Published in final edited form as:

Curr Opin Psychol. 2015 October 1; 5: 56–66. doi:10.1016/j.copsyc.2015.03.021.

Stigma, Obesity and Adolescent Risk Behaviors: Current Research and Future Directions

Tilda Farhat, Ph.D., M.P.H.

Abstract

Adolescents are particularly vulnerable to risk behaviors as, in this life stage, they are experiencing intense physical, psychological and social changes. Adolescents who are overweight/obese, but particularly those who perceive themselves as such, are more likely to engage in risk behaviors than those who are or perceive themselves of normal-weight. Weight stigma and discrimination may contribute to this association as they reinforce poor body image and create intense stress. Stress is associated with poor emotion regulation, more impulsive, contextually-determined, and less rational decision-making, leading to greater engagement in risk behaviors. However, pathways from weight stigma/discrimination to risk behavior may be moderated by adolescents' social networks. This review provides a conceptual model and empirical evidence to illustrate the proposed pathways from weight stigma and discrimination to risk behaviors. Public health implications and future research directions are also discussed.

Introduction

Overweight prevalence remains high among adolescents, with approximately one-third of United States (US) adolescents classified as overweight or obese [1]. Also prevalent are perceptions of being overweight and poor body image. Of particular concern are the associations of overweight/obesity and perceptions of overweight/obesity with health risk behaviors.

Experimentation with risk behaviors is common during adolescence, as young people's independence from parents, peer modeling, and access to potentially harmful substances increase. Engaging in health risk behaviors may be considered normative and might serve a developmental purpose, such as rebellion against authority and identification with the youth subculture [2-4]. Health-risk behaviors may also help adolescents cope with stressful life events [5].

© 2015 Published by Elsevier Ltd.

Address correspondence to: Tilda Farhat, Ph.D., M.P.H. National Institute on Minority Health and Health Disparities, National Institutes of Health, 6707 Democracy Boulevard, Bethesda, MD, 20892, USA; Phone: (301)594-9765; Fax: (301) 480-4049; tilda.farhat@nih.gov.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Adolescents who are overweight/obese and those who perceive themselves as such are particularly vulnerable to risk behaviors and are more likely to demonstrate maladaptive coping. Given the increased stigmatization of overweight/obesity in the last few decades, perceptions of being overweight may be related to more psychological distress and risk behaviors than perceptions of being about the right weight [6-9].

This paper presents a conceptual framework that connects weight stigma and discrimination to risk behaviors. Theoretical perspectives and empirical evidence, focusing mainly on the past two years, is also presented in support of the proposed pathways. Finally, implications and future directions will be discussed.

Pathways from Obesity Stigma to Stress

Drawing on theories from social psychology, adolescent development, and behavioral neurosciences, a multilevel framework is proposed to illustrate the relationships between weight stigma/discrimination, overweight, self-perceptions of overweight, and risk behaviors. The conceptualization suggests that weight-related social norms, namely weight stigma and discrimination, affect risk behaviors through their influence on body image and stress. However, these associations may be moderated by adolescents' social network and social context (Figure 1). Evidence for these pathways is presented in the following paragraphs and pertinent studies are summarized in Table 1.

Weight stigma is defined as the disapproval of individuals perceived to be overweight or obese. Discrimination refers to negative interactions with people who are overweight/obese [10]. Healthy People 2020 recognized discrimination as a social determinant of health that can have adverse consequences on mental, physical and social health [11].

Weight stigma and discrimination are highly prevalent among youth, with often deleterious consequences on adolescents' well-being [12]. Compared to their normal-weight peers, youth who are overweight/obese are more likely to experience impaired peer relationships, stigma, and weight bias [8,12-14]. It has been reported that the rates of weight discrimination in American society are close to or sometimes higher than the reported rates of racial discrimination, particularly among women [15]. Girls who are overweight/obese are more subject to weight discrimination than overweight/obese boys, and girls are more likely than boys to discriminate against overweight/obese peers[16].

Self-perceptions of overweight (whether accurate or not) may be stronger stressors and predictors of maladaptive coping than actual weight. Agnew's General Strain Theory (GST) [17] posits that perceptions may be a stronger predictor of stress than objective assessments and are more strongly related to deviant outcomes because they are more likely to produce stress. In addition, empirical evidence has demonstrated that self-perceptions of overweight are more strongly associated with poor health-related quality of life [8], dating violence victimization [6] and risk behaviors [9,18]. Further, while the association of overweight/obesity with risk behaviors is inconsistent across studies, that of perceptions of overweight/obesity with risk behaviors is more universal, suggesting that weight perceptions may be more accurate predictors of adverse behavioral outcomes than weight status [9,18-22].

Weight stigma/discrimination and perceptions of overweight/obesity can contribute to obesity as evidenced in recent research. Weight stigma may trigger an increased production of the stress hormone cortisol which promotes fat storage and increased eating, which, in turn, stimulates weight gain. Additional weight exposes individuals to greater experiences of weight stigma, prompting the production of cortisol and setting the cycle in motion again. Further, because of weight stigma, adolescents who are overweight/obese or perceive themselves as such are less likely to engage in physical activity and more likely to be sedentary, thereby increasing their likelihood of becoming overweight/obese [10,19,23].

Given the extent of negative stereotypes and discrimination associated with obesity, adolescents who are overweight/obese or who perceive themselves as such may internalize weight-based stigma and suffer from poor body image [24]. Social comparison theory posits that individuals compare themselves to others to establish similarities and differences about their own attributes, skills, and social expectations. These evaluative comparisons may generate negative outcomes, particularly when the gap between the individuals' own attributes and those of the comparison object is wide, thus making it difficult for individuals to conform to the ideal attribute. For overweight/obese adolescents, idealized thin body images are often impossible to attain, therefore creating a constant internal state of stress [25]

Stress and Risk Behaviors

According to the stress and coping theory, adolescents use a variety of coping strategies to deal with stressors, some of which may actually be maladaptive and exacerbate the stressor instead of eliminating it [5,26,27]. This may be particularly true for adolescents dealing with the stress of excess weight or negative body image. Compared to overweight/obese individuals in other developmental stages, adolescents who are overweight/obese are more likely to demonstrate maladaptive coping through engagement in risk behavior [7]. Experiencing a negative body image is therefore likely to trigger coping strategies aimed at mitigating the emotional and physiologic imbalances caused by a negative body image. Unfortunately, among overweight and obese adolescents, such coping strategies could involve practices such as substance use, sexual risk behavior and violence which are maladaptive and lead to negative health consequences that could add to the adolescents' health burden. Reducing exposure to the stressors, in this case, negative body image (proximal) and obesity stigma (distal), may therefore lead to lower engagement in risk behavior.

Biological pathways may mediate the relationship between weight stigma-induced stress and risk behaviors. Traditional models of behavior have generally relied on the basic premise that behaviors result from the cognitive processing of information. This model posits a “top-down” controlled processing of information driven by rational thought, and usually favors long-term rewards. However, as demonstrated in recent advances in behavioral neurosciences [28,29] and behavioral economics [30], another “bottom-up” model may also influence behavior. This model posits that behavior is driven by impulses/automaticity and favors immediate rewards. Behavior most likely results from the interplay of both mechanisms [31,32], but in situations of high stress, the impulsive model prevails.

This could be especially problematic during adolescence when the brain is still developing and teens are more impulsive and prone to risk-taking [3,33,34]. Recent findings demonstrate that the adolescent brain is undergoing intense physiological changes. The frontal cortex, associated with “top-down” rational decision-making, is still developing while areas associated with “bottom-up” reactivity and impulsivity are further developed. This imbalance results in adolescents' propensity for risk-taking. This propensity could be compounded in situation of high stress (e.g., weight stigma/discrimination, poor body image), where, even among adults, impulsivity prevails, leading to greater engagement in risk behaviors.

Moderating Effect of Social Context and Social Networks

Social context refers to the opportunities for interaction and the contexts within which individual interaction occurs. Social networks, largely determined by the social context, are all the people and groups with whom one has contact and the nature and extent of their interactions [35]. Social networks are important because connected people share information and shape each other's perceptions of social norms. Adolescents' social networks include, for example, peers, families, and neighbors, and play a primordial role in either enabling or mitigating risk behavior. Social networks may also protect adolescents who are overweight/obese from developing poor body image and ultimately engaging in risk behaviors [36].

Summary of Conceptual Pathways

Adolescents are particularly vulnerable to risk behaviors as, in this life stage, they are experiencing intense social changes, including independence from parents, identification with peer groups and onset of romantic relationships. Adolescents are also undergoing extensive psychological and physical changes with physical maturation, hormonal modifications and continued brain development that, as recent advances in neuroscience show, may explain adolescents' risk-taking, rebellion, and seemingly erratic behavior [33,37].

Theoretical and empirical evidence suggests that weight stigma and discrimination may put adolescents at additional risk of morbidity and mortality by further increasing their engagement in risk behaviors. Weight stigma and discrimination create intense stress for adolescents with poor body image associated with being overweight/obese or perceiving themselves as such. As suggested by stress and coping theories and empirical work in neuroscience, stress is associated with poor emotion regulation, more impulsive, contextually-determined, and less rational decision-making, leading to greater engagement in risk behaviors.

The increased engagement in risk behaviors not only entails increased likelihood of negative consequences typically associated with these risk behaviors, but also weight gain and its related problems. The underlying mechanisms of poor emotion regulation and less rational decision-making that are associated with increased risk behavior may also be associated with disordered eating and other obesogenic behaviors [19,38,39], ultimately resulting in weight gain and/or difficulty losing weight.

Summary of Empirical Evidence

A review of studies examining weight status, weight perceptions and risk behaviors showed that the largest number of studies ($n=12$) examined the relationship between weight status and risk behavior whereas only six accounted for a measure of weight perception/body image. While the association of overweight/obesity with risk behaviors was inconsistent across studies, that of perceptions of overweight/obesity with risk behaviors was more universal, suggesting that weight perceptions and body image may be more accurate predictors of adverse behavioral outcomes than weight status [9,18-22].

Findings from studies examining only weight status were diverse and varied by risk behavior (type and assessment), gender, and race/ethnicity. Marijuana [39-41] and alcohol [38-42] use were generally not associated with overweight/obesity (except [43]). Findings for smoking were more varied with no associations being reported in three studies, generally for boys [38,40,44], and positive ones in four studies [39,41,42,44]. Overweight/obesity was associated with risky sexual behavior in all [45-47] but one study [42], most notably for (White) girls. Finally, overweight/obesity was associated with bullying perpetration in both studies that examined this relationship [26,48].

The association of overweight/obesity with risk behaviors was stronger for obesity, and obesity was associated with more risk behaviors than overweight, suggesting that the greater the deviations from appearance ideals, the greater their effect on adolescents' behavioral outcomes [19,43,47]. Findings were also similar for perceptions/misperceptions of weight, whereby adolescents who (mis)perceive themselves as very overweight engage in more risk behaviors than those who (mis)perceive themselves as slightly overweight [9,20].

Conclusion, Implications and Future Directions

These findings have implications for research and practice. Prevention of youth's engagement in risk behaviors is a national US priority and is addressed through several objectives of Healthy People 2020 and its predecessors [11]. Prevention is most successful when it addresses modifiable determinants of disease or behavior, which, through successful interventions, could be targeted for change to improve health outcomes. Weight stigma and discrimination are modifiable risk factors of youth risk behaviors and obesity, and have become increasingly prominent despite the high prevalence of obesity [49]. So prominent, in fact, that even self-perceptions of overweight/obesity are exerting a heavy psychological stress on today's youth, especially girls, that is making them vulnerable to adverse health and behavioral outcomes [6,8,9,18,22]. Those adverse outcomes may be immediate, such as bullying perpetration, illicit drug use, sexually transmitted infections, drunkenness, or as mentioned previously, weight gain. Adverse outcomes may also be long-term: risk behaviors engaged in regularly during adolescence are likely sustained in adulthood and lead to chronic conditions. In addition, being subject to sustained stress may have indelible impact on the development of the adolescent brain, which is still undergoing significant changes. Research has shown that chronic childhood stress, such as abuse, neglect, or exposure to violence, is likely to affect the development of the child's brain [50]. Given recent findings

that the adolescent brain is still maturing, chronic weight stigma-related stress is likely to have a similar impact and alter its development.

Future research is needed to investigate the mechanisms that could further our understanding of the relationships between weight stigma, weight status/perceptions and risk behaviors. First, longitudinal research examining multiple levels of influence is particularly needed, one that integrates findings from the biological sciences and behavioral/environmental ones. For example, what are the biopsychosocial pathways from stigma/discrimination to risk behaviors? How do the relationships change over time? How do social networks and the adolescents' social context moderate these associations? Recent advances in understanding the biological functioning of the adolescent brain and the drivers of decisionmaking in this life stage should be examined in light of the social meaning of adolescent risk behaviors. Second, studies need to move beyond just examining weight status (i.e. objective measures of overweight/obesity) and incorporate assessments of weight perceptions, body image or other measures of self-evaluation. Theoretical and empirical evidence suggests that these measures, rather than objective weight, are more strongly associated with stress, and by extension, with risk behaviors, yet most of the current research is still focused only on the impact of weight status. Finally, to what extent do these associations vary by adolescent subgroups, especially those that are exposed to additional forms of stigma and discrimination? Is there a dose-response gradient between cumulative experiences of stigma/discrimination and number and severity of risk behaviors? If, as suggested by the proposed model, adolescents' engagement in risk behaviors is maladaptive coping in the presence of stress associated with weight stigma/discrimination, is this maladaptive coping compounded by the presence of additional stressors or vulnerabilities? Studies are already showing the differential gender impact of weight stigma, but more research is needed on other subgroups.

Current risk behavior prevention programs focus on altering behavior-related social norms (e.g., drinking culture) and the role of adolescents' social context (e.g., peer influence). This review suggests that weight-related social factors such as weight stigma and discrimination may be contributing to engagement in risk behaviors. Therefore, interventions designed to reduce weight stigma and improve adolescents' body image may reduce their engagement in risk behaviors. Further, given the current evidence that weight stigma may also be contributing to actual obesity, such interventions could have the added benefit of reducing the prevalence of overweight/obesity among adolescents. Increased awareness among professionals who work with adolescents about the detrimental associations of weight stigma and discrimination with risk behaviors would enable effective prevention interventions during adolescence, a period already characterized by increased risk-taking, and one that can significantly affect subsequent life stages.

References and Recommended Reading

*of special interest

**of outstanding interest

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *Jama-Journal of the American Medical Association*. 2014; 311:806–814.

2. Oyserman D, Fryberg SA, Yoder N. Identity-based motivation and health. *Journal of Personality and Social Psychology*. 2007; 93:1011–1027. [PubMed: 18072851]
3. Sunstein CR. Adolescent risk-taking and social meaning: A commentary. *Developmental Review*. 2008; 28:145–152.
4. Stead M, McDermott L, MacKintosh AM, Adamson A. Why healthy eating is bad for young people's health: Identity, belonging and food. *Social Science & Medicine*. 2011; 72:1131–1139. [PubMed: 21429646]
5. Compas BE, Connor-Smith JK, Saltzman H, Thomsen AH, Wadsworth ME. Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*. 2001; 127:87–127. [PubMed: 11271757]
6. Farhat T, Haynie D, Summersett-Ringgold F, Brooks-Russell A, Iannotti RJ. Weight perceptions, misperceptions, and dating violence victimization among US adolescents. *Journal of Interpersonal Violence*. 2015; 30(9):1511–1532.10.1177/0886260514540804 [PubMed: 25001616]
7. Farhat T, Iannotti RJ, Simons-Morton BG. Overweight, Obesity, Youth, and Health-Risk Behaviors. *American Journal of Preventive Medicine*. 2010; 38:258–267. [PubMed: 20171527]
- 8*. Farhat T, Iannotti RJ, Summersett-Ringgold F. Weight, Weight Perceptions and Health-Related Quality of Life among a National Sample of US Girls. *Journal of Developmental and, Behavioral Pediatrics*. in press. Findings from this study suggest that, rather than weight status perceived weight status and weight status misperceptions – especially of being too fat – are associated with poor health-related quality of life among a nationally-representative sample of adolescent girls. Four dimensions of health-related quality of life were assessed, including physical (self-reported health), emotional (psychosomatic symptoms, global well-being and life satisfaction), social (social engagement; parental support, and family relationships) and school (classmate support; school engagement; academic achievement; and school demands) functioning.
9. Jiang YW, Kempner M, Loucks EB. Weight Misperception and Health Risk Behaviors in Youth: the 2011 US YRBS. *American Journal of Health Behavior*. 2014; 38:765–780. [PubMed: 24933146]
10. Tomiyama AJ. Weight stigma is stressful. A review of evidence for the Cyclic Obesity/Weight-Based Stigma model. *Appetite*. 2014; 82:8–15. [PubMed: 24997407]
11. Secretary's Advisory Committee on Health Promotion and Disease Prevention Objectives for 2020. *Healthy People 2020: An Opportunity to Address the Societal Determinants of Health in the United States*. Edited by.
- 12*. Puhl RM, King KM. Weight discrimination and bullying. *Best Practice & Research Clinical, Endocrinology & Metabolism*. 2013; 27:117–127. This review is a very comprehensive overview of the nature and extent of weight stigmatization against overweight and obese individuals, as well as the resulting consequences that these experiences create for social, psychological, and physical health for children and adults who are targeted. [PubMed: 23731874]
13. Ludwig DS. Childhood obesity - The shape of things to come. *New England Journal of Medicine*. 2007; 357:2325–2327. [PubMed: 18057334]
14. Schaefer DR, Simpkins SD. Using Social Network Analysis to Clarify the Role of Obesity in Selection of Adolescent Friends. *American Journal of Public Health*. 2014; 104:1223–1229. [PubMed: 24832139]
15. Puhl RM, Andreyeva T, Brownell KD. Perceptions of weight discrimination: prevalence and comparison to race and gender discrimination in America. *International Journal of Obesity*. 2008; 32:992–1000. [PubMed: 18317471]
16. Latner JD, Stunkard AJ. Getting worse: The stigmatization of obese children. *Obesity Research*. 2003; 11:452–456. [PubMed: 12634444]
17. Agnew R. Building on the foundation of general strain theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of Research in Crime and Delinquency*. 2001; 38:319–361.
- 18*. Ford JA, Schroeder RD, Dotson HM. Weight Strain and Binge Drinking among Adolescents. *Deviant Behavior*. 2014; 35:742–757. This study examines the link between stigma, stress and health among adolescents. It provides a great in-depth overview of why obesity, and specifically perceptions of obesity, can be a source of stress/strain among adolescents and how this stress can

be the linked to risk behavior (binge drinking). It is one of very few longitudinal studies examining these relationships.

- 19**. Farhat T, Iannotti RJ, Caccavale LJ. Adolescent Overweight, Obesity and Chronic Disease-Related Health Practices: Mediation by Body Image. *Obesity Facts*. 2014; 7:1–14. This study examined body image as a possible mediator for the relationship of obesity with smoking, sedentary behavior, lack of physical activity, and infrequent breakfast consumption, highlighting that risk behaviors and obesity-related behaviors may share common pathways and underlying mechanisms. Therefore, improving body image could be an effective prevention strategy for obesity and risk behavior prevention. [PubMed: 24356530]
20. Jiang YW, Risica PM, Arias W, Perry D, Viner-Brown S. Perceived Weight Status Effect on Adolescent Health-Risk Behaviors: Findings from 2007 and 2009 Rhode Island Youth Risk Behavioral Survey. *School Mental Health*. 2012; 4:46–55.
21. Reulbach U, Ladewig EL, Nixon E, O'Moore M, Williams J, O'Dowd T. Weight, body image and bullying in 9-year-old children. *Journal of Paediatrics and Child Health*. 2013; 49:E288–E293. [PubMed: 23530984]
22. Zeller MH, Reiter-Purtill J, Jenkins TM, Ratcliff MB. Adolescent Suicidal Behavior Across the Excess Weight Status Spectrum. *Obesity*. 2013; 21:1039–1045. [PubMed: 23784908]
- 23*. Brewis AA. Stigma and the perpetuation of obesity. *Social Science & Medicine*. 2014; 118:152–158. This review identifies four mechanisms by which a pervasive environment of fat stigma could reinforce high body weights or promote weight gain, ultimately driving population-level obesity. Mechanisms investigated include direct behavioral change, indirect effects of psychosocial stress, indirect effects via changes in social relationships, and indirect structural effects of discrimination. It also shows that women and children are particularly vulnerable to these mechanisms. [PubMed: 25124079]
24. Suisman JL, Thompson JK, Keel PK, Burt SA, Neale M, Boker S, Sisk C, Klump KL. Genetic and Environmental Influences on Thin-Ideal Internalization across Puberty and Preadolescent, Adolescent, and Young Adult Development. *International Journal of Eating Disorders*. 2014; 47:773–783. [PubMed: 24962440]
25. Kraye A, Ingledew DK, Iphofen R. Social comparison and body image in adolescence: a grounded theory approach. *Health Education Research*. 2008; 23:892–903. [PubMed: 18156148]
- 26**. Jansen PW, Verlinden M, Domisse-van Berkel A, Mieloo CL, Raat H, Hofman A, Jaddoe VVW, Verhulst FC, Jansen W, Tiemeier H. Teacher and Peer Reports of Overweight and Bullying Among Young Primary School Children. *Pediatrics*. 2014; 134:473–480. This is a rare study examining the association of obesity with bullying perpetration (most studies look at victimization). It applied a multi-informant approach using teacher and child reports of bullying victimization and perpetration. Findings indicate that obesity was associated with higher odds of being a bully-victim (based on teachers' reports), rather than being only a bully or only a victim. These findings have implications for violence prevention programs. [PubMed: 25157018]
27. Kuntsche E, Wicki M, Windlin B, Roberts C, Gabhainn SN, van der Sluijs W, Aasvee K, Gaspar de Matos M, Dankulinova Z, Hublet A, et al. Drinking motives mediate cultural differences but not gender differences in adolescent alcohol use. *J Adolesc Health*. 2015; 56(3):323–329. [PubMed: 25586227]
28. Bickel WK, Moody L, Quisenberry AJ, Ramey CT, Sheffer CE. A Competing Neurobehavioral Decision Systems model of SES-related health and behavioral disparities. *Preventive Medicine*. 2014; 68:37–43. [PubMed: 25008219]
29. Hall PA, Marteau TM. Executive function in the context of chronic disease prevention: Theory, research and practice. *Preventive Medicine*. 2014; 68:44–50. [PubMed: 25042899]
30. Ariely, D. Predictably irrational: the hidden forces that shape our decisions. New York: Harper Perennial; 2010.
31. Albert D, Steinberg L. Judgment and Decision Making in Adolescence. *Journal of Research on Adolescence*. 2011; 21:211–224.
32. Reyna VF, Rivers SE. Current theories of risk and rational decision making. *Developmental Review*. 2008; 28:1–11. [PubMed: 19255598]
- 33**. Blakemore SJ, Mills KL. Is Adolescence a Sensitive Period for Sociocultural Processing? *Annual Review of Psychology*, Vol 65. 2014; 65:187–207. This study describes the functional

and structural changes occurring in the brain during adolescence. In this life stage, the brain is still undergoing numerous developments that make adolescents particularly susceptible to social influences. This study is especially relevant because it explains the biological links between adolescents' social environment and their behavior.

34. Mills KL, Lalonde F, Clasen LS, Giedd JN, Blakemore SJ. Developmental changes in the structure of the social brain in late childhood and adolescence. *Social Cognitive and Affective Neuroscience*. 2014; 9:123–131. [PubMed: 23051898]
35. Simons-Morton BG, Farhat T. Recent Findings on Peer Group Influences on Adolescent Smoking. *Journal of Primary Prevention*. 2010; 31:191–208. [PubMed: 20614184]
- 36*. Caccavale LJ, Farhat T, Iannotti RJ. Social engagement in adolescence moderates the association between weight status and body image. *Body Image*. 2012; 9:221–226. These study indicates the importance of the social context. It shows that social engagement can moderate the relationship between weight status and body image (for girls but not boys). Girls who were overweight/obese but with more social engagement were more likely to have body satisfaction compared to overweight/obese girls with less social engagement. Findings indicate that encouraging adolescent girls to develop healthy relationships with peers may prevent them from developing body dissatisfaction. [PubMed: 22325852]
- 37*. Steinberg L. A social neuroscience perspective on adolescent risk-taking. *Developmental Review*. 2008; 28:78–106. This study proposes a framework to examine the increase of risk-taking between childhood and adolescence and its decline during the transition to adulthood. It proposes that risk-taking results from biological changes in the brain's socio-emotional system that are associated with increased reward-seeking and low self-regulation. [PubMed: 18509515]
38. Bluml V, Kapusta N, Vyssoki B, Kogoj D, Walter H, Lesch OM. Relationship between Substance Use and Body Mass Index in Young Males. *American Journal on Addictions*. 2012; 21:72–77. [PubMed: 22211349]
- 39*. Lanza HI, Grella CE, Chung PJ. Does Adolescent Weight Status Predict Problematic Substance Use Patterns? *American Journal of Health Behavior*. 2014; 38:708–716. Using a person-centered approach, this study examined whether overweight or obesity status in adolescence predicts unique patterns of problematic substance use in young adulthood. It included 15,119 participants from the National Longitudinal Study of Adolescent Health (Add Health) at Wave 1 (11-19 years) and Wave 3 (18-26 years). Findings indicated that overweight or obese adolescents have a greater likelihood of being a regular compared to non-overweight/obese adolescents. This is one of few longitudinal studies examining these associations. [PubMed: 24933140]
40. Pasch KE, Velazquez CE, Cance JD, Moe SG, Lytle LA. Youth Substance Use and Body Composition: Does Risk in One Area Predict Risk in the Other? *Journal of Youth and Adolescence*. 2012; 41:14–26. [PubMed: 21853355]
- 41*. Huang DY, Lanza HI, Wright-Volel K, Anglin MD. Developmental trajectories of childhood obesity and risk behaviors in adolescence. *Journal of Adolescence*. 2013; 36:139–148. This longitudinal analysis examined, in a national sample, developmental pathways of obesity from early childhood to late adolescence and whether specific obesity trajectories were associated with greater trends in risk behaviors. This study uniquely examines gender and racial/ethnic differences. [PubMed: 23199644]
42. Farrant B, Utter J, Ameratunga S, Clark T, Fleming T, Denny S. Prevalence of Severe Obesity among New Zealand Adolescents and Associations with Health Risk Behaviors and Emotional Well-Being. *Journal of Pediatrics*. 2013; 163:143–149. [PubMed: 23357187]
43. Baek SI, So WY. Relationship between obesity in Korean adolescents and the frequency of alcohol consumption, the amount of alcohol consumed, and the frequency of severe alcohol intoxication. *Obesity Research & Clinical Practice*. 2012; 6:E159–E166.
44. Wang HM, Bell JF, Edwards TC, Patrick DL. Weight status, quality of life, and cigarette smoking among adolescents in Washington State. *Quality of Life Research*. 2013; 22:1577–1587. [PubMed: 23150168]
45. Averett S, Corman H, Reichman NE. Effects of Overweight on Risky Sexual Behavior of Adolescent Girls. *Economic Inquiry*. 2013; 51:605–619.
- 46*. Leech TGJ, Dias JJ. Risky Sexual Behavior: A Race-specific Social Consequence of Obesity. *Journal of Youth and Adolescence*. 2012; 41:41–52. This study examined racial differences in

the association of obesity and sexual risk behavior. Findings indicate that White adolescent girls who were obese exhibited higher rates of multiple sex partners and sex with older partners, and were also less likely to use condoms. Associations were not observed for Black girls. Findings are discussed in the context of weight stigma. [PubMed: 21541717]

47. Lowry R, Robin L, Kann L, Galuska DA. Associations of body mass index with sexual risk-taking and injection drug use among US high school students. *J Obes.* 2014; 2014:816071. [PubMed: 25105024]
48. Yen CF, Liu TL, Ko CH, Wu YY, Cheng CP. Mediating effects of bullying involvement on the relationship of body mass index with social phobia, depression, suicidality, and self-esteem and sex differences in adolescents in Taiwan. *Child Abuse Negl.* 2014; 38:517–526. [PubMed: 24011767]
49. Andreyeva T, Puhl RM, Brownell KD. Changes in perceived weight discrimination among Americans, 1995-1996 through 2004-2006. *Obesity.* 2008; 16:1129–1134. [PubMed: 18356847]
50. De Bellis MD, Zisk A. The Biological Effects of Childhood Trauma. *Child and Adolescent Psychiatric Clinics of North America.* 2014; 23:185–222. [PubMed: 24656576]

Highlights

- Adolescents who are, or self-perceive as, overweight are vulnerable to risk-taking
- Weight stigma may contribute to this association through poor body image and stress
- Increased engagement in risk behaviors may be a stress-coping mechanism
- Social networks moderate the associations between weight stigma and risk behaviors
- Interventions to reduce weight-stigma may reduce engagement in risk behaviors

Figure 1. Conceptual Framework for the Relationships of Weight Stigma, Overweight/Obesity, Perceptions of Weight Status and Risk Behaviors

Summary of Studies Examining Overweight/Obesity, Perceptions of Weight Status and Risk Behaviors (2012-2015)

Table 1

Author, Year	Study Design & Setting	Sample [N, Gender, Mean Age (or grade)]	Risk Behavior Outcome Measures	Predictor Measures	Other Key Explanatory Variables	Main Findings
Averett, Corman, Reichman, 2012	Cross-sectional US National (Add Health)	N=2,648 and 5,198 Girls 14-19 years	Sexual risk behavior (vaginal intercourse without a condom, any type of sexual activity while under the influence of alcohol, and anal intercourse)	Absolute weight categories Weight relative to other girls in school	—	Girls who were overweight or obese were less likely than their peers who were of recommended-weight to be sexually active Girls who were overweight or obese were more likely to have had anal intercourse than their peers who were of recommended-weight Stronger effects were observed for relative vs. absolute weight
Baek, So, 2012	Cross—sectional Korean National	N= 72,399 Boys and Girls 13-17 years	Substance use (frequency of alcohol consumption, amount of alcohol consumed, frequency of severe alcohol intoxication)	Weight categories (based on BMI)	—	No relationship was observed between frequency of alcohol consumption and body weight Some inverse association was observed between overweight and amount of alcohol consumed Among girls only, obesity was associated with high alcohol consumption
Biml, Kapusta, Vysotski, Kogoj, Walter, Lesch, 2012	Cross-sectional Austrian Regional	N=1,902 Boys 18 years	Substance use (illicit drug, cigarette, alcohol) – self-reported and biological samples	Weight categories (based on BMI)	—	No significant association was found between BMI and nicotine and alcohol dependence A higher BMI was associated with lower illicit drug use
DeMaria, Lugo, Rahman, Pyles, Berenson, 2013	Longitudinal Regional Clinical	N= 1,015 Girls 16-24 years	Sexual risk behavior and outcomes (sexual behaviors, STI rates, contraceptive compliance, unintended pregnancy) – self-reported and from clinical records	Weight categories (based on BMI) – objectively measured	—	Sexually transmitted infection (STI) history and contraceptive compliance did not vary by BMI White women who were overweight were less likely to give or receive oral sex than their counterparts who were of normal weight Hispanic women who were overweight were also less likely to receive oral sex during past three months
Farhat, Iannotti, Caccavale, 2014	Cross-sectional US National (HBSC)	N=8,028 Boys and Girls 14 years	Substance use (Smoking)	Weight categories (based on BMI) – Self-reported	Body Image (mediator) Physical activity; Sedentary behavior; Breakfast consumption (other outcomes)	Hispanic women who were obese were more likely to engage in anal intercourse than those classified as normal weight Overweight was not associated with smoking.

Author, Year	Study Design & Setting	Sample [N, Gender, Mean Age (or grade)]	Risk Behavior Outcome Measures	Predictor Measures	Other Key Explanatory Variables	Main Findings
Farrant, Utter, Ameratunga, Clark, Flening, Denny, 2013	Cross-Sectional New Zealand National	N=9,107 Boys and Girls Secondary school	Substance use (cigarette, alcohol) Violence (physical fighting, weapon carrying) Sexual risk behavior (inconsistent use of condoms and contraceptives)	Weight categories with special focus on severe obesity -Measured	—	Obesity was positively associated with smoking only an Obesity was positively associated with smoking only an Obesity was positively associated with smoking only an Obesity was positively associated with smoking only an Among girls, body image mediated the association of obesity with smoking Compared with adolescents of a healthy weight, adolescents who were overweight/obese and those with severe obesity were significantly more likely to be current smokers
Ford, Shroeder, Dotson, 2014	Longitudinal US National (Add Health)	N=4,684 Boys and Girls Grades 7-12 at baseline	Substance use (Binge drinking)	Weight categories – Self-reported Perception of weight (very underweight to very overweight)	Depression (CES-D) [potential mediator but not formally tested]	Perception of weight was more strongly associated with depression than objective measure of obesity Depression was associated with binge drinking, only among females Objective or subjective measures of weight strain were not significantly associated with binge drinking
Huang, Lanza, Wright-Volel, Anglin, 2013	Longitudinal US National (NLSY)	N=5,156 Boys and Girls 6 years at baseline (18 at outcome)	Sexual risk behavior (age of first sexual intercourse, number of sexual partners in the past 12 months, whether a condom was used during most recent sex) Substance use (alcohol, cigarette, marijuana) Delinquency (deviant behavior, criminal activity)	Weight categories (based on BMI) – Self-reported	Depression (CES-D), Self-esteem (Rosenberg) Self-control (Pearlin mastery Scale) All as covariates	Obesity trajectories were not associated with greater trends in alcohol use, marijuana use, or delinquency Chronically obese adolescents had a greater increase in cigarette smoking
Jansen, Verlinden, Domisse-van Berkel, Mieloo, Raat, Hofman, Jaddoe, Verhulst, 2014	Cross-sectional Netherlands Regional	N= 4,364 and 1,327 Boys and Girls 6 years	Violence (bullying perpetration – Teacher and peer reports)	Weight categories and BMI, continuous – objectively measured	Bullying victimization	Among boys, higher BMI was associated with more bullying perpetration (based on teachers' reports), including physical, verbal and relational (and victimization for these types) Obesity was associated with higher odds of being a bully-victim (teachers' reports). It was not associated with being only a bully or only a victim
Jiang, Kempner, Loucks, 2014	Cross-sectional US National (YRBS)	N= 13,864 Boys and Girls 16 years	Substance use (cigarette, alcohol, marijuana, illegal)	Weight misperception (weight categories [self-	—	Adolescents who overestimated or underestimated their weight were more likely to engage in all

Author, Year	Study Design & Setting	Sample [N, Gender, Mean Age (or grade)]	Risk Behavior Outcome Measures	Predictor Measures	Other Key Explanatory Variables	Main Findings
Jiang, Risica, Arias, Perry, Viner-Brown, 2012	Cross-sectional US Regional	N=5,423 Boys and Girls 16 years	Violence (physical fighting, safety, bullying, sexual risk behavior (forced sex, condom non-use) Substance use (cigarette, alcohol, marijuana, illegal) Violence (physical fighting, safety, bullying, suicide) Sexual risk behavior (forced sex, condom use)	Perception of weight (very underweight to very overweight) Weight categories – Self-reported	—	risk behaviors compared to those with accurate weight perceptions
Lanza, Grella, Chung, 2014	Longitudinal, US National (Add Health)	N= 15,119 Boys and Girls 11-19 years at baseline (7-year follow-up)	Substance use (cigarette, alcohol, marijuana)	Weight categories – Self-reported		No association between weight categories and risk behaviors Self-perception of slightly/very overweight and very underweight were associated with several risk behaviors Overweight/obesity was associated with regular cigarette smoking but not with problematic alcohol or marijuana use
Leech, Dias 2012	Cross-sectional US National (NLSY)	N=340 Girls 16-17 years	Sexual risk behavior (condom use, number of sexual partners, age of recent sexual partner)	Weight categories (based on BMI) – objectively measured (if missing, use self-reported)	Obesity propensity	White adolescent girls who were obese exhibited higher rates of multiple sex partners and sex with older partners, and were also less likely to use condoms. Associations were not observed for Black girls
Lowry, Robin, Kann, Galuska, 2014	Cross-sectional US national (YRBS)	N=59,594 Boys and girls 9 th -12 th grade	Sexual risk behavior (number of sexual partners, condom use) Substance use (injection drug)	Weight categories (based on BMI – self-reported)	Potential mediators: Suicidal thoughts Early sexual initiation Exposure to sexual abuse and non-consensual sex	Students who were underweight or obese were less likely than normal weight students to be currently sexually active (boys and girls) Girls who were overweight or obese were more likely to have multiple sex partners and to have sex without a condom; girls who were obese were more likely to inject illegal drugs Boys who were overweight were more likely to have sex without a condom; boys who were obese were more likely to inject illegal drugs Mediation: Suicidal thoughts and early sexual initiation mediated in part the relationships between overweight/obesity and multiple sex partners, lack of condom use, and injection drug use (boys and girls)

Author, Year	Study Design & Setting	Sample [N, Gender, Mean Age (or grade)]	Risk Behavior Outcome Measures	Predictor Measures	Other Key Explanatory Variables	Main Findings
Pasch, Velazquez, Duncan Cance, Moe, Lytle 2012	Longitudinal US regional	N=704 Boys and Girls 14.7 years	Substance use (cigarette, alcohol, marijuana)	BMIZ z-score (objectively measured) Percent body fat	Alcohol and drug use before sex Pubertal status Weight satisfaction	Baseline substance use contributed to subsequent body composition, but not vice-versa
Reulbach, Ladewig, Nixon, O'Moore, Williams, O'Dowd, 2013	Cross-sectional Ireland national	N= 8,568 Boys and Girls 9 years	Violence (bullying perpetration)	Weight categories (based on BMI) – objectively measured Weight perception (very skinny to very overweight)	Bullying victimization	Subjective measure of weight, rather than objective assessment, was associated with bullying perpetration
Wang, Bell, Edwards, Patrick 2013	Cross-sectional US regional	N= 8,702 Boys and Girls 8 th , 10 th and 12 th grades	Substance use (smoking)	Weight categories (based on BMI) – Self-reported	Quality of life Weight control behaviors (mediators)	Weight status and weight control behaviors were not significantly associated with smoking among boys Girls who were trying to lose weight had higher odds of light smoking compared to those with no weight control behavior Only among older girls, weight control behavior and quality of life mediated the relationship between BMI and smoking
Yen, Liu, Ko, Wu, Cheng, 2014	Cross-sectional Taiwan regional	N=5,252 Boys and Girls 12-18 years	Violence (suicidal attempt; suicide ideation)	BMI continuous – Self-reported	Bullying victimization/perpetration - Passive (verbal, relational) and Active (physical, belonging snatching) (Mediators) Other outcomes: Self-esteem (Rosenberg) Depression (CES-D)	Perpetration of passive bullying mediated the relationship between BMI and suicidality for boys and girls
Zeller, Reiter-Purtill, Jenkins, Ratcliff, 2013	Cross-sectional US National (YRBS)	N=27,529 Boys and Girls 9 th – 12 th grade	Violence (suicidal attempt, suicide ideation)	Weight categories (based on BMI) – Self-reported Weight perception accuracy	Depression (control)	Obesity was associated with greater odds for suicide ideation (but not attempts) Adolescents in all excess weight categories who were accurate in their weight perception were at significantly greater odds of suicidal ideation compared to those who were inaccurate (no variation by age, race, gender, data cohort or depression) Adolescents who were of a healthy weight but who misperceived their weight status (either underweight or overweight) were at greater risk of reporting suicidal ideation, and

Author, Year	Study Design & Setting	Sample [N, Gender, Mean Age (or grade)]	Risk Behavior Outcome Measures	Predictor Measures	Other Key Explanatory Variables	Main Findings
Farhat for White and Black adolescents, greater suicide attempt for White and Black adolescents, greater suicide attempt						