



Weight Management Interventions for Adults With Overweight or Obesity: An Evidence Analysis Center Scoping Review



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ABSTRACT

The objectives of this evidence scoping review were to identify and characterize studies investigating weight management interventions provided by a registered dietitian nutritionist or international equivalent (RDN) among adults with overweight or obesity. A medical librarian conducted an electronic literature search in 6 databases—MEDLINE (Ovid), Embase (Ovid), PsycINFO (Ovid), Cochrane CENTRAL (Ovid), Cochrane Database of Systematic Reviews (Ovid), and CINAHL (Ebsco). Except for narrative review, gray literature, and case study or report, all types of peer-reviewed articles published between January 2008 and April 26, 2019 were eligible. Two content advisors, who are experts in adult weight management, guided the process and reviewed the search plan and findings. The literature search resulted in 30,551 records with 16 additional records identified through other sources. A total of 29,756 records were excluded during the first round of screening due to duplication or irrelevancy. Of the 811 full-text articles that were screened, 139 met the criteria and were included. Approximately 51% and 43% of the studies were conducted in the community setting and in the United States or Canada, respectively. Over 97% of the studies were clinical or quasi-experimental trials. A total of 6 different intervention delivery modes were reported, which resulted in 22 combinations of the modes of delivery. RDNs delivered the weight management intervention (especially the nutrition component) in all studies, but some (61%) also involved an interdisciplinary team to deliver other components of the intervention. The average length of the intervention was about 10 months with a follow-up that ranged from 0 to 9 years. The commonly reported outcomes were anthropometrics, endocrine, and cardiovascular measures; dietary intake; and physical activity. Based on the scoping review, there were systematic reviews and evidence-based practice guidelines on weight management interventions but none of them met the *a priori* inclusion or exclusion criteria. Therefore, it would be beneficial to conduct a systematic review and develop an evidence-based practice guideline on adult weight management interventions provided by an RDN to guide practitioners and to evaluate their effects on health and nutrition-related outcomes.

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Supplementary materials: [Figure 1](#) is available at www.jandonline.org.

OVERWEIGHT AND OBESITY affect more than 2 out of 3 adults and are associated with a host of negative health outcomes, such as high blood pressure, type 2 diabetes, and various types of disease.¹ Despite various efforts to address overweight/obesity, it remains an issue that impacts the health of Americans. Currently, the US Preventive Service Tasks Force recommends that “clinicians offer or refer adults with a body mass index (BMI) of 30 or higher (calculated as weight in kilograms divided by height in meters squared) to intensive, multicomponent behavioral interventions.”^{2,3} This is based on the evidence that behavior-

based weight loss interventions may be helpful in improving weight status and health condition among adults with obesity.^{2,3} Nutrition is an important component when addressing overweight and obesity. Most weight management guidelines recommend including registered dietitian nutritionist or international equivalent (RDN) as part of the interdisciplinary team.⁴⁻⁶ As the food and nutrition expert, the RDN can play a key role in leading those interventions. Thus, understanding the outcomes of adult weight management provided by an RDN can help to identify best practices as well as justify reimbursement for medical nutrition therapy.

In 2014, the Evidence Analysis Library at the Academy of Nutrition and Dietetics published a guideline on adult weight management.⁷ Since it is more than 5 years old, the Evidence Analysis Library plans to update its adult weight management guideline to

incorporate new evidence. The first step of this cycle is to conduct a scoping review to evaluate the currently available scientific literature. A scoping review possesses the same methodological rigor as a systematic review.⁸ However, in a scoping review, researchers do not evaluate quality of individual studies or extract/synthesize research findings because the purpose of a scoping review is to determine whether there are enough studies in a particular area to justify a systematic review.⁸

Therefore, the objectives of this evidence scoping review were to identify and characterize studies examining weight management interventions provided by an RDN among adults with overweight or obesity (BMI \geq 25). The associated research question was: among adults with overweight or obesity, what is the availability of literature examining weight management interventions provided by an RDN to

improve health and nutrition-related outcomes? The results from this scoping review can reveal the availability of literature in this area, which could help researchers to determine the need and scope for a systematic review and evidence-based guideline.

PROTOCOL

The protocol and methodological framework for this scoping review were based on the works of Arskey and O'Malley,⁹ Levac et al (updated version),⁸ and the Joanna Briggs Institute.¹⁰ This scoping review also followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews¹¹ to ensure transparency and methodological rigor.

Search Strategy and Study Selection

A medical librarian conducted an electronic literature search in 6 databases—MEDLINE (Ovid), Embase (Ovid), PsycINFO (Ovid), Cochrane CENTRAL (Ovid), Cochrane Database of Systematic Reviews (Ovid), and CINAHL (Ebsco)—in April 28, 2019, using a combination of search terms (Figure 1, available at www.jandonline.org). As recommended by the Joanna Briggs Institute,¹⁰ the *a priori* eligibility criteria were categorized based on the Population, Concept, and Context mnemonic. The population of this scoping review included both male and female adults (18 years or older) with overweight or obesity and excluded those with conditions that may not be generalizable to the general population (eg, chronic kidney disease, cancer, eating disorder). The concept related to nutrition intervention, a step in the Nutrition Care Process framework. The context focused specifically on weight management interventions provided by RDN(s) in the outpatient or community setting.¹² Finally, although it is not necessary to explicitly identify outcomes for a scoping review, an article must report at least weight related-outcomes to be included due to the nature of the research question.¹⁰ If a publication did not include weight-related outcomes but was based on the same trial as another included article that did, then that initial article would be included.

Because the objective of this scoping review was to determine the need and scope for a systematic review and evidence-based practice guideline when updating the Adult Weight Management Guideline for the Academy of Nutrition and Dietetics' Evidence Analysis Library,¹³ only peer-reviewed articles, including systematic reviews and guidelines, published in English and between January 2008 and April 26, 2019, were eligible (it is typical to examine literature in the past 10 years). Narrative review, gray literature, and case study or report were excluded.

Data Extraction and Evidence Mapping

Once the searches were completed in the 6 databases, the medical librarian uploaded search results onto Rayyan,¹⁴ an abstract screening web tool (Qatar Computing Research Institute (Data Analytics, Doha, Qatar). F.W.C. and J.G.R. independently conducted title/abstract and full-text articles screenings. Any discrepancies were reviewed by D.H. and resolved by discussion. Basic information (eg, publication year, title, authors) of the included articles were exported from Rayyan to Excel (Office 365, v16.0; Microsoft, Inc, Redmond, Washington). Using the same Excel spreadsheet, F.W.C. and J.G.R. further manually extracted data on location, setting, population, sex, study design, objective, intervention: mode of delivery, provider, intervention details, control: types, control details, follow-up length, and outcomes.

A bubble chart was used to illustrate the number of original research articles published by year and by location. A heat map was used to show the distribution of outcomes assessed by intervention delivery modes.

Consultation

This scoping review included 2 content advisors, who are experts in adult weight management and were recruited as volunteers of the Academy of Nutrition and Dietetics. They guided the scoping review process, as well as reviewed and provided feedback on the search plan and findings.

FINDINGS

The literature search resulted in 30,551 records with 16 additional records

identified through other sources (Figure 2). The first round of screening excluded 29,756 records because of duplication ($n = 14,509$) or irrelevancy ($n = 15,247$). Of the 811 full-text articles that were screened, 139 met the *a priori* inclusion criteria and were included in this scoping review. Approximately 80% of the articles were excluded because they did not include exposures or comparator of interest (eg, weight management interventions were not provided by an RDN). The other 20% of the publications were excluded because they did not answer the research question, include population of interest, or include the study design of interest.

Of the 139 included articles, there were 122 clinical trials,¹⁵⁻¹³⁶ 13 quasi-experimental trials,¹³⁷⁻¹⁴⁹ 2 crossover studies,^{150,151} and 2 case-control studies.^{152,153} It is important to note that some publications^{16,17,24-28,41,45,47,48,50,51,53,54,69,70,84,85,101,102,104-106,137,138} were based on the same trials. Thus, there were 109 unique clinical trials, 12 unique quasi-experimental trials, 2 crossover studies, and 2 case-control studies. However, because the goal of a scoping review is to provide a better understanding of the landscape of adult weight management literature, the total number will be based on the articles vs unique trials.

Location, Setting, and Population

Studies were primarily based in the United States or Canada (43%), followed by Europe (27%), Asia or the Middle East (17%), Australia or New Zealand (9%), and Latin or South America (4%). Over half of studies (51%) were conducted in the community; fewer studies were conducted in outpatient (39%) and workplace (10%) settings. Figure 3 illustrates the number of articles published by year and by location. More articles focused on adults (18- <65 years old) (46%) or both adults and older adults (27%) than just older adults (≥ 65 years old) (1%) alone. The remaining 26% of the studies included participants ≥ 18 years old but did not specify age range. Thus, it was not possible to determine whether they included older adults as well. Although most studies did not restrict to a particular life stage, 10 trials^{27,28,36,44,45,53,54,100,110,120} focused specifically on postpartum women. Most of the interventions (67%)

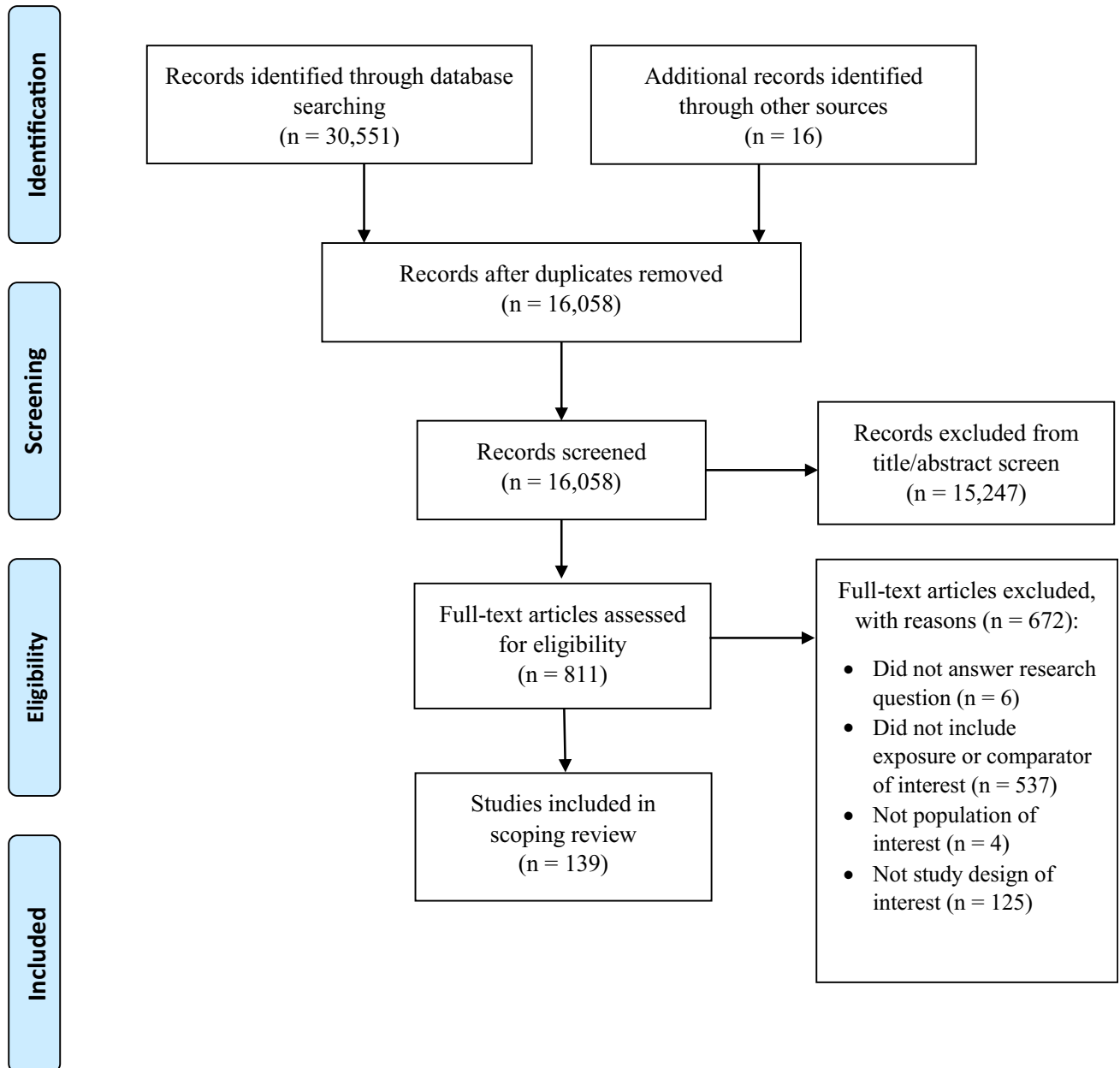


Figure 2. Preferred Reporting Items for Systematic reviews and Meta-Analyses flow diagram: adult weight management scoping review.

included both men and women, but over a quarter of them (29%) were restricted to women and 4% were restricted to men.

Interventions

Approximately 89% of the intervention focused mainly on weight loss and smaller percentages of them focused on both weight loss and weight maintenance (9%) or weight maintenance alone (2%). The average length of the

intervention was about 10 months with a range of 0 (ie, a single session) to 60 months. Roughly 73% of the studies assessed outcome measures at the end of intervention and did not follow the subjects further. The maximum post-intervention follow-up was 9 years.

The frequency, spread, and length of the sessions vary widely among interventions. Not all studies provided an exact number of sessions in the intervention. For instance, Cohen et al³⁵ provided a minimum number of

sessions—at least 6 sessions. Admiraal et al,¹⁵ on the other hand, provided a range, from 6 to 8 sessions. In terms of the spread, some studies constructed the sessions that were distributed equally throughout the intervention period, and other programs may have more sessions in the beginning. For example, Ahn et al¹³⁹ required participants to have one-on-one session with an RDN at least once a month, and Admiraal et al¹⁵ scheduled more counseling sessions in the first half of

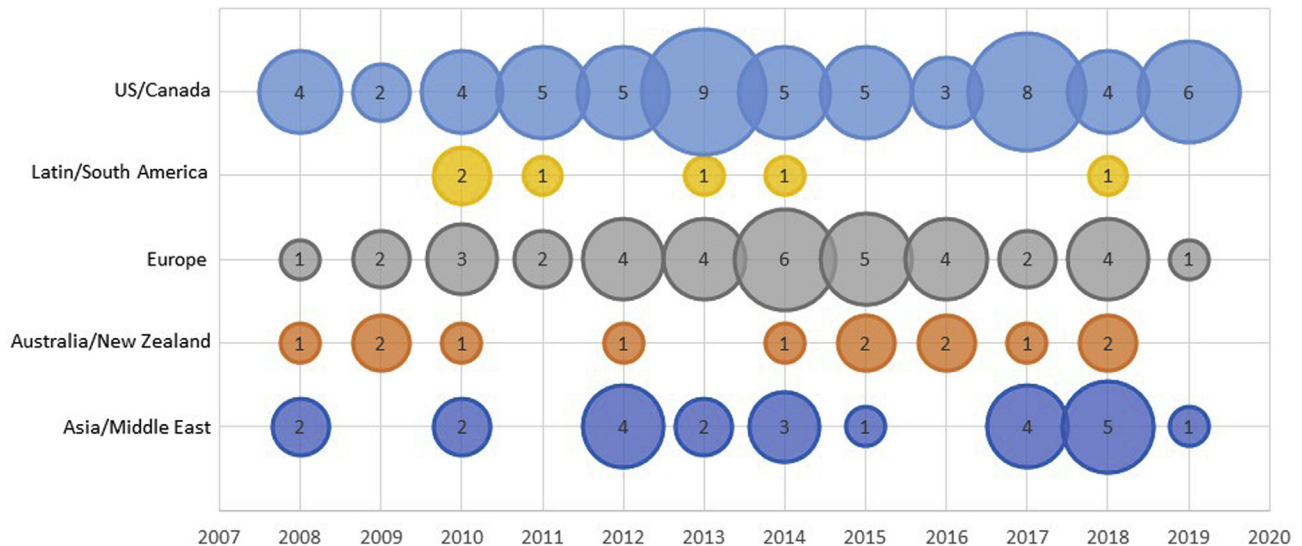


Figure 3. Bubble chart of original research published by year and by location. The bubble size is proportional to the number of original research studies published in the year and location. The total number of articles equals to 141 because the study by Niswender et al.¹⁶¹ was conducted in Europe, Latin/South America, and United States/Canada.

the intervention and 2 “booster” sessions in the second half of the program. Nearly 40% of the studies did not report the actual length of the sessions. For those that reported these data, some studies shared a range, such as 60 to 90 minutes in Ard et al,¹⁵⁰ whereas other studies had a set time, such as 2 hours in Juul et al.⁵⁸

There were 6 different modes of delivery reported in the included articles: face-to-face individual session; face-to-face group session/class; telemedicine individual session; telemedicine group session/class; call/text/e-mail just checking in; and online program/app. This resulted in 22 combinations for the modes of delivery (Figure 4). Over half of the studies used either only face-to-face individual session (n = 33) or face-to-face group session/class (n = 40). Almost 42% of the interventions used more than 1 mode of delivery.

RDN(s) delivered the weight management intervention (especially the nutrition component) in all studies but some (61%) also involved an interdisciplinary team to deliver other components of the intervention. Fitness specialist, physiologists, and physical therapist were most often part of the team (40%), followed by physician (18%), psychologist or social worker (14%), nurse or nurse practitioner (12%), health or lifestyle coach (3%), and community or public health educators (1%). All the interventions

focused on nutrition, and over 75% of the those incorporated physical activity through education, counseling, or hands-on class.

Control

There were 4 main types of control used in the included studies: no intervention (eg, waiting list or those who refused to participate in the program; 32%) was the most common, followed by usual care (eg, received usual care from another health professional or health program; 31%), minimal care (eg, nutrition-related print material or an one-time nutrition seminar; 27%), and some treatment (eg, receiving more than 1 health education sessions; 10%).

Outcomes

A total of 11 types of outcomes were reported in the included studies: anthropometrics, cost, endocrine (eg, hemoglobin A_{1c}, glucose), gastrointestinal bacterial/gut microbiota, cardiovascular (eg, blood pressure, cholesterol level), hepatic (eg, liver panel), mental and cognitive health/emotional eating, nutrition knowledge and awareness, nutritional quality/diet quality/dietary intake, quality of life (eg, perceived, functional health), and physical activity/fitness. The heat map (Figure 4) illustrates the distribution of outcomes

assessed by intervention delivery modes.

DISCUSSION

This scoping review identified 139 original studies examining weight management interventions provided by an RDN among adults with overweight or obesity. Although the search criteria included guidelines and systematic review, none of them met the eligibility criteria. Several obesity management guidelines and systematic reviews^{2-6,154-159} were identified as part of the initial search but they either did not specifically examine the effects of weight management interventions provided an RDN or their search criteria did not meet this scoping review’s *a priori* eligibility criteria. Although they were not included, it is important to note that most of those guidelines did highlight using RDN as one of the interventionists or as part of the interdisciplinary team in weight management interventions.

The 2 most recent systematic reviews were published in 2018^{2,3} and 2019.¹⁵⁹ The US Preventive Services Task Force conducted a systematic review^{2,3} to examine the effects of behavioral and/or pharmacotherapy interventions on obesity-related health outcomes and included studies that used different providers, such as lifestyle coach, cognitive behavioral therapist, exercise counselor, and RDN.

Face-to-face individual session	Intervention: Mode of Delivery			Number of studies	Reported Outcomes											
	Face-to-face group session or class	Telemedicine - individual session	Telemedicine - group session or class		Call, text, or e-mail - just checking in	Online program or app	Anthropometrics	Cardiovascular (e.g., blood pressure, cholesterol level)	Cost	Endocrine (e.g., HbA1c, glucose)	Gastrointestinal bacterial, gut microbiota	Hepatic (e.g., liver panel)	Mental and Cognitive health, emotional eating	Nutrition knowledge, awareness	Nutritional Quality, Diet Quality, Dietary Intake	Quality of Life (e.g., perceived, functional health)
•				33	31	21	1	16	0	0	0	3	0	12	1	11
•			•	1	1	0	0	0	0	0	0	0	0	0	0	0
•				1	1	1	0	0	0	0	0	1	0	0	1	1
•				17	16	6	0	12	1	0	0	2	1	10	0	0
•				4	4	0	0	2	0	0	0	0	0	1	2	4
•			•	1	1	1	0	1	0	0	0	0	0	0	0	0
•				1	1	1	0	0	0	0	0	0	0	1	0	1
•			•	1	1	1	0	0	0	0	0	0	0	0	0	0
•				16	14	5	1	5	0	0	0	2	0	9	2	4
•			•	2	2	0	0	0	0	0	0	0	0	0	0	0
•				40	39	25	0	15	0	0	1	9	1	17	7	12
				1	1	0	0	0	0	0	0	0	0	0	0	0
			•	1	1	0	1	0	0	0	0	0	0	0	0	0
				2	2	1	1	1	0	0	0	0	0	1	0	1
				1	1	0	0	0	0	0	0	0	0	0	0	0
			•	5	5	4	0	3	0	0	1	0	0	1	0	1
				1	1	0	0	0	0	0	0	0	0	0	0	0
			•	5	4	2	0	2	0	0	0	0	0	3	1	3
				2	2	1	0	1	0	0	0	0	0	0	0	1
			•	2	2	0	0	1	0	0	0	0	0	0	0	0

Figure 4. The distribution of outcomes assessed by intervention delivery modes is illustrated with a heat map. Red = highest number of studies; yellow = number of studies at around 50 percentile; green = lowest number of studies; HbA1c = hemoglobin A_{1c}

Since RDNs were not included in all the studies, the US Preventive Services Task Force systematic review was excluded from this scoping review. Williams et al¹⁵⁹ published a systematic review that examined the effectiveness of individualized nutrition care among adults. However, some of its included articles did not meet the *a priori* criteria. For example, some articles included individuals with normal BMI or patients who were on chemotherapy. Thus, this systematic review was excluded.

In general, the interventions that were included in this scoping review were diverse and used varying intervention methods and strategies. For example, out of the 139 included studies, there were 22 combinations for the modes of delivery. A similar phenomenon also was reported in other scoping review¹⁶⁰ and systematic reviews^{2,3} in this area. For instance, the US Preventive Services Task Force systematic review^{2,3} mentioned how “the behavior-based interventions were highly variable across the included trials in terms of the modes of delivery, number of sessions and contacts, and interventionists.” Additionally, Sutton et al highlighted the wide varying level of details when describing intervention components and strategies among studies.¹⁶⁰ This is consistent with what was observed in this scoping review as well.

Therefore, when conducting a systematic review on this topic, it would be helpful to have an active discussion with the systematic review team on how to address studies with different intervention approaches and set some rules as to how to categorize studies with various characteristics (eg, mode, duration) to ensure what is being compared is similar. Additionally, conducting some subgroup analyses could be helpful in explaining some of those potential heterogeneities.

Lastly, there were limited included studies that reported outcomes on cost-effectiveness, gastrointestinal bacterial and gut microbiota, hepatic function, and nutrition knowledge and awareness. Thus, more original studies are warranted in these areas. Examining the effects of adult weight management interventions provided by an RDN on a variety of outcomes can contribute to a more comprehensive

understanding of RDN's contributions and benefits. This is important to help justify position requests and for policy and reimbursement issues.

Strengths and Limitations

To ensure the quality and methodological rigor of the scoping review, the authors adapted a methodological framework based on the works of Arskey and O'Malley,⁹ Levac et al,⁸ and the Joanna Briggs Institute¹⁰ and followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews checklist.¹¹ Other strengths include having 2 content advisors, who are experts in adult weight management, to guide the scoping review process and review the search plan and findings. Lastly, a medical librarian conducted a comprehensive literature search in 6 databases.

However, there are several limitations that should be considered. Although the aim was to perform a comprehensive search, there could be a chance that it did not identify all the studies that would meet the criteria. To mitigate this issue, the team looked for other potential articles through existing included articles and found 16 additional studies to include. Also, the objective was to identify studies examining weight management interventions provided by an RDN. It is possible that eligible studies may have used an RDN for the weight management intervention but did not report it in the article, leading to exclusion. However, the authors attempted to minimize this limitation by seeking clarifying information about study methodology in previously published articles from the same trial.

CONCLUSIONS AND FUTURE DIRECTION

This scoping review completed a comprehensive literature search to investigate the availability of literature studies examining weight management interventions provided by an RDN among adults with overweight or obesity. Based on the scoping review, there were systematic reviews and evidence-based practice guidelines on weight management interventions but none of them met the *a priori* eligibility criteria. Thus, it would be beneficial to conduct a systematic review and

develop an evidence-based practice guideline on adult weight management interventions provided by an RDN to guide practitioners and to evaluate their effects on health and nutrition-related outcomes.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

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