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The Effectiveness of Integrating Psychotherapy Into Overweight/Obesity Interventions on Youth's Weight Status and Depressive Symptoms: A Narrative Review

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Abstract

Introduction: Childhood obesity and youth depression are serious ongoing global crises of the 21st century. Many researchers have often attributed this to the well-established association between them. Consequently, psychotherapies are increasingly being integrated into interventions to improve weight status and depression outcomes for individuals with overweight and/or obesity (OW/OB). However, the effectiveness of these interventions has not yet been reviewed for youth with OW/OB. Such youth tend to be at a higher risk of developing comorbid depressive symptoms, which can likely persist into adulthood. Therefore, this narrative review explored the effectiveness of psychotherapy integrations within OW/OB interventions on youth's weight statuses and their depressive symptoms contemporaneously.

Methods: Medline, Embase, PsycInfo, PubMed, and Scopus were accessed. English peer-reviewed empirical articles, reviews, meta-analyses, clinical trials, and pilot studies from the last ten years and those that investigated the effectiveness of OW/OB interventions integrated with psychotherapy among youth (5-18 years) were included. Keywords related to diet, psychotherapy, OW/OB, youth, and depression were used. Non-peer-reviewed sources, reviews lacking sufficient transparency in their methodology, editorials, letters, study protocols, commentaries, preprints, and dissertations were excluded.

Results: Four studies, including two pilot studies, were included. Overall, we found high heterogeneity in their intervention components and conditions, study designs, participants, and results. Among youth, all studies found no significant improvements in weight status as per the authors' set significance thresholds. Mixed results were obtained for the effect on youth's depressive symptoms.

Discussion: There is an alarming lack of recent literature investigating the impact of integrated evidence-based psychotherapies within OW/OB interventions on youth's weight statuses and depressive symptoms. It is important to investigate their effectiveness in equipping youth with OW/OB with skills to make sustained lifestyle changes and cope with weight discrimination and depressive symptoms. We attributed the weak success of these interventions to the lack of cultural adaptations and standardization of study types, intervention structures, components, and conditions.

Conclusion: It is important for researchers to continue investigating the success of such interventions on youth with OW/OB's physical and mental outcomes simultaneously. This will further inform the interdisciplinary approach needed to deliver appropriate care to these youth.

Keywords: effectiveness; psychotherapy; interventions; childhood obesity; overweight; adolescents; children; weight status; depressive symptoms

Introduction

The recent global surge in the prevalence of childhood obesity (OB) has been labelled one of the most serious public health challenges of the 21st century, as it presents severe health risks to youth from a plethora of countries, cultures, and ethnic backgrounds [1,2]. Specifically, it is well-established that childhood OB is associated with a significant risk of developing hypertension, dyslipidemia, and insulin resistance [3-5]. Moreover, these physiological risks are often accompanied by psychological struggles such as depressive symptoms, lowered self-esteem, and impaired body image [6].

Childhood obesity and overweight (OW) are variably defined across existing literature due to their complex, multifaceted nature. One widely accepted definition comes from the World Health Organization (WHO), which defines overweight and obesity in children as "abnormal or excessive fat accumulation that presents a risk to health… in children aged 5-19 years" [1]. Quantitatively, overweight is often defined as a BMI equal to or above the 85th

percentile, and obesity, as a BMI equal to or above the 97.7th percentile [7].

Contemporaneously, there is also an ongoing global crisis of depression [8]. Especially in light of the Coronavirus disease-2019 (COVID-19) global pandemic, studies have found the rates of youth's clinical depressive symptoms to be significantly higher than in the pre-pandemic era and continued to worsen with the progression of the pandemic [9].

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), major depressive disorder (MDD) is primarily characterized by the presence of low mood and/or loss of interest or pleasure for at least a 2-week period [10]. These symptoms are also often accompanied by others such as fatigue, indecisiveness, and recurrent thoughts of death. [10]. Nonetheless, it is important to note that these symptoms tend to display heterogeneous trajectories within and between individuals, which can often substantially influence whether they meet criteria for MDD diagnosis, meet subthreshold criteria, or don't meet criteria at all [11,12]. Hence, for this review, we chose to focus on depressive symptoms loosely, regardless of the presence of a diagnosis.

To date, an abundance of studies have demonstrated a bidirectional and multiplex association between depressive symptoms and obesity among adults [13]. Researchers have attributed this relationship to a myriad of reasons, such as having shared biological mechanisms, pathophysiology, and gene-environment interactions [14-16]. Furthermore, evidence for a similar relationship has been found among youth with obesity [17,18]. For instance, youth with obesity tend to have a higher prevalence of depressive symptoms relative to youth without obesity [17,19]. Overall, the relationship between the two becomes especially important to consider in the context of the ongoing global crises of depression and childhood obesity [2,8].

In light of this evidence, novel lifestyle interventions have increasingly been incorporating evidence-based psychotherapies in conjunction with diet and/or physical activity for adults with overweight and/or obesity (OW/OB) to target both weight- and depression-related outcomes [20]. Some popular examples of the types of psychotherapy integrated are behavioural therapy (BT), cognitive-behavioural therapy (CBT), and mindfulness-based cognitive therapy (MBCT) [21-23]. Many of these interventions either strictly incorporate all components involved in these psychotherapies or incorporate their select components [24]. Importantly, among adults with OW/OB with comorbid depression, such interventions have shown promising results [25,26].

Yet, there remains a need to review the effectiveness of these interventions in younger populations with OW/OB and their depressive symptoms. Studies have found children and adolescents with obesity to be approximately five times more likely to remain obese in adulthood than youth who are not obese [27]. Similarly, it has been shown that being obese can also dangerously increase the chances of developing comorbid mental disorders later in life [28]. Therefore, such interventions may substantially help relieve the many physical, mental, and sociocultural challenges that come with OW/OB and depressive symptoms.

The effectiveness of such interventions on children and adolescents with OW/OB and their depressive symptoms remains obscure. Given the urgency to address the negative consequences of OW/OB and depressive symptoms among youth, it is essential to conduct a narrative review of literature on this topic. Therefore, this review aimed to answer the following research question: is psychotherapy integration within interventions for youth with OW/OB effective in improving their weight status and depressive symptoms?

Methods

Literature Search Strategy

A comprehensive literature search was conducted across popular electronic databases that publish health-related research. Five databases were accessed – OVID Medline, OVID Embase, APA PsycInfo (Proquest), PubMed, and Scopus. Only publications from the last ten years were included, specifically from 30th June 2013 to 30th June 2023. Our search was restricted to the last ten years because the American Medical Association recognized obesity as "a disease state with multiple pathophysiological aspects requiring a range of interventions to advance obesity treatment and prevention" in June 2013 [29]. Despite the controversy this definition sparked within the field, this definition emphasized the need for a holistic and multi-faceted approach to the management and health improvement of individuals with OW/OB instead of focusing on weight loss alone [30,31]. Thus, this recognition largely proliferated subsequent research investigating the management and/or treatment of OW/OB and its associated comorbidities using integrative approaches such as psychotherapy. Moreover, this criterion also ensured that we only included up-to-date material on this topic, given that the overall understanding and/or approach to OW/OB and depression are shown to continually evolve over time [20,32]. Lastly, this criterion also considers that publication times can often be lengthy and variable.

Boolean combinations of relevant Map Term To Subject Heading (MeSH) terms and keywords related to diet, specific types of psychotherapy, OW/OB, children and adolescents, and depression were used to identify relevant studies (see Table 1) [33]. If present, specific search filters were applied to obtain more relevant results.

Terms related to physical activity were not included as part of our search strategy. We acknowledge that there are 3 main pillars commonly targeted as part of OW/OB interventions: diet, behaviour therapy, and physical activity [20]. However, recent efforts are being shifted from focusing on physical activity alone, towards promoting adherence to 24-hour movement guidelines that focus

jointly on physical activity, screen time, and sleep duration for childhood obesity [34-36]. As such, in relation to physical activity, we wished to leave our search unrestricted and simple in order to leave room to include interventions involving diverse types of physical activity-related components.

Table 1. List of Search Terms Used

Diet	Types of Psychotherapy	Overweight & Obese	Children & Adolescents	Depression
• Diet • Diet plan • Diet regimen • Diet program • Diet programme • Dietary management • Diet therapy • Nutrition • Nutritional plan • Nutritional regimen • Nutritional program • Nutritional programme • Nutritional management • Eating plan • Eating regimen • Eating program • Eating programme • Eating management • Food • Food plan • Food regimen • Food program • Food programme • Food management • Meal plan • Meal regimen • Meal program • Meal programme • Meal management	• Behavioral activation • Behavioural activation • Cognitive therapy • Cognitive behavioral therapy • Cognitive behavioural therapy • Interpersonal therapy • Problem-solving therapy • Mindfulness-based cognitive therapy	• Overweight • Obese • Obesity • Pediatric obesity • Paediatric obesity • Early onset obesity • Childhood obesity	• Children • Kids • Boys • Girls • Adolescents • Female adolescents • Male adolescents • Adolescence • Preadolescence • Pre-teens • Teens • Teenagers • Youth • Youths • Minors	• Depression • Unipolar depression • Clinical depression • Depressive symptoms • Depressive episodes • Major depressive episodes • Subsyndromal depressive symptoms • Low mood • Anhedonia • Loss of pleasure • Loss of interest • Depressive disorder • Major depressive disorder • Dysthymia • Dysthymic disorder • Persistent depressive disorder • Disruptive mood dysregulation disorder • Seasonal affective disorder

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method was used as part of the study selection process [37]. First, we identified articles across the five listed databases online. The following steps were taken: (1) identification of articles across e-databases, (2) removal of duplicates, (3) independent title, abstract, and full-text screenings conducted by two authors based on eligibility criteria (R.K. and G.R.), and (4) bringing in a third party (R.R.) to resolve any screening discrepancies. All full texts were manually retrieved either directly from the e-database or from the journal's official website.

Study Selection Criteria

To be included, articles must have originally been published in English. This was done to avoid errors in translation, given the language abilities of our research team, time restrictions, and availability of resources for translation. Second, articles were only included if they were classified as peer-reviewed: empirical studies, systematic reviews, reviews adopting the PRISMA or other validated methods (e.g., The Cochrane Handbook for Systematic Reviews of Interventions) [37,38], meta-analyses, clinical studies, clinical trials at any phase (1-4) and of certain types

(controlled, randomized controlled, pragmatic), and other types of studies (multicenter, comparative, validation, observational, and pilot). Articles were identified as peer-reviewed using the Ulrich's Web library database [39]. There were no restrictions placed on the national origin of the publications as we aimed to adopt an inclusive approach and did not wish to restrict our search to specific ethnoracial backgrounds, cultures, or countries.

Reviews and meta-analyses were considered in our search as although there are none investigating our research question to date, there exist a plethora of them that are tangentially related to lifestyle interventions with psychotherapy integrations for individuals with OW/OB [40,41]. As such, these were investigated based on whether they cited relevant papers that fit our inclusion criteria. Furthermore, only reviews using the PRISMA method or other well-validated methods as part of their literature search strategy were included to ensure that articles having sufficient transparency within their methodologies were included [37,38]. Note that any non-peer-reviewed articles, editorials, books, letters, case reports, study protocols, commentaries, preprints, reviews not adopting the PRISMA or Cochrane Handbook method, and theses/dissertations were excluded from this review.

Third, the articles need to have integrated at least one of the following psychotherapies or at least one of their major components into the OW/OB intervention for youth: behavioural activation (BA), cognitive therapy (CT), interpersonal therapy (IPT), problem-solving therapy (PST), CBT, and MBCT. These six types of evidence-based psychotherapies were chosen as based on the 1998 Chambless & Hollon criteria for empirically-supported therapies, these were identified as having strong research support for the treatment of depression across populations by the Society of Clinical Psychology within the Division 12 American Psychological Association [42,43]. However, for this review, psychotherapy delivery was accepted in any format/setting, (e.g., individual or group sessions, virtually or online, at a school, hospital, and/or within a community format, etc.). Such flexibility in our criteria ensured the inclusion of diverse and well-adapted interventions to better suit the unique needs of youth with OW/OB.

Fourth, articles were included if children and adolescents (5-18 years) with OW/OB were recruited and if their depressive symptoms were measured. They were not required to have a diagnosis of depression. Youths having other comorbid mental (e.g., bipolar disorder, eating disorders) or medical diagnoses (e.g., Type 2 diabetes) were excluded as such diagnoses, if present, may confound the relationship between OW/OB and depression [44].

Fifth, studies must have investigated both outcomes: (1) weight status measured at baseline and post-intervention, and (2) a score operationalizing youth's depressive symptoms at baseline and post-intervention using well-validated measures. This criterion ensured that any differences in pre- and post-intervention effects could accurately be attributed to the intervention alone. Moreover, papers that simultaneously measured other anthropometric parameters along with BMI were considered too. Articles that focused on OW/OB prevention or recruited other types of populations (e.g., adults with OW/OB, youth at risk of developing OW/OB) were excluded. No specific parameter-related cut-offs for how studies defined OW/OB among youth were included in our criteria, given the heterogeneity in and/or ongoing debates regarding cut-offs used across the literature [45].

Data Extraction

Upon completing full-text reviews, both authors independently extracted relevant data onto separate Microsoft Excel spreadsheets [46]. A third party (R.R.) resolved any discrepancies in the information entered, after which the information was then organized and compiled into tables into tables using Microsoft Word [36]. See Tables 2, 3, 4, and 5 for specific information extracted from included studies.

Results

Study Selection and Characteristics

A total of 246 articles were identified across five databases. After 21 duplicate records were removed, title screening was conducted independently by two authors (R.K. and G.R) on the 225 remaining articles. Similarly, independent abstract screening was conducted on 109 articles, followed by independent full-text screenings conducted on 26 articles. Any discrepancies following the completion of each independent screening were resolved with the help of a third party (R.R.) as necessary, and any studies deemed ineligible following these screenings were excluded. A total of 4 articles were included in the current review, out of which 2 were pilot studies. More detailed information is listed in Figure 1.

Characteristics of Included Studies

For each included study, descriptions of participants' sociodemographic characteristics and inclusion criteria have been summarized in Table 2. Each of their study designs, measures used, baseline characteristics and recruitment methods have been summarized in Table 3. Each study's different intervention conditions, components, and descriptions are summarized in Table 4.

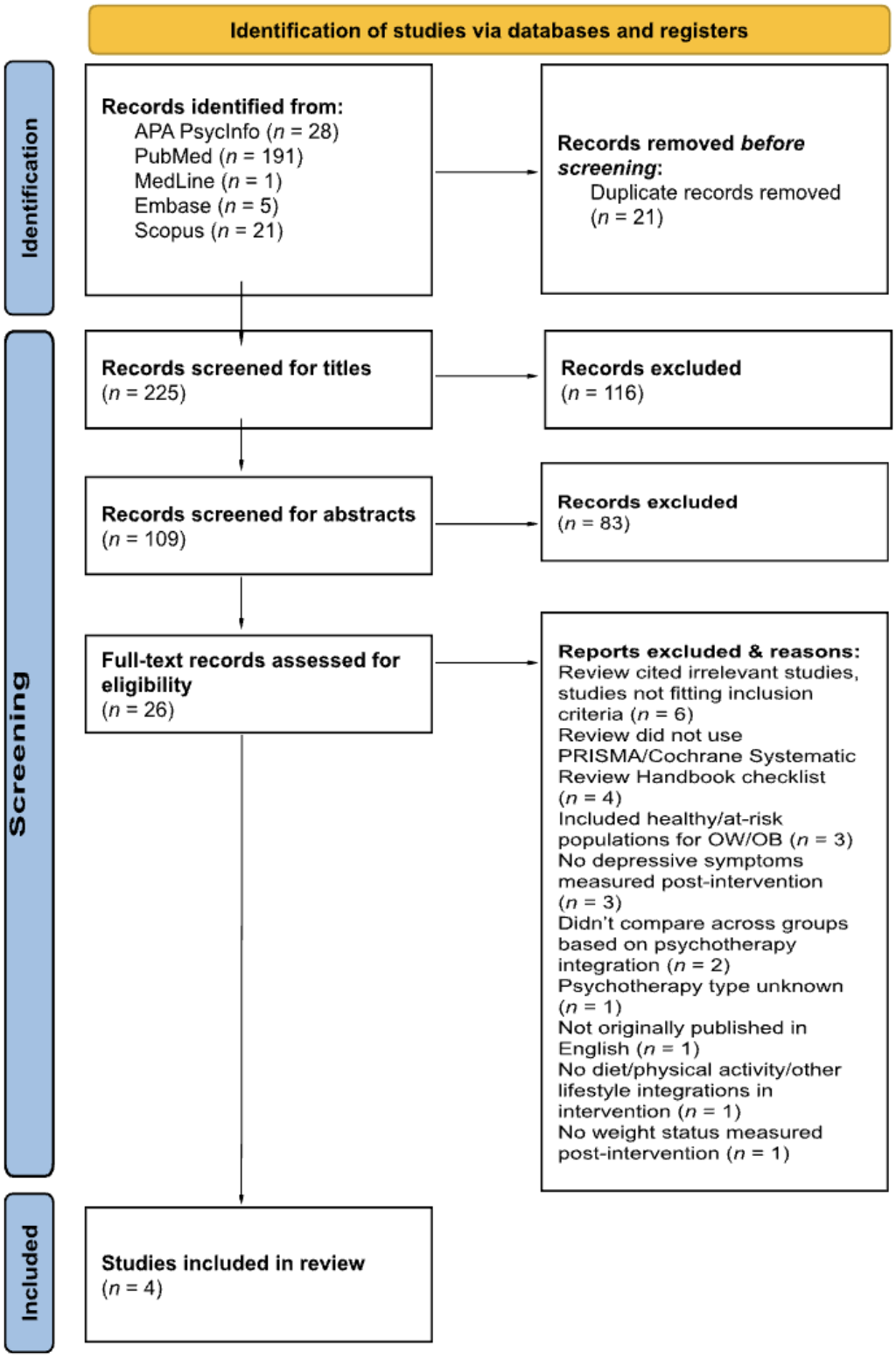

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram. Designed using Microsoft Word. Note: APA = American Psychological Association and OW/OB = overweight and/or obese.

Table 2. Characteristics of Participants in the Included Studies

Author of Publication	Sample Size/Proportion (based on sex)	Ethnicity/Race as Reported (in %)	Country	Inclusion & Exclusion Criteria	Mean Age (in years)
Robinson et al. [47]	Female (*n* = 134) Male (*n* = 107)	Latinx (98%) Black (2%) Other (<1%)	United States of America	Eligible if: aged 7–11 years; BMI at or above the 85th percentile. Not eligible if: diagnosed with a medical condition or taking a medication affecting growth; had a condition limiting participation in intervention; they or their guardian were unable to complete informed consent in English or Spanish; planned to move from the area within 36 months.	9.5
Jelalian et al.^ [48]	Girls (*n* = 24) Boys (*n* = 9)	White (61%) Hispanic (36%)	United States of America	Eligible if: 12-18 years old inclusive, met DSM-IV criteria for current MDE or Dysthymia [51], a CDRS score of 65 or greater [52], BMI greater than 25 or BMI percentile ≥ 85th percentile for sex and age, a parent or caregiver willing to participate. Not eligible if: met criteria for bipolar disorder or psychosis, if they were on medications known to impact weight status.	14.85
Luca et al. [49]	Girls in STOMP (65%)* Girls in comparison group (59%)*	NR	Canada	Eligible if: between 12-17 years and have BMI ≥ 99th percentile for age and gender or BMI > 95th percentile with a significant medical comorbidity Eligibility for STOMP participants: need to have been enrolled in the programme since January 2010 until February 2012 Eligbility for comparison group: meet entry criteria into STOMP but did not join STOMP due to time commitment and/or distance. Not excluded if they were enrolled in an obesity management program outside of STOMP. Not eligible if: STOMP participants underwent bariatric surgery after 6 months in the lifestyle program.	15.0
Abraham et al.^ [50]	Girls (*n* = 19) Boys (*n* = 29)	Chinese (100%)	China	Eligible if: aged 12-18 years, have a BMI greater than 95th percentile for age, attending the Pediatric Obesity and Lipid Clinic, and being proficient in Cantonese. Not eligible if: BMI below 95th percentile of local reference, concurrent participation in any clinical trial or dietary intervention program, have a severe medical illness.	14.4

Note: The table summarizes participant sample size, country, inclusion criteria, mean age, and relevant sociodemographic information for each included paper. BMI = body mass index; CDRS = clinical depression severity rating scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; NR = not reported; STOMP = SickKids team obesity management program; * = actual sample size unclear; ^ = pilot study.

Table 3. Study Designs, Measured Parameters, Baseline Characteristics, and Recruitment Methods Within Included Studies

Author of Publication	Study Design	Laboratory Values and/or Anthropometric Parameters Measured	Mean/Median BMI (in kg/m^2)	Depressive Score Measure(s) Used	Mean/Median Depressive Score	Recruitment Method
Robinson et al. [47]	Randomized Controlled Trial	• BMI • Weight • Waist circumference • Waist-to-height ratio • Triceps skinfold thickness • Estimated % body fat • BP • Heart rate • Hemoglobin A1C • Glucose • Insulin • Total cholesterol • LDL cholesterol • HDL cholesterol • Triglycerides • High-sensitivity C-reactive protein • Alanine aminotransferase	Mean = 25.26	CDI [53]	Mean = 2.96	Recruited through primary care providers, clinics, schools, community centres, churches, and other community locations in low-income, primarily Latinx neighbourhoods in Northern California, USA.
Jelalian et al.^ [48]	Pilot RCT	• BMI • Weight	Mean = 37.0	BDI-II [54]	Mean = 22.6	Referrals: mental health experts, pediatricians, and schools
Luca et al. [49]	Non-randomized comparative study	• BMI • z-BMI • BP • z-BP • Weight • Waist circumference • Fasting lipid profile • Glucose levels • Insulin levels	Mean = 39.65	CDI [53]	Mean (CDI-T score) = 48.4	STOMP participants were referred by a physician. Comparison participants were recruited from hospital clinics and previous studies.
Abraham et al.^ [50]	Pilot RCT	• BMI • BP • % Body fat • Waist circumference • Hip circumference	Median = 30.3	DASS-21 [55]	Median = 6.0	Recruited from the Obesity Clinic at a tertiary care hospital in Hong Kong.

Note: BMI = body mass index; BDI-II = Beck's depression inventory-second edition; BP = blood pressure; CDI = children's depression inventory; DASS-21 = depression, anxiety, and stress scale-21 items; HDL = high-density lipoprotein; LDL = low-density lipoprotein; RCT = randomized controlled trial; STOMP = SickKids team obesity management program; z-BMI = body mass index z-scores; ^ = pilot study.

Table 4. Summary of Intervention Conditions, Duration, Frequency, Component Descriptions, and Psychotherapy Integration(s) Utilized Within Included Studies.

Author of Publication	Intervention Conditions	Intervention Duration	Intervention Descriptions	Type of Psychotherapy Integration(s)
Robinson et al. [47]	(1) MMM (2) HE	3 years	(1) MMM: intervening directly with individual children, parents and families, peer groups, primary care clinics, and the home and community environments; multi-component, intervening on eating behaviours, physical activity, screen time, and parenting, via behavioural and environmental interventions based on Bandura's social cognitive model. Goals included promoting intrinsic motivation, altering implicit mindsets, and affirming cultural Latinx values. (2) HE: home counselling (twice per year), monthly health education newsletters, quarterly neighborhood-based health education, and 1-2 annual field trips per year to the Stanford campus and athletic events. Education content focused on nutrition, physical activity, screen time, chronic disease prevention, and general health.	CBT Concepts with a focus on Latinx cultural values and perspectives. Note that the intervention was based on the Bandura Cognitive Model.
Jelalian et al.^ [48]	(1) CBT (2) CBT-HL	24 weeks (+ 48-week follow-up)	(1) CBT: Problem-solving, cognitive restructuring, affect regulation, and behavioural activation skills. Additional modules (e.g., family problem-solving) as necessary. Homework assigned. 18 total sessions across 24 weeks, with each session ~60 minutes long. Weekly sessions from weeks 1-12, sessions every other week from weeks 13-24. (2) CBT-HL: All of the above; modules focused on diet, physical activity, and their relationships with depressed mood. Content on Body Image and Coping with Food Cravings. 18 total sessions across 24 weeks, with each session ~60 minutes long. Weekly sessions from weeks 1-12, sessions every other week from weeks 13-24. Additional weekly 60-minute group aerobic exercise sessions.	CBT Skills
Luca et al. [49]	(1) STOMP (2) Comparison group	STOMP; 1 year	(1) STOMP: intensive education curriculum for adolescents and their parents, frequent appointments with social worker, psychologist, dietitian, and exercise counsellor. CBT and MI delivered, with additional individual or family therapy as needed. Involved weekly visits for the first 6 weeks, then biweekly for 6 months with individualized follow-up and transition in the second year. (2) Comparison group: not enrolled in STOMP and may be enrolled in obesity management programs outside of STOMP.	Individual CBT with MI (with Family Therapy as needed)
Abraham et al.^ [50]	(1) IT group (2) sLMP (3) Control	24 weeks	(1) IT group: usual care visits with physician at weeks 0, 12, and 24, together with a 12-week (week 0-12) internet-based curriculum. Set diet and physical activity monthly goals as part of the curriculum, received weekly SMS about goals and need to respond with whether they achieved weekly target. (2) sLMP: usual care visits with physician at at weeks 0, 12, and 24. 4 meetings with dietitian/nutritionist using patient-centered approach and CBT concepts over 3 months, providing personalized dietary and exercise advice. 4 counseling sessions conducted at weeks 0, 2, 4, and 12. (3) Control: usual care visits with a physician at weeks 0, 12, and 24. Usual care consisted of a focused dietary and physical activity history, medical history, physical examination, laboratory screening, and obesity counselling.	CBT Concepts

Note: CBT = cognitive behavioural therapy; CBT-HL = cognitive behavioural therapy-healthy lifestyle; HE = health education; IT = internet intervention; MI = motivational interviewing; MMM = multi-level, multi-setting, multi-component; sLMP = simplified lifestyle modification program; SMS = short message service; ^ = pilot study.

Impact on Weight Status

First, Luca and colleagues conducted a non-randomized comparative study using the intervention conditions and components summarized in Table 4. At the 12-month time point of being enrolled in the intervention, they found that although adolescents with severe obesity displayed an increasing trend in BMI (+0.8 kg/m^2 ± 0.5; $p = 0.07$), this was accompanied by a significant decrease in waist circumference (WC; (-7.4 ± 2.1 cm; $p < 0.01$)) among participants. However, both changes were not deemed statistically significant by the researchers as per their set threshold of significance [49].

Participants in the randomized controlled trial (RCT) conducted by Robinson et al. showed patterns of decreasing BMI post-intervention. Specifically, children with OW/OB assigned to the multi-level, multi-setting, multi-component (MMM) intervention group in this study displayed a decreasing trend in BMI over one year (-0.73 [-1.07 to -0.39] kg/m^2) and two years (-0.63 [-1.13 to -0.14] kg/m^2). Other anthropometric measures within this study corroborated these findings as decreasing trends in WC, waist-to-height ratio, triceps skinfold thickness, and estimated percent body fat were all observed. However, none of the observed trends were statistically significant [47].

Among the two pilot RCTs that were included, Jelalian et al. noted a trending increase in BMI among adolescents with OW/OB in the CBT condition (+2.1 kg/m^2), whereas stability of BMI was noted in adolescents in the CBT-HL condition (+0.6 kg/m^2). However, these trends were not significant ($p = 0.32$) [48]. In Abraham et al., adolescents with OW/OB in the sLMP group, by their final visit, observed no significant differences in BMI, body fat percentage, WC, and hip circumference (HC) relative to the other intervention groups ($p > 0.05$). Although a trending decrease in blood pressure (BP) was noted by their final visit, this was not found to be significant between intervention groups ($p > 0.05$) [50].

Overall, despite the trends observed within these studies, none demonstrated a statistically significant impact on weight status among youth with OW/OB as per the authors' set significance thresholds.

Impact on Depressive Symptoms

First, in Luca et al., although adolescents with severe obesity showed significant reductions in depression scores received on the Children's Depression Inventory (CDI) 6 months into the STOMP intervention (-3.5 ± 1.7; $p < 0.05$), these reductions were not deemed statistically significant based on the authors' set threshold of significance [53]. Moreover, these effects were found to be negligible 12 months into the STOMP intervention ($p = 0.89$) [49].

Second, Robinson et al. showed that although children with OW/OB in the MMM intervention experienced decreasing trends in depressive symptoms at the 1-year, 2-year, and 3-year time points, these decreases were not significant as measured on the CDI [47,53].

Furthermore, the included pilot RCTs showed similar results. Jelalian et al. found that adolescents with OW/OB and diagnosed comorbid depression as per the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria, in the CBT-HL group, exhibited a significant reduction in depressive symptoms as measured by Beck's Depression Inventory - 2nd edition (BDI-II; -11.6 points) post-intervention [51,54]. This same significant effect was found among adolescents in the CBT group who showed a greater reduction in depressive symptoms on the BDI-II (-18.1 points). However, there were no statistical differences found in adolescents' depressive symptoms between groups [48]. Lastly, in Abraham et al., although adolescents with OW/OB in the sLMP group showed decreasing trends in depressive scores on the Depression, Anxiety, and Stress Scale - 21 items (DASS-21) upon every visit, these differences were not significant between both groups ($p = 0.13$) [50,55].

Overall, we observed mixed effects on youth with OW/OB's depressive symptoms following the integration of psychotherapy interventions. All results for the included studies have been summarized in Table 5.

Table 5. Summary of Post-Intervention Outcomes Among Youth Across Included Studies

	Author & Year of Publication			
Author of Publication	Robinson et al. [47]	Jelalian et al.^ [48]	Luca et al. [49]	Abraham et al.^ [50]
Psychotherapy Intervention Condition Being Considered	**MMM**	**CBT-HL**	**STOMP**	**sLMP**
Outcome(s): BMI	**NS** (at 1, 2, and 3-year timepoints)	**NS** (at 24 weeks, 48 weeks post-intervention, and between-group)	**NS** (at 6-month and 1-year timepoints, and between-group)	**NS** (at 24 weeks and between-groups)
Outcome(s): Other Anthropometric Parameters	• *WC:* **NS** (at 1, 2, and 3-year timepoints) • *Waist-to-height ratio:* **NS** (at 1, 2, and 3-year timepoints) • *Triceps skinfold thickness:* **NS** (at 1, 2, and 3-year timepoints) • *Estimated % body fat:* **NS** (at 1, 2, and 3-year timepoints)	**N/A**	• *WC:* **NS** (at 6-month timepoint) • *WC:* ****** (at 1-year timepoint) • *WC:* ***** (between-group at 1 year)	• *BP:* **NS** (at 24 weeks and between groups) • *% body fat*: **NS** (at 24 weeks and between groups) • *WC:* **NS** (at 24 weeks and between groups) • *HC:* **NS** (at 24 weeks and between groups)
Outcome(s): Depression Scores	**NS** (at 1, 2, and 3-year timepoints)	• ******* (at 24 weeks and 48 weeks post-intervention) • **NS** (between-group)	• ****** (at 6-month timepoint) • ***** (between-group at 6 months) • **NS** (at 1-year timepoint and between-group at 1 year)	**NS** (at 24 weeks and between-groups)

Note: BMI = body mass index; CBT = cognitive behavioural therapy; CBT-HL = cognitive behavioural therapy-healthy lifestyle; HC = hip circumference; MMM = multi-level, multi-setting, multi-component; N/A = not applicable; NS = not significant; sLMP = simplified lifestyle modification program; STOMP = SickKids team obesity management program; WC = waist circumference; ^ = pilot study; *p < 0.05; **p < 0.01; ***p < 0.001.

Discussion

All included studies demonstrated no effect on youth with OW/OB's weight statuses following OW/OB interventions with psychotherapy integrations, based on the authors' set thresholds of significance. Moreover, the effect of such interventions on their depressive symptoms varied. Robinson et al. found no effect on depressive symptoms [47]. Although Luca et al. found significant reductions 6 months post-intervention, these were not considered significant based on the authors' set threshold and eventually, became negligible 1 year post-intervention [49]. Among the pilot studies included, Jelalian et al. demonstrated significant reductions in depressive symptoms post-intervention and at follow-up, whereas Abraham et al. did not show any meaningful effects [48,50].

It is surprising to note that all studies included in this narrative review, regardless of study type, did not demonstrate significant changes in weight status for youth with OW/OB following CBT integrations. Although Luca et al. did show significant short-term improvements in waist circumference, it was not deemed as such based on the authors' set threshold [49]. This stands in contrast to a

recently published systematic review on adults with OW/OB, which found that across studies investigating CBT integrations, lifestyle interventions, weight loss interventions, or their combinations, these adults improved in at least one aspect of their weight status and/or depressive symptoms [56]. Although such a contrast in findings may, in part, be explained due to differences in characteristics between early-onset and late-onset obesity, it is difficult to ascertain as this is yet to be investigated [57].

Moreover, across the included studies, the effectiveness of psychotherapy integrations within OW/OB interventions on youth's depressive symptoms showed mixed results. This seems to be consistent with existing literature on adults with OW/OB and comorbid depression [58]. This is concerning as the monetary and infrastructural resources allocated to such interventions and any integrations may not justify their use for treating youth with OW/OB. At the same time, many researchers argue for psychotherapy integrations, regardless of OW/OB severity. Some scholars argue that CBT, for instance, can equip youth with OW/OB with skills such as self-monitoring of lifestyle changes, restructuring negative thoughts, and effectively coping with prejudice and overt discrimination [59]. Overall, psychotherapy integrations are touted across the literature as an essential tool to empower youth to make sustained lifestyle changes and deal with issues related to weight discrimination and depression [59,60]. Moving forward, to assess their effectiveness wholly and accurately, it may be important for future studies to investigate the role of psychotherapy integrations within OW/OB interventions on other important outcomes for youth such as personal goal achievements and their ability to generalize skills learned during psychotherapy in real-life.

To account for the weak success of the OW/OB interventions in improving both weight status and depression symptoms among youth across the included studies, we argue that a lack of culturally adapted integrations within these interventions potentially weakened their effectiveness. Across the included studies, we noticed that although some recruited ethnoracially diverse participants, the interventions delivered were, for the most part, not correspondingly adapted to their cultural backgrounds. To date, many studies incorporating culturally-adapted interventions for OW/OB and depressive symptoms separately have shown promising results [61-63]. Altogether, we suggest that the complexity of youth OW/OB demands that psychotherapy and interventions must include culturally adapted services delivered by a culturally competent interdisciplinary team for the greatest success.

Through our search and analyses of the included studies, we noted some trends regarding the existing literature. First, we noted a marked deficit in literature investigating the impact of integrated evidence-based psychotherapy interventions on weight status and depressive symptoms for youth with OW/OB. Young children were especially underrepresented, as only 1 of the 4 studies in this review investigated children, while all others investigated adolescents. Moreover, we also noted significant variability in study type. Consequently, caution must be exercised when interpreting the results of the included studies. By nature, pilot RCTs tend to be underpowered, due to which biased estimates are often obtained [64]. Similarly, non-randomized studies often face issues with selection bias and confounding [65].

Moreover, all included studies primarily integrated CBT components. This is unsurprising as CBT remains the gold standard for administering psychotherapy, especially for the treatment and/or management of depressive symptoms [66]. However, many other evidence-based psychotherapies have shown effectiveness in treating depressive symptoms including CT, IPT, PST, and MBCT, as per Chambless & Hollon's 1998 criteria [42, 22]. These psychotherapies were notably absent from the current literature. Future studies should seek to integrate these other evidence-based psychotherapies or their components to investigate their effect on weight status and depressive symptoms in youth with OW/OB.

Interestingly, the authors of two reviews investigating similar outcomes among adults with OW/OB having comorbid depression faced similar challenges to us. The authors noted that current literature assessing evidence-based psychotherapy-integrated OW/OB interventions targeting these adults was insufficient and highly heterogeneous [56,41]. The same was undoubtedly found in the current review. This is, in part, due to studies using variable psychotherapy integrations, intervention structures and components, study designs, and inclusion criteria. Furthermore, the variability in the study types and intervention conditions across the included studies made it difficult to isolate whether the effects observed were due to the psychotherapy types alone, or due to other factors. Such variability may have contributed to the heterogeneous results obtained across these studies. Moreover, a lack of sufficient standardization of intervention components likely hindered the comparability of outcomes found between studies. Therefore, it is essential for future studies investigating the effectiveness of such tailored interventions to sufficiently standardize their components, designs, conditions, and inclusion criteria to obtain more consistent and replicable results that can eventually be implemented for youth with OW/OB experiencing depressive symptoms.

Limitations

We acknowledge that this review has some limitations. First, we chose to include randomized and non-randomized empirical articles, reviews, meta-analyses, certain types of clinical trials, and pilot studies. This is generally an atypical approach to take in the same review. However, this was done to include as many relevant studies as possible, as we anticipated a scarcity of literature within this domain a priori. To overcome this limitation, the findings of each study were discussed and interpreted separately, based on

study type, to the best of our ability. We also only included papers published in English, which may present a risk of bias for data from North America and Europe and may limit the applicability of findings to a global setting [67]. Lastly, we acknowledge that the inclusion criteria for our review were relatively strict in order to include studies as comparable to each other as possible. However, this may have contributed, in part, to the lack of included studies in our review.

Conclusions

Our review shows preliminary evidence that psychotherapy integrations within OW/OB interventions did not show significant effects on youth with OW/OB's weight statuses, whereas the effects on their depressive symptoms remain mixed. Nonetheless, the effects of these interventions on these two outcomes still remain insufficiently characterized due to a concerning lack of literature in this domain. Given the high comorbidity and severe level of impairment associated with depression and childhood obesity among youth, there is an urgent need for researchers to develop, test, and implement interventions that holistically address and improve youth with OW/OB's weight statuses and depressive symptoms contemporaneously. Moving forward, this will further inform the interdisciplinary approach to the care these youth will subsequently receive from physicians, nurse practitioners, psychologists, social workers, nutritionists, dietitians, and exercise counsellors.

List of Abbreviations Used

ADHD: attention-deficit hyperactivity disorder
APA: American psychological association
ASD: autism spectrum disorder
BA: behavioural activation
BDI-II: Beck's depression inventory-second edition
BMI: body mass index
BP: blood pressure
CBT: cognitive behavioural therapy
CBT-HL: cognitive behavioural therapy-healthy lifestyle
CDI: children's depression inventory
CDRS: clinical depression severity rating scale
COVID-19: coronavirus disease-2019
DASS-21: depression, anxiety, and stress scale-21 items
DBT: dialectic behaviour therapy
DSM-5: diagnostic and statistical manual of mental disorders, fifth edition
DSM-IV: diagnostic and statistical manual of mental disorders, fourth edition
HC: hip circumference
HDL: high-density lipoprotein
HE: health education
IPT: interpersonal therapy
IT: internet intervention
LDL: low-density lipoprotein
MBCT: mindfulness-based cognitive therapy
MDD: major depressive disorder
MDE: major depressive episode
MeSH: map term to subject heading
MI: motivational interviewing
MMM: multi-level, multi-setting, multi-component
N/A: not applicable
NR: not reported
NS: not significant
OB: obesity
OW: overweight
OW/OB: overweight and/or obese
PRISMA: preferred reporting items for systematic reviews and meta-analysis
PST: problem-solving therapy
RCT: randomized controlled trial
SES: socioeconomic status
sLMP: simplified lifestyle modification program
SMS: short message service
STOMP: SickKids team obesity management program
T2D: type 2 diabetes
WC: waist circumference
WEIRD: western, educated, industrialized, rich and democratic
z-BMI: body mass index z-scores
z-BP: blood pressure z-scores

Conflicts of Interest

The author(s) declare that they have no conflict of interest.

Ethics Approval and/or Participant Consent

As this is a narrative review, ethics approval and/or participant consent was not required.

Authors' Contributions

RK: contributed to the conception and design of the review, collection of data, interpretation and analysis of data, wrote and revised the manuscript, and gave final approval of the version to be published.
GR: contributed to the conception and design of the review, collection of data, interpretation and analysis of data, wrote and revised the manuscript, and gave final approval of the version to be published.

Third Party Contributions

RR: resolved discrepancies throughout the title, abstract, and full-text screening processes; mentored authors throughout the development and completion of the review.

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