



Links between ACEs and Obesity

For physical abuse dominant maltreatment, depression mediated faster BMI gain in girls, suggesting treatment for depression in this population may slow weight gain in childhood or adolescence.

-Study by Sacks et al.

Overweight adolescents are more likely to be bullied, putting them at increased risk of depression and anxiety and may develop coping strategies including avoiding physical exercise and binge eating, which contributes further to overweight. However, secure relationships with parents provide a protective factor against bullying. In the absence of positive parental figures, as occurs in many ACE, bullying may further contribute to poor cardiometabolic outcomes.

-Study by Lin, Latner, Fung, & Lin

The perception of being overweight may contribute to the experience of being bullied in adolescents more than actual overweight status.

-Study by Lin, Latner, Fung, & Lin

Bullying (“weight-based victimization”) increases risk of depression, anxiety, poor body image, social isolation, and suicidality and coping strategies may include maladaptive eating behaviors and avoidance of physical activity, which may further contribute to overweight or obesity. Authors showed weight-based victimization during gym classes directly increased avoidance of physical activity in girls and weight-based victimization in locker rooms or bathrooms increased binge eating in boys. Authors also found girls more often than boys used healthy coping strategies (“tried eating healthier foods” or “exercised more”).

-Study by Puhl & Luedicke

More than half of cross-sectional studies reviewed provided evidence for association between obesity and depression, though further research needs to be done to establish bidirectional effects in children. In seven out of ten studies authors reviewed, childhood or adolescent obesity was a statistically significant predictor for depression (OR 1.3-2.9).

-Study by Muhlig et al.

Literature Review

Objective: The objective of this literature review is to compile current papers, primarily literature reviews, meta-analyses, and seminal studies, which have explored the bidirectional links between obesity and mental health in children, including depression, anxiety, and low self-esteem. Adversity along the lifespan is known to be associated with increased risk for poor cardiometabolic outcomes including obesity, type 2 diabetes mellitus, and hypertension. The bidirectionality of this association continues to be investigated, whereas not only do adverse events contribute to the development of cardiometabolic outcomes like obesity, but obesity may also contribute to increased anxiety, depression, and other mental health issues.

Background: The American Heart Association released a scientific statement in December 2017 reviewing the scientific literature associating adverse childhood experiences (ACEs) with cardiometabolic outcomes including obesity, type 2 diabetes mellitus, hypertension, and cardiovascular disease.¹ ACEs include witnessing a parent being abused, physical, sexual, or emotional abuse and neglect, living with a substance abuser or a mentally ill person, imprisonment of a household member, common adversities in diverse, nonwhite, low socioeconomic level communities, and peer-performed adversities such as bullying.¹

While the report details evidence of ACE contribution to the development of obesity, there is growing evidence of obesity's contribution to childhood depression, anxiety, and self-esteem. Being overweight in childhood or adolescence has been linked to increased risk of bullying, interpersonal and intrapersonal problems, lower health-related quality of life, and lower self-esteem².

Methods: The studies below were compiled through PUBMED searches of (children OR childhood) AND obesity AND (anxiety OR depression OR self-esteem) as well as (children OR childhood) AND obesity AND adverse events. Inclusion criteria included papers published within 2008 – 2018 and paper relevance (i.e. focus on association between obesity in childhood and mental health). Exclusion criteria included focus on experimental studies (i.e. testing new obesity interventions) or biochemical studies (i.e. exploring hormone levels in obese patients). The search lead to the compilation of twelve papers (see abstract listing).

Results: Weight-related bullying, referred to in the literature as weight-based victimization, of overweight children or adolescents increases risk of depression and anxiety². Weight-based victimization is more common in overweight and obese children and adolescence². Puhl & Luedicke found avoidance of physical activity is more prominent in girls secondary to bullying in gym classes and binge eating is more prominent in boys secondary to bullying in locker rooms and bathrooms³. Lin et al. found perception of overweight may be more important than actual overweight status in predicting bullying, but also showed a positive relationship with parents may protect against bullying and related anxiety and depression⁴. This relationship may indicate further risk of depression and related adverse coping strategies in overweight children and adolescents who are also experiencing ACEs related to parental relationships. A review by Harriger & Thomson supported the results of Lin et al.'s study, indicating that weight is not strongly related to depression when controlling for bullying⁷.

- Self- Esteem
- Anxiety

01/10/2018

A number of mechanisms were proposed in papers for the relationship between psychological problems and obesity. Of the twelve papers, five provided commentary on the cyclic nature of obesity and depression, whereas depression is predictive of obesity or vice versa, and depression propagates poor coping strategies including overeating or binge eating and avoidance of physical activity^{1,3,4,6,7}. In a review by Muhlig et al., seven of ten cross-sectional studies analyzed included childhood or adolescent obesity as a statistically significant predictor variable for development of depression with the majority showing this predictor is age-independent⁵. Other reviews suggest physiological relationships as a mechanism between overweight and depression^{1,5}.

References

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<https://doi.org/10.1161/CIR.0000000000000536>
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Bibliography

Objective: The objective of this bibliography is to compile current papers, primarily literature reviews, meta-analyses, and seminal studies, which have explored the bidirectional links between obesity and mental health in children, including depression, anxiety, and low self-esteem. The studies below were compiled through PUBMED searches of children OR childhood AND obesity AND anxiety OR depression OR self-esteem as well as children OR childhood AND obesity AND adverse events. Inclusion criteria included published within 2008 – 2010 and paper focus on association between obesity in childhood and mental health. Exclusion criteria included focus on experimental studies (i.e. testing new obesity interventions) or biochemical studies (i.e. exploring hormone levels in obese patients).

Adverse Events and Obesity

Statement from the AHA:

Suglia, S. F., Koenen, K. C., Boynton-Jarrett, R., Chan, P. S., Clark, C. J., Danese, A., . . . Zachariah, J. P. (2017). Children and Adolescent Adversity and Cardiometabolic Outcomes: A Scientific Statement From the American Heart Association. *Circulation*. <https://doi.org/10.1161/CIR.0000000000000536>

ABSTRACT: Adverse experiences in childhood and adolescence, defined as subjectively perceived threats to the safety or security of the child's bodily integrity, family, or social structures, are known to be associated with cardiometabolic outcomes over the life course into adulthood. This American Heart Association scientific statement reviews the scientific literature on the influence of childhood adversity on cardiometabolic outcomes that constitute the greatest public health burden in the United States, including obesity, hypertension, type 2 diabetes mellitus, and cardiovascular disease. This statement also conceptually outlines pathways linking adversity to cardiometabolic health, identifies evidence gaps, and provides suggestions for future research to inform practice and policy. We note that, despite a lack of objective agreement on what subjectively qualifies as exposure to childhood adversity and a dearth of prospective studies, substantial evidence documents an association between childhood adversity and cardiometabolic outcomes across the life course. Future studies that focus on mechanisms, resiliency, and vulnerability factors would further strengthen the evidence and provide much-needed information on targets for effective interventions. Given that childhood adversities affect cardiometabolic health and multiple health domains across the life course, interventions that ameliorate these initial upstream exposures may be more appropriate than interventions remediating downstream cardiovascular disease risk factor effects later in life.

Elsenburg, L.K., van Wijk, K.J.E., Liefbroer, A.C., & Smidt, N. (2017). Accumulation of Adverse Childhood Events and Overweight in Children: A Systematic Review and Meta-Analysis. *Obesity* (25) 820-832. doi:10.1002/oby.21797

Objective: This study systematically summarizes the evidence of all observational studies investigating the relation between accumulation of adverse life events and measures of overweight in children <18 years. **Methods:** MEDLINE, Embase, PsycINFO, and CINAHL were systematically searched (last search date 18 February 2015). The Newcastle-Ottawa Scale was used for methodological quality assessment. Study estimates were pooled using a random-effects model, and sources of heterogeneity were explored (PROSPERO registration number CRD42014014927).

Results: Eighteen articles were included, containing five longitudinal (n56,361) and fourteen cross-sectional and case-control study results (n552,318). The pooled estimate of the longitudinal studies showed that accumulation of adverse life events is positively related to childhood overweight measures

01/10/2018

(OR [95% CI]51.12 [1.01-1.25]). Cross-sectional and case-control study results were heterogeneous. Subgroup analyses showed that cross-sectional and case-control studies using a continuous adverse events measure, studies using a continuous overweight measure, and studies in children >6-12 years also generated positive pooled estimates, while the pooled estimate of studies assessing recent adverse events (past 2 years) was indicative of no relation with overweight.

Conclusions: Accumulation of adverse life events and childhood overweight measures are positively associated. However, increases in overweight measures in response to adverse childhood events do not seem to occur instantaneously.

Elsenburg, L.K., Liefbroer, A.C., & Smidt, N. (2017). The Longitudinal Relation Between Accumulation of Adverse Life Events and Body Mass Index From Early Adolescence to Young Adulthood. *Psychosomatic Medicine*, (79) 365-373. 10.1097/PSY.0000000000000401

ABSTRACT

Objective: Stressors, such as adverse life events, can cause weight changes through behavioral and biological mechanisms. Whether the accumulation of adverse life events is related to body mass index (BMI) across multiple time points from early adolescence to young adulthood has not been investigated to date.

Methods: Data are from 2188 children participating at T1 (10–12 years), T3 (14–18 years), and/or T5 (21–23 years) of the prospective Tracking Adolescents' Individual Lives Survey cohort study. Adverse events before T1 and between T1, T3, and T5 were measured with a parent interview at T1 and a semistructured interview (Event History Calendar) with the adolescent at T3 and T5. An adverse events score was calculated per wave. Body mass index z-scores were determined from objectively measured height and weight using the LMS (skewness, median, and coefficient of variation) reference curves of the International Obesity Task Force for children 18 years or younger. Data were analyzed using a modified bivariate autoregressive cross-lagged structural equation model.

Results: Adverse events before T1 and between T3 and T5 were related to BMI at T5 ($\beta = 0.06$, $p = .001$ and $\beta = -0.04$, $p = .04$, respectively). Specifically, health events before T1 were associated with a higher BMI at T5, and events related to relationships and victimhood events between T3 and T5 were associated with a lower BMI at T5.

Conclusions: Adverse relationship and victimhood events in their recent past were related to a lower BMI in young adults, whereas adverse health events during childhood were related to a higher BMI in young adults. No relationships were found between adverse life events with BMI in children and adolescents.

Key words: life events, body mass index, children, adolescents, young adults.

Hughes, K., Bellis, M.A., Hardcastle, K.A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M.P. (2017) The Effect of Multiple Adverse Childhood Experiences on Health: a Systematic Review and Meta-Analysis. *Lancet Public Health* (2)e356-66.

Summary:

Background: A growing body of research identifies the harmful effects that adverse childhood experiences (ACEs; occurring during childhood or adolescence; eg, child maltreatment or exposure to domestic violence) have on health throughout life. Studies have quantified such effects for individual ACEs. However, ACEs frequently co-occur and no synthesis of findings from studies measuring the effect of multiple ACE types has been done.

Methods: In this systematic review and meta-analysis, we searched five electronic databases for cross-sectional, case-control, or cohort studies published up to May 6, 2016, reporting risks of health outcomes, consisting of substance use, sexual health, mental health, weight and physical exercise, violence, and physical health status and conditions, associated with multiple ACEs. We selected articles that presented risk

estimates for individuals with at least four ACEs compared with those with none for outcomes with sufficient data for meta-analysis (at least four populations). Included studies also focused on adults aged at least 18 years with a sample size of at least 100. We excluded studies based on high-risk or clinical populations. We extracted data from published reports. We calculated pooled odds ratios (ORs) using a random-effects model.

Findings: Of 11 621 references identified by the search, 37 included studies provided risk estimates for 23 outcomes, with a total of 253 719 participants. Individuals with at least four ACEs were at increased risk of all health outcomes compared with individuals with no ACEs. Associations were weak or modest for physical inactivity, overweight or obesity, and diabetes (ORs of less than two); moderate for smoking, heavy alcohol use, poor self-rated health, cancer, heart disease, and respiratory disease (ORs of two to three), strong for sexual risk taking, mental ill health, and problematic alcohol use (ORs of more than three to six), and strongest for problematic drug use and interpersonal and self-directed violence (ORs of more than seven). We identified considerable heterogeneity (I^2 of >75%) between estimates for almost half of the outcomes. Interpretation To have multiple ACEs is a major risk factor for many health conditions. The outcomes most strongly associated with multiple ACEs represent ACE risks for the next generation (eg, violence, mental illness, and substance use). To sustain improvements in public health requires a shift in focus to include prevention of ACEs, resilience building, and ACE-informed service provision. The Sustainable Development Goals provide a global platform to reduce ACEs and their life-course effect on health.

Funding: Public Health Wales.

Adverse Events and Obesity (pulled from AHA scientific statement)

Danese A, Tan M. Childhood maltreatment and obesity: systematic review and meta-analysis. *Mol Psychiatry*. 2014;19-544-554. Doi: 10.1038/mp.2013.54

Obesity is a prevalent global-health problem associated with substantial morbidity, impairment and economic burden. Because most readily available forms of treatment are ineffective in the long term, it is essential to advance knowledge of obesity prevention by identifying potentially modifiable risk factors. Findings from experimental studies in non-human primates suggest that adverse childhood experiences may influence obesity risk. However, observations from human studies showed heterogeneous results. To address these inconsistencies, we performed Medline, PsycInfo and Embase searches till 1 August 2012 for articles examining the association between childhood maltreatment and obesity. We then conducted a meta-analysis of the identified studies and explored the effects of various possible sources of bias. A meta-analysis of 41 studies (190 285 participants) revealed that childhood maltreatment was associated with elevated risk of developing obesity over the life-course (odds ratio 1.36; 95% confidence interval 1.26–1.47). Results were not explained by publication bias or undue influence of individual studies. Overall, results were not significantly affected by the measures or definitions used for maltreatment or obesity, nor by confounding by childhood or adult socioeconomic status, current smoking, alcohol intake or physical activity. However, the association was not statistically significant in studies of children and adolescents, focusing on emotional neglect, or adjusting for current depression. Furthermore, the association was stronger in samples including more women and whites, but was not influenced by study quality. Child maltreatment is a potentially modifiable risk factor for obesity. Future research should clarify the mechanisms through which child maltreatment affects obesity risk and explore methods to remediate this effect.

Gustafson TB, Sarwer DB. Childhood sexual abuse and obesity. *Obes Rev* 2004;5:129-135. Doi: 10.1111/j.1467-789X.2004.00145.x

01/10/2018

Midei AJ, Matthews KA. Interpersonal violence in childhood as a risk factor for obesity: a systematic review of the literature and proposed pathways. *Obes Rev.* 2011;12:e159-e172. Doi: 10.1111/j.1467-789X.2010.00823.x

Summary

We examined the associations between exposure to interpersonal violence in childhood and risk for obesity and central adiposity. Interpersonal violence is defined as behaviour that threatens, attempts or causes physical harm. In addition, we evaluated the evidence for three mechanisms that may connect interpersonal violence to obesity: negative affect, disordered eating and physical inactivity. Based on a literature search of Medline and PsycInfo databases, 36 separate studies were evaluated and ranked based on quality. Approximately 81% of the studies reported a significant positive association between some type of childhood interpersonal violence and obesity, although 83% of the studies were cross-sectional. Associations were consistent for caregiver physical and sexual abuse and peer bullying, and there was mixed evidence for community violence. Although few studies explored mechanisms, early evidence suggests that negative affect and disordered eating may be involved. More prospective studies are needed, as well as studies that examine the mechanisms connecting early childhood victimization to obesity and central adiposity.

Obesity and Depression/Anxiety

Mannan M, Mamun A, Doi S, Clavarino A (2016) Prospective Associations between Depression and Obesity for Adolescent Males and Females- A Systematic Review and Meta-Analysis of Longitudinal Studies. *PLoS ONE* 11(6): e0157240. doi:10.1371/journal.pone.0157240

Adolescent obesity and depression are increasingly prevalent and are currently recognized as major public health concerns worldwide. The aim of this study is to evaluate the bi-directional associations between obesity and depression in adolescents using longitudinal studies. A systematic literature search was conducted using Pubmed (including Medline), PsycINFO, Embase, CINAHL, BIOSIS Preview and the Cochrane Library databases. According to the inclusion criteria, 13 studies were found where seven studies evaluated depression leading to obesity and six other studies examined obesity leading to depression. Using a bias-adjusted quality effects model for the meta-analysis, we found that adolescents who were depressed had a 70% (RR 1.70, 95% CI: 1.40, 2.07) increased risk of being obese, conversely obese adolescents had an increased risk of 40% (RR 1.40, 95% CI: 1.16, 1.70) of being depressed. The risk difference (RD) of early adolescent depression leading to obesity is 3% higher risk than it is for obesity leading to depression. In sensitivity analysis, the association between depression leading to obesity was greater than that of obesity leading to depression for females in early adulthood compared with females in late adolescence. Overall, the findings of this study suggest a bi-directional association between depression and obesity that was stronger for female adolescents. However, this finding also underscores the importance of early detection and treatment strategies to inhibit the development of reciprocal disorders.

Muhlig, Y., Antel, J., Focker, M., & Hebebrand J. (2016). Are bidirectional associations of obesity and depression already apparent in childhood and adolescence as based on high-quality studies? A systematic review. *Obesity Reviews* (17) 235–249, doi: 10.1111/obr.12357

Summary: Our aim was to evaluate bidirectional associations of obesity and depression in cross-sectional and longitudinal studies with initial assessments in childhood or adolescence. The clarification of these relationships may support the development of innovative interventions, e.g. based on nutrition

and mental health. A systematic literature search was conducted in MEDLINE. Main inclusion criteria were (i) assessment of subjects <18 years at baseline, (ii) use of validated psychometric instruments and (iii) elicitation of objectively measured anthropometric data at least at one time point. Twenty-four studies met our inclusion criteria. Out of 19, 14 cross-sectional studies confirmed a significant association of obesity and depression. Three out of eight longitudinal studies reported associations between obesity and subsequent depression in female children and adolescents only, and three out of nine studies obtained evidence in favour of the other direction with two studies revealing significant results only for female and one only for male children and adolescents. Evidence is mixed, and secure conclusions are hampered by the methodological variance of the included studies. Relationships are seemingly more readily detectable in female children adolescents and in the cross-sectional compared with the longitudinal analyses. Possibly, the joint development of obesity and depression in predisposed subjects accounts for the latter discrepancy.

Ortega, Y., et al., (2017) Impact of depression and/or anxiety on the presentation of cardiovascular events in a cohort with metabolic syndrome. StreX project: Five years of follow-up, Prim. Care Diab. <http://dx.doi.org/10.1016/j.pcd.2017.09.002>

Abstract

Objectives: To determine the role of anxiety and depression on the incidence of cardiovascular events (CVE) in a Catalanian population with metabolic syndrome (MetS) over a five-year follow-up according to the number/type of MetS criteria.

Methods: Prospective study to determine the incidence of CVE according to the presence of anxiety and depression disorders among individuals with different combinations of clinical traits of the MetS.

Setting: Primary Care, Catalonia (Spain). **Subjects:** 35–75 years old fulfilling MetS criteria without CVE at the initiation of follow-up (2009). We studied 16 MetS phenotypes [NCEP-ATPIII criteria] based on the presence of depression/anxiety. The primary end point was the incidence of CVE at five years.

Results: We analyzed 401,743 people with MetS (17.2% of the population); 8.7% had depression, 16.0% anxiety and 3.8% both. 14.5% consumed antidepressants and 20.8% tranquilizers. At the 5-year follow-up, the incidence of CVE was 5.5%, being 6.4% in men and 4.4% in women. On comparing individuals with and without depression the incidence of CVE was 6.7% vs. 5.3%, respectively ($p < 0.01$), being 5.5% in both groups in relation to anxiety.

Conclusion: Depression and anxiety play a role in the poor prognosis of patients with MetS. In Catalonia, the two predominant MetS phenotypes do not include obesity as a criterion.

Small, L. & Aplasca, A. (2016) Child Obesity and Mental Health: A Complex interaction. Child Adolesc Psychiatric Clin N Am (25)269–282. <http://dx.doi.org/10.1016/j.chc.2015.11.008>

KEY POINTS

- Both mental health and weight-based challenges are pervasive in America's youth.
- Child obesity and mental health treatment strategies share many common elements.
- A wide variety of intervention strategies is needed to make an impact on the comorbid problems of child obesity and psychosocial disturbances.
- Addressing both mental wellness and obesity from a healthy-lifestyle approach appears to be both feasible and effective and requires inter-professional collaboration.
- Broad-based conceptualization of these issues is necessary for strategically aligned intervention that should occur at the individual, family, organizational, community, and policy levels.

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Quek, Y., Tam, W.W.S., Zhang, M.W.B., Ho, R.C.M. (2017). Exploring the association between a childhood and adolescent obesity and depression: a meta-analysis. *Obesity Reviews*. (18)742-754. doi:10.1111/obr.12535

Summary: This meta-analysis aimed to evaluate the association between childhood and adolescent obesity and depression. We systematically searched PubMed, PsycInfo, EMBASE and Science Direct for studies that compared prevalence of depression and depressive symptoms in normal weight and obese children and adolescents. Observational studies were included if they reported body mass index and assessed depression by validated instruments or diagnostic interviews. Quality assessment was performed using the Newcastle–Ottawa scale. We used the random-effect model to calculate the pooled odds ratios, standard mean differences (SMDs) and subgroup analysis. Findings for a total of 51,272 participants were pooled across 18 studies and examined. Our analyses demonstrated a positive association between childhood and adolescent obesity and depression (pooled odds ratio = 1.34, 95% confidence interval [CI]: 1.1–1.64, $p = 0.005$) and more severe depressive symptoms (SMD = 0.23, 95% CI: 0.025–0.44, $p = 0.028$) in the obese groups. Overweight subjects were not more likely to have either depression (pooled odds ratio = 1.16, 95% CI: 0.93–1.44, $p = 0.19$) or depressive symptoms (SMD = 0, 95% CI: -0.101 to 0.102 , $p = 0.997$). Non-Western and female obese subjects were significantly more likely to have depression and severe depressive symptoms ($p < 0.05$). In conclusion, obese children and adolescents are more likely to suffer from depression and depressive symptoms, with women and non-Western people at higher risk.

Sacks, R.M. Takemoto, E., Andrea, S., Dieckmann, N.F., Bauer, K.W., Boone-Heinonen, J. (2017) Childhood Maltreatment and BMI Trajectory: The Mediating Role of Depression. *Am Jour Prev Med* 53(5):625-633 <https://doi.org/10.1016/j.amepre.2017.07.007>.

Introduction: Childhood maltreatment is associated with later obesity, but the underlying mechanisms are unknown. The objective of this study was to estimate the extent to which depression mediates the associations between childhood maltreatment and BMI in adolescence through adulthood.

Methods: Data on a cohort of 13,362 adolescents in the National Longitudinal Study of Adolescent to Adult Health (Wave I [1994–1995] to Wave IV [2008–2009]) were analyzed in 2015–2016. Classes of maltreatment experienced prior to age 12 years were statistically identified using latent class analysis. Gender-stratified latent growth curve analysis was used to estimate total effects of maltreatment classes on latent BMI trajectory (aged 13–31 years) and indirect effects of maltreatment classes that occurred through latent depression trajectory (aged 12–31 years).

Results: Four latent maltreatment classes were identified: high abuse and neglect; physical abuse dominant; supervisory neglect dominant; and no/low maltreatment. In girls, compared with no/low maltreatment, supervisory neglect dominant (coefficient $\%0.3$, 95% CI $\%0.0, 0.7$) and physical abuse dominant (coefficient $\%0.6$, 95% CI $\%0.1, 1.2$) maltreatment were associated with faster gain in BMI. Change in depression over time fully mediated the association of BMI slope with physical abuse dominant maltreatment, but not with supervisory neglect dominant maltreatment. In boys, high abuse and neglect maltreatment was associated with marginally greater BMI at baseline (coefficient $\%0.7$, 95% CI $\% -0.1, 1.5$); this association was not mediated by depression.

Conclusions: Although maltreatment was associated with depression and BMI trajectories from adolescence to adulthood, depression only mediated associations with physical abuse dominant maltreatment in girls.

Obesity and Self-Esteem

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Harriger, J.A. & Thompson, J.K. (2012) Psychological consequences of obesity: Weight bias and body image in overweight and obese youth, *International Review of Psychiatry*, 24:3, 247-253, DOI: 10.3109/09540261.2012.678817

Abstract

Over the past several decades, the prevalence of overweight and obesity in children has increased considerably. While it has been widely documented that childhood obesity is related to a variety of negative health consequences, and numerous campaigns have focused on increasing physical activity and healthy food choices in children, less research has focused on the negative psychological consequences of childhood obesity, namely body image disturbance. This article examines research on body image disturbance in overweight/obese children, comorbidity of psychological disorders and childhood overweight/obesity, and factors that contribute to body image disturbance in overweight and obese youths. Additionally, the authors present research pertaining to treatment and prevention of body image disturbance in overweight/obese youths and discuss potential future directions for research, prevention and advocacy.

Hubner, C. et al. (2016) Weight-Related Teasing and Non-Normative Eating Behaviors as Predictors of Weight Loss Maintenance. A Longitudinal Mediation Analysis. *Appetite* (102)25-31.
<http://dx.doi.org/10.1016/j.appet.2016.02.017>

Weight loss maintenance is essential for the reduction of obesity-related health impairments. However, only a minority of individuals successfully maintain reduced weight in the long term. Research has provided initial evidence for associations between weight-related teasing (WRT) and greater nonnormative eating behaviors. Further, first evidence was found for associations between non-normative eating behaviors and weight loss maintenance. Hence, the present study aimed to examine the predictive value of WRT for weight loss maintenance and the role of non-normative eating behaviors as possible mediators of this relationship. The study was part of the German Weight Control Registry that prospectively followed individuals who had intentionally lost at least 10% of their maximum weight and had maintained this reduced weight for at least one year. In N = 381 participants, retrospective WRT during childhood and adolescence, current non-normative eating behaviors (i.e., restrained, external, emotional eating), and change in body mass index (BMI, kg/m²) over two years were examined using self-report assessments. Structural equation modeling was used to analyze the assumed mediational relationship. As a result, a greater effect of retrospective WRT during childhood and adolescence predicted less successful adult weight loss maintenance over two years. Current emotional eating fully mediated this relationship while current restrained and external eating yielded no mediational effects. Hence, a greater effect of WRT predicted greater current emotional eating, which in turn predicted a smaller decrease or a greater increase in BMI. Our findings suggest that suffering from WRT during childhood and adolescence might lead to emotional eating which in turn impairs long-term weight loss maintenance. Thus, our results highlight the need for interventions aiming at reducing weight stigmatization and targeting emotional eating for successful long-term weight loss maintenance.

Lin, Y., Latner, J.D., Fung, X.C.C., Lin, C. (2017). Poor Health and Experiences of Being Bullied in Adolescents: Self-Perceived Overweight and Frustration with Appearance Matter. *Obesity* 00-00.
doi:10.1002/oby.22041

Objective: To examine the associations between body image (actual and self-perceived weight status; feelings about appearance) and health outcomes (overall health, life satisfaction, and mental health) and between body image and experiences of being bullied.

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Methods: Participants included 8,303 children from 7th to 10th grade in the Health Behavior of School-Aged Children (HBSC) 2009-2010 data set, a large-scale sample in the United States. Several multiple linear regressions (with health outcomes as dependent variables) and multivariate logistic regressions (with being bullied or not as dependent variable) were conducted to investigate the associations between each dependent variable and the following independent variables: relationship with parents, frustration with appearance, and actual and self-perceived weight status.

Results: Self-perceived underweight, self-perceived overweight (OW), and frustration with appearance were positively associated with being bullied. Frustration with appearance was a risk factor, while good relationship with parents was a protective factor, especially for psychological health outcomes. Self-perceived OW had a stronger association with the experience of being bullied than actual OW. The relationship between actual OW and being bullied might be attenuated when self-perceived OW is simultaneously considered.

Conclusions: Body image may be an important factor in the association between weight status and the experience of being bullied.

Rankin, J. et al. (2016). Psychological Consequences of Childhood Obesity: Psychiatric Comorbidity and Prevention. *Adolescent Health, Medicine, and Therapeutics*. (7) 125-146 doi: <http://dx.doi.org/10.2147/AHMT.S101631>

Abstract: Childhood obesity is one of the most serious public health challenges of the 21st century with far-reaching and enduring adverse consequences for health outcomes. Over 42 million children <5 years worldwide are estimated to be overweight (OW) or obese (OB), and if current trends continue, then an estimated 70 million children will be OW or OB by 2025. The purpose of this review was to focus on psychiatric, psychological, and psychosocial consequences of childhood obesity (OBy) to include a broad range of international studies. The aim was to establish what has recently changed in relation to the common psychological consequences associated with childhood OBy. A systematic search was conducted in MEDLINE, Web of Science, and the Cochrane Library for articles presenting information on the identification or prevention of psychiatric morbidity in childhood obesity. Relevant data were extracted and narratively reviewed. Findings established childhood OW/OBy was negatively associated with psychological comorbidities, such as depression, poorer perceived lower scores on health-related quality of life, emotional and behavioral disorders, and self-esteem during childhood. Evidence related to the association between attention-deficit/hyperactivity disorder (ADHD) and OBy remains unconvincing because of various findings from studies. OW children were more likely to experience multiple associated psychosocial problems than their healthy-weight peers, which may be adversely influenced by OBy stigma, teasing, and bullying. OBy stigma, teasing, and bullying are pervasive and can have serious consequences for emotional and physical health and performance. It remains unclear as to whether psychiatric disorders and problems are a cause or a consequence of childhood obesity or whether common factors promote both obesity and psychiatric disturbances in susceptible children and adolescents. A cohesive and strategic approach to tackle this current obesity epidemic is necessary to combat this increasing trend which is compromising the health and well-being of the young generation and seriously impinging on resources and economic costs.

Puhl, RM, Luedicke, J. (2012) Weight-Based Victimization Among Adolescents in the School Setting: Emotional Reactions and Coping Behaviors. *J Youth Adolescence* 41:27-40. Doi: 10.1007/s10964-011-9713-z

Abstract: Weight-based victimization is a frequent experience for adolescents, but little is known about their emotional reactions and coping strategies in response to weight-based teasing and bullying. The present study examined the ways that adolescents cope with experiences of weight-based victimization at school. An initial sample of 1,555 students from two high schools in central Connecticut completed a comprehensive battery of self-report measures to assess their experiences of weight-based teasing and bullying at school, affective responses to these experiences, and coping strategies used to deal with incidents of weight-based victimization. Only those students who reported experiencing weight-based victimization (N = 394) were included for the purposes of the present study. Of this subsample, 56% were females, 84% were Caucasian, and the mean age was 16.4 years. Weight-based victimization resulted in 40–50% of adolescents feeling sad and depressed, worse about themselves, bad about their body, angry, and some feeling afraid. Gender differences emerged with respect to how boys and girls react to experiences of weight-based victimization. However, structural equation model estimates demonstrated that both boys and girls who reported negative affect in response to weight-based victimization were more likely to use coping strategies of avoidance (e.g., avoiding gym class), increased food consumption, and binge eating. Binary logistic regressions showed that the odds of students skipping school or reporting that their grades were harmed because of weight-based teasing increased by 5% per teasing incident, even after controlling for gender, age, race, grades, and weight status. To our knowledge, this study is the first systematic examination of affective reactions and coping strategies among overweight adolescents in response to weight-based victimization. These findings can inform efforts to assist overweight youth to cope adaptively with weight-based victimization.

Weinberger, N., Kersting, A., Rieel-Heller, S.G., Luck-Sikorski, C. Body Dissatisfaction in Individuals with Obesity Compared to Normal-Weight Individuals: A Systematic Review and Meta-Analysis. *Obes Facts* (9)424-441, doi:10.1159/000454837

Background: Body dissatisfaction has been identified as a psychological correlate of obesity that is related to disordered eating, poor self-esteem, and depression. However, not all individuals with obesity are equally vulnerable to these correlates, and ‘normative discontent’ is present in individuals with normal weight, too. In this light, the complex relationship of body image and individual weight status seems like a worthwhile direction of research inquiry. As such, this review aims to systematically explore the degree of body dissatisfaction in individuals with obesity compared to normal-weight individuals.

Methods: A systematic literature search was conducted. All quantitative studies of adult samples reporting results regarding differences in body dissatisfaction between individuals with normal weight and obesity were included.

Results: 17 articles were found. Across studies, individuals with obesity reported higher body dissatisfaction than normal-weight individuals (questionnaires: $d = 0.89$, 95% CI = 0.63–1.16, $p < 0.001$; silhouette scales: $d = 1.41$, 95% CI = 0.57–2.25, $p < 0.001$). Meta-regression revealed a significant association of female gender and higher body dissatisfaction ($b = 0.60$, $p = 0.007$).

Conclusion: The findings underline the severity of body dissatisfaction among individuals with obesity and especially among women. Future research recommendations are discussed.