

ORIGINAL ARTICLE

The association between bullying and eating disorders: A case-control study

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Abstract

Objective: Childhood bullying is associated with a range of adverse mental health outcomes, and here we investigated the association between bullying exposure and eating disorders (EDs).

Method: In this case-control study, we compared bullying history in individuals with EDs with community controls. Participants ($n = 890$, mean age = 29.50 ± 10.60) completed an online self-report battery assessing bullying history and lifetime history of bulimia nervosa (BN), binge-eating disorder (BED), and anorexia nervosa (binge-eating/purging (AN-BP) or restrictive (AN-R) subtype). Logistic regressions were performed to estimate odds ratios (ORs).

Results: In the combined ED sample, individuals with a history of any ED were significantly more likely than controls to have experienced bullying victimization during childhood or adolescence (ORs = 1.99–3.30), particularly verbal, indirect, and digital bullying. Bullying prior to ED onset was also significantly more common than bullying within the same time frame for controls (ORs = 1.75–2.16). Further analysis showed that these effects were due to individuals with BN or BED reporting significantly more lifetime ($p < .001$) and premorbid bullying ($p = .002$) than controls, while individuals in the other diagnostic subgroups did not differ significantly from controls.

Discussion: Our results confirm an association between bullying and binge-eating/purging ED subtypes. Prospective studies are needed to establish bullying as a risk factor for EDs.

KEYWORDS

anorexia nervosa, binge-eating disorder, bulimia nervosa, bullying, case-control studies, feeding and eating disorders, risk factors

1 | INTRODUCTION

Bullying is a form of aggressive behavior that is intentional, occurs repeatedly, and targets a less powerful individual or someone who has difficulty defending themselves (Olweus, 1994). These behaviors can be physical in nature (e.g., hitting, kicking, stealing), verbal (e.g., name-calling, threatening), or indirect (sometimes referred to as “relational,” e.g., exclusion from social groups, spreading lies or rumors; Björkqvist, Lagerspetz, & Kaukiainen, 1992). Bullying can also occur digitally (cyber-bullying), for example teasing and exclusion on online platforms and social media. Involvement in bullying is common; a recent meta-analysis of children and adolescents found that 25% had been bullied and 12% had bullied others, with the prevalence being lower for digital bullying (7% and 3%, respectively; Jadambaa et al., 2019). However, digital bullying is a constantly evolving field of research, and other recent studies have reported prevalences of 17% (Eyuboglu et al., 2021), 13% (Kaiser, Kyrrestad, & Fossum, 2020), and 5% (Skilbred-Fjeld, Reme, & Mossige, 2020) for involvement in digital bullying.

Being exposed to bullying during childhood or adolescence can negatively impact social development and psychological well-being (Troop-Gordon, 2017). Bullying victimization has been linked to adverse mental health outcomes, including anxiety and poor self-esteem (Wolke & Sapouna, 2008), psychosomatic problems (Gini & Pozzoli, 2013), psychotic symptoms (Schreier, Wolke, & Thomas, 2009; van Dam et al., 2012), depression (Reijntjes, Kamphuis, Prinzie, & Telch, 2010), and suicidality (Islam, Khanam, & Kabir, 2020; Klomek, Sourander, & Gould, 2010), and these problems can persist into adulthood (Ttofi, Farrington, Lösel, & Loeber, 2011). Moreover, enduring effects of bullying victimization include higher rates of hospitalizations due to psychiatric illness and suicidality (Copeland, Wolke, Angold, & Costello, 2013; John et al., 2018; Winsper, Lereya, Zanarini, & Wolke, 2012; Wolke, Copeland, Angold, & Costello, 2013). Current evidence suggests that those who bully others (perpetrators) also have adverse mental health outcomes (Copeland et al., 2013; Skilbred-Fjeld et al., 2020; Sourander et al., 2009).

Despite the wealth of studies indicating an association between bullying and psychiatric disorders, few have investigated bullying history in eating disorders (EDs). Bullying victimization has been associated with a range of ED symptoms such as restricted eating, bulimic behaviors, and binge eating in both clinical and non-clinical populations (Copeland et al., 2015; Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006; Kwan, Gordon, Minnich, Carter, & Troop-Gordon, 2017), but only a few studies have directly compared bullying history in people with and without EDs. A recent review and meta-analysis showed that individuals with EDs were two- to threefold more likely to have experienced bullying prior to ED onset than healthy controls (Lie, Rø, & Bang, 2019). Bullying history appeared to be more frequent in individuals with bulimia nervosa (BN) and binge-eating disorder (BED) than in individuals with anorexia nervosa (AN), although few studies included AN samples. Even fewer studies considered differences between restricting (AN-R) and binge-eating/purging (AN-BP) AN subtypes. The same review highlighted the need for

more comprehensive studies, and also revealed several methodological limitations; mainly the inconsistent definitions of the term “bullying” and a lack of studies investigating whether bullying occurred prior to ED onset (Lie et al., 2019). Moreover, only a few studies have investigated history of bullying others among individuals with EDs, with mixed evidence (Copeland et al., 2015; Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000; Kaltiala-Heino, Rissanen, Rimpelä, & Rantanen, 2003). While some studies have investigated digital bullying and ED psychopathology (Marco & Tormo-Irun, 2018; Marco, Tormo-Irun, Galán-Escalante, & Gonzalez-García, 2018), there is still limited evidence on the possible impact of digital bullying on the development of EDs. Therefore, more studies are needed to clarify the association between bullying and EDs, which will advance our understanding of etiology and inform treatment.

The current study expands on previous findings and knowledge gaps identified in a previous meta-analysis (Lie et al., 2019). We compared school-age bullying experiences among predominantly female individuals with a lifetime history of EDs and individuals with no ED history. To overcome some of the limitations of the existing literature; we assessed lifetime history of DSM-5 defined EDs, used a conservative definition of bullying, and distinguished between bullying types. Our primary aims were (a) to investigate whether bullying exposure is more common among individuals with EDs than controls, and (b) to retrospectively assess whether bullying exposure prior to ED onset age is more common than bullying within the same time frame for controls. Because previous studies have found specific associations between bullying and binge-eating/purging subtypes of EDs, we included a secondary aim (c) to investigate whether bullying exposure differed between binge-eating/purging and restrictive ED subtypes. We hypothesized that individuals with EDs would report more frequent bullying than controls, and that the association would be stronger for binge-eating/purging subtypes than restrictive subtypes.

2 | METHOD

2.1 | Design

This case-control study was conducted as part of the Eating Disorders: Genes & Environment (EDGE) project, which investigates genetic and environmental risk factors for the development of EDs and is approved by the Norwegian Regional Committee for Medical and Health Research Ethics (#2017/0606). Written informed consent was obtained from all participants.

2.2 | Participants and procedures

A total of 916 individuals participated in the study. The study was open to all Norwegian residents over the age of 16 years, and data were collected between June 2019 and January 2020. Individuals with and without a lifetime history of an ED were invited to participate. No other inclusion criteria were enforced. Participants were

recruited through user-organizations for EDs, specialized ED treatment units across Norway, online/social media platforms (e.g., websites, Facebook), and flyers and posters at Norwegian universities. All participants completed an online assessment battery.

The ED100K (see below) self-report measure was used to assess lifetime history of AN, BN, and BED. Individuals who either a) fulfilled lifetime DSM-5 criteria for an ED, or b) reported having received treatment for an ED and endorsed lifetime core ED features (e.g., low weight, binge eating, compensatory behaviors) were classified as cases. Those who did not fulfill the aforementioned criteria were classified as controls. A total of 495 participants (54%) were classified as cases and 395 (43%) as controls. We were unable to determine case status for 26 (3%) participants due to missing or ambiguous responses, resulting in a final sample of 890 participants (95% female, aged 16–78 years [$M = 29.50 \pm 10.60$]). In the ED group, 64% fulfilled lifetime criteria for AN, 47% for BN, and 34% for BED, with many individuals having fulfilled criteria for more than one lifetime diagnosis. AN was further classified into AN-R and AN-BP subtypes, according to presence or absence of binge-eating and purging behaviors during the AN period (28% and 72% of those with AN, respectively).

To address aim 2, we performed case–control matching to specifically investigate bullying history prior to ED onset. Participants in the control group were individually matched for age and gender to those in the ED group. This resulted in 348 (total of 696 individuals) case–control pairs (98% female). Note that a control participant with matching age and gender was not available for all individuals in the ED group, which is why the matched sample is smaller than the total sample. For each individual with a history of EDs, we calculated the ED onset age, defined as the earliest age at which the first significant ED features emerged. This included frequent binge eating, compensatory behaviors (e.g., purging behaviors, fasting), and low weight (whichever occurred first). To compare bullying experiences occurring prior to ED onset in cases to the same time-frame for controls, all case–control pairs were assigned an “index age.” This age corresponded to the ED onset age for cases, and controls were assigned the same index age as their matched case to ensure equal time available for exposure. This method is similar to previous studies retrospectively assessing risk factors for EDs (Fairburn, Welch, Doll, Davies, & O'Connor, 1997; Hilbert et al., 2014), and enabled us to compare bullying history within the same time-frame for each case–control pair.

2.3 | Measures

2.3.1 | ED100K

An adapted version (translated into Norwegian and then back-translated) of the self-report measure ED100K (version 2) was used to assess lifetime history of AN, BN, and BED according to DSM-5 (Thornton et al., 2018). The ED100K contains questions regarding frequency, duration, and severity of core ED features (weight history, binge eating, compensatory behaviors) as well as age when these

features first emerged. The measure has previously validated against the Structural Clinical Interview (SCID) for DSM-5 (Thornton et al., 2018), showing good predictive validity.

2.3.2 | Retrospective bullying questionnaire (RBQ)

Bullying victimization and perpetration was measured using an adapted version (translated into Norwegian and then back-translated) of the RBQ self-report measure (Schäfer et al., 2004). The RBQ retrospectively assesses different types of bullying victimization (physical, verbal, and indirect) occurring in childhood/adolescence. We also added questions regarding digital bullying (e.g., teased or excluded on digital platforms) and differentiated between body-related (“teased or called nasty names related to body/weight/appearance”) and body-unrelated (“teased or called nasty names not related to body/weight/appearance”) verbal bullying. For each bullying type, the participant was asked whether they had been subjected to bullying (“yes” or “no”), how frequently the bullying occurred (“never,” “rarely,” “sometimes,” “frequently,” or “constantly”), how severe they viewed the bullying to be (“not at all,” “only a bit,” “quite serious,” “extremely serious”), and how old they were when bullying occurred. Participants also indicated duration of bullying attacks (“just a few days,” “weeks,” “months,” or “a year or more”). Two questions assessed involvement in the bullying of others (perpetration). A final section contained questions about school avoidance and self-harm/suicidal thoughts due to bullying victimization. At the beginning of the questionnaire, participants were presented with a formal definition of bullying (Olweus, 1994) and instructed to think back on the specified time period (6–18 years of age). For the purpose of our study and in keeping with the formal definition of bullying, participants were considered bully victims if they reported (a) having been bullied, (b) with a frequency of “sometimes” or more, and (c) viewed the seriousness of the bullying to be “quite serious” or worse. Participants were considered bully perpetrators if they confirmed they had bullied others.

2.3.3 | Eating Disorder Examination-Questionnaire (EDE-Q)

The EDE-Q self-report measure was used to assess ED psychopathology during the past 28 days (Fairburn & Beglin, 2008). The four subscales were averaged to obtain the EDE-Q global score. The Norwegian version of the EDE-Q has demonstrated satisfactory psychometric properties (Rø, Reas, & Lask, 2010). The present study showed excellent internal consistency of the EDE-Q for controls ($\alpha = .96$) and the ED group ($\alpha = .95$).

2.4 | Analysis

To investigate bullying occurring at any time during school-age (6–18 years of age, aim 1), ED status (dependent variable) and bullying

victimization exposure (independent variable) were entered into logistic regression models to obtain odds ratios (ORs) and corresponding 95% confidence intervals (CIs) for any bullying and for each type of bullying separately (physical, verbal [body-related and body-unrelated], indirect, and digital). These analyses addressed whether individuals with EDs have experienced more bullying victimization in their life than controls. The same analysis was repeated with bullying perpetration as the independent variable. Models were adjusted for current age, gender, and education level, but we also report unadjusted ORs.

To investigate premorbid bullying history (aim 2), conditional logistic regression models were conducted using the individually matched case-control pairs and considering only bullying prior to (or coinciding with) the index age (corresponding to age of ED onset) in each pair. As in the analyses above, separate models were performed for any bullying and each type of bullying victimization. We were unable to compare bullying perpetration due to the low occurrence prior to index age. Only education was included as a covariate, since the two groups were matched on age and gender. We also report unadjusted ORs.

To investigate potential differences between restricting and binge-eating/purging ED subtypes in bullying exposure (aim 3), the regression models above were repeated for ED subtypes. Subtype classification was based on the ED100k, and groups were mutually exclusive. Individuals who only met criteria for AN (and no other EDs) at any point in their life were further classified as either AN-R or AN-BP to explore the hypothesis that binge-eating/purging EDs are more strongly associated with bullying than restrictive types. We were unable to subtype three individuals with AN due to missing data, and these were excluded from the subgroup analysis. Due to a large overlap between BN and BED in our sample, all individuals with a lifetime history of BN and/or

BED (but not AN) were combined in one group of EDs characterized by binge eating and purging. Those with a history of AN and BN or BED were combined in one last mixed ED group. This resulted in the following group distribution: AN-R ($n = 65$), AN-BP ($n = 114$), BN/BED ($n = 180$), AN and BN/BED ($n = 133$). We did not perform subgroup analysis on different types of bullying separately or bullying perpetration due to insufficient numbers in each group.

To investigate characteristics and correlates of bullying victimization, we performed independent samples *t*-tests (with Hedges' *g*; interpreted as small [<0.5], medium [$0.5-0.8$], and large [>0.8 ; Cohen, 1988]) to compare the ED group with controls on frequency, severity, duration, age of bullying onset, self-harm, and school avoidance.

Analyses were performed using R version 3.6.1 (R Core Team, 2019) and IBM SPSS statistics version 25 (IBM Corp, 2017). Alpha levels were corrected for multiple comparisons according to a Bonferroni-Holm adjustment corresponding to number of independent variables of interest within each family (aims) of tests. To ease interpretation, we report corrected *p*-values, with $p < .05$ considered statistically significant.

3 | RESULTS

3.1 | Participant characteristics

Sample descriptive statistics are shown in Table 1. The overall ED group did not differ from controls with regards to age or current body mass index (BMI, kg/m^2). As expected however, current BMI was lower than the control group (23.04 ± 4.41) for the AN-R (19.97 ± 2.68), AN-BP (19.78 ± 3.55), and mixed AN and BN/BED (21.51 ± 4.46) groups, while it was higher for the BN/BED group (29.45 ± 8.29 , all $p < .001$). In the ED group, 89% reported having

TABLE 1 Descriptive statistics for total and matched samples

Total sample ($n = 890$)						
	ED ($n = 495$)		Control ($n = 395$)		ED versus control ^a	
	<i>M</i> (<i>SD</i>)	Range	<i>M</i> (<i>SD</i>)	Range	<i>p</i> -value	Effect size (<i>g</i>)
Age (years)	29.08 (9.76)	16–69	30.16 (11.66)	16–78	.140	–0.01
EDE-Q global score	3.32 (1.54)	0–6	1.29 (1.26)	0–5.72	<.001	1.47
Current BMI	23.85 (7.29)	12.42–58.59	23.94 (4.41)	16.04–48.67	.831	–0.01
Matched sample ($n = 696$)						
	ED ($n = 348$)		Control ($n = 348$)		ED versus control ^a	
	<i>M</i> (<i>SD</i>)	Range	<i>M</i> (<i>SD</i>)	Range	<i>p</i> -value	Effect size (<i>g</i>)
Age (years)	28.42 (9.59)	16–65	28.42 (9.59)	16–65	NA	NA
EDE-Q global score	3.36 (1.55)	0–6	1.34 (1.27)	0–6	<.001	1.43
Current BMI	23.69 (6.92)	12.42–58.59	23.94 (4.53)	16.41–48.67	.584	0.04
Index age (ED onset)	15.09 (4.58)	4–50	15.09 (4.58)	4–50	NA	NA

Abbreviations: BMI, body mass index; ED, eating disorder; EDE-Q, Eating Disorder Examination-Questionnaire; NA, not applicable (test not performed as groups were matched on the variable).

^aCompared using independent samples *t*-tests, boldface indicates statistical significance ($p < .05$).

TABLE 2 Exposure to school-age bullying controlled for age, gender, and education

	ED (n = 495)		Control (n = 395)		ED versus control			
	n	%	n	%	Unadjusted		Adjusted	
					OR (95% CI)	Corrected p-value ^b	OR ^a (95% CI)	Corrected p-value ^b
Bullied (any type)	157	31.8	73	18.5	2.05 (1.50–2.83)	<.001	1.99 (1.45–2.76)	<.001
Physical	37	7.6	24	6.1	1.28 (0.75–2.20)	.738	1.18 (0.69–2.06)	1.000
Verbal	113	24.2	45	11.7	2.40 (1.66–3.53)	<.001	2.36 (1.62–3.50)	<.001
Body-related verbal	104	22.3	36	9.4	2.77 (1.86–4.21)	<.001	2.75 (1.83–4.22)	<.001
Body-unrelated verbal	66	14.1	30	7.8	1.94 (1.24–3.10)	.013	2.00 (1.27–3.24)	.014
Indirect	117	26.4	49	13.2	2.34 (1.63–3.41)	<.001	2.30 (1.59–3.37)	<.001
Digitally	29	6.1	7	1.8	3.55 (1.62–8.88)	.012	3.30 (1.49–8.38)	.018
Bullied others (perpetration)	44	9.4	37	10	0.84 (0.60–1.50)	.804	1.11 (0.69–1.79)	1.000

Abbreviations: CI, confidence interval; ED, eating disorder; OR, odds ratio (OR > 1 indicates more bullying in ED group than controls).

^aORs adjusted for age, gender, and education.

^bp-values corrected for multiple comparisons using the Bonferroni-Holm correction, boldface indicates statistical significance ($p < .05$).

TABLE 3 Exposure to bullying prior to ED onset using a matched (gender and age) conditional regression controlled for education

	n ^a	ED (n = 348)		Controls (n = 348)		ED versus controls			
		n	%	n	%	Unadjusted		Adjusted	
						OR (95% CI)	Corrected p-value ^c	OR ^b (95% CI)	Corrected p-value ^c
Bullied (any type)	694	131	26.5	56	14.2	1.95 (1.32–2.88)	.003	1.75 (1.70–2.62)	.026
Physical	685	35	7.1	20	5.1	1.35 (0.76–2.41)	.309	1.86 (0.65–2.18)	.581
Verbal	654	100	20.2	35	8.9	2.26 (1.44–3.55)	.003	2.02 (1.26–3.25)	.021
Body-related verbal	658	93	18.8	28	7.1	2.52 (1.56–4.09)	.001	2.16 (1.30–3.56)	.019
Body-unrelated verbal	661	60	12.1	24	6.1	1.86 (1.09–3.16)	.067	1.57 (0.90–2.75)	.337
Indirect	625	95	19.2	34	8.6	2.43 (1.46–4.04)	.003	2.16 (1.27–3.67)	.021
Digital	666	14	2.8	4	1	2.75 (0.88–8.64)	.166	2.49 (0.77–8.06)	.337

Abbreviations: CI, confidence interval; ED, eating disorder; OR, odds ratio (OR > 1 indicates more bullying in ED group than controls).

^an refers to participants available for analysis of each variable and varies due to exclusion of pairs with missing data on age of onset for relevant bullying outcome variables.

^bOR adjusted for education (age and gender inherent in the conditional matched-pair analysis).

^cp-values corrected for multiple comparisons using the Bonferroni-Holm correction, boldface indicates statistical significance ($p < .05$).

received treatment for an ED. The ED group also had a higher EDE-Q global score than controls ($p < .001$).

3.2 | Are bullying experiences more frequent among individuals with EDs?

Overall prevalence of bullying victimization was 26%. Experiences of any bullying victimization were significantly more common among individuals with EDs (31.8%) than controls (18.5%), overall OR = 1.99 (see Table 2). Specifically, the ED group was significantly more likely than controls to have experienced verbal (both body-related and body-unrelated), indirect, and digital forms of bullying (ORs 2.0–3.3), but not physical bullying. Bullying perpetration was not significantly associated with EDs.

3.3 | Do individuals with EDs recall experiencing more bullying than controls in the time period prior to ED onset?

Mean age of bullying onset for the whole sample was 10.23 ± 2.66 years, and mean ED onset age was 15.10 ± 4.50 years (AN-R: 15.75 ± 3.41 , AN-BP: 15.39 ± 4.92 , BN/BED: 14.76 ± 4.66 , AN and BN/BED: 15.01 ± 4.28). The majority of bullying victimization (84%) among individuals with EDs occurred prior to ED onset. Similarly, the majority of bullying in the control group (77%) occurred within the same time frame (i.e., prior to index age). Individuals with EDs were significantly more likely than controls to have experienced bullying victimization prior to index age (OR 1.75; see Table 3). This indicates that individuals with EDs were more likely to have been bullied before onset of their ED, compared to the same time-frame for

TABLE 4 Any school-age bullying by ED subtype, controlled for age, gender, and education (total sample)

	n in ED group	Unadjusted		Adjusted	
		OR (95% CI)	Corrected <i>p</i> -value ^b	OR (95% CI) ^a	Corrected <i>p</i> -value ^b
Control versus AN-R	65	0.80 (0.37–1.59)	1.000	0.79 (0.36–1.60)	1.000
Control versus AN-BP	114	1.90 (1.17–3.04)	.066	1.77 (1.08–2.88)	.151
Control versus BN/BED	180	3.15 (2.13–4.66)	<.001	3.05 (2.05–4.54)	<.001
Control versus AN and BN/BED	133	1.76 (1.11–2.77)	.099	1.65 (1.03–2.61)	.197
AN-R versus AN-BP	65 (AN-R) 114 (AN-BP)	2.37 (1.11–5.42)	.157	2.42 (1.10–5.77)	.197
AN-R versus BN/BED	65 (AN-R) 180 (BN/BED)	3.93 (1.95–8.63)	.002	3.83 (1.87–8.56)	.004
AN-R versus AN and BN/BED	65 (AN-R) 133 (AN and BN/BED)	2.20 (1.05–4.98)	.181	2.45 (1.11–5.87)	.197
AN-BP versus BN/BED	114 (AN-BP) 180 (BN/BED)	1.66 (1.01–2.75)	.181	1.65 (0.99–2.76)	.197
AN-BP versus AN and BN/BED	114 (AN-BP) 133 (AN and BN/BED)	0.93 (0.54–1.62)	1.000	0.94 (0.54–1.66)	1.000
BN/BED versus AN and BN/BED	180 (BN/BED) 133 (AN and BN/BED)	0.56 (0.34–0.90)	.106	0.54 (0.33–0.87)	.102

Abbreviations: AN-BP, anorexia nervosa binge-eating/purging subtype; AN-R, anorexia nervosa restrictive subtype; BN, bulimia nervosa; BED, binge-eating disorder; CI, confidence interval; ED, eating disorder; OR, odds ratio (OR > 1 indicates more bullying in the latter group).

^aOR adjusted for age, gender, and education.

^b*p*-values corrected for multiple comparisons using the Bonferroni-Holm correction, boldface indicates statistical significance (*p* < .05).

controls. Significant ORs were found for verbal, body-related verbal, and indirect bullying (ORs 2.02–2.16). Physical, body-unrelated verbal, and digital bullying prior to ED onset did not differ significantly between groups.

3.4 | Characteristics and sequelae of bullying victimization

There were no significant differences in frequency, severity, or age of bullying experiences between individuals with EDs and controls. Among those who had experienced bullying, EDs were associated with more thoughts of self-harm or suicide with a medium effect size ($t[112] = 3.82, p < .001, g = 0.54$). There were no differences in school avoidance ($t[126] = 2.21, p = .056, g = 0.31$), or duration of bullying attacks ($t[93] = 1.16, p = .249, g = 0.16$) between the ED group and controls.

3.5 | Do bullying experiences differ across ED subtypes?

Individuals with a lifetime history of BN and/or BED were significantly more likely to have been bullied at any point in their life (OR 3.05; see Table 4) and to have been bullied prior to index age than controls (OR 2.47; see Table 5). In addition, individuals with BN/BED were significantly more likely to have been bullied at any point in their life than individuals in the AN-R group (OR 3.83), but these groups did

not differ significantly in bullying prior to ED onset. The AN-R, AN-BP, and mixed ED (AN and BN/BED) groups did not significantly differ from controls in overall bullying or bullying prior to ED onset. There were no other significant group differences. Figure 1 illustrates the differences between groups.

4 | DISCUSSION

In the present study, we found a significant association between bullying and EDs characterized by binge-eating and purging behaviors. The overall ED case-control comparisons (with all ED diagnoses combined) showed that individuals with a history of any ED had experienced significantly more school-age bullying overall than controls, and significantly more bullying prior to ED onset than controls within the same time frame. However, further analysis showed that the observed effects were driven by individuals with binge-eating/purging ED subtypes (BN/BED). We also found that individuals in the ED group reported more thoughts of self-harm and suicide as a result of bullying than controls. Bullying perpetration did not differ between individuals with EDs and controls. Our results are strengthened by the use of a conservative definition of bullying, and provide new insights into what types of bullying are most commonly experienced in individuals with EDs.

In our study, bullying experiences were common among individuals with binge-eating/purging type EDs, particularly verbal and indirect forms of bullying. When considering all EDs combined, individuals with a history of any ED were two- to threefold more likely

TABLE 5 Any bullying prior to ED onset by ED subtype, controlled for age, gender, education, and index age (matched sample)

	n in ED group	Unadjusted		Adjusted ^a	
		OR (95% CI)	Corrected <i>p</i> -value ^b	OR (95% CI) ^a	Corrected <i>p</i> -value ^b
AN-R versus control	49	1.02 (0.42–2.18)	1.000	1.07 (0.44–2.34)	1.000
Control versus AN-BP	83	1.91 (1.107–3.34)	0.199	1.73 (0.95–3.08)	.517
Control versus BN/BED	123	2.36 (1.46–3.80)	0.004	2.47 (1.50–4.06)	.004
Control versus AN and BN/BED	90	1.90 (1.08–3.25)	0.199	1.70 (0.96–2.90)	.517
AN-R versus AN-BP	49 (AN-R) 83 (AN-BP)	1.88 (0.79–4.87)	1.00	1.89 (0.75–5.14)	.948
AN-R versus BN/BED	49 (AN-R) 123 (BN/BED)	2.32 (1.03–5.76)	0.365	2.49 (1.06–6.45)	.407
AN-R versus AN and BN/BED	49 (AN-R) 90 (AN and BN/BED)	1.86 (0.79–4.78)	1.000	2.03 (0.81–5.63)	.948
AN-BP versus BN/BED	83(AN-BP) 123(BN/BED)	1.23 (0.67–2.32)	1.000	1.41 (0.73–2.75)	.948
AN-BP versus AN and BN/BED	83(AN-BP) 90 (AN and BN/BED)	0.99 (0.50–1.96)	1.000	1.00 (0.50–2.01)	1.000
BN/BED versus AN and BN/BED	123 (BN/BED) 90 (AN and BN/BED)	0.80 (0.44–1.46)	1.000	0.65 (0.35–1.21)	.948

Abbreviations: AN-BP, anorexia nervosa binge-eating/purging subtype; AN-R, anorexia nervosa restrictive subtype; BN, bulimia nervosa; BED, binge-eating disorder; CI, confidence interval; ED, eating disorder; OR, odds ratio (OR > 1 indicates more bullying in the latter group).

^aOR adjusted for age, gender, education, and index age.

^b*p*-values corrected for multiple comparisons using the Bonferroni-Holm correction, boldface indicates statistical significance ($p < .05$).

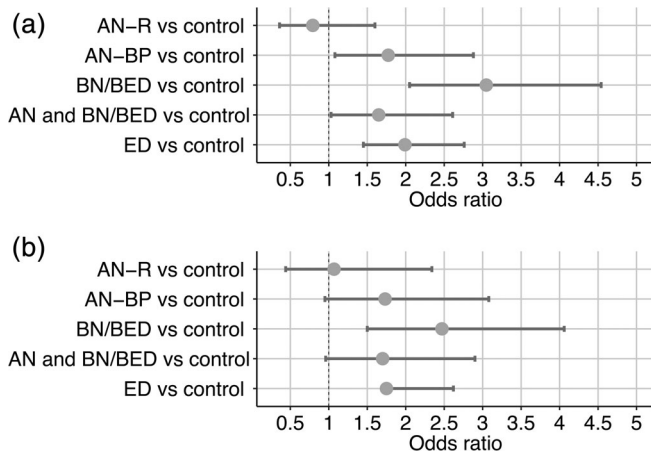


FIGURE 1 Overall association (odds ratios with 95% confidence intervals) of (a) any school-age bullying and (b) bullying prior to ED onset age with the different eating disorder subtypes compared to controls ($n = 395$). AN and BN/BED = anorexia nervosa and [bulimia nervosa and/or binge-eating disorder], AN-BP = anorexia nervosa binge-eating/purging subtype ($n = 114$), AN-R = anorexia nervosa restricting subtype ($n = 65$), BN/BED = bulimia nervosa and/or binge-eating disorder ($n = 180$), ED = eating disorder combined sample ($n = 495$)

than controls to have experienced verbal (both body-related and body-unrelated), indirect, and digital bullying victimization at some point in their life (but not physical bullying). These effects were largely replicated for bullying occurring in the time period prior to ED onset, consistent with the interpretation that bullying is a risk factor for

binge-eating/purging EDs. Almost one third of individuals with EDs in our study reported experiences of bullying during school-age, which is important when considering psycho-social elements of EDs. While only 6.1% of individuals in our ED group and 1.8% of the controls had experienced digital bullying (even less in the time prior to ED onset; 2.8% and 1%, respectively), our participants had an average age of 30 years and many would therefore have finished school prior to the emergence of digital bullying. We would expect to find a different pattern of results for digital bullying in a younger sample, and highlight the need for more research on this subject.

Although the subgroup analyses showed that the BN/BED group was significantly more likely to have been bullied than controls, this was not the case for AN-R or AN-BP or individuals in the mixed ED group. Direct subtype comparisons showed that the BN/BED group reported significantly more lifetime bullying than the AN-R group, but did not significantly differ from the other two groups (AN-BP and AN and BN/BED). We note however, that sample sizes were modest for some of the diagnostic subgroups. Our study was powered for the comparison between ED and controls (aim 1), and thus our ability to detect significant differences between subtypes may have been limited by low power for comparisons between specific ED subtypes. Thus, our findings clearly indicate that individuals with BN/BED have experienced more bullying than controls, while findings are less conclusive for the AN-BP subtype and the mixed ED group. We found no evidence of elevated bullying victimization in the AN-R group. Therefore, our results strongly suggest that the BN/BED group drives the overall association between bullying and EDs, and that any presence of AN (particularly AN-R) makes this association less clear.

Overall, our results are in line with previous research on EDs and bullying victimization (Lie et al., 2019). We support previous findings that bullying victimization is more strongly linked to EDs characterized by binge eating and purging than those of a more restricting nature (Hilbert et al., 2014; Krug et al., 2015), and show that this is the case for different types of bullying. Similar patterns have been found for other traumatic childhood events, as for example childhood abuse tends to be more strongly associated with BN/BED than AN (Caslini et al., 2016; Molendijk, Hoek, Brewerton, & Elzinga, 2017). This could be indicative of a different etiology underlying restrictive EDs as compared to binge-eating/purging EDs, but more research is needed to explore this. The relationship between bullying and binge-eating/purging ED subtypes can be bi-directional, as individuals with psychological difficulties in childhood and adolescence can be more exposed to bullying as a result of being viewed as different or atypical by their peers (Arseneault, Bowes, & Shakoor, 2010). However, in our study we found that the majority of bullying victimization began early and prior to ED onset. While prospective studies would be needed to confirm this, our results are consistent with bullying as a risk factor preceding ED development. Our ORs are also comparable to those found for other mental disorders and bullying, such as depression, suicidality, and anxiety disorders (Copeland et al., 2013; Islam et al., 2020; Ttofi et al., 2011). As such, bullying is associated with a range of adverse mental health outcomes, including EDs. To assess whether bullying is a specific risk factor for EDs over and above the general risk for adverse mental health outcomes, future studies would benefit from including psychiatric control groups.

While we aimed to contribute to the scarce literature available on bullying perpetration and EDs, perpetration was not significantly associated with EDs in the current study. A few studies have previously found that bullying perpetration is also associated with EDs, but findings are mixed (Copeland et al., 2015; Kaltiala-Heino et al., 2000; Kaltiala-Heino et al., 2003). In our study, only 9% and 10% of the ED and control group, respectively, reported having bullied others at some point in their life, which prohibited us from performing follow-up analyses of these.

Individuals in the ED group reported more thoughts of self-harm or suicide due to bullying than controls. There were no differences in frequency or severity of bullying between the ED group and controls, so it is unlikely that the increase in self-harm is due to more severe victimization in our ED group. Instead, this could reflect susceptibility for maladaptive coping which may be related to a vulnerability to develop EDs. Studies have found that exposure to traumatic experiences is related to self-harm and suicidal behaviors in ED populations (Franko & Keel, 2006; Paul, Schroeter, Dahme, & Nutzinger, 2002), and it is possible that this relationship is also present for victimization by bullying. However, our measure of self-harm was a single question and further investigation would be needed before conclusions can be drawn.

There are several potential mechanisms through which bullying can influence risk of developing EDs. Disruptions in social relationships or unfavorable social comparisons during childhood and adolescence as a result of peer-victimization can be of importance for the

development of EDs (Duarte, Pinto-Gouveia, & Rodrigues, 2015; Myers & Crowther, 2009; Striegel-Moore & Bulik, 2007). Bullying or teasing about weight or appearance has been linked to body dissatisfaction and a negative body image (Menzel et al., 2010), which are present in EDs and constitute risk factors for developing behavioral ED symptoms (Stice, 2016). This could be the case especially for verbal body-related bullying, which showed a strong association with EDs in our study. Victimization by bullying can also be viewed as a traumatic stressor causing emotional problems, which in turn can increase risk of EDs (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Reijntjes et al., 2010). The ORs reported in the current study are indeed comparable to the association found between binge-eating/purging ED subtypes and other traumatic life events such as child maltreatment and abuse (Caslini et al., 2016; Larsen et al., 2017; Molendijk et al., 2017).

Our study has a number of limitations. Firstly, diagnostic classification was based on self-report. However, we used a comprehensive and previously validated measure for determining ED case status based on DSM-5 criteria, and note that 89% of the ED group reported having received treatment for an ED. Moreover, although we had a large total sample size, our secondary diagnostic subgroup analysis comprised modest sample sizes. We also combined BN and BED in one group while separating between AN-R and AN-BP to facilitate exploration of differences between binge-eating/purging subtypes and restrictive subtypes of EDs. Also, as we measured lifetime EDs, the subtype results may not accurately reflect the distribution of individuals within each subtype at any given time as it is common for people to transition between different EDs throughout their lifetime. Secondly, we relied on self-reported, retrospective assessments of bullying, which could lead to recall bias. However, we controlled for current age in the analysis to reduce age related recall effects and our overall prevalence of bullying was in line with previous studies (Jadambaa et al., 2019). We also used a conservative definition of bullying based on frequency and severity of self-reported experiences to adhere to formal bullying definitions. Our prevalence estimate of digital bullying may differ from other recent studies due to the wide age range of our participants (16–78 years). Thirdly, we note that the psychometric properties of the adapted and translated versions of the ED100K and the RBQ have not been validated in their current forms. Lastly, our sample was predominantly female, which limits generalizability, and we did not collect data regarding race, ethnicity, and immigration status. We note that the population in Norway is relatively homogenous and primarily of northern European descent.

In conclusion, the current study found that having a history of various forms of bullying victimization is common among individuals with binge-eating/purging ED subtypes. Compared to controls, individuals with a history of binge-eating/purging EDs were more likely to have been bullied, and reported more bullying in the time period prior to ED onset than controls. These effects were strongest for BN and BED, in line with previous findings. Our results indicate that bullying victimization may be a risk factor for development of binge-eating/purging subtypes of EDs, but prospective studies are needed to address this and explore the mechanisms involved. As the

consequences of bullying can have severe implications, further studies are warranted to investigate correlates of bullying such as self-harm. The high prevalence of bullying victimization in individuals with EDs points to the importance of exploring bullying experiences in ED treatment to better understand the antecedents and triggers that contribute toward the development and maintenance of EDs for each individual patient.

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CONFLICT OF INTEREST

CM Bulik reports: Shire (grant recipient, Scientific Advisory Board member); Idorsia (consultant); Pearson (author, royalty recipient). Dr. Andreassen reports: Speakers honorarium from Lundbeck, consultant to HealthLytix. The remaining authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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