Original Investigation

Cyberbullying Victimization and Mental Health in Adolescents and the Moderating Role of Family Dinners

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IMPORTANCE This study presents evidence that cyberbullying victimization relates to internalizing, externalizing, and substance use problems in adolescents and that the frequency of family dinners attenuate these associations.

OBJECTIVES To examine the unique association between cyberbullying victimization and adolescent mental health (after controlling differences in involvement in traditional, face-to-face bullying) and to explore the potential moderating role of family contact in this association.

DESIGN, SETTING, AND PARTICIPANTS This cross-sectional, observational study used survey data on 18 834 students (aged 12-18 years) from 49 schools in a Midwestern US state. Logistic regression analysis tested associations between cyberbullying victimization and the likelihood of mental health and substance use problems. Negative binomial regression analysis tested direct and synergistic contributions of cyberbullying victimization and family dinners on the rates of mental health and substance use problems.

EXPOSURES Frequency of cyberbullying victimization during the previous 12 months; victimization by traditional (face-to-face) bullying; and perpetration of traditional bullying.

MAIN OUTCOMES AND MEASURES Five internalizing mental health problems (anxiety, depression, self-harm, suicide ideation, and suicide attempt), 2 externalizing problems (fighting and vandalism), and 4 substance use problems (frequent alcohol use, frequent binge drinking, prescription drug misuse, and over-the-counter drug misuse).

RESULTS About one-fifth (18.6%) of the sample experienced cyberbullying during the previous 12 months. The frequency of cyberbullying positively related to all 11 internalizing, externalizing, and substance use problems (odds ratios from 2.6 [95% CI, 1.7-3.8] to 4.5 [95% CI, 3.0-6.6]). However, victimization related more closely to rates of problems in adolescents that had fewer family dinners.

CONCLUSIONS AND RELEVANCE Cyberbullying relates to mental health and substance use problems in adolescents, even after their involvement in face-to-face bullying is taken into account. Although correlational, these results suggest that family dinners (ie, family contact and communication) are beneficial to adolescent mental health and may help protect adolescents from the harmful consequences of cyberbullying.

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Bullying contributes to various health problems in adolescents[1,2] including anxiety and depression,[3,4] suicidal ideation,[5] self-harm,[6-8] and disruptive behavioral problems.[9] The rapid proliferation of online social media has drawn public attention to the issue of cyberbullying. About 1 in 5 adolescents has experienced online bullying in the past year,[10,11] and studies found that cyberbullying—like traditional bullying—increases the risk for internalizing and externalizing problems[12-14] and misuse of drugs and alcohol.[15,16] A meta-analysis found that the odds of suicidal ideation was 3.1 times greater in adolescents who had experienced cyberbullying than in those who had not.[17]

However, it is unclear whether cyberbullying contributes to mental health problems primarily because of its overlap with traditional (face-to-face) bullying. Juvonen and Gross[15] found that 85% of adolescents who were involved in online bullying were also involved in traditional forms of bullying. Other studies have found weak correlations between traditional bullying and cyberbullying.[18,19] Given the invasive nature of cyberbullying and that it is so difficult for parents and educators to monitor, it is important to understand whether cyberbullying uniquely contributes to mental health and substance use problems independently of verbal or physical forms of bullying.[20]

It is also important to identify protective factors for youths who are exposed to cyberbullying. Research on traditional bullying found that parent or peer support moderates the harmful effects associated with bullying.[21,22] Holt and Espelage[23] found that peer support moderated the association between victimization and symptoms of anxiety and depression whereas maternal support did not. However, a study by Davidson and Demaray[24] found fewer internalizing symptoms (eg, anxiety and depression) among adolescent female victims whose social support from parents was greater. Such findings may generalize to cyberbullying. However, we are unaware of prior research that specifically examined moderated effects of social supports on the relation between cyberbullying victimization and mental health nor on the mechanisms or modalities through which they operate.

Family dinners are one outlet through which family support is expressed and have established links to adolescent mental health and risk behavior.[25] Research has found that the frequency of evening family meals predicts adolescent mental health and risk behaviors owing, in part, to family contact and communication and parental involvement.[25,26] These are positive social assets for adolescent health that may provide opportunities for families to discuss online behavior and bullying and ways to cope with online harassment. However, it is unclear whether the frequency of family dinners has only direct links to adolescent health or can also moderate the health consequences of a specific stressor such as cyberbullying.

This study examined the association between cyberbullying victimization and mental health and substance use problems in adolescents and whether this association is moderated by family contact and communication. This study addressed gaps in the literature by first examining the association between cyberbullying and various mental health and substance use problems in adolescents. We controlled individual differences in involvement in traditional (face-to-face) bullying to examine the unique association between cyberbullying and health. We then explored the potential moderating role of family communication and contact—operationalized by the frequency of family dinners—on the relation between cyberbullying and health. We hypothesized that cyberbullying relates more closely to health problems among youths who have fewer family dinners.

Methods

Participants

The 2012 Dane County Youth Assessment evaluated health and health behaviors in a sample of 20 385 high school students in 49 middle schools and high schools across a Midwestern US state.[27] The number of participants per school ranged from 31 to 1554. The survey was voluntary, anonymous, and administered electronically at school. A waiver of parental consent was granted by notifying parents 4 weeks in advance of survey administration, inviting them to review the survey at their school district office and allowing them to opt out. More than 90% of students in most districts participated. The University of Illinois institutional review board approved the study procedures[27]; child written assent was obtained.

We excluded 1551 cases (7.6% of the sample) for which cyberbullying data were unavailable, resulting in a final sample of 18 834 adolescents. Removed cases were slightly older than the remaining sample (15.3 vs 15.0 years; $t = -6.9$; $P < .001$) and included fewer girls (35.9% vs 50.5%; $\chi^2_1 = 104.1$; $P < .001$) and fewer low-income students (10.1% vs 19.2%; $\chi^2_1 = 78.9$; $P < .001$). Their removal did not change the composition of the remaining sample. Participants were 50.7% girls and ranged in age from 12 to 18 years (mean [SD], 15.0 [1.7] years). With respect to race/ethnicity, 70.0% of the sample self-identified as white; 7.6% as black; 6.6% as Hispanic; 7.0% as mixed; and the remaining 8.8% as either Asian, Native American, Middle Eastern, or other. Also, 23.5% (95% CI, 18.8-28.9) of the sample qualified for free or reduced-cost school lunches (**Table 1**).

Measures

The frequency of cyberbullying victimization was measured with the item "In the past 12 months, how often have you been bullied, threatened, or harassed through the Internet or text messaging (never, rarely, sometimes, or often)?" The Bullying and Victimization subscales of the University of Illinois Aggression Scales measured the occurrence of face-to-face bullying.[28] The Bullying Subscale contained 6 items that measured the frequency of harassing, upsetting, or making fun of other students; spreading rumors; starting arguments; or socially excluding others (0 = never, 1 = 1-2 times, 2 = 3-4 times, 3 = ≥5 times; α = 0.87). The Victimization Subscale contained 4 items that measured the frequency of being picked on, made fun of, called names, and hit or pushed by other students (0 = never, 1 = 1-2 times, 2 = 3-4 times, 3 = ≥5 times; α = 0.86). Bullying perpetration scores ranged from 0 to 18 and victimization scores ranged from 0 to 12.

The survey also measured the presence of 5 internalizing problems (anxiety, depression, self-harm, and suicidal attempt in the previous 12 months, and suicidal thoughts in the previous 30 days), 2 externalizing problems (physical fighting and vandalizing property in the previous 30 days), and 4 substance use problems that may represent attempts to cope with cyberbullying (≥3 episodes of drunkenness, ≥3 episodes of binge drinking [≥5 alcoholic drinks on a single occasion] in the previous 30 days, and prescription drug misuse and over-the-counter [OTC] drug misuse during the previous 12 months). Drunkenness and binge drinking were assessed in a subsample of 6454 students owing to a technical issue during data collection. This subsample did not differ from the remaining sample on any demographic or health variable.

Family dinners were measured with the item "In an average week, how many days do you eat evening meals with your family (0 to 7)?" This item was consistent with prior studies of family dinners and adolescent health.[25,26] Other relevant survey items assessed age, sex, and qualification for free or reduced-cost school lunches, which was used to indicate low household income.

Data Analysis

The data were weighted to ensure a balanced representation of the sample across school districts. Confidence intervals were adjusted according to design effects of school cluster. We used ordinal regression to examine the contributions of age, sex, low household income, and involvement in traditional bullying to the frequency of cyberbullying victimization. Logistic regression was then used to estimate odds ratios (ORs) of mental health and substance use outcomes as a function of cyberbullying exposure, with other differences in age, sex, low household income, and involvement in traditional bullying held constant. Finally, the direct and interactive effects of victimization and family dinners on the number of reported internalizing, externalizing, substance use, and total problems were tested using negative binomial regressions. All analyses were performed using Stata/SE 13.1 (StataCorp).

Results

Descriptive statistics on the main study variables are shown in Table 1. A depressive episode was the most commonly reported mental health problem, found in 18.9% of the sample. Less common problems were suicide attempts (4.8%) and the misuse of OTC drugs (5.1%) and prescription drugs (6.4%). These results also showed that 18.6% of the sample had experienced cyberbullying at least once during the previous 12 months, although only 2.2% had experienced it often. As shown in the eTable in the Supplement, cyberbullying was more common in girls than in boys (OR, 2.95; 95% CI, 2.54-3.44) and increased with each additional year of age (OR, 1.07; 95% CI, 1.03-1.11) and involvement in traditional (face-to-face) bullying, either as the target (OR, 1.37; 95% CI, 1.33-1.40) or an aggressor (OR, 1.12; 95% CI, 1.08-1.16). Family dinners per week negatively related to the odds of cyberbullying (OR, 0.91).

Table 1. Sample Characteristics and Prevalence of Cyberbullying and Mental Health and Substance Use Problems

Variable	Total Participants, Unweighted No.	% (95% CI)
Sample characteristics		
Sex		
Male	9287	49.4 (48.4-50.3)
Female	9488	50.7 (49.7-51.6)
Low household income	3609	23.5 (18.8-28.9)
Race/ethnicity		
White	13 613	70.0 (66.0-73.7)
Black	1114	7.6 (5.7-10.0)
Hispanic	1051	6.6 (5.2-8.4)
Mixed	1406	7.0 (6.6-7.4)
Other	1650	8.8 (8.0-9.7)
Cyberbullying victimization		
Never	15 207	81.4 (80.2-82.6)
Rarely	2247	11.5 (10.7-12.4)
Sometimes	960	4.9 (4.4-5.4)
Often	420	2.2 (1.9-2.5)
Internalizing problems		
Anxiety	3093	16.43 (15.14-17.80)
Depressed	3443	18.89 (17.43-20.45)
Self-harm	2172	11.50 (10.71-12.34)
Suicidal thoughts	2364	12.56 (11.74-13.43)
Suicide attempt	911	4.84 (4.44-5.28)
Externalizing problems		
Physical fighting	2141	12.04 (10.77-13.44)
Vandalized property	1973	10.71 (9.88-11.60)
Substance use problems		
Binge drinking	901	12.36 (11.28-13.53)
Drunk ≥3 times	775	14.51 (13.32-15.78)
Prescription drug misuse	1164	6.35 (5.58-7.23)
OTC drug misuse	918	5.10 (4.44-5.86)
	Mean (SD)	α (Range)[a]
Family dinners	4.4 (2.3)	NA (0-7)
Internalizing problems	0.6 (1.2)	0.74 (0-5)
Externalizing problems	0.2 (0.5)	0.44 (0-2)
Substance use problems	0.2 (0.8)	0.86 (0-4)
Total problems	1.9 (1.9)	0.78 (0-11)

Abbreviations: NA, not applicable; OTC, over the counter.

[a] α, Cronbach alpha coefficient.

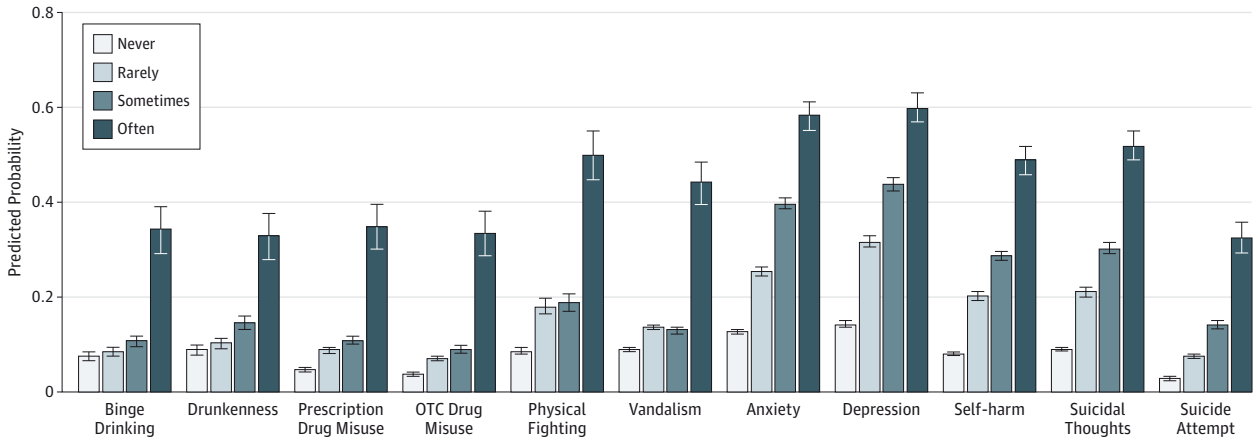
The first hypothesis was tested using logistic regression analyses (**Table 2**). Eleven regression models included sex, age, low household income, face-to-face bullying involvement (perpetration and victimization), family dinners, and cyberbullying victimization (entered as dummy variables with rarely, sometimes, and often responses compared with a never reference group). The odds of substance use problems (binge drinking, drunkenness, and prescription and OTC drug misuse) and externalizing problems (fighting and vandalism) were lower in girls than in boys, and the odds of internalizing problems (high anxiety, depression, self-harm behaviors, suicidal thoughts, and suicide attempt) were higher in girls. Age negatively related to all 11 problems, with each additional year of

Table 2. Odds Ratios of Substance Use and Mental Health Problems

Variable	Odds Ratio (95% CI)										
	Binge Drinking	Drunkenness	Fighting	Vandalism	Prescription Drug Misuse	OTC Drug Misuse	Anxiety	Depression	Self-harm	Suicidal Thoughts	Suicide Attempt
Female	0.58 (0.45-0.75)	0.68 (0.55-0.86)	0.45 (0.39-0.52)	0.47 (0.37-0.59)	0.67 (0.56-0.79)	0.55 (0.45-0.68)	1.56 (1.38-1.75)	1.40 (1.25-1.56)	1.76 (1.49-2.08)	1.26 (1.11-1.42)	1.18 (0.96-1.44)
Age	0.97 (0.94-0.99)	0.96 (0.94-0.98)	0.88 (0.86-0.89)	0.92 (0.90-0.94)	0.90 (0.89-0.92)	0.90 (0.88-0.92)	0.88 (0.87-0.89)	0.90 (0.88-0.91)	0.83 (0.81-0.84)	0.87 (0.86-0.88)	0.81 (0.79-0.82)
Low household income	0.82 (0.68-0.99)	0.79 (0.62-1.00)	3.05 (2.47-3.76)	1.46 (1.22-1.75)	1.13 (0.86-1.49)	1.53 (1.28-1.82)	1.21 (1.06-1.38)	1.88 (1.67-2.13)	1.34 (1.16-1.54)	1.64 (1.41-1.91)	1.68 (1.43-1.97)
Harassed others	1.17 (1.14-1.21)	1.17 (1.14-1.21)	1.31 (1.27-1.35)	1.24 (1.21-1.26)	1.22 (1.19-1.25)	1.21 (1.18-1.24)	1.05 (1.02-1.08)	1.03 (1.01-1.05)	1.09 (1.06-1.11)	1.05 (1.02-1.08)	1.10 (1.06-1.14)
Bullying victim	0.89 (0.86-0.91)	0.89 (0.87-0.92)	1.13 (1.09-1.16)	0.99 (0.97-1.01)	0.90 (0.87-0.93)	0.93 (0.90-0.97)	1.11 (1.09-1.14)	1.11 (1.09-1.13)	1.10 (1.08-1.13)	1.16 (1.14-1.18)	1.10 (1.06-1.14)
Family dinners	0.81 (0.78-0.84)	0.82 (0.79-0.84)	0.95 (0.92-0.98)	0.91 (0.88-0.94)	0.80 (0.77-0.83)	0.79 (0.76-0.82)	0.83 (0.81-0.85)	0.83 (0.81-0.85)	0.85 (0.82-0.88)	0.84 (0.81-0.86)	0.82 (0.79-0.85)
Cyberbullying victimization											
Rarely	0.99 (0.80-1.24)	1.02 (0.88-1.19)	1.67 (1.39-2.00)	1.37 (1.17-1.60)	1.66 (1.31-2.12)	1.75 (1.38-2.22)	1.55 (1.38-1.75)	2.08 (1.81-2.39)	1.99 (1.73-2.28)	1.84 (1.60-2.13)	1.81 (1.43-2.28)
Sometimes	1.45 (1.01-2.07)	1.58 (1.22-2.03)	1.41 (1.08-1.83)	1.32 (0.93-1.86)	2.20 (1.54-3.14)	2.26 (1.61-3.16)	2.56 (2.13-3.09)	2.77 (2.21-3.48)	2.66 (2.11-3.35)	2.43 (1.93-3.07)	3.01 (2.30-3.93)
Often	3.63 (2.50-5.28)	2.59 (1.77-3.78)	2.55 (1.74-3.75)	2.86 (1.71-4.79)	4.49 (3.04-6.63)	4.37 (2.86-6.68)	3.27 (2.42-4.40)	3.49 (2.56-4.77)	3.30 (2.38-4.56)	2.97 (2.03-4.35)	3.47 (2.25-5.36)

Abbreviation: OTC, over the counter.

Figure 1. Predicted Probabilities of 11 Mental Health and Substance Use Problems in Adolescents by Cyberbullying Victimization



OTC indicates over the counter.

age reducing ORs from 19% (suicide attempt) to 3% (binge drinking). Low household income related to higher ORs of internalizing problems (anxiety, depression, self-harm, suicidal thoughts, and suicide attempts), externalizing problems (fighting and vandalism), and OTC drug misuse. The perpetration of face-to-face bullying positively related to the ORs of all health problems. Victimization by face-to-face bullying positively related to some outcomes (fighting, depression, self-harm, suicidal thoughts, and suicide attempts) and negatively related to others (binge drinking, drunkenness, and prescription and OTC drug misuse). In other analyses (not shown), victimization from traditional bullying positively related to all 11 outcomes when cyberbullying was removed from these models, which suggests its relation to substance use problems was mediated by cyberbullying. Family dinners negatively related to all health outcomes (range, OR, 0.79; 95% CI, 0.76-0.82 [OTC drug misuse] to OR, 0.95; 95% CI, 0.92-0.98 [fighting]).

With these differences taken into account, cyberbullying victimization related to elevated ORs of all 11 mental health and substance use problems. Adolescents who were most often victimized (compared with those who were never victimized); had more than twice the ORs of having been drunk, gotten into a fight, vandalized property, and had suicidal thoughts; more than 3 times the ORs of binge drinking, high anxiety, self-harm, and suicide attempt; and more than 4 times the OR of misusing prescription drugs and OTC drugs. **Figure 1** shows the predicted probabilities of mental health and substance use

Table 3. Negative Binomial Regressions of Mental Health and Substance Use Problems

Variable	Problems, IRR (95% CI)			
	Internalizing	Externalizing	Substance Use	Total
Female	1.44 (1.33-1.56)	0.55 (0.49-0.61)	0.65 (0.56-0.76)	1.09 (1.03-1.16)
Age	0.94 (0.94-0.95)	0.94 (0.92-0.95)	0.99 (0.97-1.01)	1.00 (0.99-1.01)
Low household income	1.44 (1.34-1.54)	1.74 (1.54-1.97)	1.23 (0.98-1.56)	1.52 (1.41-1.64)
Harassed others	1.04 (1.03-1.06)	1.13 (1.12-1.14)	1.16 (1.13-1.19)	1.09 (1.08-1.10)
Bullying victim	1.10 (1.09-1.11)	1.04 (1.03-1.06)	0.93 (0.89-0.98)	1.08 (1.07-1.09)
Cyberbullied				
Rarely	1.31 (1.13-1.50)	1.33 (1.08-1.65)	1.11 (0.79-1.55)	1.33 (1.17-1.52)
Sometimes	1.33 (1.10-1.59)	1.05 (0.82-1.36)	1.51 (1.15-1.99)	1.30 (1.10-1.54)
Often	1.38 (1.05-1.82)	0.73 (0.58-0.93)	1.84 (1.17-2.88)	1.34 (1.04-1.72)
Family dinner interactions	0.86 (0.84-0.88)	0.93 (0.91-0.95)	0.79 (0.76-1.83)	0.88 (0.87-0.90)
Interactions				
Dinners × rarely	1.06 (1.02-1.09)	1.03 (0.99-1.07)	1.07 (0.98-1.16)	1.04 (1.01-1.07)
Dinners × sometimes	1.10 (1.07-1.14)	1.07 (1.02-1.13)	1.08 (1.00-1.16)	1.08 (1.05-1.12)
Dinners × often	1.09 (1.03-1.15)	1.11 (1.05-1.18)	1.12 (1.03-1.21)	1.09 (1.04-1.14)

Abbreviation: IRR, incident rate ratio.

problems by cyberbullying (adjusted for differences in sex, age, low household income, and involvement in face-to-face bullying).

We then combined these outcomes into composite variables that represented rates of internalizing problems (α = 0.74), externalizing problems (α = 0.44), substance use problems (α = 0.86), and total problems (α = 0.78). Table 1 shows descriptive statistics on these variables. **Table 3** shows the results of 4 regression analyses with the incident rate ratios of each outcome reported. Incident rate ratios represent changes in the rate of symptoms attributed to 1-unit differences in the predictor variable. Girls reported lower rates of externalizing problems and higher rates of internalizing and substance use problems than boys. Age positively related only to the rate of substance use problems, whereas low household income and the perpetration of face-to-face bullying positively related to all problem areas. Victimization by face-to-face bullying increased the rates of internalizing and externalizing problems but not substance use problems.

Finally, family dinners moderated the relations between cyberbullying and the rates of internalizing, externalizing, substance use, and total problems (Table 3). We probed these interactions by estimating predicted rates of each problem by level of bullying and the frequency of family dinners (**Figure 2**). In each domain, health disparities across levels of victimization tended to narrow as family dinners increased. For example, at 4 or more dinners per week, there was an approximately 4-fold difference in the rates of total problems between no victimization and frequent victimization. At zero dinners per week, this difference was more than 7-fold.

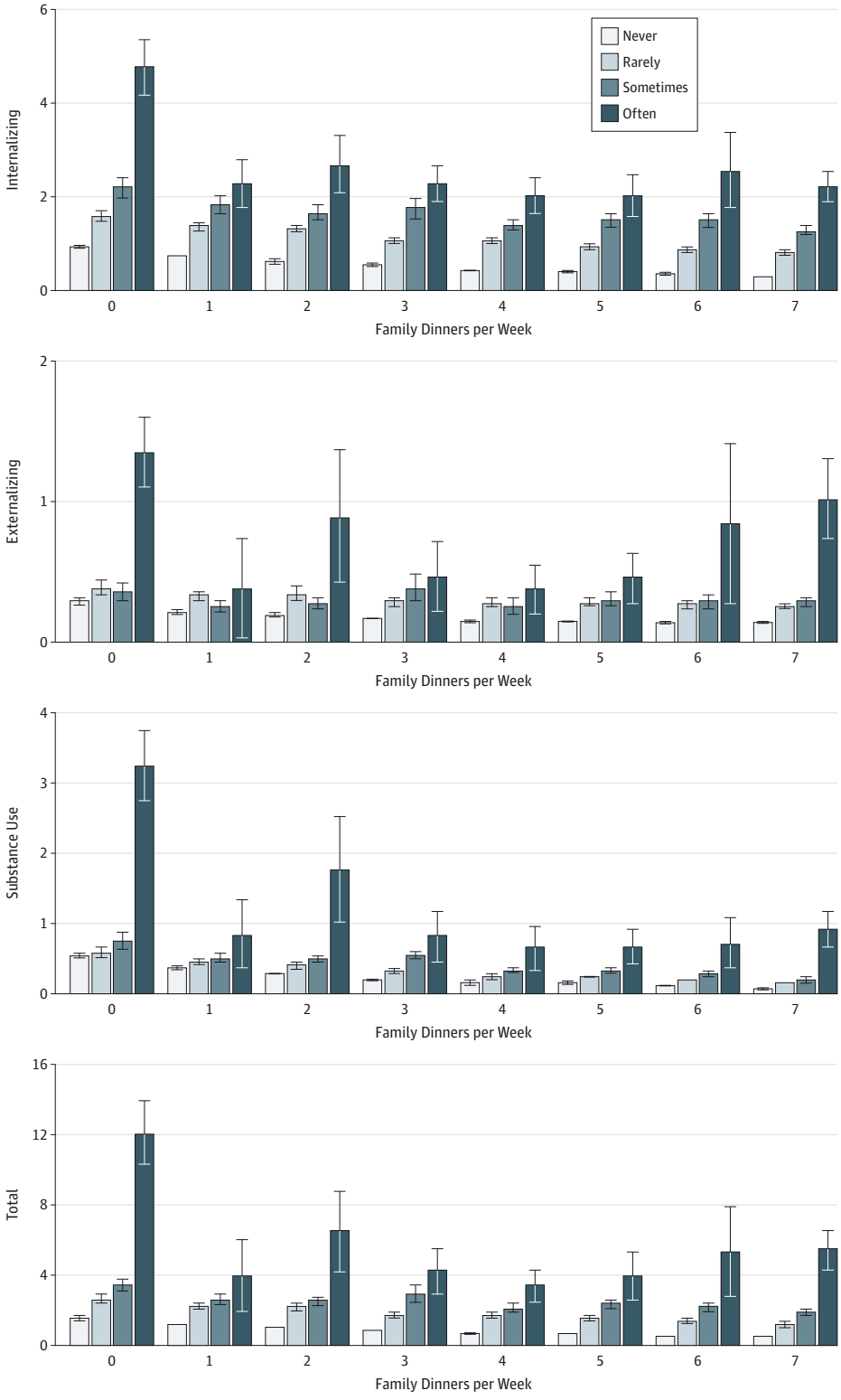
Discussion

This study found that cyberbullying related to every mental health and substance use problem that was measured, even after exposure and involvement in face-to-face bullying were statistically controlled. The findings suggest that the health consequences of cyberbullying are not completely attributed to its co-occurrence with face-to-face bullying and is therefore a legitimate focus of preventive interventions.[12,14] The results also showed evidence of a moderating role of family contact and communication on the associations between cyberbullying and the rates of internalizing, externalizing, and substance use problems. Family dinners shared a negative association with mental health and substance use problems, and these associations strengthened as cyberbullying became more frequent.

It is important to interpret the frequency of family dinners as a proxy of several contextual factors that may support and protect adolescent health. With more frequent dinners comes more regular family contact, which facilitates parental guidance and support, open communication with parents and siblings, and opportunities for adolescents to express problems and concerns as they arise.[25,26] Therefore, family dinners are indicative of a broad set of family characteristics that may promote adolescent health and buffer the impact of stressful situations on adolescent functioning.[29]

The results also showed that cyberbullying victimization was more common among girls than boys but not closely related to age nor to disadvantaged socioeconomic back-

Figure 2. Predicted Rates of Internalizing, Externalizing, Substance Use, and Total Problems by Cyberbullying Victimization and Family Dinners per Week



grounds. Other studies found similar sex differences in cyberbullying[30-32] and relational aggression,[33] whereas some found no sex differences in cyberbullying.[34] It is possible that the girls in our study were more likely to report bullying than boys.[35,36] Unfortunately, without data from multiple informants or data on the perpetration of cyberbullying, we were

unable to verify an underreporting of victimization among boys and examine the sex distribution of groups of victims, perpetrators, and bully victims.

The strengths of this study included a large sample and an assessment of multiple health domains including self-harm, suicidal thoughts, and suicide attempts. Such data are rarely reported in the pediatric literature and are helpful in documenting the level of distress associated with cyberbullying. Additionally, the focus on family dinners rather than general perceptions of family support provided practical information to families about one way to support youths who are victimized online. The limitations of the study included a single item measure of cyberbullying that did not capture all the criteria of commonly used bullying assessments (ie, power differential between aggressors and victims), the potential underreporting of victimization by boys, and the cross-sectional design, which precluded firm conclusions regarding the direction of the effects between victimization, family dinners, and health problems. The associations between these variables were likely transactional. Adolescents with emotional or behavioral problems may become the targets of cyberbullying, become reluctant to interact with their families, or both.[9]

Furthermore, based on these findings, we did not conclude that cyberbullying alone is sufficient to produce poor health outcomes nor that family dinners alone can inoculate adolescents from such exposures. Such an oversimplified interpretation of these associations disregards other exacerbating and protective factors throughout the social environment.[37] Instead, these findings support calls for integrated approaches to protecting victims of cyberbullying that encompass individual coping skills and family and school social supports.[38-40] Given the evidence that peer and parent support can moderate the association between bullying and health outcomes, it is important to identify the mechanisms through which these positive outcomes can be achieved. This study suggests that regular family dinners are one such mechanism. However, future research should consider other sources of social support that help reduce cyberbullying and its harmful effects on adolescent health.

Conclusions

Cyberbullying uniquely relates to internalizing, externalizing, and substance use problems in adolescents. The associations are not explained by involvement in traditional (face-to-face) forms of bullying. However, their strength is moderated by the frequency of family dinners. Health care professionals should be aware of the potential health risks associated with cyberbullying and the benefits associated with regular and frequent family contact. Further study is needed to identify other paths through which social support can protect adolescents from the risks associated with online bullying.

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Acquisition, analysis, or interpretation of data: Elgar, Napoletano, Saul, Dirks, Craig, Poteat, Holt.
Drafting of the manuscript: Elgar, Napoletano, Saul, Poteat.
Critical revision of the manuscript for important intellectual content: Elgar, Saul, Dirks, Craig, Poteat, Holt, Koenig.
Statistical analysis: Elgar, Saul.
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REFERENCES

1. Glew GM, Fan M, Katon W, Rivara FP, Kernic MA. Bullying, psychosocial adjustment, and academic performance in elementary school. *Arch Pediatr Adolesc Med*. 2005;159(11):1026-1031.

2. Fekkes M, Pijpers F, Fredriks AM, Vogels T, Verloove-Vanhorick SP. Do bullied children get ill, or do ill children get bullied? a prospective cohort study on the relationship between bullying and health-related symptoms. *Pediatrics*. 2006;117(5):1568-1574.

3. Fekkes M, Pijpers FI, Verloove-Vanhorick SP. Bullying behavior and associations with psychosomatic complaints and depression in victims. *J Pediatr*. 2004;144(1):17-22.

4. Copeland WE, Wolke D, Angold A, Costello EJ. Adult psychiatric outcomes of bullying and being bullied by peers in childhood and adolescence. *JAMA Psychiatry*. 2013;70(4):419-426.

5. Klomek AB, Sourander A, Kumpulainen K, et al. Childhood bullying as a risk for later depression and suicidal ideation among Finnish males. *J Affect Disord*. 2008;109(1-2):47-55.

6. Tharp-Taylor S, Haviland A, D'Amico EJ. Victimization from mental and physical bullying and substance use in early adolescence. *Addict Behav*. 2009;34(6-7):561-567.

7. Fisher HL, Moffitt TE, Houts RM, Belsky DW, Arseneault L, Caspi A. Bullying victimisation and risk of self harm in early adolescence: longitudinal cohort study. *BMJ*. 2012;344:e2683.

8. Winsper C, Lereya T, Zanarini M, Wolke D. Involvement in bullying and suicide-related behavior at 11 years: a prospective birth cohort study. *J Am Acad Child Adolesc Psychiatry*. 2012;51(3):271-282.e3.

9. Arseneault L, Walsh E, Trzesniewski K, Newcombe R, Caspi A, Moffitt TE. Bullying victimization uniquely contributes to adjustment problems in young children: a nationally representative cohort study. *Pediatrics*. 2006;118(1):130-138.

10. Kowalski R, Limber S. Electronic bullying among middle school students. *J Adolesc Health*. 2007;41(suppl 1):s22-s30.

11. Mitchell KJ, Ybarra M, Finkelhor D. The relative importance of online victimization in understanding depression, delinquency, and substance use. *Child Maltreat*. 2007;12(4):314-324.

12. Sourander A, Brunstein Klomek A, Ikonen M, et al. Psychosocial risk factors associated with cyberbullying among adolescents: a population-based study. *Arch Gen Psychiatry*. 2010;67(7):720-728.

13. Didden R, Scholte RH, Korzilius H, et al. Cyberbullying among students with intellectual and developmental disability in special education settings. *Dev Neurorehabil*. 2009;12(3):146-151.

14. Katzer C, Fetchenhauer D, Belschak F. Cyberbullying: who are the victims? a comparison of victimization in Internet chatrooms and victimization in school. *J Media Psychol*. 2009;21:25-36.

15. Juvonen J, Gross EF. Extending the school grounds? bullying experiences in cyberspace. *J Sch Health*. 2008;78(9):496-505.

16. Hinduja S, Patchin JW. Offline consequences of online victimization: school violence and

delinquency. *J Sch Violence*. 2007;6(3):89-112. doi:10.1300/J202v06n03_06.

17. van Geel M, Vedder P, Tanilon J. Relationship between peer victimization, cyberbullying, and suicide in children and adolescents: a meta-analysis. *JAMA Pediatr*. 2014;168(5):435-442.

18. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: its nature and impact in secondary school pupils. *J Child Psychol Psychiatry*. 2008;49(4):376-385.

19. Ybarra ML, Diener-West M, Leaf PJ. Examining the overlap in internet harassment and school bullying: implications for school intervention. *J Adolesc Health*. 2007;41(6)(suppl 1):S42-S50.

20. Cross D, Li Q, Smith PK. *Cyberbullying in the Global Playground: Research From International Perspectives*. Oxford, England: Wiley-Blackwell; 2012.

21. Hodges EV, Boivin M, Vitaro F, Bukowski WM. The power of friendship: protection against an escalating cycle of peer victimization. *Dev Psychol*. 1999;35(1):94-101.

22. Prinstein MJ, Boergers J, Vernberg EM. Overt and relational aggression in adolescents: social-psychological adjustment of aggressors and victims. *J Clin Child Psychol*. 2001;30(4):479-491.

23. Holt MK, Espelage DL. Perceived social support among bullies, victims, and bully-victims. *J Youth Adolesc*. 2007;36(8):984-994.

24. Davidson L, Demaray MK. Social support as a moderator between victimization and internalizing-externalizing distress from bullying. *School Psych Rev*. 2007;36(3):383-405.

25. Fulkerson JA, Story M, Mellin A, Leffert N, Neumark-Sztainer D, French SA. Family dinner meal frequency and adolescent development: relationships with developmental assets and high-risk behaviors. *J Adolesc Health*. 2006;39(3):337-345.

26. Elgar FJ, Craig W, Trites SJ. Family dinners, communication, and mental health in Canadian adolescents. *J Adolesc Health*. 2013;52(4):433-438.

27. Dane County Youth Commission. 2012 Dane County Youth Assessment: overview report. http://pdf.countyofdane.com/humanservices/youth/assessment_surveys/2012/youth_2012_overview.pdf.

28. Espelage DL, Holt MK. Bullying and victimization during early adolescence: peer influences and psychosocial correlates. *J Emotional Abuse*. 2001;2:123-142. doi:10.1300/J135v02n02_08.

29. Musick K, Meier A. Assessing causality and persistence in associations between family dinners and adolescent well-being. *J Marriage Fam*. 2012;74(3):476-493.

30. Wang J, Iannotti RJ, Nansel TR. School bullying among adolescents in the United States: physical, verbal, relational, and cyber. *J Adolesc Health*. 2009;45(4):368-375.

31. Dempsey AG, Sulkowski ML, Nichols R, Storch EA. Differences between peer victimization in cyber and physical settings and associated psychosocial adjustment in early adolescence. *Psychol Sch*. 2009;46(10):962-972. doi:10.1002/pits.20437.

32. Kowalski RM, Limber SP. Electronic bullying among middle school students. *J Adolesc Health*. 2007;41(6)(suppl 1):S22-S30.

33. Rose AJ, Rudolph KD. A review of sex differences in peer relationship processes: potential trade-offs for the emotional and behavioral development of girls and boys. *Psychol Bull*. 2006;132(1):98-131.

34. Tokunaga RS. Following you home from school: a critical review and synthesis of research on cyberbullying victimization. *Comput Human Behav*. 2010;26(3):277-287.

35. Li Q. Cyberbullying in schools: a research of gender differences. *Sch Psychol Int*. 2006;27(2):157-170.

36. Buhs ES, McGinley M, Toland MD. Overt and relational victimization in Latinos and European Americans: measurement equivalence across ethnicity, gender, and grade level in early adolescent groups. *J Early Adolesc*. 2010;30(1):171-197.

37. Hertz MF, Donato I, Wright J. Bullying and suicide: a public health approach. *J Adolesc Health*. 2013;53(1)(suppl):s1-s3.

38. Borowsky IW, Taliaferro LA, McMorris BJ. Suicidal thinking and behavior among youth involved in verbal and social bullying: risk and protective factors. *J Adolesc Health*. 2013;53(1)(suppl):s4-s12.

39. Lubell KM, Vetter JB. Suicide and youth violence prevention: The promise of an integrated approach. *Aggress Violent Behav*. 2006;11:167-175.

40. Williams KR, Guerra NG. Prevalence and predictors of internet bullying. *J Adolesc Health*. 2007;41(6)(suppl 1):S14-S21.