The Association Between Weight-Based Teasing from Peers and Family in Childhood and Depressive Symptoms in Childhood and Adulthood: A Systematic Review

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ABSTRACT

The Association Between Weight-Based Teasing from Peers and Family in Childhood and Depressive Symptoms in Childhood and Adulthood: A Systematic Review.

Erica Szwimer

RECENT FINDINGS: Depressive symptoms may be a psychological correlate of weight-based teasing from peers and/or family. However, it is unclear whether the association of weight-based teasing with depressive symptoms differs by time (short-term vs. long-term), sex (males vs. females) or source (family vs. peers). **PURPOSE:** The purpose of this systematic review was to (1) examine whether the frequency of weight-based teasing differs according to sex and source and (2) examine whether the association of weight-based teasing with depressive symptoms varies according to time, sex and source. **METHODS:** On February 16th, 2018, a combination of keywords within three concepts: i) children and adults; ii) weight-based teasing source and: iii) mental health outcomes were searched in four databases (PubMed, PsychINFO, SCOPUS and Web of Science) for relevant articles. Cross-sectional and longitudinal original research articles were included, and studies were excluded if the relationship between weight-based teasing and depressive symptoms were not explicitly measured. **RESULTS:** The search yielded 3572 articles and nineteen studies were included in the final analysis. Experiences of weight-based teasing occurred more frequently among girls than boys. Peers were a more common source of weight-based teasing compared to family. Weight-based teasing was significantly associated with depressive symptoms in both the short and long-term. Weight-based teasing exhibited a greater association with depressive symptoms in girls vs. boys and when it came from multiple sources than from either source alone. **SUMMARY:** Weight-based teasing from peers and family is associated with depressive symptoms, and females are more psychologically vulnerable than males. Interventions are required to reduce weight-based teasing and its harmful psychological effects.

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AUTHOR CONTRIBUTIONS

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Chapter 1: Introduction

1.0 General introduction

In 2015, the Canadian Medical Association officially declared obesity as a chronic disease (2). Obesity can be defined as having abnormal or excessive adipose tissue that can compromise an individual's health (3). Health care professionals use Body Mass Index (BMI) to classify overweight and obesity, and they calculate it by taking a person's weight in kilograms and dividing it by the square of their height in meters (kg/m^2). For children, BMI is age and sex specific. A BMI between the 85th and 95th percentile for children of the same age and sex is considered overweight. A BMI ≥ 95th percentile for children of the same age and sex is considered obese (4). Despite the known limitations associated with BMI (such as its inability to estimate body composition and differentiate between fat and muscle (5)), it is still the most commonly used tool to asses overweight and obesity in children and adults.

Obesity in children and youth has more than doubled since the late 1970s, and to date, one in ten Canadian children have obesity (6). The rise in childhood obesity is of particular concern as it increases a child's risk of developing a number of serious health conditions such as high blood pressure, high blood cholesterol, heart disease and type 2 diabetes (7, 8). Recent data is suggesting that the rates of obesity among children have begun to plateau (9), yet the rates remain high (9), and severe obesity (BMI ≥ 120% of the 95th percentile) continues to increase (10). Moreover, mental health issues such as anxiety and depression are commonly associated with obesity among children (11). Recent research is now addressing these negative psychological consequences, such as the issue of weight bias, in addition to the physiological concerns (12).

Weight bias can be defined as the tendency to associate negative attitudes, judgments or beliefs towards a person because of their weight (13). Children living with overweight or obesity could experience weight bias (14), which could later translate into weight discrimination, defined as the behavioral manifestation of weight bias (15). In the past decade, the frequency of weight discrimination in the US has increased by 66% (12). Weight discrimination can occur in employment settings (16), health-care facilities (17), educational institutions (18), social media (19) and in interpersonal relationships (14). It has been suggested that it can emerge as early as the age of three years old (20). Among youth and adolescents, these experiences of weight discrimination typically occur in the form of weight-based teasing, bullying and victimization, specifically from peers and family members (21). Weight-based teasing has been defined as the

negative communication from an agent regarding the weight of a target person, in which elements of humour, aggressiveness and ambiguity are present (22, 23).

Research consistently shows that weight-based teasing is the most prevalent form of bullying among youth (24), and teasing in interpersonal relationships, such as from family and peers, is most rampant (12). Approximately 30-40% of children with overweight or obesity report experiences of weight-based teasing (25), and 25-60% experience weight-based teasing from family members specifically (26-30). Past research has shown that 13-42% of adolescents report receiving weight comments from mothers and 19-26% from fathers (26, 31). A mixed-methods study by Berge et al. examined the types of weight-related comments which adolescents receive from mothers versus fathers (31). Mothers were more likely to comment on their child's weight or weight status because of health concerns, whereas fathers were more likely to comment on the appearance of specific body parts in order to encourage weight loss (31). In addition, a previous study suggested that the frequency of weight-based teasing from peers among an overall sample of school-aged teenagers was 29%, while the frequency was significantly higher among youth with overweight or obesity than youth of normal weight (32). Children with higher body weight appear to experience weight-based teasing more frequently than their normal weight counterparts. Research indicates that among adolescents seeking treatment for obesity, 90% reported weight-based teasing from peers while 60% reported weight-based teasing from family (21). Additionally, more than one third of these youth reported that these experiences of weight-based teasing persisted for at least five years (21). Similarly, weight-based teasing was three times more likely among children with obesity aged 10-14 years than children who were not obese in this same age range (33).

Due to the increasing frequency of weight-based teasing in youth, studies continue to explore the impact of these experiences on important mental health indicators, such as depressive symptoms (21, 32). Depressive symptoms are critical health outcomes to focus on because if symptoms are sufficiently abundant, severe and persistent, then they may lead to depression (34). Depression is the most prevalent mental health disorder (35, 36), has peak onset in adolescence (37, 38) and young adulthood (38), and is one of the leading causes of disability, morbidity and mortality (39). It also poses a serious economic (40) and societal burden (41, 42). Considering the pervasiveness of weight-based teasing and depressive symptoms among children and youth, it is necessary to better understand their conceivable relationship.

Over a decade of research has demonstrated associations between weight-based teasing from peers and family members and psychological distress in childhood, including longitudinal associations in adulthood. For example, a study by Eisenberg et al. found that the total proportion of respondents who reported depressive symptoms in childhood was higher among those who experienced weight-based teasing from family and peers (97.1%) compared to those who were not teased (47.1%) (43). Weight-based teasing from family and peers in childhood may have immediate effects on rates of depressive symptoms at an early age (43), yet the negative psychological consequences could also emerge or last into in adulthood (44). A prospective study by Eisenberg et al. proposed that participants who were teased about their weight in high school reported depressive symptoms in young adulthood, suggesting that weight-based teasing in childhood could be associated with the development of depressive symptoms in adulthood (45).

It is apparent that some studies have made significant contributions to the understanding of the short and long-term effects of weight-based teasing in relation to emotional well-being. However, despite the fact that previous studies exist, the current body of literature presents conflicting results regarding crucial factors that influence this relationship. It is unclear whether the frequency of weight-based teasing differs according to sex (males vs. females) and source (family vs. peers). In addition, it is unclear whether depressive symptoms in response to weight-based teasing differ according to time (short-term vs. long-term), sex (males vs. females) and source (family vs. peers). We use the word "time" to signify the effects of teasing over time, with effects in childhood (short-term) or in adulthood (long-term). To our knowledge, no systematic review has examined these relationships or summarized the effects of familial and peer weight-based teasing in childhood and depressive symptoms in childhood and adulthood.

1.1 Objectives

The objectives of this systematic review were the following: 1) to examine whether the frequency of weight-based teasing differs according to sex (males vs. females) and source (family vs. peers) and; 2) to examine whether the association of weight-based teasing with depressive symptoms varies according to time (short-term vs. long-term), sex (males vs. females) and source (family vs. peers).

1.2 Hypotheses

We hypothesized the following:

I. Peers are a more common source of weight-based teasing than family.

II. Females experience more weight-based teasing than males.

III. The combination of weight-based teasing from both peers and family has a stronger association with depressive symptoms compared to either source of teasing on its own.

IV. Females who are teased because of their weight experience greater depressive symptoms than males.

V. Long-term depressive symptoms will emerge (in adulthood) due to the experiences of weight-based teasing in childhood.

Chapter 2: Methods

2.1 Protocol and registration

Suggestions from the Cochrane Handbook (46) were used to develop the research questions and criteria for including studies. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (47) was used to direct the search process. On May 16th, 2018, this systematic review was registered on PROSPERO (CRD42018093004), an international database of registered systematic reviews.

2.2 Eligibility criteria

Inclusion Criteria:

1. Cross-sectional studies
2. Longitudinal studies
3. Studies published in English or French
4. Studies published at any location (international studies)
5. Studies published after 1961 (this was when research on weight bias first occurred)
6. Original research studies
7. Peer reviewed, published, academic articles
8. Weight-based teasing was explicitly measured in the study and/or reported as the primary outcome
9. Participants in the study experienced weight-based teasing from family and/or peers
10. Participants in the study who experienced weight-based teasing from family and/or peers were aged 3-18 inclusively
11. Depressive symptoms were measured in the study and/or reported as the primary outcome

Exclusion criteria:

1. If the source of weight-based teasing was not family and/or peers (e.g., we did not include studies looking at weight-based teasing from health care professionals, teachers, employers etc.)

2. If weight-based teasing only occurred in adulthood (weight-based teasing must have first occurred at baseline in childhood)
3. If weight-based teasing was not explicitly measured and/or was not reported as the primary outcome (e.g., if shaming, peer victimization or bullying in general were assessed)
4. If depressive symptoms were not measured and/or were not reported as the primary outcome (e.g., if sadness, negative affect or psychological functioning in general was measured)
5. If weight-based teasing and depressive symptoms were measured but the association between these variables was not reported and/or assessed
6. If the study was a review
7. If it was an intervention study, experimental study or randomized controlled trial
8. Grey literature (unpublished, non-academic, non-peer-reviewed)

2.3 Information sources

Four databases were included in the search strategy:

1. PubMed
2. PsychINFO
3. SCOPUS
4. Web of Science (Core Collection)

The first search for this systematic was completed on February 16th, 2018 by myself, as well as with the assistance of Katherine Hall, the Biology and Health, Kinesiology & Applied Physiology Subject Librarian at Concordia University. Other sources, such as references from previous reviews or relevant papers, were searched as well. The first search yielded 5431 articles. PubMed yielded 784, SCOPUS yielded 1740, Web of Science (Core Collection) yielded 1159, and PsychINFO yielded 1748. These citations were imported into Covidence.org (48), an online software designed to improve the efficiency and experience of systematic reviews. After removing the duplicates, there were 3572 articles. Two authors (E.S. and F.M.) simultaneously reviewed 3572 abstracts and any disagreement was resolved through consensus. The full texts of the remaining 274 studies were reviewed, resulting in 19 studies included in the final analysis.

Figure 1 illustrates the PRISMA flow diagram showing the procedure for the selection of studies (pg. 32 in manuscript). On March 29th, 2019, a second search was conducted to verify if any additional studies were conducted within the past year that met our inclusion criteria. The same four databases were included in the updated search. I, along with the assistance of Katharine Hall, searched for studies which were conducted after February 1st, 2018. The updated search did not yield any additional studies which met our inclusion criteria.

2.4 Search strategy

The full electronic search strategy for each of the four databases are included in the Appendix (Table 3), page 64. It is worth noting that the electronic search strategy for SCOPUS and Web of Science (Core Collection) are included in the same table, as their databases do not have descriptors (only keywords), so their search strategies are identical. For the updated search, we removed several mental health outcomes, such as eating disorders and anxiety-related terms, since after consulting with my thesis committee during my thesis proposal (May 14th, 2018), it became apparent that it was more feasible to focus explicitly on one outcome: depressive symptoms. The eligibility criteria are liberally applied at the onset of the search to ensure that all relevant studies are included (49). Nonetheless, they may be subject to change as the systematic review progresses through the early stages of the process (49). Systematic reviews present strict guidelines and some of the criteria are fundamental in order to ensure a rigorous and robust set of data for the review (49). The updated search strategy for the second search can be found in the Appendix on page 67 of this dissertation.

2.5 Quality assessment and risk of bias

The quality assessment tool from the National Heart, Lung and Blood Institute (NIHLBI) for Observational Cohort and Cross-Sectional Studies was used to assess the risk of bias in each study included in the analysis (1). This assessment tool was chosen as this review consisted of observational studies which were prospective cohort studies (n=4) or cross-sectional in design (n=15). Critical appraisal involves considering the risk of potential for selection bias, information bias, measurement bias, or confounding (1). High risk of bias translated to a rating of poor quality while low risk of bias translated to a rating of good quality (1). Thus, the greater the risk of bias, the lower the quality rating of the study. The NIHLBI assessment tool included a

checklist of 14 questions that focused on key concepts for evaluating the internal validity of the studies. These questions evaluated the studies' research questions, study population, participant recruitment and eligibility criteria, the sample size justification, the measurement and assessment of the exposure and outcome variables, the timeframe of the study, the follow-up rate, and the statistical analyses. Two independent researchers (E.S. and F.M.) evaluated each criterion by answering "Yes", "NO" or "Other (cannot determine, not reported or not applicable)" in response to the 14 questions. Overall quality scores for each study were categorized as good, fair or poor. Any disagreement between the researchers was resolved through consensus. General guidance for assessing each question and determining the overall quality of the studies was provided by the National Heart, Lung and Blood Institute (1). As noted by the NHLBI, this tool was not designed to generate a final tally for the overall quality rating score (1). Additionally, it did not provide sufficient guidelines or cut-offs to determine the overall scores. In order to accommodate for the subjectivity of these guidelines, the ranking protocol for the final overall quality rating was based on the judgement of the evaluators with reference to a systematic review that used this same quality assessment tool (50). The two independent researchers determined that question 9, 11 and 14 held the most weight in this systematic review and were identified in the guidelines provided by the NHLBI (1). Question 9 evaluated the exposure measurement and assessment, question 11 evaluated the outcome measures and question 14 assessed the statistical analyses of each study. The ranking protocol for the studies included in this review can be found in Table 4 on page 74 in the Appendix. All studies were included in the analysis regardless of their overall quality rating. The results of this assessment can be found in Table 1 on page 33 of the manuscript.

2.6 Analysis

The following information from each study was extracted in order to better summarize the data and prepare for the narrative synthesis: study journal, location of study, first author and publication year, study objective, sample size, description of sample (participants' age, sex, BMI, ethnicity, school grade), setting of data collection, study design, source of weight-based teasing, weight-based teasing and depressive symptoms measurement tools, frequency of weight-based teasing according to sex and source, and cross-sectional and longitudinal associations of weight-based teasing and depressive symptoms. Following this, I condensed the original summary table

and extrapolated the primary descriptive characteristics of each study, which are presented in Table 2 on page 35 of the manuscript. Third, I performed a narrative analysis, where I systematically organized and summarized the main findings of each study, and identified the commonalities in relation to the research question (51). Extensive variability existed among the studies included in the analysis, which prevented us from performing a meta-analysis; it was not suitable to group the data from each study together in one analysis. We compared the results from the studies, yet many had different characteristics and were not sufficiently homogeneous (e.g., different sample sizes, participants, publication time, confounding variables, exposures, outcomes, statistical analysis procedures). Narrative syntheses provide a qualitative rather than a quantitative assessment of the studies included in the review, which is the approach we took to analyze the studies included in our systematic review.

Secondly, the first objective of my thesis, as stated on page 4 of this dissertation, was the following: 1) to examine whether the frequency of weight-based teasing differs according to sex (males vs. females) and source (family vs. peers). Fourteen of the nineteen studies reported findings on the frequency of weight-based teasing in relation to sex and source (26, 32, 43, 45, 52-61). However, only five of the fourteen studies conducted statistical tests to determine if the mean difference in the frequency of weight-based teasing was significantly different (32, 52, 53, 55, 61). Authors were contacted to see if this data was available elsewhere, however, most authors did not respond or stated that these statistical tests were not performed. Therefore, I conducted chi square tests for the remaining nine studies that did not conduct these statistical tests (26, 43, 45, 54, 56-60). However, I was unable to successfully conduct the chi square test for one of these studies due to insufficient data (60). I conducted these tests using SPSS Statistics Version 24. Results of the chi square tests I conducted are reported in Table 5 in the Appendix on page 75 of this thesis.

Chapter 3: Results

Manuscript: **The Association Between Weight-Based Teasing from Peers and Family in Childhood and Depressive Symptoms in Childhood and Adulthood: A Systematic Review**

Manuscript formatted for *Current Obesity Reports*. The original version of this manuscript was submitted on March 11th, 2019. The following version is the updated manuscript that was resubmitted with revisions to *Current Obesity Reports* and responses to reviewers on August 8th, 2019. The following manuscript is currently under a third review for consideration for publication.

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ABSTRACT

RECENT FINDINGS: Depressive symptoms may be a psychological correlate of weight-based teasing from peers and/or family. However, it is unclear whether the association of weight-based teasing with depressive symptoms differs by time (short-term vs. long-term), sex (males vs. females) or source (family vs. peers).

PURPOSE: The purpose of this systematic review was to (1) examine whether the frequency of weight-based teasing differs according to sex and source and; (2) examine whether the association of weight-based teasing with depressive symptoms varies according to time, sex and source.

METHODS: On February 16th, 2018, a combination of keywords within three concepts: i) children and adults; ii) weight-based teasing source and: iii) mental health outcomes were searched in four databases (PubMed, PsychINFO, SCOPUS and Web of Science) for relevant articles. Cross-sectional and longitudinal original research articles were included, and studies were excluded if the relationship between weight-based teasing and depressive symptoms were not explicitly measured.

RESULTS: The search yielded 3572 articles and nineteen studies were included in the final analysis. Experiences of weight-based teasing occurred more frequently among girls than boys. Peers were a more common source of weight-based teasing compared to family. Weight-based teasing was significantly associated with depressive symptoms in both the short and long-term. Weight-based teasing exhibited a greater association with depressive symptoms in girls vs. boys and when it came from multiple sources than from either source alone.

SUMMARY: Weight-based teasing from peers and family is associated with depressive symptoms, and girls are more psychologically vulnerable than boys. Interventions are required to reduce weight-based teasing and its harmful psychological effects.

Keywords: weight bias; weight stigma; weight discrimination; child; adult; depression

INTRODUCTION

Children living with overweight or obesity may be subjected to weight-based teasing, which has been defined as the negative communication from an agent regarding the weight of a target person, in which elements of humour, aggressiveness and ambiguity are present (1, 2). Weight-based teasing in interpersonal relationships, such as from family members and peers, is widespread (3). Approximately 30-40% of children report experiences of weight-based teasing (4), and 25-60% of children with overweight or obesity experience weight-based teasing from family members specifically (5-9). Previous research suggested that one-third of girls and one-fourth of boys reported weight-based teasing from peers and the frequency of teasing increased to approximately 60% among children with higher body mass indexes (BMIs) (8). This is concerning due to the adverse association weight-based teasing can have with important mental health indicators, such as depressive symptoms (10). Depressive symptoms are critical health outcomes to focus on because if symptoms are sufficiently abundant, severe and persistent, then they may lead to depression (11). Depression is the most prevalent mental health disorder (12, 13), has peak onset in adolescence (14, 15) and young adulthood (15), and is one of the leading causes of disability, morbidity and mortality (16). It also poses a serious economic (17) and societal burden (18, 19). Considering the pervasiveness of weight-based teasing and depressive symptoms, it is necessary to better understand their conceivable relationship.

The current literature has begun to explore this association. For example, a study by Eisenberg et al. found that the total proportion of respondents who reported depressive symptoms was higher among those who experienced weight-based teasing from family and peers (97.1%) compared to those who were not teased (47.1%) (20). Weight-based teasing from family and peers in childhood may have immediate effects on rates of depressive symptoms (20), yet the negative psychological consequences could also emerge or last into adulthood (21). A prospective study by Eisenberg et al. proposed that participants who were teased about their weight in high school reported depressive symptoms in young adulthood, suggesting that weight-based teasing in childhood is associated with the development of depressive symptoms in adulthood (22). However, the current body of literature presents conflicting results regarding crucial factors that influence this relationship. It is unclear whether the frequency of weight-based teasing differs according to sex (males vs. females) and source (family vs. peers) (23). In addition, it is unclear whether depressive symptoms in response to weight-based teasing differ according to time (short-term vs. long-term), sex (males vs. females) and source (family vs. peers) (24), information that is important to optimally inform weight-based teasing prevention programs. We use the word “time” to signify the effects of teasing over

time, with effects in childhood (short-term) or in adulthood (long-term). To our knowledge, no systematic review has examined these relationships or summarized the effects of familial and peer weight-based teasing in childhood and depressive symptoms in childhood and adulthood. Therefore, the objectives of this systematic review were to 1) examine whether the frequency of weight-based teasing differs according to sex (males vs. females) and source (family vs. peers) and; 2) examine whether the association of weight-based teasing with depressive symptoms varies according to time (short-term vs. long-term), sex (males vs. females) and source (family vs. peers).

METHODS

Suggestions from the Cochrane Handbook (25) were used to develop the research questions and criteria for including studies. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (26) was used to direct the search process. On May 16th, 2018, this systematic review was registered on PROSPERO (CRD42018093004), an international database of registered systematic reviews.

On February 16th, 2018, with the assistance of a research librarian (K.H.), a combination of keywords within three concepts: i) children and adults; ii) weight-based teasing source and iii) mental health outcomes were searched in four databases (PubMed, PsychINFO, SCOPUS and Web of Science) for relevant articles. Other sources, such as references from previous reviews or relevant papers, were searched as well. Inclusion criteria consisted of cross-sectional and longitudinal studies published in English or French from 1961 and onwards. Only original, peer-reviewed published research studies were included. Studies were only included if participants *first* experienced weight-based teasing from family and/or peers in childhood (i.e., between the ages of 3-18 years inclusively). Studies were also included if weight-based teasing and depressive symptoms were explicitly measured and/or reported as the primary outcomes. Studies were excluded if the source of weight-based teasing was not family and/or peers or if weight-based teasing only occurred in adulthood. Finally, studies were excluded if weight-based teasing and depressive symptoms were measured but the association between these variables was not reported and/or assessed. Authors were contacted in circumstances when weight-based teasing and/or depressive symptoms were not explicitly measured or reported to see if additional data was available to answer our research questions. On March 29th, 2019, a second search using the same original search strategy was conducted to verify if any additional studies were published within the past year which met the inclusion criteria. This updated search looked for studies that

were published after February 1st, 2018. The updated search did not yield any additional studies that met the inclusion criteria.

The quality assessment tool from the National Heart, Lung and Blood Institute (NIHLBI) for Observational Cohort and Cross-Sectional Studies was used to assess the risk of bias in each study included in the systematic review (27). This assessment tool was chosen because this systematic review included observational prospective cohort studies (n=4) and cross-sectional studies (n=15). The NIHLBI assessment tool included a checklist of 14 questions that focused on key concepts for evaluating the internal validity of the studies. Two independent researchers (E.S. and F.M.) evaluated each criterion by answering "Yes", "NO" or "Other (cannot determine, not reported or not applicable)" in response to the 14 questions (Table 1). Moreover, we ran a series of chi square tests for the studies included in our review that did not conduct these statistical tests in their own publications. These tests were run in order to address the first objective of our review, which was to determine if the mean difference in frequency of weight-based teasing was significantly different according to sex and source. Lastly, we performed a narrative analysis to synthesize the results of our systematic review (28).

RESULTS

Quality and characteristics of included studies

The search strategy yielded a total of 5431 studies, of which 1859 were duplicates. Two authors (E.S. and F.M.) simultaneously reviewed 3572 abstracts and any disagreement was resolved through consensus. The full texts of the remaining 274 studies were reviewed, resulting in 19 studies included in the final narrative analysis. Figure 1 illustrates the PRISMA flow diagram showing the procedure for the selection of studies. Overall, the subjective quality rating of the of included studies, which was determined by the researchers (E.S. and F.M.), was poor (n=1) (29), fair (n=4) (30-33) and good (n=14) (5, 10, 20-22, 34-42) (Table 1). Table 2 presents the characteristics of the included studies. In the majority of studies (n=14), there was a greater percentage of female participants compared to males (10, 21, 22, 29-31, 33, 35-37, 39-42), and some studies (n=2) only included female participants (5, 32). The majority of studies were cross-sectional in design (n=15) (5, 10, 20, 29-31, 33-39, 41, 42) and only four studies were longitudinal (21, 22, 32, 40). Some studies only included peers (n=4) (38, 39, 41, 42) or family (n=4) (5, 29, 34, 36) as a source of weight-based teasing, while seven studies reported both peers and family (10, 20, 30, 32, 33, 37, 40); four studies did not report the source of weight-based teasing (21, 22, 31, 35).

Measures of weight-based teasing

The most common measure of weight-based teasing was the Perceptions of Teasing Scale (n=6) (5, 29, 31, 34, 41, 42). Weight-based teasing was also often measured by asking participants "Have you ever been teased or made fun of by [other kids/family members] because of your weight?" (n=6) (20, 30, 33, 36, 39, 40).

Measures of depressive symptoms

The most common measure of depressive symptoms was the Center for Epidemiological Studies Depression Scale (n=7) (5, 30, 32, 33, 37, 38, 41) and the Kandel and Davies (1982) 6-item Depressive Mood Scale (n=7) (20-22, 35, 36, 39, 40). The second most common measure was the Children's Depression Inventory (n=5) (10, 29, 31, 34, 42).

Frequency of weight-based teasing

Fourteen studies reported findings on the frequency of weight-based teasing in relation to sex and source (5, 10, 20, 22, 29, 30, 32, 33, 35, 36, 38, 40-42). Only five of the fourteen studies conducted statistical tests to determine if the mean difference in the frequency of weight-based teasing was significantly different (10, 29, 35, 41, 42). We ran chi square tests for the remaining nine studies that did not conduct these statistical tests and these findings are reported below (5, 20, 22, 30, 32, 33, 36, 38, 40). However, we were unable to conduct the chi square test for one of these studies due to insufficient data (36). Among the remaining eight studies, two reported findings in relation to both sex and source (20, 40), four reported exclusively on source (5, 30, 32, 33) and two reported exclusively on sex (22, 38). A study by Goldfield et al. conducted the chi square tests in their publication in relation to sex, however, we conducted the statistical test to examine whether one source of teasing occurred more frequently than the other (10).

Among the studies where we ran chi square tests to examine the frequency of teasing in relation to sex, in three studies, the chi square tests revealed that girls were teased significantly more than boys (20, 22, 40) whereas in one study, there was no statistical difference (38). Across the studies that ran statistical tests in their own publications, three found that girls were teased significantly more than boys (10, 35, 42) whereas two found no statistical difference (29, 41). In total, six studies found that girls were teased significantly more than their male counterparts (10, 20, 22, 35, 40, 42), whereas three studies found no statistically significant difference in the frequency of weight-based teasing according to sex (29, 38, 41).

The following paragraph describes the results of the chi square tests that we ran on studies with available data relating to source of weight-based teasing (5, 20, 30, 32, 33, 40, 43). In two studies, the chi square tests showed that peers were a significantly more common source of weight-based teasing compared to family (10, 33), yet in one study, the chi square test suggested that this difference was not significant (20). One study revealed that the combination of weight-based teasing from peers and family was significantly more common than either source of teasing on its own (30). However, our chi square test on data reported by Eisenberg et al. challenged this finding revealing that either peer or parent teasing on its own was reported significantly more than the combination of sources (20). In a study of only girls, our chi square test revealed that family (parents) was a more common source of weight-based teasing than peers among African American girls, yet the opposite held true among Caucasian girls (32). The last results of our chi square test on data reported by Keery et al. found that siblings were a significantly more common source of teasing than parents, while fathers were a source of teasing significantly more than mothers (5). Regardless of the weight-based teasing source, the range of teasing for girls was between 14% and 45% while the range for boys was between 10% and 35%.

Cross-sectional associations of weight-based teasing and depressive symptoms

Sixteen studies examined the cross-sectional association between weight-based teasing and depressive symptoms in relation to sex and source (5, 10, 20, 22, 29-39, 41). Most of the studies (n=15) presented a significant positive association between weight-based teasing and depressive symptoms (5, 10, 20, 22, 29-31, 33, 34, 36-41). Among these studies, however, Madowitz et al. suggested that only peer weight-based teasing was significantly associated with depressive symptoms compared to family (33). Libbey et al. suggested that in addition to being associated with depressive symptoms, more frequent weight-based teasing was related to higher odds of experiencing depressive symptoms (30).

Five studies found that there was a stronger, more positive association between weight-based teasing and depressive symptoms among girls compared to boys (10, 22, 29, 35, 36), yet none of these studies tested this statistically. Due to the greater correlation coefficient for peers, there appeared to be a stronger, more positive association when teasing came from peers than parents among girls (10). In the overall sample of this same study, there was a significant positive correlation between weight-based teasing from parents and peers with depressive symptoms and again, it appeared that there was a stronger association between peer teasing and depressive symptoms compared to parent (10). However, after conducting multivariate regressions to examine the association

between weight-based teasing and depressive symptoms, Eisenberg et al. found that boys and girls had greater odds of experiencing depressive symptoms when teasing came from family (20). This study also observed that in response to weight-based teasing, participants reported depressive symptoms when teasing came from family, peers and the combination of these two sources, and depressive symptoms were reported most frequently by both sex groups when teasing came from multiple sources than either source on its own (20). In each of these circumstances, girls reported depressive symptoms more frequently than boys (20), yet boys appeared to have greater odds of experiencing depressive symptoms (20).

Two studies found that frequency of teasing as well as the number of sources of teasing was significantly associated with depressive symptoms (30, 33). Libbey et al. suggested that more sources of weight-based teasing had a stronger association with depressive symptoms, and participants teased by multiple sources had greater odds of experiencing depressive symptoms (30). After interpreting the results, however, it appeared that a child had a greater chance of experiencing depressive symptoms if they were teased by multiple sources (e.g., family & peers) even if they did not experience teasing that often.

Longitudinal associations of weight-based teasing and depressive symptoms

Of the four longitudinal studies included in the review, three reported findings on the long-term associations between weight-based teasing and depressive symptoms in relation to sex and source; each of these studies found a significant association between teasing and depressive symptoms (21, 22, 32). Two studies reported a greater association among women compared to men (21, 22), yet this was not confirmed through statistical testing. A study by Eisenberg et al. presented two age cohorts: i) participants who were middle school students at Time 1 and high school students at Time 2 and; ii) participants who were high school students at Time 1 and young adults at Time 2 (22). Among the first age cohort, teasing at Time 1 was significantly associated with depressive symptoms at Time 2 only among women (22). Among the second age cohort, a significant association existed between Time 1 teasing and Time 2 depressive symptoms for both men and women, yet it appeared that a stronger association existed for women (22). In both age cohorts, teasing at Time 1 was no longer significantly associated with Time 2 depressive symptomology when controlling for Time 1 depressive symptoms (22). The authors also controlled for Time 2 teasing to determine if the earlier Time 1 teasing would maintain a significant association with later Time 2 depressive symptoms among women in both cohorts. They found that Time 1 teasing was still marginally

significantly associated with Time 2 depressive symptoms even when controlling for later teasing in Time 2 (22) in women from both cohorts.

Discussion

Summary of main findings

Frequency of weight-based teasing

One of the main findings of our review was that weight-based teasing was frequently reported by both girls and boys. This coincides with the existing literature which suggests that body weight is the most common reason that youth are teased (44-46). Fourteen studies reported findings on the frequency of weight-based teasing in relation to sex and source. Six studies showed that girls experienced weight-based teasing significantly more than boys. It is not surprising that approximately 40% of studies found that girls were teased more than boys, as research suggests that girls' appearance is more harshly scrutinized which can result in experiencing weight-based teasing to a greater degree (47). However, it remains uncertain whether one source of teasing is more common than the other, since only two studies found peers to be a more common source of weight-based teasing compared to family.

Cross-sectional associations of weight-based teasing and depressive symptoms

Weight-based teasing from family and/or peers was significantly positively associated with depressive symptoms for both boys and girls. Teasing about weight sends the message that one's body size, shape and appearance deviates from socially acceptable norms, and adolescents may have experienced depressive symptoms due to this sense of deviation (38). The apparent association between teasing and depressive symptoms during adolescence may be particularly harmful because of a teen's desire for social acceptance (48) and the immense amount of pressure they feel to conform to social norms of attractiveness (49, 50). Children living in larger bodies, in particular, experience weight-based teasing more often than children of normal weight (8, 10, 51), which can have serious implications on their emotional well-being. Children with overweight or obesity already have higher rates of depressive symptoms (5, 51-53) and research has found stronger associations between their experiences of teasing and depressive symptoms compared to children of normal weight (33, 51, 54). Society emphasizes the value of attractiveness characterized by a lean body figure (55), and any perceived violation of these social appearance norms may ignite the onset of teasing (56) and may intensify an adolescent's feelings of depressive symptoms (57). For example, in addition to being related to depressive symptoms, Eisenberg et al. found that weight-based teasing was

associated with suicide attempts and ideation (20). Although previous research has shown that children with overweight or obesity endure more weight-based teasing and have greater associations with depressive symptoms (33, 51, 54), our results suggested that depressive symptoms were associated with teasing across the entire weight spectrum (20). In one study, weight was not significantly associated with depressive symptoms after controlling for teasing, further suggesting that it is the experience of being teased about weight, rather than actual body shape and weight, which is a contributing factor to depressive symptoms (10, 20). This finding, which is in agreement with a previous study (58), explains why the relationship between weight-based teasing and depressive symptoms with regards to weight status was not a primary focus of our review, as a relationship appears to exist regardless of a child's weight category.

Moreover, our review found girls to be more affected by weight-based teasing in terms of depressive symptoms compared to their male counterparts. This may be attributed to the fact that for girls, body shape becomes a primary focus during the middle-school years (59), so they may be more sensitive and susceptible to the negative psychological effects of weight-based teasing. Also, in general, girls are subjected to more appearance and weight-related pressure than boys (60). However, research is increasingly showing that males also experience appearance related pressures and concerns (61), with a greater focus on lean muscularity as opposed to weight loss (62-64). Western society reinforces the stereotype of muscularity by highlighting the association between muscularity and masculinity (63).

With regards to weight-based teasing source, a study by Goldfield et al. found that the correlations between teasing and depressive symptoms appeared to be stronger for peers than for parents (10), suggesting that peer teasing may be more psychologically harmful. This could be due to the fact that adolescence is a time of increasing peer influence (65). Nevertheless, despite the shift from parent to peer influence, parental teasing could still have an impact on depressive symptoms (5). For example, a study by Eisenberg et al. suggested that there were greater odds of experiencing depressive symptoms when teasing came from family compared to peers (20), perhaps because parents remain important attachment figures during adolescence, especially among those with strong family values (66). Moreover, it is also important to consider the child's age and stage of development (i.e. young childhood vs. adolescence). Prior to adolescence (ages 12-18 years), parents typically maintain a greater influence on their children compared to peers (67), so any negative feedback from a parent towards a child may be particularly harmful to their emotional well-being. Additionally, even so-called "benign" parental weight-related comments (e.g.,

encouraging weight loss or modeling diet behaviour) have been shown to be negatively associated with a child's well-being (68, 69). However, Madowitz et al. contradicted this finding and suggested that there was no significant association between teasing and depressive symptoms among family (33). Due to these conflicting findings, we cannot determine that weight-based teasing from one particular source is more related to depressive symptoms than the other, but the literature shows that both sources are harmful.

Furthermore, two studies found that frequency of weight-based teasing as well as the number of sources of teasing was significantly associated with depressive symptoms and increased the likelihood of experiencing depressive symptoms (30, 33). After interpreting the results, our findings suggested that even if the incidence of teasing is not as recurrent, but it comes from multiple sources, then there is a greater chance that the child will experience depressive symptoms. It appears that it is not the quantity of teasing, but the quantity of the sources of teasing which appears to have a greater association with depressive symptoms.

In certain circumstances, mediators or moderators may be present which can impact the relationship between weight-based teasing and depressive symptoms (54). For example, research has proposed that other variables, such as BMI and/or body weight (34), body satisfaction (31, 38) and self-esteem (38) may partially influence the relationship between teasing and depressive symptoms. To our knowledge, one variable that has not been analyzed to help explain the relationship between weight-based teasing and depressive symptoms in children is weight bias internalization. Weight bias internalization can be defined as the awareness of negative stereotypes about one's social identity and the agreement and application of these stereotypes to oneself (70). Weight bias internalization occurs when weight bias becomes self-directed, and individuals begin to devalue themselves because of their body weight (71). For example, people who have weight bias internalization may believe that they are less attractive, less valued, less competent or less deserving of a social life than most other people because of their weight (72). Children could begin to internalize their experiences of weight-based teasing and feel as though this maltreatment is warranted (73). Those who internalize weight-based teasing could then develop depressive symptoms (71, 74, 75). In this manner, the internalization of weight-based teasing may have partially mediated the relationship between teasing and depressive symptoms (54), whereby children who internalize may be more negatively affected. This speculation ultimately suggests that weight bias internalization may influence the relationship between teasing and depressive symptoms.

Few studies have examined weight bias internalization in youth (73, 76) and to our knowledge, no studies have examined its potential impact on the association between weight-based teasing and depressive symptoms. The only study conducted that we found which resembles this form of investigation was a study recently published by Himmelstein et al. (77). This study examined the relationship between frequency of weight-based teasing from different sources and responses as well as coping strategies used in response to teasing. However, this study did not explicitly tease out depressive symptoms in their analyses (i.e., negative emotions in general was an outcome measure). In the future, more research is needed on the potential presence of weight bias internalization in youth and its possible associations with important mental health indicators such as depressive symptoms. It would be important to investigate not only how it may be associated specifically with depressive symptoms, but also if it partially mediates or moderates the relationship between weight-based teasing and depressive symptoms.

Finally, gender of the peer-teasing source can be an important explanatory factor when evaluating the relationship between peer weight-based teasing and depressive symptoms. During adolescence, heterosexual teens begin to have an interest in the opposite gender and wish to be seen as attractive (78-80). Thus, girls may be more vulnerable to weight-based teasing from boys (81). In a recent study by Valois et al., teasing from a male peer was more strongly and negatively associated with appearance esteem for female adolescents compared to male adolescents (81). However, these results may manifest differently among LGBTQ (Lesbian, Gay, Bisexual, Transgender, Queer or Questioning) youth. Weight-based teasing is a common experience for adolescents across diverse sexual and gender identities (82). LGBTQ teens may be vulnerable targets of weight-based teasing, perhaps even more so than cisgender youth (youth who's gender identity is concordant with the sex they were assigned with at birth) (82). It would be important for future studies to consider how the gender of the weight-based teasing source influences the association between teasing and depressive symptoms among heterosexual and LGTBQ adolescent populations.

Longitudinal associations of weight-based teasing and depressive symptoms

This review found that a significant positive association existed between weight-based teasing and depressive symptoms in both childhood and adulthood. Similarly as in cross-sectional studies, there was a stronger association between teasing during childhood and depressive symptoms in childhood or adulthood among women (22). Among men, ongoing teasing was required for a longitudinal association to exist (22). This suggests that for women, weight-based teasing during childhood may be strong enough to influence subsequent emotional well-being

in adulthood, without the need for ongoing teasing. Previous research suggested that ongoing teasing is required for there to exist a significant longitudinal association between teasing and depressive symptoms among both men and women (20), yet our study found this only to be true among men.

Additionally, when controlling for baseline levels of depressive symptoms in childhood, the long-term association between weight-based teasing and depressive symptoms was no longer significant. This suggests that the cross-sectional association between teasing and depressive symptoms influences the longitudinal relationship as well (22). Therefore, it might be important to consider a child's emotional well-being prior to teasing before attempting to interpret the long-term effects of weight-based teasing. Weight-based teasing can be associated with later emotional disturbances, however, our review supports prior research which has indicated that this association becomes insignificant when controlling for Time 1 levels of the outcome variable (58, 83-85).

Strengths and Limitations

Strengths of this review included the comprehensive summary of the current literature relevant to the research question, including a rigorous search strategy and critical appraisal of the quality of studies. To our knowledge, this is the first review to systematically evaluate the association between weight-based teasing in childhood and depressive symptoms in childhood and adulthood, according to time, source and sex. The primary limitation of our review was that many of our interpretations were based on qualitative comparisons because many of the included studies did not conduct statistical tests to answer our research questions. Furthermore, the NHLBI assessment tool that we used to assess the quality of included studies lists questions that help guide the researchers to evaluate the internal validity of the studies. However, the NHLBI states that "they are not intended to create a list that you simply tally up to arrive at a summary judgment of quality" (27). Although we did not use the quality rating score to exclude studies in this review, we recognize the limitations of the subjective nature of this tool that required the researchers (E.S. and F.M.) to subjectively evaluate the overall quality rating score (i.e. good, fair or poor) without being provided with distinct cut-off scores. Moreover, the majority of studies were cross-sectional in nature, therefore we could not determine causality, and only four longitudinal studies were included in the review, limiting the ability to make conclusions on the effect of time. Seven studies performed secondary analyses using data from Project EAT, which included the same sample of people within each published study. The studies included in this

review did not distinguish between sex and gender whereby studies only described youth participants as boys or girls and men or women for adults. Furthermore, some studies in our review only included female participants or had substantially more women compared to men. The majority of the studies were conducted in the United States, and participants' ethnicity was predominantly Caucasian.

Variability existed among study designs and reporting of outcome measures, which prevented us from performing a meta-analysis. Many studies had different characteristics that were deemed not sufficiently homogeneous (e.g., different lengths of follow-up, exposures, outcomes, statistical procedures, confounding variables) to perform a meta-analysis. This systematic review reports on results from a narrative synthesis which provides a qualitative rather than a quantitative assessment of the studies included in the review, which may have introduced bias when interpreting results.

Implications and future research directions

The findings of our study serve to guide the implementation of policies against weight-based teasing in both the school and the home to reduce its frequency and its negative effects on mental health in childhood and adulthood. Although girls may be more psychologically vulnerable to teasing, our review found that both sexes can be adversely affected, warranting programs for all students of all genders. Based on our systematic review in combination with other studies' findings (5, 20, 22), parents should learn to institute a "no teasing" zone at home to protect their children from at least one source of teasing (30). School administrators could also explore strategies for reducing weight-based teasing as a recent meta-analysis found that anti-bullying programs successfully reduced bullying victimization by 17-20% (86).

In the future, quantitative studies are warranted to continue to explore the relationship between weight-based teasing and depressive symptoms in order to understand differences among youth of sexual minorities and diverse gender identities as well. Studies where ethnically diverse groups are included are warranted as well given that perception of body image and weight may vary among different ethnic backgrounds. More longitudinal studies are necessary, where baseline levels of depressive symptoms are adjusted, to better understand this relationship as well.

Conclusion

The main findings of our review highlighted the permeating issue of weight-based teasing from family and peers and its relationship with depressive symptoms in both the short and long term. This review established that girls are teased more frequently than boys, and they were found to be more affected in terms of depressive symptoms by weight-based teasing. It appears that peers were a more common source of teasing, and teasing from multiple sources increased the likelihood of experiencing depressive symptoms. However, our findings were based on a narrative synthesis and some studies showed contradicting results and lacked statistical support, emphasizing the need for further, more quantitative investigation on the relationship between weight-based teasing in childhood and concurrent or future depressive symptoms in adulthood. Nevertheless, we provide enough evidence to demonstrate the psychological harm associated with weight-based teasing in children and youth, highlighting the need to develop effective anti-bullying interventions and programs targeted in the home and school environments.

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Figure 1 PRISMA diagram showing the procedure for selection of studies

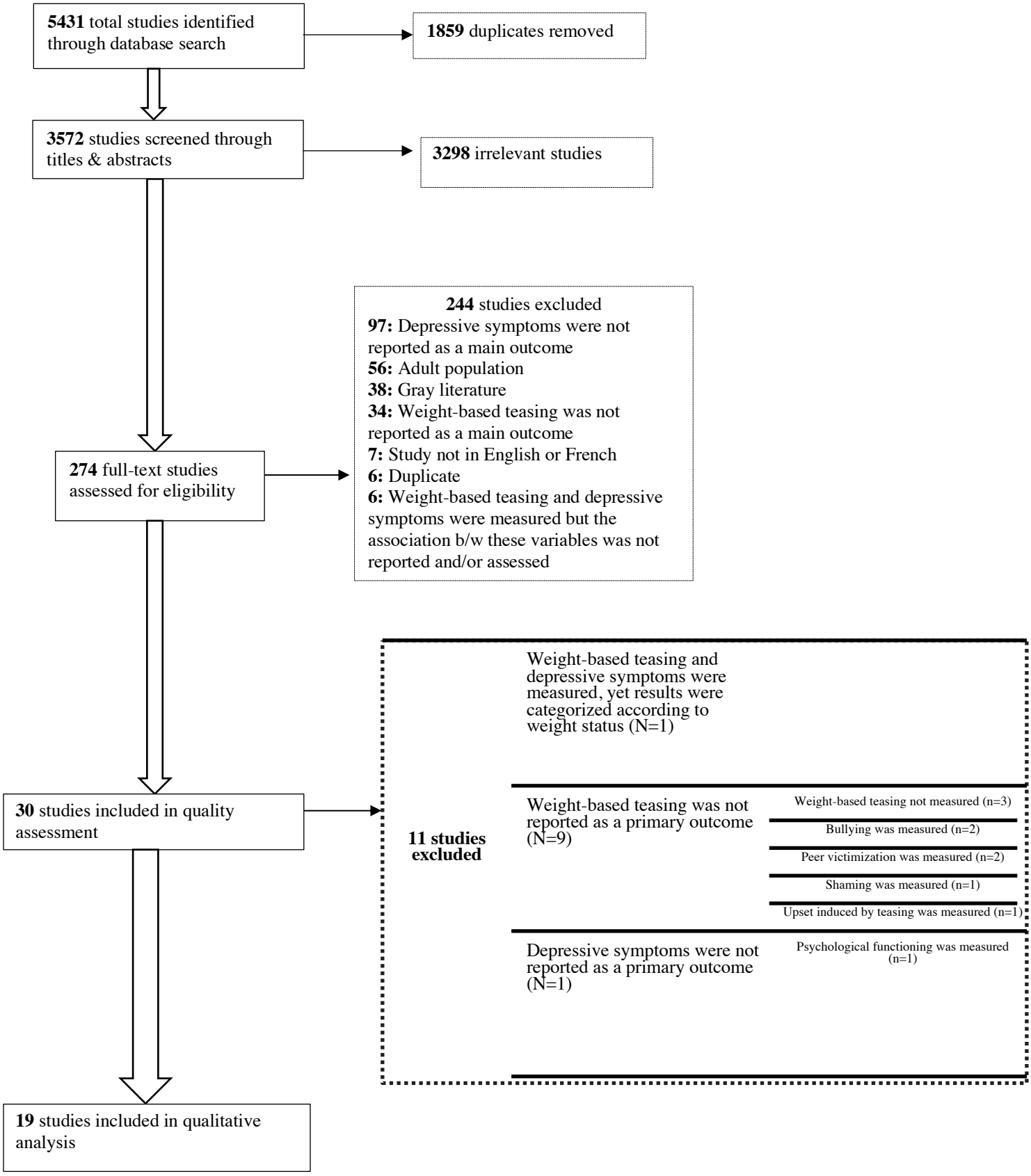

Table 1. NHLBI Quality Assessment Tool for Observational and Cross Sectional Studies

Reference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Subjective quality rating (good, fair, poor) tallied by the researchers*
Bang et al. 2012 [#34]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Bucchianeri et al. 2014 [#35]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Eisenberg et al. 2003 [#20]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Eisenberg et al. 2006 [#22]	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	NR	No	Yes	Good
Fulkerson et al. 2007 [#36]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Goldfield et al. 2010 [#10]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	Yes	NA	Yes	Good
Goldschmidt et al. 2016 [#21]	Yes	Yes	NR	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	NR	No	Yes	Good
Greenleaf et al. 2014 [#37]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Greenleaf et al. 2017 [#38]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Keery et al. 2005 [#5]	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good

Lampard et al. 2014 [#39]	Yes	Yes	Yes	Yes	NR	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Libbey et al. 2008 [#30]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	NR	Yes	NR	NA	NR	Fair
Madowitz et al. 2012 [#33]	Yes	Yes	NR	Yes	No	No	No	Yes	NR	No	NR	NR	NA	Yes	Fair
Mustillo et al. 2013 [#32]	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	NR	Yes	Yes	NR	NA	Yes	Fair
Phares et al. 2004 [#29]	Yes	Yes	Yes	Yes	Yes	No	No	Yes	NR	No	NR	NR	NA	NR	Poor
Porter et al. 2013 [#31]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	NR	Fair
Quick et al. 2013 [#40]	Yes	Yes	NR	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	NA	No	Yes	Good
Quinlan et al. 2009 [#41]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good
Young-Hyman et al. 2006 [#42]	Yes	Yes	NR	Yes	No	No	No	Yes	Yes	No	Yes	NR	NA	Yes	Good

Abbreviations: NHLBI= National Heart, Lung and Blood Institute for Observational Cohort and Cross-Sectional Studies (1); NR= not reported; NA= not applicable.

Note: According to the NHLBI quality assessment tool (1), the following numbers apply to the following questions: 1= Was the research question or objective in this paper clearly stated?; 2= Was the study population clearly specified and defined?; 3= Was the participation rate of eligible persons at least 50%?; 4= Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all participants?; 5= Was a sample size justification, power description, or variance and effect estimates provided?; 6= For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?; 7= Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?; 8= For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?; 9= Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?; 10= Was the exposure(s) assessed more than once over time?; 11= Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?; 12= Were the outcome assessors blinded to the exposure status of participants?; 13= Was loss to follow-up after baseline 20% or less?; 14= Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

*The NHLBI tool was not designed to create a final tally for the overall quality rating score (1). This subjective quality rating score reported herein was determined by the researchers themselves to create their own overall quality rating score for the studies included in this systematic review.

Table 2. Characteristics of Studies

Reference	Study Design	Sample Size	Sex	Ethnicity	Measure of Depressive symptoms	Measure of Weight-Based Teasing	Source of Weight-Based Teasing
Bang et al. 2012 [#34]	Cross-sectional	455	Girls (n=232) Boys (n=223)	Asian	Children's Depression Inventory	Perceptions of Teasing Scale	Family (parents)
Bucchianeri et al. 2014 [#35]	Cross-sectional	2793	Girls (53.2%) Boys (46.8%)	African American (29%) Asian American (19.9%) Caucasian (18.9%) Hispanic (16.9%) Native American (3.7%) Mixed or other (11.6%)	Kandel and Davies (1982) 6-itemcale	Perceived harassment was measured using a series of items. Four types of perceived harassment were assessed with the questions: "How often do any of the following things happen?": (1) "You are teased or harassed about your race"; (2) "You are teased or harassed about your weight"; (3) "You are teased or harassed about your family's financial situation"; or (4) "You are teased or harassed in a sexual way (e.g., grabbing/pinching, sexual comments,	Not reported

						unwanted touching)".	

Eisenberg et al. 2003 [#20]	Cross-sectional	4734	Girls (n=2357) Boys (n=2377)	Caucasian (48.5%) African American (19%) Hispanic (5.8%) Asian (19.2%) Native American (3.5%) Mixed or other (4.0%)	Kandel and Davies (1982) 6-item scale	"Have you ever been teased or made fun of by other [kids/family members] because of your weight?"	Peers & family
Eisenberg et al. 2006 [#22]	Longitudinal Time 1: 1998-1999 Time 2: 2003-2004	2516	Women (n=1386) Men (n=1130)	Caucasian (61.9%) African American (11.1%) Hispanic (4.5%) Asian (17.8%) Native American (1.9%) Mixed or other (2.7%)	Kandel and Davies (1982) 6-item scale	"How often do any of the following things happen to you" followed by a list of 5 types of harassment, including "You are teased about your weight".	Not reported
Fulkerson et al. 2007 [#36]	Cross-sectional	1351	Girls (n=684) Boys (n=667)	Caucasian (47%) African American (20%) Asian American (16%) Hispanic/Latino (8%) Native American (5%) Other or multiracial (4%)	Kandel and Davies (1982) 6-item scale	"Have you ever been teased or made fun of by family members because of your weight?"	Family

Goldfield et al. 2010 [#10]	Cross-sectional	1491	Girls (n=640) Boys (n=851)	North American (54.4%) European (23.1%) Asian (5.2%) Middle eastern (3.7%) African (3.3%) Central or South American (1.9%) Caribbean (1.5%) Aboriginal (1.1%) Oceanian (0.5%) Other (3.3%)	Children's Depression Inventory	McKnight Risk Factor Survey III	Peers & family (parents)
Goldschmidt et al. 2016 [#21]	Longitudinal Time 1: 1998-1999 Time 2: 2003-2004 Time 3: 2008-2009	1902	Women (56.9%) Men (43.1%)	Caucasian (66.5%) Asian (15.4%) African American (8.9%) Hispanic (3.4%) Other (5.8%)	Kandel and Davies (1982) 6-item scale	"How often did any of the following happen to you": (a) you were teased about your weight (b) you were teased about your appearance	Not reported

Greenleaf et al. 2014 [#37]	Cross-sectional	1419	Girls (n=782) Boys (n=637)	Caucasian (58.8%) Hispanic/Latino (26.3%) African American (11.6%) Others (3.4%)	Center for Epidemiologic Studies Depression Scale for Children	Participants responded to items that assessed whether they had been teased for (1) weighing too much (2) for not being strong enough (3) because of their appearance by 3 different sources (family members, female friends, male friends)	Peers & family
Greenleaf et al. 2017 [#38]	Cross-sectional	343	Girls (n=143) Boys (n=200)	Caucasian (50.7%) Hispanic/Latino (31.5%) African American (14.3%) American Indian or Alaska Native (3%) Asian (2.6%) Other (6%)	Center for Epidemiologic Studies Depression Scale for Children	Weight/Size Teasing subscale of the Physical Appearance Related Teasing Scale	Peers

Keery et al. 2005 [#5]	Cross-sectional	372	All girls	Caucasian (85%) Hispanic (5%) African American (2%) Native American (2%) Asian (1%) Other (4%)	Center for Epidemiologic Studies Depression Scale for Children	Perceptions of Teasing Scale-Weight Teasing Frequency subscale. Sibling teasing: Participants were asked to rate their agreement about whether a sibling "says or does things that make me feel bad about the way I look".	Family
Lampard et al. 2014 [#39]	Cross-sectional	2793	Girls (53.2%) Boys (46.8%)	African American (29%) Asian American (19.9%) Caucasian (18.9%) Hispanic (16.9%) Native American (3.7%) Mixed or other (11.6%)	Kandel and Davies (1982) 6-item scale	Individual: "Have you ever been teased or made fun of by other kids because of your weight?" School-level: The proportion of participants at each school reporting individual-level weight-related teasing	Peers

Libbey et al. 2008 [#30]	Cross-sectional	130	Girls (65.5%) Boys (34.5%)	Caucasian (58.4%) African American (13.6%) Hispanic (0.8%) Asian (2.4%) American Indian (7.2%) Other (3.2%) Mixed (14.4%)	Center for Epidemiological Studies Depression Scale	Frequency: "How often are you teased about your weight?" Have you been teased about your weight by [peers/family] and if so, to what extent were you bothered by it?	Peers & family

Madowitz et al. 2012 [#33]	Cross-sectional	79	Girls (58.8%) Boys (41.2%)	Caucasian (76%) Hispanic or Latino (17.5%) African American (10%) Asian (5%) Hawaiian (2.5%) Pacific Islander (2.5%) Other (7.5%)	Center for Epidemiologic Studies Depression Scale for Children	(1) "Have you been teased or made fun of about your weight by other kids your age?"; (2) "If you have been teased or made fun of about your weight by other kids your age, how much did this make you mad, sad or worried?"; (3)"Have you been teased or made fun of about your weight by family members?"; (4)"If you have been teased or made fun of about your weight by family members, how much did this make you mad, sad or worried?"	Peers & family
Mustillo et al. 2013 [#33]	Longitudinal Time 1:1987 Time 2: 1997 Participants were assessed annually for approximately 10 years.	2123	All women	Caucasian (48.99%) African American (51.01%)	Perceived Stress Scale at ages 10-15 Center for Epidemiologic Studies Depression Scale 18-21	At ages 9-14, participants were asked whether people in their lives (mother, father, best female friend, best male friend, any female friend, any male friend) told them they were too fat.	Peers & family (parents)

Phares et al. 2004 [#29]	Cross-sectional	141	Girls (n=77) Boys (n=64)	Caucasian (63.1%) African American (21.3%) Hispanic/Latino/Latina (12.8%) Asian American (0.7%) Other (2.1%)	Children's Depression Inventory	Perception of Teasing Scale & Weight Teasing Scale	Family
Porter et al. 2013 [#31]	Cross-sectional	119	Girls (72.2%) Boys (27.8%)	African American	Children's Depression Inventory	Perceptions of Teasing Scale	Not reported
Quick et al. 2013 [#40]	Longitudinal Time 1: 1998-1999 Time 2: 2008-2009	1655	Women (n=891) Men (n=764)	Caucasian (48%) African American (20%) Asian (18%) Hispanic (5%) Native American (3%) Mixed or other race/ethnicity (5%)	Kandel and Davies (1982) 6-item scale	"Have you ever been teased or made fun of by other [kids/family members] because of your weight?"	Peers & family
Quinlan et al. 2009 [#41]	Cross-sectional	96	Girls (n=70) Boys (n=26)	Caucasian (76%) African American (11.5%) Hispanic (7.3%)	Center for Epidemiological Studies Depression Scale	Perception of Teasing Scale	Peers
Young-Hyman et al. 2006 [#42]	Cross-sectional	164	Girls (n=83) Boys (n=81)	Caucasian (N=106) African American (N=58)	Children's Depression Inventory	Perception of Teasing Scale	Peers

3.1 Additional results

This section includes supplementary results which could not be reported in the manuscript due to the journal *Current Obesity Reports* word limitations. The results presented herein do not directly answer the objectives of this thesis, but are complimentary to the relationships which were identified in the qualitative narrative analysis. The following results contribute to our understanding of the association between weight-based teasing and depressive symptoms in childhood and adulthood. This chapter will be followed by Chapter 4, which will be a discussion on these additional results.

3.1.1 Frequency of weight-based teasing: the influence of weight status

Eight studies investigated the relationship between weight status and frequency of weight-based teasing (32, 45, 52, 53, 56, 59, 62, 63). Out of these eight studies, six of them found that weight-based teasing was reported more frequently among participants with overweight or obesity (32, 45, 52, 59, 62, 63), whereas one study found no significant association between BMI and weight-based teasing (53). More specifically, Goldfield et al. found that the frequency of weight-based teasing by parents and peers was significantly higher among youth with overweight or obesity than youth of normal weight (32). Girls with overweight or obesity experienced more weight-based teasing than boys with overweight or obesity, regardless of teasing source (32). One study found a significant association between BMI and weight-based teasing; however, when correlations were conducted by sex, there only existed a significant correlation between BMI and weight-based teasing among males (62). Finally, Libbey et al. found no statistically significant difference in the number of sources of teasing according to BMI (56).

3.1.2 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of weight status

A study by Goldfield et al. suggested that weight-based teasing from parents and peers was significantly correlated with depressive symptoms among participants who were categorized as overweight or obese (32). However, among participants with obesity, only weight-based teasing from peers (and not family) was significantly correlated with depressive symptoms (32). Although it was not statistically tested for, Goldfield et al. observed stronger correlations

between weight-based teasing and depressive symptoms for peers than for parents among participants with overweight and obesity, but not for participants with normal weight (32). One study found that weight status was no longer significantly associated with depressive symptoms among girls after controlling for weight-based teasing (43). Moreover, a study by Bang et al. found that it was BMI which explained the mediating effect of parental teasing on depressive symptoms (63). Nonetheless, this study also found that parental teasing explained the outcome variable of depressive symptoms even when controlling for BMI (63).

3.1.3 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of body satisfaction

Two studies examined the influence of body satisfaction in relation to weight-based teasing and depressive symptoms (59, 62). One study found that weight-based teasing was significantly associated with depressive symptoms as well as body satisfaction (62). The authors found that body satisfaction partially mediated the relationship between teasing and depressive symptoms (62). When entered into the model, the association between teasing and depressive symptoms remained significant, yet the absolute value of this relationship decreased (β= 0.33 to β=0.23) (62). The second study agreed with this finding and found that participants who were teased about their weight had lower body satisfaction, and lower body satisfaction was associated with higher levels of depressive symptomology (59). The indirect effect of teasing on depressive symptoms via body satisfaction was significant and accounted for a small portion of the total effect (P_M=0.09) (59).

3.1.4 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of self-esteem

Greenleaf et al. suggested that participants who experienced weight-based teasing had lower self-esteem and participants with lower self-esteem had higher levels of depressive symptoms (59). The indirect effect of teasing on depressive symptoms through self-esteem was significant, and self-esteem accounted for approximately half of the total effect (P_M=0.48) (59).

3.1.5 Frequency of weight-based teasing: the influence of specific family members

One study found that overall, more girls reported that their fathers teased them about their appearance or being heavy compared to their mothers (26). A higher number of girls reported weight-based teasing from siblings (26). Of those girls who reported being teased by a sibling, an older brother was the most frequent source of teasing (26).

3.1.6 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of specific family members

Keery et al. found that maternal and paternal weight-based teasing accounted for a significant amount (10%) of variance in reports of depressive symptoms (26). This same study found that girls with at least one sibling who teased them about their weight had significantly greater depressive symptomology than girls with no siblings as well as girls who were not teased (26). Teasing by any source was associated with depressive symptoms yet teasing specifically by fathers and older brothers was associated with the highest levels of depressive symptoms (26).

Chapter 4: Discussion

4.1 Summary of additional findings

The relationship between weight-based teasing and depressive symptoms is not always direct, as it is possible that other variables influence this association (64). In certain circumstances, mediators or moderators may be present which can impact the relationship between weight-based teasing and depressive symptoms (64). For example, research has proposed that other variables, such as BMI and/or body weight (63), body satisfaction (59, 62) and self-esteem (59) may partially mediate the relationship between teasing and depressive symptoms. To our knowledge, one variable that has not been analyzed as a mediator to help explain the relationship between weight-based teasing and depressive symptoms in children is weight bias internalization. Weight bias internalization can be defined as the awareness of negative stereotypes about one's social identity and the agreement and application of these stereotypes to oneself (65). Weight bias internalization occurs when weight bias becomes self-directed, and individuals begin to devalue themselves because of their body weight (66). For example, people who have weight bias internalization may believe that they are less attractive, less valued, less competent or less deserving of a social life than most other people because of their weight (67). Children could begin to internalize their experiences of weight-based teasing and feel as though this maltreatment is warranted (68). Those who internalize weight-based teasing could then develop depressive symptoms (66, 69, 70). In this manner, the internalization of weight-based teasing may have partially mediated the relationship between teasing and depressive symptoms (64), whereby children who internalize may be more negatively affected. This speculation deserves future research attention to determine if weight bias internalization would influence the relationship between teasing and depressive symptoms.

Few studies have examined weight bias internalization in youth (68, 71) and to our knowledge, no studies have examined its potential impact on the association between weight-based teasing and depressive symptoms specifically. The only study conducted that we found which resembles this form of investigation was a study recently published by Himmelstein et al. (72). However, this study did not explicitly tease out depressive symptoms in their analyses. Himmelstein et al. examined the relationship between weight-based teasing from four sources (friends, peers, family members and teachers) and its association with stigma-specific coping responses in adolescents using linear regression. More specifically, they examined the

associations between responses to weight-based teasing, as well as coping strategies for weight-based teasing, as a function of body weight, internalized weight bias and frequency of weight-based teasing (72). They found that weight bias internalization was associated with adolescents responding to weight-based teasing with increased negative emotions (four items: anger, sad/depressed, feeling worse about themselves and feeling bad about their body) as well as coping via avoidance and via eating (72). The results of this study suggest that shaming and blaming oneself for weight has important implications for responses to weight-based teasing as well as the strategies adolescents use to cope with weight-based teasing (72). Adolescents who internalize weight bias may have heightened risk for maladaptive responses and coping strategies for dealing with weight stigma (72). In the future, more research is needed on the potential presence of weight bias internalization in youth and its possible associations with important mental health indicators such as depressive symptoms. It would be important to investigate not only how it may be associated specifically with depressive symptoms, but also if it partially mediates the relationship between weight-based teasing and depressive symptoms.

In addition to these variables, other factors such as culture (52) and gender of the source of weight-based teasing (73) may influence the relationship between weight-based teasing and depressive symptoms. For example, African American culture may serve as a protective factor against weight-based teasing, as cultural standards for African Americans tend to be more inclusive of larger bodies (52). Thus, different attitudes and norms across racial/ethnic groups may influence the experience of weight discrimination (74). However, the current literature regarding ethnic differences and weight acceptance is ambiguous (29). There are increasing similarities across different ethnic groups, partially due to a diffusion of social norms across cultures via numerous mass media channels, as well as the tendency towards adopting the norms of the dominant culture within society (29). Future studies should further investigate the effect of different cultures on the relationship between weight-based teasing and depressive symptoms, and they should ensure that a wide range of cultures are included to truly understand differences between cultures.

Finally, gender of the peer-teasing source can be an important explanatory factor when evaluating the relationship between peer weight-based teasing and depressive symptoms. During adolescence, heterosexual teens begin to have an interest in the opposite sex and wish to be seen as attractive (75-77). Thus, girls may be more vulnerable to weight-based teasing from a male

peer (73). In a recent study by Valois et al., teasing from a male peer was more strongly and negatively associated with appearance esteem for female adolescents compared to male adolescents (73). However, these results may manifest differently among LGBTQ (Lesbian, Gay, Bisexual, Transgender, Queer or Questioning) youth. Weight-based teasing is a common experience for adolescents across diverse sexual and gender identities (78). In a recent study by Puhl et al., LGBTQ teens reported weight-based teasing from family members (44-70%), peers (41-57%) and the combination of these sources (44%) (78). LGBTQ teens may be vulnerable targets of weight-based teasing, perhaps even more so than cis-gender youth (78). It would be important for future studies to consider how the gender of the weight-based teasing source influences the association between teasing and depressive symptoms among an LGTBQ adolescent population. The following points are additional variables which we found in our study that may influence the relationship between weight-based teasing and depressive symptoms.

4.1.1 Frequency of weight-based teasing: the influence of weight status

One of the main supplementary findings in our systematic review was that children living with overweight or obesity reported more experiences of weight-based teasing from peers and family than children of normal or average weight. Despite the limited research to date, children with overweight or obesity also experience more weight-based teasing in cyberspace (79). In a study among adolescents seeking weight loss treatment, more than half of the participants reported that they experienced weight-based cyber bullying via computers or cell phones. Among these adolescents, 61% reported on-line postings of embarrassing content while 59% received mean text messages, e-mails or instant messages (80). Another study suggested that adolescents with severe obesity were significantly more likely to be bullied via the Internet, across numerous social media platforms, compared to their peers of normal weight (81). It has become apparent that weight can influence the frequency of weight-based teasing in the virtual realm as well as in person. Weight-based teasing is becoming increasingly prevalent in multiple domains of an adolescent's life. Unlike traditional bullying, however, cyber bullying does not necessarily mediate the relationship between BMI and psychological distress (79). More studies are needed to investigate the frequency of weight-based cyber bullying to better understand the influencing factors and to determine how it might differ from traditional weight-based teasing.

Nevertheless, one study in our systematic review suggested that BMI was not significantly associated with weight-based teasing (53). This may be attributed to the fact that sociocultural standards of beauty and thinness, which are perpetuated by the mass media, are deeply rooted in society to the point where any slight deviation from these appearance related norms are cause for teasing by others (64, 73). Indeed a majority of our findings suggested that children with overweight or obesity, whose body weight deviates from these beauty standards, experience more teasing. However, adolescents with below average weights also report experiencing more weight-based teasing than their peers in the average weight range (29, 33, 73). Thus, children across the entire weight spectrum may experience weight-based teasing since ideal beauty standards are so specific, and any minor deviancy could incentivize mockery.

4.1.2 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of weight status

Our supplementary findings, which are in accordance with previous studies (29, 32, 33) suggested that weight-based teasing from parents and peers was significantly correlated with depressive symptoms among participants who were overweight. This is especially concerning since children with overweight or obesity already have higher rates of depressive symptoms (26, 33, 82, 83) and research has found stronger associations between their experiences of teasing and depressive symptoms compared to children of normal weight (33, 58, 64). Among participants with obesity, however, only weight-based teasing from peers was significantly associated with depressive symptoms. This could be due to the fact that children with obesity have weaker social support systems and tend to be more socially marginalized than children who are overweight or children of average weight (84). Thus, weight-based teasing by peers may be more psychologically damaging among children with obesity (32). However, one study suggested that weight status had only a minor influence on the strength of the relationship between teasing and depressive symptoms, and another found that weight status was no longer significantly associated with depressive symptoms (among girls) after controlling for weight-based teasing. Despite the fact that children with overweight or obesity tend to experience more weight-based teasing than children of normal weight, the association with psychological distress can be similar across the entire weight spectrum (32). This supports the notion that it is the experience of being teased, rather than actual body weight, which may be a contributing factor to depressive

symptoms (43). In the future, studies should control for weight status in order to better understand if children in a certain weight category may be more vulnerable to teasing as well as developing depressive symptoms, since the current literature presents conflicting results.

4.1.3 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of body satisfaction and self-esteem

Children living in large bodies have lower self-esteem (85, 86) and body satisfaction (87, 88) compared to children of normal weight status. An additional finding in our systematic review suggested that self-esteem and body satisfaction may mediate the association between weight-based teasing and depressive symptoms (59). During adolescence, young people begin to develop a sense of self and engage more in self-evaluation and reflection (89). Experiences of weight-based teasing may lower one's self-esteem which in turn can heighten the risk of developing depressive symptoms (59). Additionally, adolescence is a developmental period marked by significant psychosocial and physical changes (73). Adolescents begin to experience changes in their body composition, and they become more aware of how their bodies compare to specific appearance-related norms (90, 91). Adolescents with body types which deviate from these norms may be vulnerable to developing body dissatisfaction (12, 32, 92), which could trigger the onset of depressive symptoms (59). However, one study suggested that body satisfaction accounted for a much smaller portion of the total effect than self-esteem (P_M=0.09 for body satisfaction vs. P_M=0.48 for self-esteem) (59). Greenleaf et al. speculated that perhaps this could be attributed to the fact that during adolescence, self-concept is more prominent and a greater contributing factor to emotional well-being than body satisfaction (59). Based on these additional findings, it would be important for future studies to delineate the temporal nature of these relationships as well as better understand the effects of self-esteem and body satisfaction on the association between teasing and depressive symptoms.

4.1.4 Frequency of weight-based teasing: the influence of specific family members

One supplementary finding in our systematic review suggested that siblings were the most common source of weight-based teasing within the family followed by fathers and then mothers (26). To our knowledge, only one other study included both parents and siblings in discussing weight-based teasing as well as examined them separately (31). This study disagreed

with our additional findings and suggested that mothers were the source of teasing almost twice as often as fathers (31). As limited research currently exists, it is difficult to interpret why siblings tease more than parents, specifically older brothers. It is also difficult to understand the conflicting results regarding frequency of mother versus father teasing. Future research should measure weight-based teasing from specific family members to better understand the differences in frequency of teasing within the immediate family. It would also be interesting to examine the motivation behind the teasing from specific family members.

4.1.5 Cross-sectional associations of weight-based teasing and depressive symptoms: the influence of specific family members

An additional finding in our systematic review indicated that weight-based teasing from specific family members influences the level of reported depressive symptoms among adolescents. Keery et al., who only included female participants, found that teasing specifically by fathers and older brothers was associated with the highest levels of depressive symptoms (26). Adolescents (who identify as heterosexual) are increasingly concerned about whether or not they are perceived as attractive by their opposite sex peers, as dating begins to emerge during this time period (75-77). Adolescents may be more sensitive and vulnerable to criticism from the opposite sex regarding weight or appearance compared to criticism from peers of the same sex (73) although this may not be the case among adolescents in the LGBTQ community. As heterosexual girls transition from childhood to adolescence, they experience changes in their bodies as well as in their relationships with specific family members (26). Fathers and older brothers may serve as models of hetero-social interactions, so negative feedback from these male figures may be particularly harmful during this vulnerable time period (26), especially when girls are seeking validation from the opposite sex on whether or not they are perceived as attractive (73). Thus, this could explain why additional findings in our systematic review found fathers and older brothers to elicit the highest levels of depressive symptoms among female participants. Girls may not be as sensitive to appearance-related feedback from mothers and sisters during this developmental transition (26). In the future, however, more studies should explore how the gender of the source of weight-based teasing within the family influences the development of depressive symptoms among adolescents across diverse sexual orientations and gender identity groups. It would be interesting to see whether weight-based teasing from mothers or older sisters

has a greater effect on depressive symptomology among female adolescents. To our knowledge, there currently only exists one study which explored weight-based teasing among an LGBTQ adolescent population (78), yet this study did not tease out specific family members.

Chapter 5: Conclusion

5.1. Conclusion

The main findings of this systematic review highlighted the permeating issue of weight-based teasing from family and peers and the adverse impact it has on depressive symptoms in both the short and long term. This review established that girls are teased more frequently than boys, and they were found to be more affected in terms of depressive symptoms by weight-based teasing. It appears that peers were a more common source of teasing, and teasing from multiple sources increased the likelihood of experiencing depressive symptoms. However, our findings were based on a narrative synthesis and some studies showed contradicting results and lacked statistical support, emphasizing the need for further, more quantitative investigation on the relationship between weight-based teasing in childhood and concurrent or future depressive symptoms in adulthood. This quantitative investigation could include conducting a meta-analysis, yet it would be necessary for the studies to be sufficiently homogeneous. Nevertheless, we provide enough evidence to demonstrate the psychological harm associated with weight-based teasing, highlighting the need to develop effective anti-bullying interventions and programs targeted in the home and school environments.

The findings of our study serve to guide the implementation of policies against weight-based teasing in both the school and the home to reduce its frequency and its negative effects on mental health in childhood and adulthood. Although girls may be more psychologically vulnerable to teasing, our systematic review found that both sexes could be adversely affected, warranting programs for all students of all genders. Based on our systematic review, parents should learn to institute a "no teasing" zone at home to protect their children from at least one source of teasing (56). School administrators could also explore strategies for reducing weight-based teasing, as a meta-analysis found that anti-bullying programs successfully reduced bullying victimization by 17-20% (93). While many schools may already have anti-bullying policies in place, our systematic review suggests the need for additional strategies to educate students and teachers about weight bias in the school setting. This could include professional development programs specifically on weight discrimination for teachers and interactive workshops for students. With the high frequency of weight discrimination in families (12) and in schools (94) there should be increased efforts by parents and educators to intervene on behalf of the children, especially those living with overweight or obesity, to protect them from the psychological ramifications of weight-based teasing.

In the future, quantitative studies are warranted to continue to explore the relationship between weight-based teasing and depressive symptoms in order to explore differences among children of sexual minorities and diverse gender identities as well. More longitudinal studies are necessary, where weight status and baseline levels of depressive symptoms are adjusted for, to better understand this relationship. Finally, it would be interesting to determine if implementing interventions that focus explicitly on factors such self-esteem and body satisfaction, may reduce depressive symptoms in children and teenagers. However, it would be important to include children and teenagers who have overweight or obesity and experienced weight-based teasing. Perhaps positive body image could serve as a protector for depressive symptoms in those who experience weight-based teasing.

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Appendix

Table 3. Electronic Search Strategy for PsychINFO

Key term	Terms
Population	Youth OR youths OR "young person" OR "young people" OR " young adult" OR " young adults" OR teen OR teens OR teenager OR teenagers OR adolescents OR adolescent OR adolescence OR child OR children OR kid OR kids OR boys OR boy OR girls OR girl OR schoolage OR school-age OR school-aged OR schoolaged OR student OR students OR DE " Students"
AND	
Weight teasing I	hate OR hatred OR bully OR bullied OR bullying OR harass OR harassed OR harassment OR harassing OR Shame OR shaming OR shamed OR abuse OR abused OR abuses OR abusive OR abusiveness OR abusing OR teasing OR teased OR policing OR taunting OR taunts OR taunted OR "negative comments" OR "negative comment" OR stigma OR stigmatized OR stigmatizing OR stigmatization OR stigmatised OR stigmatising OR stigmatisation OR Bias OR biases OR discrimination OR discriminated OR discriminatory OR discriminate OR prejudice OR prejudiced OR DE " Hate" OR DE "Bullying" OR DE "Relational Aggression" OR DE "Aggressive Behavior" OR DE "Emotional Abuse" OR DE "Harassment" OR DE "Teasing" OR DE "Victimization" OR DE " Harassment" OR DE "shame" OR DE "Stigma" OR DE "Prejudice" OR DE "Social Discrimination" OR DE "Stereotyped Attitudes" OR DE " Discrimination"
AND	
Weight teasing II	"Body mass index" OR BMI OR weight OR overweight OR obese OR obesity OR fat OR anti-fat OR DE "Body Mass Index" OR DE "Body Size" OR DE "Body Weight" OR DE "Obesity" OR DE "Overweight" OR DE "Obesity (Attitudes Toward)"
AND	
Source	Home OR school OR family OR families OR Parent OR parents OR mother OR father OR sibling OR siblings OR brother OR brothers OR

	sister OR sisters OR friend OR friends OR acquaintance OR acquaintances OR companion OR companions OR peer OR peers OR schoolmate OR schoolmates OR classmate OR classmates OR "interpersonal relations" OR DE "Family" OR DE "Parents" OR DE "Family Members" OR DE "Fathers" OR DE "Mothers" OR DE "Siblings" OR DE "Brothers" OR DE "Sisters" OR DE " Peers" OR DE " classmates"
AND	
Outcome	"Feeding and Eating Disorders" OR Anorexia OR "weight loss" OR “Loss-of-control eating” OR “Disordered eating” OR “uncontrolled eating” OR “Non-normative eating" OR “Emotional eating” OR "addictive eating" OR orthorexia OR bulimia OR purging OR "binge eating" OR binging OR "binge-eating" OR "food addiction" OR "Night Eating Syndrome" OR “Weight-control practices" OR diets OR dieting OR diet OR "eating disorder" OR "eating disorders" OR "feeding disorder" OR "feeding disorders" OR "eating behaviours" OR "eating behaviors" OR "eating behaviour" OR "eating behavior" OR "eating attitudes" OR "eating attitude" OR depression OR depressed OR depressive OR anxiety OR anxieties OR anxious OR "attempted suicide" OR “Psychological distress” OR "mental distress" OR "emotional distress" OR “Psychological health” OR “Mental health” OR "emotional health" OR “Psychological illness” OR "mental illness" OR DE "Anorexia Nervosa" OR DE "Eating Disorders" OR DE "Bulimia" OR DE "Mental Disorders" OR DE "Binge Eating Disorder" OR DE "Purging (Eating Disorders)" OR DE "Binge Eating" OR DE "Eating Behavior" OR DE "Feeding Disorders" OR DE "Diets" OR DE "Dietary Restraint" OR DE "Eating Behavior" OR DE "Food Deprivation" OR DE "Depression (Emotion)" OR DE "Anxiety" OR DE "Anxiety Disorders" OR DE "Shame" OR DE "Stress" OR DE "Emotions" OR DE " Negative emotions" OR DE "Emotional States" OR DE "Alienation" OR DE "Disappointment" OR DE "Disgust" OR DE

	"Dissatisfaction" OR DE "Distress" OR DE "Sadness" OR DE "Suffering" OR DE "Emotional Disturbances" OR DE "Attempted Suicide" OR DE "Behavior Disorders" OR DE "Self-Destructive Behavior" OR DE "Suicide" DE "Mental Health" OR DE " mental disorders" OR DE "Mental Illness (Attitudes Toward)"

Electronic Search Strategy for SCOPUS and Web of Science (Core Collection)

Key term	Terms
Population	Youth OR youths OR "young person" OR "young people" OR "young adult" OR "young adults" OR teen OR teens OR teenager OR teenagers OR adolescents OR adolescent OR adolescence OR child OR children OR kid OR kids OR boys OR boy OR girls OR girl OR schoolage OR school-age OR school-aged OR schoolaged OR "young adult" OR adolescent OR child OR student OR students
AND	
Weight teasing I	Hate OR hatred OR bully OR bullying OR bullied OR harass OR harassed OR harassment OR harassing OR Shame OR shaming OR shamed OR abuse OR abused OR abuses OR abusive OR abusiveness OR abusing OR teasing OR teased OR policing OR taunting OR taunts OR taunted OR "negative comments" OR "negative comment" OR stigma OR stigmatized OR stigmatizing OR stigmatization OR stigmatised OR stigmatising OR stigmatisation OR Bias OR biases OR discrimination OR discriminated OR discriminatory OR discriminate OR prejudice OR prejudiced
AND	
Weight teasing II	"Body mass index" OR BMI OR weight OR overweight OR obese OR obesity OR fat OR anti-fat
AND	
Source	Home OR school OR family OR families OR Parent OR parents OR mother OR father OR sibling OR siblings OR brother OR brothers OR sister OR sisters OR friend OR friends OR acquaintance OR acquaintances OR companion OR companions OR peer OR peers OR schoolmate OR schoolmates OR classmate OR classmates OR "interpersonal relations"
AND	

Outcome	"Feeding and Eating Disorders" OR Anorexia OR "weight loss" OR "Loss-of-control eating" OR "Disordered eating" OR "uncontrolled eating" OR "Non-normative eating" OR "Emotional eating" OR "addictive eating" OR orthorexia OR bulimia OR purging OR "binge eating" OR binging OR "binge-eating" OR "food addiction" OR "Night Eating Syndrome" OR "Weight-control practices" OR diets OR dieting OR diet OR "eating disorder" OR "eating disorders" OR "feeding disorder" OR "feeding disorders" OR "eating behaviours" OR "eating behaviors" OR "eating behaviour" OR "eating behavior" OR "eating attitudes" OR "eating attitude" OR Anxiety OR anxieties OR anxious OR depression OR depressive OR depressed OR "attempted suicide" OR "Psychological distress" OR "mental distress" OR "emotional distress" OR "Psychological health" OR "Mental health" OR "emotional health" OR "Psychological illness" OR "mental illness"

Updated electronic search strategy: PsychINFO

youth OR youths OR "young person" OR "young people" OR " young adult" OR " young adults" OR teen OR teens OR teenager OR teenagers OR adolescents OR adolescent OR adolescence OR child OR children OR kid OR kids OR boys OR boy OR girls OR girl OR schoolage OR school-age OR school-aged OR schoolaged OR student OR students

OR Index Terms: "Students"

hate OR hatred OR bully OR bullied OR bullying OR harass OR harassed OR harassment OR harassing OR Shame OR shaming OR shamed OR abuse OR abused OR abuses OR abusive OR abusiveness OR abusing OR teasing OR teased OR policing OR taunting OR taunts OR taunted OR "negative comments" OR "negative comment" OR stigma OR stigmatized OR stigmatizing OR stigmatization OR stigmatised OR stigmatising OR stigmatisation OR Bias OR biases OR discrimination OR discriminated OR discriminatory OR discriminate OR prejudice OR prejudiced

OR Index Terms: "Hate" OR "Bullying" OR "Relational Aggression" OR "Aggressive Behavior" OR "Emotional Abuse" OR "Harassment" OR "Teasing" OR "Victimization" OR "Harassment" OR "shame" OR "Stigma" OR "Prejudice" OR "Social Discrimination" OR "Stereotyped Attitudes" OR "Discrimination"

AND

"body mass index" OR BMI OR weight OR overweight OR obese OR obesity OR fat OR anti-fat

OR Index Terms: "Body Mass Index" OR "Body Size" OR "Body Weight" OR "Obesity" OR "Overweight" OR "Obesity (Attitudes Toward)"

Home OR school OR family OR families OR Parent OR parents OR mother OR father OR sibling OR siblings OR brother OR brothers OR sister OR sisters OR friend OR friends OR acquaintance OR acquaintances OR companion OR companions OR peer OR peers OR schoolmate OR schoolmates OR classmate OR classmates OR "interpersonal relations"

OR Index Terms: "Family" OR "Parents" OR "Family Members" OR "Fathers" OR "Mothers" OR "Siblings" OR "Brothers" OR "Sisters" OR " Peers" OR "classmates"

depression OR depressed OR depressive OR "attempted suicide" OR “Psychological distress” OR "mental distress" OR "emotional distress" OR “Psychological health” OR “Mental health” OR "emotional health" OR “Psychological illness” OR "mental illness"

OR Index Terms:	"Mental Disorders" OR "Depression (Emotion)" OR "Shame" OR "Stress" OR DE "Emotions" OR "Negative emotions" OR "Emotional States" OR "Alienation" OR "Disappointment" OR "Disgust" OR "Dissatisfaction" OR "Distress" OR "Sadness" OR "Suffering" OR "Emotional Disturbances" OR "Attempted Suicide" OR "Behavior Disorders" OR "Self-Destructive Behavior" OR "Suicide" OR "Mental Health" OR "mental disorders" OR "Mental Illness (Attitudes Toward)"

Updated electronic search strategy: PubMed

[redacted]

youth[tiab] OR youths[tiab] OR "young person"[tiab] OR "young people"[tiab] OR "young adult"[tiab] OR "young adults"[tiab] OR teen[tiab] OR teens[tiab] OR teenager[tiab] OR teenagers[tiab] OR adolescents[tiab] OR adolescent[tiab] OR adolescence[tiab] OR child[tiab] OR children[tiab] OR kid[tiab] OR kids[tiab] OR boys[tiab] OR boy[tiab] OR girls[tiab] OR girl[tiab] OR schoolage[tiab] OR school-age[tiab] OR school-aged[tiab] OR schoolaged[tiab] OR "young adult"[mesh] OR adolescent[mesh] OR child[mesh] OR student[tiab] OR students[tiab] OR students[mesh]

[redacted]

hate[tiab] OR hatred[tiab] OR bully[tiab] OR bullied[tiab] OR bullying[tiab] OR harass[tiab] OR harassed[tiab] OR harassment[tiab] OR harassing[tiab] OR Shame[tiab] OR shaming[tiab] OR shamed[tiab] OR abuse[tiab] OR abused[tiab] OR abuses[tiab] OR abusive[tiab] OR abusiveness[tiab] OR abusing[tiab] OR teasing[tiab] OR teased[tiab] OR policing[tiab] OR taunting[tiab] OR taunts[tiab] OR taunted[tiab] OR "negative comments"[tiab] OR "negative comment"[tiab] OR stigma[tiab] OR stigmatized[tiab] OR stigmatizing[tiab] OR stigmatization[tiab] OR stigmatised[tiab] OR stigmatising[tiab] OR stigmatisation[tiab] OR Bias[tiab] OR biases[tiab] OR discrimination[tiab] OR discriminated[tiab] OR discriminatory[tiab] OR discriminate[tiab] OR prejudice[tiab] OR prejudiced[tiab] OR "Harassment, Non-Sexual"[mesh] OR bullying[mesh] OR "Agonistic behavior"[mesh] OR "social discrimination"[mesh] OR "social stigma"[mesh]

AND

"body mass index"[tiab] OR BMI[tiab] OR weight[tiab] OR overweight[tiab] OR obese[tiab] OR obesity[tiab] OR fat[tiab] OR anti-fat[tiab] OR "Pediatric Obesity"[MeSH] OR Obesity[mesh] OR overweight[mesh] OR "body weight"[mesh] OR "body mass index"[mesh]

[redacted]

Home[tiab] OR school[tiab] OR family[tiab] OR families[tiab] OR Parent[tiab] OR parents[tiab] OR mother[tiab] OR father[tiab] OR sibling[tiab] OR siblings[tiab] OR brother[tiab] OR brothers[tiab] OR sister[tiab] OR sisters[tiab] OR friend[tiab] OR friends[tiab] OR acquaintance[tiab] OR acquaintances[tiab] OR companion[tiab] OR companions[tiab] OR peer[tiab] OR peers[tiab] OR schoolmate[tiab] OR schoolmates[tiab] OR classmate[tiab] OR classmates[tiab] OR Family[mesh] OR Friends[mesh] OR "interpersonal relations"[mesh]

[redacted]

"Mental Health"[mesh] OR depression[mesh] OR "Stress, psychological"[mesh] OR "suicide, attempted/psychology"[mesh] OR "feedback, psychological"[mesh] OR emotions[mesh] OR depression[tiab] OR depressive[tiab] OR depressed[tiab] OR "attempted suicide"[tiab] OR “Psychological distress”[tiab] OR "mental distress"[tiab] OR "emotional distress"[tiab] OR “Psychological health”[tiab] OR “Mental health”[tiab] OR "emotional health"[tiab] OR “Psychological illness”[tiab] OR "mental illness"[tiab]

Updated electronic search strategy: SCOPUS and Web of Science

youth OR youths OR "young person" OR "young people" OR "young adult" OR "young adults" OR teen OR teens OR teenager OR teenagers OR adolescents OR adolescent OR adolescence OR child OR children OR kid OR kids OR boys OR boy OR girls OR girl OR schoolage OR school-age OR school-aged OR schoolaged OR "young adult"OR adolescent OR child OR student OR students

[redacted]

Hate OR hatred OR bully OR bullying OR bullied OR harass OR harassed OR harassment OR harassing OR Shame OR shaming OR shamed OR abuse OR abused OR abuses OR abusive OR abusiveness OR abusing OR teasing OR teased OR policing OR taunting OR taunts OR taunted OR "negative comments" OR "negative comment" OR stigma OR stigmatized OR stigmatizing OR stigmatization OR stigmatised OR stigmatising OR stigmatisation OR Bias OR biases OR discrimination OR discriminated OR discriminatory OR discriminate OR prejudice OR prejudiced

AND

"Body mass index" OR BMI OR weight OR overweight OR obese OR obesity OR fat OR anti-fat

[redacted]

Home OR school OR family OR families OR Parent OR parents OR mother OR father OR sibling OR siblings OR brother OR brothers OR sister OR sisters OR friend OR friends OR acquaintance OR acquaintances OR companion OR companions OR peer OR peers OR schoolmate OR schoolmates OR classmate OR classmates OR "interpersonal relations"

[redacted]

depression OR depressive OR depressed OR "attempted suicide" OR “Psychological distress” OR "mental distress" OR "emotional distress" OR “Psychological health” OR “Mental health” OR "emotional health" OR “Psychological illness” OR "mental illness"

Table 4. Ranking Protocol for the Quality Assessment of Studies

Criteria No.	Good	Fair	Poor
#9	Yes	No	No
#11	Yes	Yes	No
#14	Yes	Other	No

Criteria No.	Good	Fair	Poor
#9	Yes	Yes	No
#11	Yes	Yes	No
#14	Yes	Other	Yes

Criteria No.	Good	Fair	Poor
#9	Yes	Yes	Other
#11	Yes	Yes	Other
#14	Yes	No	Other

Criteria No.	Good	Fair	Poor
#9	Yes	Other	No
#11	Yes	Yes	No
#14	Yes	Other	Other

Note: The ranking protocol for the final overall quality rating was based on the judgement of the evaluators with reference to a systematic review that used this same quality assessment tool (50). Two independent researchers (E.S. and F.M.) determined that question 9, 11 and 14 held the most weight in this systematic review and were identified in the guidelines provided by the NHLBI (1). Questions 9, 11 and 14 held the most weight in the systematic review which assisted in the design of this protocol. These questions correspond to the following questions: Question #9: Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? Question #11: Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? Question #14: Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)? Depending on which response each individual question received (i.e., either Yes, No or Other), one can determine the overall quality rating for the study. The first column presents the criteria number. The second column presents the four different ways in which the study would receive an overall "good" quality rating. The third column presents the four different ways in which the study would receive an overall "fair" quality rating. The fourth column presents the four different ways in which the study would receive an overall "poor" quality rating.

Table 5. Summary of findings according to the research question

Author & year of publication	Frequency of weight-based teasing	Cross-sectional associations of weight-based teasing and depressive symptoms	Long-term associations of weight-based teasing and depressive symptoms
Bang et al. 2012		Depressive symptoms had a significant positive correlation with parental teasing (r=0.267, p<0.001)	
Bucchianeri et al. 2014	Girls; 38.2%, boys; 31.8%, (p=0.0005)	Weight-based teasing significantly associated with depressive symptoms among girls and boys [(Girls:β=0.51, p<0.001) (boys: β=0.48, p<0.001)] Among girls and boys, depressive symptoms were associated with weight-based harassment [(girls: β=0.34, CI=0.22,0.45) (boys: β=0.23, CI=0.11,0.36)]	
Eisenberg et al. 2003	<u>Source & Sex</u> *Peers: Girls; 30%, boys; 24.7% (p<.0001, χ^2: 16.74) *Family: Girls; 28.7%, boys; 16.1% (p<0.0001, χ^2: 107.64) *Combination: Girls; 14.6%, boys; 9.6% (p<0.0001, χ^2: 27.89) <u>Sex & Source</u> *Girls: Peers; 30%, family; 28.7% (p<0.321, χ^2: 0.983) *Boys: Peers; 24.7%, family; 16.1% (p<0.0001, χ^2: 53.90)	Proportion of respondents reporting depressive symptoms: <u>Source & Sex</u> Peers: [Girls; 40.1%, boys; 25.8%] Family: [Girls; 49.0%, boys; 28.5%] Combination: [Girls; 55.1%, boys; 42.0%] Teasing significantly associated with depressive symptoms. Multivariate regression results for depressive symptoms: <u>Source & Sex</u> [(Girls: peers; OR=1.39; CI:1.10,1.76, family; OR=1.95; CI:1.51,2.20) (Boys: peer; OR=1.93; CI:1.40,2.68, family; OR=2.10; CI:1.63,2.69. p=0.05)]	

Eisenberg et al. 2006	*<u>High School students:</u> Time 1: girls; 44%, boys; 32.3% ($p<0.0001$, χ^2: 35.967) *<u>Young adults:</u> Time 1: girls; 44.9%, boys; 35.4% ($p<0.0001$, χ^2: 23.19)	<u>High School students:</u> Cross-sectional association b/w Time 2 teasing and Time 2 depressive symptoms among females and males [(Females: $\beta=1.52$, $p<0.001$) (males: $\beta=0.91$, $p<0.05$)] Time 2 teasing maintained its significant association with Time 2 depressive symptoms after accounting for the mediating influence of Time 1 depressive symptoms. This was true for females and males [(Females:$\beta=1.32$, $p<0.001$) (males:$\beta=0.80$, $p<0.05$)]	<u>High School students:</u> Among females, teasing at Time 1 was significantly associated with depressive symptoms at Time 2 ($\beta=1.12$; $p<0.01$). There was no significant association between Time 1 teasing and Time 2 depressive symptoms among males <u>Mediation</u> Among females, teasing at Time 1 maintained a marginal association with Time 2 depressive symptoms when Time 2 teasing and Time 2 BMI were entered into the model ($\beta=0.67$; $p<0.1$). Time 1 teasing was no longer significantly associated with Time 2 depressive symptoms when Time 1 depressive symptoms were entered into the model. <u>Young Adults:</u> Time 1 teasing was significantly associated with Time 2 depressive symptoms [(Females: $\beta=0.88$, $p<0.001$) (males: $\beta=0.67$, $p<0.01$)] Girls > boys <u>Mediation</u> Among females, teasing at Time 1 maintained a marginal association with Time 2 depressive symptoms when Time 2 teasing and Time 2 BMI were entered into the model ($\beta=0.39$; $p<0.1$). Time 1 teasing was no longer significantly associated with Time 2 depressive symptoms when Time 1 depressive symptoms were entered into the model.
Fulkerson et al. 2007	Girls; M=1.4, boys; M=1.3	Teasing by family significantly associated with depressive symptoms	

		[(Girls: β=0.22, p<0.001) (boys: β=0.16, p<0.001)]	
Goldfield et al. 2010	<u>Sex</u> Girls; 33%, boys 18%, (p<0.001) <u>Source</u> *Peers; 29%, parents; 21%, (p<0.0001, χ^2: 25.34) <u>Sex & Source</u> Girls; 25%, boys; 15%, (p<0.01)	Teasing significantly associated with depressive symptoms <u>Sex & Source</u> [(Boys: parents; r=0.16, peers; r=0.16, p<0001) (girls: parents; r=0.34, peers; r=0.41, p<0.001)] Teasing significantly associated with depressive symptoms in the overall sample [(parents; r=0.29) (peers; r=0.34), p<0.001]	
Goldschmidt et al. 2016			Among both males and females, Time 2 teasing was significantly associated with Time 3 depressive symptoms [(males: β=0.138, p=0.004) (females: β=0.126, p=0.001)]
Greenleaf et al. 2014		Children teased about their weight reported significantly higher rates of depressive symptoms than children who were not teased (Cohen's d=-0.78)	
Greenleaf et al. 2017	*Girls; 25.9%, boys; 24.5% (p<0.772, χ^2: 0.084)	Weight-based teasing significantly associated with depressive symptoms [(Participants with overweight: r=0.49, p<0.01) (participants with obesity: r=0.64, p<0.01)]	
Keery et al. 2005	<u>Source</u> *Siblings; 29%, parents, 23%, (p<0.066, χ^2: 3.375) <u>Source</u> *Fathers; 19%, mothers; 10% (p<0.0001, χ^2: 12.52)	Maternal and paternal teasing accounted for a significant amount (10%) of variance in depressive symptoms (F=9.62, p<0.001, βmother=0.12, p<0.01, βfather=0.19,p<0.01) Girls with at least 1 sibling who teased had greater rates of depressive symptoms than girls who reported that their siblings did not tease and girls who reported no siblings (F=12.45, p<0.001)	

		(older brother: F=7.68, p<0.001) (older sister: F=6.52, p<0.001)]	
Lampard et al. 2014		School-level weight-related teasing significantly associated with depressive symptoms (Girls:β=0.30, p<0.05; boys: β=0.29, p<0.05)	
Libbey et al. 2008	<u>Source</u> *Both peers & family: 48%; either source alone: 33%, (p<0.016, χ^2: 5.767) <u>Sex</u> No statistically significant difference in # of sources detected among sex (P=0.72)	Higher depressive symptoms scores significantly associated with higher teasing frequency (β=2.60, p<0.001) Higher depressive symptoms scores significantly associated with a greater number of teasing sources (β=4.24, p<0.001) Higher teasing frequency is related to higher odds of depressive symptoms (OR=1.66, CI: 1.25,2.22) The greater the number of teasing sources, the greater the odds of experiencing depressive symptoms (OR=2.24, CI:1.29,4.52)	
Madowitz et al. 2012	*Peers; 49%, family; 33%, (p<0.036, χ^2: 4.417)	Frequency of teasing and # of sources of teasing significantly associated with depressive symptoms [(Frequency: β=2.5, P=0.002) (# of sources: β=4.6, P=0.004)] Teasing by peers significantly associated with high levels of depressive symptoms (β=6.1, P=0.009) Teasing from family did not have a significant association with depressive symptoms	
Mustillo et al. 2013	<u>Sex & Source: Caucasian girls</u> *[Age 9-10: peers; 21.37%, parents; 15.62%, (p<0.001, χ^2: 11.50)]; [(age 13-14: peers; 19.34%, parents: 15.41%), (p<0.018, χ^2: 5.634)] <u>Sex & Source: African American girls</u> *[Age 9-10: parents; 29.68%, peers; 27.62%, (p<0.296, χ^2: 1.09)]; [(age 13-14: parents;		Teasing by peers and parents was significantly associated with proximal depressive symptoms for both Caucasian and African American girls. Some direct effects of teasing on proximal depressive symptoms existed, but obesity significantly mediated this association.

	24.45%, peers; 21.51%), (p<0.102, χ^2: 2.670)]		
Phares et al. 2004	Girls; 1.62, boys; 1.33 (these differences were not significantly different; t=-0.44, p=0.660)	Teasing significantly associated with higher levels of depressive symptoms [(Boys; r=0.29, p<0.05) (girls; r=0.45, p<0.001)]	
Porter et al. 2013		Teasing significantly associated with depressive symptoms (β=0.33, p<0.001)	
Quick et al. 2013	<u>Sex & Source</u> *Peers: girls; 28.4%, boys; 24% (p<0.041, χ^2: 4.183) *Family: girls; 29.4%, boys; 14%, (p<0.0001, χ^2: 57.376) <u>Source & Sex</u> *Girls: family: 29.4%; peers: 28.4%, (p<0.638, χ^2:0.221) *Boys: peers: 24%; family: 14%, (p<0.0001, χ^2: 24.583)		
Quinlan et al. 2009	Independent samples t-tests indicated no significant sex differences in reported prevalence of teasing; quantitative results not reported	Frequency of teasing significantly associated with depressive symptoms (r=0.28, p<0.01)	
Young-Hyman et al. 2006	Girls: 19.8 +/- 5.9, boys: 18.1+/- 4.1, (p<0.03)		

Note: * Indicates the studies in which I ran a chi square test to determine if frequency of weight-based teasing differs according to sex and/or source