Published in final edited form as:

Child Youth Serv Rev. 2018 October ; 93: 196–202. doi:10.1016/j.childyouth.2018.07.024.

Relationship between Child Maltreatment and Adolescent Body Mass Index Trajectories

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Abstract

This study examines the relationship between childhood maltreatment experiences and body mass index (BMI) over time. Using data from the National Longitudinal Study of Adolescent to Adult Health, we use latent profile analysis to create child maltreatment experience classes and latent growth modeling to understand how classes relate to BMI trajectories from adolescence to early adulthood. The best-fitting model suggests four child maltreatment experience classes: 1) *poly-maltreatment* (n=607); 2) *physical abuse* (n=1,578); 3) *physical abuse and neglect* (n=345); and 4) *no childhood maltreatment* (n=4,188). Class membership differentially predicts BMI trajectories, such that individuals in the *no maltreatment*, *physical abuse*, and *physical abuse plus neglect* classes exhibit the most stable BMI, and individuals in the *poly-maltreatment* class increase most rapidly ($X^2[9]=149.9$, $p < 0.001$). Individuals in the *poly-maltreatment* class experience significantly higher BMI over time compared to the other three classes. In addition to overall growth differing between classes, there is substantial inter-individual variability in BMI trajectories within each class. Because BMI trajectories differ across different childhood maltreatment experiences—and substantial variability in BMI trajectories exists within these different experiences—future analyses should investigate mediators and moderators of this relationship to inform trauma-based therapies and interventions.

Keywords

child maltreatment; body mass index; latent profile analysis; longitudinal

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Declarations of interest

None.

Conflicts of Interest

The authors have no conflicts of interest to report.

1. Introduction

Annually, nearly 1.25 million children in the United States experience maltreatment (Sedlak et al., 2010), defined as the “nonaccidental physical injury, sexual exploitation or misuse, neglect or serious mental injury of a child ... as a result of acts of commission or omission by a parent, guardian, or caretaker” (Cahill, Kaminer, & Johnson, 1999). Such adversity is associated with poor health outcomes across the life course, including obesity (Gilbert et al., 2009). Elevated BMI over time in this population warrants particular attention, as obesity is related to multiple negative health outcomes including depression, asthma, sleep disorders, and lower self-esteem (Gilbert et al., 2009), and child maltreatment already places individuals at risk for these conditions (Cornette, 2008; De Niet & Naiman, 2011; French, Story, & Perry, 1995; Kelly et al., 2013; Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014; Rank et al., 2013). Beyond considering weight cross-sectionally, evaluating the shape of body mass index (BMI) trajectories of individuals who have faced childhood maltreatment provides insight into obesity development in this population. However, the relationship between overall child maltreatment experiences and BMI over time is not well understood.

Previous research suggests that individuals who experience child maltreatment exhibit elevated levels and steeper increases in BMI in the time between maltreatment and adulthood (Morris, Northstone, & Howe, 2016; Schneiderman, Negri, Peckins, Mennen, & Trickett, 2015; Shin & Miller, 2012), which are characteristics of trajectories linked to obesity-related disorders in midlife (Tirosh et al., 2011). However, with respect to the relationship between specific forms of child maltreatment and later weight outcomes, findings are mixed. While some studies suggest sexual abuse in childhood is associated with an overweight or obese BMI in adulthood (C. J. Clark et al., 2014; Noll, Trickett, Harris, & Putnam, 2009; Richardson, Dietz, & Gordon-Larsen, 2014), others find no increase in risk among these individuals (Bentley & Widom, 2009; Li, Pereira, & Power). Likewise, studies focusing on physical abuse or neglect as the primary exposure report mixed results (Bentley & Widom, 2009; Helton & Liechty, 2014; Shin & Miller, 2012).

Mixed results from previous studies may partly be due to our operationalization of child maltreatment. Most research considers child maltreatment as categorical groups—typically physical abuse, sexual abuse, and neglect—often in a hierarchical manner (T. T. Clark, Yang, McClernon, & Fuemmeler, 2015; Gilbert et al., 2009; Schneiderman et al., 2015; Shin & Miller, 2012). For example, in a Schneiderman et al. 2015 study, individuals were categorized into the “sexual abuse” group if they ever experienced sexual abuse (regardless of other maltreatment). Of those individuals who did not experience sexual abuse, youth with any physical abuse (regardless of other maltreatment) were categorized into the “physical abuse” group. Then, among individuals without sexual or physical abuse, those with emotional abuse (with or without neglect) were categorized into the “emotional abuse” group. Lastly, the remaining individuals who experienced neglect were categorized into the “neglect” category (Schneiderman et al., 2015). Such hierarchical assignment requires a priori assumptions regarding which maltreatment type is most salient, and this is appropriate when assumptions are grounded in theory or previous research. Moreover, different coding schemes complicate comparisons across studies. However, measures that simultaneously capture maltreatment frequency, type(s), and type co-occurrence represent an individual’s

overall experience and therefore may provide better insights into the consequences of maltreatment when it is unclear what maltreatment types (or combinations) are most relevant for the given outcome. It may be particularly important to accurately capture maltreatment co-occurrence, as previous work has demonstrated a graded relationship between the number of childhood adversity types and adult health issues (Felitti et al., 1998). Moreover, nearly 41% of youth exposed to violence or abuse experience more than one such event (Finkelhor, Turner, Shattuck, & Hamby, 2015). Likewise, it may be disingenuous to assign individuals to one particular maltreatment experience if they experience multiple types. Here, we employ latent profile analysis (LPA) to uncover patterns of child maltreatment experiences to understand the relationship between overall maltreatment profiles and BMI trajectories.

Understanding the nature of BMI growth for different classes of maltreatment experiences enables us to identify particular groups of individuals who may be at risk of overweight and obesity. Although weight gain during the transition from childhood to adulthood is expected, adolescence is a risk period for excessive, unhealthy weight gain (McTigue et al., 2003; The, Suchindran, North, Popkin, & Gordon-Larsen, 2010). Individuals who experience child maltreatment are disproportionately susceptible to this unhealthy pattern (Power, Pinto Pereira, & Li, 2015; Schneiderman et al., 2015; Shin & Miller, 2012). Previous analyses have demonstrated that girls who experience sexual abuse and those who experience neglect exhibit greater BMI growth across adolescence compared to girls who were not maltreated (Schneiderman et al., 2015). Shin and Miller found that children of both sexes who experienced neglect had a faster average BMI growth over time compared to children who experienced no childhood maltreatment (Shin & Miller, 2012). As these studies operationalized child maltreatment in a hierarchical manner and assigned names to these groups accordingly, these findings imply the association between a specific exposure and BMI trajectories. The next line of inquiry in this field includes understanding how overall patterns of childhood maltreatment experience are associated with BMI growth from adolescence to early adulthood.

To our knowledge, only one previous study has evaluated the relationship between overall patterns of child maltreatment experiences and longitudinal weight outcomes. Sacks et al. identified four latent maltreatment classes: high abuse and neglect; physical abuse dominant; supervisory neglect dominant; and no/low maltreatment. They found that in girls, compared with no/low maltreatment, supervisory neglect dominant and physical abuse dominant maltreatment were associated with faster gains in BMI (Sacks et al., 2017). While Sacks et al. assessed if growth patterns differed between classes (i.e., intercept, linear slope, and quadratic slope), they did not evaluate if actual BMI differed between classes at all stages of development. We address this by modeling and comparing the corresponding 95% confidence limits of BMI for each latent maltreatment experience class across the entire developmental period of adolescence to young adulthood.

Despite the potential presence of different average BMI growth patterns across child maltreatment classes, inter-individual variance within classes may be substantial. On average, individuals who experience child maltreatment are at-risk for elevated BMI over time (Danese & Tan, 2014; Felitti et al., 1998; Schneiderman et al., 2015; Shin & Miller, 2012), but prior research has not considered the degree of heterogeneity within this

population. Heterogeneity of weight outcomes within a maltreatment class would indicate multifinality; i.e., different weight outcomes amongst individuals with similar child maltreatment experiences due to the existence of moderators. Given there is significant BMI trajectory variability in the general population, this same heterogeneity likely exists among individuals within a given class of childhood maltreatment experiences. Identifying this variability is the first step in understanding how individuals can attain healthy outcomes despite extreme adversity. To address these gaps, the present study used LPA and latent growth modeling (LGM) to:

1. Detect latent profiles indicating actual patterns of child maltreatment experiences;
2. Determine if BMI trajectories differ by class of child maltreatment experiences; and
3. Evaluate variability around BMI trajectory parameter estimates (i.e., intercept, linear slope, and quadratic slope) by child maltreatment experience.

2. Methods

2.1 Data Source

Data are from the National Longitudinal Study of Adolescent to Adult Health (Add Health), a longitudinal study of a nationally representative sample of 20,745 adolescents in grades 7–12 during 1994–95, with additional data collection seven (N = 15,197) and 13 years (= 15,701) later. The analytic sample includes 6,718 respondents from Wave I (ages 13–21), Wave III (ages 18–28), and Wave IV (ages 24–31) with at least one measure of BMI across the three waves and complete information on all covariates. We omit Wave II from the present analysis, as this collection period was only one year after Wave I on a subset of respondents. As the present study was secondary data analysis, the University of North Carolina Chapel Hill Institutional Review Board granted exemption from human subjects' research approval.

2.2 Measures

2.2.1 Child maltreatment—We develop profiles of child maltreatment experiences based on three maltreatment type variables: physical abuse, sexual abuse, and neglect. Because child maltreatment is often underreported (Stoltenborgh, Bakermans-Kranenburg, Alink, & IJzendoorn, 2015), we triangulate data from two waves of Add Health to inform variable values. Childhood maltreatment was assessed retrospectively at Waves III and IV. Questions at both waves asked respondents about the frequency of maltreatment types perpetrated by the primary caregiver, with responses ranging from never to ten or more times. At Wave III, respondents were asked questions about their maltreatment experiences prior to sixth grade. These questions asked about neglect (How often had your parents or other adult caregivers not taken care of your basic needs, such as keeping you clean or providing food or clothing?), physical abuse (How often had your parents or other adult caregivers slapped, hit, or kicked you?), and sexual abuse (How often had one of your parents or other adult caregivers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?). At Wave IV, respondents were asked questions about

maltreatment experienced prior to age 18 years. These questions asked about physical abuse (How often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?) and sexual abuse (How often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?). Add Health did not assess child neglect at Wave IV. All maltreatment questions were coded as 0 = never, 1 = one time, 2 = two times, 3 = three to five times; 4 = six to ten times; 5 = more than ten times. Additional questions at Wave IV asked about the age at which each of these types of maltreatment occurred. Because the present analyses model BMI starting at age 13 years and we define our primary exposure as child maltreatment (i.e., maltreatment occurring before adolescence), it would be incorrect to include exposure measures that occur after age 13 years. Therefore, we recode Wave IV maltreatment indicators to be zero if the reported age at first incident was greater than 13 years, but we control for child maltreatment that began after age 13 years in our models. With respect to inter-rater reliability, in 89% of cases, sexual abuse reported at Wave III was consistent with sexual abuse reported at Wave IV, and in 65% of cases, physical abuse at Wave III was consistent with physical abuse reported at Wave IV. Because of the underreporting of maltreatment (Stoltenborgh et al., 2015), we retain the higher reported frequency for the physical and sexual abuse variables.

2.2.2 Body mass index—Respondents reported height and weight at each wave. From this report, we calculate BMI (kg/m^2). Although self-reports of adolescent weight and height may contain bias, self-reported data from Add Health has been found to accurately identify overweight status in 96% of cases (Goodman, Hinden, & Khandelwal, 2000; Sherry, Jefferds, & Grummer-Strawn, 2007).

2.2.3 Covariates—Previous research on overweight and obesity among youth with maltreatment histories informed covariate selection. The present study includes controls for variables known to influence adolescent BMI and its growth into adulthood as well as various markers for socioeconomic status, but we do not control for variables on the causal path between maltreatment and weight (Parsons, Power, Logan, & Summerbelt, 1999). Covariates include biological sex, racial identity, parent report of whether the respondent was foreign born, parent education, parent employment, child birthweight (in ounces), whether a child was exclusively breastfed for six or more months, pubertal development (on a scale of 1–6), and whether an adolescent's biological mother or biological father was obese (Anderson, Butcher, & Levine, 2003; Harris, Perreira, & Lee, 2009; Owen, Martin, Whincup, Smith, & Cook, 2005; Parsons et al., 1999). We also control for maltreatment experiences that occurred after childhood (i.e., after age 13 years). For all analyses, we mean center continuous covariates and set the reference category of categorical covariates to the modal group.

2.3 Analysis

To address Aim 1 and identify classes of child maltreatment experiences that capture maltreatment type and frequency, we employ LPA. LPA allows for an empirical grouping of patterns of maltreatment experiences (i.e., sexual abuse, physical abuse, and neglect) within individuals. The model produces latent profile membership probabilities (reflecting the

prevalence of each class), and the expected value of each item (e.g., frequency of sexual abuse, physical abuse, and neglect) given membership in a particular class. We first identify the optimal number of classes for our analytic sample. To arrive at the optimal number of latent profiles, we evaluate information criteria (AIC/BIC), the Adjusted Lo-Mendell-Rubin Likelihood Ratio Test, clinical relevance and interpretability, and proportion of the sample within each class for one through six class solutions. Lower AIC/BIC values indicate better fit (Collins & Lanza, 2013; Petras & Masyn, 2010).

We use the child maltreatment classes empirically derived from LPA to predict subject-specific BMI trajectories using Asparouhov and Muthén's 3-step procedure (Asparouhov & Muthén, 2014), conditioned on the covariates listed above. The 3-step procedure allows us to account for uncertainty in class assignment. We structure the data by age rather than by wave (Biesanz, Deeb-Sossa, Papadakis, Bollen, & Curran, 2004) and use a quadratic LGM to map the average BMI trajectory across all ages (in years) of adolescent development. We estimate all models in Mplus v.7.31 with full information maximum likelihood to accommodate the planned missingness of our outcome variable (BMI) imposed by our coding of time (Graham, 2009). Because maximum likelihood estimation for mixture and latent profile models can result in local solutions, we increase the number of random starts to 200 to avoid sub-optimal solutions in all analyses (Hipp & Bauer, 2006). Analyses adjust variance estimates to account for clustering and included sampling weights.

Accounting for class assignment uncertainty precludes including all maltreatment classes as predictors of the same BMI trajectory. Therefore, to address Aim 2 and determine if BMI trajectories differs by childhood maltreatment class, we estimate the LGM described above for each of the empirically derived childhood maltreatment classes, holding the growth parameters constant across classes. Then, we conduct a likelihood ratio test to determine if model fit is significantly improved when we allow for different growth patterns (i.e., different intercept, linear, and quadratic slopes) among the different childhood maltreatment classes. To evaluate the nature of growth differences between classes, we use resulting class-specific growth parameter values and their standard errors to calculate and plot the expected BMI at each age/class combination at modal values of all covariates, with corresponding 95% confidence limits. To address Aim 3 and evaluate variability around average BMI growth overtime by child maltreatment class, we identify the 5th and 95th percentile for the three trajectory parameters estimates within each class.

3. Results

3.1 Descriptive Characteristics

Approximately half of all respondents were male (51%); 70% self-identified as non-Hispanic White, 13% non-Hispanic Black, 11% Hispanic, and 6% as another race/ethnicity. Regarding parent education, 33% had college degrees, 31% completed some college, 25% completed high school, and 11% achieved less than high school. Remaining descriptive statistics can be found in Table 1.

3.2 Aim 1: Latent profiles of Childhood Maltreatment Experiences

The best fitting model based on the incremental improvement in entropy and AIC/BIC for an additional class was a four class solution (entropy=0.87). The Adjusted Lo-Mendell-Rubin Likelihood Ratio Test indicated that a four class solution significantly improved the model over a three class solution ($p < 0.001$). Depicted in Figure 1, the recovered child maltreatment experience classes included: 1) a *poly-maltreatment* class with high levels of sexual abuse and co-occurring physical abuse and neglect ($n=607$); 2) a *physical abuse* class with high levels of physical abuse ($n=1,578$); 3) a *physical abuse and neglect* class with high levels of neglect and co-occurring physical abuse ($n=345$); and 4) a *no childhood maltreatment* class ($n=4,188$).

3.3 Aim 2: Different Patterns of BMI Growth between Groups

Aim 2 examined whether BMI trajectories differ by child maltreatment type. According to fit indices, a model with a quadratic term fit superior to a model with only a linear term in all classes. Our likelihood ratio test of a constrained model (intercept, linear, and quadratic slopes were restricted to be equivalent across classes) compared to an unconstrained model (intercept, linear, and quadratic slopes were allowed to vary across classes) indicated model fit was significantly improved when we allowed for different growth patterns among the classes ($X^2[9]=149.9$, $p < 0.001$). This suggests that the different child maltreatment classes, on average, experience different patterns of growth in BMI overtime after controlling for relevant confounders. As illustrated by the trajectories depicted in Figure 2 and parameter estimates in Table 2, individuals in the *no maltreatment*, *physical abuse*, and *physical abuse and neglect* classes exhibited the most stable BMI over time, on average. Those in the *poly-maltreatment* class, on average, experienced a significantly higher BMI at each age across adolescent development compared to the other three classes (Figures 2 and 3). Individuals in the poly-maltreatment class also exhibited the most rapid increase in BMI, although this was not a significant difference as evidenced by overlapping confidence intervals for the linear slope across classes (Table 2).

3.4 Aim 3: Variability by Maltreatment Type

Substantial variability existed in each class's BMI growth parameter estimates (Table 3). While on average, individuals in the *poly-maltreatment class* exhibited significantly higher BMI across adolescent development compared to the other three classes, individuals within this group also displayed the greatest amount of variability in their trajectories. With respect to the starting BMI at age 13 years in the poly-maltreatment group, the 5th percentile was the lowest (16.89 kg/m²), and the 95th percentile was the highest (30.58 kg/m²) compared to the other three classes. This suggests significant variability in each class's intercept and linear slope is yet to be explained, specifically in the *poly-maltreatment class*.

4. Discussion

The present analyses go beyond a variable-centered analytic approach to evaluate BMI trajectories on the basis of child maltreatment experience classes. The extracted classes reflect maltreatment type, co-occurrence, and frequency. In the present sample, the best

solution included four classes: a *physical abuse and neglect, poly-maltreatment, physical abuse*, and *no childhood maltreatment* class.

Our analyses suggest that the overall growth in BMI varies between classes, as indicated by the superior fit of the model that allowed growth parameters to vary across classes. The presence of different longitudinal BMI trends between groups is important, as previous work demonstrates BMI growth over time explains added variance in health outcomes above and beyond BMI at a single time point (Tirosh et al., 2011). Specifically, elevated BMI levels across adolescent development (observed for the *poly-maltreatment* class) is associated with obesity related disorders in midlife (Cheng et al., 2015; Nakano et al., 2010; Tirosh et al., 2011).

The *poly-maltreatment* class was the only class to contain sexual abuse experiences, and this was also the class with the highest BMI across adolescence. This aligns with previous work that suggests a positive relationship between childhood sexual abuse and subsequent weight gain (Danese & Tan, 2014; Gustafson & Sarwer, 2004; Noll et al., 2009; Schneiderman et al., 2015). Schneiderman et al.'s 2015 classification of child maltreatment experiences is similar to the LCA groups identified in the present analyses, whereby sexual abuse co-occurs with many other maltreatment types (Schneiderman et al., 2015). The major difference in the maltreatment coding schemes between the present work and Schneiderman's is the nomenclature—whereby the previous work named this “sexual abuse”, we name it “poly-maltreatment.” Future work should explore if sexual abuse alone drives these associations, or if sexual abuse in the presence of other maltreatment types contributes to elevated BMI over time.

Regardless of answer to the aforementioned research question, in practice, child service providers should recognize that individuals who have experienced multiple maltreatment forms may be at risk for elevated BMI over time. One plausible mechanism for the association between poly-maltreatment and elevated BMI includes disordered eating as a maladaptive coping mechanism (Gustafson & Sarwer, 2004). Future research should examine this and other mediators of the longitudinal relation between child maltreatment experience and BMI trajectories in an effort to identify potential intervention targets.

We also found that all classes exhibited significant inter-individual variation in BMI trajectories—specifically the *poly-maltreatment* class. Because a significant amount of variation is yet to be explained within these classes, future analyses should examine what promotes the development of healthy BMI trajectories despite the experience of such adversity early in life. Such research could inform future policy and prevention efforts. Moreover, the variation uncovered here illustrates that individuals who experience child maltreatment are not predestined to unhealthy BMI trajectories. Likewise, providers should recognize the variability in weight outcomes that these children display when developing care plans, and make specific recommendations according to individual need.

The present study relied on self-report for measures of child maltreatment and obesity. It is possible that participants failed to disclose experiences of abuse or neglect due to social desirability or recall bias. This would mean that individuals may have been misclassified

into maltreatment classes, making it more difficult to find differences between the BMI trajectories. In regards to BMI, it is possible that individuals did not report their correct height and weight, either due to a lack of accurate knowledge or social desirability. However, prior research has demonstrated that the self-report measures of height and weight in Add Health are valid (Goodman et al., 2000; Sherry et al., 2007).

Whereas we demonstrated that the four classes of childhood maltreatment experiences display different average growth patterns in BMI from adolescence to young adulthood, we also found significant within-class variability in BMI trajectories. As this was the first study to operationalize child maltreatment in this manner—while accounting for class assignment uncertainty—future studies should explore the validity of these classes against other operationalizations of child maltreatment. Understanding the processes that link maltreatment to elevated BMI, in addition to the circumstances under which individuals attain a healthy weight despite facing child maltreatment, are the next steps in informing interventions that improve the quality of life for this population.

5. Conclusion

BMI trajectories differ across different child maltreatment experiences, whereby individuals exposed to multiple forms of maltreatment exhibit the highest BMI over adolescent development. Moreover, substantial variability in BMI trajectories exists within these different experiences. Future analyses should investigate mediators and moderators of this relationship to inform trauma-based therapies and interventions.

Acknowledgments

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (<http://www.cpc.unc.edu/addhealth>). No direct support was received from grant P01-HD31921 for this analysis.

Funding source

This work was supported by the National Institute of Child Health and Human Development (T32-HD07376), and by the National Institute on Drug Abuse of the National Institutes of Health (K01 DA035153). The funding sources had no involvement in the study design, data collection, analysis, interpretation, or writing of the report.

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Highlights

- The *poly-maltreatment* class had the highest BMI across adolescence
- Substantial BMI trajectory variability exists within each maltreatment class
- Investigating mediators and moderators could inform trauma-based therapy

Figure 1.

Child maltreatment experience classes and corresponding expected frequencies for neglect, physical abuse, and sexual abuse. Frequencies coded as 1 = one time, 2 = two times, 3 = three to five times; 4 = six to ten times; 5 = more than ten times. Error bars indicate the 95% confidence interval of each frequency.

Figure 2.

Expected body mass index trajectories from ages 13 to 31 and shaded 95% confidence intervals within the (A) no child maltreatment, (B) physical abuse, (C) poly-maltreatment, and (D) physical abuse and neglect class for an individual with modal (for categorical) or mean (for continuous) values of covariates.

Figure 3.

Expected body mass index trajectories from ages 13 to 31 for the four child maltreatment classes, plotted on one graph.

Table 1

Descriptive statistics of respondents

Demographics	Proportion or mean (s.e.)
Male	0.51
Race	
White	0.70
Black	0.13
Hispanic	0.11
Other	0.06
Breastfeed 6+ months	0.21
Birthweight	2.24 (1.34)
US born	0.95
Pubertal status	0.09 (0.07)
Obese parent(s)	0.24
Employed parent(s)	0.80
Parent education	
< High school	0.11
High school	0.25
Some college	0.31
College	0.33

Note: Estimates based on analytic sample of 6,718 respondents. Birthweight and pubertal status are mean-centered. All estimates account for survey clustering and weighting.

Table 2

Mean body mass index growth parameters by child maltreatment class with 95% confidence intervals.

	Intercept (95% CI)	Linear slope (95% CI)	Quadratic slope (95% CI)
Poly-maltreatment	24.00 (22.52, 25.45)	0.63 (0.27, 0.99)	−0.012 (−0.02, 0.01)
Physical abuse	19.48 (18.38, 20.58)	0.34 (0.07, 0.61)	−0.002 (−0.02, 0.01)
Physical abuse + neglect	18.64 (17.29, 19.99)	0.26 (−0.03, 0.55)	0.000 (−0.02, 0.02)
No maltreatment	19.65 (18.48, 20.82)	0.29 (0.05, 0.53)	0.000 (−0.02, 0.02)

Note: Parameter estimates based on analytic sample of 6,718 respondents. Values reflect average trajectory parameters for individuals at the modal (or mean) value of all covariates. All estimates account for survey clustering and weighting.

5th and 95th percentile for body mass index growth parameter estimates by child maltreatment class.

Table 3

Maltreatment class	Intercept		Linear slope		Quadratic slope	
	5 th percentile	95 th percentile	5 th percentile	95 th percentile	5 th percentile	95 th percentile
Poly-maltreatment	16.89	30.58	0.26	1.50	-0.03	0.00
Physical abuse	17.39	28.50	0.23	1.18	-0.02	0.00
Physical/neglect	17.63	29.05	0.24	1.23	-0.02	0.00
No maltreatment	17.18	27.26	0.26	1.05	-0.02	0.00

Note: Percentiles based on analytic sample of 6,718 respondents. All estimates account for survey clustering and weighting.