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Adverse childhood events are associated with obesity and disordered eating: Results from a U.S. population-based survey of young adults

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Abstract

We investigated the relationship between childhood abuse and obesity in young adulthood (M age = 22) in a large, U.S., representative sample ($N = 15,197$). Controlling for demographics and depression, men with a history of childhood sexual abuse (CSA) were at increased risk of overweight and obesity. No association between childhood abuse and obesity or overweight was observed for women in this sample. Higher percentages of skipping meals to loose weight and problematic eating were observed among women with a history of physical abuse. This is the first study to note an association between childhood abuse with obesity and problematic weight management behaviors in a sample of young adults.

Keywords

Child adversity; child maltreatment; obesity; weight management

The rising prevalence of obesity among young adults in the U.S. population is a growing public health concern. Child maltreatment and abuse may contribute to an increased risk of obesity (Gilbert, Widom, Browne, Fergusson, Webb, & Janson, 2009). Several clinical studies suggest a history of sexual abuse is common among individuals who are obese or who exhibit disordered eating (Gustafson & Sarwer, 2004). Also, chart review and insurance database studies indicate higher obesity among individuals with a history of sexual (Felitti, 1991) and nonsexual abuse (Felitti, 1993).

Preliminary data from community-based samples have confirmed some of these studies. Using data from the California Women's Health Survey (CWHs), authors reported that obese women were 27% more likely to report a history of childhood physical or sexual abuse (Alvarez, Pavao, Baumrind, & Kimerling, 2007). Similarly, data from the Adverse Childhood Experiences Cohort indicated that those reporting four or more adverse childhood experiences had a 2-fold increased risk of severe obesity, defined as a Body Mass Index (kg/m^2) ≥ 35 (Anda, Felitti, Bremner, Walker, Whitfield, Perry et al., 2006). Additionally, data from the Brain Resource International Database suggest an association between childhood

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abuse and obesity, even in participants who screened negative for common medical and psychiatric problems (Gunstad, Paul, Spitznagel, Cohen, Williams, Kohn et al., 2006).

While studies on childhood abuse and obesity collectively suggest an association, this field of research lacks replications in large nationally representative cohorts. Also, many of the above-mentioned studies examined obesity in middle or later adulthood. The degree to which abuse in childhood is associated with obesity in early adulthood remains largely unknown. The goal of the present study is to examine the relation between childhood physical abuse, neglect, and childhood sexual abuse (CSA) on obesity in a young adult sample from a nationally representative cohort. Depressive symptoms were included in multivariate regression models since previous research has indicated associations between depression and obesity (Faith, Matz, & Jorge, 2002). We also examined the relation between abuse, neglect, and CSA on weight management practices and eating behaviors.

Method

Participants

The study sample was drawn from 20,747 adolescents from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative study of adolescents. Respondents participated in surveys in three separate waves: in 1995 (Wave 1; M age = 15.6, SD = 1.7); 1996 (Wave 2; M age = 16.2, SD = 1.6); and August 2001 to August 2002 (Wave 3; M age = 22.0, SD = 1.8). The Wave 3 cross-sectional cohort includes 15,197 respondents.

The sample for this study relied on data collected during the most recent wave (n = 15,197). Participants who were pregnant (n = 379) were excluded from the analyses. By design, the Add Health survey included a sample stratified by region, urbanicity and school type, ethnic mix and size to garner a nationally representative sample. Details regarding the design and data collection are described elsewhere (Harris, Gordon-Larsen, Chantala, & Udry, 2006).

Measures

Measured height and weight were ascertained by Add Health study personnel at Wave 3. BMI, the Quetelet index (kg/m^2) (Centers for Disease Control and Prevention), was calculated and sorted into 3 categories (normal BMI = 18 – 25; overweight BMI = 25 – 29; and obese BMI $\geq$ 30). Those in the underweight category (BMI < 18) were not included in the analyses (n = 402). In Wave 3, in-home survey participants were asked if they were trying to lose weight, and if so, the method they were using (dieting, exercising, skipping meals, taking laxatives, diuretics, or supplements, or participating in a weight loss program). All participants also reported on problematic eating behaviors (feeling afraid to eat because won't be able to stop, and being told by a doctor that they have an eating disorder).

In Wave 3, participants were asked to retrospectively report on the presence of exposure to childhood physical abuse (i.e., prior to 6th grade), defined as being slapped, hit or kicked; being neglected during childhood, defined as a caregiver not meeting basic needs; and the occurrence of CSA, defined as being forced to engage in sexual relations with an adult caregiver. The frequency was coded as 0 for none and 1 for any occurrence reported.

The Add Health study included a 10-item version of the Center for Epidemiologic Studies – Depression Scale (CES-D) (Radloff, 1977). The response scale and tense of some CES-D items were modified, but have been shown to not meaningfully affect the internal structure of the measure (Crockett, Randall, Shen, Russell, & Driscoll, 2005). This version of the CES-D has demonstrated good internal consistency (α = .87 for Wave 3).

Factors related to socioeconomic status (SES) have been shown to be associated with obesity in the U.S., in particular educational level (Wang, 2001). Parental report of the highest education level was used as a proxy for SES. We also controlled for age and race, as they have been shown to be related to obesity and weight management practices (Flegal, Carroll, Ogden, & Johnson, 2002).

Data Analysis

Statistical analyses were conducted using SAS-callable SUDAAN (version 8.0) statistical software (Research Triangle Institute, 2001). SUDAAN allows for control of survey design effects of individuals clustered in sampling unit by school, and stratification of geographic region. Post-stratification weights were applied in order to allow the results to be comparable to young adults in the U.S. population. Controlling for socio-demographics (age, race, parental education) and current depressive symptoms, logistic regression models examined the association with overweight and obesity separately for CSA, neglect, physical abuse, and subsequently with all abuse types in the model. These analyses were stratified by gender, as previous findings have suggested possible gender differences in the association between trauma and obesity (Gunstad et al., 2006). The prevalence of weight management practices and problematic eating behaviors by abuse categories were also examined.

Results

The frequency of each type of abuse for the study sample among men and women can be viewed in Table 1. The percentages are weighted to be representative of the U.S. population. These estimates are consistent with estimates from high-income countries (Gilbert et al., 2009). For the overall sample in these analyses, 48.2% were normal weight, 27.9% were overweight, and 23.9% were obese.

Table 2 presents results of the multivariate models controlling for race, parental educational level, age, and depressive symptoms stratified by gender. Compared to normal weight men, obese men were more likely to report a history of CSA. This positive association was also found in overweight+obese men. For women no associations between weight classifications and abuse status were found. The fourth model indicated that CSA remained a significant predictor of weight classification among men after accounting for the other abuse categories. No significant interaction effects between CSA and other abuse categories on weight classification outcomes were found (data not shown).

Table 3 presents the frequencies of weight management and problematic eating behaviors by abuse categories. Among woman, skipping meals was more prevalent among those with a history of physical abuse. Further, women reporting a history of CSA or physical abuse were more likely to report being told they have an eating disorder or being afraid to eat because they may lose control.

Discussion

Findings of this study indicate young adult men, but not women, with a history of CSA are at increased risk of overweight and obesity. However, compared to women without a history of CSA, women with a history of CSA had a higher prevalence of self-reported problematic eating and possible eating disorder history.

The absence of relationships between childhood abuse and overweight/obesity in women in this study contrasts with early studies from clinical samples comprised mostly or completely of women (Felitti, 1991, 1993), as well CWS data (Alvarez et al., 2007). However, these previous studies were conducted with women of more advanced age. Although further study

is needed, effects of childhood trauma on obesity in young women may be counterbalanced by societal influences to be thin, which may be more salient for women during the adolescent and young adult period. Despite differences between our findings and those of previous clinic-based studies, our results are consistent with those of Gunstad et al. (2006) who reported relationships between a greater number of early life stressors and adult obesity in men, but not in women.

This study is limited by use of retrospective self-report for childhood maltreatment. Reliance on self-report of childhood abuse may result in underreporting, thus potentially underestimating the true association. Further, some important variables were not available in the data, thus limiting the types of models we could test. Also, other important outcomes that have been considered in recent similar studies, such as measures of central obesity and glycosylated hemoglobin (Thomas, Hypponen, & Power, 2008) were also not available in this wave of Add Health. However, examining these outcomes and their association with adverse childhood events will be possible in future data releases.

Although adverse childhood events may account for only a small proportion of the current obesity epidemic in the U.S. (Alvarez et al., 2007), risk of obesity in this select group is highly relevant. Health care providers who work with trauma survivors may be well poised to assist in delivery of health promotion and preventive interventions targeting this group. While continued research would be useful in determining and clarifying potential moderators and mechanisms, this study along with others suggests that adverse childhood events are important risk factors for not only poor psychological outcomes in adulthood, but also risky lifestyle factors and poor physical health outcomes.

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Table 1

Means and Percentages for Variables by Gender and BMI Categories, n %

Demographic variables	Men									
	Total					Obese				
	Normal		Obese			Normal		Obese		
	N	%	n	%	χ^2_{2a}	n	%	n	%	χ^2_{2b}
Racial minority status										
Caucasian	3986	73.4	1994	76.1	873	69.1		1992	70.8	
Non-Caucasian	2328	26.6	1015	23.9	648	30.9	9.17**	1313	29.2	10.18**
Parental Education										
Less than HS	684	11.0	269	9.3	208	14.7		415	12.7	
HS or equivalent	1359	26.9	605	25.3	388	31.8		754	28.5	
Greater than HS	1626	30.2	763	29.0	376	28.7		863	31.4	
College or professional	1796	37.8	979	36.3	333	24.9	10.97**	817	27.4	9.20**
Childhood sexual abuse	294	4.8	116	3.7	91	6.9	9.76**	178	5.9	10.53**
Childhood neglect	292	4.8	122	4.4	87	6.3	3.01	170	5.1	0.84
Childhood physical abuse	894	13.6	406	13.5	218	13.8	0.04	488	13.7	0.02
Age	M	SE	M	SE	t-test	M	SE	M	SE	t-test
	21.75	0.13	21.58	0.13	22.01	0.15	3.94**	21.91	0.13	4.13**
CES-D 10 -item	5.24	0.10	5.14	0.12	5.62	0.17	2.52**	5.33	0.12	1.34
Women										
Demographic variables	Total†					Obese				
	Normal		Obese			Normal		Obese		
	N	%	n	%	χ^2_{2a}	n	%	n	%	χ^2_{2b}
Racial Minority Status										
Caucasian	4099	74.6	1995	75.9	905	70.9		2104	73.4	
Non-Caucasian	2359	25.4	1064	24.2	633	29.1	5.42*	1295	26.6	3.01
Parental Education										
Less than HS	665	11.4	271	10.0	207	13.6		394	12.7	

Demographic variables	Men											
	Total			Normal			Obese			Overweight + obese		
	N	%		n	%		n	%		n	%	χ^2 ^{2b}
HS or equivalent	1349	26.4		605	14.4		356	30.8		744	28.3	
Greater than HS	1697	30.6		762	28.8		400	31.6		935	32.2	
College or professional	1879	31.7		1032	36.9		339	24.1	7.81**	847	26.9	8.25**
Childhood sexual abuse	277	4.1		125	4.3		73	4.4	0.04	152	4.0	0.17
Childhood neglect	308	5.3		152	5.2		69	5.3	0.01	156	5.3	0.01
Childhood physical abuse	944	15.6		456	16.0		229	16.2	0.01	488	15.2	0.41
	M	SE		M	SE		M	SE	t-test	M	SE	t-test
Age	21.84	0.12		21.68	0.13		22.03	0.13	4.00**	21.98	0.12	4.65**
CES-D 10 -item	5.5	0.08		5.45	0.10		5.74	0.17	1.60	5.54	0.12	0.65

Note. Means and Percentages are weighted to be representative of the U.S. population.

^a Tests the difference between BMI in the Normal range vs BMI in the Obese range.

^b Tests the difference between BMI in the Normal range vs BMI in the Overweight+Obese range.

^c CES-D = Center for Epidemiologic Studies – Depression Scale

* $p < .05$.

** $p < .01$.

Table 2

Adjusted OR for CSA and CPA on Obesity or Overweight+Obesity

	Males			
	Normal vs. obese		Normal vs. overweight+obese	
	OR	95% CI	OR	95% CI
Model 1				
CSA ^a	1.63*	(1.03 – 2.58)	1.46*	(1.02 – 2.08)
Model 2				
Neglect	1.26	(0.78 – 2.03)	1.02	(0.68 – 1.52)
Model 3				
CPA ^b	0.96	(0.74 – 1.25)	0.94	(0.76 – .15)
Model 4				
CSA	1.66*	(1.03 – 2.70)	1.51*	(1.05 – 2.19)
Neglect	1.22	(0.76 – 1.98)	0.99	(0.67 – 1.48)
CPA	0.94	(0.72 – .24)	0.95	(0.76 – .18)
	Females			
	Normal vs. obese		Normal vs. overweight+obese	
	OR	95% CI	OR	95% CI
Model 1				
CSA	0.86	(0.54 – 1.35)	0.80	(0.57 – 1.11)
Model 2				
Neglect	0.85	(0.53 – 1.37)	0.92	(0.64 – 1.33)
Model 3				
CPA	1.02	(0.77 – 1.37)	0.94	(0.77 – 1.15)
Model 4				
CSA	0.81	(0.53 – 1.23)	0.76	(0.54 – 1.06)
Neglect	1.01	(0.61 – 1.67)	1.13	(0.77 – 1.66)
CPA	1.00	(0.75 – 1.35)	0.93	(0.76 – 1.15)

All models control for race, parental education level, age, and depressive symptoms.

^aCSA = Childhood sexual abuse^bCPA = Childhood physical abuse*
p<.05

Table 3
Prevalence of weight management practices and eating behaviors by categories of gender and categories of abuse

Weight management practices among those trying to lose or maintain weight	Men									
	No CSA ^a		CSA		No Neglect		Neglect		PA	
	N	% [†]	N	% [†]	N	% [†]	N	% [†]	N	% [†]
Exercise to change weight	2176	76.8	104	69.6	2163	77.1	98	71.0	1917	77.0
Dieted to change weight	1131	40.6	63	46.8	1139	40.7	52	45.9	993	40.4
Skip meals	515	17.6	33	26.0 [†]	502	17.8	37	25.7	437	17.0
Took pills/laxatives/diuretics/supplements	489	16.6	24	14.0	480	16.5	28	17.2	418	16.3
Took part in weight program last week	86	3.6	9	8.2	93	3.9	3	2.0	82	4.1
Eating Behaviors	(n = 5794)		(n = 294)		(n = 5729)		(n = 292)		(n = 5100)	
Afraid to eat because lose control	120	1.7	17	3.7	125	1.7	12	4.14 [†]	107	1.7
Told by doctor have eating disorder	99	1.8	11	2.8	103	1.8	7	2.4	85	1.8
Weight management practices among those trying to lose or maintain weight	Women									
	No CSA ^a		CSA		No Neglect		Neglect		PA	
	N	% [†]	N	% [†]	N	% [†]	N	% [†]	N	% [†]
Exercise to change weight	2374	78.1	103	68.7	2362	77.8	101	74.7	2065	78.1
Dieted to change weight	1258	40.1	62	44.3	1193	40.2	61	44.9	1034	39.8
Skip meals	547	17.4	32	21.1	539	17.2	36	23.2	456	16.6
Took pills/laxatives/diuretics/supplements	500	16.4	24	12.9	502	16.7	19	7.0 ^{**}	429	16.0
Took part in weight program last week	93	3.3	6	2.1	97	3.4	2	0.4	91	3.8
Eating Behaviors	(n = 5948)		(n = 277)		(n = 5872)		(n = 308)		(n = 5201)	
Afraid to eat because lose control	131	2.0	11	5.7 [†]	131	2.2	12	2.8	112	2.1
Told by doctor have eating disorder	113	1.9	19	8.1 ^{**}	123	2.1	9	2.8	93	1.6

Chi-Square statistical tests performed when cell size greater than 5. Fisher exact used when cell size less than 5

^{††} Percentages are weighted to be representative of the U.S. population

^a CSA = Childhood sexual abuse

^b PA = Physical abuse

* p < .05.

** p < .01.

[‡] p < .10.