



Heterosexual, Cisgender and Gender and Sexually Diverse Adolescents' Sexting Behaviors: The Role of Body Appreciation

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Abstract

Sexting has become part of the repertoire of adolescents' sexual behaviors, especially among those who identify as gender and sexually diverse. Whereas body dissatisfaction increases during adolescence and is associated with negative sexuality outcomes, little research has examined how body appreciation may contribute to adolescents' sexting. The present study examined associations between body appreciation and sexting behaviors, and whether these differed by gender and sexual orientation, using path analysis in a sample of 2904 adolescents ($M_{\text{age}} = 14.53$; $SD = 0.61$) comprised of five groups: heterosexual cisgender and gender and sexually diverse boys (heterosexual cisgender = 1193; gender and sexually diverse = 157), heterosexual cisgender and gender and sexually diverse girls (heterosexual cisgender = 1152; gender and sexually diverse = 320), and non-binary adolescents ($n = 18$). Lower levels of body appreciation were associated with higher sexting frequency in heterosexual cisgender girls and gender and sexually diverse boys. Adolescents preoccupied with their appearance may use sexting for body image-related validation.

Keywords Adolescents · Body Appreciation · Body Image · Gender and Sexually Diverse · Sexting

Introduction

The advent of online technologies has changed the landscape of adolescents' lives, particularly their sexuality. Adolescents are now not only exposed to web-based sexual content, but can also create their own sexual electronic material via sexting. Sexting is a means of communication in which the transmitter creates and delivers electronic text messages, photos, or videos with sexual content (Gámez-Guadix et al., 2017). Studies among adolescents to date have predominantly focused on the prevalence of sexting behaviors and the purported adverse correlates of sexting, such as depressive symptoms (Temple et al., 2014), substance use (Ybarra & Mitchell, 2014) and risky

sexual behaviors (Kosenko et al., 2017). Nevertheless, sexting is likely becoming a normative step in adolescents' romantic development (Lenhart, 2009) and an accepted way to express their sexuality (Anastassiou, 2017). Yet, little research has examined which factors may contribute to adolescents' sexting, particularly among gender and sexually diverse youth, who may sext more than their heterosexual, cisgender peers (e.g., Gámez-Guadix et al., 2017). One such factor is body appreciation. As body dissatisfaction develops and increases over time in adolescents (Eisenberg et al., 2006), sexting can become a way to obtain social reinforcement about the adequacy of their appearance (Bianchi et al., 2017). Yet although body dissatisfaction is associated with negative sexuality outcomes (e.g., Klettke et al., 2014), little research has examined how it may contribute to adolescents' sexting. This study aimed to examine the associations between body appreciation and sexting behaviors in adolescents and whether these associations differed by gender and sexual orientation.

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Sexting Behaviors in Adolescents

Sexting generally refers to the electronic exchange of sexually suggestive messages or images of its author naked or semi-nude (Ringrose et al., 2013) and can be used to communicate a romantic or sexual interest toward another person (Lippman & Campbell, 2014). The definition and the reference period

for measuring the frequency of sexting has varied across studies (for a review, see Barrense-Dias et al., 2017), which may affect the reported prevalence. According to two recent meta-analyses, sexting prevalence rates (i.e., sending and receiving a sext) among adolescents aged 11–18 years ranged from 0.9% to 60.0% (Barrense-Dias et al., 2017), and 14.8% of adolescents aged 11–17 years reported having sent a sext (Madigan et al., 2018). In the present study, the definition of sexting was both broader and more specific, as it included different types of digital communication (e.g., explicit text messages and images/videos) in a timeframe of one year.

Engagement in sexting behaviors is likely influenced by different factors, such as gender and sexual orientation. Previous studies among adolescents aged between 11 and 19 years showed inconsistent results concerning binary gender differences (e.g., Barrense-Dias et al., 2017). Some studies reported no significant differences in sexting frequency between boys and girls (e.g., Van Ouytsel et al., 2021). Other studies suggested that either boys (Van Ouytsel et al., 2014) or girls (Reed et al., 2020) were more likely to sext. These differences might be explained by the different roles sexting can have among boys and girls (Davidson, 2014), whereby boys typically ask for sexts, as sexting may help to gain peer popularity. For adolescent girls, sexting may be more associated with being pressured to sext with peers or romantic partners (Van Ouytsel et al., 2017) and they may experience higher levels of stigma in relation to their sexting, such as being labeled as “sluts” (Ringrose et al., 2013). However, these studies only used the woman and man gender of the continuum, not considering non-binary individuals.

Despite the fact that 4.5% of Americans (The Williams Institute, 2019), 13% of Canadians (Fondation Jasmin Roy (2017)), and 2.6% of British individuals (Organization for Economic Co-operation and Development OECD (2019)) report belonging to LGBTQ+ communities (i.e., Lesbian, Gay, Bisexual, Transgender, Queer and other sexualities), only a handful of studies on adolescents included sexual orientation-related information. Some studies reported that individuals who identified as gender and sexually diverse might be more often involved in sexting (e.g., Kim et al., 2020), possibly because the digital world could allow them to explore their sexuality with more freedom (Bauermeister et al., 2014). However, another study found no significant differences between heterosexual cisgender and gender and sexually diverse adolescents (aged 12 to 16 years old) in sexting behaviors (Gámez-Guadix & de Santisteban, 2018).

As for gender minority individuals (i.e., individuals who have a different gender identity than their sex assigned at birth; Reisner et al., 2015), there is a paucity of information about their sexting behaviors. Gender minority youth rely more on the Internet to connect with peers, initiate romantic relationships and find information about their gender identity (Cannon et al., 2017). However, only one study examined

gender minority youth’s sexting experiences (Van Ouytsel et al., 2020), in which 16.7% of the 18 gender minority youth participants had sent a sexting image. In addition to its small sample of minority youth, this study did not examine whether they were more likely to send sexually explicit images relative to non-minority youth.

The underlying motivations behind sexting may play an important role in adolescents’ sexuality (Bianchi et al., 2016), such as sexual motivations (e.g., exploring sexuality), body image reinforcement (e.g., using sexting for feedback about the body) and instrumental/aggravated reasons (e.g., relational aggression). The majority of research has focused on sexual/intimacy motivations (e.g., Champion & Pedersen, 2015) as well as relational violence (e.g., Morelli et al., 2016). Body image reinforcement has received little scientific attention, despite the fact that adolescents and young adults had sent a sext to obtain feedback regarding their body, suggesting sexting could be used to seek approval to appease their body preoccupation (Bianchi et al., 2016).

Lastly, as sexting may play a role in sexual exploration in a relationship (Reed et al., 2020) and has been associated with dating and sexual experience (e.g., Klettke et al., 2014), as well as with alcohol and substance use (e.g., Ševčíková, 2016), these variables were controlled for in the present study (see Fig. 1).

Body Appreciation in Adolescents

Body appreciation (i.e., positive body image) is part of the larger concept of body image, which is viewed as a multifaceted construct (Pruzinsky & Cash, 2002). It includes the acceptance, respect, and favorable opinions of one’s body. It also considers the rejection of the ideals promoted by the media as the only standards of beauty (Tylka & Wood-Barcalow, 2015). Although most available research focuses on body dissatisfaction, with findings indicating that it increases during adolescence (e.g., Bucchianeri et al., 2013), recent research has included considerations for positive body image (e.g., Alleva et al., 2018).

Previous findings suggest that adolescent girls tend to be more dissatisfied with their bodies (Bucchianeri et al., 2013) and report lower levels of body appreciation than adolescent

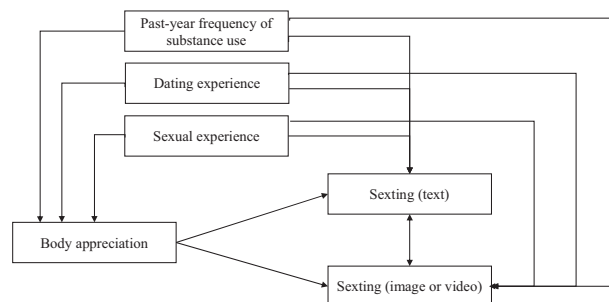


Fig. 1 Conceptual model of the associations between body appreciation, sexting behaviors, and control variables

boys (He et al., 2020). This can be explained by the ideal of thinness conveyed by the media (Seidah et al., 2004), which can make girls dissatisfied with their silhouette (Smolak, 2004). Boys' body dissatisfaction tends to stabilize in early adulthood (Bucchianeri et al., 2013), as they gain in muscle and size and become closer to society's male ideal (Seidah et al., 2004).

Most of the research on adolescent body image has focused on cisgender youth. However, gender minorities could have increased risk for body image concerns compared to cisgender individuals (Diemer et al., 2015). Trans individuals (including binary and non-binary) may experience more dissatisfaction with their bodies than cisgender individuals (McClain and Peebles, 2016). However, these findings stem from studies focusing primarily on eating disorders.

Importantly, most studies on body image/appreciation that included sexual and gender minorities were comprised of adult men (e.g., Alleva et al., 2018) and women (e.g., Meneguzzo et al., 2018), limiting the knowledge about gender and sexually diverse adolescents. This is especially important given that the development of sexual orientation might be intertwined with that of body image (Udall-Weiner, 2009). Although body image appears to vary depending on sexual orientation, there is greater variability among women. Research has showed that adolescents and women identifying with the LGBTQ+ community tend to have greater body satisfaction (Polimeni et al., 2009) and body appreciation (Ramseyer Winter et al., 2015) than cisgender heterosexual women. LGBTQ+ women may be more resistant to the pressures of being thin, as the lesbian community would place less emphasis on physical appearance (Austin et al., 2004). Nevertheless, some studies suggest that lesbian and bisexual women might have similar levels of body dissatisfaction as heterosexual women (Moreno-Domínguez et al., 2019).

Gay and bisexual boys may be more likely to have a more negative body image (Calzo et al., 2018) and lower levels of body appreciation (Alleva et al., 2018) than heterosexual boys. Some studies have shown that gender and sexually diverse men could be even more influenced and pressured than heterosexual cisgender men to achieve certain standards of body image, such as fit and muscular bodies (e.g., Jankowski et al., 2014) since these are more prevalent in the LGBTQ+ community (Austin et al., 2004). Despite the fact that adolescence is an important period in the development of body image (Bucchianeri et al., 2013) and that feeling coveted, through responses to sexts, could make a teenager feel better about their appearance, a paucity of studies has examined associations between body image and sexting among youth.

Associations between Body Appreciation and Sexting in Adolescents

Adolescents who are more preoccupied with their appearance could show different patterns of sexting behaviors as they use

sexting for validation about their looks (Chalfen, 2009). Only three studies have examined the association between sexting and body image. In a study among 361 college students examining a model that included objectified body consciousness, comfort with nudity, and sexting (i.e., sexually explicit or nude photos), participants who sexted had higher levels of body dissatisfaction, while others had higher levels of comfort with nudity (Liong & Cheng, 2018). In a sample of 190 youth aged between 13 to 20, a cross-sectional study showed that regardless of gender, age, and sexual orientation, when adolescents compared their bodies against cultural standards, they were more likely to send sexts (i.e., sexually suggestive or provocative text messages, photos, or videos) to receive body image reinforcement (Bianchi et al., 2017). Lastly, in a study involving 147 women, when participants received or sent sexually explicit images, they experienced lesser dissatisfaction with their physical appearance. However, the association between body dissatisfaction and sexting was not significant. Also, women who held negative evaluations of their physical appearance reported a greater tendency to feel pressured to sext, or to sext for verification of attractiveness (Howard et al., 2019). These results suggest that body appreciation may play a role in adolescents' sexting behaviors. However, no study has focused on the links between body appreciation and sexting considering gender and sexual orientation simultaneously in a large sample of adolescents of similar ages.

The Current Study

As little research has examined how body appreciation may contribute to adolescents' sexting, especially among gender and sexually diverse youth, the present study aimed to fill this gap by examining the associations between body appreciation and sexting behaviors in young adolescents of all genders and sexual orientations. It was hypothesized that participants with lower body appreciation would report higher levels of sexting behaviors, consistent with most previous reports in adolescents. Gender and sexual orientation-based differences in the association between body appreciation and sexting were examined in an exploratory manner.

Method

Participants

The sample included 2904 participants ($M_{age} = 14.53$ years, $SD = 0.61$) recruited through 23 schools. To participate, teenagers had to be in ninth grade, aged at least 14 and attend high school. As for the biological sex of the participants, 1520 (52.3%) were girls and 1384 (47.7%) were boys. To simplify the analysis, five groups based on sex

assigned at birth, gender identity, trans status, and sexual orientation were created, as per a preestablished categorization (Böthe et al., 2020). In terms of sexual orientation and gender identity, 1193 (41.1%) identified as heterosexual cisgender (HC) boys; 1152 (39.7%) as HC girls; 157 (5.4%) as gender and sexually diverse (GSD) boys; 320 (11%) as GSD girls, and 18 (0.6%) as GSD non-binary adolescents. A total of 61 (2.1%) participants could not be categorized because they did not answer one or more questions related to their sexual orientation and gender, thus, they were not included in analyses comparing these groups. The majority of participants identified with the French-Canadian culture (1912; 65.8%), 405 (13.9%) identified with the Canadian culture, 75 (2.6%) with the African culture, 71 (2.4%) with the Caribbean culture, 60 (2.1%) with the Latin American and/or Hispanic culture, 57 (2%) with the European culture, 50 (1.7%) with the Asian culture, and 271 (9.3%) reported other cultural identities.

Procedure

Data collection took place between November 2018 and February 2020, as part of a larger ongoing Canadian longitudinal study on adolescents' sexual health (all measures assessed in the larger project can be found at https://osf.io/gly9wp/?view_only=a4d21a3bf74e42e7ab63f6b84700153f). A priori sample size calculation and power analysis were conducted based on the main research questions of the larger longitudinal project. Therefore, a posteriori power analysis was conducted for the present study. The results showed that a sample size of 1713 participants would have 80% power to detect the small, anticipated effects (i.e., 0.1), suggesting that the study ($n = 2,904$) is adequately powered. The cohort was recruited from both a large metropolitan area and a rural area to ensure sample diversity. Schools presenting different socioeconomic backgrounds and White and multi-ethnic populations were solicited. Of 50 schools approached, 23 accepted, 16 did not respond to the emails or calls, and 11 refused to participate in the study. The different refusals were often related to the presence of other ongoing research projects within the school as well as the high workload of teachers. After providing their own informed consent, participants who were eligible completed online questionnaires in class, through *Qualtrics Research Suite*. The aims and implications of the study were presented to the participants, and they provided informed consent before completing the 45-minute surveys. Three simple attention-testing questions were distributed within the survey. If they failed two out of three of these questions, their data were considered invalid (Thomas & Clifford, 2017). After completion, participants were given a list of resources that they could contact, and encouraged to speak with the school's social worker or psychologist if they experienced distress.

They were also compensated with a 10\$ gift card. Ethical approval was granted by the ethics committees of the concerned universities and school boards.

Measures

Sociodemographic characteristics, gender identity status and sexual orientation

Sociodemographic information (i.e., age, sex assigned at birth, ethnicity, family structure, etc.) was collected using a questionnaire created by the research team. Participants also reported their sexual orientation following prior recommendations (Weinrich, 2014): “*People describe their sexual orientation in different ways. Which expression best describes your current sexual orientation? If no expression describes you, check “None of the above” and write the answer that describes you personally.*”; answer options: 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; other (with specification). They also reported their gender identity status following prior recommendations (Bauer et al., 2017): “*What gender or gender identity do you identify with?*”; answers options: men, women, indigenous or other cultural gender minority identity (e.g., two-spirit), non-binary, gender fluid or something else (e.g., genderqueer), other (with specification). Adolescents' transgender status was also assessed (answer options: *I am not a trans person; I am a trans man; I am a trans woman; I am a non-binary trans person; I am questioning my gender identity; I don't know what it means; other*).

Body appreciation

This construct was assessed using the *Body Appreciation Scale-2 (BAS-2)* (Tylka & Wood-Barcalow, 2015). This measure comprises ten items (e.g., *I respect my body*) and demonstrated strong psychometric properties in previous studies. In this study, Cronbach's α was 0.93. The BAS-2 is scored on a five-point scale from 1 (never) to 5 (always). The scores range from five to 30, with higher scores indicating higher body appreciation.

Sexting

Sexting was assessed via two questions used in a previous study (Drouin et al., 2013). The items were as follows: *In the last year, how often did you engage in the following: (1) Sent sex texts (text messages with sexual content), (2) Sent sex pictures or videos*. In this study, the correlation between the two items was $r = 0.72$. The items were scored on a 6-point scale ranging from 1 (never) to 6 (very frequently).

Alcohol and substance use

Lifetime alcohol and drug use was assessed using a single yes/no question (*Have you ever consumed alcohol or drugs?*) created by the research team. Among those adolescents who reported having ever used alcohol or drugs, the frequency of alcohol, cannabis, and other drugs use in the past 12 months was assessed with the following question: *“During the last 12 months, how many times did you consume these products? (1) Alcohol; (2) Cannabis (pot, marijuana, hashish, oil, etc.); (3) Other drugs (ecstasy, amphetamines, speed, cocaine, acid, etc.)”*. Participants indicated their responses concerning each substance on a seven-point scale (0 = *never consumed*; 6 = *every day*; Landry et al., 2004). First, based on the lifetime substance use and frequency of use variables, new alcohol, cannabis, and other drugs use frequency scores were computed. The responses of those adolescents who indicated that they had not used alcohol and drugs before (i.e., answering “no” to the lifetime alcohol and drug use question: $n = 1017$, 35.0%) were recoded to represent “never consumed” in the past-year frequency questions. The mean score of these new alcohol and drug use frequency variables was used in further analyses, and referred to it as substance use frequency throughout the text.¹ This substance use frequency scale demonstrated slightly lower reliability in terms of Cronbach’s alpha ($\alpha = 0.58$) than the recommended cut-off score. Therefore, the McDonald’s omega coefficient was examined, which was in the acceptable range ($\omega = 0.70$). The lower Cronbach’s alpha value may derive from assessing each type of substance use with only one item (Cortina, 1993).

Dating experience

Before answering the dating-related question, participants read the definition that dating someone or going or with someone referred to: *“dating the person or forming a couple, and that this relationship may have lasted only a few days or many weeks, months or years”*. Dating was assessed with one dichotomous question asking about participant’s dating experiences: *“Did you ever go out with someone?”* (answer options: 1 = *yes*, 0 = *no*).

¹ Confirmatory factor analysis (CFA) was conducted with the three frequency items with the weighted least squares means and variance adjusted (WLSMV) estimator to examine the factor structure of the three items. According to the results of the CFA, the one-factor model had an excellent fit to the data (CFI = 1.00, TLI = 1.00, RMSEA = 0.00 [90%CI 0.00-0.00]), and the three items had high standardized factor loadings (ranging between 0.72 to 0.94) on the latent factor of substance use.

Sexual experience

Sexual experiences were assessed with two questions. First, adolescents were asked about engaging in any consensual oral or manual sexual activities in their lifetime (i.e., *“With your consent, have you ever exchanged sexual caresses (manual or oral) with someone?”*; answer options: 1 = *yes*, 0 = *no*). Next, adolescents were asked about engaging in any consensual sexual activities with penetration in their lifetime (i.e., *“Have you ever had sex with vaginal or anal penetration, with your consent?”*; answer options: 1 = *yes*, 0 = *no*). Before answering the penetrative sexual activities questions, they were provided with the following definition: *“For the following questions, a “sexual intercourse with penetration” includes the penetration of the vagina or the anus with the penis, fingers, sex toy, etc.”* In this study, the correlation between the two items was $r = 0.67$. Therefore, the mean score of these two items was used in further analyses and referred to as *sexual experience* throughout the text.

Statistical Analysis

Using SPSS 25, descriptive statistics and Spearman’s correlations were computed. After examining the assumptions, a one-way analysis of variance (ANOVA) with a Bonferroni post-hoc test was conducted to compare adolescents’ body appreciation. A Kruskal–Wallis H-test with a Bonferroni adjusted post-hoc test was conducted to compare adolescents’ sexting behaviors.

Using *Mplus* 8.2, two sets of path analyses were performed to examine the associations between body appreciation and sexting behaviors, with and without controlling for substance use frequency, dating, and sexual experience. Due to the non-normality of the data, the models were estimated using the robust-maximum-likelihood (MLR). Commonly used goodness-of-fit indices were observed to assess the acceptability of the examined models: Tucker–Lewis index (TLI; ≥ 0.90 for acceptable; ≥ 0.95 for excellent), Comparative Fit Index (CFI; ≥ 0.90 for acceptable; ≥ 0.95 for excellent), and Root-Mean-Square Error of Approximation (RMSEA; ≤ 0.08 for adequate; ≤ 0.06 for excellent) with its 90% confidence intervals were examined (Browne & Cudeck, 1993; Marsh et al., 2005; Schermelleh-Engel et al., 2003). Missing values for examined variables (i.e., body appreciation, sexting, substance use, dating, sexual experience, and SGM status) ranged from 0 to 2.1%, and were missing completely at random, based on Little’s Missing Completely at Random Test (MCAR) ($\chi^2 = 12.51$, $df = 24$, $p = 0.974$) (Little, 1988). Following prior guidelines (Newman, 2014), the full information maximum likelihood (FIML) method was used to handle missing data.

In the first set of analyses, the associations between body appreciation and sexting behaviors were examined without

Table 1 Descriptive statistics, reliability indices, and correlations between body appreciation, sexting behaviors, past-year frequency of substance use, dating, and sexual experience

Variables	Skewness (<i>SE</i>)	Kurtosis (<i>SE</i>)	Range	<i>M</i> (<i>SD</i>)	1	2	3	4	5
1. Body appreciation	−0.78 (0.05)	0.19 (0.09)	1–5	3.94 (0.79)	–				
2. Sexting (text) ^a	1.82 (0.05)	2.16 (0.09)	1–6	1.62 (1.17)	−0.11*	–			
3. Sexting (image or video) ^a	2.69 (0.05)	6.57 (0.09)	1–6	1.37 (0.94)	−0.11*	0.72*	–		
4. Past-year frequency of substance use	1.88 (0.05)	4.96 (0.09)	0–6	0.66 (0.79)	−0.13*	0.32*	0.31*	–	
5. Dating experience ^b	−0.53 (0.05)	−1.72 (0.09)	0–1	0.63 (0.48)	−0.01	0.31*	0.23*	0.30*	–
6. Sexual experience ^b	0.95 (0.05)	−0.82 (0.09)	0–1	0.56 (0.81)	−0.08*	0.53*	0.42*	0.44*	0.48*

SE Standard error, *M* Mean, *SD* Standard deviation

* $p < 0.01$

^a1: never; 2: very rarely; 3: rarely; 4: occasionally; 5: frequently; 6: very frequently

^b0: no; 1: yes

control variables in the total sample (Model 1a). Next, variation of this model based on gender and sexual diversity status was examined (i.e., HC boys; HC girls; GSD boys; GSD girls, GSD non-binary adolescents) using multi-group path analysis (Model 1b). In the final step, the associations between body appreciation and sexting behaviors were constrained to be equal across the groups (Model 1c). When comparing Model 1b and Model 1c (i.e., unconstrained and constrained models), changes in chi-square, CFI, TLI, and RMSEA values were observed. A significant corrected chi-square difference test, significant decreases in CFI and TLI ($\Delta\text{CFI} \leq 0.010$; $\Delta\text{TLI} \leq 0.010$), and significant increases in RMSEA ($\Delta\text{RMSEA} \leq 0.015$) (Böthe et al., 2021; Chen, 2007; Cheung & Rensvold, 2002) indicated whether the constrained and unconstrained models differed significantly (i.e., whether the associations differed significantly between HC and GSD boys and girls, and non-binary individuals).

In the second set of analyses, the control variables were added to the models and followed the same sequence of model testing. The associations between body appreciation and sexting behaviors were examined with control variables in the total sample (Model 2a), whether this model varied based on gender and sexual diversity status using multi-group path analysis (Model 2b), and tested whether the associations differed significantly between these groups (Model 2c) observing the changes in fit indices.

Results

Descriptive Statistics and Comparisons of Heterosexual Cisgender and Gender and Sexually Diverse Adolescents

Descriptive statistics, reliability indices, and associations between body appreciation, sexting behaviors, and lifetime alcohol and substance use are shown in Table 1. The one-way ANOVA indicated that HC boys reported the highest levels of body appreciation ($M = 4.24$, $SD = 0.68$),

followed by GSD boys ($M = 3.99$, $SD = 0.79$); these two groups differed from all other groups significantly. HC girls ($M = 3.72$, $SD = 0.79$), GSD girls ($M = 3.65$, $SD = 0.80$) and GSD non-binary adolescents ($M = 3.25$, $SD = 1.17$) had significantly lower scores than HC and GSD boys, but they did not differ significantly from each other (Table 2). The Kruskal-Wallis H-tests suggested no statistically significant differences between the groups in the frequency of their sexting behaviors, except for the sexting – image and video – variable, in which case a significant difference was identified between HC boys and GSD girls, and HC girls and GSD girls (Table 2). Although this difference was statistically significant, each group's median was 1 (never). In total, 27% had sent a sexting text, and 18% sent an image or video.

Examining the Associations between Body Appreciation and Sexting Behaviors without Control Variables

In the first set of analyses, the associations between body appreciation and sexting behaviors were examined without control variables. In the path analysis for the total sample (Model 1a; CFI = 1.00, TLI = 1.00, RMSEA = 0.00 [90% CI 0.00, 0.00]), body appreciation was weakly and negatively related to both sexting – text ($\beta = -0.11$ [95% CI = -0.15 , -0.08], $p < 0.001$) and sexting – image and video ($\beta = -0.11$ [95% CI = -0.15 , -0.07], $p < 0.001$). Next, this model was examined across the previously established groups of adolescents based on gender and sexual minority status. To examine whether the identified associations were significantly different between the groups, the original, unconstrained model (Model 1b; CFI = 1.00, TLI = 1.00, RMSEA = 0.00 [90% CI = 0.00, 0.00]) was compared to a model in which all associations between body appreciation and sexting behaviors were constrained to be equal between all groups (Model 1c; CFI = 0.947, TLI = 0.934, RMSEA = 0.090 [90% CI 0.070, 0.112]). The corrected

Table 2 Comparisons of heterosexual, cisgender and gender and sexually diverse groups of adolescents regarding their body appreciation and sexting behaviors

	Total sample of adolescents (<i>N</i> = 2897–2904) <i>M</i> (<i>SD</i>)/Median	(1) Heterosexual, cisgender boys (<i>n</i> = 1195–1197) <i>M</i> (<i>SD</i>)/Median	(2) Heterosexual, cisgender girls (<i>n</i> = 1147–1151) <i>M</i> (<i>SD</i>)/Median	(3) Gender and sexually diverse boys (<i>n</i> = 157) <i>M</i> (<i>SD</i>)/Median	(4) Gender and sexually diverse girls (<i>n</i> = 320) <i>M</i> (<i>SD</i>)/Median	(5) Gender and sexually diverse non-binary individuals (<i>n</i> = 17–18) <i>M</i> (<i>SD</i>)/Median	ANOVA/Kruskal Wallis H ^b		
							<i>F</i> / χ^2	<i>p</i>	η^2/η^2_H
Body appreciation	3.93 (0.79)	4.24 (0.68) ^{1,3,4,5}	3.72 (0.79) ^{1,3}	3.99 (0.74) ^{1,2,4,5}	3.65 (0.80) ^{1,3}	3.25 (1.17) ^{1,3}	88.67	<0.001	0.11
Sexting (text) ^a	1	1	1	1	1	1	6.11	0.191	<0.01
Sexting (image or video) ^a	1	1 ⁴	1 ⁴	1	1 ^{1,2}	1	11.05	0.026	<0.01

M Mean, *SD* Standard deviation

Superscript numbers ^{1,2,3,4,5} indicate significant (*p* < 0.05) difference between the given group and the indexed group within the same variable

^a1: never; 2: very rarely; 3: rarely; 4: occasionally; 5: frequently; 6: very frequently

^bAn one-way ANOVA was used to compare the groups regarding the continuous variable (i.e., body appreciation), while the Kruskal–Wallis H-test was used to compare the groups regarding the ordinal variables (i.e., frequency of sexting behaviors)

chi-square difference test ($\Delta\chi^2 = 67.73, p < 0.001$) and the changes in the fit indices ($\Delta CFI = -0.053; \Delta TLI = -0.066; \Delta RMSEA = +0.090$) indicated a significant difference between the unconstrained (Model 1b) and the fully constrained (Model 1c) models, suggesting that the associations differed significantly between groups.

In the case of HC boys, body appreciation was unrelated to both sexting – text ($\beta = -0.03$ [95% CI = -0.09, 0.03], *p* = 0.299) and sexting – image and video ($\beta = -0.04$ [95% CI = -0.10, 0.03], *p* = 0.269). For HC girls, body appreciation was weakly and negatively related to both sexting – text ($\beta = -0.15$ [95% CI = -0.21, -0.09], *p* < 0.001) and sexting – image and video ($\beta = -0.13$ [95% CI = -0.19, -0.07], *p* < 0.001). Among GSD boys, body appreciation was weakly and negatively related to both sexting – text ($\beta = -0.27$ [95% CI = -0.43, -0.11], *p* = 0.001) and sexting – image and video ($\beta = -0.22$ [95% CI = -0.41, -0.04], *p* = 0.018). For GSD girls, body appreciation was unrelated to either sexting – text ($\beta = -0.08$ [95% CI = -0.18, 0.03], *p* = 0.163) or sexting – image and video ($\beta = -0.03$ [95% CI = -0.13, 0.07], *p* = 0.592). In GSD non-binary adolescents, body appreciation was moderately and negatively related to both sexting – text ($\beta = -0.41$ [95% CI = -0.73, -0.10], *p* = 0.010) and sexting – image and video ($\beta = -0.36$ [95% CI = -0.70, -0.03], *p* = 0.035).

Examining the Associations between Body Appreciation and Sexting Behaviors with Control Variables

In the second set of analyses, the associations between body appreciation and sexting behaviors were examined, controlling for past-year substance use frequency, dating, and sexual experience. In the path analysis for the total sample

(Model 2a; CFI = 1.00, TLI = 1.00, RMSEA = 0.00 [90% CI 0.00, 0.00]), body appreciation was weakly and negatively related to both sexting – text ($\beta = -0.07$ [95% CI = -0.10, -0.03], *p* < 0.001) and sexting – image and video ($\beta = -0.06$ [95% CI = -0.10, -0.03], *p* = 0.001). Next, this model was examined across the pre-established groups of adolescents based on gender and sexual minority status. To examine whether the identified associations were significantly different between the groups, the original, unconstrained model (Model 2b; CFI = 1.00, TLI = 1.00, RMSEA = 0.00 [90% CI = 0.00, 0.00]) was compared to a model in which all associations between body appreciation and sexting behaviors were constrained to be equal between all groups (Model 2c; CFI = 0.988, TLI = 0.938, RMSEA = 0.065 [90% CI 0.043, 0.087]). The corrected chi-square difference test ($\Delta\chi^2 = 40.50, p < 0.001$) and the changes in the fit indices ($\Delta CFI = -0.012; \Delta TLI = -0.062; \Delta RMSEA = +0.065$) indicated a significant difference between the unconstrained (Model 2b) and the fully constrained (Model 2c) models, suggesting that the associations differed significantly between groups.

Similarly to the findings of the model without the control variables, in the case of HC boys, body appreciation was unrelated to both sexting – text ($\beta = -0.02$ [95% CI = -0.07, 0.03], *p* = 0.482) and sexting – image and video ($\beta = -0.02$ [95% CI = -0.08, to 0.04], *p* = 0.528). For HC girls, body appreciation was weakly and negatively related to sexting – text ($\beta = -0.06$ [95% CI = -0.12, < -0.01], *p* = 0.043), but not to sexting – image and video ($\beta = -0.05$ [95% CI = -0.12, 0.01], *p* = 0.109). Among GSD boys, body appreciation was weakly and negatively related to sexting – text ($\beta = -0.23$ [95% CI = -0.40, -0.07], *p* = 0.005), but not to sexting – image and video ($\beta = -0.18$ [95% CI = -0.36, < 0.01], *p* = 0.052). For GSD girls, body appreciation was unrelated to either sexting – text

($\beta = -0.07$ [95% CI = $-0.16, 0.02$], $p = 0.130$) or sexting – image and video ($\beta = -0.02$ [95% CI = $-0.11, 0.07$], $p = 0.637$). In GSD non-binary adolescents, body appreciation was moderately and negatively related to both sexting – text ($\beta = -0.29$ [95% CI = $-0.65, 0.08$], $p = 0.120$) and sexting – image and video ($\beta = -0.26$ [95% CI = $-0.59, 0.07$], $p = 0.124$) (Fig. 2).²

Discussion

Sexting has become a new form of expression of one's sexuality for adolescents (Anastassiou, 2017) and could underlie the redefinition and acceptance of body image (Bianchi et al., 2016), especially in those identifying as gender and sexually diverse. This study examined the associations between body appreciation and sexting behaviors in a large sample of young heterosexual cisgender and gender and sexually diverse adolescents. Lower levels of body appreciation were associated with a higher frequency of sexting in heterosexual cisgender girls and gender and sexually diverse boys, but not in heterosexual cisgender boys, gender and sexually diverse girls, and gender and sexually diverse non-binary adolescents.

Associations between Body Appreciation and Sexting in Heterosexual Cisgender Girls and Gender and Sexually Diverse Boys

Lower levels of body appreciation were associated with a higher frequency of sexting – text in heterosexual cisgender girls and gender and sexually diverse boys. Heterosexual cisgender girls, who are more preoccupied with their appearance than heterosexual cisgender boys (He et al., 2020), could use sexting behaviors to obtain confirmation of the suitability of their physique. Girls who self-objectified viewed sexting more positively as this activity can provide validation that they are sexually attractive (Speno & Aubrey, 2019). Heterosexual cisgender girls may be more apt to send sexts when prompted, due to low self-esteem arising from negative body image, as a way to feel

considered or desired (Gámez-Guadix & de Santisteban, 2018). Indeed, adolescents who sext may be more likely to have lower self-esteem (Ybarra & Mitchell, 2014). Further, girls may experience greater pressure to send sexts (Howard et al., 2019) and may use sexting to experiment with different forms of sexual expression (O'Sullivan, 2014), with a view to increasing their popularity among their peers (Bianchi et al., 2017). Previous studies have found that adolescent girls have gained status when they had been asked for a picture of their bodies (Ringrose et al., 2013).

As for gender and sexually diverse boys, digital technologies may facilitate the development of new friendships and dating relationships among gender and sexually diverse individuals. According to the minority stress model (Meyer, 2003), these technologies might protect the psychological and relational well-being of sexual and gender minorities by the perception of safety against social stigma, prejudice, and discrimination. Sharing sexual texts could be a way to create intimacy with another youth. However, it seems that the use of sexting is more frequent among those who present lower levels of body appreciation. Some studies also found that individuals who identified as gender and sexually diverse were more likely to use sexting to receive validation about their physical appearance (e.g., Bianchi et al., 2019), partly explaining why those with lower body appreciation would sext more.

For both gender and sexually diverse boys and heterosexual cisgender girls, body appreciation was only significantly associated with sexting – text in the model, which may also be related to the low frequency of sexting pictures or videos. These findings are in line with previous results suggesting that sexting with text messages is more prevalent, as the prevalence rate for sexting text messages can reach 17%, while text messages and images together only reached 5% in adolescents (Barrense-Dias et al., 2017). Given these differences between text and image/video sharing during sexting, future studies should include sexting with text messages and images and/or videos separately in their analyses to gain a better understanding of sexting behaviors among adolescents.

No Associations between Body Appreciation and Sexting in Heterosexual Cisgender Boys, Gender and Sexually Diverse Girls and Non-Binary Adolescents

In contrast to prior studies reporting significant, positive associations between boys' body image and sexting behaviors (e.g., Liong & Cheng, 2018), heterosexual cisgender boys' body appreciation was unrelated to both sexting behaviors in the study. Inconsistencies between the present results and the findings of previous studies may derive from sample differences. In this study, a sample of younger adolescent boys (average age was 14 years) was used, while

² As an additional test of the robustness of the results, the final model (Model 2b) was tested with the addition of the mean score of sexting behaviors instead of including them separately in the model. Based on the results of this model, HC boys' body appreciation was unrelated to sexting ($\beta = -0.02$ [95% CI = $-0.07, 0.03$], $p = 0.446$); HC girls' body appreciation was weakly and negatively related to sexting ($\beta = -0.06$ [95% CI = $-0.12, <-0.01$], $p = 0.047$); GSD boys' body appreciation was weakly and negatively related to sexting ($\beta = -0.22$ [95% CI = $-0.40, -0.05$], $p = 0.010$); GSD girls' body appreciation was unrelated to sexting ($\beta = -0.05$ [95% CI = $-0.13, 0.04$], $p = 0.252$); and GSD non-binary adolescents' body appreciation was unrelated to sexting ($\beta = -0.28$ [95% CI = $-0.63, 0.07$], $p = 0.118$), providing further support for the robustness of the study's findings.

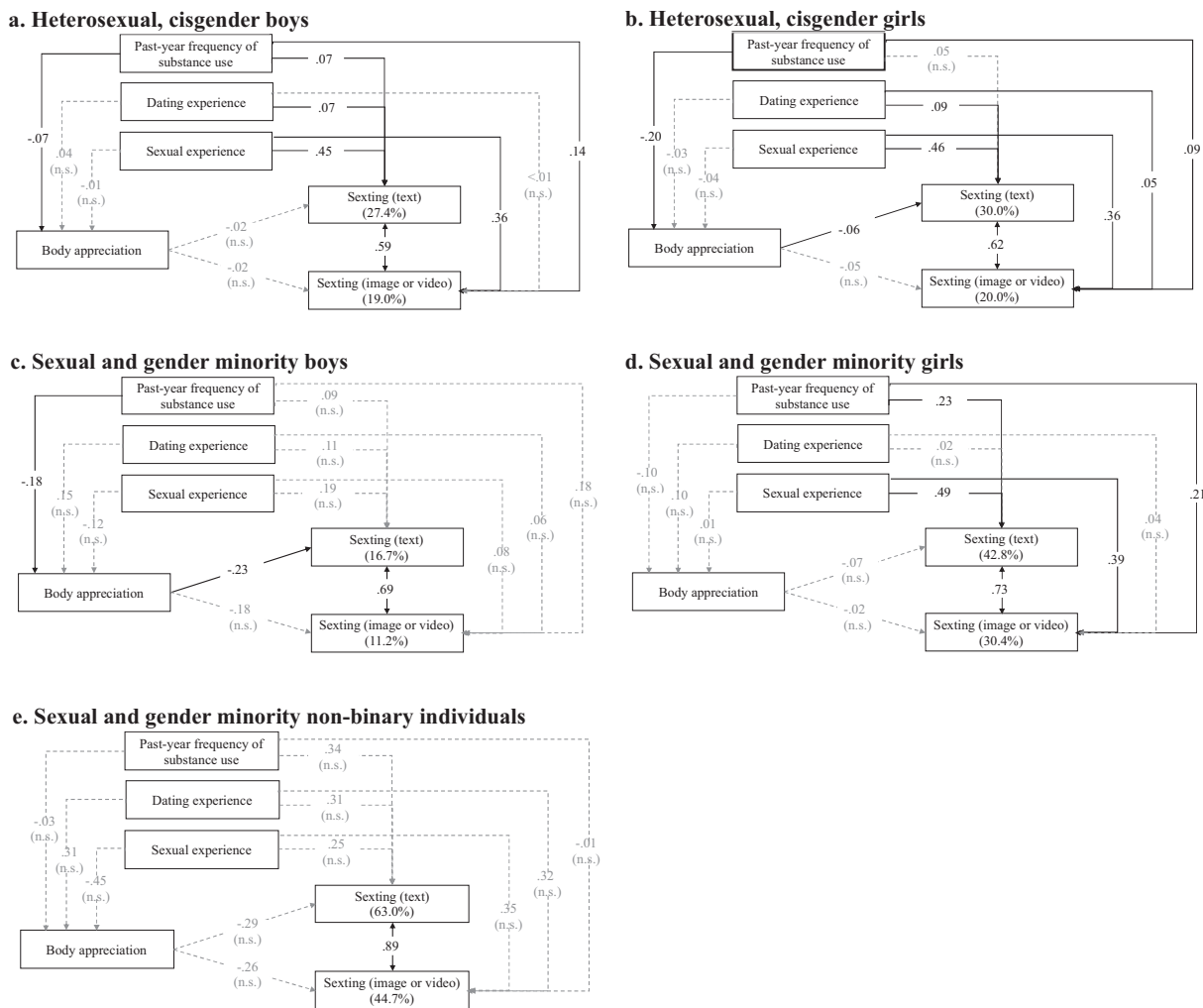


Fig. 2 Associations between body appreciation and sexting behaviors for heterosexual, cisgender and gender and sexually diverse adolescents controlling for past-year frequency of substance use, dating, and sexual experience. *Note.* One-headed arrows represent standardized regression weights and two-headed arrows represent correlations. Numbers on the arrows indicate the standardized path coefficients. Percentages in parentheses below the variables represent the proportion of explained variance. Dashed arrows indicate non-significant pathways. All pathways in black were significant at level $p < 0.05$

previous studies used samples including both adolescents and adults aged between 13 and 24 years (e.g., Liong & Cheng, 2018). It is possible that the associations between body appreciation and sexting are not as prominent in younger boys (especially in heterosexual cisgender boys), in part because their bodies have not yet undergone their full maturation process. Yet, this potential difference between younger boys and emerging adult men warrants further investigation.

Although previous studies have shown that gender and sexually diverse individuals tend to sext more (Gómez-Guadix et al., 2017) and use sexting to receive validation about their physical appearance (Bianchi et al., 2019), these studies only compared heterosexual vs. sexually diverse teenagers regardless of gender. Results of the present study

suggest that body appreciation was unrelated to sexting in gender and sexually diverse girls. In line with previous findings among college students, these results show that there could be several trajectories within the same population (Liong & Cheng, 2018). Thus, among gender and sexually diverse girls who sext, some may use sexting to improve their body appreciation while others may not. The levels of body appreciation and comfort with their body could be different within the same population. To examine this possibility, futures studies may use person-centered analyses and over-sample specific subgroups, such as gender and sexually diverse teenagers.

Gender and sexually diverse non-binary teens' body appreciation was unrelated to sexting, potentially due to the small sample size and low statistical power. Thus, the

findings should be interpreted with caution. Nevertheless, the direction of associations for gender and sexually diverse non-binary adolescents reflects those of heterosexual cisgender boys and gender and sexually diverse girls. Future studies should include gender minorities, as they may be more dissatisfied with their bodies compared to cisgender individuals (Diemer et al., 2015).

Strengths, Limitations, and Future Directions

This study focused on sexting behaviors among adolescents and one of its potential contributors, body appreciation. The age of participants (i.e., 14 years) and the large sample are strengths of the study, as only one published paper examined body image and sexting among adolescents previously, in a relatively small and heterogeneous sample in terms of age and developmental stage (Bianchi et al., 2017). Similarly, this study included an often-neglected populations in sex and body image research: sexual and gender minority adolescents. This study also has some limitations. Since the design was cross-sectional, causality between the examined variables cannot be inferred. Given the measures were self-reported, biases may be present (e.g., social desirability bias). In the present study, sexting's rate for sending a text was 27% and 18% for sending an image or video in the past year, but adolescents may have over- or underreported their sexting behaviors if they believed it is common or not among their peers. Moreover, future studies should examine the practice of pornography-sharing or revenge pornography in the context of sending sex pictures or videos. In addition, sexting partner availability and identity were not assessed in the present study and should be examined in future studies, as sexting is more common between romantic partners (Lenhart, 2009). The young age of participants might have restricted the sample of adolescents who sexted and were aware of/out with their sex/gender identity, as older age has been associated with a higher prevalence of sexting (Temple et al., 2014) and disclosure of one's sex/gender identity (Shilo & Savaya, 2011). It is important to note that the number of gender and sexually diverse non-binary adolescents was low, such that the conclusions that can be drawn from the findings concerning this subgroup are limited. Future studies on body image in non-binary adolescents should include body modification and external appearance, as their gender exploration could position their relationship with their physical characteristics in a different way than cisgender adolescents.

Conclusions

As research on adolescents has progressed from viewing sexting exclusively as a problem (sexting is still illegal in

some countries), studies have begun to approach it as a contemporary component of adolescent sexual and romantic relationships (Ybarra & Mitchell, 2014). The present findings highlight the importance of the differentiated examination of sexting behaviors and body appreciation in heterosexual cisgender and gender and sexually diverse adolescents. Results showed that lower levels of body appreciation were related to a greater frequency of sexting, and that this association differed depending on gender and sexual orientation. Gender and sexually diverse boys and heterosexual cisgender girls' lower body appreciation may result in more sexting – text to obtain confirmation about the adequacy of their bodies (Bianchi et al., 2017). In line with the findings of this study, there have been calls for integrating information about sexting into adolescents' health-promotion curricula (Strassberg et al., 2017). This could facilitate the development of prevention and intervention programs targeted toward teenagers' sexuality, sexting and body appreciation, especially among gender and sexually diverse groups.

Data Availability

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

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Authors' Contribution M.M.P. contributed to the study's conception and design, contributed to data collection, and drafted the manuscript; J.D. conceived the study and obtained funding, provided material resources, participated in the design and coordination of the study, and helped to review the manuscript; B.B. contributed to the study conception and design; performed the statistical analysis, and helped to draft and review the manuscript; A.G. contributed to the study's conception and design, contributed to data collection and helped to draft and review the manuscript; S.B. 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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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration. The present research was approved 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). This study was performed in line with the principles of the Declaration of Helsinki.

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

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