



Bullying Victimization and Sexual Wellbeing in Sexually Active Heterosexual, Cisgender and Sexual/Gender Minority Adolescents: The Mediating Role of Emotion Regulation

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Abstract

Bullying victimization is prevalent in adolescence and associated with adverse consequences on physical and psychological wellbeing, particularly in sexual and gender minority youth. However, little is known about its associations with sexual wellbeing and the underlying mechanisms that could explain this association. The present study assessed the associations between bullying victimization and sexual wellbeing (sexual satisfaction, sexual desire/arousal and orgasmic function difficulties, sexual distress) via the mediating role of emotion regulation difficulties, considering potential sexual/gender minority status-based differences. Self-report online surveys were completed by 1036 sexually active (49.7% were girls) high school students ($M_{age} = 14.6$ years, $SD_{age} = 0.6$). Bullying victimization was directly and negatively associated with sexual desire/arousal difficulties and positively with sexual distress. Higher emotion regulation difficulties mediated the associations between higher bullying victimization and higher orgasmic function difficulties, as well as higher bullying victimization and higher sexual distress. No significant association was observed between bullying victimization and sexual satisfaction. No significant differences were observed between heterosexual, cisgender and sexual and gender minority youth in any of the associations. The findings suggest that bullying victimization is associated with adolescents' sexual wellbeing. The cross-sectional design and small effect sizes support the need for further prospective cohort studies.

Keywords Adolescence · Bullying victimization · Emotion regulation · LGBTQ · Sexual and gender minorities · Sexual wellbeing

Introduction

Bullying victimization is a major societal problem, affecting one in three Canadian adolescents (33%) (Molcho et al., 2009).

It involves aggressive, intentional acts carried out by a group or an individual repeatedly and over time against victims who cannot easily defend themselves (Olweus, 1993). Being bullied is associated with multiple long-lasting negative consequences on physical and psychological wellbeing (Moore et al., 2017) and could also result in lower levels of sexual wellbeing (Hertz et al., 2015) by compromising one's feelings of safety in relationships (MacIntosh et al., 2020). However, only a handful of studies have investigated the relationship between bullying victimization and sexual wellbeing, and these focused on adult and older adolescent samples, increasing recall bias. Further limitations included a lack of attention to gender and sexual minority youth—who are more at risk of being bullied (Kaufman et al., 2020), adopting a sexual risk perspective rather than examining normative aspects of adolescent sexuality, and clouding the unique contribution of bullying by not controlling for childhood maltreatment (Spector, 2019). Importantly, no study to date has identified

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potential mechanisms that may explain the link between bullying and its sexual correlates. One such potential mechanism is emotion regulation, which is central to adolescents' ability to adjust to the socioemotional challenges they face (Riediger & Klipker, 2014). Thus, the aim of the present study was to examine the associations between bullying victimization and sexual wellbeing indicators among middle adolescents, considering the mediating role of emotion regulation difficulties in these associations, and controlling for past childhood maltreatment. The present study also examined whether the aforementioned associations differed between SGM and heterosexual, cisgender adolescents.

Sexual Wellbeing in Adolescence

Although an active sex life for adults is associated with numerous benefits in terms of physical and mental health (Diamond & Huebner, 2012), an active sex life is often seen as a risk factor that can lead to sexually transmitted infections or unwanted pregnancies for adolescents (van de Bongardt et al., 2015). Whereas previous research focused primarily on risky sexual behaviors, there has been a shift in recent years toward examining the sexual wellbeing of adolescents (Mitchell et al., 2016). Although there is no consensus in the literature concerning any definition of sexual wellbeing, most researchers stress the importance of assessing its various dimensions (Harden, 2014) and agree that the following are crucial: sexual satisfaction, sexual function, and absence of sexual distress (Merwin & Rosen, 2019). Sexual satisfaction refers to the subjective evaluation of the positive and negative aspects of one's sexuality and the subsequent affective response to this evaluation (e.g., Pascoal et al., 2018). Sexual function is a multidimensional construct measured in terms of desire, arousal (lubrication and erection), pain and orgasm (Rosen et al., 2000). Sexual distress refers to the negative emotions that can arise in the face of one's sexual experiences (DeRogatis et al., 2008).

Pioneering studies in the field have documented adolescents' sexual wellbeing cross-sectionally and longitudinally. They demonstrated that, in adolescents and young adults (15–24 years old), *low sexual satisfaction* ranged from 7.0% to 48.3% in girls and 8.0% to 47.6% in boys (Moreau et al., 2016; O'Sullivan et al., 2014; O'Sullivan et al., 2016). Previous research also showed the high prevalence of sexual function problems in adolescents and young adults (16–21 years old), ranging from 49.3% to 98% in girls and 53.5% to 97% in boys (O'Sullivan et al., 2014, 2016). The differences between the definitions of sexual wellbeing, the follow-up periods, and the different questionnaires used in the aforementioned studies could explain the wide range in estimates (Li et al., 2019). Among those who had a sexual problem, 41.7% to 50.0% reported clinically significant

sexual distress (O'Sullivan et al., 2014, 2016). An important caveat of research documenting adolescents' sexual wellbeing concerns its focus on samples of older adolescents and young adults. The fact that, by age 15, 11.0% to 20.2% of Canadian (Ministry of Health and Social, 2018) and US (Abma & Martinez, 2017) adolescents will have had consensual sexual activity and 26.0% to 30.0% of British adults report first intercourse before 16 years of age (Wellings et al., 2001) underscores the importance of assessing younger adolescents' sexual wellbeing.

Bullying Victimization in Relation to Sexual Wellbeing Indicators

The limited studies on the associations between bullying and sexual outcomes suggest that bullying victimization is associated with adverse consequences for adolescents' sexuality. Among middle adolescents, typical sexual activity includes but is not limited to low-intimacy behaviors such as kissing, holding hands, hugging, or masturbation (O'Sullivan et al., 2014). Partnered sexual behaviors become prominent during mid- and late adolescence. These behaviors may include sexual kissing, breast and genital touching, partnered masturbation, fellatio, cunnilingus, penile-vaginal intercourse, and penile-anal intercourse (Fortenberry, 2013). Bullying victimization has been shown to be associated with a higher number of sexual partners (Dane et al., 2017), or condomless sexual activities (Hertz et al., 2015). There are only a handful of studies documenting the associations between bullying victimization and sexual wellbeing to date. A cross-sectional study in a sample of 360 adult women (mean age of 50 years old), showed that a history of bullying was not associated with participants' *sexual satisfaction*, but was associated with lower *sexual function* (Nault et al., 2016). However, this study was limited by the overlap between being a victim of bullying and having a history of maltreatment (neglect, sexual, physical, and emotional abuse), which could obscure associations between bullying and sexual wellbeing. This overlap may also explain the non-significant result concerning sexual satisfaction and reinforces the need to control for past childhood maltreatment as it is known to be an important predictor of bullying victimization at school (Lereya et al., 2013). Another study conducted among 678 SGM adolescent boys (16–20 years) did not report a significant association between bullying victimization and *sexual function* (Li et al., 2019). The low prevalence of bullying in the sample, and the evaluation of physical and verbal forms of bullying only (not relational and cyberbullying) might explain this result.

Finally, no study seems to have investigated the associations between bullying victimization and *sexual distress*. However, bullying victimization is associated with the

emergence of negative affect during adolescence, rendering adolescents more emotionally vulnerable to the effects of stress (Larson et al., 2002). Moreover, being bullied can have damaging effects on social adjustment (McLaughlin et al., 2009) and has been associated with greater stress in social-evaluative threatening situations (Östberg et al., 2018). Thus, adolescents who are victims of bullying could feel higher distress in sexual contexts, as these involve intimate interactions during which they could fear being negatively judged by a sexual partner.

Emotion Regulation Difficulties in Relation to Bullying and Sexual Wellbeing

Emotion regulation comprises the ability to be aware of, understand, and accept one's emotions; control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions; and use situationally appropriate emotion regulation strategies flexibly to meet individual goals and situational demands (Gratz & Roemer, 2004). Hence, emotion regulation difficulties may result in increased sensitivity to emotional cues and use of maladaptive regulation strategies (Adrian et al., 2019). Adolescents who report bullying victimization may experience stronger negative emotions, as well as higher levels of emotional arousal and reactivity (Mahady Wilton et al., 2000) and emotion regulation difficulties (Morelen et al., 2016) compared to adolescents who are not bullied.

The development of sexuality is also a component of adolescent maturation that could be influenced by emotion regulation difficulties, as emotion regulation is central to adolescents' ability to adjust to the socioemotional challenges they face (Riediger & Klipker, 2014). Moreover, in adults, unregulated negative emotions in sexual contexts have been linked to lower sexual satisfaction (Rellini et al., 2012), impaired desire and arousal, as well as heightened sexual distress (Dubé et al., 2019). However, there is a dearth of empirical literature devoted to the examination of emotion regulation difficulties and sexual development in adolescents. As seen through the heuristic model of Nolen-Hoeksema & Watkins (2011), chronic adverse life events, such as bullying victimization, may function as a distal risk factor whose association with later problems is mediated and moderated through more proximal factors, such as how adolescents regulate their emotions. Specifically, distal factors may lead to emotion regulation difficulties by shaping vigilance, helplessness, and a dysregulated stress response to one's environment, which may result in lower sexual wellbeing. Also, identifying as SGM may influence the divergent trajectories that could appear in the case of bullied individuals with emotion regulation difficulties (Nolen-Hoeksema & Watkins, 2011). Indeed, SGM adolescents are more likely to be bullied (Kaufman et al.,

2020), to have emotion regulation difficulties (Hatzenbuehler et al., 2008), as well as lower overall wellbeing (Mustanski et al., 2015).

Bullying Victimization and Sexual Wellbeing in Sexual and Gender Minority Adolescents

Research has shown that adolescents identifying as SGM were approximately twice as likely to be bullied than their heterosexual, cisgender (HC) peers (Kaufman et al., 2020). The minority stress framework (Meyer, 2003) may explain why SGM adolescents experience not only more frequent bullying, but also greater psychosocial harm than their HC peers (Gower et al., 2018). This model posits that those identifying as SGM experience stress not only due to victimization, but also due to internalized homophobia or perceived stigma (Kurki-Kangas et al., 2019). The stressful effects of bullying victimization can be added to those inherent to having a minority status, resulting in worse outcomes, such as worse sexual wellbeing.

In terms of SGM adolescents' sexual wellbeing, research is even more scarce, despite that SGM adolescents may be more susceptible to being stigmatized during the development of their sexual identities (Li et al., 2019). One study conducted in a sample of 678 SGM boys (16–21 years old) showed that during the past 30 days, 20.0% reported being "somewhat" or less satisfied with their sex lives, 13.9% reported having difficulty with erections, and 6.9% reported having less than "good" satisfaction with orgasms (Li et al., 2019). Sexual distress was not investigated in this study. Hence, knowledge about SGM adolescents' sexual wellbeing remains limited, especially regarding SGM girls' sexual wellbeing.

Moreover, SGM adolescents are known to experience more emotion regulation difficulties than their HC counterparts (Hatzenbuehler et al., 2008), which could derive from a higher risk of being bullied and lead to heightened negative emotions in a stressful context, such as discovering their sexual orientation or gender identity (McLaughlin et al., 2009). Emotion regulation has been identified as a potential treatment target to attenuate the impact of minority stress on gay and bisexual men's sexual health (Pachankis et al., 2015) and eventually reduce the documented health disparities between HC and SGM adolescents (Gower et al., 2018).

The Current Study

Past studies have mainly focused on the psychological and physical correlates of bullying victimization among adolescents. To expand this knowledge, the primary aim of the current study was to examine associations between bullying and sexual wellbeing indicators: sexual satisfaction, sexual desire/arousal and orgasmic function difficulties,

and sexual distress. It was hypothesized that higher levels of bullying victimization would be associated with lower levels of sexual satisfaction and sexual desire/arousal as well as higher levels of orgasmic function difficulties and sexual distress. Secondary aims were to test the mediating role of emotion regulation difficulties and to examine potential sexual/gender identity-based differences (i.e., heterosexual, cisgender vs. SGM adolescents). It was hypothesized that higher emotion regulation difficulties would mediate the associations between higher bullying victimization and lower sexual wellbeing and that these associations would be stronger for SGM adolescents. Past childhood maltreatment was included as a control variable in order to isolate the unique contribution of bullying, as abuse and neglect and maladaptive parenting are known to be important predictors of bullying victimization at school.

Methods

Participants

The study sample was drawn from an ongoing longitudinal study on adolescents' sexual health and victimization experiences. Of the 2904 participants in the overall study, only those who had been consensually sexually active during their lifetime (i.e., exchanged manual or oral carresses, and/or had penetrative sexual activity with their consent in their lifetime) completed the questionnaires about sexual wellbeing as measures were designed and validated for sexually active persons only, resulting in a final sample size of 1036 (See Table 1 for detailed socio-demographic information about sexual orientation and gender identity). Participants were 14.6 years ($SD = 0.6$) on average. Students were classified as HC adolescents ($n = 864$; 84.5%) or SGM adolescents ($n = 159$; 15.5%); another 13 participants did not provide sufficient information on their gender identity, trans status, or sexual orientation and so were not included in these analyses (for the process of categorization see Bóthe et al., 2020a). Regarding participants' assigned sex at birth, 524 (50.7%) were girls and 510 (49.3%) were boys. In terms of gender identity, 511 (49.4%) identified as a boy, 514 (49.7%) identified as a girl, four (0.4%) identified as non-binary or gender fluid, one (0.1%) identified as two-spirit, and four (0.4%) indicated the "other" answer category. Regarding trans status, 1024 (99.0%) reported not being a trans person, six (0.6%) said that they were questioning their gender identity, and four (0.4%) did not know what "trans" meant. As for sexual orientation, 881 (85.1%) identified as heterosexual, 27 (2.6%) were questioning their sexual orientation, ten (1.0%) identified as gay or lesbian, 11 (1.1%) as heteroflexible, one (0.1%) as homoflexible, 49 (4.7%) as bisexual, four (0.4%)

Table 1 Detailed gender identity and sexual orientation information

	Total sample ($N = 1036$ [%])
Sex assigned at birth	
Male	510 (49.3%)
Female	524 (50.7%)
Gender identity	
Boy	511 (49.4%)
Girl	514 (49.7%)
Non-binary/gender fluid	4 (0.4%)
Bi-spiritual	1 (0.1%)
Other	4 (0.4%)
Trans status	
Not being trans	1024 (99.0%)
Questioning	6 (0.6%)
Does not know what trans means	4 (0.4%)
Sexual orientation	
Heterosexual	881 (85.1%)
Questioning	27 (2.6%)
Gay/Lesbian	10 (1.0%)
Heteroflexible	11 (1.1%)
Homoflexible	1 (0.1%)
Bisexual	49 (4.7%)
Queer	4 (0.4%)
Pansexual	17 (1.6%)
None of these categories	26 (2.5%)
Refused to answer	9 (0.9%)
Sexual and gender categorization	
Heterosexual, cisgender adolescents	864 (84.5%)
Sexual and gender minority adolescents	159 (15.5%)

as queer, 17 (1.6%) as pansexual, 26 (2.5%) chose the "none of these categories" answer option, and 9 (0.9%) refused to answer. The majority of participants identified with the Quebecois culture (733; 70.8%), 126 (12.2%) identified with the Canadian culture, 176 (17.0%) reported other cultural identities (e.g., American, European), and one participant did not report their cultural identity.

Procedure

Recruitment was conducted in two distinct phases: (1) school recruitment and (2) participant recruitment within selected schools. Schools were contacted directly after the approval of their school board. The study was explained to them in detail and they were invited to participate by the research coordinator. Selection was based on availability of the personnel and willingness to participate in a research project. Schools were selected from both large urban and rural areas to ensure sample diversity. Schools presenting different socioeconomic

backgrounds as well as Caucasian and multi-ethnic populations were approached. Of the 49 schools initially solicited, 22 accepted to take part in the study, 16 did not reply to the invitation, and 11 declined. The main reasons mentioned for not participating were that there was another research project was ongoing in their school or that the teachers could not free in-class periods for the completion of questionnaires. Data collection took place between November 2018 and December 2019. To be eligible, adolescents had to be in ninth grade, at least 14 years of age, and attending high school. Of 3027 potential participants, 20 students refused to participate, and one withdrew from the study. Thus, participation rate was 99.31%. Of the 3006 adolescents who agreed to participate, two were deemed ineligible (13 years of age), four were excluded because they gave inconsistent answers, and 142 were excluded for failing at least two out of the three attention questions in the survey (4.86%), resulting in a final sample of 2905 adolescents. Participants completed a self-report, anonymous survey, using a secure online platform (Qualtrics Research Suite) in their classrooms on tablets provided by research assistants, ensuring greater confidentiality. Students clicked a secure and confidential link, received detailed information about the aims of the study, and provided informed consent prior to beginning completion of the measures. In Québec (Canada), adolescents can provide their own informed consent from the age of 14. Not relying on parental consent can ensure the safety of students involved in the study, and can prevent sampling biases that may distort the results (O'Sullivan & Thompson, 2014). Informed consent did not require a signature or the student's name, further ensuring complete anonymity. Students who did not want to participate in the study could complete another activity put on the tablet by the research team, such that other students could not tell who was completing the measures or who was doing the other activity. A secret code was used as an anonymous identifier. To generate their unique identification code, students answered eight questions (e.g., the first letter of your mother's or female caregiver's first name, the first letter of the city where they were born). Surveys took approximately 30 to 45 min to complete. Three attention checks were embedded throughout the survey. Those who failed two or three of the three attention checks were not included in the analyses (Thomas & Clifford, 2017). They were also compensated with a \$10 online gift card. Full ethics approval was granted by the institutional review boards of the universities and school boards involved.

Measures

Sociodemographic characteristics, sexual orientation and gender identity status

Sociodemographic information (age, sex assigned at birth, cultural identity/ethnicity, etc.) was collected using a

questionnaire created by the research team. Adolescents' gender identity (*men, women, indigenous or other cultural gender minority identity [e.g., two-spirit], non-binary, gender fluid or something else [e.g., genderqueer], other*) and sexual orientation (*heterosexual, gay/lesbian, heteroflexible, homoflexible asexual, pansexual, queer, I do not know yet or I am currently questioning my sexual orientation, none of the above, I don't want to answer*) were assessed according to prior recommendations (Bauer et al., 2017; Weinrich, 2014).

Bullying

Bullying was measured using Lambe & Craig's (2017) Victimization Scale, based on Olweus' (2006) bullying questionnaire. This measure comprises 11 items rated on a five-point scale from *never* (0) to *several times a week* (4). Items addressed experiences within prior three months. The questionnaire consists of four subscales: physical bullying (one item; "I was hit, kicked, shoved around, or locked indoors"), verbal bullying (two items; e.g., "I was called mean names, was made fun of, or teased in a hurtful way"), relational bullying (four items; e.g., "Other students left me out of things on purpose, excluded me from their group of friends, or completely ignored me") and cyberbullying (four items; e.g., "Someone sent mean instant messages, wall postings (Facebook), emails or text messages, or created a Web site that made fun of me") (Napoletano et al., 2015). A higher score indicates higher levels of bullying victimization. The reliability of the total scale was adequate in the current study ($\alpha = 0.72$; $\omega = 0.77$).

Sexual wellbeing

Sexual wellbeing was measured via four distinct indicators. First, *sexual satisfaction* was measured using the *Global Measure of Sexual Satisfaction* (Lawrance & Byers, 1992), which has been used successfully in samples of adolescents (e.g., Blunt-Vinti et al., 2016). This questionnaire provides a global assessment of satisfaction with participants' overall sexual relationship and does not focus on a specific period of time or aspect of sexuality. It includes five items asking whether their sexual relationship with their partner is good (7) versus bad (0), pleasant (7) versus unpleasant (0), positive (7) versus negative (0), satisfying (7) versus unsatisfying (0), and valuable (7) versus worthless (0). Greater scores indicated greater sexual satisfaction. Test-retest reliability has been shown to be 0.84 at two-week follow-up (Lawrance & Byers, 1992), 0.78 at three-month follow-up and 0.68 at 18-month follow-up (Byers & MacNeil, 2006). The reliability of the scale was ($\alpha = 0.92$; $\omega = 0.93$) was excellent in the current study.

Second, *sexual desire/arousal difficulties* were measured by three items from the *Arizona Sexual Experiences Scale (ASEX)* (McGahuey et al., 2000) (i.e., “How strong is your sex drive?”, “How easily are you sexually aroused (turned on)?” and “How easily does your vagina become lubricated (moist/wet) during sex?/Can you easily get and keep an erection?”). Convergent validity of the ASEX was demonstrated through correlation with the Brief Index of Sexual Functioning, and discriminant validity through correlations with the Beck Depression Inventory and the Hamilton Depression Rating Scale (McGahuey et al., 2000). This measure has been used extensively with adolescents (e.g., Byers et al., 2021). In the present study, these three items had an acceptable reliability for both boys and girls, respectively ($\alpha = 0.64$; $\omega = 0.67$; $\alpha = 0.74$; $\omega = 0.77$). Participants indicated their overall level of sexual desire/arousal difficulties during the past 12 months. Participants who identified as non-binary or transgender had the option not to answer this measure. Items were answered on six-point scales adjusted to the content of the items. Higher scores on the factors indicated higher levels of sexual desire/arousal difficulties.

Third, *orgasmic function difficulties* was measured by two items, the first coming from the ASEX (McGahuey et al., 2000) (“How easily can you reach an orgasm with a partner?”) and the second from a longitudinal study on adolescent sexual wellbeing (O’Sullivan et al., 2016) (i.e., How do you consider the delay between the beginning of your sexual activities and your ejaculation/orgasm?). Those two items had strong correlations for both boys and girls, respectively ($r = 0.73$; $r = 0.90$). Participants indicated their overall level of orgasmic function difficulties during the past 12 months. Participants who identified as non-binary or transgender had the option not to answer this measure. Items were answered on six-point scales adjusted to the content of the items. Higher scores on the factors indicated higher levels of orgasmic function difficulties.

Lastly, *sexual distress* was measured using the Female Sexual Distress Scale (FSDS) (Derogatis et al., 2002), which was also modified and adapted for use with male adolescents in previous studies (O’Sullivan et al., 2014). The FSDS initially comprised 12 items, which was shortened to three items to reduce completion time (Pâquet et al., 2018). The FSDS assesses how often in the past month a sexual difficulty caused distress (e.g., “How often did you feel distressed about your sex life?”) on a five-point scale from 0 (*never*) to 4 (*always*). Discriminative and construct validity was demonstrated for the original 12-item measure (Derogatis et al., 2002). Convergent validity for the 3-item version was also demonstrated through correlations with sexual arousal (Bóthe et al., 2021a). The FSDS demonstrated acceptable reliability in the present sample ($\alpha = 0.66$; $\omega = 0.69$).

Emotion regulation difficulties

This construct was measured by an adapted version of the 36-item Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004; Neumann et al., 2010).¹ The present 11-item scale assesses habitual difficulties regulating emotions (e.g., “When I’m upset, I believe that my feelings are valid and important”) on a five-point scale from 1 (*False*) to 5 (*True*). Construct and predictive validity have been demonstrated for the 36-item version in both clinical and non-clinical populations (e.g., Gratz & Roemer, 2004). Concurrent validity has also been demonstrated through the associations between the DERS and symptoms of externalizing/internalizing psychopathology (Neumann et al., 2010). The scale showed good reliability in the present sample ($\alpha = 0.85$; $\omega = 0.86$).

Childhood maltreatment

Childhood maltreatment was assessed by five indicators (i.e., sexual, emotional, and physical abuse, neglect, and witnessing parental violence). Given the differences in measurement in these variables, all indicators were dichotomized (i.e., 0 = the participant did not experience the trauma; 1 = the participant experienced the trauma at least once or more frequently). Thus, the total cumulative childhood maltreatment score varied between zero (no maltreatment) and five (five types of maltreatment). See the detailed description of the variables in the supplementary material (Appendix).

Statistical Analyses

Descriptive statistics, correlations between the examined variables, independent samples t-tests, and Cronbach’s alphas were examined using SPSS 22, and McDonald’s omegas were calculated using JASP (Version 0.14.1; JASP Team, 2020). Reliability was assessed using two indicators (i.e., Cronbach’s alpha and McDonald’s omega) as using only Cronbach’s alpha coefficients may be less reliable (McNeish, 2018; Sijtsma, 2009).

Mplus 8 was used for multivariate analyses (Muthén & Muthén, 1998–2017). To test the hypothesized model, path analysis was used to examine the associations between bullying and sexual wellbeing indicators via the mediating role of emotion regulation difficulties in HC and SGM adolescents, controlling for the levels of childhood maltreatment. The robust maximum-likelihood (MLR) estimator was used, which can provide fit indices and standard errors that are robust to non-normal distribution. Commonly

¹ Each item of the DERS was evaluated by the following criteria: having adequate standardized factor loadings in the validation study and best covering the breadth of the content determined by separate subjective evaluations from the co-investigators of the study (Bóthe et al., 2020b).

used goodness-of-fit indices were observed to assess the acceptability of examined models: Comparative Fit Index (CFI; ≥ 0.90 for acceptable; ≥ 0.95 for excellent), Tucker–Lewis index (TLI; ≥ 0.90 for acceptable; ≥ 0.95 for excellent), and Root-Mean-Square Error of Approximation (RMSEA; ≤ 0.08 for acceptable; ≤ 0.06 for excellent) with 90% confidence intervals were examined (Browne & Cudeck, 1993; Marsh et al., 2005; Schermelleh-Engel et al., 2003). Missing values for examined variables (i.e., bullying, emotion regulation difficulties, sexual wellbeing indicators, childhood maltreatment, and SGM status) ranged from 0 to 5.8%, and were not missing completely at random, based on Little’s Missing Completely at Random Test (MCAR) ($\chi^2 = 186.37, df = 62, p < 0.001$) (Little, 1988). Therefore, following prior guidelines (Newman, 2014), the full information maximum likelihood (FIML) estimation method was selected to handle any missing data.

First, the associations between bullying victimization, emotion regulation difficulties, and sexual wellbeing were examined with a fully saturated model in the total sample, without the control variable (Model 1). Next, the non-significant paths were removed from the model, providing model fit indices (Model 2). Then, the control variable (i.e., childhood maltreatment) was added to the model (Model 3), and the non-significant paths were trimmed (Model 4). Next, multi-group path analysis was used to verify whether the model varied across HC and SGM adolescents (HC adolescents = 0 vs. SGM adolescents = 1) (Model 5). In the final step, this difference test was pushed forward and the path coefficients between bullying victimization, emotion regulation difficulties, and sexual wellbeing indicators were shown to be equal across the groups (Model 6). When comparing Model 5 and Model 6 (i.e., unconstrained and constrained models), changes in chi-square, CFI, TLI, and RMSEA values were inspected. A significant corrected chi-square difference test, significant decreases in CFI and TLI ($\Delta CFI \leq 0.010$; $\Delta TLI \leq 0.010$), and significant increases in RMSEA ($\Delta RMSEA \leq 0.015$) (Bóthe et al., 2021b; Chen, 2007; Cheung & Rensvold, 2002), indicated whether the constrained and unconstrained models differed significantly (i.e., whether the paths differed significantly between HC and SGM adolescents). To test the direct and indirect effects bias-corrected bootstrap (10,000 bootstrap replication samples) 95% confidence intervals were conducted (CI; Ferguson, 2016; Preacher & Hayes, 2008).

Results

Descriptive data and correlations between the examined variables are presented in Table 2. Small-to-moderate bivariate associations were observed between the variables. Bullying had small, positive associations with

Table 2 Descriptive statistics and correlations between childhood maltreatment, bullying, emotion regulation difficulties, and sexual wellbeing indicators

	M	SD	Range	Skewness (SE)	Kurtosis (SE)	1.	2.	3.	4.	5.	6.	7.
1. Identifying as SGM ^a	—	—	0–1	—	—	—	—	—	—	—	—	—
2. Bullying	0.26	0.34	0–4	3.45 (0.08)	22.58 (0.15)	0.10**	—	—	—	—	—	—
3. Emotion regulation diff.	2.73	0.80	1–5	0.18 (0.08)	-0.48 (0.15)	-0.11**	0.27**	—	—	—	—	—
4. Sexual satisfaction	5.70	1.33	1–7	-1.41 (0.08)	2.05 (0.16)	-0.09**	-0.05	-0.07	—	—	—	—
5. Sexual desire/arousal difficulties	2.77	0.80	1–6	0.82 (0.08)	2.07 (0.16)	-0.02	-0.08	0.02	-0.31**	—	—	—
6. Orgasmic function difficulties	2.79	1.54	1–6	1.21 (0.08)	0.07 (0.16)	0.05	<-0.01	0.12**	-0.23**	0.34**	—	—
7. Sexual distress	0.54	0.66	0–4	1.68 (0.08)	3.36 (0.15)	0.10**	0.18**	0.28**	-0.15**	-0.04	0.12**	—
8. Childhood maltreatment	1.87	1.30	0–5	0.36 (0.08)	-0.68 (0.15)	0.13**	0.35**	0.29**	-0.08**	-0.01	0.06	0.21**

N = 976–1036

SGM sexual and gender minority, M mean, SD standard deviation, SE standard error

* $p < 0.05$; ** $p < 0.001$

^aIdentifying as SGM was dichotomized: 0 = heterosexual, cisgender adolescents (84.5%), 1 = sexual and gender minority adolescents (15.5%; 14.63% sexual minority, 0.87% gender minority)

Table 3 Descriptive statistics for childhood maltreatment, bullying, emotion regulation difficulties, and sexual wellbeing indicators in heterosexual, cisgender, and sexual and gender minority adolescents

	HC adolescents (<i>n</i> = 824–864)		SGM adolescents (<i>n</i> = 140–159)		<i>t</i> (<i>df</i>)	<i>p</i>	<i>d</i>
	<i>M</i> (<i>SD</i>)	Range	<i>M</i> (<i>SD</i>)	Range			
Bullying	0.25 (0.33)	0–4	0.35 (0.41)	0–4	–3.11 (196.07)	0.002	0.29
Emotion regulation difficulties	2.68 (0.79)	1–5	2.93 (0.81)	1–5	–3.63 (1018)	<0.001	0.32
Sexual satisfaction	5.75 (1.30)	1–7	5.44 (1.44)	1–7	2.67 (976)	0.008	0.23
Sexual desire/arousal difficulties	2.78 (0.80)	1–6	2.74 (0.79)	1–6	0.47 (986)	0.640	0.05
Orgasmic function difficulties	2.76 (1.52)	1–6	2.97 (1.64)	1–6	–1.46 (962)	0.145	0.14
Sexual distress	0.50 (0.63)	0–4	0.69 (0.75)	0–4	–2.97 (200.27)	0.003	0.29
Childhood maltreatment	1.80 (1.28)	0–5	2.26 (1.33)	0–5	–4.15 (1020)	0.001	0.36

HC heterosexual, cisgender, SGM sexual and gender minority, *M* mean, *SD* standard deviation, *df* degree of freedom

emotion regulation difficulties and sexual distress, while it was unrelated to the other sexual wellbeing indicators. Emotion regulation difficulties had small, positive associations with orgasmic function difficulties and sexual distress, but were unrelated to sexual satisfaction and sexual desire/arousal difficulties. Childhood maltreatment had significant, small-to-moderate associations with each variable (except for sexual desire/arousal and orgasmic function difficulties), supporting the need to control for its potential effects in the hypothesized models. SGM adolescents reported significantly higher levels of bullying victimization, childhood maltreatment, sexual distress, emotion regulation difficulties, and lower levels of sexual satisfaction, with small effect sizes (Table 3).

Associations between Bullying, Emotion Regulation Difficulties, and Sexual Wellbeing Indicators

All estimated models showed excellent fits, see Table 4 for details. When examining whether the hypothesized associations between bullying victimization, emotion regulation difficulties, and sexual wellbeing differ across HC and SGM adolescents, the constrained model (Model 6) was compared to the unconstrained one (Model 5). Changes in model fit indices remained in the acceptable range ($\Delta\text{CFI} = +0.003$; $\Delta\text{TLI} = +0.012$; $\Delta\text{RMSEA} = +0.011$) and the corrected chi-square difference test was not significant ($\Delta\chi^2 = 3.14$, $p = 0.679$). These results suggested that associations between bullying, emotion regulation difficulties, and sexual wellbeing indicators did not differ significantly across HC and SGM adolescents². Therefore,

² As an additional test of the robustness of the results, using the moderation framework with interaction terms, the moderating role of identifying as SGM was examined (HC adolescents were coded as 0 and SGM adolescents were coded as 1 in the analysis). Identifying as HC vs. SGM did not moderate any of the examined associations (all *ps* ranged between 0.282 to 0.597), providing further support for the findings of the study.

following the principle of parsimony, results of Model 4 are reported (i.e., all non-significant paths trimmed, total sample) in detail below in Table 5.

The results of the hypothesized model controlling for childhood maltreatment are presented in Table 4 and depicted in Fig. 1. Higher levels of bullying were directly associated with greater emotion regulation difficulties ($\beta = 0.19$, 95% CI = [0.13, 0.26], $p < 0.001$) with a small effect size. Higher levels of bullying were directly associated with lower desire/arousal difficulties ($\beta = -0.07$, 95% CI = [–0.12, –0.02], $p = 0.009$) and higher levels of sexual distress ($\beta = 0.09$, 95% CI = [0.02, 0.15], $p = 0.011$), with small effect sizes (i.e., <0.10, explaining less than 1% of the variance in the outcome). Higher levels of emotion regulation difficulties were directly and positively associated with sexual distress ($\beta = 0.21$, 95% CI = [0.16, 0.27], $p < 0.001$) and orgasm difficulties ($\beta = 0.10$, 95% CI = [0.04, 0.16], $p = 0.001$), with small effect sizes. Two indirect effects pathways were significant. Higher levels of bullying were associated with greater emotion regulation difficulties, which in turn, were associated with higher levels of sexual distress (indirect path's $\beta = 0.04$, 95% CI = [0.03, 0.06], $p < 0.001$) and orgasm difficulties (indirect path's $\beta = 0.02$, 95% CI = [0.01, 0.03], $p = 0.004$), with small effect sizes. The model explained 0.6% of the variance in sexual satisfaction, 0.5% in desire difficulties, 1.0% in orgasm difficulties, and 9.7% in sexual distress.

Discussion

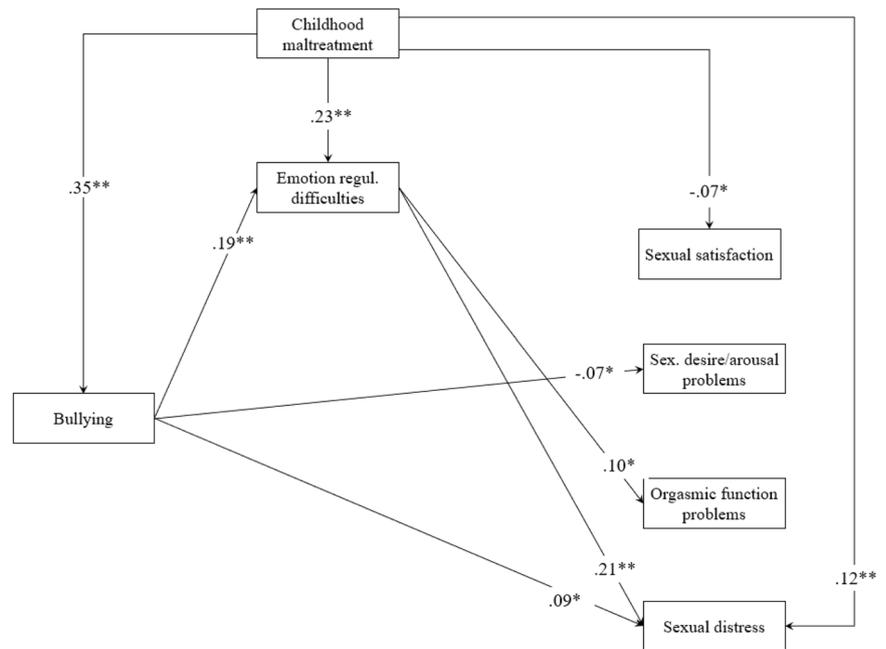
Despite extensive research on the physical and psychological correlates of bullying victimization (Moore et al., 2017), little is known about its associations with sexual wellbeing and underlying explanatory mechanisms such as emotion regulation difficulties. Controlling for childhood maltreatment to isolate the unique contribution of bullying (Lereya et al., 2015), the current study examined the

Table 4 Examination of the associations between bullying, emotion regulation difficulties, and sexual wellbeing indicators across heterosexual, cisgender, and sexual and gender minority adolescents, controlling for child maltreatment

Models	χ^2 (df)	CFI	TLI	RMSEA	90% CI
Model 1: Fully saturated model, no control variable (total sample)	0 (0)	1.000	1.000	0.000	0.000–0.000
Model 2: Non-significant paths trimmed in the model, no control variable (total sample)	6.549 (4)	0.994	0.976	0.025	0.000–0.058
Model 3: Non-significant paths trimmed in the model, control variable added (total sample)	4.186 (4)	1.000	0.998	0.007	0.000–0.048
Model 4: Non-significant paths trimmed in the model, control variable added and non-significant associations with the control variable trimmed (total sample)	4.728 (6)	1.000	1.000	0.000	0.000–0.035
Model 5: Same as Model 4, grouping by SGM status (i.e., HC vs. SGM adolescents)	14.447 (12)	0.996	0.985	0.020	0.000–0.051
Model 6: Same as Model 5, paths constrained to be equal between HC and SGM adolescents	17.670 (17)	0.999	0.997	0.009	0.000–0.041

χ^2 Chi-square, *df* degrees of freedom, *CFI* comparative fit index, *TLI* Tucker–Lewis Index, *RMSEA* root-mean-square error of approximation, *90% CI* 90% confidence interval of the RMSEA, *HC* heterosexual, cisgender, *SGM* sexual and gender minority

Fig. 1 Associations between bullying, emotion regulation difficulties, and sexual wellbeing indicators, controlling for the level of childhood maltreatment. Correlations between the variables are not depicted for the sake of clarity. Significant associations are depicted with solid black arrows. Coefficients are standardized regression coefficients. Heterosexual, cisgender, and sexual and gender minority adolescents did not differ significantly in any of the examined associations. * $p < 0.05$, ** $p < 0.01$



associations between bullying victimization and sexual wellbeing indicators, considering the mediating role of emotion regulation difficulties, and potential sexual/gender minority status-based differences. Overall, findings showed that higher bullying victimization was both directly and indirectly, via higher emotion regulation difficulties, associated with adolescents' higher sexual distress, higher orgasmic function difficulties and lower desire/arousal difficulties. No significant differences were observed between heterosexual, cisgender, and sexual and gender minority adolescents in these associations.

Bullying Victimization, Sexual Wellbeing, and the Mediating Role of Emotion Regulation Difficulties

The hypotheses that higher levels of bullying victimization would be directly and negatively associated with *sexual satisfaction*, and that emotion regulation difficulties would mediate the associations between bullying victimization and

sexual satisfaction were not supported. This finding can be surprising as a stable association between cumulative adverse childhood experiences (including bullying) and decreased sexual satisfaction has been reported (Bigras et al., 2017), although in adults. However, the finding aligns with those of a study of adult women, which also found that a history of bullying was not associated with sexual satisfaction (Nault et al., 2016). Relationship variables and interpersonal mechanisms, such as communication, trust, and intimacy, might be better predictors of sexual satisfaction than individual variables, such as past victimization (Dundon & Rellini, 2010). Also, relational and sexual contexts might differ between adolescents and adults, with adolescents having limited relationship and sexual experience (McIsaac et al., 2008). As they age, relational and sexual contexts may evolve, giving interpersonal dynamics the time to unfold, which may result in a stronger association between one's past traumatic experiences and their sexuality-related feelings. Lastly, trauma such as bullying

Table 5 Results of the mediation model predicting different sexual wellbeing indicators including total, direct, and indirect effects in the associations, controlling for child maltreatment

	Total effect		
	β	95% CI	<i>p</i>
Bullying → sexual desire/arousal difficulties	−0.07	[−0.12, −0.02]	0.009
Bullying → orgasmic function difficulties	0.02	[0.01, 0.03]	0.004
Bullying → sexual distress	0.13	[0.06, 0.19]	<0.001
	Direct effect		
	β	95% CI	<i>p</i>
Bullying → sexual desire/arousal difficulties	−0.07	[−0.12, −0.02]	0.009
Bullying → sexual distress	0.09	[0.02, 0.15]	0.011
	Indirect effect		
	β	95% CI	<i>p</i>
Bullying → emotion regulation difficulties → orgasmic function difficulties	0.02	[0.01, 0.03]	0.004
Bullying → emotion regulation difficulties → sexual distress	0.04	[0.03, 0.06]	<0.001

Bootstrapped confidence intervals were based on 10,000 replication samples; β = standardized regression coefficients, 95% CI = bias-corrected bootstrapped confidence intervals

victimization could produce symptoms that accumulate over the long haul, for example, through the disrupted assumptions about relationships and the consolidation of emotion regulation difficulties (Briere, 2002, MacIntosh, 2020), which eventually could result in lower sexual satisfaction in adulthood (Bigras et al., 2017).

Bullying victimization was negatively associated with *desire/arousal difficulties* in the present sample, suggesting that prior bullying experiences were associated with a stronger sex drive and easier arousal. This result should however be interpreted with caution as it explains less than 1% of the variance in the outcome, suggesting that other factors should be investigated to better understand desire/arousal difficulties in adolescents. Still, this finding could be analyzed through a dual-pathway model (MacIntosh et al., 2020), in which one branch involves inhibition (sexual avoidance and dysfunction), while the other involves sexual disinhibition, such as engaging in sexual activity and potentially having higher sexual desire and arousal. Moreover, bullying victimization and sexual desire/arousal difficulties were not related through the mediating role of emotion regulation difficulties. Thus, emotion regulation difficulties may offer explanatory value for some, but not all, aspects of sexual function among adolescents. Again, it is plausible that interpersonal mechanisms, such as attachment insecurity or lower perceived partner responsiveness (Birnbau, 2018), may be more potent mediators in the association between bullying victimization and sexual wellbeing. This finding is unexpected given that previous cross-sectional studies have documented that adults in a clinical

population with emotion regulation difficulties report lower sexual desire (Dubé et al., 2019). The discrepancy could also be due to the fact that Dubé et al. (2019) results were from a clinical population, where emotion regulation difficulties are more prevalent.

The hypothesis that bullying victimization would be positively and directly associated with *orgasmic function difficulties* was not supported. However, bullying victimization and orgasmic function difficulties were related through the mediating role of emotion regulation difficulties. This may be explained by potential declines in dispositional mindfulness (Riggs & Brown, 2017) and symptoms of social anxiety and depression (Clear et al., 2020) caused by bullying victimization. These barriers could distract teenagers from interoceptive awareness and cause distraction from bodily sensations, potentially negatively impacting orgasmic function (Adam et al., 2015).

Bullying victimization was positively and directly related to *sexual distress*, suggesting that having been bullied in the prior three months may be associated with worries and feelings of inferiority about one's sexuality. Again, this result should be interpreted with caution as it explained less than 1% of the variance in the outcome (Ferguson et al., 2016). Still, the relationship between bullying victimization and sexual distress could be explained by the victim's perception of sexuality and subsequent stress response. Bullying victimization can have a detrimental effect on one's self-esteem and self-worth (Brito & Oliveira, 2013) and may be associated with heightened subjective stress in situations involving social-evaluative threats (Östberg et al., 2018), contributing to teenagers internalizing a vision of themselves as inadequate. As sexuality is often new and frequently stressful for adolescents in its early stages, those who have been victimized might feel greater sexual distress as they could also fear the negative judgment from their partner.

Moreover, emotion regulation difficulties also explained part of the association between bullying victimization and sexual distress. This result supports the proposed hypothesis and is consistent with past literature suggesting that being rejected or made fun of by peers may shape a dysregulated stress response to one's environment (Cohen & Belsky, 2008). These greater emotion regulation difficulties could increase sexual distress as lower emotion regulation implies a failure to secure comfort when overwhelmed (Dubé et al., 2019). The results also provide some evidence for Nolen-Hoeksema & Watkins' (2011) heuristic model, according to which distal variables, such as bullying victimization, can be risk factors for later sexual distress mediated by proximal factors, such as emotion regulation difficulties.

The Role of Identifying as SGM in the Associations between Bullying Victimization, Emotion Regulation Difficulties, and Sexual Wellbeing

Although SGM adolescents in the present sample had significantly higher bullying victimization scores, higher sexual distress, and lower sexual satisfaction, as well as greater emotion regulation difficulties, the hypothesis regarding differences between adolescents identifying as HC and those identifying as SGM was not supported in the overall model. This result is somewhat surprising considering the documented health disparities between HC and SGM adolescents, and worse psychosocial consequences of bullying in SGM adolescents (Gower et al., 2018). Even though the minority stress framework in adolescents has been empirically supported for mental health consequences (Burton et al., 2013), there is a lack of studies examining whether there are differences between SGM and HC adolescents regarding their sexuality. Studies conducted among adults demonstrated no differences between SGM and HC individuals in terms of sexual satisfaction (Frederick et al., 2018), yet SGM adults may have a higher prevalence of sexual dysfunction (Flynn et al., 2017), whereas sexual distress has not been investigated in past studies.

A potential explanation for the fact that SGM adolescents did not differ significantly from their heterosexual, cisgender peers in any of the examined associations may be that the participants have been coming of age in a culture characterized by a growing acceptance of sexual and gender diversity. Indeed, this is illustrated by increasing non-discrimination laws and the presence of groups designed specifically to support SGM adolescents (Burton et al., 2013). However, there is still overwhelming evidence that even in today's potentially more accepting culture, SGM adolescents may be more at risk of being bullied (Martin-Storey & Fish, 2019). The results of this study are also in accordance with a developmental trajectory framework (Savin-Williams, 2011) that recognizes the inherent uniqueness of every life and reflects that SGM youth can be similar to other adolescents in their developmental trajectories as they are all subject to similar biopsychosocial influences. Finally, the absence of differences could be explained by the use of a general bullying scale that does not specifically account for bullying based on a person's marginalized group identity, such as homophobic bullying (Espelage et al., 2019) or microaggressions based on sexual and/or gender identity (Bostwick & Hequembourg, 2014).

Strengths, Limitations, and Future Studies

This study documented the associations between bullying victimization, emotion regulation difficulties, and sexual wellbeing in both SGM and HC adolescents. The use of a

sample of young adolescents minimized recall bias linked to the occurrence of bullying in this developmental window. Controlling for past childhood maltreatment allowed us to isolate the unique contribution of bullying victimization to sexual wellbeing. Despite these strengths, this study has some limitations that must be considered. First, its cross-sectional design prevents us from identifying the directionality of the associations. It is possible that lower levels of sexual wellbeing could be part of broader behavioral profiles or traits including lower self-esteem and social skills that could make one more likely to be victimized (Rodríguez-Hidalgo et al., 2019). Reliance on self-report measures is a limitation that has been well documented (e.g., under-reporting, Schwartz, 1999), yet remains the only ethically acceptable way to measure sexual wellbeing in adolescents. The measures for sexual desire/arousal difficulties and for orgasmic difficulties demonstrated slightly lower internal consistency than the suggested threshold in the present study, presumably as a result of administering a wide range of characteristics with a relatively low number of items (Cortina, 1993). Only the adolescents who were sexually active were included in this study (35% of the total sample). This decision may have introduced a selection bias, limiting the generalizability of the results as the adolescents who are sexually active at 14 years of age might differ from their peers who become sexually active at later ages. Indeed, there is evidence that bullied adolescents may be more sexually active than those who are not bullied (Nicholson et al., 2019). Moreover, the levels of bullying victimization were low in the present study. However, these findings are consistent with those of other studies conducted among middle or older adolescents from the general population (e.g., Hertz et al., 2015; Li et al., 2019), as bullying has been shown to peak during middle school (grades 7–8) and decline by the end of high school (Hymel & Swearer, 2015; Kljakovic & Hunt, 2016).

Future studies should use longitudinal study designs to examine the directionality of the associations between bullying, emotion regulation difficulties, and sexual wellbeing indicators. Future studies could also include bullying or microaggressions measures that take into consideration marginalized identities, explore interpersonal mechanisms (e.g., attachment, social skills, perceived partner responsiveness) through which bullying victimization may be related to sexual wellbeing, or investigate the association between bullying victimization and sexual wellbeing with measures that are designed for sexually inactive adolescents, such as sexual self-concept (O'Sullivan et al., 2006) or sexual subjectivity (Horne & Zimmer-Gembeck, 2006). Future studies may also use measures of bullying and sexual wellbeing that assess these variables in the same timeframe (e.g., all measures referring to the past 12 months).

Conclusion

Despite extensive research on the physical and psychological correlates of bullying victimization (Moore et al., 2017), little is known about its associations with sexual wellbeing and underlying explanatory mechanisms such as emotion regulation difficulties. The dearth of research is even greater in sexual and gender minority youth (Mustanski, 2015), despite the fact that they are more prone to being bullied and to experience more emotion regulation difficulties (Kaufman et al., 2020). The current cross-sectional study examined the associations between bullying victimization, emotion regulation difficulties, and sexual wellbeing indicators, considering potential differences between heterosexual, cisgender and sexual/gender minority adolescents. The findings showed that higher bullying victimization was directly and negatively associated with sexual lower desire/arousal difficulties, as well as directly and positively associated with higher sexual distress. Higher emotion regulation difficulties acted as a mediator in the associations between higher bullying victimization and higher orgasmic function difficulties, as well as higher bullying victimization and higher sexual distress. No significant differences were observed in these associations between sexual/gender minority and heterosexual, cisgender youth. These findings offer preliminary insights concerning associations between bullying victimization and adolescents' sexual wellbeing, and suggest that this process may be similar across adolescents, regardless of sexual/gender minority status. Findings also support the importance of assessing emotion regulation difficulties—a modifiable target of intervention—among adolescents who have been bullied. Fostering adaptation in victimized youth is important as the learning that takes place during this period will shape their romantic relationships and sexual wellbeing for years to come (Collins et al., 2009).

Data Availability

Our research team has full control of all data and we agree to allow the journal to review the data if needed.

Code Availability

The authors of the paper can provide all study materials if requested.

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Authors' Contributions AG contributed to the study's conception and design, contributed to data collection, and drafted the manuscript; BB contributed to the study conception and design, performed the statistical analysis, and helped to draft and review the manuscript; JD conceived the study and obtained funding, provided material

resources, participated in the design and coordination of the study, and helped to draft and review the manuscript; LO contributed to the study's conception and design and helped to draft and review the manuscript; SB conceived the study and obtained funding, provided material resources, participated in its design and coordination, helped to draft as well as review the manuscript, and offered supervision. All authors read and approved the final manuscript.

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Data Sharing and Declaration The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval This study involved human participants and was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Université de Montréal (#CERAS-2018-19-020-P-2) and of Université du Québec à Chicoutimi (#CER-602.170.15).

Informed Consent Informed consent was obtained from all individual participants included in the study.

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