Child and adolescent maltreatment patterns and risk of eating disorder behaviors developing in young adulthood

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Abstract

Background: Child maltreatment may be an important risk factor for eating disorder (ED) behaviors. However, most previous research has been limited to clinical, female, and cross-sectional samples, and has not adequately accounted for complex abuse patterns.

Objective: To determine whether women and men with distinct patterns of child and adolescent maltreatment have higher risks of developing ED behaviors in young adulthood than individuals with a low probability of maltreatment.

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Participants and Setting: Data came from 7,010 U.S. women and men (95% White) in the Growing Up Today Study, a prospective, community-based cohort study (14 waves between 1996–2016).

Methods: We used a previously created maltreatment variable that was empirically derived using latent class analysis. Maltreatment groups were characterized as: "no/low abuse," "child physical abuse," "adolescent emotional abuse," "child and adolescent physical and emotional abuse," and "child and adolescent sexual abuse." We estimated risk ratios for ED behaviors developing in young adulthood using the modified Poisson approach with generalized estimating equations. We stratified models by sex.

Results: Groups characterized by maltreatment had elevated risks of incident ED behaviors compared with the "no/low abuse" group among both women and men. For women, risks tended to be strongest among the "child and adolescent sexual abuse" group. For men, risks tended to be strongest among the "child and adolescent physical and emotional abuse" group. Risks were particularly strong for purging behaviors.

Conclusion: Risk of incident ED behaviors in young adulthood varied by distinct maltreatment groups. Detecting maltreatment early may help prevent EDs and subsequent maltreatment.

INTRODUCTION

Eating disorders (EDs) typically develop between late adolescence and young adulthood (Hudson, Hiripi, Pope, & Kessler, 2007; Udo & Grilo, 2019). Consequently, ED behaviors, including binge eating and purging, are common among young adults (Field et al., 2014; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011; Ziobrowski et al., 2019). Large community-based studies have estimated that more than 25% of women and men engage in disordered eating or unhealthy weight control behaviors by young adulthood (Field et al., 2014; Neumark-Sztainer et al., 2011; Ziobrowski et al., 2019). Individuals who engage in ED behaviors, even at subclinical levels, are at high risk of developing adverse health outcomes such as obesity, high depressive symptoms, and substance use disorders (Field et al., 2012; Johnson, Cohen, Kasen, & Brook, 2002). Given their severity and high prevalence, understanding risk factors for ED behaviors is urgently needed for effective prevention and treatment.

Increasing evidence suggests that child maltreatment may be an important risk factor for ED behaviors (Afifi et al., 2017; Caslini et al., 2016; Hazzard, Bauer, Mukherjee, Miller, & Sonneville, 2019; Molendijk, Hoek, Brewerton, & Elzinga, 2017). Maltreatment affects an estimated one in four children in the U.S. and includes physical, sexual, and emotional abuse (Finkelhor, Turner, Shattuck, & Hamby, 2013). A meta-analysis of cross-sectional studies found that individuals who reported maltreatment had more than three times the odds of having an ED compared to those who did not report maltreatment (Caslini et al., 2016). Victims of maltreatment may be more likely to develop disordered eating possibly as a way to cope, or possibly due to dysregulation of stress response and emotion regulation systems

resulting from chronic stress (Akkermann et al., 2012; Burns, Fischer, Jackson, & Harding, 2012; Halfon & Hochstein, 2002; Sauro, Ravaldi, Cabras, Faravelli, & Ricca, 2008).

There are several limitations in the existing literature examining associations of child maltreatment with EDs. First, most studies in this area have used clinical samples (Caslini et al., 2016). Because most people with EDs do not receive treatment (Hudson et al., 2007; Swanson, Crow, Grange, Swendsen, & Merikangas, 2011; Ziobrowski et al., 2019), clinical samples are not representative of all people with EDs. Second, there have been very few prospective studies (Caslini et al., 2016). The temporal order of associations cannot be established using cross-sectional studies, limiting causal inference. Third, few studies have included men (Caslini et al., 2016). Findings from female samples may not be generalizable to males. Fourth, most studies have not adequately accounted for complex abuse patterns in which individuals may experience multiple forms of abuse, potentially prolonged across several developmental periods. In contrast to singular traumatic events, complex abuse patterns may result in unique health risks and are characteristic of the new *International Classification of Diseases and Related Health Problems* (11th edition; ICD-11; World Health Organization, 2019) diagnosis of complex posttraumatic stress disorder. This diagnosis is characterized by disturbances in self-organization (e.g., affect dysregulation, negative self-concept, and disturbances in relationships) in addition to core posttraumatic stress disorder symptoms. Much of the research on child maltreatment and EDs has focused on sexual abuse (Connors & Morse, 1993; Smolak & Murnen, 2002), yet most victims of maltreatment experience more than one abuse type (Felitti et al., 1998; Finkelhor, Ormrod, & Turner, 2007). Moreover, the combination of abuse types and the developmental timing of abuse both may affect risk of adverse health outcomes (Manly, Kim, Rogosch, & Cicchetti, 2001; Ziobrowski et al., 2020).

One strategy to examine complex abuse patterns is to empirically classify maltreatment using latent class analysis (LCA) (Hazzard et al., 2019; Shevlin & Elklit, 2008; Ziobrowski et al., 2020). LCA is a statistical approach that identifies latent (i.e., unmeasurable) natural subgroups of individuals in a population based on their responses to observed variables (Oberski, 2016). Only two studies have examined associations of maltreatment with disordered eating using LCA and there are important limitations to these studies (Hazzard et al., 2019; Ziobrowski et al., 2020). In one study (Hazzard et al., 2019), participants reported ED behaviors occurring within the past seven days and only at one time-point, when individuals were ages 18–26 years. Since most people who engage in disordered eating do so less than weekly (Glazer et al., 2019), many people with ED behaviors may have been misclassified. Moreover, questions on maltreatment pertained only to abuse occurring before 6th grade and did not account for abuse occurring in adolescence. A second study classified maltreatment according to the types and developmental timing of abuse and examined cross-sectional associations of maltreatment groups with a range of adverse health outcomes in young adulthood, including ED behaviors (Ziobrowski et al., 2020). This study grouped all types of ED behaviors together, however, and is limited by its cross-sectional approach.

The goal of the present study was to determine whether women and men with distinct maltreatment patterns, based on the types and developmental timing of abuse, had increased

risks of developing ED behaviors in young adulthood, using a large, prospective community-based study and an empirical maltreatment classification derived using LCA.

METHODS

Sample

The Growing Up Today Study (GUTS) is an ongoing cohort study in the U.S. that was established in 1996 when participants were aged 9–15 years. All participants were children of women in the Nurses' Health Study II, a large ongoing cohort of over 100,000 nurses throughout the U.S. who have been followed since 1989 (Field, Manson, Taylor, Willett, & Colditz, 2004). In 1996, women in the Nurses' Health Study II who were aged 25–43 years and identified as having children in the appropriate age range were asked for consent for their children to participate in GUTS. Children whose mother consented were mailed letters inviting them to participate; 9,033 girls and 7,843 boys returned surveys, thereby assenting to participate in GUTS. There have been 14 data collection waves between 1996 to 2016.

Our analytic sample was restricted to individuals who completed the 2007 questionnaire (when maltreatment was assessed; 6,168 women, 3,698 men) and had information on maltreatment and sociodemographic characteristics (5,908 women, 3,406 men), who did not positively report any ED behaviors before age 18 years (5,081 women, 3,310 men), and who reported on ED behaviors at least once during each of these age periods: 18–23 years, 24–30 years (final analytic sample size: 4,647 women, 2,363 men). Among individuals eligible for the present study (i.e., those with information on maltreatment who did not report ED behaviors before age 18 years), there were no substantial differences in the distribution of race, age, or maternal age at the GUTS participant's birth between those who were and were not included in the analytic sample. The Institutional Review Board at Brigham and Women's Hospital approved the GUTS study and present analyses.

Measurements

Child and adolescent maltreatment: Questions about maltreatment were included on the 2007 survey, which was the first year that all participants were at least 18 years old. Participants reported on physical, sexual, and emotional abuse occurring during *childhood (before age 11 years)* and *adolescence (ages 11–17 years)*. Physical and emotional abuse pertained only to abuse occurring by adults in the family, whereas sexual abuse pertained to abuse by anyone, adults or children, inside or outside of the family. Physical abuse was assessed using items from the Conflict Tactic Scales (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Participants reported the frequency with which an adult in the family: pushed, grabbed, or shoved them; kicked, punched, or hit them with something in a way that hurt, or physically attacked them in another way; and hit them so hard it left bruises or marks. We categorized physical abuse as none vs. any physical abuse. Emotional abuse was measured with items from the Childhood Trauma Questionnaire (Bernstein et al., 1994). Participants reported how often, on a five-point Likert scale from never to very often, an adult in their family: yelled and screamed at them; said hurtful or insulting things to them; and punished them in a way that seemed cruel. We summed Likert scores and dichotomized emotional abuse as not reporting high emotional abuse levels (below 75th percentile)

vs. reporting high emotional abuse levels (75th percentile and greater). Previous GUTS investigations have used this cut-off to reflect moderate/severe emotional abuse (Mason et al., 2015). Sexual abuse was assessed using questions from the Sexual Experiences Survey (Koss & Gidycz, 1985). Participants reported whether and how often: 1) they had ever been touched by or been forced to touch an adult or older child in a sexual way when they did not want to, and 2) an adult or older child had ever forced or attempted to force them into any sexual activity by "threatening you, holding you down, or hurting you in some way when you did not want to?". We dichotomized sexual abuse as none vs. any sexual touching and/or forced sexual activity. These dichotomous indicators of child and adolescent physical, emotional, and sexual abuse were used in a series of LCAs, described below, to create subgroupings of maltreatment patterns, which was used as the main exposure variable in our analyses.

Eating disorder behaviors: Participants reported on ED behaviors on every GUTS questionnaire using validated questions on purging and binge eating episodes (Field, Taylor, Celio, & Colditz, 2004). Purging was defined as using vomiting or laxatives to keep from gaining weight in the past year. To assess binge eating episodes, participants first reported the frequency of eating a very large amount of food during the past year. Participants who endorsed overeating subsequently reported whether they felt out of control (i.e., that they could not stop eating even if they wanted to) during these episodes. Binge eating episodes were defined as overeating and feeling out control while doing so.

We categorized participants as reporting behaviors of bulimia nervosa (BN), binge eating disorder (BED), or other specified feeding or eating disorder (OSFED) based on DSM-5 criteria for these disorders (American Psychiatric Association, 2013). Participants who reported both binge eating episodes and purging at least weekly were classified as reporting BN behaviors. Those who reported weekly binge eating episodes without purging were classified as reporting BED behaviors. Participants who reported monthly, but not weekly, binge eating episodes and/or at least monthly purging were classified as reporting OSFED behaviors. We classified individuals as reporting PD behaviors if they reported at least weekly purging without binge eating. Because PD is a form of OSFED, individuals who were classified has reporting PD behaviors were also classified as reporting OSFED behaviors. We additionally created a dichotomous variable for any ED behaviors (BN, BED, or OSFED).

Covariates: Participants self-reported their race in 1996. Because the cohort is more than 90% White, we classified participants as either White or non-White. We calculated a variable for mothers' age at birth of her GUTS child by taking the difference in dates from the mothers' and GUTS participants' birthdays. Participants self-reported height and weight on all surveys. Body mass index (BMI) was calculated as weight in kilograms divided by height in squared meters. International Obesity Task Force BMI cut-offs for age and sex were used to define overweight/obesity before age 18 years (Cole, Bellizzi, Flegal, & Dietz, 2000).

Statistical analysis

For our main exposure, we used an empirically derived maltreatment variable that was previously developed, described in detail elsewhere (Ziobrowski et al., 2020). In brief, a series of LCAs were conducted that included indicator variables for child physical abuse, child sexual abuse, child emotional abuse, adolescent physical abuse, adolescent sexual abuse, and adolescent emotional abuse. We fit models with increasing numbers of classes and selected the best solution based on model fit statistics as well as interpretability. The best solution consisted of five maltreatment groups, characterized as follows (proportions refer to those in the present sample): 1) "no/low abuse" (62% of women, 60% of men), very low probability of any abuse in both childhood and adolescence; 2) "child physical abuse" (12% of women, 20% of men), high probability of child physical abuse, and medium probabilities of child emotional abuse and adolescent physical abuse: 3) "adolescent emotional abuse" (10% of women, 6% of men), high probability of adolescent emotional abuse, and medium probability of child emotional abuse; 4) "child and adolescent physical and emotional abuse" (15% of women, 14% of men), high probability of physical and emotional abuse in both childhood and adolescence; 5) "child and adolescent sexual abuse" (1% of women, 0% of men), high probability of sexual abuse in childhood and adolescence, and medium probability of physical and emotional abuse in both childhood and adolescence. Individuals were assigned to the maltreatment group they had the highest probability of membership in.

We stratified all analyses by sex (based on whether participants responded to the girls vs. boys baseline questionnaire in 1996) because previous research suggests that associations of maltreatment with EDs may be different for women and men (Afifi et al., 2017; Ziobrowski et al., 2020). We first examined differences in sociodemographic characteristics and incident ED behaviors between maltreatment groups using chi-square tests for categorical outcomes and analysis of variance tests for continuous outcomes. We next examined adjusted associations of maltreatment groups with incident ED behaviors from ages 18 to 30 years. To estimate risk ratios, we used the modified Poisson approach (Zou & Donner, 2013) with generalized estimating equations (SAS version 9.4, proc genmod) to account for non-independence due to repeated measures within individuals and sibling clusters (387 women and 159 men had at least one same sex sibling also in the sample). Our analyses adjusted for age in 2007, race, and maternal age at the participant's birth. We excluded men in the "child and adolescent sexual abuse" maltreatment group from all analyses among men since there were too few individuals in this group to draw meaningful inference (n=5). Only one man reported incident BN behaviors. We were thus unable to assess BN behaviors as an outcome among men but included this participant in the PD behaviors group. No men in the "adolescent emotional abuse" maltreatment group developed PD behaviors, so this group was excluded from analyses predicting PD.

We conducted sensitivity analyses for our main analyses that additionally adjusted for the number of surveys in adulthood and overweight/obesity status before adulthood. Furthermore, since we did not adjust our main analyses for parental-level factors that may be common causes of maltreatment and disordered eating (e.g., parental mental illness), there may be residual confounding. We thus computed E-values for the risk ratios and confidence

intervals in our main analyses predicting any ED behaviors (Mathur, Ding, Riddell, & VanderWeele, 2018; VanderWeele & Ding, 2017). The calculated E-values describe the minimum strength of association that unmeasured confounders would need to have with both the exposure and outcome to "explain away" an effect estimate (i.e., reduce the risk ratio to 1.00 or move 95% confidence interval to cross 1.00). Larger E-values imply that considerable confounding would need to be present to explain away associations.

RESULTS

Approximately 95% of participants were White and the average age in 2007 was 22 years (Table 1). A substantially higher proportion of women in the "child and adolescent sexual abuse" group had overweight/obesity before age 18 years compared with the other maltreatment groups. More than 20% of women and 7% of men developed ED behaviors in young adulthood, which we defined as ages 18 to 30 years. OSFED behaviors were the most commonly reported incident ED behaviors during young adulthood for both women and men. The "no/low abuse" group had the lowest incidence of ED behaviors compared with other maltreatment groups for both women and men.

The crude cumulative incidence of any ED behaviors from ages 18 to 30 years among women and men by maltreatment group is displayed in Figure 1. By age 30, the proportion of individuals who developed any ED behaviors was substantially higher in maltreatment groups characterized by abuse compared with the "no/low abuse" maltreatment group among both women and men.

In adjusted analyses predicting incident ED behaviors (Table 2), women and men in each maltreatment group characterized by abuse had greater risks compared with those in the "no/low abuse" maltreatment group. Women in the "adolescent emotional abuse" and "child and adolescent physical and emotional abuse" groups had nearly twice the risk, while those in the "child and adolescent sexual abuse" group had more than twice the risk, of any incident ED behaviors compared with those in the "no/low abuse" group. Women in the "child and adolescent sexual abuse" group had 2.75 times the risk of incident PD behaviors (risk ratio [RR]: 2.75, 95% confidence interval [CI]: 1.12, 6.76) and more than 3 times the risk of BN behaviors (although 95% CIs crossed 1.00 for this association; RR: 3.32 95% CI; 0.84, 13.11), compared with those in the "no/low abuse" group. The association of the "child and adolescent sexual abuse" group with BED behaviors was weaker in magnitude and the 95% CI crossed 1.00 (RR: 1.55, 95% CI: 0.49, 4.87).

Among men, associations of maltreatment groups with incident ED behaviors were similar in direction but appeared stronger in magnitude compared to those among women. For example, men in the "adolescent emotional abuse" and the "child and adolescent physical and emotional abuse" groups had more than three times the risk of incident BED behaviors compared with men in the "no/low abuse" group. Men in the "child physical abuse" group had more than four times the risk of incident PD behaviors (RR: 4.52; 95% CI: 1.30, 15.70), while those in the "child and adolescent physical and emotional abuse" group had nearly seven times the risk of incident PD behaviors (RR: 6.95; 95% CI: 1.99, 24.35), compared with men in the "no/low abuse" group.

In sensitivity analyses, associations were similar in magnitude and direction for women and men when we further adjusted for the number of ED measurements in adulthood and overweight/obesity status before adulthood (Supplemental Table 1). The distribution of ED measurements before and during young adulthood was similar between maltreatment groups (Supplemental Table 2). For the associations of "child and adolescent physical and emotional abuse" and "child and adolescent sexual abuse" with any ED behaviors, the E-values were above 2.0 for the 95% CIs and above 3.0 for the RRs (Supplemental Table 3). The E-values calculated suggest that, overall, moderate to strong residual confounding would need to be present to "explain away" the observed associations of maltreatment groups with any ED behaviors.

DISCUSSION

In this large, community-based prospective study of women and men, we found that distinct maltreatment groups were differentially associated with risk of ED behaviors developing in young adulthood. To our knowledge, this is the first study to examine prospective associations of maltreatment with ED behaviors using an empirical maltreatment classification that accounts for the types and developmental timing of abuse. This method better captures complex abuse patterns, which are associated with unique health risks and are characteristic of complex posttraumatic stress disorder (World Health Organization, 2019). This is also the first study to examine associations of maltreatment with behaviors of OSFED and PD, the most prevalent EDs, or to have information on ED behaviors reported multiple times throughout childhood/adolescence and adulthood.

This study has several noteworthy findings. While maltreatment groups were associated with increased risks of each ED behavior for both women and men, risks were especially high for developing ED behaviors involving purging (BN and PD). In addition, maltreatment groups characterized by abuse sustained throughout childhood and adolescence and those that involved multiple forms of abuse (i.e., complex abuse) tended to have the highest risks of developing EDs in young adulthood. These findings emphasize the need to account for complex abuse patterns that may involve multiple forms of abuse occurring over several developmental periods, rather than focusing on individual forms of abuse occurring over broad age spans, to fully capture risks associated with maltreatment and complex abuse. This is especially important considering that the vast majority of maltreatment victims experience complex abuse patterns (Finkelhor et al., 2007; Ziobrowski et al., 2020). The consequences of emotional abuse have received less attention than those due to sexual or physical abuse. One of the unique contributions of our study is that we observed that both women and men in the "adolescent emotional abuse" group had increased risks for incident EDs in young adulthood. Although emotional abuse is likely to co-occur with other forms of abuse (Ziobrowski et al., 2020), those in the "adolescent emotional abuse" maltreatment group, which was predominantly characterized by only emotional abuse in adolescence, was associated elevated relative-risks for any ED behaviors and most strongly for PD among both women and men.

Although most previous research in this area has focused exclusively on women, we observed strong risks among men. The risk of PD for men in the "child physical abuse"

and "child and adolescent physical and emotional abuse" groups is particularly striking, with relative-risks above 4.0 for those in the "child physical abuse" group and nearly 7.0 for those in the "child and adolescent physical and emotional abuse" group. Moreover, men in the "child and adolescent physical and emotional abuse" group had nearly 3 times the risk of any ED behaviors developing in young adulthood than those in the "no/low abuse" group. It is also noteworthy that some associations appeared stronger for men than women, particularly those predicting BED and PD behaviors. Future research should examine whether the sex differences observed in our study are replicated in other samples during this age period.

There are some limitations to this study. First, maltreatment was self-reported. However, self-reported maltreatment, even when reported much later in adulthood, has been found to be reliable (Dube, Williamson, Thompson, Felitti, & Anda, 2004). Moreover, cases of maltreatment are likely to be missed if information on maltreatment is obtained from other sources, such as court records or parents. Second, GUTS did not collect information on neglect, which affects approximately 15% of U.S. children (Finkelhor et al., 2013). Neglect often co-occurs with other forms of abuse, or may be the predominant form of abuse, and is associated with EDs (Finkelhor et al., 2013; Hazzard et al., 2019; Rivera, Fincham, & Bray, 2018). Our derived maltreatment groups may have been even more nuanced if we had been able to include neglect as an indicator in the LCA, and the associations we observed between maltreatment groups and ED behaviors may in part be due to co-occurring neglect. Third, our results may not be generalizable to non-White or more economically diverse populations. However, our sample was large and community-based, and represents individuals across all U.S. regions. Fourth, some participants who were eligible to be included were missing information on EDs in young adulthood and were excluded. This may induce selection bias if being selected into our analyses depended on both maltreatment group membership and incident ED behaviors in young adulthood. However, exclusions due to non-response were relatively low, especially among women (our analytic sample consisted of 91% of women and 72% of men who were eligible to be included). Fifth, it is possible that common causes of maltreatment and disordered eating, particularly parental mental illness and substance use disorders, may explain some of the observed associations. However, the computed E-values suggest that the risk ratios for confounders needed to nullify most of the associations for any ED behaviors would be higher than those typically seen in the literature. Still, future research in this area that could account for detailed psychiatric histories of both parents would be beneficial to demonstrate robust findings. Sixth, GUTS did not assess anorexia nervosa behaviors in young adulthood, and it is possible that the risk of developing any ED behaviors may be underestimated in our models as a result. Our findings should only be interpreted as pertaining to the risk of ED behaviors that involve binge eating and purging in young adulthood. Lastly, we defined sex according to the survey that participants responded to in 1996, but this may not reflect participants' gender identity across development. Additional research is needed to examine associations of child and adolescent maltreatment among transgender or non-gender identifying individuals, who may also have different profiles of abuse and risks for EDs.

This study has numerous strengths. First, our sample was large, consisted of individuals residing in all regions across the U.S., and included both women and men. Second, we had information on ED behaviors, rather than ED diagnoses, which is beneficial since most people with disordered eating do not receive a diagnosis or treatment and would not be included clinical samples. Third, we had information on ED behaviors from multiple time-points across childhood/adolescence and adulthood for all participants in this study, which increased the chance that ED behaviors would be detected in the past 12 months and helped to establish the temporal ordering of maltreatment and ED behaviors. Fourth, we calculated E-values to assess the robustness of our findings to unmeasured confounding, thus strengthening our ability to causally infer about the observed effect estimates. Lastly, we used an empirically defined classification of maltreatment, based on the types and developmental timing of abuse, which allowed us to examine the effects due to complex maltreatment patterns.

Overall, this study illustrates the long-term impact of maltreatment on disordered eating. Although each maltreatment group characterized by abuse had increased risks for EDs, those characterized by abuse sustained across childhood and adolescence had the greatest risks. Detecting maltreatment early in development and preventing maltreatment in adolescence may help prevent negative sequalae due to maltreatment. Adults who have maltreatment detected, especially those who report multiple forms of abuse or abuse sustained across childhood and adolescence, may benefit from targeted ED prevention efforts. Lastly, individuals being treated for EDs who have experienced maltreatment may benefit from trauma-informed care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments:

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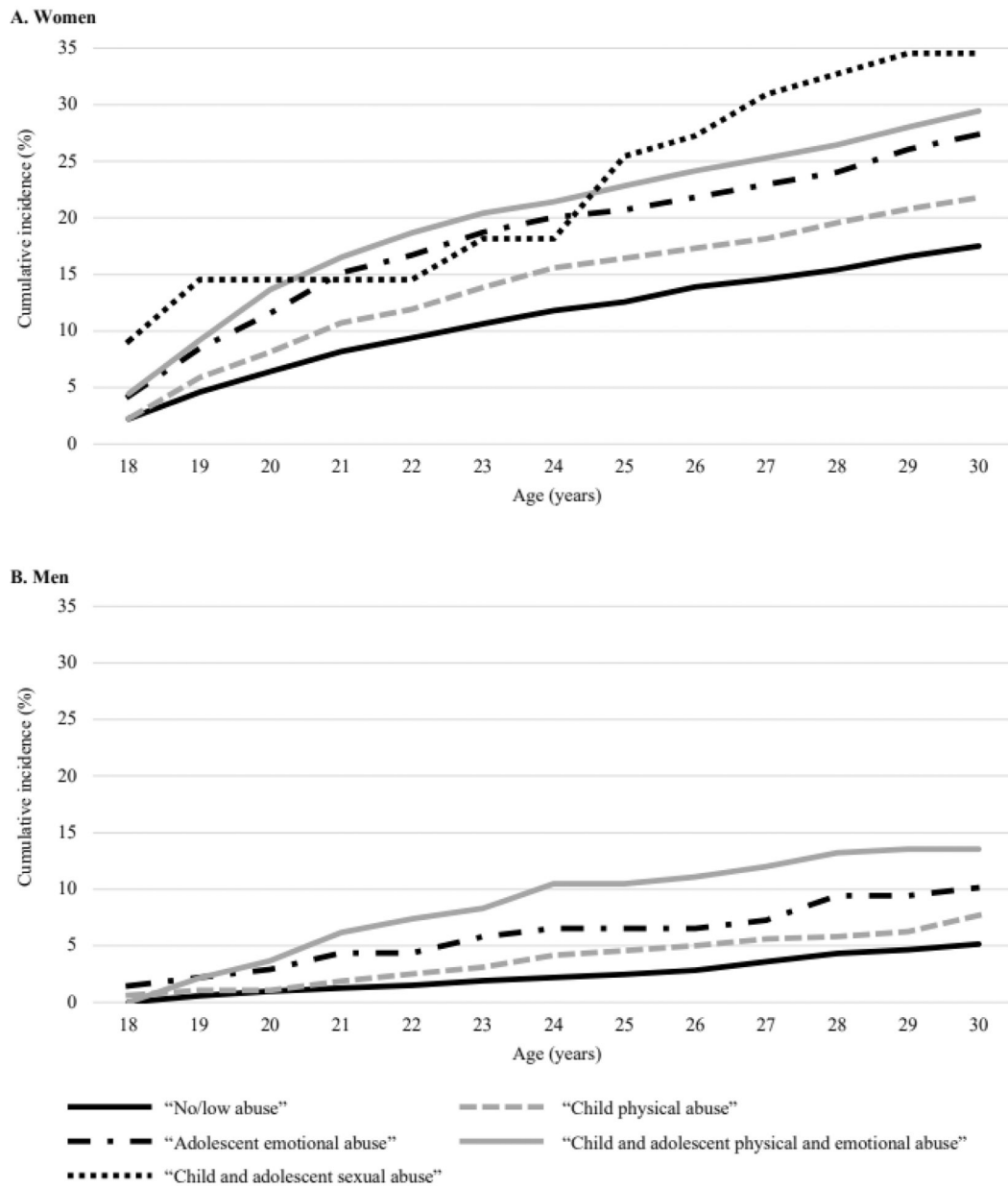Author Manuscript Author Manuscript Author Manuscript Author Manuscript

A. Women

B. Men

Figure 1.
Cumulative incidence of any eating disorder behaviors developing in young adulthood by maltreatment group among (A) women and (B) men.

Table 1.

Characteristics of 4,647 women and 2,363 men from the Growing Up Today Study in the main analytic sample

	Total, n = 4,647 women, 2,363 men, mean (SD) or n (%)	"No/low abuse" group, n = 2,869 women, 1,419 men, mean (SD) or n (%)	"Child physical abuse" group, n = 578 women, 481 men, mean (SD) or n (%)	"Adolescent emotional abuse" group, n = 449 women, 138 men, mean (SD) or n (%)	"Child and adolescent physical and emotional abuse" group, n = 696 women, 325 men, mean (SD) or n (%)	"Child and adolescent sexual abuse" group, n = 55 women, 0 men, mean (SD) or n (%)	P[a]
A. Women							
Age in 2007	22.7 (1.7)	22.7 (1.7)	22.8 (1.7)	22.8 (1.6)	22.7 (1.7)	22.8 (1.7)	.789
White race	4,388 (94.4)	2,731 (95.2)	537 (92.9)	420 (93.5)	650 (93.4)	50 (90.9)	.059
Maternal age at participant's birth	29.4 (3.5)	29.4 (3.5)	29.0 (3.4)	29.7 (3.4)	29.2 (3.5)	29.6 (3.8)	.024
Overweight/obesity in childhood	1,159 (25.0)	663 (23.1)	152 (26.3)	129 (28.8)	192 (27.6)	23 (41.8)	.001
Incident any ED behaviors	975 (21.0)	502 (17.5)	126 (21.8)	123 (27.4)	205 (29.5)	19 (34.6)	<.001
Incident BN behaviors	63 (1.4)	30 (1.1)	9 (1.6)	6 (1.3)	16 (2.3)	2 (3.6)	.061
Incident BED behaviors	210 (4.5)	107 (3.7)	31 (5.4)	25 (5.6)	44 (6.3)	3 (5.5)	.021
Incident OSFED behaviors	879 (18.9)	455 (15.9)	112 (19.4)	111 (24.7)	183 (26.3)	18 (32.7)	<.001
Incident PD behaviors	189 (4.1)	94 (3.3)	25 (4.3)	25 (5.6)	40 (5.8)	5 (9.1)	.003
B. Men							
Age in 2007	22.8 (1.8)	22.8 (1.8)	22.7 (1.7)	22.7 (1.7)	22.9 (1.8)	----	.430
White race	2,245 (95.0)	1,352 (95.3)	458 (95.2)	128 (92.8)	307 (94.5)	----	.584
Maternal age at participant's birth	29.5 (3.5)	29.7 (3.4)	29.0 (3.4)	29.6 (3.8)	29.3 (3.7)	----	.001
Overweight/obesity in childhood	877 (37.2)	524 (37.0)	174 (36.2)	49 (35.5)	130 (40.1)	----	.658
Incident any ED behaviors	168 (7.1)	73 (5.1)	37 (7.7)	14 (10.1)	44 (13.5)	----	<.001
Incident BED behaviors	49 (2.1)	19 (1.3)	10 (2.1)	6 (4.4)	14 (4.3)	----	.002
Incident OSFED behaviors	162 (6.9)	71 (5.0)	36 (7.5)	12 (8.7)	43 (13.2)	----	<.001
Incident PD behaviors	16 (0.7)	4 (0.3)	6 (1.3)	0 (0.0)	6 (1.9)	----	.004

[a] P values are from chi-square and analysis of variance tests comparing maltreatment groups among women and men separately

Abbreviations: BED (binge eating disorder), BN (bulimia nervosa), ED (eating disorder), OSFED (other specified feeding or eating disorder), PD (purging disorder), SD (standard deviation)

Table 2.

Risk ratios (RR) and 95% confidence intervals (CI) from modified Poisson models[a] using generalized estimating equations predicting incident eating disorder behaviors in young adulthood (ages 18 to 30 years) among women and men

	Any eating disorder behaviors, RR (95% CI)	Bulimia nervosa behaviors, RR (95% CI)	Binge eating disorder behaviors, RR (95% CI)	Other specified feeding or eating disorder behaviors, RR (95% CI)	Purging disorder behaviors,[b] RR (95% CI)
A. Women					
Maltreatment group					
"No/low abuse"	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
"Child physical"	1.28 (1.06, 1.55)	1.52 (0.73, 3.16)	1.45 (0.97, 2.16)	1.25 (1.02, 1.53)	1.31 (0.85, 2.04)
"Adolescent emotional"	1.67 (1.38, 2.03)	1.24 (0.52, 2.98)	1.53 (0.99, 2.35)	1.66 (1.36, 2.03)	1.72 (1.11, 2.66)
"Child and adolescent physical and emotional"	1.90 (1.62, 2.22)	2.32 (1.27, 4.25)	1.80 (1.27, 2.55)	1.84 (1.56, 2.18)	1.83 (1.26, 2.64)
"Child and adolescent sexual"	2.15 (1.39, 3.33)	3.32 (0.84, 13.11)	1.48 (0.47, 4.67)	2.24 (1.43, 3.51)	2.75 (1.12, 6.76)
B. Men					
Maltreatment group					
"No/low abuse"	1.00 (reference)	-----	1.00 (reference)	1.00 (reference)	1.00 (reference)
"Child physical"	1.51 (1.02, 2.25)	-----	1.49 (0.70, 3.19)	1.52 (1.02, 2.27)	4.52 (1.30, 15.70)
"Adolescent emotional"	2.11 (1.20, 3.73)	-----	3.44 (1.38, 8.58)	1.85 (1.01, 3.41)	-----
"Child and adolescent physical and emotional"	2.95 (2.02, 4.30)	-----	3.34 (1.67, 6.66)	2.97 (2.03, 4.34)	6.95 (1.99, 24.35)
"Child and adolescent sexual"	-----	-----	-----	-----	-----

[a] Models adjusted for age, race, and maternal age at child's birth, and accounted for non-independence due to repeated measures and sibling sets

[b] Men who reported bulimia nervosa behaviors were included in the purging disorder behaviors group