Guideline CPD

# Managing obesity in children: a clinical practice guideline

Geoff D.C. Ball PhD, Roah Merdad MD PhD, Catherine S. Birken MD MSc, Tamara R. Cohen PhD, Brenndon Goodman JD, Stasia Hadjiyannakis MD, Jill Hamilton MD, Mélanie Henderson MD PhD, John Lammey MASc JD, Katherine M. Morrison MD, Sarah A. Moore PhD, Aislin R. Mushquash PhD, Ian Patton PhD, Nicole Pearce, Joshua K. Ramjist MD, Tracy Rhyason Lebel BScEng, Brian W. Timmons PhD, Annick Buchholz PhD, Jennifer Cantwell BEd, Jennifer Cooper BA MEd, Julius Erdstein MD, Donna Fitzpatrick-Lewis MSW, Dawn Hatanaka MA, Patrice Lindsay PhD, Tasneem Sajwani MD, Meghan Sebastianski PhD, Diana Sherifali PhD, Julie St. Pierre MD PhD, Muhammad Usman Ali MD PhD, Jessica Wijesundera MSc MPH, Angela S. Alberga PhD, Christine Ausman MA, Trisha C. Baluyot MSc, Emily Burke MA, Kara Dadgostar MA, Bronwyn Delacruz MD, Elizabeth Dettmer PhD, Maegan Dymarski MA, Zahra Esmaeilinezhad MSc, Ilona Hale MD, Soren Harnois-Leblanc PhD, Josephine Ho MD, Nicole D. Gehring MSc, Marsha Kucera MD, Jacob C. Langer MD, Amy C. McPherson PhD, Leen Naji MD PhD, Krista Oei MD MSc, Grace O'Malley PhD, Angelica M. Rigsby MSc, Gita Wahi MD PhD, Ian S. Zenlea MD MPH, Bradley C. Johnston PhD

■ Cite as: *CMAJ* 2025 April 14;197:E372-89. doi: 10.1503/cmaj.241456

## Abstract

**Background:** Obesity is a complex, chronic, stigmatized disease whereby abnormal or excess body fat may impair health or increase the risk of medical complications, and can reduce quality of life and shorten lifespan in children and families. We developed this guideline to provide evidence-based recommendations on options for managing pediatric obesity that support shared decision-making among children living with obesity, their families, and their health care providers.

**Methods:** We followed the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach. We used the Guidelines International Network principles to manage competing interests. Caregivers, health care providers, and people living with obesity participated throughout the guideline development process, which optimized relevance. We surveyed end users (caregivers, health care providers) to prioritize health outcomes, completed 3 scoping reviews (2 on minimal important difference estimates; 1 on clinical assessment), performed 1 systematic review to characterize families' values and preferences, and conducted 3 systematic reviews and meta-analyses to examine the benefits and harms of behavioural and psychological, pharmacologic, and surgical interventions for managing obesity in children. Guideline panellists developed recommendations focused on an individualized approach to care by using the GRADE evidence-to-decision framework, incorporating values and preferences of children living with obesity and their caregivers.

**Recommendations:** Our guideline includes 10 recommendations and 9 good practice statements for managing obesity in children. Managing pediatric obesity should be guided by a comprehensive child and family assessment based on our good practice statements. Behavioural and psychological interventions, particularly multicomponent interventions (strong recommendation, very low to moderate certainty), should form the foundation of care, with tailored therapy and support using shared decision-making based on the potential benefits, harms, certainty of evidence, and values and preferences of children and families. Pharmacologic and surgical interventions should be considered (conditional recommendation, low to moderate certainty) as therapeutic options based on availability, feasibility, and acceptability, and guided by shared decision-making between health care providers and families.

**Interpretation:** This guideline will support children, families, and health care providers to have informed discussions about the balance of benefits and harms for available obesity management interventions to support value- and preference-sensitive decision-making.


© 2025 CMA Impact Inc. or its licensors

Pediatric obesity is a chronic, stigmatized, progressive disease, characterized by the presence of excess body fat that may impair the health and well-being of children and their families.[1] When body mass index (BMI) is used as a proxy measure for body fat (or adiposity), about one-quarter of 4- to 11-year-olds and one-third of 12- to 17-year-olds in Canada have an elevated BMI (i.e., overweight or obesity).[2,3] National data are unavailable, but international reports suggest that the global prevalence of pediatric obesity has tripled over the past 30 years,[4] a trend that likely accelerated during the COVID-19 pandemic.[5] These findings are important to health care providers and systems, as most children who are referred for and enrolled in obesity management have severe obesity.[6–8]

Adverse metabolic (e.g., insulin resistance, high blood pressure), mechanical (e.g., obstructive sleep apnea, musculoskeletal pain), mental health (e.g., anxiety, depression), and social (e.g., bullying) issues are common in children with obesity, especially among those with severe obesity.[7,9] Just over half of 7- to 11-year-olds with obesity maintain their obesity into adolescence, and about 80% of 12- to 18-year-olds with obesity continue to have obesity in adulthood.[10] Children with obesity face substantial bias and stigma,[11] which may have negative long-term effects on health outcomes[12] and can discourage children and their families from accessing health services for managing pediatric obesity.[13]

The health consequences and persistence of pediatric obesity into adulthood highlight the need for available, accessible, family-oriented interventions for effective obesity management. Success in managing pediatric obesity is most likely when children and their families access support and receive practical strategies to make and maintain positive behavioural changes,[14] complemented by pharmacologic and surgical interventions, when available and indicated.

The purpose of this guideline, developed in partnership with Obesity Canada, is to provide evidence-based recommendations on options for managing pediatric obesity that support informed and shared decision-making among children living with obesity, their families, and their health care providers. People from these 3 groups were included in developing this guideline to optimize relevance and applicability. This guideline supersedes the original Canadian guideline[15] and complements the updated adult obesity guideline.[16]

## Scope

This clinical practice guideline is intended to support providers of health care to children with obesity in varied settings. It should also be useful to families (children living with obesity and their caregivers) by helping to inform their decisions related to managing obesity. We anticipate that decision-makers will find our guideline useful for allocating health care resources.

In this guideline, the term "children" refers to those aged up to 18 years, unless specified otherwise. The focus of our guideline is on managing obesity exclusively and not managing overweight and obesity or obesity in children with other chronic diseases or genetic diseases (e.g., monogenic or syndromic obesity) that may exist concurrently. Although addressing the primary prevention of obesity in children is an essential public health issue,[17] prevention is also beyond the scope of this guideline.

## Recommendations

We developed 10 recommendations; 5 recommendations are for behavioural and psychological interventions, 3 for pharmacologic interventions, and 2 for surgical interventions (Table 1).[18] We also generated 9 good practice statements (Box 1),[19–23] designed to serve as guiding principles for health care providers when offering care for children with obesity and their families. A visual summary of the guideline is available in Figure 1.

As shown in Table 2,[18,24,25] we used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to develop our recommendations, taking into consideration the balance between the magnitude and certainty of desirable (benefits) and undesirable (harms) outcomes based on 3 systematic reviews and meta-analyses (referred to as meta-analyses) of behavioural and psychological, pharmacologic, and surgical interventions.[26–28] Our recommendations were also informed by a systematic review of health-related values and preferences based on the lived experience of caregivers and people living with obesity.[29]

To interpret intervention effects, we prioritized health outcomes as critically important, very important, or important (Table 3).[30,31] Where possible, we applied minimal important difference (MID) estimates to determine the magnitude of effect (e.g., little to no effect, small effect) for each outcome.[32,33] The magnitude of effect was accompanied by the certainty of evidence (i.e., from low to high) for each outcome. If results were not statistically significant, we did not conclude that there was no effect; rather, based on GRADE guidance, we rated down the certainty of evidence for imprecision, which applied to outcome measures regardless of whether they had an MID estimate (Appendix 1, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.241456/tab-related-content).[34] We applied a standardized process, also based on GRADE, to develop our good practice statements.[25]

### Behavioural and psychological interventions

Aligning with the Canadian adult obesity guideline,[16] we defined behavioural and psychological interventions as interventions that had health or health behaviour goals (e.g., improved nutrition, physical activity, sleep habits, health-related quality of life [HRQoL]). They often included theory-driven interventions (e.g., cognitive behavioural therapy) and strategies such as goal-setting, self-monitoring, stimulus control, problem-solving, cognitive restructuring, and relapse prevention. Table 1 provides recommendations and Table 3 information regarding health outcomes, MID estimates, and priority level rankings.

#### Multicomponent interventions

*We recommend using multicomponent interventions (i.e., at least 2 of physical activity, nutrition, psychology, and technology interventions) for managing obesity in children aged 18 years and younger (strong recommendation, very low to moderate certainty of evidence*).

**Table 1 (part 1 of 2): Recommendations for behavioural and psychological, pharmacologic, and surgical interventions for managing pediatric obesity**

| Recommendations | Strength of recommendations; certainty of evidence* |
|---|---|
| **1. Behavioural and psychological interventions** | |
| 1.1 Multicomponent interventions<br>*We recommend using multicomponent interventions (i.e., at least 2 of physical activity, nutrition, psychology, and technology interventions) for managing obesity in children aged 18 years and younger.*<br>Rationale: For critically important and very important outcomes, compared with minimal interventions, multicomponent interventions had a small effect on depression, anxiety, and BMIz. Interventions had little to no effect on HRQoL. No serious AEs were reported in any multicomponent intervention studies. When mild to moderate AEs were reported, they were trivial. | Strong; very low to moderate certainty |
| 1.2 Nutrition interventions<br>*We suggest using nutritional interventions for managing obesity in children aged 18 years and younger.*<br>Rationale: For critically important outcomes, no data were available, but for our very important outcome (BMIz), compared with minimal interventions, nutrition interventions had a small beneficial effect. No serious AEs were reported in any nutrition intervention studies. When mild to moderate AEs were reported, they were trivial. This recommendation relates to nutrition interventions exclusively, not in conjunction with other interventions. | Conditional; very low to low certainty |
| 1.3 Physical activity interventions<br>*We suggest using physical activity interventions for managing obesity in children aged 18 years and younger.*<br>Rationale: For critically important and very important outcomes, intervention effects were small for HRQoL and BMIz; for depression and anxiety, there were little to no effects. No serious AEs were reported in any physical activity intervention studies. On rare occasions when mild to moderate AEs were reported, they included musculoskeletal injuries (e.g., mild ankle sprain) or discomfort (e.g., postexertional malaise). This recommendation relates to physical activity interventions exclusively, not in conjunction with other interventions. | Conditional; very low to low certainty |
| 1.4 Psychological interventions<br>*We suggest using psychological interventions for managing obesity in children aged 18 years and younger.*<br>Rationale: For critically important outcomes, intervention effects for depression were moderate and small for HRQoL; no anxiety data were reported. For our very important outcome (BMIz), psychological interventions resulted in little to no effect. There was no evidence of serious AEs and very little evidence of mild to moderate AEs from psychological interventions. This recommendation relates to psychological interventions exclusively, not in conjunction with other interventions. | Conditional; very low to moderate certainty |
| 1.5 Technology interventions<br>*We recommend neither for nor against using technology interventions for managing obesity in children aged 18 years and younger.*<br>Rationale: For all critically important outcomes, there were little to no effects of technology interventions on HRQoL, depression, or anxiety. For our very important outcome, there was a small beneficial effect on BMIz. There was no evidence of serious (critically important outcome) or mild to moderate (important outcome) AEs. This recommendation relates to technology interventions exclusively, not in conjunction with other interventions. | Conditional; very low to low certainty |
| **2. Pharmacologic interventions** | |
| 2.1 Glucagon-like peptide-1 receptor agonists<br>*We suggest that glucagon-like peptide-1 receptor agonists be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 12 years and older.*<br>Rationale: Overall, for critically important outcomes, GLP-1RAs had little to no effect on HRQoL; no data were available on depression and anxiety. For our very important outcome (BMIz), GLP-1RAs may result in a small reduction in BMIz. Subgroup analyses showed that semaglutide had more substantial effects on HRQoL (small effect) and BMIz (very large effect), along with effects on several other important outcomes, versus other GLP-1RAs. Evidence regarding an increased risk of serious AEs (a critically important outcome) with GLP-1RAs was uncertain. There may be a small increased risk in mild to moderate AEs with GLP-1RAs, but the risk appeared to vary. Most of the evidence supporting this recommendation was derived from children aged 12 years and older. The effectiveness and safety of GLP-1RAs for children younger than 12 years has not been evaluated. Studies that examined the effects of GLP-1RAs included concurrent behavioural and psychological interventions, which varied study to study. | Conditional; very low to low certainty |
| 2.2 Biguanides<br>*We suggest that biguanides be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 12 years and older.*<br>Rationale: For critically important outcomes, biguanides (e.g., metformin) had little to no effect on HRQoL; no data were reported on anxiety and depression. For our very important outcome (BMIz), biguanides had a moderate effect. Biguanides resulted in no serious AEs (critically important outcome) but may result in more mild to moderate AEs than in controls. Most of the evidence supporting this recommendation was derived from children aged 12 years and older. Studies that examined the effects of biguanides included concurrent behavioural and psychological interventions, which varied study to study. | Conditional; low to moderate certainty |

**Table 1 (part 2 of 2): Recommendations for behavioural and psychological, pharmacologic, and surgical interventions for managing pediatric obesity**

| Recommendations | Strength of recommendations; certainty of evidence* |
|---|---|
| 2.3 Lipase inhibitors<br>*We suggest against using lipase inhibitors for managing obesity in children.*<br>Rationale: There was a lack of evidence for the effects of lipase inhibitors (e.g., orlistat) on critically important (HRQoL, anxiety, depression) and very important (BMIz) outcomes. Lipase inhibitor use may result in more cases of serious AEs (a critically important outcome) and more cases of mild to moderate AEs (e.g., gastrointestinal) than in controls. Most of the evidence supporting this recommendation was derived from children aged 12 years and older. Studies that examined the effects of lipase inhibitors included concurrent behavioural and psychological interventions, which varied study to study. | Conditional; low certainty |
| **3. Surgical interventions** | |
| 3.1 Laparoscopic sleeve gastrectomy<br>*We suggest that laparoscopic sleeve gastrectomy be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 13 years and older who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team.*<br>Rationale: For critically important outcomes, LSG had a very large effect on HRQoL; no data were reported on anxiety and depression. For very important outcomes, weight and BMI decreased substantially. For undesirable effects, LSG may result in a higher incidence of serious AEs (a critically important outcome) and mild to moderate AEs (an important outcome). The effectiveness and safety of LSG were evaluated in individuals who were almost exclusively aged 13 years and older and in combination with behavioural and psychological interventions, which varied study to study. | Conditional; low to moderate certainty |
| 3.2 Roux-en-Y gastric bypass<br>*We suggest that Roux-en-Y gastric bypass be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 13 years and older who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team.*<br>Rationale: For critically important outcomes, RYGB had a large effect on HRQoL and small effects on anxiety and depression. For very important outcomes, RYGB led to substantial reductions in weight and BMI. For undesirable effects, RYGB may result in higher incidence of serious AEs (a critically important outcome) and mild to moderate AEs (an important outcome). The effectiveness and safety of RYGB were evaluated in individuals who were almost exclusively aged 13 years and older and in combination with behavioural and psychological interventions, which varied study to study. | Conditional; low to moderate certainty |

Note: AE = adverse event, BMI = body mass index, BMIz = body mass index *z* score, GLP-1RA = glucagon-like peptide-1 receptor agonists, GRADE = Grading of Recommendations Assessment, Development and Evaluation, HRQoL = health-related quality of life, LSG = laparoscopic sleeve gastrectomy, RYGB = Roux-en-Y gastric bypass.
*GRADE certainty of evidence[18] for behavioural and psychological, pharmacologic, and surgical interventions was based on critically important (HRQoL, depression, anxiety, and serious AEs) and very important outcomes (BMIz for behavioural and psychological and pharmacotherapy interventions; BMI and weight for surgery) only. Ranges were included for certainty of evidence ratings based on recommendations from the guideline panel and variability in the certainty of evidence across critically important and very important outcomes. Most panellists with lived experience placed higher value on improvements in HRQoL, depression, anxiety, serious AEs, and BMIz (or BMI and weight) than other outcomes.

We derived the evidence for multicomponent interventions (which include 2 or more of physical activity, nutrition, psychological, or technology interventions) from a meta-analysis[26] that included 22 randomized controlled trials (RCTs) (2184 participants; 55% female; ages 3–5 yr 17.4%, 6–12 yr 43.5%, 13–18 yr 21.7%, mixed 17.4%), mostly combining both physical activity and nutrition interventions. Multicomponent interventions were heterogeneous, so we could not infer whether any specific intervention was superior. For perspective, 1 exemplar RCT investigated the effects of a 6-month, family-based, behavioural intervention that included 2 high-intensity exercise sessions each week (participants were encouraged to be physically active 3 additional days per week) and a weekly nutrition education session emphasizing low-fat, nutrient-dense foods in moderate portions and behaviour modification techniques (e.g., self-awareness, goal-setting, coping skills training). Monthly gift card raffles were used as external motivation.[35]

### *Balance of benefits and harms*

For multicomponent interventions, the guideline panel assessed the overall anticipated desirable effects as moderate and undesirable effects as trivial, which was based on very low- to moderate-certainty evidence (Appendix 1). For critically important and very important desirable outcomes (Table 3), compared with usual care, multicomponent interventions had a small beneficial effect on depression (Clinical Depression Inventory mean difference [MD] –2.30, 95% confidence interval [CI] –4.07 to –0.54) and a large effect on anxiety (Social Anxiety Scale for Children and Adolescents MD –13.83, 95% CI –19.87 to –7.79). We found little to no effect on HRQoL (Pediatric Quality of Life Inventory [PedsQL] MD 0.51, 95% CI –3.69 to 4.70) and a small reduction in BMI *z* score (BMIz; i.e., a relative measure of BMI that accounts for age and sex) (MD –0.18, 95% CI –0.34 to –0.03). For important anthropometric outcomes, weight (MD –4.33 kg, 95% CI –6.73 to –1.93 kg) and possibly BMI (MD –2.10, 95% CI –3.81 to 0.36) showed improvements (no MID estimates).

## Box 1: Good practice statements for managing obesity in children

**Health care providers should use person-first language and avoid using negative, stigmatizing language.**

This good practice statement acknowledges that health care providers should establish trust, rapport, and a positive relationship with children and families, which begins with using appropriate language. Health care providers are in a good position to address the shame and guilt felt by some children and families, especially if they view obesity as a personal choice and moral failing. Some children with obesity and families have a history of negative interactions with health care providers, including feeling blamed and shamed. It is important to use encouraging, supportive words and language during clinical conversations. Health care providers should consider children's age and maturity before initiating conversations about obesity, considering whether conversations should include caregivers exclusively, children exclusively, or caregivers and children together. Health care providers can plan and lead positive conversations using practical resources, including a casebook for health care providers and guide for caregivers.[19]

**Health care providers should acknowledge that obesity is a complex, chronic, and relapsing disease that requires establishing a positive relationship with children and families, and includes providing long-term support for obesity management for children and families.**

This good practice statement recognizes that misperceptions are common regarding the causes and consequences of obesity and weight gain. In their conversations with children and families, health care providers should acknowledge that genetic, physiologic, and environmental factors make it challenging to lose weight and maintain weight loss. The chronicity of obesity highlights the valuable role played by health care providers to help children and families transition from pediatric to adult care when that time comes.

**Health care providers in Canada should assess children's physical growth and development using the World Health Organization (WHO) growth charts for Canada[20] criteria and sex- and age-specific body mass index (BMI) data.**

This good practice statement acknowledges the appropriateness of the WHO criteria for evaluating children's growth and development, which is based on reference data relevant for Canadian children. This resource provides guidance for health care providers regarding weighing and measuring children as well as calculating and interpreting body mass index (BMI) and BMI *z* score. This statement is consistent with recommendations from leading Canadian health organizations. Health care providers should discuss growth and development using neutral words (e.g., BMI, weight, growth) that children and families may find less stigmatizing. They should also recognize that focusing solely on body weight can precipitate weight preoccupation, body image disturbances, and unhealthy eating behaviours in susceptible children and families.

**Health care providers should consider the social determinants of health and how they may influence shared decision-making, intervention recommendations, and access to health care resources to support obesity management for children and families.**

This good practice statement recognizes that obesity disproportionately affects some groups of children and families more than others based on social determinants of health, which may be a barrier to accessing culturally appropriate care to meet the social and material needs of children and families.

**Health care providers should complete a comprehensive health assessment of children with obesity using a framework such as the 4Ms for Assessment of Obesity (Metabolic, Mechanical, Mental Health, Social Milieu) to help identify consequences of obesity and barriers to obesity management.**

This good practice statement recognizes the complexity of obesity, extending beyond anthropometric outcomes such as BMI. It acknowledges the varied and dynamic genetic, physiologic, and societal influences on weight regulation. Attention should be paid to risk of eating disorders (e.g., binge-eating disorder, atypical anorexia), with referral to specialist care, when indicated. Interventions designed to manage obesity can have broad effects on health, so there is value in measuring a range of outcomes to monitor health status and changes over time. The 4Ms framework is based on the Edmonton Obesity Staging System for Pediatrics.[21]

**Health care providers should take a nonjudgmental, nonstigmatizing approach that encourages children and families to participate in obesity management interventions, including talking with children and families about their expectations for improving health outcomes.**

This good practice statement recognizes the important role played by health care providers to support children and families in accessing and participating in obesity management interventions. This can include applying motivational interviewing and cognitive behavioural therapy to help support and sustain healthy behaviours, as well as discussing expected outcomes from different intervention strategies. Obesity management success can be defined in different ways (e.g., enhanced health-related quality of life, reduced blood pressure, improved mobility and participation in physical activities) by health care providers, children, and families. Changes in health outcomes can vary between individuals for a variety of reasons, and some outcomes may be more responsive than others to intervention-related changes.

**Health care providers should use resources such as the 5As for Pediatric Obesity Management[22] (Ask, Assess, Advise, Agree, Assist) to enable screening and caring for children with obesity and families in a respectful, participatory manner.**

This good practice statement acknowledges that health care providers need resources and tools that can provide structure to guide assessment and obesity management with children and families. As an example, the 5As of Pediatric Obesity Management serves as a tool kit for health care providers, and includes whiteboard videos as companion resources with background on obesity and how to incorporate the 5As into clinical practice.

**Health care providers should present children and families with intervention options for managing obesity based on evidence, feasibility, and availability.**

This good practice statement acknowledges that behavioural and psychological, pharmacologic, and surgical interventions can improve health outcomes in pediatric obesity management. There is no evidence to support a stepwise approach whereby pharmacologic and surgical interventions should be offered only if behavioural and psychological interventions prove ineffective. Using shared decision-making with families, health care providers should consider all intervention options. Centres that offer bariatric surgery for adolescents with obesity are limited in Canada, but health care providers should apply established screening and assessment criteria when considering surgery as an option.[23]

**Health care providers should ideally offer services for managing pediatric obesity in a multidisciplinary team environment, where available.**

This good practice statement acknowledges the complexity of obesity, which often requires health care providers with diverse and complementary expertise (e.g., dietitian, family physician, kinesiologist, nurse, pediatrician, psychologist, social worker) to assess and manage obesity, its causes, and its consequences, using behavioural and psychological, pharmacologic, and surgical interventions. In Canada, health services for managing pediatric obesity are limited, especially in rural and remote communities. Many health care providers do not work in multidisciplinary teams, so partnering with colleagues who possess complementary knowledge and skills will require proactive communication and coordination.


**Figure 1:** Summary of the guideline recommendations. See Related Content tab for accessible version.

**Table 2: Interpretation of strength of recommendations using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach and description of good practice statements[18,24,25]**

| Criteria | Interpretation by patients | Interpretation by health care providers | Interpretation by policy-makers |
|---|---|---|---|
| **Strong recommendation for or against an intervention** | | | |
| Desirable consequences clearly outweigh the undesirable consequences in most settings (or vice versa). | Most individuals in this situation would want the recommended course of action, and only a small proportion would not. | Most individuals should receive the recommended course of action. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences. | Recommendation can be adopted as policy in most situations. |
| **Conditional recommendation for or against an intervention** | | | |
| Desirable consequences probably outweigh undesirable consequences in most settings (or vice versa). | Many individuals in this situation would want the suggested course of action, but many would not. | Health care providers should recognize that different choices will be appropriate for each person and must help each person arrive at a management decision consistent with the person's values and preferences. Decision aids may be useful to help people make decisions consistent with their values and preferences. | Policy-making will require substantial debate and involvement of various stakeholders. |
| **Good practice statements** | | | |
| Good practice statements should:<br>• Represent an actionable statement necessary for health care practice, which is supported by indirect evidence that does not diminish the certainty of evidence.<br>• Result in large net-positive consequences.<br>• Be adequate and appropriate whereby the collection and summarization of additional data would be poor use of resources for guideline developers to use. | | | |

For the remaining important cardiometabolic outcomes, total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides showed moderate to very large beneficial effects. We found a small beneficial effect on diastolic blood pressure, homeostatic model assessment of insulin resistance (HOMA-IR), and possibly fasting insulin (no MID estimate). Subgroup analyses showed that children aged 13–18 years had more substantial desirable effects for some outcomes, including BMIz, BMI, systolic blood pressure, HDL-C, and triglycerides. With respect to undesirable effects, for serious adverse events (critically important outcome), no events were reported in any multicomponent intervention studies. Mild and moderate adverse events were reported infrequently and inconsistently; when reported, adverse events were trivial (e.g., mild ankle sprain).

### Nutritional interventions

*We suggest using nutritional interventions for managing obesity in children aged 18 years and younger (conditional recommendation, very low to low certainty of evidence).*

The evidence for nutritional interventions was derived from a meta-analysis that included 8 RCTs (447 participants; 56% female; ages 6–12 yr 37.5%, 13–18 yr 62.5%).[26] These interventions included mainly nutrition counselling or nutrition education, as well as interventions that involved specific dietary patterns such as low-fat, low glycemic index, and Mediterranean-style diets. Nutrition interventions were heterogeneous, so we could not infer what intervention(s) may be superior. A 3-month exemplar RCT[36] included an intensive phase delivered by dietitians, with 5 individual, face-to-face counselling sessions for children and caregivers, plus 2 telephone sessions. The nutrition intervention applied a client-centred approach that included goal-setting, problem-solving, and self-monitoring techniques. Children consumed an energy-restricted diet (20% below their estimated energy expenditure) and ate meals using a plate with partitioned sections to guide portion sizes.

#### *Balance of benefits and harms*

For nutritional interventions, the guideline panel judged the overall anticipated desirable effects as small and undesirable effects as trivial, based on very low to low certainty of evidence (Appendix 1). For critically important and very important desirable outcomes from nutrition interventions compared with

**Table 3: Minimally important difference estimates and priority levels used to assess the magnitude of effects for changes in health outcomes from behavioural and psychological, pharmacologic, and surgical interventions for managing pediatric obesity**

| Health outcome | MID | Priority level* |
|---|---|---|
| **Patient or proxy-reported outcomes** | | |
| Pediatric Quality of Life Inventory 4.0 (child or self-reported) | ≥ 4.36 | Critically important |
| Pediatric Quality of Life Inventory 4.0 (parent or proxy-reported) | ≥ 4.50 | Critically important |
| Children's Depression Inventory | ≥ −3.57 | Critically important |
| Children's Depression Scale | ≥ −17.89 | Critically important |
| Center for Epidemiologic Studies – Depression | ≥ −2.98 | Critically important |
| Depression Anxiety and Stress Scale-21 (depression) | ≥ −2.26 | Critically important |
| Depression Anxiety and Stress Scale-21 (anxiety) | ≥ −1.85 | Critically important |
| Social Anxiety Scale for Children – Revised | ≥ −5.60 | Critically important |
| Children's Manifest Anxiety Scale – Revised | ≥ −2.90 | Critically important |
| Adverse events† | | |
| Severe adverse events | ≥ 1% | Critically important |
| Mild to moderate adverse events | ≥ 10% | Important |
| Anthropometric outcomes | | |
| BMIz | ≥ −0.25 | Very important/important |
| BMI | NS‡ | Very important/important |
| Weight, kg | NS‡ | Very important/important |
| **Cardiometabolic outcomes** | | |
| Systolic blood pressure, mm Hg | ≥ −3.20 | Important |
| Diastolic blood pressure, mm Hg | ≥ −2.20 | Important |
| Total cholesterol, mmol/L | ≥ −0.20 | Important |
| High-density lipoprotein cholesterol, mmol/L | > 0.04 | Important |
| Low-density lipoprotein cholesterol, mmol/L | > −0.10 | Important |
| Triglycerides, mmol/L | ≥ −0.09 | Important |
| Fasting insulin, pmol/L | NS‡ | Important |
| Homeostatic model of insulin resistance, units | ≥ −0.5 | Important |
| ALT, U/L | NS‡ | Important |

Note: ALT = alanine transaminase, BMI = body mass index, BMIz = BMI *z* score, GRADE = Grading of Recommendations Assessment, Development and Evaluation, MID = minimal important difference, NS = not specified.
*Priority levels were established by a group of caregivers and health care providers whom we surveyed to determine the outcomes that mattered most to them.[30] Consistent with GRADE,[31] participants ranked outcomes based on whether they perceived them to be critically important (rank: 7–9 out of 9), important (rank: 4–6 out of 9), or not important (rank: 1–3 out of 9). After a discussion of survey results, our 4 guideline panellists who had experience living with obesity recommended elevating BMIz from important to very important (an intermediate category that we designated above important but below critically important) for behavioural and psychological, and pharmacologic interventions. For surgical interventions, our panellists with lived experience suggested assigning BMI and weight (kg) as very important outcomes (in lieu of BMIz) because they perceived them to be more meaningful in older adolescents as they approached adulthood, and most surgical intervention data were derived from that group.
†Adverse events were reported inconsistently and infrequently in many of the studies included in the evidence that informed our guideline. For behavioural and psychological interventions, adverse events tended to be trivial. For pharmacologic and surgical interventions, adverse events tended to be reported more often and frequently included gastrointestinal effects such as nausea, vomiting, and diarrhea; they were typically defined as "present" or "absent."
‡We were unable to specify MID estimates for some outcomes. Specifically, there are no normal or universal BMI and weight values in pediatrics because of variability in growth and development patterns. For fasting insulin and ALT, we were unable to achieve consensus regarding MID estimate values.

minimal interventions, we found no data regarding the effects of interventions on HRQoL, depression, or anxiety. Nutrition interventions showed a small effect on BMIz (MD −0.16, 95% CI −0.36 to 0.04). For important outcomes, we found favourable effects on BMI (MD −1.3, 95% CI −2.37 to −0.21) and weight (MD −1.86 kg, 95% CI −3.64 to −0.16 kg) (no MID estimates), and a small favourable effect on total cholesterol, LDL-C, and HOMA-IR. We found little to no effect on systolic and diastolic blood pressure and triglycerides. For our desirable outcomes, no subgroup comparisons were statistically significant. For critically important serious adverse events, no events were reported in any nutrition intervention studies. Important mild and moderate adverse events were reported infrequently and inconsistently; when reported, adverse events were trivial.

### Physical activity interventions

*We suggest using physical activity interventions for managing obesity in children aged 18 years and younger (conditional recommendation, very low to low certainty of evidence).*

The evidence for physical activity interventions was derived from a meta-analysis that included 23 RCTs (1437 participants; 51% female; ages 6–12 yr 39.1%, 13–18 yr 56.5%, mixed 4.3%)[26] that emphasized exercise; aerobic or resistance training interventions were most common. Combined training (aerobic and resistance training) seemed to be superior to aerobic or resistance training alone, and higher-intensity aerobic exercises were commonly reported as more effective than exercise performed at lower intensities. For instance,[37] 1 exemplar RCT included testing the effects of different interventions over 5 months: 4 sessions per week of aerobic training using treadmills, elliptical machines, and bicycle ergometers (with incremental increases in duration and intensity of training); 4 sessions per week of resistance training using weight machines or free weights (with incremental increases in the number of sets and weight lifted); and combined aerobic and resistance training that included completing the exercises for both programs in 4 sessions per week.

#### *Balance of benefits and harms*

For physical activity interventions, the guideline panel judged the overall anticipated desirable effects as small and undesirable effects as trivial, based on very low to low certainty of evidence (Appendix 1). For critically important and very important outcomes, intervention effects were small for HRQoL (PedsQL MD 2.54, 95% CI –1.91 to 6.99) and BMIz (MD –0.18, 95% CI –0.39 to 0.03); for depression and anxiety, we found little to no beneficial or harmful effects. For important outcomes, although no MIDs were available to aid the interpretation of changes, favourable reductions in BMI (MD –1.12, 95% CI –2.04 to –0.21) and weight (MD –2.55 kg, 95% CI –3.79 to –1.32 kg) were reported. Our systematic review and meta-analysis showed improvements in diastolic blood pressure and HDL-C (moderate effects), systolic blood pressure and total cholesterol (large effects), and LDL-C, triglycerides, and HOMA-IR (very large effects). Subgroup analyses showed statistically significant desirable effects among children aged 13–18 years for BMIz, HDL-C, LDL-C, and triglycerides. For undesirable effects, only 2 of 23 RCTs reported data on adverse events related to physical activity interventions. Almost all adverse events involved musculoskeletal injury (e.g., mild ankle sprain) or discomfort (e.g., postexertional malaise).

### Psychological interventions

*We suggest using psychological interventions for managing obesity in children aged 18 years and younger (conditional recommendation, very low to moderate certainty of evidence).*

We derived the evidence for psychological interventions from a meta-analysis that included 9 RCTs (1336 participants; 53% female; 3–5 yr 11.1%; ages 6–12 yr 22.2%, 13–18 yr 66.7%).[26] The trials investigated individual counselling primarily, often with motivational interviewing and group-based education for families. We were unable to infer which intervention(s) may be superior. A 2-year exemplar RCT included a standardized cognitive behavioural therapy intervention delivered by a multidisciplinary team, emphasizing medical, psychological, and behavioural counselling.[38] The intervention began with an intensive 3-month phase, followed by booster sessions up to 2 years after baseline. The intensive phase comprised 7 group sessions for children, 5 group sessions for caregivers, and 1 session for both children and caregivers. The sessions focused on child and caregiver knowledge, attitudes, behaviours, and skills for managing obesity.

#### *Balance of benefits and harms*

For psychological interventions, the guideline panel judged the overall anticipated desirable effects as small and undesirable effects as trivial, based on very low to moderate certainty of evidence (Appendix 1). For critically important outcomes, psychological interventions had a moderate effect on depression (Clinical Depression Inventory MD –6.60, 95% CI –11.66 to –1.46) and a small effect on HRQoL (PedsQL MD 2.42, 95% CI 0.64–4.19). No data were reported on anxiety. For our very important outcome (BMIz), psychological interventions resulted in little to no effect. For our important outcomes, BMI (MD –0.59, 95% CI –1.12 to –0.06) and possibly weight (MD –0.85 kg, 95% CI –3.56 to 1.86 kg) improved (no MID estimates), but there was little to no effect on systolic or diastolic blood pressure, total cholesterol, HDL-C, and LDL-C; there was a small beneficial effect on triglycerides. For our desirable outcomes, no subgroup comparisons were statistically significant. With respect to potential harms, fasting insulin possibly increased (MD 4.21 pmol/L, 95% CI –13.24 to 22.27 pmol/L; no MID): however, no data were available regarding HOMA-IR and alanine transaminase (ALT). Only 2 (22%) of 9 RCTs reported data on adverse events, and from these trials, there was no evidence of critically important serious adverse events, and negligible important mild to moderate adverse events from psychological interventions.

### Technology interventions

*We recommend neither for nor against using technology interventions for managing obesity in children aged 18 years and younger (conditional recommendation, very low to low certainty of evidence).*

We derived the evidence for technology interventions from a meta-analysis that included 13 RCTs (901 participants; 51% female; ages 6–12 yr 30.8%, 13–18 yr 53.8%, mixed 15.4%),[26] with intervention elements such as websites, smartphone applications, or wearable devices (e.g., pedometer, FitBit) designed to monitor and enhance healthy behaviours. We were unable to determine whether any intervention was superior. An exemplar 12-month RCT[39] included several intervention elements, such as a study-dedicated website, individual counselling telephone sessions, group sessions for families, text messages, and printed materials. The website offered educational resources for families (e.g., information about food portions, recipes), Web-based tutorials on behaviour-change strategies, and weekly behavioural goal-setting, skill-building activities, a reward system, progress assessments, and weekly virtual weigh-ins. All participants received a pedometer and a body weight scale.

*Balance of benefits and harms*

For technology interventions, the guideline panel judged the overall anticipated desirable effects as trivial and undesirable effects as trivial, based on very low to low certainty of evidence (Appendix 1). For all critically important outcomes, we found little to no beneficial effects of technology interventions on HRQoL, depression, or anxiety. For our very important outcome, we found a small beneficial effect on BMIz (MD −0.16, 95% CI −0.34 to 0.02). For our important outcomes, there were small beneficial effects for blood pressure. Body mass index (MD −1.27, 95% CI −3.46 to 0.89) and weight (MD −0.54 kg, 95% CI −3.25 to 2.09 kg) both possibly decreased (no MID estimates). No data were reported on total cholesterol, LDL-C, triglycerides, HOMA-IR, or fasting insulin. Regarding desirable outcomes, subgroup comparisons were not statistically significant. With respect to undesirable outcomes, HDL-C decreased and ALT increased (no MID). Only 4 (31%) of 13 RCTs had a plan to document adverse events; of those with a plan to report, none reported adverse events related to technology interventions.

**Practice considerations**

In addition to our meta-analysis[26] that focused on intervention benefits and harms, data from a recent review by O'Connor and colleagues,[40] which included children with overweight or obesity (58 RCTs; 10 143 participants, aged 2–18 yr), offered complementary information for health care providers and families. Specifically, children who received 26 hours or more of intervention contact demonstrated improvements in some health outcomes (BMI, systolic blood pressure, triglycerides, and fasting glucose) compared with their peers who received less than 26 hours, at least up to 1-year follow-up.[40]

In our meta-analysis,[26] we found that structured, multicomponent behavioural and psychological interventions had positive effects on anxiety and depression, with effects ranging from small to large; similar findings have been reported previously.[41] Most higher-intensity behavioural interventions included physical activity sessions, which were superior to physical activity counselling or education exclusively, and no data suggested that any specific nutrition intervention was superior.[40] If behavioural changes are not maintained, it is reasonable to expect that intervention-derived benefits will not be sustained long term. Multicomponent activities, including self-monitoring, goal-setting, and problem-solving skills, that are aligned with behaviour change principles and practices (e.g., motivational interviewing, cognitive behavioural therapy) also appear beneficial and should be included in behavioural and psychological interventions.

## Pharmacologic interventions

Recommendations for pharmacologic interventions are presented in Table 1. Table 3 provides information regarding health outcomes, MID estimates, and priority level rankings.

**Glucagon-like peptide-1 receptor agonists**

*We suggest that glucagon-like peptide-1 receptor agonists be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 12 years and older (conditional recommendation, very low to low certainty of evidence).*

We derived the evidence regarding glucagon-like peptide-1 receptor agonists (GLP-1RAs) (e.g., exenatide, liraglutide, semaglutide) from a meta-analysis that included 7 RCTs (684 participants; 56% female; ages 3–12 yr 12.5%, 13–18 yr 87.5%)[28] with 4 studies of exenatide, 2 of liraglutide, and 1 of semaglutide, which were provided in combination with behavioural interventions that varied between trials.

*Balance of benefits and harms*

For GLP-1RAs, the guideline panel judged the overall anticipated desirable effects as variable and undesirable effects as variable, as treatment responses varied considerably between different GLP-1RAs. The certainty of evidence for effects ranged from very low to moderate (Appendix 1). For critically important outcomes, evidence from RCTs showed that GLP-1RAs as a group had little to no effect on HRQoL (PedsQL MD 1.36, 95% CI −2.94 to 5.66), and we found no evidence for GLP-1RAs on depression and anxiety, which limited our ability to draw conclusions about these outcomes. For our very important outcome, GLP-1RAs resulted in a small reduction in BMIz (MD −0.25, 95% CI −0.51 to 0.00). For important outcomes, GLP-1RAs reduced BMI (MD −1.58, 95% CI −2.80 to −0.39) and weight (MD −4.91 kg, 95% CI −8.40 to −1.42 kg) (no MID estimates), and showed a small beneficial effect on triglycerides, HOMA-IR, and systolic blood pressure. Evidence regarding the risk of serious adverse events (critically important outcome) with GLP-1RAs was very uncertain. Across 6 RCTs, the rate of serious adverse events (e.g., events that required hospital admission, such as cholelithiasis and gastritis) appeared similar in intervention (0%–12%) and control (0%–17%) groups. For mild to moderate adverse events (e.g., diarrhea, nausea, vomiting, abdominal pain), GLP-1RAs led to a small increased risk, which varied.

Regarding treatment effects by drug type, subgroup analyses showed that semaglutide (1 RCT; 201 children aged 12–17 yr)[42] had larger beneficial effects than other GLP-1RAs. Overall, semaglutide resulted in a small benefit on HRQoL; a very large effect on BMIz and weight; a large benefit on triglycerides; a moderate benefit on LDL-C; small benefits on HDL-C, total cholesterol, and systolic blood pressure; and little to no benefit on diastolic blood pressure. Adverse events were reported in 79% and 82% of the semaglutide and control (placebo) groups, respectively. Gastrointestinal events (e.g., nausea, diarrhea, vomiting) were most common. Serious adverse events (e.g., cholelithiasis, appendicitis) were reported in 11% and 9% of the semaglutide and control groups, respectively; the 5 cases of cholelithiasis were reported in the semaglutide group only. Similar proportions of participants discontinued the trial because of adverse events (semaglutide 5%; control 4%), which were mainly from gastrointestinal effects. Because the evidence regarding semaglutide was based on data from only 1 RCT, our guideline panel chose to make an overall recommendation for GLP-1RAs as a group.

**Biguanides**

*We suggest that biguanides be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 12 years and older (conditional recommendation, low to moderate certainty of evidence).*

We derived the evidence regarding biguanides (e.g., metformin) from a meta-analysis that included 26 RCTs (2218 participants; 58% female; ages 3–12 yr 27.6%, 13–18 yr 55.2%, mixed 17.2%).[28] All trials studied metformin (provided off label) in combination with various behavioural interventions.

*Balance of benefits and harms*

For biguanides, the guideline panel judged the overall anticipated desirable effects as moderate and undesirable effects as small, based on low to moderate certainty of evidence (Appendix 1). For critical outcomes, evidence suggested that treatment with biguanides resulted in little to no difference in HRQoL (PedsQL MD 0.56, 95% CI −7.31 to 8.24 units). There was no evidence regarding the impact of biguanides on symptoms of anxiety and depression, which limited our ability to draw conclusions about these critical outcomes. For very important outcomes, biguanides showed a moderate reduction in BMIz (MD −0.26, 95% CI −0.39 to −0.14). For important outcomes, biguanides resulted in moderate reductions in triglycerides and HOMA-IR, with improvements in BMI (MD −1.49, 95% CI −2.06 to −0.89), weight (MD −5.13 kg, 95% CI −7.96 to −2.40 kg), and ALT (MD −2.77 U/L, 95% CI −5.08 to −0.31 U/L) (no MIDs). We found no serious adverse events (critical outcome) noted, but compared with controls, there were 10.6% more (i.e., 106 more events per 1000 people) mild to moderate adverse events (important outcome) such as nausea, diarrhea, or vomiting.

### Lipase inhibitors

*We suggest against using lipase inhibitors for managing obesity in children (conditional recommendation, low certainty of evidence).*

We derived the evidence regarding lipase inhibitors (i.e., orlistat) from a meta-analysis that included 2 RCTs (579 participants; 68% female; all aged 13–18 yr).[28] Both trials included orlistat, provided in combination with variable behavioural interventions.

*Balance of benefits and harms*

For lipase inhibitors, the guideline panel judged the overall anticipated desirable effects as trivial and undesirable effects as moderate, based on low-certainty evidence (Appendix 1). There was a lack of evidence about the effect of lipase inhibitors on critical (HRQoL, anxiety, depression) and very important outcomes (BMIz). For important outcomes, lipase inhibitors resulted in little to no effect on cardiometabolic outcomes, including systolic blood pressure, total cholesterol, HDL-C, LDL-C, and triglycerides. They resulted in small reductions in diastolic blood pressure, BMI (MD −1.28, 95% CI −1.79 to −0.75), and weight (MD −2.62 kg, 95% CI −4.58 to −0.76 kg) (no MIDs). An assessment of undesirable effects showed that lipase inhibitor use resulted in 0.4% more cases of serious adverse events (critical outcome), and 22%–60% more cases of mild to moderate adverse events (important outcome), typically gastrointestinal effects, compared with placebo. Given available data on adverse events,[43] the guideline panel decided that the undesirable effects outweighed the desirable effects.

### Practice considerations

Information remains limited on the long-term (i.e., > 1 yr) benefits and harms of pharmacologic interventions.[28] In the absence of such data, it is reasonable for health care providers to present the available data (i.e., absolute estimates and certainty of estimates) to families considering GLP-1RA pharmacotherapy for beyond 1 year, particularly when behavioural and psychological interventions alone have proven ineffective in managing obesity and improving obesity-related health outcomes. Our subgroup analysis showed that semaglutide was the most effective GLP-1RA; however, this was based on a single trial with about 1.5 years' follow-up.[42] Semaglutide showed moderate to large effects for the outcomes most important to families (HRQoL, BMIz), but gastrointestinal adverse events were common (although a similar rate was seen in the placebo group). Adverse events were generally mild or moderate in severity and lasted 2–3 days, peaking at 16 weeks as the medication dose escalated. Although serious adverse events were reported in both groups (11% for semaglutide and 9% for placebo), cholelithiasis was reported only in the semaglutide group.

It is likely that discontinuing medication will lead to weight regain and regression of improvements to health outcomes,[44,45] which highlights the importance of long-term multicomponent interventions for managing obesity as a chronic disease. Our pharmacologic recommendations apply only to children aged 12 years and older, given the existing evidence. Medication cost, access, availability, and acceptability will influence medication initiation and continuation.

## Surgical interventions

Recommendations for surgical interventions are presented in Table 1. Table 3 provides information regarding health outcomes, MID estimates, and priority level rankings.

### Laparoscopic sleeve gastrectomy

*We suggest that laparoscopic sleeve gastrectomy be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 13 years and older who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team (conditional recommendation, low to moderate certainty of evidence).*

The evidence regarding the potential benefits and harms of laparoscopic sleeve gastrectomy (in which up to 85% of the stomach is removed, leaving a cylindrical sleeve-shaped tube of the stomach along the lesser curvature[46]) was derived from a meta-analysis that included 32 observational, uncontrolled pre–post studies with 1254 participants (about 60% female; about 95% of participants were aged 13–18 yr),[27] provided in combination with varying behavioural and psychological interventions.

*Balance of benefits and harms*

For laparoscopic sleeve gastrectomy, the guideline panel judged the overall anticipated desirable effects as large and undesirable effects as small to moderate, based on low to moderate certainty of evidence (Appendix 1). Evidence from observational, uncontrolled pre–post studies for critical outcomes showed that laparoscopic sleeve gastrectomy likely led to a very large beneficial effect on HRQoL (PedsQL MD 16.67, 95% CI 8.03–25.17). Although our review[27] did not uncover findings related to how the procedure

may affect changes in anxiety and depression, a recent observational study[47] and RCT,[48] not included in our review, showed mixed results for these outcomes. For very important outcomes, BMI (MD −8.21, 95% CI −9.89 to −6.53) and weight (MD −23.50 kg, 95% CI −29.90 to −17.11 kg) substantially decreased (no MIDs). For important outcomes, the procedure resulted in very large beneficial effects on systolic blood pressure, HDL-C, triglycerides, and HOMA-IR; a moderate effect on LDL-C; a small effect on total cholesterol; and little to no effect on diastolic blood pressure. Laparoscopic sleeve gastrectomy also resulted in substantial improvements in fasting insulin and ALT (no MIDs). For undesirable effects, the procedure resulted in a 1% incidence of serious adverse events (a critically important outcome), such as reoperation; and a 7% incidence of mild to moderate adverse events (an important outcome), such as nausea and diarrhea.

#### Roux-en-Y gastric bypass

*We suggest that Roux-en-Y gastric bypass surgery be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged 13 years and older who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team (conditional recommendation, low to moderate certainty of evidence).*

The evidence regarding the potential benefits and harms of Roux-en-Y gastric bypass (formation of a small gastric pouch, with ingested nutrients bypassing most of the stomach and upper small bowel and directly entering the mid-jejunum[49]) was derived from a meta-analysis that included 10 observational, uncontrolled pre–post studies with 499 participants (about 60% female; about 95% of participants were aged 13–18 yr),[27] provided in combination with varying behavioural and psychological interventions.

##### *Balance of benefits and harms*

For Roux-en-Y gastric bypass surgery, the guideline panel judged the overall anticipated desirable effects as large and undesirable effects as moderate, based on low to moderate certainty of evidence (Appendix 1). For critically important outcomes, the procedure resulted in a large beneficial effect on HRQoL (PedsQL MD 10.50, 95% CI 3.55–17.45) and small beneficial effects on anxiety (Beck Youth Inventory MD −2.78, 95% CI −4.34 to −1.23) and depression (Beck Depression Inventory MD −2.88, 95% CI −4.36 to −1.40). For very important outcomes, the procedure led to substantial reductions in BMI (MD −7.61, 95% CI −9.56 to −5.65) and weight (MD −22.38 kg, 95% CI −29.33 to −15.61 kg) (no MIDs). For important outcomes, Roux-en-Y gastric bypass surgery led to very large beneficial effects on LDL-C, HDL-C, HOMA-IR, and BMIz; a large effect on triglycerides; and moderate effects on systolic and diastolic blood pressure, as well as substantial improvements in fasting insulin and ALT (no MIDs). For undesirable effects, evidence showed that the procedure resulted in a 9% incidence of serious adverse events (e.g., infection and local organ inflammation; surgery-specific port displacement or leakage; bowel stricture, prolapse, or obstruction) and a 21% incidence of mild to moderate adverse events (e.g., abdominal pain; nausea and vomiting; $B_{12}$ and iron deficiency).

#### Practice considerations

Our recommendations focused on laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass surgery because they are the primary procedures offered by most programs that provide bariatric surgery for children, including the few programs in Canada. Our guideline panel declined to make recommendations for other procedures (e.g., gastric band, intragastric balloon). Currently, there is little information to inform the profile of patients most likely to benefit from surgical interventions and optimal timing of surgery. In the absence of such data, it is reasonable for health care providers to present the available evidence (i.e., absolute estimates and certainty of estimates) to families to consider surgery when behavioural and psychological interventions alone are ineffective at improving obesity-related health outcomes. Recent observational evidence[50] suggested that surgical interventions lead to improved anthropometric and cardiometabolic outcomes up to 10 years after surgery (for both laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass surgery), indicating durability of health improvements over time. Almost all the evidence to inform our recommendations was derived from children aged 13 years and older, so our recommendations reflect this age range. Regardless of procedure, measurable adverse events are associated with bariatric surgery, although there appears to be low risk of serious perioperative complications.[51]

## Methods

Our guideline was developed in partnership with Obesity Canada. We followed guideline standards from the National Academy of Medicine (formerly the Institute of Medicine),[52] the GRADE working group,[53–55] Guidelines International Network,[56] and the Guidance for Reporting Involvement of Patients and the Public (short-form) reporting checklist[57] (Appendix 2, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.241456/tab-related-content). Funding to support guideline development was provided by Obesity Canada and the Alberta Health Services Chair in Obesity Research. Details of our study protocol were published a priori.[58]

### Composition of participating groups

Led by 2 co-chairs (G.D.C.B., B.C.J.), our steering committee comprised 3 caregivers, 2 clinicians (a general pediatrician and a general pediatrician specializing in adolescent medicine), 5 PhD researchers including 2 methodologists,[59] 9 clinician–scientists (6 pediatric endocrinologists, 1 psychologist, 1 registered dietitian, and 1 registered nurse), 1 representative from the Heart & Stroke Foundation of Canada with experience in patient engagement and guideline development, and 1 representative from Obesity Canada. Starting in late 2019, the steering committee developed the study protocol — including research questions, guideline methods, literature reviews — and planned knowledge translation and dissemination activities.[58] From early 2020 to early 2024, the committee met monthly by video conference, with ad hoc correspondence as needed.

Five evidence teams (10–16 members) with relevant content, clinical, and methodological expertise completed the evidence syntheses,[26–29,60] which addressed our overarching research questions.

Teams were led by at least 1 member of our steering committee and included other steering committee members, plus external researchers and learners.

Our guideline panel, which developed the recommendations, comprised 4 people with lived experience (a youth with obesity, an adult with obesity as a youth, 2 parents of children with obesity), 1 primary care–based physician, 1 representative from Obesity Canada, 6 clinician–scientists (4 pediatric endocrinologists, 1 general pediatrician, 1 pediatric surgeon), and 7 PhD researchers with expertise in GRADE methods, nutrition, physical activity, mental health, or pediatrics. Of the 19 panellists, 9 were members of our steering committee.

## Selection of priority topics

After an iterative process that included numerous tele- and video-conference calls and email discussions, our steering committee established 5 overarching research questions to inform the guideline.[58] These questions were addressed using 5 independent knowledge syntheses (meta-analyses of the overall benefits and harms of behavioural and psychological,[26] pharmacologic,[28] and surgical interventions[27] for managing obesity in children; a systematic review on health-related values and preferences of caregivers and people with experience living with pediatric obesity; [29] and a scoping review related to clinical assessment[60]). This evidence was supplemented by a survey[30] of 30 caregivers and 17 health care providers or researchers to prioritize the outcomes included in our 3 meta-analyses,[26–28] and 2 scoping reviews of MID estimates for patient-reported outcome measures, and cardiometabolic and anthropometric outcomes.[32,33] The inclusion of MIDs for our outcomes, estimates of what are considered to be small but clinically important differences on average, was a key part of our guideline development as they were used to capture the magnitude of benefits or harms in outcomes that people placed on changes to outcomes,[61] an approach based on GRADE guidance that is superior to relying on direction of effect and statistical significance.[34,62]

We combined this information with feedback from 4 guideline panel members who had experience living with obesity, which led us to prioritize 4 critically important outcomes (HRQoL, anxiety, depression, serious adverse events), and 1 very important outcome (BMIz). For surgical interventions, our guideline panel members who had lived obesity experience recommended assigning BMI and weight instead of BMIz as very important outcomes because they were likely to be more meaningful in older adolescents as they approached adulthood (most data were derived from this age group).

## Literature review and quality assessment

Evidence to inform our 3 meta-analyses[26–28] was screened, abstracted, and assessed for risk of bias and certainty of evidence by the McMaster Evidence Review and Synthesis Team (D.F.L., D.S., M.U.A.) and steering committee co-chairs with expertise in obesity (G.D.C.B.) and GRADE methods (B.C.J.). Our other reviews[29,32,33,60] relied on methodological support from within our evidence teams.

To evaluate intervention effects using MID estimates for prioritized outcomes[32,33] (Table 3), we applied the following categories: 0 to ≤ 0.5 times ( × ) the MID (little to no effect), > 0.5 to ≤ 1.0 × MID (small effect), > 1.0 to ≤ 2.0 × MID (moderate effect), > 2.0 to ≤ 3.0 × MID (large effect), and > 3.0 × MID (very large effect).[63,64] The magnitude of effect was accompanied by the certainty of evidence (i.e., from very low to high) for each outcome. If results were not statistically significant, we did not conclude that there was no effect; rather, based on GRADE guidance, we rated the certainty of evidence down for imprecision (Appendix 1).[34]

We examined subgroup effects (i.e., age, sex, treatment duration, duration of follow-up, severity of obesity, GLP-1 class), which were established a priori, but reported only statistically significant effects. We did not complete cost-effectiveness analyses, although we indirectly considered intervention-related costs in our recommendations in relation to intervention acceptability and feasibility (Appendix 3, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.241456/tab-related-content).

## Development of recommendations

We applied evidence-to-decision (EtD) tables[24] within the GRADEpro Guideline Development Tool (www.gradepro.org) to provide summaries of the findings for our 3 meta-analyses of interventions, including the estimates of effect for outcome measures and their corresponding certainty of evidence (Appendix 1).[26–28] To inform our EtD tables, data were supplemented with information from our systematic review on values and preferences[29] and scoping reviews on MID estimates[32,33] and clinical assessment.[60] The EtD tables enabled the guideline panel to generate recommendations by working step by step through several GRADE domains (problem, desirable effects [benefits], undesirable effects [harms], certainty of evidence, values and preferences, balance of effects, acceptability, and feasibility[53]), with a particular emphasis on critically important and very important outcomes. For each of our research questions, relevant data were shared with panellists for review, refinement, and discussion using the PanelVoice function in GRADEpro, which was done synchronously and asynchronously.

The EtD tables informed 12 virtual meetings (March to July 2024) with panellists. We sourced additional data when our reviews were lacking (e.g., adverse events associated with GLP-1RAs) or conducted reanalyses after panellist feedback (e.g., focus on laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass surgeries, based on use and availability in most countries, including Canada). In advance of each panel meeting, 3 members (G.D.C.B., R.M., B.C.J.) wrote draft recommendations; comments and feedback were documented throughout the review process. We set an 80% threshold for panellist agreement on recommendations a priori but achieved 100% agreement on most decisions.

Good practice statements are appropriate when substantial clinical or real-world experience suggests that the included actions will do more good than harm, but little direct research evidence exists.[65] These statements represent guidance that we considered important but were not appropriate for systematic reviews and formal ratings of certainty of evidence. We were confident that for each statement, the action had a net benefit, each action was useful for health care providers, and no sensible alternatives existed, all of which justify including good practice statements alongside GRADE recommendations.[25] We followed a

formal, consistent process in generating each good practice statement; they were drafted iteratively during guideline development and refinement.[25]

### External review

Before submission, a draft version of our guideline was reviewed externally to solicit feedback on our recommendations. Six individuals (see Acknowledgements), comprising health care providers and researchers, reviewed our guideline and submitted written feedback using a standardized process. Their feedback improved the explanation of our recommendations and descriptions of contextual factors that can influence obesity management, but did not alter the direction or strength of our recommendations.

### Management of competing interests

We adhered to the principles and practices recommended by the Guidelines International Network to manage competing interests.[56] Members of our steering committee and guideline panel completed individual, signed disclosure-of-interest forms at committee inception, annually, and throughout the guideline development process, when required. Steering committee meetings included dedicated time to query members' changes to any competing interests (adjudicated by the steering committee co-chairs); changes prompted members to update their written forms. Among our panellists, 5 reported competing interests related to pharmacologic recommendations, so they abstained from voting on recommendations that were relevant to them (e.g., panellists did not vote on the recommendation for GLP-1RAs if they had a competing interest with a company that manufactured and marketed a GLP-1RA medication). Obesity Canada had a representative on the steering committee and guideline panel (N.P.), who adhered to Guidelines International Network principles and practices, as with all other members. Obesity Canada collected competing interest forms and stored them electronically.

## Implementation

We are developing knowledge transfer resources to support health care providers and families in discussing intervention options for managing obesity in children. In partnership with Obesity Canada, we are creating a suite of educational resources (e.g., whiteboard videos, infographics) for health care providers and families. These resources will be shared through multiple venues, including academic and professional conferences, traditional media, and social media channels, and in collaboration with leading national health organizations. Obesity Canada will play a lead role in disseminating and evaluating the uptake of our guideline, and will track it over time.

Our steering committee will monitor evidence and partner with Obesity Canada to update the guideline based on regular literature search updates to identify new evidence as it becomes available over the next 3–5 years. An update is likely most relevant for pharmacologic interventions as new and emerging medications are evaluated for benefits and harms in pediatrics.[66]

## Other guidelines

The first Canadian clinical practice guideline on preventing and managing obesity in adults and children was published in 2007.[15] In 2015, the Canadian Task Force on Preventive Health Care provided recommendations for growth monitoring and preventing and managing overweight and obesity in children and youth primary care.[67] That guideline offered minimal guidance on pharmacologic and surgical interventions, which reflected the limited evidence base at that time.

In 2023, the American Academy of Pediatrics published its inaugural guideline on obesity in children and adolescents.[68] The guideline also recommended health behaviour and lifestyle treatment, pharmacotherapy, and surgical referral for specific groups of children. However, in contrast to the American Academy of Pediatrics methodology, we applied the rigorous GRADE approach in our development process. We included youth, caregivers, multidisciplinary health care providers, and researchers throughout the guideline development process; prioritized health outcomes that were most meaningful to caregivers; and established MID estimates to determine the magnitude of benefits and harms comparatively across interventions, so that caregivers and health care providers can make value- and preference-sensitive decisions.

## Gaps in knowledge

Developing our recommendations identified several evidence gaps. We lack up-to-date information regarding the prevalence of pediatric obesity in Canada, so the magnitude of the problem and intervention effects remain unknown, particularly since the COVID-19 pandemic. Despite our intention to assess obesity management in populations for health outcomes based on subgroups that were prioritized a priori,[30] our work was limited based on how data were presented in the original studies. Most reports did not document intervention effects based on sex, gender, culture, ethnicity, or obesity severity, limiting our ability to identify whether intervention benefits and harms varied by subgroups. Very limited data existed for children who were younger than 6 years, identified as a member of a racial or an ethnic minority, or were living with physical or cognitive impairments or disabilities. Our systematic review of values and preferences[29] yielded few insights regarding the outcomes and treatment preferences of those living with obesity, so we relied on input from our guideline panellists with lived obesity experience. Few studies reported adverse event data, which was particularly true for behavioural and psychological trials; this reduced what we could infer on potential harms, especially as there can be unintended, negative consequences to obesity management (short- and long-term) that go unrecognized.[69] Because our meta-analyses[26–28] included little evidence that extended beyond 1 year, there is a clear need for data from longer-term trials. This is particularly relevant for pharmacologic interventions that may be used for an extended period for managing obesity (i.e., potential long-term effects on bone and muscle mass[70]). To facilitate subgroup analyses in systematic reviews, studies should follow appropriate reporting guidelines that include clear, specific descriptions of the population (e.g., subgroups by sex or severity of obesity), intervention, and comparator groups.[71]

## Limitations

We focused exclusively on obesity management, recognizing that some health care providers and decision-makers will value guidance on both managing and preventing pediatric obesity. Developing our guideline using GRADE required us to establish MID estimates for our outcomes to examine important group differences in a way that differed from traditional (statistical) approaches,[34] so some individuals or groups may disagree with our MID estimates. Our steering committee and guideline panel included 7 members with lived experience with obesity. Although 1 youth participated as a member of our panel, perspectives from others representing different ages and backgrounds were lacking, despite repeated recruitment attempts. Across behavioural and psychological interventions, substantial heterogeneity existed regarding intervention content, dose, and intensity, so we relied on exemplar interventions from our meta-analysis[26] and other reports[40,72] for specific intervention characteristics that may improve health outcomes. Because the literature searches were completed for our meta-analyses in 2023, additional reports (e.g., a randomized trial[66]) have been published that may have influenced our assessment of intervention effects, which is particularly relevant for pharmacologic interventions, a rapidly evolving area.[73]

## Conclusion

Obesity is a complex, chronic disease in which abnormal or excess body fat (adiposity) may impair health, increases the risk of long-term medical complications, and can reduce quality of life and lifespan. To support value- and preference-sensitive decision-making, we encourage health care providers and the systems they work in to apply and share our guideline so children with obesity and their families can have informed discussions about the balance of benefits and harms for available, acceptable, and feasible obesity management interventions.

## References


1. Farpour-Lambert NJ, Baker JL, Hassapidou M, et al. Childhood obesity is a chronic disease demanding specific health care — a position statement from the Childhood Obesity Task Force (COTF) of the European Association for the Study of Obesity (EASO). *Obes Facts* 2015;8:342-9.
2. Rao DP, Kropac E, Do MT, et al. Childhood overweight and obesity trends in Canada. *Health Promot Chronic Dis Prev Can* 2016;36:194-8.
3. Carsley S, Tu K, Parkin PC, et al. Overweight and obesity in preschool aged children and risk of mental health service utilization. *Int J Obes (Lond)* 2019;43:1325-33.
4. Kerr JA, Patton GC, Cini KI, et al. Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *Lancet* 2025;405:785-812.
5. Dietz WH. The COVID-19 lockdown increased obesity disparities: Will the increases in type 2 diabetes continue? *Obesity (Silver Spring)* 2023;31:699-702.
6. Kumar S, King EC, Christison AL, et al. Health outcomes of youth in clinical pediatric weight management programs in POWER. *J Pediatr* 2019;208:57-65.e4.
7. Hadjiyannakis S, Ibrahim Q, Li J, et al. Obesity class versus the Edmonton Obesity Staging System for Pediatrics to define health risk in childhood obesity: results from the CANPWR cross-sectional study. *Lancet Child Adolesc Health* 2019;3:398-407.
8. Perez AJ, Yaskina M, Maximova K, et al. Predicting enrollment in multidisciplinary clinical care for pediatric weight management. *J Pediatr* 2018;202:129-35.
9. Skinner AC, Perrin EM, Moss LA, et al. Cardiometabolic risks and severity of obesity in children and young adults. *N Engl J Med* 2015;373:1307-17.
10. Simmonds M, Llewellyn A, Owen CG, et al. Predicting adult obesity from childhood obesity: a systematic review and meta-analysis. *Obes Rev* 2016;17:95-107.
11. Puhl RM, Lessard LM. Weight stigma in youth: prevalence, consequences, and considerations for clinical practice. *Curr Obes Rep* 2020;9:402-11.
12. Pascoe EA, Smart Richman L. Perceived discrimination and health: a meta-analytic review. *Psychol Bull* 2009;135:531-54.
13. Srivastava G, Browne N, Kyle TK, et al. Caring for US children: Barriers to effective treatment in children with the disease of obesity. *Obesity (Silver Spring)* 2021;29:46-55.
14. Burchett HED, Sutcliffe K, Melendez-Torres GJ, et al. Lifestyle weight management programmes for children: a systematic review using qualitative comparative analysis to identify critical pathways to effectiveness. *Prev Med* 2018;106:1-12.
15. Lau DCW, Douketis JD, Morrison KM, et al. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *CMAJ* 2007;176:S1-13.
16. Wharton S, Lau DCW, Vallis M, et al. Obesity in adults: a clinical practice guideline. *CMAJ* 2020;192:E875-91.
17. Lister NB, Baur LA, Felix JF, et al. Child and adolescent obesity. *Nat Rev Dis Primers* 2023;9:24.
18. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336:924-6.
19. Weight-related conversation resources. Toronto: Holland Bloorview Kids Rehabilitation Hospital; 2021. Available: https://hollandbloorview.ca/research-education/bloorview-research-institute/research-centres-labs/weight-related-conversations (accessed 2025 Feb. 12).
20. WHO growth charts for Canada. Toronto Dietitians of Canada; 2019. Available: https://www.dietitians.ca/Dietitians-Views/Prenatal-and-Infant/WHO-Growth-Charts.aspx (accessed 2025 Feb. 12).
21. Edmonton Obesity Staging System for Pediatrics. Ottawa: Children's Hospital of Eastern Ontario. Available: https://eoss-p.com/ (accessed 2025 Feb. 12).
22. 5As for pediatric obesity management. Edmonton: Obesity Canada. Available: https://obesitycanada.ca/healthcare-professionals/5as-pedatrics/ (accessed 2025 Feb. 12).
23. Pratt JSA, Browne A, Browne NT, et al. ASMBS pediatric metabolic and bariatric surgery guidelines, 2018. *Surg Obes Relat Dis* 2018; 14:882-901.
24. Alonso-Coello P, Oxman AD, Moberg J, et al. GRADE Evidence to Decision (EtD) frameworks: a systematic and transparent approach to making well informed health care choices. 2: clinical practice guidelines. *BMJ* 2016;353:i2089.
25. Dewidar O, Lotfi T, Langendam MW, et al. Good or best practice statements: proposal for the operationalisation and implementation of GRADE guidance. *BMJ Evid Based Med* 2023; 28:189-96.
26. Henderson M, Moore SA, Harnois-Leblanc S, et al. Effectiveness of behavioral and psychological interventions for managing obesity in children and adolescents: a systematic review and meta-analysis framed using minimal important difference estimates based on GRADE guidance to inform a clinical practice guideline. *Pediatr Obes* 2025;20:e13193.
27. Oei K, Johnston BC, Ball GDC, et al. Effectiveness of surgical interventions for managing obesity in children and adolescents: a systematic review and meta-analysis framed using minimal important difference estimates based on GRADE guidance to inform a clinical practice guideline. *Pediatr Obes* 2024;19:e13119.
28. Wahi G, St-Pierre J, Johnston BC, et al. Effectiveness of pharmacological interventions for managing obesity in children and adolescents: a systematic review and meta-analysis framed using minimal important difference estimates based on GRADE guidance to inform a clinical practice guideline. *Pediatr Obes* 2024;19:e13169.
29. Zenlea IS, Sebastianski M, Kucera M, et al. Incorporation of patient and family values and preferences for health-related outcomes in paediatric obesity management: a systematic review. *Pediatr Obes* 2023; 18:e13006.
30. Gehring ND, Johnston BC, Birken C, et al. A survey of stakeholders' perceived importance of health indicators and subgroup analyses to inform the Canadian clinical practice guideline for managing paediatric obesity. *Pediatr Obes* 2022; 17:e12949.
31. Schünemann H, Brozek J, Guyatt GH, et al. GRADE handbook for grading quality of evidence and strength of recommendations; 2013. Available: https://gdt.gradepro.org/app/handbook/handbook.html (accessed 2021 May 14).
32. Esmaeilinezhad Z, Rigsby M, Ball GDC, et al. Characterizing minimal clinically important difference (MCID) estimates for cardiometabolic risk factors in children: a scoping review [poster]. Presented at Obesity Week; 2023 Oct. 14–17; Dallas.
33. Esmaeilinezhad Z, Merdad R, Ball GDC, et al. Characterizing minimal important difference (MID) estimates for patient/parent reported outcome measures in pediatric obesity: a scoping review [poster]. Presented at Obesity Week; 2023 Oct. 14–17; Dallas.

34. Santesso N, Glenton C, Dahm P, et al. GRADE guidelines 26: informative statements to communicate the findings of systematic reviews of interventions. *J Clin Epidemiol* 2020; 119:126-35.
35. Savoye M, Caprio S, Dziura J, et al. Reversal of early abnormalities in glucose metabolism in obese youth: results of an intensive lifestyle randomized controlled trial. *Diabetes Care* 2014; 37:317-24.
36. Truby H, Baxter K, Ware RS, et al. A randomized controlled trial of two different macronutrient profiles on weight, body composition and metabolic parameters in obese adolescents seeking weight loss. *PLoS One* 2016; 11:e0151787.
37. Sigal RJ, Alberga AS, Goldfield GS, et al. Effects of aerobic training, resistance training, or both on percentage body fat and cardiometabolic risk markers in obese adolescents: the healthy eating aerobic and resistance training in youth randomized clinical trial. *JAMA Pediatr* 2014; 168:1006-14.
38. Vos RC, Huisman SD, Houdijk ECAM, et al. The effect of family-based multidisciplinary cognitive behavioral treatment on health-related quality of life in childhood obesity. *Qual Life Res* 2012; 21:1587-94.
39. Patrick K, Norman GJ, Davila EP, et al. Outcomes of a 12-month technology-based intervention to promote weight loss in adolescents at risk for type 2 diabetes. *J Diabetes Sci Technol* 2013; 7:759-70.
40. O'Connor EA, Evans CV, Henninger M, et al. Interventions for weight management in children and adolescents: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2024; 332:233-48.
41. Jebeile H, Gow ML, Baur LA, et al. Association of pediatric obesity treatment, including a dietary component, with change in depression and anxiety: a systematic review and meta-analysis. *JAMA Pediatr* 2019; 173:e192841.
42. Weghuber D, Barrett T, Barrientos-Pérez M, et al. Once-weekly semaglutide in adolescents with obesity. *N Engl J Med* 2022; 387:2245-57.
43. Chanoine JP, Hampl S, Jensen C, et al. Effect of orlistat on weight and body composition in obese adolescents: a randomized controlled trial. *JAMA* 2005; 293:2873-83.
44. Wilding JPH, Batterham RL, Davies M, et al. Weight regain and cardiometabolic effects after withdrawal of semaglutide: The STEP 1 trial extension. *Diabetes Obes Metab* 2022; 24:1553-64.
45. Kelly AS, Auerbach P, Barrientos-Perez M, et al. A randomized, controlled trial of liraglutide for adolescents with obesity. *N Engl J Med* 2020; 382:2117-28.
46. Felsenreich DM, Bichler C, Langer FB, et al. Sleeve gastrectomy: surgical technique, outcomes, and complications. *Surg Technol Int* 2020; 36:63-9.
47. Tuli S, Lopez Lopez AP, Nimmala S, et al. Two-year study on the impact of sleeve gastrectomy on depressive and anxiety symptoms in adolescents and young adults with moderate to severe obesity. *Obes Surg* 2024; 34:568-75.
48. Järvholm K, Janson A, Peltonen M, et al. Metabolic and bariatric surgery versus intensive non-surgical treatment for adolescents with severe obesity (AMOS2): a multicentre, randomised, controlled trial in Sweden. *Lancet Child Adolesc Health* 2023; 7:249-60.
49. Manning S, Pucci A, Batterham RL. Roux-en-Y gastric bypass: effects on feeding behavior and underlying mechanisms. *J Clin Invest* 2015; 125:939-48.
50. Ryder JR, Jenkins TM, Xie C, et al. Ten-year outcomes after bariatric surgery in adolescents. *N Engl J Med* 2024; 391:1656-8.
51. Inge TH, Coley RY, Bazzano LA, et al. Comparative effectiveness of bariatric procedures among adolescents: the PCORnet bariatric study. *Surg Obes Relat Dis* 2018; 14:1374-86.
52. Institute of Medicine (US) Committee on Standards for Developing Trustworthy Clinical Practice Guidelines. *Clinical practice guidelines we can trust*. In: Graham R, Mancher M, Miller Wolman D, et al., editors. Washington (D.C.): National Academies Press; 2011. Available: http://www.ncbi.nlm.nih.gov/books/NBK209539/ (accessed 2022 Dec. 8).
53. Andrews JC, Schünemann HJ, Oxman AD, et al. GRADE guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. *J Clin Epidemiol* 2013; 66:726-35.
54. Andrews J, Guyatt G, Oxman AD, et al. GRADE guidelines: 14. Going from evidence to recommendations: the significance and presentation of recommendations. *J Clin Epidemiol* 2013; 66:719-25.
55. Guyatt GH, Oxman AD, Kunz R, et al. Going from evidence to recommendations. *BMJ* 2008; 336:1049-51.
56. Schünemann HJ, Al-Ansary LA, Forland F, et al. Guidelines International Network: principles for disclosure of interests and management of conflicts in guidelines. *Ann Intern Med* 2015; 163:548-53.
57. Staniszewska S, Brett J, Simera I, et al. GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research. *BMJ* 2017; 358:j3453.
58. Johnston BC, Merdad R, Sherifali D, et al. Updating the Canadian clinical practice guideline for managing pediatric obesity: a protocol. *CMAJ Open* 2022; 10:E155-64.
59. Guyatt G, Akl EA, Hirsh J, et al. The vexing problem of guidelines and conflict of interest: a potential solution. *Ann Intern Med*2010; 152:738-41.
60. Hadjiyannakis S, Morrison K, Henderson M, et al. Symposium II – Pediatric Obesity Guidelines: Review of Literature in Pediatric Obesity, *18th Annual Canadian Pediatric Endocrine Group Scientific Meeting*; 2024 Feb. 8–10; Saskatoon: University of Saskatchewan.
61. McGlothlin AE, Lewis RJ. Minimal clinically important difference: defining what really matters to patients. *JAMA* 2014; 312:1342-3.
62. Schünemann HJ, Guyatt GH. Commentary–goodbye M(C)ID! Hello MID, where do you come from? *Health Serv Res* 2005; 40:593-7.
63. Johnston BC, Thorlund K, Schünemann HJ, et al. Improving the interpretation of quality of life evidence in meta-analyses: the application of minimal important difference units. *Health Qual Life Outcomes* 2010; 8:116.
64. Johnston BC, Thorlund K, da Costa BR, et al. New methods can extend the use of minimal important difference units in meta-analyses of continuous outcome measures. *J Clin Epidemiol* 2012; 65:817-26.
65. Guyatt GH, Alonso-Coello P, Schünemann HJ, et al. Guideline panels should seldom make good practice statements: guidance from the GRADE Working Group. *J Clin Epidemiol* 2016; 80:3-7.
66. Fox CK, Barrientos-Pérez M, Bomberg EM, et al. Liraglutide for children 6 to < 12 years of age with obesity — a randomized trial. *N Engl J Med* 2025;392:555-65.
67. Canadian Task Force on Preventive Health Care. Recommendations for growth monitoring, and prevention and management of overweight and obesity in children and youth in primary care. *CMAJ* 2015; 187:411-21.
68. Hampl SE, Hassink SG, Skinner AC, et al. Clinical practice guideline for the evaluation and treatment of children and adolescents with obesity. *Pediatrics* 2023; 151:e2022060640.
69. Alberga AS, Sacco S, Booij L. Overlooked outcomes in pediatric obesity management—unintended consequences. *JAMA Pediatr* 2023; 177:997-8.
70. Tinsley GM, Heymsfield SB. Fundamental body composition principles provide context for fat-free and skeletal muscle loss with GLP-1 RA treatments. *J Endocr Soc* 2024;8:bvae164.
71. Byrne JLS, Yee T, O'Connor K, et al. Registration status and methodological reporting of randomized controlled trials in obesity research: a review. *Obesity (Silver Spring)* 2017; 25:665-70.
72. Ge L, Sadeghirad B, Ball GDC, et al. Comparison of dietary macronutrient patterns of 14 popular named dietary programmes for weight and cardiovascular risk factor reduction in adults: systematic review and network meta-analysis of randomised trials. *BMJ* 2020;369:m696.
73. Armstrong SC, Eneli I, Osganian SK, et al. Pediatric obesity pharmacotherapy: state of the science, research gaps, and opportunities. *Pediatrics* 2024;154:e2024067858.


**Competing interests:** Geoff Ball reports serving as the Alberta Health Services Chair in Obesity Research. Funds from the chair helped to support the research activities that informed this guideline. Outside the submitted work, Dr. Ball also reports receiving grant funding from the Canadian Institutes of Health Research (CIHR) and the Women and Children's Health Research Institute; consulting fees as a member of the national consultation board for Novo Nordisk Canada; and support for travel and accommodation from Obesity Canada. Dr. Ball has also served in unpaid leadership roles (co-chair) on the Steering Committee and Guideline Panel to update Canada's Clinical Practice Guideline for Managing Pediatric Obesity. Catherine Birken reports receiving grants from CIHR; Heart & Stroke Foundation of Canada; Physician Services Inc.; the Edwin S.H. Leong Centre for Healthy Children, University of Toronto and Hospital for Sick Children; Centre for Addiction and Mental Health; Joannah & Brian Lawson Centre for Child Nutrition, University of Toronto; and a Walmart Canada Regional Community Grant. Stasia Hadjiyannakis reports receiving honoraria for lectures from Rhythm Pharmaceuticals and Obesity Canada, payment for online course development from Obesity Canada, support to attend the National Obesity Summit from Obesity Canada, and payment for attending a Rhythm Pharmaceuticals advisory board meeting. Jill Hamilton reports receiving grants for industry-sponsored study sites from Rhythm Pharmaceuticals, Eli Lilly, and Novo Nordisk, and unrestricted research funds from

Mead Johnson and Sun Life Financial (for an education program). Dr. Hamilton has also participated as a consultant on the Novo Nordisk Pediatric Expert Obesity National Advisory Board, and in the Rhythm Pharmaceuticals national advisory board meeting on the management of rare forms of obesity. Aislin Mushquash reports receiving grants from CIHR, the Brain Canada Foundation, and the Social Sciences and Humanities Research Council of Canada (SSHRC). Nicole Pearce owns the Global Obesity Learning Centre and is an employee of Obesity Canada. Tracy Rhyason Lebel reports receiving travel support to and honoraria for speaking at the National Clinical Obesity Update 2025 from Obesity Canada. Julie St. Pierre reports receiving grants and honoraria from Eli Lilly and Novo Nordisk Canada, and has participated on advisory boards for Novo Nordisk Global and Eli Lilly. Angela Alberga reports receiving a salary award from Les Fonds de Recherche du Québec (Chercheur Boursier Junior 1 & 2) and the University Research Chair from Concordia University, in support of the present manuscript. Outside the submitted work, Dr. Alberga reports receiving research grants from SSHRC, CIHR, and TD Bank; honoraria from the Canadian Collaborative Research Network; and travel support from Obesity Canada. Dr. Alberga has also served on the Obesity Canada Scientific Advisory Board and Bias 180 Board of Directors (both unpaid). Soren Harnois-Leblanc reports receiving fellowships from Obesity Canada and the American Diabetes Association and the Thomas O. Pyle Fellowship Award (all paid to institution). Josephine Ho reports serving as the local site investigator for future multicentre studies with Eli Lilly study and Novo Nordisk. Marsha Kucera reports serving as board chair for Mosaic Primary Care Network, a not-for-profit corporation. Jacob Langer reports receiving honoraria for a webinar hosted by the *World Journal of Pediatric Surgery* and for participating as an external examiner for the University of West Indies Pediatric Surgery Board examinations. Dr. Langer has also received payment for expert testimony in several lawsuits. Mélanie Henderson reports serving as the president of the Scientific Committee on Obesity Prevention (Institut national de santé publique du Québec) and as a member of the consultation group on the management of obesity in children and adolescents and the Quebec Advisory Committee on Bariatric Medicine (Québec Health Ministry), both roles unpaid. Katherine Morrison reports receiving grants from Diabetes Canada and the CIHR and consulting fees for advisory board work from Novo Nordisk. Dr. Morrison has also participated on a data safety monitoring board for Novartis. Ian Patton reports receiving support from Johnson & Johnson to attend the HealtheVoices patient advocacy conference, and participating in patient advisory boards for Novo Nordisk, Eli Lilly, and Boehringer Ingelheim (unpaid) via Obesity Canada. Krista Oei reports receiving a Canadian Pediatric Endocrine Group fellowship grant (paid to institution) and SickKids Clinician Scientist Training Program Master's Scholarship (paid to self). Ian Zenlea reports receiving payment from Novo Nordisk Canada for participating in an Advisory Board related to pharmaceutical management of childhood obesity. Dr. Zenlea has also participated in the Ontario Paediatric Bariatric Network Committee. Grace O'Malley reports receiving grants from the Health Research Board of Ireland, the European Association for the Study of Obesity (EASO), and the Department of Health Health Service Executive (all paid to institution); honoraria from Novo Nordisk for training on childhood obesity to general practitioners in Ireland; and reimbursement of travel and subsistence costs, in role as Secretary of EASO to attend conferences and congresses. Dr. O'Malley also reports serving as trustee and general secretary of EASO, and director and committee member of the Association for the Study of Obesity on the Island of Ireland. Bradley Johnston reports receiving a start-up grant from Texas A&M AgriLife Research to fund investigator-initiated research related to saturated and polyunsaturated fats, and National Institute of Diabetes and Digestive and Kidney Diseases R25 funds to support training resources in evidence-based nutrition practice, all outside the submitted work. Dr. Johnston has also received travel support from Obesity Canada, Alberta Health Services, EASO, and the University of Barcelona. Dr. Johnston serves as director of EvidenceBasedNutrition.org, a research and education program. Sarah Moore reports receiving a CIHR Planning and Dissemination Grant in support of knowledge translation for the current guideline. Outside the submitted work, Dr. Moore has received research funding or in-kind support from CIHR; the Department of Communities, Culture, Tourism and Heritage (Government of Nova Scotia); ParticipACTION; Outdoor Play Canada; Obesity Canada; Dalhousie University; and Women and Children's Health Research Institute (University of Alberta). Dr. Moore also reports receiving an honorarium from PHE Canada to review its Guidebook, and partial reimbursement from Obesity Canada for travel to the Canadian Obesity Summit. Dr. Moore serves as a Project Lead for the MacEachen Institute for Public Policy and Governance and receives some administrative support, as well as funding for events, to support research assistants. Dawn Hatanaka is a former employee of Obesity Canada, which provided financial and in-kind support. Elizabeth Dettmer reports receiving funds from SunLife Foundation for development and sharing of a pediatric obesity group treatment program. No other competing interests were declared.

This article has been peer reviewed.

**Affiliations:** Department of Pediatrics, Faculty of Medicine & Dentistry, College of Health Sciences (Ball, Wijesundera), University of Alberta, Edmonton, Alta.; Department of Community Medicine, Faculty of Medicine (Merdad), King Abdulaziz University, Jeddah, Saudi Arabia; The Hospital for Sick Children and Department of Pediatrics (Birken), University of Toronto, Toronto, Ont.; Faculty of Land and Food Systems, Food, Nutrition and Health (Cohen), University of British Columbia, Vancouver, BC; Youth representative (Goodman), Toronto, Ont.; Department of Pediatrics, Faculty of Medicine (Hadjiyannakis), Children's Hospital of Eastern Ontario Research Institute, University of Ottawa, Ottawa, Ont.; Division of Endocrinology, Hospital for Sick Children, Department of Paediatrics, University of Toronto (Hamilton), Toronto, Ont.; Department of Pediatrics, Université de Montréal and Centre de Recherche CHU Sainte-Justine and School of Public Health, Department of Social and Preventive Medicine, Université de Montréal (Henderson), Montréal, Que.; Family representative (Lammey), Ottawa, Ont.; Department of Pediatrics, Centre for Metabolism, Obesity and Diabetes Research (Morrison), McMaster University, Hamilton, Ont.; Dalhousie University (Moore), Halifax, NS; Department of Psychology (Mushquash), Lakehead University, Thunder Bay, Ont.; Obesity Canada (Patton, Pearce), Edmonton, Alta.; Division of General & Thoracic Surgery, The Hospital for Sick Children and Department of Surgery, Temerty School of Medicine, University of Toronto (Ramjist), Toronto, Ont.; Family representative (Lebel), Edmonton, Alta.; McMaster University (Timmons), Hamilton, Ont.; Children's Hospital for Eastern Ontario (Buchholz), Ottawa, Ont.; Family representative (Cantwell, Cooper), Toronto, Ont.; McGill University (Erdstein), Montréal, Que.; School of Nursing, Faculty of Health Sciences (Fitzpatrick-Lewis, Sherifali), McMaster University, Hamilton, Ont.; University of Alberta (Hatanaka), Edmonton, Alta.; Heart and Stroke Foundation (Lindsay), Toronto, Ont.; Edmonton Weight Management Centre & Family Clinic (Sajwani), Edmonton, Alta.; Cochrane Collaboration (Sebastianski), Edmonton, Alta.; Department of Pediatrics (St. Pierre), McGill University, Montréal, Que.; Department of Health Research, Evidence and Impact, Faculty of Health Sciences (Ali), McMaster University, Hamilton, Ont.; Department of Health, Kinesiology, and Applied Physiology (Alberga, Baluyot), Concordia University, Montréal, Que.; School of Health and Human Performance, Faculty of Health (Ausman), Dalhousie University, Halifax, NS; University of Calgary (Delacruz, Kucera),

Calgary, Alta.; School of Health and Human Performance (Burke), Dalhousie University, Halifax, NS; Lakehead University (Dadgostar), Thunder Bay, Ont.; The Hospital for Sick Children (Dettmer, Langer, Oei), Toronto, Ont.; Department of Psychology (Dymarski), Carleton University, Ottawa, Ont.; Department of Nutrition, College of Agriculture and Life Sciences (Esmaeilinezhad, Johnston, Rigsby), Texas A&M University, College Station, Tex.; University of British Columbia (Hale), Kimberley, BC; Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute (Harnois-Leblanc), Boston, Mass.; Centre de recherche Azrieli, CHU Sainte-Justine (Harnois-Leblanc), Montréal, Que.; Division of Endocrinology, Department of Pediatrics, Cumming School of Medicine (Ho), University of Calgary, Calgary, Alta.; School of Public Health, College of Health Sciences (Gehring), University of Alberta, Edmonton, Alta.; Holland Bloorview Rehabilitation Hospital (McPherson), Toronto, Ont.; Department of Family Medicine (Naji), McMaster University, Hamilton, Ont.; School of Physiotherapy (O'Malley), Royal College of Surgeons in Ireland, University of Medicine and Health Sciences, Dublin, Ireland; Department of Pediatrics (Wahi), McMaster University, McMaster Children's Hospital, Hamilton, Ont.; Institute for Better Health (Zenlea), Trillium Health Partners, Mississauga, Ont.

**Contributors:** All the authors contributed to the conception and design of the work and the acquisition, analysis, and interpretation of data. All the authors drafted the manuscript, revised it critically for important intellectual content, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work (Appendix 4, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.241456/tab-related-content for details).

**Content licence:** This is an Open Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY 4.0) licence, which permits use others to distribute, remix, adapt and build upon this work, for commercial use, provided the original work is properly cited. See: https://creativecommons.org/licenses/by/4.0/

**Funding:** This guideline was supported financially by Obesity Canada and an Alberta Health Services Chair in Obesity Research (awarded to Geoff Ball). Coauthors who had experience living with obesity as well as nonacademic or nonclinical members who participated as members of our steering committee and guideline panel committee received tokens of appreciation ($25 CDN gift cards) for participating in meetings. No other coauthors received any compensation or tokens of appreciation for their contributions to the guideline.

**Acknowledgements:** The authors acknowledge Samantha Davies and Christina Giese (University of Alberta) for administrative support; Shawn Page for contributing his perspective as a caregiver member of our steering committee; external reviewers (Tesia Bennett BSc, Tanis Fenton PhD, Ximena Ramos-Salas PhD, Ana Sant'Anna MD, Arya Sharma MD PhD, Tom Warshawski MD) for their comments and edits on our draft guideline, which improved the quality of our report; and Jennifer Brogly MD for assistance with an earlier review.

**Correspondence to:**
Geoff Ball, gdball@ualberta.ca;
Bradley Johnston, bjohnston@dal.ca