Correlation of Minority Status, Cyberbullying, and Mental Health: A Cross-Sectional Study of 1031 Adolescents

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Abstract

Adolescent cyberbullying is increasingly prevalent. Depression and suicidal ideation are also common, particularly among minority adolescents and cyberbullied adolescents. Little data exists to establish whether minority cyberbullied adolescents are at greater risk of negative mental health outcomes associated with cyberbullying. This cross-sectional study of 1031 adolescents presenting to an emergency room examines the prevalence of cyberbullying in minority and non-minority populations. Using logistic regression, we compared mental health symptoms between minority and non-minority cyberbullying-involved adolescents (accounting for demographic factors), and examined the correlation between use of multiple forms of online technology, minority status, and prevalence of cyberbullying. Sexual orientation was the only demographic factor to strongly correlate with cyberbullying involvement or to correlate with negative mental health symptoms. Increased use of social media platforms also correlated with cyberbullying involvement. This analysis provides a baseline for future work around targeted cyberbullying interventions for minority adolescent populations.

Keywords Cyberbullying · Adolescent · Demographics · Social media · Mental health

Introduction

Bullying is a well-established risk factor for adolescent mental illness (Bond et al. 2001; Kumpulainen et al. 2001). Cyberbullying is an increasingly prevalent form of bullying (Kessel Schneider et al. 2015), reported by 20 to 40% of adolescents (Aboujaoude et al. 2015). Aboujaoude, and colleagues (2015) define cyberbullying as “any

behavior performed through electronic or digital media by individuals or groups that repeatedly communicates hostile or aggressive messages intended to inflict harm or discomfort on others.” Cyberbullying perpetrators and victims are highly overlapping populations, with similarities not just in patterns of cyberbullying involvement, but also in terms of psychosocial indicators (Jansen 2011). For instance, compared to adolescents with no cyberbullying

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involvement, victims and perpetrators of cyberbullying are equally likely to have lower self-control and lower psychological well-being (Jansen 2011). Due to the high degree of similarity in indicators and outcomes between cyberbullying perpetrators and victims, cyberbullying involvement is defined for the purposes of this study as involvement with either perpetration of bullying *or* being a victim of bullying on a technology-based platform.

Most studies report that minority adolescents are more likely to experience in-person bullying than non-minority adolescents (Berlan et al. 2010; Carlyle and Steinman 2007). Some studies suggest similar patterns hold for cyberbullying. For example, cyberbullying involvement is more likely to be reported among females, particularly younger females (Barlett and Coyne 2014; Elgar et al. 2014). Similarly, lesbian, gay, and bisexual (LGB) high school students are more likely to be bullied than their heterosexual peers both in-person (34% vs. 19% respectively) and online (28% vs. 14% respectively) (Kann, McManus et al. 2016). Prior studies have found higher rates of cyberbullying involvement among adolescents of younger age, female gender, white race and Hispanic ethnicity (Kowalski et al. 2014).

Given that low socioeconomic status (SES) was historically a barrier to technology access, it was thought to be a protective factor against adolescent cyberbullying involvement (NTIA 1998). Wang, Iannotti and Nansel (2009) found that affluent adolescents were more likely to be victims of cyberbullying than their less affluent peers. Similarly, Ybarra and Mitchell (2004) found that higher socioeconomic status was associated with increased involvement in cyberbullying. In contrast, a meta-analysis of twenty-eight studies investigating the relationship between all forms of bullying and SES showed that adolescent victims and bully-victims were more likely to be of low SES; this meta-analysis did not, look at cyberbullying independently (Tippett and Wolke 2014). The mixed findings on the association between SES and cyberbullying coupled with increased access to mobile technology among youth of low SES (Lenhart 2015) make the relationship between SES and cyberbullying unclear.

Depression, anxiety, attempted suicide, and other negative mental health consequences are more common among cyberbullying-involved adolescents than non-cyberbullying-involved adolescents. Cyberbullying victims are 1.9 times more likely to report attempted suicide, and cyberbullying perpetrators are 1.5 times more likely to attempt suicide, compared to adolescents with no involvement in cyberbullying (Hinduja and Patchin 2010; Patchin and Hinduja 2010). Cyberbullying involvement strongly correlates with anxiety, depression, low self-esteem, and poor academic outcomes (Kowalski and Limber 2013; Bauman et al. 2013). Peer-victimization, for both in-person bullying and cyberbullying, predict PTSD symptoms among adolescents (Litman et al. 2015; Ranney et al. 2017).

Many symptoms of mental illness are more common among minority adolescents. Depression and other mood disorders are more prevalent among female adolescents than male adolescents (Merikangas et al. 2010; World Health Organization 2000). Merikangas and colleagues (2010) found higher rates of mood disorders among Mexican American adolescents compared to White or Black adolescents. In many studies, increased rates of depression and suicidality were found in low SES adolescents (Reiss 2013; Leech et al. 2006). These demographic markers of minority status, particularly race and low SES, are also associated with lower rates of mental health treatment (Kataoka et al. 2002).

Little information exists on which cyberbullied demographic subgroups are more likely to be depressed, anxious or attempt suicide. It is unknown whether individuals of minority status are at an increased risk of mental health consequences among cyberbullying-involved adolescents. To develop targeted screening and intervention protocols, it is important to first establish which adolescents are at highest risk of cyberbullying involvement, and which of those adolescents are at highest risk of negative mental health outcomes. This analysis therefore aims to further elucidate which adolescents are at greatest risk for the clinically significant negative mental health outcomes of cyberbullying.

Methods

Participants

This is a secondary analysis of data previously obtained from an intervention study for high-risk adolescents presenting to a pediatric emergency department. As part of the screening for eligibility for the larger study, we conducted a cross-sectional survey, over a nine-month period, of English-speaking adolescents age 13 to 17 presenting for any reason to an urban pediatric emergency department (ED) in the Northeast United States (Ranney et al., in press). An urban pediatric ED was chosen as the recruitment site, as extensive data demonstrates that EDs treat a representative cross-section of adolescents and are an important location to screen and provide interventions for high-risk adolescents (Bernstein and D'Onofrio 2009; Wilson and Klein 2000).

The adolescent population of the selected ED is approximately 50% white, 40% Hispanic, and 40% publicly insured (Ranney et al. 2014). Study exclusion criteria included a presentation to the ED for suicidality, psychosis, sexual assault, or child abuse; being in police or child protective services' custody (per state law); being unable to assent due to severity of illness or developmental disability; or having no consentable parent present. These exclusion criteria reflect the hospital's institutional review board (IRB) guidelines. Study approval was obtained from the hospital IRB.

Procedure

Adolescents aged 13 to 17 years presenting to an urban pediatric emergency department from February to December 2015 were pre-screened for eligibility using the electronic health record. Research assistants approached eligible adolescents and obtained verbal consent from parents and verbal assent from the adolescent. Adolescents completed a screening survey through REDCap on an iPad and received a small item (e.g. gum or pen) as compensation for completing the survey.

Measures

Demographics Participants reported demographic information using validated questions on age, gender, race, ethnicity, SES, and sexual orientation (Gender Identity in U.S. Surveillance Group 2013; Harris et al. 2003). Participants who reported receiving some form of financial assistance (e.g. reduced lunches at school or had parents receiving financial assistance) were categorized as low SES, as per prior self-report studies with adolescents (Shope et al. 1996). Individuals identifying as transgender were excluded from data analysis due to small sample size ($n = 11$). For race, participants were categorized as either White or non-White based on self-report; for ethnicity participants were categorized as either Hispanic or non-Hispanic. The binary categorization was performed to allow for comparative analysis of minority and non-minority subgroups within the dataset.

Cyberbullying Cyberbullying was assessed using two relevant items from the Student School Survey (Williams and Guerra 2007). Participants reported frequency of two statements, “I told lies or made fun of other teens using the Internet (email, instant messaging, cell phone text messaging, or websites)” and “Another teen or group of teens told lies or made fun of me using the Internet (email, instant messaging, cell phone text messaging, or websites)” (0 = never, 1 = once or twice, 2 = several times, 3 = a lot). The Student School Survey is one of eight scales the CDC recommends for the study of bullying and cyberbullying in adolescent populations (Hamburger et al. 2011). As described in the introduction, this study considers any involvement in cyberbullying, whether perpetrator, victim, or perpetrator-victim, to constitute cyberbullying.

Depressive Symptoms The Patient Health Questionnaire version 9 (PHQ-9; Kroenke et al. 2001) is a 9-item questionnaire that assesses depressive symptoms. Participants report past 2-week frequency of depressive symptoms, such as “feeling down, depressed, or hopeless” on a 4-point Likert scale (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly all the days). The scale produces a composite

score with higher scores indicating more severe symptoms of depression. However, it is the presence of depression that is clinically relevant, informing our decision to structure this as a categorical variable. For this study, participants scoring a 10 or greater on the PHQ-9 were classified as having moderate or severe depressive symptoms based on methodology from prior studies (Gilbody et al. 2007). This scale has good internal consistency for this study ($\alpha = 0.83$).

Suicidal Ideation Question 9 of the PHQ-9, “In the past two weeks have you had thoughts that you would be better off dead, or of hurting yourself,” assessed suicidal ideation. Response options range from “Not at all” to “Nearly every day.” For this analysis, the variable was dichotomized, with any positive response coded as suicidal ideation (i.e. any response other than “not at all” = 1 to indicate suicidal ideation). Research demonstrates question 9 of the PHQ-9 is strongly associated with future suicide attempts (Louzon et al. 2016; Simon et al. 2013, 2016).

PTSD Symptoms The Child PTSD Symptom Scale (CPSS; Foa et al. 2001) is a 17-question scale that assesses PTSD symptoms in children and adolescents. Participants were asked to think about a past upsetting or dangerous event and report the frequency of symptoms such as “not being able to remember an important part of the upsetting event” on a Likert scale (0 = not at all or only at one time; 1 = once a week or less/once in awhile; 2 = 2 to 4 times a week/half the time; 3 = 5 or more times a week/almost always). This scale produces a composite score, with higher scores indicating more severe PTSD symptoms. However, the presence of PTSD symptoms is clinically relevant, informing our decision to structure this as a dichotomous variable. For this study, participants with scores of 0 to 10 were coded as not having PTSD symptoms, and participants with scores 11 or greater were coded as having moderate to severe symptoms based on methodology from prior work (Foa et al. 2001; Ranney et al., 2016). In this study, the CPSS has good internal consistency ($\alpha = 0.93$).

Social Networking Use Participants reported which current social networking modalities they used on their mobile phone (e.g. texting, Facebook, Instagram, Twitter) (Ranney et al. 2012). Total number of social network platforms used was recorded for analysis, with four applications used as the maximum number.

Plan of Analysis

Descriptive statistics of the total surveyed population were calculated for gender, race, ethnicity, SES and sexual orientation. The frequency of cyberbullying involvement (i.e. bullying-only versus victim-only versus both) and the

characteristics of cyberbullying-involved adolescents were also calculated. To assess the relationship between demographic variables and cyberbullying involvement, t-tests and Chi square tests were performed as appropriate. To determine whether a difference in categorical mental health outcomes (depression, suicidal ideation, and PTSD) were present between adolescents involved in cyberbullying and those not involved, Chi square tests were performed. To control for correlation between demographic characteristics, number of social media platforms used, and cyberbullying involvement, an adjusted logistic regression was conducted, with past-year cyberbullying as the outcome. Finally, to determine whether cyberbullied adolescent demographic sub-groups had higher rates of suicidal ideation, depression, or PTSD, unadjusted and adjusted logistic regressions were conducted, broken down by demographic variables. As a sensitivity analysis, all analyses were repeated separating cyberbullying-involved adolescents into “victim only,”

“perpetrator only,” and “victim-perpetrator.” All data analyses were conducted using STATA 13 (StataCorp 2013).

Results

Demographics

Of the 1,190 eligible adolescents, 1,063 consented and assented to taking the screening survey, with 1,031 adolescents successfully completing the survey (86.6% response rate) (see Fig. 1). Demographics of the screened population are reported in Table 1. The sample was approximately half female ($n = 529$; 52.2%); 36.7% identified as non-white ($n = 356$); 29.1% identified as Hispanic ($n = 294$); 49.1% identified as low SES ($n = 506$); 7.4% of participants identified as LGB ($n = 74$). The mean age of participants was 14.9 years ($SD = 1.39$).

Fig. 1 Eligibility and Screening of ED Population

Table 1 Demographics of screened adolescent population (presented as n(%))

Characteristic	Total sample (N = 1,031)	Participants reporting any cyberbullying involvement (N = 253)	Participants not reporting any cyberbullying involvement (N = 776)
Female	529 (52.2%)	142 (57.3%)	385 (50.5%)
Non-white	356 (36.7%)	84 (35.4%)	265 (36.9%)
Hispanic	294 (29.1%)	66 (26.7%)	224 (29.9%)
Low SES	506 (49.1%)	135 (53.8%)	365 (47.7%)
LGB	74 (7.36%)	32 (13.2%)*	35 (4.67%)*
Age (Mean(SD))	14.9 (1.39) years	14.8 (1.31) years	15.0 (1.42) years
Number of social media platforms (Mean)	2.50 (1.24)	2.68 (1.21)**	2.46 (1.24)**

*Statistically significant on chi2 test ($p < .05$)

**Statistically significant in an ANOVA ($p < .05$)

Of adolescents who completed the screening survey, 256 (24.6%) reported at least one experience of cyberbullying in the past year. Fifty-eight participants (5.6%) reported cyberbullying perpetration in the past year; 115 participants (11.1%) reported being a victim of cyberbullying in the past year; 83 (8.0%) reported being both a cyberbully perpetrator and victim in the past year. Adolescents involved in any cyberbullying were 57.3% female, 35.4% non-white, 26.7% Hispanic, 53.8% low SES, 13.2% LGB, with a mean age of 14.8 years ($SD=1.31$) and on average used 2.68 different social media platforms ($SD=1.21$), with no significant demographic differences between those who were victims, perpetrators, and perpetrator-victims (Table 1).

To establish which adolescent sub-groups were most likely to be involved in cyberbullying, adjusted logistic regressions were conducted. LGB adolescents were 3.11 times more likely to be involved in cyberbullying than their heterosexual counterparts in the unadjusted model, and were 2.49 times more likely to be involved in cyberbullying than their heterosexual counterparts after controlling for all other demographic factors and social media use (Table 2). Adolescents using a great number of social media platforms were 1.16 times more likely to be involved in cyberbullying, even in an adjusted logistic regression controlling for all demographic variables (Table 2). Adolescents of low SES were 1.47 times more likely to be involved in cyberbullying when controlling for all other demographic factors and social media use

(Table 2), although, socioeconomic status in-and-of-itself (on unadjusted analyses) did not correlate with cyberbullying involvement (Table 1b).

Suicidal ideation, depression, and PTSD symptoms were more prevalent among participants who reported any past-year cyberbullying than those who reported no past-year cyberbullying involvement (Table 3). Our sensitivity analysis, examining adolescents in each category of cyberbullying involvement, obtained similar results.

Demographic Correlates of Mental Health Symptoms Among Adolescents Who Experience Cyberbullying

On unadjusted logistic regression, among adolescents reporting past-year cyberbullying, female gender did not significantly correlate with negative mental health outcomes, although minority race and ethnicity did (Table 4). Cyberbullying-involved adolescents who identified as LGB or low SES were significantly more likely to report depressive symptoms and PTSD symptoms than their heterosexual or high SES counterparts (Table 4). On adjusted logistic regression, controlling for all markers of minority status among cyberbullying-involved adolescents, LGB status was the only statistically significant correlate of depression and PTSD (Table 5). No demographic factors were significantly correlated with suicidal ideation.

Table 2 Correlates of past-year cyberbullying involvement among all surveyed adolescents ($n=1,031$)

Correlate	Unadjusted logistic regression Odds ratio	Adjusted logistic regression		
		95% confidence interval	Odds ratio	95% confidence interval
Female	1.31	0.98–1.75	1.14	0.83–1.57
Non-White	0.94	0.69–1.28	0.82	0.57–1.18
Hispanic	0.86	0.62–1.18	0.86	0.58–1.29
Low SES	1.28	0.96–1.70	1.47	1.05–2.05
LGB	3.11	1.88–5.15	2.49	1.45–4.28
Number of social media platforms used	1.16	1.03–1.31	1.15	1.01–1.31

Bold = statistically significant

Table 3 Prevalence of mental health outcomes among adolescents, by cyberbullying status ($n=1,031$)

Mental health outcome	Any cyberbullying $n=256$ (24.6%)	No cyberbullying $n=784$ (75.4%)	Chi squared, Pr
Suicidal ideation	19 (17.4%)	21 (2.68%)	11.7, Pr = 0.00
Depressive symptoms (PHQ-9 ≥ 10)	43 (16.8%)	61 (7.78%)	17.4, Pr = 0.00
PTSD symptoms (CPSS ≥ 11)	84 (33.9%)	91 (12.1%)	61.7, Pr = 0.00

Bold = statistically significant

Table 4 Demographic correlates of mental health outcomes in cyberbullied adolescents: unadjusted logistic regression ($n_{\text{total population of cyberbully-involved adolescents}} = 256$)

Predictor	Mental health outcomes		
	Model 1: suicidal ideation	Model 2: depression	Model 3: PTSD
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Female	1.54 (0.55–4.24)	1.92 (0.93–3.99)	1.13 (0.66–1.95)
Non-White	4.00 (1.44–11.1)	2.05 (1.04–4.01)	2.02 (1.15–3.53)
Hispanic	4.20 (1.61–11.0)	2.68 (1.35–5.33)	2.02 (1.13–3.62)
Low SES	2.55 (0.90–7.30)	3.40 (1.59–7.24)	2.23 (1.29–3.86)
LGB	2.03 (0.62–6.64)	4.58 (2.08–10.1)	3.54 (1.62–7.72)

Bold = statistically significant

Table 5 Demographic correlates of mental health outcomes in adolescents involved in cyberbullying: logistic regression adjusted for demographic factors ($n_{\text{total population of cyberbully-involved adolescents}} = 256$)

Predictor	Mental health outcomes		
	Model 1: suicidal ideation	Model 2: depression	Model 3: PTSD
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Female	1.41 (0.44–4.50)	1.57 (0.72–3.42)	1.03 (0.57–1.88)
Non-White	2.66 (0.76–9.36)	1.27 (0.56–2.91)	1.76 (0.90–3.47)
Hispanic	1.94 (0.57–6.59)	1.90 (0.81–4.46)	1.31 (0.62–2.74)
Low SES	1.99 (0.48–8.20)	2.27 (0.95–5.45)	1.59 (0.83–3.03)
LGB	1.39 (0.34–5.65)	3.15 (1.27–7.78)	4.21 (1.67–10.6)

Bold = statistically significant

Discussion

Previous quantitative studies on minority adolescents' involvement in cyberbullying are sparse. Our study demonstrates high rates of cyberbullying among adolescents presenting to an urban pediatric emergency department for any reason. These data, collected from a large sample of adolescent ED patients, provide novel estimates of the correlation between minority status, cyberbullying involvement, and the prevalence of negative mental health symptoms.

Minority race, ethnicity, gender and SES did not correlate with cyberbullying involvement or negative mental health symptoms in this adolescent population, after adjustment for other factors. Minority sexual orientation correlated with both cyberbullying involvement and negative mental health symptoms. Overall technology use also correlated with prevalence of cyberbullying. Our findings may help inform efforts to identify which high-risk adolescent populations should be recipients of targeted interventions aimed at preventing the negative health outcomes of cyberbullying.

Demographic Findings

Our findings regarding LGB adolescents strengthen prior literature on bullying in general, and on cyberbullying in particular. For instance, one cross-sectional study of adolescents in Wisconsin found those who identify as LGB experience higher rates of cyberbullying victimization (Schneider et al. 2012). Recent CDC data also shows higher rates of cyberbullying among LBG adolescents versus heterosexual adolescents (Kann, McManus et al. 2016). For LGB adolescents, cyberbullying may not be a novel experience. Since LGB individuals are more likely to experience in-person bullying compared to their heterosexual counterparts, it is possible that, with the advent of technology, cyberbullying has simply become an extension of in-person bullying (Kann, O'Malley Olsen et al. 2016). A recent 2016 cross-sectional study of adolescents living in Spain found that sexual minorities were more likely to be involved in both in-person and cyberbullying than their heterosexual counterparts (Llorant et al. 2016). Further research can determine whether

cyberbullying is an extension of the bullying already faced by this particular population, or whether it is a novel experience. Differentiating between the two will inform more specific bullying prevention interventions. Nonetheless, special attention should be paid to the prevention of cyberbullying and its mental health correlates among LGB adolescents.

We observed no correlation between gender, race, ethnicity, and cyberbullying involvement. In contrast, other studies have found associations between race, ethnicity, and cyberbullying involvement. For example, the 2011 CDC Youth Risk Behavior Survey found that the highest rates of cyberbullying victimization were among “Caucasians,” followed by “Other,” “Hispanics,” and “African Americans,” respectively (Messias et al. 2014). Our finding of gender as a non-correlate of cyberbullying is consistent with some, but not all previous studies (Aboujaoude et al. 2015). Several previous studies on gender differences in cyberbullying involvement may not be generalizable to the United States population, as they were conducted in populations in Singapore, Turkey, and the United Kingdom (Ang and Goh 2010; Erdur-Baker 2010; Fletcher et al. 2014).

Our results indicate that SES contributes independently to cyberbullying involvement only when controlling for other demographic factors and social media use. This finding suggests that other demographic factors (e.g. race, ethnicity) might be negative confounders and may worsen the effects of low SES on cyberbullying involvement. Supporting this hypothesis, Tippett and Wolke (2014) in a meta-analysis of twenty-eight studies reported in-person victims and bully-victims were slightly more likely to be of low SES, while victims were less likely to be of high SES. However, Tippett and Wolke (2014) concluded that SES was not a useful demographic factor by which to screen adolescents for cyberbullying prevention interventions. Rather, they concluded that all children regardless of SES should be involved in cyberbullying prevention interventions.

These differences between our analysis and prior studies of cyberbullying may be explained by the narrowing of socioeconomic and racial gaps in technology access over the past decade, resulting in concomitant equalization of access to social media through which adolescents may be cyberbullied (Lenhart 2015).

Mental Health Correlates in Adolescents Involved in Cyberbullying

Mental health symptoms have been repeatedly demonstrated to be more common among adolescents involved in cyberbullying, in comparison to adolescents who do not experience cyberbullying (Bauman et al. 2013; Hinduja and Patchin 2010; Kowalski and Limber 2013). Our study confirmed that cyberbullying-involved adolescents were more likely to experience negative mental health symptoms than

non-cyberbullying-involved adolescents. However, among those exposed to cyberbullying, sexual orientation was the only specific demographic correlate of negative mental health symptoms.

This finding further highlights the high-risk nature of LGB adolescents with respect to known mental health correlates of cyberbullying. Although cyberbullying has established, generally negative, mental health consequences, this analysis highlights a particularly high-risk population where special attention and targeted resources may be needed. Non-heterosexual adolescents have a greater likelihood of negative mental health outcomes and other high-risk health behaviors (Kann, O'Malley Olsen et al. 2016); the superimposed, increased threat of cyberbullying is therefore noteworthy. While sexual orientation is not a modifiable risk factor for negative mental health consequences, in-person bullying and cyberbullying is likely preventable. Further research can and should target LGB adolescents for cyberbullying prevention interventions, as well as for interventions to improve resiliency in the face of cyberbullying.

Technology Use as a Predictor of Cyberbullying Involvement

Finally, our data supports our hypothesis that greater use of technology would predispose adolescents to increased cyberbullying involvement, and would reduce the observed effect of minority status. This finding is inconsistent with previous studies that found adolescents using a greater number of technology platforms are not at an inherently greater risk of cyberbullying than adolescents who use fewer technology platforms (Mitchell et al. 2016). Previous research suggests that teens of different socioeconomic groups use different forms of social media (Lenhart 2015). It is conceivable that some forms of online social networking may be associated more strongly with negative outcomes with regards to cyberbullying. For example, negative experiences on Facebook have been correlated with increased rates of depressive symptoms in users (Rosenthal et al. 2016). Unfortunately, our sample size did not allow analysis by social media platform. Given that socioeconomic groups use social media platforms with differing frequencies, future studies should examine rates of cyberbullying by platform. Such research may also inform how to prevent cyberbullying based on the structure of the social media platform.

Of course, teens' technology preferences are constantly fluctuating. For example, between 2013 and 2015, Instagram and Snapchat moved from being novel, but largely unused, platforms to being among the most common social media networks used by teens (Lenhart 2015; Pew Research Center Fact Tank 2013). To account for and understand these fluctuations in technology use and how they may confound

demographic predictors, longitudinal studies of their relationships with cyberbullying are needed.

Limitations

As this is a secondary data analysis from a study recruiting high-risk adolescents from a pediatric emergency department, certain limitations are present. By recruiting in an emergency department, it is possible that our study sample has more at-risk adolescents than the general population. It is possible that some of the adolescents who were ineligible for this study based on IRB exclusion criteria are most at-risk for cyberbullying and its mental health sequelae. For instance, previous literature shows that those with higher levels of parental support have less cyberbullying involvement (Wang et al. 2009). Likewise, as a disproportionate percent of children in state custody identify as a sexual minority (Human Rights Campaign 2016), it is possible that our inability to approach such adolescents under-sampled LGB adolescents. These groups were unable to partake in the study due to IRB regulations. Finally, it is possible that those who did not speak English were more likely to identify as racial and ethnic minorities. However, only 5.5% of screened adolescents were excluded due to being non-English speaking. Future studies should consider alternative sampling methodology to account for these high-risk populations.

Another limitation of this study is the use of a single, two-question item to measure cyberbullying. This measure might not accurately classify a participant as being a victim or perpetrator of cyberbullying, and participants might be relying on a single instance when answering the question. This limitation was unavoidable in this analysis due to it being a secondary analysis. Future studies should utilize multiple empirically-supported measures of cyberbullying.

Additional limitations of our data include their self-reported nature and the conservative assumptions made regarding missing demographic data. For example, if participants responded “prefer not to answer” on questions about sexual orientation or SES, there were excluded from the analyses of these respective variables. It is possible that sexual minority respondents may have refused to answer these sensitive questions about sexual orientation (Makadon et al. 2007); if this is true, we may have misestimated the correlation of sexual orientation with cyberbullying and its mental health outcomes.

Future Directions for Research

This study highlights that sexual minority adolescents are at particularly high risk for cyberbullying involvement, and are more likely to report mental health symptoms than other minority adolescent populations involved in

cyberbullying. Future studies focused on sexual minority adolescents should be conducted longitudinally to understand consequences of cyberbullying over time, its temporal relationship to other predictors of mental health sequelae, and potential avenues for its prevention.

Additionally, although existing research informs mental health interventions for sexual minority adolescents (Kosciw et al. 2016, 2009; Mishna et al. 2009; O'Brien et al. 2016; Russell and Fish 2016), this research is not necessarily directly generalizable to cyberbullying-involved LGB adolescents (Dooley et al. 2009; Smith et al. 2008). Additional research is needed to develop culturally competent cyberbullying interventions to build resilience and reduce mental health symptoms among cyberbullying involved LGB adolescents. Increased research in this area should aim to eliminate cyberbullying as a modifiable risk factor for negative mental health symptoms in LGB adolescents who are already at an increased risk when compared to heterosexual adolescents. Our analysis also highlights the importance of obtaining data regarding specific social media platforms to best target future interventions.

While cyberbullying continues to be an issue for adolescents, research continues to illuminate which sub-groups face the greatest risk from cyberbullying with regards to their mental health outcomes. This study contributes to the literature by assessing rates of cyberbullying between minority and non-minority adolescent groups and comparing mental health symptoms between them. Additionally, further work was done to document the influence of social media on cyberbullying. Moderate to severe depressive symptoms, PTSD symptoms and suicidal ideation were more prevalent among cyberbullying-involved adolescents regardless of demographics. This is the first study to establish no correlation between cyberbullying and socioeconomic status, perhaps signaling a change in access to technology. The analysis performed here will provide as a baseline for future work around targeted mental health cyberbullying interventions for specific adolescent populations using social media.

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