8	13.5	35.9
Japanese	19.6	9.4	36.3
Other or multiple population groups	16.8 *	11.8	23.3
Family income			
Above LIM[2]	25.0	23.9	26.2
Below LIM	23.5	21.8	25.4
Chronic conditions			
No[2]	23.4	21.6	23.8
Yes[3]	28 *	27.2	30.8
Subsample aged 15 to 17[4]			
Sexual attraction			
Exclusively attracted to a different gender[2]	26.0	24.5	27.6
Same-gender attracted or unsure	31.5 *	28.3	34.9

* significantly different from reference category (p < 0.05)
1. Sample size is N = 13,602.
2. Reference category
3. Excludes diagnoses of depression, anxiety disorder, or eating disorder.
4. Subsample size is n = 6,857.
Note: LIM = Low-income measure.
Source: Statistics Canada, Canadian Health Survey on Children and Youth, 2019.

transgender or non-binary; those whose sex and gender were identical were considered cisgender. Adolescents aged 15 to 17 additionally reported on their sexual attraction with the following response options: "only attracted to males," "mostly attracted to males," "equally attracted to females and males," "mostly attracted to females," "only attracted to females," and "not sure." Those who indicated any degree of same-gender attraction or were unsure (attracted to the same gender) were compared with youth exclusively attracted to a different gender.

An adolescent's membership in a population group (e.g., White, South Asian, Black) was reported by the parent. A separate question assessed the adolescent's Indigenous identity (First Nations, Métis, Inuk [Inuit], or not an Indigenous person). Responses to these questions were used to create the following

Table 3
Results of logistic regression showing the associations between the experience of cybervictimization and sociodemographic characteristics, household population aged 12 to 17 years, Canada, 2019

Variable[1]	OR	95% Confidence interval	
		from	to
Age			
15 to 17	1.07	0.96	1.21
12 to 14[2]	1.00	…	…
Sex at birth			
Female	1.10	0.95	1.27
Male[2]	1.00	…	…
Gender diversity			
Transgender or non-binary	2.57 *	1.33	4.96
Cisgender[2]	1.00	…	…
Place of residence			
Rural area	0.95	0.83	1.08
Population centre[2]	1.00	…	…
Province or territory			
Quebec	0.67 *	0.55	0.81
Rest of Canada[2]	1.00	…	…
Population group			
Indigenous			
First Nations	1.21	0.85	1.73
Métis	1.11	0.83	1.49
Inuk	2.15	0.75	6.16
Non-Indigenous			
White[2]	1.00	…	…
South Asian	0.54 *	0.43	0.69
Chinese	0.74 *	0.58	0.94
Black	0.81	0.59	1.1
Filipino	0.50 *	0.37	0.68
Arab	0.79	0.51	1.21
Latin American	0.75	0.38	1.45
Southeast Asian	0.85	0.52	1.39
West Asian	0.81	0.4	1.62
Korean	0.72	0.35	1.45
Japanese	0.59	0.23	1.51
Other or multiple population groups	0.48 *	0.31	0.75
Income			
Below LIM cut-off	0.90	0.77	1.05
At or above LIM cut-off[2]	1.00	…	…
Chronic condition			
Yes[3]	0.98	0.81	1.18
No[2]	1.00	…	…
Frequency of social media use			
Once a day or less	0.72 *	0.63	0.83
Several times a day[2]	-	-	-
Constantly	1.16	0.97	1.38
Frequency of video or instant messaging			
Once a day or less	0.81 *	0.71	0.93
Several times a day[2]	-	-	-
Constantly	1.31 *	1.10	1.57
Frequency of online gaming			
Never	0.76 *	0.66	0.88
Occasionally[2]	-	-	-
Once a day or more	1.29 *	1.11	1.51
Uses device before bed			
No[2]	1.00	…	…
Yes	1.17 *	1.01	1.36
Allowed device at dinner			
No[2]	1.00	…	…
Yes	1.07	0.94	1.22
Does not have family dinner	1.50 *	1.22	1.85
Sexual attraction[4]			
Same-gender attracted or unsure	1.28 *	1.06	1.54
Exclusively attracted to a different gender[2]	1.00	…	…

… not applicable
* significantly different from reference category (p < 0.05)
1. The model also includes the following significant interaction terms: (1) low income and chronic condition and (2) sex at birth and chronic condition.
2. Reference category.
3. Excludes diagnoses of depression, anxiety disorder, or eating disorder.
4. Based on the model using the subsample aged 15 to 17 (n = 6,646). The model additionally includes the following significant interaction term: sex at birth and sexual attraction.
Notes: OR = odds ratio, CI = confidence interval, and LIM = low-income measure.
Source: Statistics Canada, Canadian Health Survey on Children and Youth, 2019.

categories: First Nations, Métis, Inuit, White, South Asian, Chinese, Black, Filipino, Arab, Latin American, Southeast Asian, West Asian, Korean, Japanese, and other or multiple population groups. Residence in rural areas versus population centres and province of residence were defined based on postal codes. Family low-income status was determined based on parent-reported family income in relation to the low-income measure (LIM);[35] those with total gross incomes below the low-income threshold for their household size were considered to have low income.

Chronic conditions: Parents reported whether children had been diagnosed with any of the following chronic conditions: asthma, diabetes, epilepsy, anxiety disorder, mood disorder, eating disorder, learning disability, attention deficit disorder (ADD), autism spectrum disorder (ASD), fetal alcohol spectrum disorder, or other chronic condition. For the present study, this variable was categorized dichotomously (yes or no), excluding anxiety disorder, mood disorder, and eating disorder because of overlap with mental health outcomes.

Digital media habits: Adolescents reported on their digital media habits, including frequency of social media use, video or instant messaging, and online gaming. Adolescents were asked how often they go online for these three activities; responses for social media and video or instant messaging were collapsed into three categories: "once a day or less," "several times a day," and "constantly." Adolescents reported less frequent use of online gaming than other digital media; therefore, responses were categorized differently: "never," "occasionally," and "once a day or more." Adolescents were also asked whether they were allowed to use devices at the dinner table (response options were "yes," "no," and "family does not eat the evening meal together") and before bed ("In the past 7 days, did you use an electronic device in your bedroom before falling asleep?").

Analysis

SAS 9.4 and SUDAAN survey procedures were used to provide weighted estimates using survey and bootstrap weights.

To address the first objective, weighted proportions of the sample in each sociodemographic category were calculated, and proportions of youth experiencing cybervictimization were compared between sociodemographic categories using chi-square tests of independence. The choice to consider sex at birth in the analyses rather than gender was purposeful, for both conceptual (given sex differences found in previous research) and methodological (to reduce potential multicollinearity with the gender diversity variable) reasons.

To address the second objective, logistic regression analysis was conducted to examine the relative odds of experiencing cybervictimization from sociodemographic characteristics and digital media habits. Interaction terms between characteristics (i.e., rural residence and chronic condition) were included in successive models, and where these were statistically significant, stratified models were fitted. A sensitivity analysis

included the experience of traditional victimization in the final model.

Finally, to address the third objective, a series of multiple logistic regression analyses were conducted to assess associations between cybervictimization and mental health indicators, adjusting for sociodemographic characteristics. Interaction terms were used to test the modifying role of sociodemographic characteristics in these associations (e.g., cybervictimization and same-gender attraction). A sensitivity analysis included the experience of traditional victimization in the final model.

Cases with missing data (ranging from 0% for place of residence to 1.7% for general mental health) were deleted from the analysis. Where cell sizes were insufficient, certain categories were collapsed (e.g., population groups were collapsed into "White," "Indigenous," and "all other population groups") in models predicting mental health outcomes.

Results

Sample sociodemographic characteristics are presented in Table 1. The sample was predominantly White (64%) and resided in urban areas (82%). Close to 28% were living below the LIM threshold for their household size, and 27% were living with a chronic condition (excluding depression, anxiety, and eating disorder).

Predicting the experience of cybervictimization

Proportions of adolescents in each sociodemographic category who had experienced cybervictimization are presented in Table 2. Of note, transgender and non-binary adolescents were more likely to experience cybervictimization than cisgender adolescents (47.3% versus 24.5%), as were adolescents aged 15 to 17 who were attracted to the same gender compared with adolescents of the same age exclusively attracted to a different gender (31.5% versus 26.0%) and adolescents with a chronic condition compared with those without one (28.0% versus 23.4%).

A model containing all variables simultaneously, including two-way interactions, is presented in Table 3. Transgender and non-binary adolescents were more likely to experience cybervictimization than cisgender adolescents (odds ratio [OR]: 2.57, 95% confidence interval [CI]: 1.33, 4.96). Adolescents residing in Quebec were at a lower risk than those in the rest of Canada (OR: 0.67, 95% CI: 0.55, 0.81). Compared with White adolescents, South Asian, Chinese, and Filipino adolescents had lower odds of experiencing cybervictimization. In terms of digital media habits, lower frequencies of use were generally associated with a lower likelihood of experiencing cybervictimization (see Table 3).

An interaction effect between sex at birth and a chronic condition revealed that the association between the presence of a chronic condition and the experience of cybervictimization was statistically significant among females (OR: 1.52, 95% CI:

1.26, 1.82) but not males (OR: 1.08, 95% CI: 1.00, 1.33). Stratification by low-income status revealed that the presence of a chronic condition was more strongly associated with cybervictimization among adolescents in low-income households (OR: 1.51, 95% CI: 1.17, 1.95) than among those above the LIM (OR: 1.15, 95% CI: 1.00, 1.33). A sensitivity analysis included ADD and ASD conditions separately from the other chronic conditions because of the potential comorbidities of these conditions with the mental health correlates examined. ADD was a significant independent predictor of cybervictimization (OR: 1.40, 95% CI: 1.13, 1.74). Patterns of association between other chronic conditions and cybervictimization were similar to those in the main model, including interaction effects (e.g., interaction between sex at birth and a chronic condition). These findings suggested that including ADD and ASD in the composite measure of chronic conditions did not alter the pattern of results.

A similar pattern of results was noted in the restricted sample including only adolescents aged 15 to 17 (full model not shown). One interaction effect was significant: females attracted to the same gender were at an elevated risk of experiencing cybervictimization (OR: 1.57, 95% CI: 1.22, 2.01), but males attracted to the same gender were not (OR: 0.98, 95% CI: 0.71, 1.36).

Predicting mental health correlates

Results of logistic regression predicting each mental health indicator from adolescents' experience of cybervictimization before and after adjusting for all sociodemographic covariates are presented in Table 4.

Robust associations were noted between cybervictimization and mental health. Even after all sociodemographic covariates were adjusted for, adolescents in the full sample who had experienced cybervictimization were at an increased risk of having poorer general mental health, experiencing difficulty with depression or anxiety, and having elevated eating disorder symptoms, while adolescents in the sample aged 15 to 17 who had experienced cybervictimization were at an increased risk of suicidal ideation and suicide attempt (Table 4).

Models including interactions with cybervictimization (e.g., chronic conditions and cybervictimization) were tested; however, because no consistent significant findings were noted, results from models without these interactions are presented. A sensitivity analysis included adolescents' experience of traditional face-to-face victimization. Face-to-face victimization (dichotomized at the top 25% of scores) significantly predicted cybervictimization (OR: 8.56, 95% CI: 7.51, 9.76); patterns of results for all other predictors were similar to the model without traditional bullying. In models predicting mental health outcomes, associations with cybervictimization were somewhat attenuated in the presence of traditional face-to-face victimization but remained significant (data not shown).

Discussion

In this large, representative sample of Canadian adolescents, almost one in four adolescents aged 12 to 17 (24.6%) had experienced at least one incident of cybervictimization in the past 12 months. In line with previous research highlighting the negative psychological correlates of cybervictimization,[8] these adolescents were at a significantly higher risk of experiencing multiple mental health difficulties, including poorer general mental health, depression or anxiety, elevated eating disorder symptoms, suicidal ideation, and suicide attempt.

The odds of experiencing cybervictimization were higher among transgender and non-binary youth and females attracted to the same gender. These findings support previous literature reporting that LGBTQ youth are at disproportionate risk of experiencing cybervictimization.[15] Targeted victimization specifically related to adolescents' sexual orientation and gender diversity is common and may be particularly detrimental to LGBTQ adolescents' mental health.[36,37] Some prior research has suggested that girls attracted to the same gender may be particularly at risk of cybervictimization.[38] For example, one Canadian study reported that bisexual girls were more likely to experience cyberbullying than bisexual boys.[39]

Table 4
Results of regression models showing the association between experience of cybervictimization and mental health indicators, household population aged 12 to 17 years, Canada, 2019

Outcome	Crude model			Adjusted model		
		95% Confidence interval			95% Confidence interval	
	OR	from	to	OR	from	to
General mental health "fair" or "poor"[1]	2.78 *	2.31	3.36	2.33 *	1.90	2.85
Functional difficulty: depression or anxiety[1]	2.13 *	1.75	2.59	1.78 *	1.45	2.18
Elevated eating disorder symptoms[1]	2.12 *	1.88	2.38	1.95 *	1.72	2.21
Suicidal ideation[2]	3.29 *	2.74	3.96	3.10 *	2.53	3.81
Suicide attempt[2]	3.74 *	2.88	4.86	3.17 *	2.41	4.17

* significantly different from reference category (p < 0.05)

1. The model was adjusted for sex at birth, gender diversity, place of residence, province, population group, low-income status, presence of chronic condition, frequency of social media use, frequency of video or instant messaging, frequency of online gaming, device use before bed, and device use at the dinner table.

2. Based on the subsample aged 15 to 17 and additionally adjusted for sexual attraction.

Notes: Reference categories are "good," "very good," or "excellent" for general mental health; no functional difficulty; no elevated eating disorder symptoms; no suicidal ideation; and no suicide attempt. OR = odds ratio and CI = confidence interval.

Source: Statistics Canada, Canadian Health Survey on Children and Youth, 2019.

The findings also indicated that adolescents with chronic conditions, particularly those living in low-income households, were at increased risk of experiencing cybervictimization. Although few studies have examined rates and correlates of cybervictimization among those with chronic conditions, these results are in line with the limited research suggesting that youth with chronic conditions or a disability are at an elevated risk compared with their peers.[23] Several reasons for this vulnerability have been proposed. The daily management required by many conditions, as well as activity limitations for some youth, may, for example, set youth apart from their peers and confer a social disadvantage.[40] These findings suggest that those living in low-income households may be particularly at risk. In addition to psychological consequences, the experience of cybervictimization may exacerbate symptoms among youth with certain conditions, such as Tourette's syndrome[41] and asthma,[42] highlighting the importance of efforts to prevent the experience of cybervictimization among this group of youth.

In this study, members of certain population groups (South Asian, Chinese, and Filipino) were less likely to experience cybervictimization than White adolescents. It has been hypothesized that reduced rates of cybervictimization among members of racialized groups reflect lower rates of technology ownership among families from these groups and differences in preferred social media platforms between groups.[18] Some Canadian research has suggested that adolescents of East Asian descent (including Chinese and Filipino descent) are less likely to perpetrate cybervictimization than their White peers, a finding that has been ascribed to cultural differences in the importance of social responsibility.[43] Future research with larger samples from diverse population groups of children and youth is necessary to clarify how these differences in perpetration might relate to the differences in victimization observed in this study.

Notably, whereas the likelihood of experiencing cybervictimization differed according to sociodemographic characteristics, the mental health correlates of cybervictimization appeared to be similar for all youth, regardless of their sociodemographic characteristics. Given the robust associations between cybervictimization and several indicators of mental ill health across multiple domains, reducing the experience of cybervictimization may prove a worthwhile target for interventions aimed at improving the mental health of Canadian youth. Other authors have noted the importance of cyberbullying prevention in schools, suggesting that discussions of cybervictimization be incorporated into pre-existing anti-bullying programs.[44] Results of intervention studies point to the short-term efficacy of school-based programs in reducing cybervictimization.[45,46] Some of these programs include teacher and student modules, with teacher

modules focused on recognizing and intervening in cybervictimization and student modules aimed at reducing the risk of experiencing and perpetrating cybervictimization through social skills training and fostering a sense of collaboration within the classroom.[45,46] One such program also included a parent module that focused on setting limits on and monitoring adolescents' online activity.[46] Further research is warranted to better understand longer-term outcomes of such programs among diverse youth.

Limitations and future directions

A major aim of this study was to assess between-group differences in the experience of cybervictimization. While several interaction effects could be tested, examining the impact of multiple intersecting domains of marginalization, the small cell sizes for certain combinations of categories (e.g., transgender and non-binary adolescents in different population groups) reduced the ability to detect potential differences and resulted in wide CIs around certain estimates (e.g., for the interaction between sex at birth and same-gender attraction). Future intersectional research employing targeted oversampling of populations of interest may be warranted.

Although the CHSCY is considered to be representative of the Canadian population, it may not be a national representation of all the subsamples considered. For example, the analysis of adolescents living with chronic conditions was limited to conditions that were diagnosed by a health professional; adolescents experiencing undiagnosed chronic conditions were not captured by this analysis.

Though robust associations between cybervictimization and mental health were found, the cross-sectional nature of the data precludes an examination of the direction of this effect. Adolescents in poorer mental health, for example, may be more likely to become victims of cybervictimization. Indeed, some longitudinal research suggests bidirectional associations between cybervictimization and mental health difficulties.[47,48]

Conclusion

Experienced by one in four Canadian youth, cybervictimization is associated with multiple indicators of mental ill health, including suicidal ideation and attempt. While certain population groups (transgender and non-binary youth, females attracted to the same gender, and those living with chronic conditions) appear to be at a higher risk of experiencing cybervictimization, results suggest that cybervictimization is associated with similar mental health indicators for all adolescents. Future research should continue to examine cybervictimization in relation to adolescent mental health by applying an intersectional lens.

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