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The Relationship Between Obesity and Depression Among Adolescents

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Obesity and depression are two major public health problems among adolescents. Both obesity and depression are very prevalent and associated with numerous health complications, including hypertension, coronary heart disease, and increased mortality.¹ Because they both carry a risk for cardiovascular disease, a possible association between depression and obesity has been assumed and studied.²

Several evidence-based studies have shown that obese teens have a higher incidence of mental health problems such as depression, anxiety, and poor self-esteem than nonobese teens.³ A reasonable conclusion is that obesity should predict depression, but the findings are not clear.⁴ In reality, few studies have found that obesity predicted depression over time,

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thus it has been proposed that instead of looking at the basic main effects of obesity predicting depression, it might be more practical to examine the specific processes or experiences by which obesity might lead to depression among adolescents so that specific interventions can be targeted.⁵

This article summarizes data on the role of mediating and moderating variables associated with obesity and depression among adolescents. This literature review also examines the thoughts and experiences of obese adolescents that facilitate the development of depressive symptoms.

EPIDEMIOLOGY OF OBESITY

Obesity is defined as an excess of body fat. The body mass index (BMI) is the standard measure of overweight and obesity in children 2 years of age and older. The BMI is equal to the body weight divided by the height squared. In adults, a BMI between 25 and 30 is regarded as overweight and a BMI greater or equal to 30 is regarded as obese. In children, the BMI vary with age and sex. Obesity in children is defined as a BMI greater than or equal to the 95th percentile for age and sex. As children come close to adulthood, the percentile BMI for age and sex approach the adult standards.⁶

Countries all over the world experienced a marked increase in the prevalence of overweight and obese children and adolescents from the 1980s to 1990s. Evidence from the US suggests that this upward trend has continued into the 21st century.⁷ A dramatic increase in the prevalence of obesity among adolescents in the United States was seen between 1976–1980 and 2007–2008.^{8,9}

In addition, between 1986 and 1998, the prevalence of overweight and obesity increased among children and adolescents by 120% for blacks and Hispanics and by 50% for whites.¹⁰ Obese girls were more prone to develop persistent obesity during adolescence.¹¹ Despite of efforts to curb the growing prevalence of childhood obesity, rates are still increasing and the stigmatization to which obese children are being exposed to is also growing.¹² Currently, almost one-third of children and adolescents in the US are either overweight or obese.⁹ Factors influencing the obesity epidemic mainly include an increase in inactivity and changes in dietary patterns and food consumption, such as fast foods and large portion sizes.¹³

EPIDEMIOLOGY OF DEPRESSION

The risk for depression increases in adolescents, with the prevalence of major depressive disorder (MDD) estimated to be 2% in children compared with 4% to 8% in adolescents.¹⁴ The cumulative incidence of MDD during adolescence ranges from 15% to 20%, a rate which is comparable to the lifetime prevalence of MDD in adults.¹⁵ Teenage girls are more likely to develop depression during adolescence than teenage boys.¹⁶ Gender differences appear during early adolescence and persist throughout adulthood.¹⁷

Depression criteria include depressed mood, anhedonia, fatigue, feelings of guilt or worthlessness, thoughts of death, changes in sleep and appetite or psychomotor activity. Problems with sleep, appetite, or psychomotor activity can occur in either direction (ie, a person may experience insomnia or hypersomnia; anorexia or increased appetite; psychomotor retardation or agitation). *DSM-IV-TR* criteria for MDD requires that five of the nine depression criteria must be present for most of the time over a 2-week period; one of the criteria must include either depressed mood or anhedonia (ie, diminished interest or pleasure), and the symptoms must be a change from prior functioning.¹⁸

In adolescents, mood may be irritable instead of depressed. Depressed adolescents convey their sadness by being moody, pessimistic, belligerent, or by picking fights, or having angry outbursts. They also convey anhedonia as being bored; they may feel sorry for themselves, find others uncaring, and may feel that they have disappointed their parents or teachers.¹⁴

Some factors that place adolescents at an increased risk for depression include peer problems, negative ways of interpreting events, and poor coping skills when stressed.¹⁵

DEFINITION OF MODERATOR AND MEDIATOR VARIABLES

A moderator variable is one that influences the strength of a relationship between two other variables, whereas a mediator variable is one that explains the relationship between two other variables.

Moderator Variables

Moderators such as gender, age, ethnicity, and socioeconomic status affect the obesity/depression associations through differences in the way obesity is experienced in the individual; they come before what they moderate, this, in turn, comes before the outcome.^{1,5,19}

For example, an association between obesity and depression may exist in girls but not in boys; or it may exist in black youth but not in white youth. Two studies found differences in gender, with obese girls more prone to depression than obese boys.^{20,21}

There is a difference between black and white female adolescents' perception of being overweight. White females tend to see themselves as overweight when clinically they are not. This leads to unhealthy weight management behaviors and having low self-esteem.^{20,22}

In summary, it is important to identify moderators such as gender, ethnicity, socioeconomic status, or age so as to recognize those obese adolescents who might be the most appropriate candidates for psychiatric treatment or psychological intervention.⁵

Mediator Variables

Mediators connect the causal effect of obesity onto depression.¹ They determine why and how agents such as age, gender, ethnicity, and socioeconomic status influence this pathway.⁵ Physical attacks, social mistreatment, and verbal victimization are the most frequent and disturbing acts of aggression in schools.²³ Studies have found that higher rates of both peer victimization and depression occur more in obese than nonobese adolescents.⁴ Peer victimization is hostility toward children by other children who are not siblings and not always of the same age.²⁴ The term "peer victimization" is commonly used by researchers in the US. Also the terms "bullying" and "peer victimization" are synonymously used by researchers.¹²

Global self-worth, self-esteem for physical appearance, and body dissatisfaction were mediators for the relationship between weight status and different types of bullying.¹² Obese adolescents experience high rates of peer victimization; as victimization is a predictor of depression,^{4,25,26} obese adolescents are at an increased risk for depression through peer victimization.

Using self-reports of height/weight and bullying, Janssen et al²⁷ found that obesity status was related to peer victimization in younger youth (11 to 14 year olds). A meta-analysis of cross-sectional studies between 1978 and 1997 found that victimization is strongly related to depression.²⁴

Peer victimization may mediate the relationship between obesity and depression. Thus, obesity may lead to peer victimization and this may lead to depression among youth. Therefore, obese youth are prone to become depressed indirectly through being victimized by their peers.

A study done by Berg and colleagues²⁸ found that weight-based teasing is a problem of all youth — especially obese youth — regardless of their racial/ethnic group.²⁸

In another study, teasing was shown to mediate the link between obesity and depression over a 3-year period for a sample of adolescent females.²⁹ In yet another study, teasing was a mediating factor linking obesity and depression in an overweight adolescent sample.³⁰ In a follow-up study of 470 Australian girls aged 13 to 17 years, Berg et al³¹ found that weight-based teasing influence on psychological functioning was mediated by body dissatisfaction. In addition, they found that body dissatisfaction predicted a reduction of adaptive psychological functioning.

Body dissatisfaction is a reliable predictor of depression.³² BMI is the most common factor linked to body dissatisfaction. It is positively correlated with body dissatisfaction for female adolescents.³³ BMI, increased depression, and lower self-esteem are associated with body dissatisfaction among college students.^{34,35} Franklin et al³⁶ found in a community sample of 2,813 Australian youths that body dissatisfaction mediated the association between obesity and negative self-esteem in females. Also, the results of a very recent cross-sectional study showed that in a survey of 1,490 youth in grades 7 through 12, obese youth reported higher body dissatisfaction and greater depressive symptoms, including anhedonia and negative self-esteem. This cohort also had higher depression scores compared with overweight or normal-weight youth.³⁷

Obesity in adolescents often leads to teasing, which in turn may cause depression in obese youth, who consequently experience amplified dissatisfaction with their appearance. Also, obese female adolescents are more prone to have body dissatisfaction, which may lead to depression and lower self-esteem.

OBESITY AND DEPRESSION

For years it has been assumed that any relationship of obesity to depression in the general population is largely coincidental, but a recent subanalysis by Luppino and colleagues^{1,5} found that the effect of obesity on the development of depression was stronger in American studies. They highlighted the possibility of a biological link between overweight, obesity, and depression, with obesity seen as an inflammatory state. Inflammation has also been associated with depression, which is perceived as a stressful life event in which the brain responds in a similar way as it responds to a medical illness, leading to elevated pro-inflammatory cytokines.

In people with normal weight, fat tissue contains fat cells, but in obese people, fat tissue is loaded with macrophages, cells that ingest pathogens and other foreign materials and release inflammatory hormones such as TNF-alpha and interleukin-6 that constantly activate the immune system at a low level, therefore contributing to a chronic inflammatory state.³⁸

Luppino and colleagues¹ also noted that although the biological mechanisms underlying obesity and depression-onset risk may not be different across cultures, sociocultural systems could be different and stricter in one culture compared with another culture.

The National Health and Nutrition Examination Survey (NHANES)-III data showed that among the most obese adolescents, in the 95th to 100th percentile, the prevalence of major

depression increased to highly significant levels, 20% for boys and 30% for girls.⁵ A longitudinal study of a large birth cohort from northern Finland assessed measures of obesity at ages 14 and 31 years old, along with measures of depression at age 31 years, found that adolescent obesity was associated with adulthood depression.³⁹ Swallen and colleagues¹⁰ used a cross-sectional analysis of the 1996 National Longitudinal Study of Adolescent Health and found that among the youngest adolescents (aged 12 to 14 years), obesity was linked to depression and self-esteem.

Compared with normal weight adolescents, obese adolescents have a higher prevalence of school and mental health problems, including poor academic performance and self-esteem, anxiety, depressive disorders, and a greater number of reported suicide attempts. Despite this and the rapidly increasing incidence and adverse health outcomes associated with overweight and mental health problems, very few intervention studies have been conducted with adolescents to improve both their healthy lifestyles and mental health outcomes.¹³

CONCLUSION

Of the studies reviewed in this article, the evidence for the direct causal pathway from obesity to depression is not substantial. Obesity might not directly cause depression in adolescents, but other pathways and experiences may lead to depression indirectly. Also, stressful life events such as peer victimization and weight-based teasing might biologically predispose youth to depression and may be a factor that leads to depression in obese youth. Further research studies exploring these factors in youth will increase our understanding of obesity/depression associations and might then be a venue for intervention studies. The importance of recognizing these pathways and factors are to know when to intervene to prevent depression in obese adolescents.

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