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Adverse childhood experiences in relation to mood-, weight-, and eating-related outcomes in emerging adulthood: Does self-compassion play a buffering role?

Vivienne M. Hazzard, PhD, MPH, RD^a, Cynthia Yoon, PhD, MS, RD^b, Rebecca L. Emery, PhD^b, Susan M. Mason, PhD, MPH^b, Ross D. Crosby, PhD^{a,c}, Stephen A. Wonderlich, PhD^{a,c}, Dianne Neumark-Sztainer, PhD, MPH, RD^b

^aSanford Center for Biobehavioral Research, Fargo, North Dakota USA

^bDivision of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota USA

^cDepartment of Psychiatry and Behavioral Science, University of North Dakota School of Medicine and Health Sciences, Fargo, North Dakota USA

Abstract

Background: Adverse childhood experiences (ACEs) are associated with a range of health problems, yet protective factors such as self-compassion may help buffer these associations.

Objective: This study examined associations of distinct patterns of ACEs with depressive symptoms, body mass index (BMI), and disordered eating symptoms and investigated self-compassion as a potential protective factor.

Participants and Setting: Data from a diverse sample of 1,440 emerging adults ($M_{age}=22.2$ years; 53.7% female; 80.3% with race/ethnicity other than non-Hispanic white) came from the population-based EAT 2018 (Eating and Activity over Time) study.

Methods: Seven types of ACEs were retrospectively self-reported and used as model indicators in latent class analysis to identify patterns of ACEs. Self-compassion, depressive symptoms, height and weight (to calculate BMI), and disordered eating symptoms were also assessed. Demographic-adjusted regression models were conducted.

Results: Three latent classes emerged: “low ACEs” (66.5% of the sample), “household dysfunction” (24.3%), and “household dysfunction and abuse” (9.1%). Compared to participants in the “low ACEs” class, participants in either latent class involving household dysfunction demonstrated higher levels of depressive and disordered eating symptoms. Participants in the “household dysfunction and abuse” class also had higher BMI. Associations differed by self-

Corresponding author: Correspondence concerning this article should be addressed to Vivienne M. Hazzard, Sanford Center for Biobehavioral Research, 120 Eighth Street South, Fargo, ND 58103, viviennehazzard@gmail.com.

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compassion for depressive symptoms ($P_{interaction}=.01$), BMI ($p_{interaction}=.03$), and disordered eating symptoms ($p_{interaction}=.005$), such that associations for latent classes characterized by ACEs were weaker with higher levels of self-compassion.

Conclusions: These findings suggest self-compassion may act as a buffer against adverse mood-, weight-, and eating-related outcomes in the face of adversity and therefore may be an important intervention target.

Keywords

Adverse Childhood Experiences; Child Abuse; Self-Compassion; Depression; Body Mass Index; Disordered Eating

Introduction

Adverse childhood experiences (ACEs), which include various forms of maltreatment (i.e., abuse, neglect) and household dysfunction (e.g., household substance abuse, mental illness, incarceration), are associated with a wide range of mental and physical health problems (Felitti et al., 1998; Hughes et al., 2017; Petruccioli, Davis, & Berman, 2019). Depressed mood, elevated weight status, and disordered eating represent a subset of interrelated outcomes that have been consistently linked to ACEs (Caslini et al., 2016; Danese & Tan, 2014; Felitti et al., 1998; Hemmingsson, Johansson, & Reynisdottir, 2014; Hughes et al., 2017; Molendijk, Hoek, Brewerton, & Elzinga, 2017; Palmisano, Innamorati, & Vanderlinden, 2016; Petruccioli et al., 2019). These often overlapping (Nightingale & Cassin, 2019; Preiss, Brennan, & Clarke, 2013) conditions are major public health concerns, as they are associated with substantial impairment, morbidity, and mortality (Cassano & Fava, 2002; Dixon, 2010; van Hoeken & Hoek, 2020). However, not all individuals who experience ACEs go on to develop these adverse outcomes (Afifi & MacMillan, 2011).

Resiliency theory, which suggests that protective factors can mitigate the negative consequences of known risk exposures, may help explain why some individuals achieve positive outcomes despite a history of ACEs (Fergus & Zimmerman, 2005). Therefore, while we must prioritize efforts to prevent ACEs from occurring in the first place, identifying modifiable factors that promote resilience following ACEs is an important step toward improving outcomes for individuals who have already experienced ACEs. Some research has begun exploring potential protective factors that may foster resilience against a broad range of adverse outcomes after exposure to ACEs. Thus far, protective factors that have been found to promote such resilience include adaptive coping strategies, positive self-esteem, low self-blame, and mindfulness (Afifi & MacMillan, 2011; Beshai & Parmar, 2019; Cheung et al., 2018; Racine, Eirich, Dimitropoulos, Hartwick, & Madigan, 2020). A related but underexplored potential protective factor is self-compassion, which involves being kind and understanding toward oneself through times of suffering (Neff, 2003). Individuals who have experienced emotional abuse consistently demonstrate lower levels of self-compassion (Ross, Kaminski, & Herrington, 2019; Tanaka, Wekerle, Schmuck, & Paglia-Boak, 2011; Wu, Chi, Lin, & Du, 2018), but less research has examined self-compassion in relation to ACEs more broadly.

Self-compassion may be particularly valuable for individuals who have endured ACEs, as evidence suggests that self-compassion facilitates adaptive emotion regulation (Inwood & Ferrari, 2018; Vettese, Dyer, Li, & Wekerle, 2011), and individuals with a history of ACEs tend to exhibit difficulties regulating their emotions (Gruhn & Compas, 2020). Whereas difficulties in emotion regulation are strongly linked with depressed mood (Aldao, Nolen-Hoeksema, & Schweizer, 2010), elevated weight status (Aparicio, Canals, Arijia, De Henaauw, & Michels, 2016), and disordered eating (Prefit, Căndea, & Szentagotai-Tar, 2019), self-compassion demonstrates protective associations with each of these outcomes (Braun, Park, & Gorin, 2016; MacBeth & Gumley, 2012; Puhl, Telke, Larson, Eisenberg, & Neumark-Stzainer, 2020). Thus, interventions to increase self-compassion, which has been found to be modifiable (Wilson, Mackintosh, Power, & Chan, 2019), could hold promise to help mitigate adverse mood-, weight-, and eating-related outcomes among individuals exposed to ACEs. Encouragingly, preliminary research suggests that self-compassion may indeed play a protective role in the relationship between emotional maltreatment and depressive symptoms (Ross et al., 2019; Tanaka et al., 2011; Wu et al., 2018). However, to our knowledge, no studies to date have examined the analogous protective capacity of self-compassion in the context of broader ACEs or in relation to weight- or eating-related outcomes.

Emerging adulthood is a critical developmental period during which risk for developing depression and disordered eating (Berry, 2004; Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2005; Potterton, Richards, Allen, & Schmidt, 2020), as well as excess weight gain (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008), is particularly high. Emerging adulthood is a unique transitional period between adolescence and adulthood when many individuals leave home for the first time and often experience increased responsibility, changes in family relationships, instability, and identity exploration (Aquilino, 2007; Arnett, 2004). Given that emerging adulthood is marked by shifts in social roles, significant development of one's sense of self, and elevated risk for adverse mood-, weight-, and eating-related outcomes, this period represents an important stage of development to study the relationship between ACEs and these health outcomes. A limited number of studies have previously examined ACEs in relation to health outcomes in emerging adults, with some finding a history of ACEs to be associated with a greater likelihood of a range of adverse mental and physical health outcomes, including depression (Forster, Grigsby, Rogers, & Benjamin, 2018; Mersky, Topitzes, & Reynolds, 2013; Santoro, Suchday, Robbins, Benkhokha, & Zemon, 2021; Schilling, Aseltine, & Gore, 2007). Research is needed, however, to understand how ACEs are associated with weight- and eating-related outcomes during emerging adulthood, as well as to identify factors that might mitigate the risk of adverse outcomes during this period, which ultimately may help reduce the risk of such outcomes across the life course.

To address the existing gaps in the literature, the present study examined self-compassion as a potential moderator of associations of a range of ACEs, encompassing both maltreatment and household dysfunction, with mood-, weight-, and eating-related outcomes in emerging adulthood. As different forms of ACEs often co-occur (e.g., Felitti et al., 1998), we used a person-centered approach to identify groups characterized by common ACEs co-occurrence patterns. A person-centered approach offers important advantages, such as the

ability to address the interrelatedness yet unique qualities of multiple forms of ACEs, over more conventional variable-centered approaches to analyzing ACEs (Debowska, Willmott, Boduszek, & Jones, 2017). In contrast, the cumulative risk approach (i.e., using a sum score of the number of ACEs experienced) assigns equal weight to different types of ACEs that may not have equivalent influence (e.g., parental divorce versus sexual abuse), and examining specific types of ACEs in isolation may overestimate their unique associations with health outcomes. Importantly, growing evidence suggests that distinct patterns of ACEs have qualitatively different associations with health outcomes (e.g., Lacey, Pinto Pereira, Li, & Danese, 2020; Lanier, Maguire-Jack, Lombardi, Frey, & Rose, 2018). Therefore, the objectives of the present study were to (a) identify distinct patterns of ACEs in a population-based sample, (b) examine associations between patterns of ACEs and depressive symptoms, body mass index (BMI), and disordered eating symptoms in emerging adulthood, and (c) assess the extent to which such associations differ according to levels of self-compassion.

Methods

Participants

EAT 2018 (Eating and Activity over Time) is the second wave of a population-based study of dietary intake, physical activity, weight control behaviors, weight status, and factors associated with these outcomes in young people. For the first wave of the study in 2009-2010 (EAT 2010), a total of 2,793 middle and senior high school students at 20 urban public schools in Minneapolis-St. Paul, Minnesota completed classroom surveys and anthropometric measures (Arcan et al., 2014; Larson, Wall, Story, & Neumark-Sztainer, 2013; Neumark-Sztainer et al., 2012). At follow-up in 2017-2018, original participants were mailed letters inviting them to complete the EAT 2018 survey. The EAT 2018 survey was completed by 1,568 of the participants from the first wave of the study (65.8% response rate among those with contact information available). Participants with missing data on ACEs ($n = 79$), self-compassion ($n = 45$), or demographic covariates ($n = 42$) were excluded from the present cross-sectional analysis, resulting in an analytic sample of 1,440 participants with a mean age of 22.2 ± 2.0 years. The mixed-gender sample was highly diverse with regard to race/ethnicity and socioeconomic status (see Table 1). All study protocols were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

Survey development

The EAT 2010 survey (Berge, Wall, Larson, Loth, & Neumark-Sztainer, 2013; Neumark-Sztainer et al., 2012) was modified for the second wave to improve the relevance of items for young adults. Decisions to retain or drop items were based on their relevance to the aims of the EAT 2018 survey and the performance of represented constructs in the peer-reviewed literature. Focus groups ($n = 29$) were conducted to pretest the EAT 2018 survey and, after it was finalized, the test-retest reliability of measures was examined using data from a subgroup of 112 young adult participants who completed the EAT 2018 survey twice within a period of three weeks. All test-retest reliability statistics reported below come from this subgroup of the EAT 2018 sample, and all internal consistency statistics reported below come from the full EAT 2018 sample.

Measures

Adverse childhood experiences.—ACEs were assessed retrospectively with seven items modified from the Adverse Childhood Experiences scale (Felitti et al., 1998; Finkelhor, Shattuck, Turner, & Hamby, 2015) and the Childhood Trauma Questionnaire (Bernstein et al., 2003). Participants were asked if any of the following had ever happened prior to their 18th birthday (*yes/no*): “a household member was depressed, mentally ill, or attempted suicide” (household mental illness or suicide attempt), “lived with someone who was a problem drinker or alcoholic, who used street drugs, or who abused prescription drugs” (household substance abuse), “a household member went to prison” (household incarceration), or “someone [in/outside] your family touched you in a sexual way against your wishes or forced you to touch them in a sexual way” (sexual abuse by a family member; sexual abuse by someone outside the family who was not a dating partner). Participants were also asked how often, prior to their 18th birthday, an adult in their family had done either of the following (5-point scale with response options of *never*, *rarely*, *sometimes*, *often*, and *very often*): “said hurtful or insulting things to me” (emotional abuse by a family member; responses dichotomized such that *often* or *very often* was considered an affirmative response) or “hit me so hard it left me with bruises or marks” (physical abuse by a family member; responses dichotomized such that any response other than *never* was considered an affirmative response). Per the Adverse Childhood Experiences scale, household mental illness/suicide attempt, household substance abuse, and household incarceration are considered types of household dysfunction, and emotional, physical, and sexual abuse are considered forms of abuse (Felitti et al., 1998). Test-retest reliability was assessed for the sum of these seven items ($r = .71$).

Self-compassion.—Self-compassion was assessed with the five-item Self-Kindness subscale of the Self-Compassion Scale (Neff, 2003). Specifically, this subscale is comprised of the following items: (1) “I try to be understanding and patient towards those aspects of my personality I don’t like,” (2) “I’m kind to myself when I’m experiencing suffering,” (3) “When I’m going through a very hard time, I give myself the caring and tenderness I need,” (4) “I’m tolerant of my own flaws and inadequacies,” and (5) “I try to be loving toward myself when I’m feeling emotional pain.” Response options ranged from 1 = *almost never* to 5 = *almost always*. Responses were averaged. Possible scores ranged from 1 to 5, with higher scores indicating higher levels of self-compassion (Cronbach’s $\alpha = .88$; test-retest $r = .61$).

Depressive symptoms.—Depressive symptoms over the past year were assessed with the validated six-item Kandel and Davies Depressive Mood Scale (Kandel & Davies, 1982). Response options were 1 = *not at all*, 2 = *somewhat*, and 3 = *very much*. Responses were averaged, and the average was multiplied by 10. Possible scores ranged from 10 to 30, with higher scores indicating higher depressive symptoms (Cronbach’s $\alpha = .89$; test-retest $r = .71$).

Body mass index.—BMI was calculated as kg/m^2 using participants’ self-report of height and weight at EAT 2018 (test-retest $r = .98$). Young adults’ self-report of height and weight were previously found to be highly correlated with measured height and weight

and thus adequately valid for the assessment of BMI (Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013)

Disordered eating symptoms.—Past-year disordered eating symptoms were assessed via self-report with items representing five of the seven constructs from the Project EAT Disordered Eating Attitudes and Behaviors scale (the other two constructs, distress about overeating and perceived importance of weight and shape, were not assessed at EAT 2018; Yoon, Simone, Mason, & Neumark-Sztainer, 2020). The following disordered eating symptoms were summed to represent a symptom count ranging from 0 to 5: overeating (test-retest agreement = 91%), loss of control while overeating (test-retest agreement = 89%), chronic dieting (i.e., having gone on a diet five times or more over the past year; test-retest agreement = 93%), any extreme unhealthy weight control behaviors (i.e., self-induced vomiting, diet pill use, laxative use, and/or diuretic use to control weight; test-retest agreement = 93%), and any less extreme unhealthy weight control behaviors (i.e., fasting, skipping meals, eating very little food, using food substitutes, and/or smoking more cigarettes to control weight; test-retest agreement = 76%). Each of these symptoms correspond to characteristic features of eating disorders as outlined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013).

Demographic covariates.—Structurally racialized categories labeled as race/ethnicity and indicators of socioeconomic status were self-reported at EAT 2010, and age and gender were self-reported at EAT 2018. A socioeconomic status variable was derived primarily based upon parental education level at baseline, defined as the higher level of educational attainment of either parent (test-retest $r = .90$). A Classification and Regression Tree-based algorithm was also used to take into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parent employment status (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003).

Statistical analysis

Analyses were conducted with Stata 16.0 unless otherwise noted. Attrition from EAT 2010 to EAT 2018 did not occur completely at random; thus, inverse probability weighting was used for all analyses to minimize potential response bias due to missing data and allow for extrapolation back to the original EAT 2010 school-based sample (Little, 1986; Seaman & White, 2013). Inverse probability weights were derived as the inverse of the estimated probability that an individual responded at the two time points based on several characteristics reported in 2010, including demographics, past year frequency of dieting, and weight status.

Latent class analysis.—Using the seven dichotomous ACE variables as indicators, we conducted latent class analysis using Latent GOLD Version 5.1 to identify distinct patterns of ACEs. Models were fit successively increasing the number of classes, up through an eight-class solution. Initial inspection of bivariate residuals (BVRs) indicated that the physical abuse/emotional abuse (BVR = 24.01) and household substance abuse/incarceration (BVR = 10.86) indicator pairs violated the local independence assumption;

thus, models were conducted allowing local dependence between these indicator pairs. Minimum Bayesian Information Criterion (BIC), sample-size adjusted BIC (aBIC), and consistent Akaike's Information Criterion (cAIC) were used to determine which number of classes provided the optimal balance between model fit and parsimony. After identifying the model providing the optimal balance between model fit and parsimony, each participant was assigned to a latent class based on maximum posterior probability (i.e., the class they had the highest probability of membership in). We then conducted a one-way analysis of variance (ANOVA) to examine differences in levels of self-compassion across the latent classes. To provide a visual description of self-compassion, depressive symptoms, BMI, and disordered eating symptoms across each latent class and facilitate comparison across these variables, we also plotted the means of standardized versions of each of these variables by latent class.

Regression models.—Using the latent class assignments based on maximum posterior probability, we conducted separate linear regression models examining latent class associations with depressive symptoms and BMI (excluding 41 women who were pregnant at EAT 2018 for this model), as well as a Poisson regression model examining latent class associations with disordered eating symptom count. Models were adjusted for age, gender, race/ethnicity, and socioeconomic status. We then assessed for interaction on the additive scale (i.e., corresponding to differences in absolute risk) between latent class and self-compassion by adding self-compassion and a cross-product term (latent class \times self-compassion) to the models, using the identity link function for the Poisson regression model (Marschner, 2010). Significant interaction terms were interpreted graphically and with simple slope analyses.

Results

In this sample of emerging adults, 45% of participants reported having experienced at least one of the seven types of ACEs examined in this study (Table 1). The most common type of ACE in this sample was growing up with a household member who was mentally ill or had attempted suicide, reported by 26.5% of the sample.

Latent class analysis

Minimum BIC, aBIC, cAIC values were observed for a three-class model (Table 2), indicating that this model provided the optimal balance between model fit and parsimony. Item probability estimates of each type of childhood maltreatment for each latent class are displayed in Figure 1. Class 1 was characterized by low probability of ACEs (i.e., participants in this class were unlikely to have experienced any of the ACEs examined; this latent class is hereafter referred to as the “no/low ACEs” class) and comprised 66.5% of the sample, Class 2 was characterized by high probability of household dysfunction indicators (hereafter referred to as the “household dysfunction” class) and comprised 24.3% of the sample, and Class 3 was characterized by high probability of household dysfunction and abuse indicators (hereafter referred to as the “household dysfunction and abuse” class) and comprised 9.1% of the sample. Self-compassion differed across latent classes, $F(2, 1437) = 29.36, p < .001$. Post-hoc comparisons indicated lower levels of self-compassion in the “household dysfunction” ($M = 3.2, SD = 0.9$) and “household dysfunction and

abuse” ($M = 3.2$, $SD = 0.9$) classes compared to the “no/low ACEs” class ($M = 3.6$, $SD = 0.9$), while levels of self-compassion did not differ between the “household dysfunction” and “household dysfunction and abuse” classes. For descriptive purposes, the means of standardized self-compassion, depressive symptoms, BMI, and disordered eating symptoms by latent class are illustrated in Figure 2.

Latent class associations with mood-, weight-, and eating-related outcomes

In models adjusted for age, gender, race/ethnicity, and socioeconomic status, participants in either latent class involving household dysfunction demonstrated statistically significantly higher levels of depressive and disordered eating symptoms compared to participants in the “no/low ACEs” class, and participants in the “household dysfunction and abuse” class also had statistically significantly higher BMI (Table 3). More specifically, compared to participants in the “no/low ACEs” class, depressive symptom scores were nearly 5 points higher in both latent classes involving household dysfunction, disordered eating symptom counts were 20% and 53% higher in the “household dysfunction” and “household dysfunction and abuse” classes, respectively, and BMI was 1.70 kg/m² higher in the “household dysfunction and abuse” class. While not statistically significant, BMI was also 0.67 kg/m² higher in the “household dysfunction” class.

Interactions between latent class and self-compassion

Self-compassion was found to moderate latent class associations with depressive symptoms, $F(2, 1421) = 4.37, p = .01$, BMI, $F(2, 1352) = 3.39, p = .03$, and disordered eating symptoms, $\chi^2(2, N = 1406) = 10.71, p = .005$. These interactions are described in more detail below, as well as illustrated in Figures 2–4.

Depressive symptoms (Figure 3).—Significantly higher depressive symptoms were observed for the “household dysfunction” and “household dysfunction and abuse” classes relative to the “no/low ACEs” class regardless of self-compassion level. However, these associations were somewhat weaker at higher levels (i.e., one standard deviation above the mean) of self-compassion (“household dysfunction”: $b = 2.96$ [95% CI: 1.97, 3.95], $p < .001$; “household dysfunction and abuse”: $b = 3.90$ [95% CI: 2.27, 5.53], $p < .001$) than at lower levels (i.e., one standard deviation below the mean) of self-compassion (“household dysfunction”: $b = 4.83$ [95% CI: 4.01, 5.64], $p < .001$; “household dysfunction and abuse”: $b = 4.67$ [95% CI: 3.41, 5.92], $p < .001$).

Body mass index (Figure 4).—At lower levels of self-compassion, both the “household dysfunction” ($b = 1.24$ [95% CI: 0.15, 2.33], $p = .03$) and “household dysfunction and abuse” ($b = 2.51$ [95% CI: 0.81, 4.21], $p = .004$) classes were associated with higher BMI relative to the “no/low ACEs” class, while neither the “household dysfunction” ($b = -0.57$ [95% CI: -1.89, 0.75], $p = .40$) nor the “household dysfunction and abuse” ($b = -0.02$ [95% CI: -2.21, 2.18], $p = .99$) classes were associated with BMI relative to the “no/low ACEs” class at higher levels of self-compassion.

Disordered eating symptoms (Figure 5).—At lower levels of self-compassion, both the “household dysfunction” ($\exp[b] = 1.22$ [95% CI: 1.02, 1.47], $p = .03$) and “household

dysfunction and abuse” ($\exp[b] = 1.89$ [95% CI: 1.39, 2.57], $p < .001$) classes were associated with greater disordered eating symptoms relative to the “no/low ACEs” class, while neither the “household dysfunction” ($\exp[b] = 1.00$ [95% CI: 0.84, 1.18], $p = .98$) nor the “household dysfunction and abuse” ($\exp[b] = 1.11$ [95% CI: 0.84, 1.47], $p = .46$) classes were associated with disordered eating symptoms relative to the “no/low ACEs” class at higher levels of self-compassion.

Discussion

The aims of this study were to identify distinct patterns of ACEs, examine associations between patterns of ACEs and mood-, weight-, and eating-related outcomes, and assess the extent to which these associations differ according to levels of self-compassion in a population-based sample of emerging adults. We identified three latent ACEs classes: “no/low ACEs,” “household dysfunction,” and “household dysfunction and abuse,” mapping onto the two key domains of ACEs as established by Felitti and colleagues (i.e., household dysfunction and childhood abuse; 1998). Results suggested that household dysfunction, whether accompanied by abuse or not, was associated with elevated levels of both depressive and disordered eating symptoms, and exposure to both household dysfunction and abuse was also associated with elevated BMI. Self-compassion moderated each of these associations, such that associations for latent classes characterized by ACEs were weaker — or, in some cases, fully attenuated — with higher levels of self-compassion. These findings suggest that self-compassion may act as a buffer against adverse outcomes among individuals with a history of ACEs.

The prevalences of ACEs observed in this sample of emerging adults were largely similar to or higher than those observed in other studies of ACEs among emerging adults. For example, household substance abuse was reported by 22% of the present sample, identical to the prevalence observed in U.S. college students who participated in the 2015 National College Health Assessment II (Forster et al., 2018), while the 17% prevalence of physical abuse observed in the present sample was higher than the 14% prevalence of physical abuse observed in the 2015 National College Health Assessment II (Forster et al., 2018). The latent classes observed in this sample were also generally consistent with those identified in prior studies applying latent class analysis to examine patterns of ACEs, which have often included classes characterized by low ACEs overall, household dysfunction without abuse, and high ACEs overall (Lacey et al., 2020; Lanier et al., 2018; Lew & Xian, 2019; Merians, Baker, Frazier, & Lust, 2019; Shin, McDonald, & Conley, 2018; Witt, Sachser, Plener, Brähler, & Fegert, 2019). However, in some prior studies, additional classes beyond these three have emerged, such as maltreatment without household dysfunction (Lacey et al., 2020; Merians et al., 2019; Witt et al., 2019). Such additional classes may have been observed in prior studies due, in part, to inclusion of a broader range of ACEs (e.g., including neglect) than were included in the present study. Overall, however, classes observed in the present study and prior studies collectively provide evidence that different types of household dysfunction often cluster together, as do different types of maltreatment.

The present study builds upon evidence from prior studies for associations between ACEs and mood-, weight-, and eating-related outcomes, many of which have focused exclusively

on maltreatment (e.g., Caslini et al., 2016; Danese & Tan, 2014; Hemmingsson et al., 2014; Molendijk et al., 2017), although some have examined ACEs more broadly (e.g., Felitti et al., 1998; Hughes et al., 2017; Palmisano et al., 2016; Petruccelli et al., 2019). In prior research, ACEs have demonstrated dose-response relationships with depression, obesity, and eating disorders, such that the greater the number of exposures to different types of ACEs, the greater the likelihood of the outcome (Molendijk et al., 2017; Petruccelli et al., 2019). By examining qualitatively distinct patterns of ACEs, the present study suggests that, in the absence of abuse, household dysfunction may hold more relevance for depressive and disordered eating symptoms than for BMI, at least in this sample of emerging adults. Therefore, in addition to the number of ACEs experienced, the types experienced also matter. Future research should investigate the reasons underlying these differences.

Although ACEs exhibited clear associations with adverse mood-, weight-, and eating-related outcomes in the present study, not all individuals with a history of ACEs experienced these adverse outcomes. To increase understanding of factors that might promote such resilience, we examined self-compassion as a potential protective factor. Extending prior work that found self-compassion to play a protective role in the relationship between emotional maltreatment and depressive symptoms (Ross et al., 2019; Tanaka et al., 2011; Wu et al., 2018), we found evidence for a protective role of self-compassion in the context of broader ACEs, as well as in relation to weight- and eating-related outcomes. In fact, self-compassion demonstrated a stronger buffering role in relation to BMI and disordered eating symptoms than in relation to depressive symptoms in the present study. Specifically, associations of ACEs latent classes with BMI and disordered eating symptoms were fully attenuated at higher levels of self-compassion, while associations between ACEs latent classes and depressive symptoms were only somewhat attenuated at higher levels of self-compassion. The salience of self-compassion in relation to weight- and eating-related outcomes is supported by growing evidence indicating a particularly strong protective role of self-compassion in relation to body image and disordered eating (Fresnic, Wang, & Borders, 2019; Messer, Anderson, & Linardon, 2021; Turk & Waller, 2020).

This study had important strengths, including the large, population-based sample and the use of latent class analysis to address the interrelatedness yet distinct qualities of different types of ACEs. However, this study also had limitations that must be noted. ACEs were retrospectively self-reported, limiting the validity of their assessment. Additionally, because the ability to assess ACEs along with a wide range of health-related constructs at the population level necessitated a brief measure, the ACEs assessed did not encompass all types of ACEs (e.g., emotional neglect, physical neglect, parental separation/divorce, and witnessing domestic violence were not assessed). We were also unable to examine differences according to the duration or frequency with which ACEs were experienced. Further, latent class assignment does not convey the probabilistic nature of the latent class model; thus, not accounting for the uncertainty in class assignment may have resulted in underestimation of standard errors in regression models. Another limitation of this study is that we only assessed one facet of self-compassion (i.e., self-kindness) and therefore cannot comment on the roles of other aspects of self-compassion. We were also unable to disentangle the protective role of self-compassion as compared to other related factors that have previously been found to promote resilience after exposure to ACEs, such as low

self-blame (Afifi & MacMillan, 2011), which was not assessed in the present study. As prior research has found self-compassion and self-blame to be inversely correlated (Petrocchi, Ottaviani, & Couyoumdjian, 2014), future research should examine the extent to which self-compassion and low self-blame uniquely predict resilience among individuals with a history of ACEs. Additionally, it is possible that self-compassion may, to some extent, function as a proxy for unmeasured severity of ACEs, such that lower self-compassion may reflect greater severity of ACEs not captured in the present study. Further limitations include the brevity of the measures used to assess depressive and disordered eating symptoms. Finally, the cross-sectional, observational design of this study precludes the ability to establish temporality or causality. Longitudinal research is needed to tease apart the temporality of the relationships between ACEs, self-compassion, and mood-, weight-, and eating-related outcomes. Despite these limitations, findings from this study offer important contributions to understanding how ACEs and self-compassion relate to mood-, weight-, and eating-related outcomes.

The results of this study highlight the relevance of childhood experiences not only of abuse, but also household dysfunction, in relation to psychological and behavioral health, thus emphasizing the importance of screening for a broad range of ACEs in clinical settings. Additionally, findings suggest that self-compassion may play a buffering role against adverse mood-, weight-, and eating-related outcomes among individuals who have been exposed to ACEs. Therefore, while more research in this area is needed, self-compassion may be an important intervention target for individuals with a history of ACEs. Evidence-based approaches for building self-compassion include yoga (Gard et al., 2012), mindfulness (Keng, Smoski, Robins, Ekblad, & Brantley, 2012), and third-wave cognitive behavioral therapies such as Acceptance and Commitment Therapy (Yadavaia, Hayes, & Vilaradaga, 2014). It may therefore be beneficial to incorporate approaches such as these into treatment and prevention programs for individuals with a history of ACEs.

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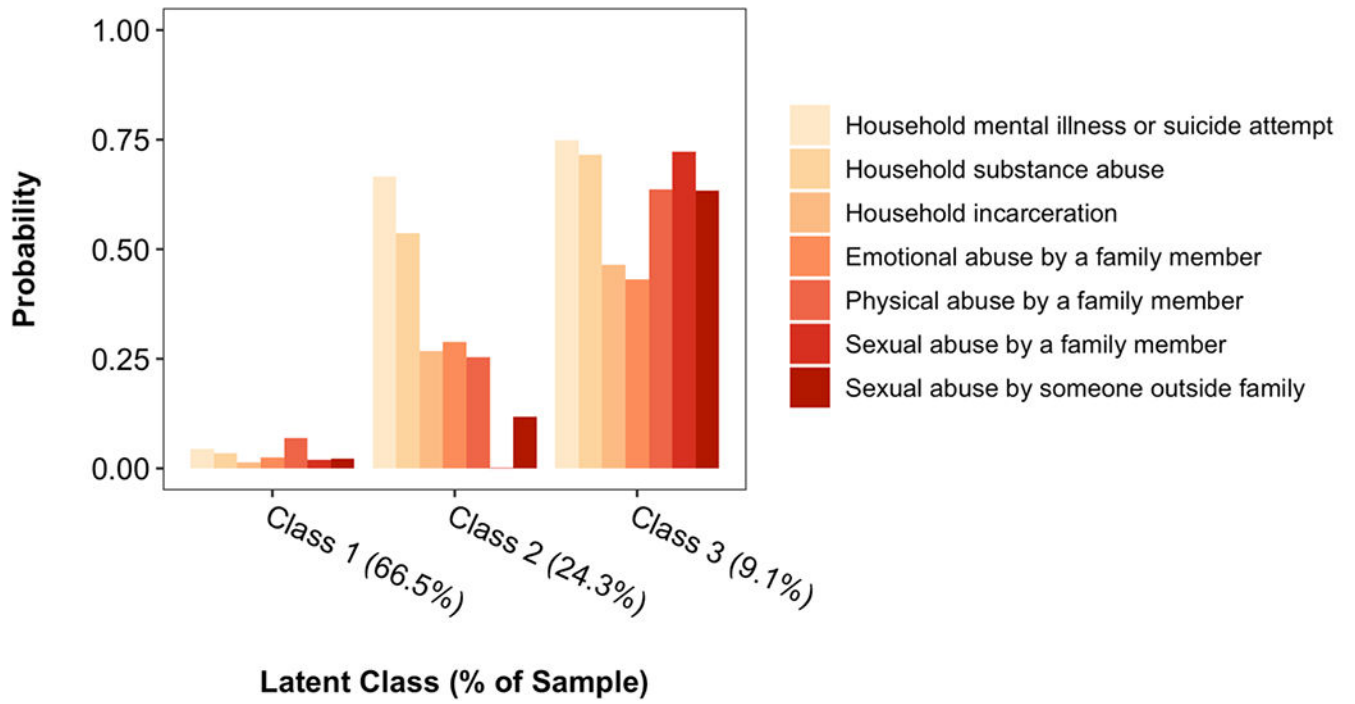


Figure 1. Probability estimates of each type of adverse childhood experience for latent class 1 (“no/low ACEs”), latent class 2 (“household dysfunction”), and latent class 3 (“household dysfunction and abuse”)

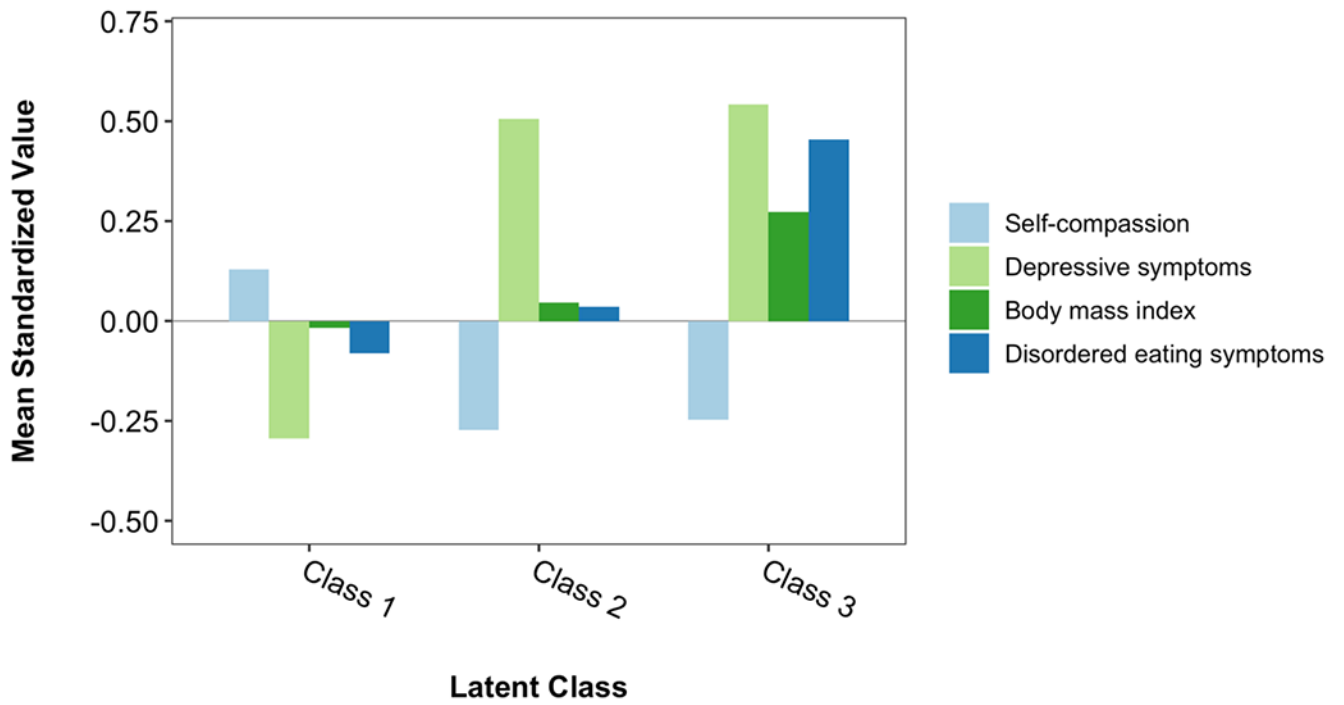


Figure 2. Means of standardized self-compassion, depressive symptoms, body mass index, and disordered eating symptoms in latent class 1 (“no/low ACEs”), latent class 2 (“household dysfunction”), and latent class 3 (“household dysfunction and abuse”)

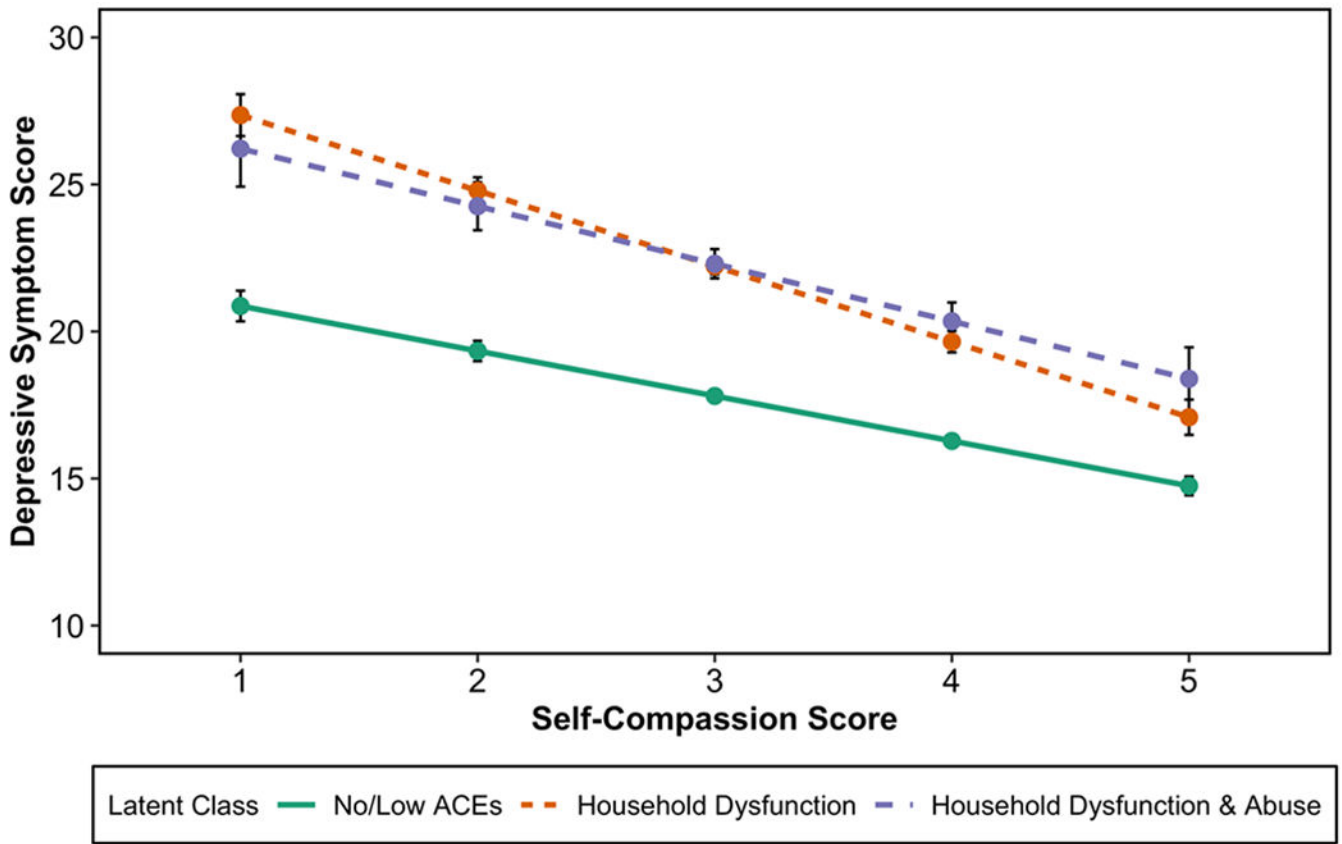


Figure 3. Predicted depressive symptom score by latent class and self-compassion after adjusting for age, gender, race/ethnicity, and socioeconomic status (error bars represent standard errors)

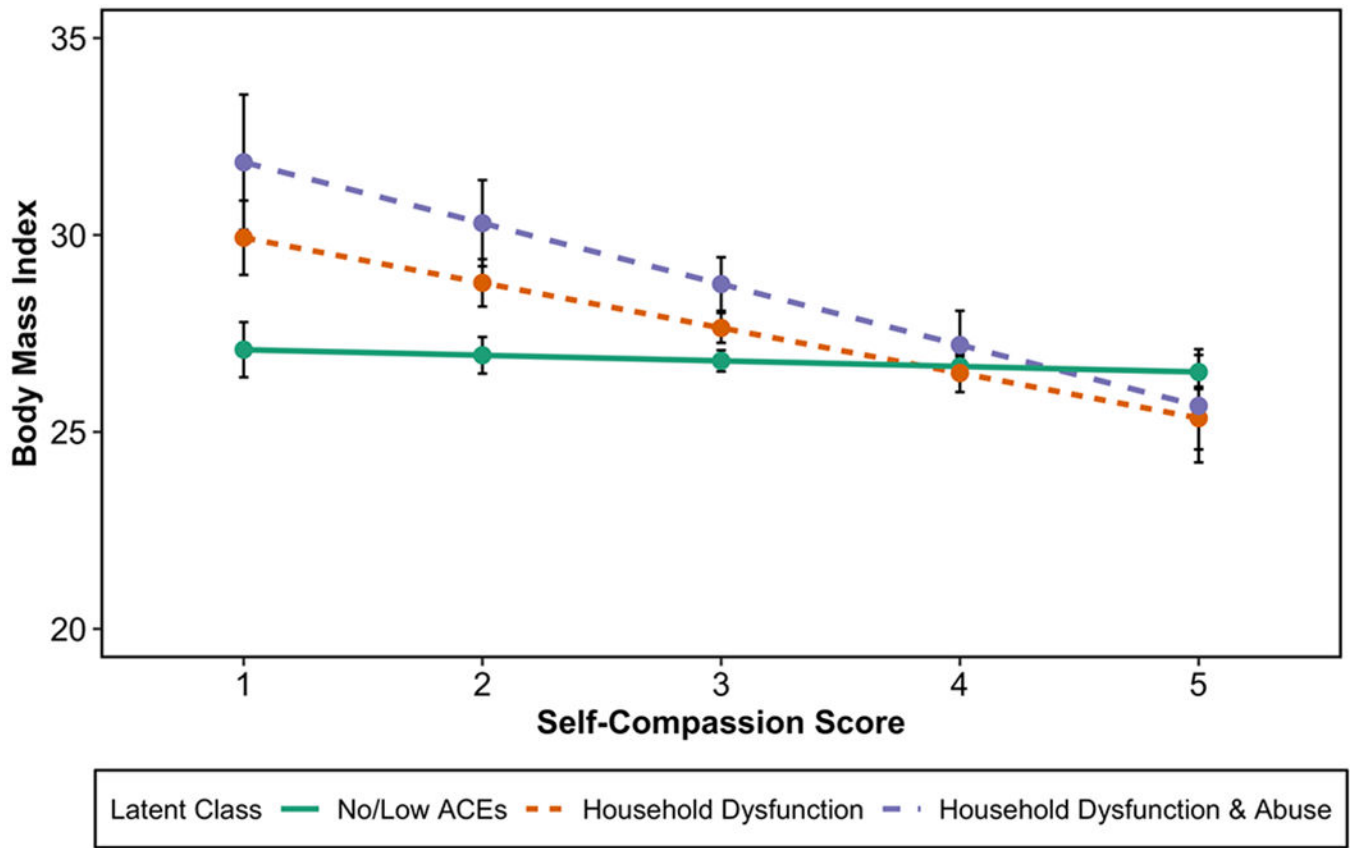


Figure 4. Predicted body mass index by latent class and self-compassion after adjusting for age, gender, race/ethnicity, and socioeconomic status (error bars represent standard errors)

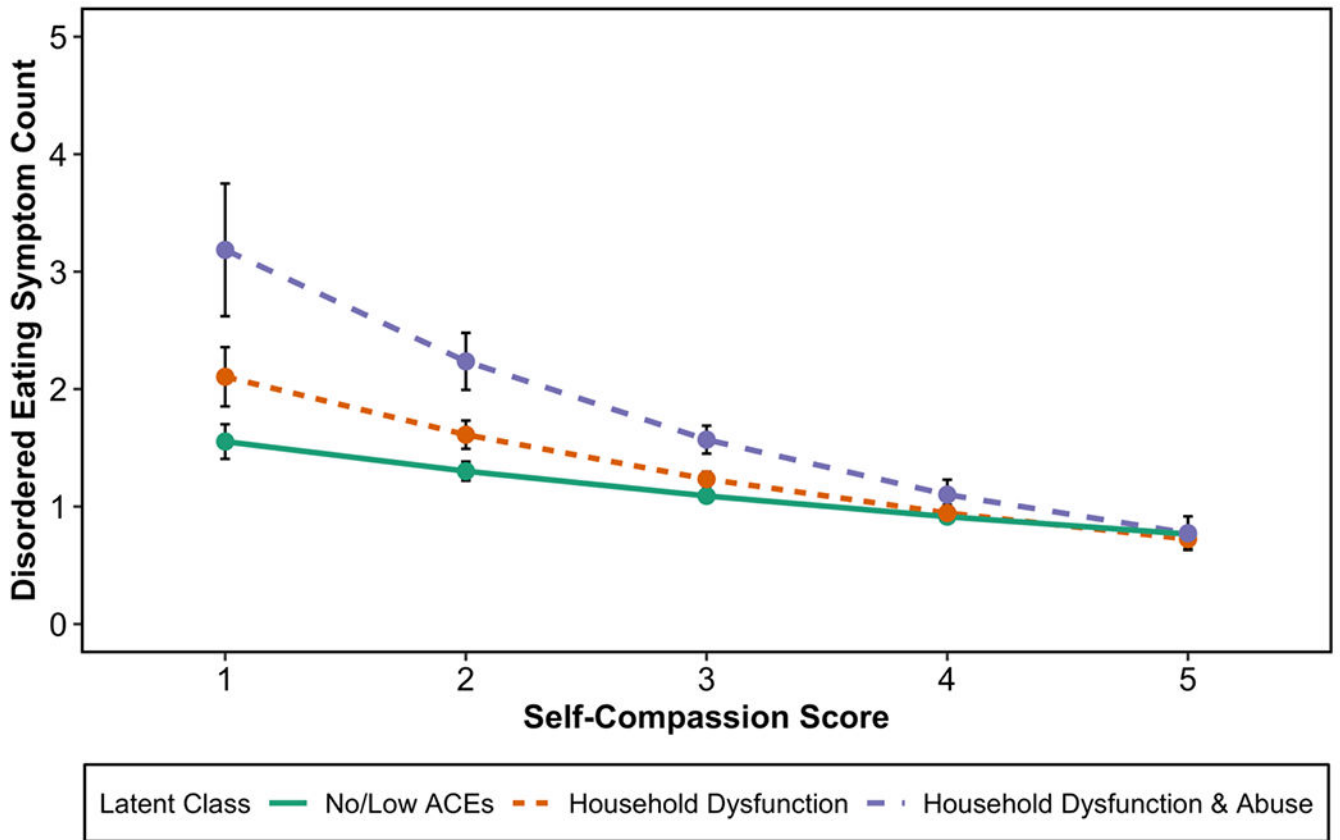


Figure 5. Predicted disordered eating symptom count by latent class and self-compassion after adjusting for age, gender, race/ethnicity, and socioeconomic status (error bars represent standard errors)

Table 1.Sample characteristics ($N = 1,440$)

	% (<i>n</i>)
Gender	
Male	45.6 (590)
Female	53.7 (839)
Other	0.7 (11)
Race/ethnicity	
White	19.7 (347)
Black/African American	28.4 (311)
Hispanic/Latinx	16.7 (248)
Asian American	20.1 (330)
Mixed/other	15.0 (204)
Socioeconomic status	
Low	38.5 (520)
Low-middle	22.4 (317)
Middle	18.1 (244)
High-middle	13.3 (229)
High	7.7 (130)
Any adverse childhood experiences	45.0 (655)
Household mental illness or suicide attempt	26.5 (394)
Household substance abuse	22.1 (318)
Household incarceration	11.7 (162)
Emotional abuse by a family member	12.6 (186)
Physical abuse by a family member	16.7 (232)
Sexual abuse by a family member	8.1 (122)
Sexual abuse by someone outside family	10.3 (160)
	Mean (<i>SD</i>)
Age (years)	22.2 (2.0)
Self-compassion score (range: 1–5)	3.5 (0.9)
Depressive symptom score (range: 10–30)	18.5 (5.9)
Body mass index (kg/m ²)	27.0 (6.9)
Disordered eating symptom count (range: 0–5)	1.09 (1.22)

Note. *SD* = standard deviation. All statistics except *n*, which represents observed count, are weighted to account for attrition over time and allow for extrapolation to the original population-based sample.

Table 2.

Fit indices for latent class analysis characterizing patterns of adverse childhood experiences

	BIC	aBIC	cAIC
1-class model	8270.93	8242.34	8279.93
2-class model	7438.09	7384.09	7455.09
3-class model	7397.93	7318.51	7422.93
4-class model	7425.64	7320.80	7458.64
5-class model	7475.46	7345.22	7516.46
6-class model	7522.80	7367.14	7571.80
7-class model	7574.74	7393.67	7631.74
8-class model	7619.37	7412.88	7684.37

Note. BIC = Bayesian Information Criterion; aBIC = sample-size adjusted BIC; cAIC = consistent Akaike's Information Criterion. Lower values indicate better model fit. Models with > 8 classes were not identified. Bold indicates optimal balance between model fit and parsimony.

Table 3.

Latent class associations with mood-, weight-, and eating-related outcomes

	Depressive Symptoms	Body Mass Index	Disordered Eating Symptoms
	<i>b</i> (95% CI)	<i>b</i> (95% CI)	exp(<i>b</i>) (95% CI)
Latent class 1 (“no/low ACEs”)	Ref	Ref	Ref
Latent class 2 (“household dysfunction”)	4.74 (4.07, 5.41) ***	0.67 (-0.19, 1.53)	1.20 (1.06, 1.35) **
Latent class 3 (“household dysfunction and abuse”)	4.98 (3.92, 6.04) ***	1.70 (0.32, 3.08) *	1.53 (1.30, 1.80) ***

Note. CI = confidence interval; ACEs = adverse childhood experiences. Models were adjusted for age, gender, race/ethnicity, and socioeconomic status.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

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