Motivational Interviewing for Overweight Children: A Systematic Review

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abstract

CONTEXT: Motivational interviewing (MI) is a communication method to help facilitate adherence to health behaviors through a series of person-centered strategies. MI’s evidence base supports its use as a potential intervention strategy at the parental decision-maker level to impact young children’s lifestyle behaviors to address childhood obesity; however, clarity is needed on the literature.

OBJECTIVE: The purpose of this systematic review is to synthesize the literature examining the use of MI at the parental level to impact young children’s weight status.

DATA SOURCES: A modified Cochrane method of systematic search and review was conducted in several databases (eg, PsycINFO, Academic Search Premier, Medline, Cumulative Index to Nursing and Allied Health Literature, Health Source: Nursing/Academic Edition, and SPORTDiscus).

STUDY SELECTION: Criteria for retention included randomized controlled trials and studies using varied settings, methods, interventionists, target behaviors, and outcomes.

DATA EXTRACTION: Extraction domains included study characteristics and risk of bias.

RESULTS: Of the 352 references initially identified, 7 studies were included in the review. In most studies, authors reported significant anthropometric changes as well as significant changes in nonanthropometric outcomes related to weight management compared to usual care.

LIMITATIONS: The heterogeneity of the included studies and lack of comparison with attention control groups may cloud generalizations. Studies not written in English were excluded, possibly biasing the results.

CONCLUSIONS: MI, compared to usual care, revealed positive effects for parent influence on young child anthropometric measures when applied. Future research should be focused on sample diversity, using attention control groups, using exercise physiologists for MI delivery, and reporting sex-specific results.

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Mr Suire contributed to the overall design of the study, conducted the initial review and study elimination, conducted the full-text review, interpreted the data, and participated in the writing and revising of the manuscript; Dr Kavookjian contributed to the overall design of the study, directed and advised for the study procedures, conducted the full-text review, interpreted the data, and participated in the writing and revising of the manuscript; Dr Wadsworth contributed to the overall design of the study, interpreted the data, and participated in the writing and revising of the manuscript; and all authors approved the final manuscript as submitted.

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Weight management continues to be a major global issue despite significant attention over the past 20 years, and, perhaps, most concerning are the trends among children. In a recent review, authors reported that almost all countries have experienced a continued rise in childhood overweight prevalence.\(^1\) According to the World Health Organization, 41 million children aged <5 had overweight or obesity in 2016 and >340 million children and adolescents aged 5 to 19 had overweight or obesity in 2016,\(^2\) with estimates expected to continue in an upward trend.\(^3\) This is concerning because of the health issues related to having overweight.\(^4\)–\(^6\)

Preventing and treating childhood obesity is difficult and multifaceted. Children have little control over their environment and rely on the inputs and protection of adults for their health. To impact a child’s behavior, it is important to intervene at the family level by working with parents or caregivers who play a foundational role in childhood influences. Previous literature has revealed that family structure and environment can both play a key role in unfavorable family dietary behaviors\(^7\) and influence the child’s physical activity by direct means (transportation, financial, and access) or indirect means\(^8\) (support, encouragement, and role modeling). These factors may be further compounded by parents and caregivers who may be reluctant, unconcerned, or unaware of child weight status and its associated health risks. With this in mind, one communication method that may have potential in this realm is motivational interviewing (MI).

MI is a set of communication skills and approaches established in the literature as a potential strategy to help facilitate decision-making regarding various health behaviors. MI communication includes being collaborative, compassionate, evocative, and accepting or nonjudgmental by expressing empathy, supporting self-efficacy, rolling with resistance and avoiding argumentation, and supporting autonomy, among others.\(^9\) MI communication supports autonomous decision-making and goal setting, self-efficacy for even small plans, or success in a target behavior change.

The origin of MI began in the realm of addiction treatment to address resistance and ambivalence commonly found among problem drinkers; strong evidence for MI emerged in this realm.\(^10\) MI has now expanded, having been applied in numerous health behaviors and target outcomes.\(^11\)–\(^14\) There is also evidence that MI has revealed potential among youth populations for various health behaviors, including weight management.\(^15\)–\(^17\) Potentially, MI is thought to provide an intervention strategy for use with parents to impact behavioral and clinical outcomes in their children. To our knowledge, there has been no comprehensive review of the impact of randomized controlled trials (RCTs) of MI delivered to parents on physical activity, nutrition, and anthropometric outcomes in children that relate to childhood overweight and obesity. Therefore, our objectives for this review are to (1) explore the literature for effects on anthropometric outcomes among children from a physical activity–based and nutrition-based MI intervention with their parents and (2) report implications for practice and research on the basis of exploration of evidence and gaps in the literature for outcomes of MI interventions with parents.

**METHODS**

A modified Cochrane method of systematic search and review was conducted within relevant databases (eg, PsycINFO, Academic Search Premier; Medline, Cumulative Index to Nursing and Allied Health Literature, Health Source: Nursing/Academic Edition, and SPORTDiscus) by the lead author.\(^18\) Keywords, such as “Motivational Interviewing,” AND “children or youth or child or kid or parents,” AND “physical activity or BMI or exercise or nutrition or healthy eating or lifestyle behaviors,” were used. Keywords remained consistent across databases. Hand searches of references lists within study articles and reviews were also conducted.

Inclusion criteria included the following: (1) a rigorous RCT study design from which to draw valid conclusions (2) MI independent of other interventions, (3) a focus on children (10 years and younger), (4) involving both healthy eating habits and physical activity, (5) anthropometric outcomes, (6) published in English language during the time frame of 1990–2018 (because MI applications began to move into the health care realm in the early 1990s), (7) pre- and postintervention data collection, and (8) MI intervention conducted, at least in part, via a face-to-face encounter (because the majority of the MI evidence base includes in-person interactions that include both verbal MI strategies and person-centered nonverbal communication components).

An initial review of the titles and abstracts was conducted by the lead author to remove articles that noticeably did not meet inclusion criteria. In the second review tier, 2 authors independently conducted a full-text review of the remaining articles, discussing to consensus the retain or reject decision for each article. For the articles retained after the full-text review, each study’s details were entered into a tailored data extraction tool by the lead author for efficient extraction, organization, and report of study characteristics.
It is vital to assess the methodologic quality of retained articles in a review because rigor plays an important role in the validity implications of conclusions drawn from results. All retained articles in this review were next assessed for methodologic quality by using the Cochrane Risk-of-Bias tool. This method involves evaluation of each article’s study design and methods across 5 domains of bias risk (eg, selection bias, performance bias, attrition bias, reporting bias, and detection bias). Each article was evaluated for each domain and received a designation of either high risk, low risk, or unclear risk (when minimal or no information was reported within the article and a bias risk decision could not be directly achieved).

RESULTS

The initial search of databases yielded 349 citations; 3 additional studies were located via manual search, bringing the total initial pool of articles to 352. In Fig 1, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram, we describe results for each search and review tier and reasons for rejection. After duplicates were removed, 245 studies were identified for the initial review of titles and abstracts. This led to an exclusion of 234 articles primarily on the basis of the following: incorrect age group, nonintervention studies, and not having anthropometric measurements as an outcome. For the next review tier, 11 full-text articles were reviewed, and 4 studies were excluded because of the following: having a combination of intervention frameworks, no RCT, lack of anthropometric measurements as an outcome, incorrect age group, and/or being a methods or protocol article with results projected in a future or ongoing portion of the study. We retained 7 RCT interventions that used MI as a lifestyle behavior intervention delivered to parents with the goal of weight management of children aged ≤10 years. A summary of retained study characteristics and outcomes is provided in Table 1.

Types of Studies and Interventions

As per the inclusion criteria, all retained studies were RCTs. The 7 retained studies were heterogeneous, in that they included study designs that varied in duration, type and number of intervention contacts, type of practitioner delivering the intervention, age of participant children, and setting. All the retained studies were identified as having only MI as the intervention framework. MI delivery varied significantly in these interventions. Interventions were provided solely or collaboratively by pediatricians (n = 2), unspecified health care providers (n = 2), dietitians (n = 1), nurses (n = 1), and a team of multidisciplinary providers (mentor, dietitian, exercise specialist, clinical psychologist, nutritionist, exercise trainer) (n = 1). The number of sessions and duration of study protocols ranged from 2 to 17 sessions over a course of time ranging from 2 to 3 months to 39 months. All studies included BMI or BMI z score as a primary outcome. A few studies included other anthropometric measurements and other secondary outcomes (ie, nutritional behaviors, attendance at intervention sessions, adherence to goals, etc). All interventions used usual care or a similar method for the control group. Usual care centered around normal visits to health care providers and health information, and 1 intervention employed goal setting and educational meetings. In all studies, participants were recruited from health care centers, and all but 1...
<table>
<thead>
<tr>
<th>Source</th>
<th>Sample Size</th>
<th>Sample Description</th>
<th>Intervention Structure</th>
<th>Anthropometric Outcomes</th>
<th>Other Outcomes</th>
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<tr>
<td>Brucoli et al.19, 2016</td>
<td>372</td>
<td>4-7 y old I: pediatrician led</td>
<td>5 interviews over 12 mo C: usual care (received booklet of information at baseline and 12-mo visit)</td>
<td>SC: BMI at 12 mo (MD = -0.32; P = .005) compared with C</td>
<td>SC: increase in breakfast consumption (P = .008), decrease in sugary drink (P = .004) and dessert consumption (P = .047) at 24 mo compared with C NS: nonorganized PA (P = .72), fruit intake (P = .07), consumption of sweet snacks and/or candies (P = .068) at 24 mo compared with C</td>
</tr>
<tr>
<td>Döring et al.30, 2018</td>
<td>355</td>
<td>Infants of first-time parents</td>
<td>1 group session and 8 individual (6 in-person, 2 telephone) sessions over 39 mo C: usual care (regular health checkups by Swedish child health services, which focus on physical development and immunizations)</td>
<td>NS: BMI (β = -0.11; CI: -0.31 to 0.08; P = .28) compared with C, WC (β = -0.48; CI: -0.99 to 0.04; P = .07) compared with C</td>
<td>SC: increase in vegetable consumption (MD = 0.13, CI 0.04 to 0.22, P = .01), decrease in sugary drinks (MD = -0.49, CI: -0.97 to -0.15, P = .04), French fry consumption (MD = -0.23, CI: -0.58 to -0.17, P &lt; .001), and discretionary calories (MD = -0.40; CI: -1.01 to -0.18; P = .01) compared with C</td>
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<tr>
<td>van Grieken, et al.21, 2013</td>
<td>637</td>
<td>5 y old I: youth health care provider led</td>
<td>1 initial session, up to 3 additional sessions over 2 y C: usual care (general information about a healthy lifestyle and notice that the child is classified as overweight)</td>
<td>NS: BMI overall (β = -1.6; CI: -0.60 to 0.27; P = .0463) compared with C</td>
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<td>Resnicow et al.22, 2015</td>
<td>457</td>
<td>2-8 y old I: group 2 (provider only) delivered 4 MI counseling sessions over 2 y; group 3 (provider and RD) delivered 4 provider MI sessions plus 6 MI sessions from an RD over 2 y</td>
<td>NS: BMI percentile between group 3 (MD = -0.21; P = .02) and C</td>
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<tr>
<td>Small et al.23, 2013</td>
<td>60</td>
<td>4-8 y old I: primary care provider led</td>
<td>4 intervention sessions of 30-60 min over 17 wk C: goal setting, and educational meetings regarding family health and safety</td>
<td>NS: BMI percentile between group 2 (MD = -2.0) and C</td>
<td>—</td>
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<tr>
<td>Taveras et al.24, 2011</td>
<td>475</td>
<td>2-6 y old I: Nurse practitioner led</td>
<td>SC: BMI among girls (MD = -0.38; CI: -0.73 to -0.03; P = .03) and among participants in households with annual incomes of &lt;$50,000 (MD = -0.93, CI: -1.60 to -0.25; P = .01) compared with C</td>
<td>NS: BMI overall (MD = -0.21; CI: -0.50 to 0.07; P = .15) compared with C</td>
<td>NS: fast food consumption servings per wk (MD = -0.16; CI: -0.33 to 0.01, P = .07), sugar-sweetened beverage servings per d (MD = -0.22, CI: -0.52 to 0.08; P = .19) intake</td>
</tr>
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Note: BMI = Body Mass Index, WC = Waist Circumference, WHR = Waist to Hip Ratio, MI = Motivational Interviewing, PA = Physical Activity, NS = Not Significant, MD = Mean Difference, CI = Confidence Interval.
TABLE 1 Continued

<table>
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<tr>
<th>Source</th>
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<tr>
<td>Taylor et al. (2018)</td>
<td>206</td>
<td>4-8 y old BMI in the 85th percentile</td>
<td>MINT mentor (1 nutritionist, 1 exercise trainer), 12 sessions for 12 mo for first year, 4 sessions for second year</td>
<td>SC: BMI (MD: −0.34; CI: −0.65 to −0.02, P &lt; .002), BMI z score (MD: −0.12; CI: −0.20 to −0.04, P &lt; .02), WC (MD: −1.5; CI: −2.5 to −0.5 cm, P &lt; .09) all at 24 mo compared with C</td>
<td>SC: higher fruit and vegetables consumption (P = .038), fewer noncore foods (P = .020), fewer noncore foods available in the home (P = .002), more physically active (P = .035)</td>
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</table>

NS: not statistically significant (P > .05); PA, physical activity; RD, registered dietician; SC, statistically significant changes (P < .05); —, not applicable.
Secondary Outcomes: Changes in Lifestyle Behaviors

In multiple studies, authors reported changes in eating behaviors in children after parents participated in a MI intervention, including increased fruit and vegetables consumption, decreased sugary food and/or drink consumption as well as other discretionary food options. For interventions aimed at reducing sedentary time or increasing physical activity, the authors of one study reported decreases in television and/or screen viewing time, and the authors of another reported increases in nonstructured physical activity.

Intervention Fidelity and MI Training

In all studies, authors reported that the provider was trained in MI. In studies in which it was reported, training duration ranged from 2 to 5 days, although training details were mostly omitted. In most studies in which training details were reported, expert supervision was also implemented during the study, with feedback being provided to the interventionists. Four of the intervention protocols employed an intervention fidelity assessment plan, which included recording the MI sessions and coding for fidelity to MI standards. In the case of the intervention conducted by Small et al., interventionists scored themselves on the basis of goal establishment and completion of intervention checklists. In 2 studies, the MI intervention encounters were scored by using the Motivational Interviewing Treatment Integrity evaluation tool. The MI sessions coded in the intervention completed by Döring et al. were found to fall below beginner proficiency on all levels, suggesting that the sessions were not performed with a high effectiveness, as reported by the methods article. MI sessions completed by Taylor et al. were found to reach proficiency levels on all indicators other than complex reflecting, suggesting that effective MI, as reported by the methods article, was conducted.

Risk of Bias

In Table 2, we present the methodologic quality ratings of the 7 retained articles. All 7 studies were RCTs, which represents a consistent level of rigor among the body of work represented by the retained studies. With these interventions being randomized, a reduction in population bias and variance is present. It is important to note that allocation concealment was not detailed in these interventions, except for the one by Taylor et al. Because of the nature of MI and behavioral interventions, blinding MI-trained professionals delivering MI cannot occur; however, in some interventions, the research team involved in measuring and calculating outcomes was blinded. Most studies were free of major selective reporting and other biases, although some concerns are present. Overall, the studies displayed a low to moderate risk of bias, with a high standard of methodologic design reported in most.

DISCUSSION

The body of literature for the impact of MI delivered to parents on anthropometric outcomes in young children is modest but rigorous, with all 7 of the retained studies being RCTs and most having significant sample sizes. Although more research is needed to draw general conclusions, the retained studies provide useful details regarding the intervention design and methods used with parents of children with overweight or obesity. Results among retained studies suggest that MI has potential in helping parents influence anthropometric outcomes in their children when MI is adequately conducted with training and fidelity measures compared to usual care. Three of the 7 interventions revealed significant results regarding child BMI and/or BMI z score outcomes. Two studies also revealed significant positive results for child WC and WHR. With 4 of the 7 studies revealing overall significant changes among at least 1 anthropometric measurement, this suggests potential for MI intervention in parents of children with overweight or obesity. In addition, 4 of the 7 studies revealed significant improvements to nonanthropometric measures, suggesting that there is potential that MI of parents may improve intermediate behavioral outcomes known to reduce health

<table>
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<tr>
<th>Source</th>
<th>Selection Bias</th>
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<td></td>
<td>Sequence Generation</td>
<td>Allocation Concealment</td>
<td>Blinding</td>
<td>Incomplete Data</td>
<td>Free of Selective Reporting</td>
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<td>Broccoli et al.16, 2016</td>
<td>Low risk</td>
<td>Unclear risk</td>
<td>Low risk</td>
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<td>Döring et al.20, 2016</td>
<td>Low risk</td>
<td>Unclear risk</td>
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<td>Unclear risk</td>
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<td>High risk</td>
<td>Low risk</td>
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<td>Resnicow et al.25, 2015</td>
<td>Low risk</td>
<td>Unclear risk</td>
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risks, regardless of weight loss or gain.

The 4 interventions that detailed significant improvements to anthropometric measures had commonalities with implications for practice and research.\textsuperscript{19,22,23,25} The frequency of MI encounters was higher (with an average of $\sim$1 session every 2 months) compared to that of the nonsignificant interventions in this review (with an average of $\sim$1 session every 3 to 4 months), meaning that a higher dose of MI may be important for success. In all 4 studies, some degree of interventionist MI training was described, an essential step for ensuring that the technical and relational aspects of MI are applied and maintained as intended. Three of these 4 also employed supervision and intervention fidelity assessments, which not only support claims for the validity of MI application in the intervention but also enhance the delivery of MI through the feedback received after these assessments.\textsuperscript{22,23,25} All 4 impactful interventions also had health care providers fully deliver or participate in the MI intervention sessions. Overall, these findings suggest that having fully trained and educated practitioners may produce significant results.

There are, however, some methodologic concerns regarding these 4 interventions. Broccoli et al\textsuperscript{19} had possible cross-contamination after intervention and did not report specific MI fidelity assessment measures. For the follow-up, both the intervention and control groups were to receive usual care. The authors reported that it could not be ruled out that the pediatricians may have adopted an MI style after receiving the previous training. In addition, the research conducted by Small et al\textsuperscript{23} had attrition challenges, and the study ended up with a much smaller sample size ($N = 60$) compared with the other studies in this review ($N > 200$).\textsuperscript{23} This same study also employed a fidelity measure in which the interviewers scored themselves on the basis of goal establishment and completion of intervention checklists, which could introduce bias. Resnicow et al\textsuperscript{22} stated that the registered dietitians did not implement the intervention as close to the protocol as the primary care providers because of multiple issues with integration.\textsuperscript{22} Dieticians participated solely for the study, worked with participants that were not their patients, and felt primary care providers did not encourage patients to attend MI sessions with them. There was also potential for a usual care impact because BMI was reduced at a much higher rate than the researchers anticipated, suggesting that the usual care group may have already been motivated for weight loss and the study. Lastly, there were also potentially biased sample results because more minority parents and children left the study. In addition, all of these 4 interventions used nonattention control groups, thus limiting the generalizations made regarding the impact of MI.

It is also important to mention some methodologic concerns and designs among the 3 studies that revealed improved but nonsignificant outcomes in target anthropometric measurements. For 2 of the interventions that did not support a statistically significant improvement in the MI group, there were no MI fidelity assessments described in the narrative, which is critical for claims that MI was conducted in a valid and consistent manner.\textsuperscript{22,24} It is also imperative to note these same 2 interventions lacked basic details regarding MI training of the interventionists. Döring et al\textsuperscript{20} reported study characteristics that made their study unique when compared with others. This intervention was conducted over a period lasting 39 months, which was, by far, the longest among these studies. It also involved the parents of infants aged 9 to 10 months, the youngest subjects among the retained studies. More information is needed on the assessment of long-term interventions and among younger samples to examine the long-term effects of MI in preventing or reducing overweight or obesity through changing family culture regarding healthy eating and being active. It is also vital to mention that the intervention fidelity assessment revealed scores that fell below beginner proficiency. With this fact taken into account, generalizations regarding MI are limited in this intervention because of inconsistent MI delivery.

Gaps in the Literature

Although the body of research is continuing to grow, there are numerous gaps identified via the retained studies that should be noted. With BMI in mind, eating and exercise behaviors are both important factors. Although they are both addressed in the retained studies, only 1 study used an exercise professional to conduct MI with parents for exercise behaviors, and this took place in a multidisciplinary session.\textsuperscript{25} Although health care professionals, dieticians, and other MI interventionists can be prepared to discuss physical activity, having an exercise professional may allow for more targeted person-centered physical activity discussions and goal setting.

One significant gap among retained studies is the lack of diversity among the samples. Most of the studies were conducted among majority white families and attrition was greater among minority participants than white participants, limiting generalizations to racial and/or ethnic segments of the population that are often at higher risk of disease and other conditions associated with overweight and obesity. This is also
true for the education level of the mother participants in these studies. Studies that collected education-level data revealed a high skew for mothers with college degrees and education beyond high school. A similar situation is evident regarding income level, with the studies that collected income information revealing a skew toward higher income levels. Taveras et al examined household income and found that among households with an income <$50,000, the results revealed a significantly lower BMI after the MI intervention in participants in the intervention group compared with participants in the control group, revealing that MI may have a higher impact among children of lower socioeconomic status. Previous research has revealed a potential for MI to facilitate physical activity decision-making and outcomes among adults with low socioeconomic status. In future studies, researchers should investigate MI's impact on weight management among low-income families further.

Another gap among these studies is the lack of sex-specific results. Only 2 studies provided sex-specific results, and in both, the authors reported stronger behavior change and outcome results for female children. This may point to a potentially stronger impact on female children, although more work is needed to fully explore this concept.

Although the authors of all studies reported that the providers were trained in MI, details were scarce. In future studies, researchers would strengthen the literature by reporting the types of actions done during training as well as the frequency and duration so that a gold standard can be reached. With future studies, researchers would also aid the literature by reporting proficiency scores from an established fidelity method (Motivational Interviewing Treatment Integrity, Motivational Interviewing Skills in Health Care Encounters) so that more can be gathered regarding the required proficiency level to cause impact on anthropometric outcomes.

Although the reliance on usual care as the control (which does not match the MI groups by frequency, timing, or duration) makes it difficult to make generalizations regarding MI techniques and skill, in this review, we illustrate success compared with usual care and it appears manageable for large sample sizes in health care settings. Usual care groups in this review consisted of either one-time education or typical visits with health care providers. Only 2 interventions detailed the frequency of the meetings, which was much lower than that for the MI group. It cannot be ruled out that the additional contacts contributed to some of these changes. However, the results revealed that MI interventions as a whole can positively impact outcomes when compared to usual care or health education, which has implications for health care providers. Future studies would address this gap using attention control groups.

### Limitations

Although the methods employed were intended to pursue studies of valid and reliable rigor; it is important to mention the limitations of this review. Although these articles were all focused on MI delivered to parents or caretakers of children in an attempt to make an impact on anthropometric measures, there was a high amount of heterogeneity in the types of interventions. The duration, the number of MI sessions, the MI practitioner, setting, MI training, and other factors varied across these interventions. Although the body of work within this review of evidence and gaps in the literature makes a solid case for MI as an intervention to impact childhood anthropometric outcomes, the generalizations are limited because of the differences among these interventions, and, as a result, no single gold standard intervention protocol can be described. It is also important to mention the lack of dose-matched control groups. This limits the generalization regarding the actual impact of MI because of the differences in contact between groups across all studies. It is important to keep in mind that the result of this review is a comparison to usual care. An additional limitation of this review was the exclusion of research not written in English. Not allowing interventions in other languages increases the potential for biased results, especially because of the small number of studies included and the minimal diversity within the samples.

### Conclusions

MI intervention appears to have merit for consideration as an intervention delivered to parental figures for young childhood anthropometric outcomes when compared to usual care or health education. Although the number of interventions was limited, the sample sizes were large, with 3576 children being included in total, which is notable and may reveal that MI is a manageable intervention for health care providers. Although more research is needed, health professionals may consider MI when treating or preventing excess weight gain among young people. Results suggest that evidence-based training and intervention fidelity assessment
are required to achieve optimal MI-based intervention outcomes. Results also suggest that a higher frequency of MI sessions, such as 1 session every other month, is necessary to achieve significant impact. There are numerous gaps in the literature that future research can act on: increasing diversity among samples, reporting MI training details and proficiency scores from an evidence-based fidelity measure, using attention control groups, using exercise physiologists for MI delivery in this context, and reporting sex-specific results.

ABBREVIATIONS
MI: motivational interviewing
RCT: randomized controlled trial
WC: waist circumference
WHR: waist-to-hip ratio

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