

The individual-level effects of social media campaigns related to healthy eating, physical activity, and healthy weight: A narrative review

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Abstract

Objective: Social media are promising channels for health communication promoting positive weight-related behaviors, but no prior studies have synthesized evidence on the independent effects of social media campaigns focused on promoting healthy eating, physical activity (PA), and healthy weight. This study aimed to fill that gap and inform future social media-based obesity-prevention research and practice by reviewing findings from studies testing the effects of such campaigns on individual-level cognitive, behavioral, and anthropometric outcomes.

Method: The Web of Science and PubMed databases were searched for peer-reviewed articles published between 2012 and 2023 that explored the independent effects of social media campaigns related to healthy eating, PA, or weight management. Study characteristics and outcomes were extracted and summarized.

Results: Eleven studies were included in this review describing campaigns targeting healthy eating-related outcomes (e.g., fruit and vegetable consumption, meal preparation, nutrition label reading), PA, or weight management. Most campaigns ($n = 7$) were developed by universities or research centers. Priority audiences included parents, adult females, adolescents, college students, and adult government employees. The majority ($n = 8$) of the campaigns used single platforms, with the most common being Facebook, Instagram, blogs, and YouTube. Campaigns had mixed effects on cognitive outcomes (e.g., intention, attitude, knowledge), behavioral outcomes (e.g., food choices, PA), and anthropometric outcomes (e.g., weight, waist circumference).

Conclusion: Social media campaigns focused on promoting healthy eating, PA, and healthy weight had mixed effects on individual-level cognitive, behavioral, and anthropometric outcomes. Various limitations of the included studies make it difficult to ascertain which factors influence campaign effectiveness. Advancing knowledge in this area is important, particularly given social media's widespread use and potential for broad reach. New research with features such as rigorous study designs, larger and more diverse samples, and strong theoretical foundations may

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provide important insights into what types of interventions are effective or not and under what conditions.

KEYWORDS

body weight, diet, food, and nutrition, exercise, health communication, social media

1 | INTRODUCTION

Weight-related behaviors are influenced by factors at multiple levels, including personal, social, environmental, and economic determinants.¹ At the individual level, factors such as knowledge, beliefs, attitudes, and motivation are important determinants of dietary and physical activity (PA) behaviors.² Previous reviews have demonstrated the positive role of communications in influencing these determinants through processes such as promoting observational learning, clarifying misinformation, providing informational guidance, and reinforcing social support.³⁻⁶

Social media is a promising mechanism for shifting these individual-level factors. Social media have been adopted by millions of people worldwide, and the proportion of the population using social media reached 58% in 2021.⁷ In the United States (US), about 72% of adults use some type of social media, and more than half of those are active users.⁸ In turn, health professionals have shown increasing interest in the use of social media platforms in health communications.⁹ For example, since 2014, more than 80% of state-level health departments in the US had at least one social media account.¹⁰ Compared with traditional communication channels, social media may lower physical barriers to the dissemination of messaging and increase the breadth of reach to a wider range of audiences.^{3-6,11,12}

Given the widespread interest among nutrition and PA communicators in using social media to reach large numbers of people, it is important to synthesize the available research evidence on the effectiveness of such efforts. Research that supports the dissemination of evidence-based messages on social media may be especially critical to combat the proliferation of inaccurate or misleading information on those channels.¹³⁻¹⁶ Prior reviews have explored the effects of multicomponent diet- and PA-related interventions without evaluating the independent effects of social media components or have examined the effects of intensively moderated, limited-reach social media programs (e.g., private online discussion boards or social media groups).^{4,17-20} However, no prior reviews have focused specifically on studies testing the independent effects of social media campaigns that promote healthy eating, PA, and healthy weight and do not include intensive moderation that might limit campaign reach. Given that one of the often-cited advantages of social media is its potential to reach large numbers of people, it is important to understand the independent effects of social media campaigns that do not require intensive moderation and therefore have the potential for broad reach. This study aimed to fill that knowledge gap.^{3-6,11,12}

2 | METHOD

A narrative review was conducted to capture existing evidence on the independent effects of social media campaigns related to healthy eating, PA, and healthy weight. A search was conducted for peer-reviewed articles published between January 2012 and August 2023 using the Web of Science and PubMed databases. Search strategies were developed under the guidance of a research librarian. Search strings included nutrition-related terms (e.g., nutrition, diet, feeding, eating), PA-related terms (e.g., PA, exercise), weight-related terms (e.g., weight, overweight, weight-loss), social media-related terms (e.g., social media, Facebook, WhatsApp, Twitter, Instagram), and campaign-related terms (e.g., campaign, communication). Additional studies were identified by examining the reference lists of the included articles.

Articles were included if they were primary, peer-reviewed studies that assessed the impact of nutrition-, PA-, and/or weight-related social media campaigns on individual-level outcomes. A social media campaign was defined as a coordinated set of social media-based intervention activities with broad reach or potential for broad reach. Campaigns included those that centered on outbound messaging that could reach large numbers of people and not on one-to-one instruction or other types of individually tailored communication (e.g., heavily moderated discussion groups). This review included campaigns with goals related to nutrition, PA, and/or healthy weight. Both qualitative and quantitative studies were included. Articles were excluded if they (1) assessed social media campaigns delivered mainly through online discussion boards or private social media groups, which limited their actual or potential reach to broader audiences, (2) involved multi-component campaigns (including traditional communication channels) that did not have an independent analysis of the influence of social media communication on individual-level outcomes, (3) evaluated process-related factors (e.g., dose or reach) without examining the downstream outcomes on individuals including changes in cognitive, behavioral, and/or anthropometric outcomes, (4) evaluated mass-marketing social media campaigns from consumer-packaged goods companies, (5) were conference abstracts, reviews, or dissertations, or (6) were not available in English.

There were 1065 articles resulting from the search on the Web of Science and 855 articles from PubMed. One hundred and ninety two duplicated articles were removed, resulting in 1728 unique results for screening. One author (YL) screened titles and abstracts based on the inclusion and exclusion criteria and consulted with other authors where eligibility was unclear. Full text was reviewed if

the title and abstract suggested likely eligibility for inclusion or if the potential for inclusion was unclear based on the title and abstract. In cases where it remained unclear whether an article should be included based on full-text review, the other two authors were consulted, and a determination was made by consensus. Data related to campaign and study characteristics were extracted from the included articles into Microsoft Excel. Data extraction was completed by YL and confirmed by DH, though AM also reviewed all papers and data extraction tables in full. Discrepancies were discussed and resolved by consensus. Extracted campaign characteristics included the campaign name (if there was one), characteristics of the target audience, setting, social media platforms employed, duration, objectives, content, theoretical foundations, and responsible agencies. Extracted study characteristics included study design, sample size, study population, outcome variables, and main results.

3 | RESULTS

3.1 | Campaigns' characteristics

Eleven studies, each testing a unique campaign, were identified for inclusion.²¹⁻³¹ Some of them targeted a single goal, while others had more than one objective. The majority of the studies ($n = 9$) tested campaigns targeting diet-related outcomes such as healthy eating, cooking, meal preparation, and nutrition label reading.^{21-25,27,29-31} One campaign aimed at promoting increased PA as well as healthy dietary behaviors, and the remaining two campaigns either targeted increasing PA or managing weight (including messages on both diet and PA).^{26,28,30} Among those nine campaigns that were diet-oriented, four of them aimed to improve parenting-specific behaviors.²¹⁻²⁴ The duration of the campaigns ranged from 4 weeks to 8 months, except for one cross-sectional study that was conducted 5 months into a campaign that is still ongoing as of this writing. Most of the campaigns ($n = 7$) were launched by research institutions to assess the efficacy of social media interventions.^{22-25,27,28,30} The other campaigns ($n = 4$) were implemented by a state agency, non-profit organization, governmental agency, or health institute^{21,26,29,31} (Table 1).

Table 1 describes the characteristics of the campaigns. More than half of the campaigns ($n = 6$) were based in North America, one was based in the United Kingdom, and the remaining four were based in Asia. Of the six campaigns in North America, one targeted African Americans; the other five did not target a particular racial or ethnic group.^{22-24,27,31} Priority audiences included parents ($n = 4$), adult women ($n = 1$), adolescents ($n = 3$), college students ($n = 2$), and government employees ($n = 1$). The majority of the campaigns used single platforms ($n = 8$), and three campaigns used multiple platforms. Chosen social media platforms included Facebook (Meta Platforms, Inc) ($n = 5$), Instagram (Meta Platforms, Inc) ($n = 6$), blogs ($n = 2$), YouTube ($n = 2$), WeChat ($n = 1$), Snapchat ($n = 1$), and LINE ($n = 1$). Three of the campaigns applied behavioral theories or models to their design. *Jump2Health* was informed by social cognitive theory

(SCT); *Swap Up* used the Specific, Adaptable, Viable, and Impactful framework, which drew on SCT and Social Norm Theory; and the healthy eating blog targeting Canadian mothers of preschool- and school-aged children was based on the Theory of Reasoned Action and Theory of Planned Behavior.^{22,23,31} One additional campaign, *B'more Healthy Communities for Kids (BHCK)*, employed the socio-ecological model (SEM) to inform the overall design of a multilevel intervention including social media; however, the theory used to inform the social media messaging in particular was not specified.²⁴

Common types of content among all campaigns included informational messages (e.g., healthy eating tips, meal planning ideas, nutrition-related memes, nutrition label interpretations), educational materials (e.g., meal planning worksheets, videos on healthy food alternatives, cooking and exercise demonstrations), interactive posts (e.g., polls, quizzes, weekly challenges, Q&A, interactive games), and general campaign notifications (e.g., reminders of new posts, nutritional themes of the week). Frequently employed communication formats included written messages, infographics, pictures, and videos. Written messages were used in all campaigns to announce campaign-related information, deliver nutrition knowledge, or convey the rationale for engaging in healthy eating or PA. Infographics, pictures, and videos were incorporated to demonstrate specific recipes, communicate steps in meal planning, or provide other practical strategies to advance behavior change. For example, *Cooking Matters* posted seasonal recipes, meal planning or cooking-related videos, and live events on a regular basis on their Facebook page.²¹ *Pretty and Picky* communicated healthy food recommendations by posting theme-related activities, articles, pictures, and recipes on their Instagram account.²⁹ *Swap Up* used various content types including short videos, memes, and GIFs to deliver nutrition-related facts on different platforms.³¹

3.2 | Study characteristics and campaign effectiveness

Table 2 describes the studies that evaluated the effects of the campaigns. Four studies used randomized control trials (RCT), three used quasi-experimental designs, one used a pre-post survey with matched samples, one used a pre-post survey with unmatched samples, one used a cross-sectional survey, and one used post-campaign interviews. One study also used a focus group interview in addition to the pre-post survey with unmatched samples. In three of the RCT studies (*Jump2Health*, the healthy eating blog targeting Canadian mothers, and the healthy eating blog targeted toward adult women), participants in the control group had zero exposure to content during the campaign period because access to social media sites was controlled.^{22,23} In the RCT that assessed the effect of *BHCK*, social media pages were publicly available so the possibility of the control group being exposed to the campaign content could not be ruled out.²⁴ Five studies had sample sizes of less than 100.^{22,23,27,29,30} The other studies ranged from several hundred participants to several thousand. In five studies, the demographic characteristics of study

TABLE 1 Campaign characteristics.

Campaign, study authors (year)	Characteristics of target audience	Campaign setting	Social media platforms employed	Campaign duration	Campaign objectives	Campaign content	Theoretical foundations	Campaign developer
Cooking Matters, Zhang, Panichelli, Hall (2021) ²¹	Low-income caregivers of young children (<6 years old)	US	Facebook (Meta Platforms, Inc)	2 months	Cooking Matters (CM) designed a Facebook-based communications campaign to promote healthy eating among low-income families	Content of Cooking Matters Facebook page included seasonal recipes, tips for food planning and cooking, related videos, and live events to address caregivers' barriers to healthy eating and encourage positive behaviors	Not specified	Share our strength (nonprofit organization)
Healthy eating blog for Canadian mothers, Dumas et al. (2020) ²²	Canadian mothers of preschool- and school-aged children	Canada	Blog	6 months	The blog was designed to improve diet quality by increasing the consumption of vegetables, fruit, milk, and milk alternatives in mothers (developed for research purposes)	A new evidence-informed healthy eating blog was published weekly by an registered dietitian with 5 years of blogging experience	Theory of planned behavior; theory of reasoned action	Research team at Université Laval, Canada
Jump2Health, Bakirci-Taylor et al. (2018) ²³	Parents of preschool children aged 3-5	US (Lubbock, TX)	Facebook (Meta Platforms, Inc) page	10 weeks	Jump2Health was designed to increase the number of fruits and vegetables children consumed and the variety of fruits and vegetables they were provided with, especially those high in vitamin A	Content of Jump2Health included cooking videos and recipes, strategies to address picky eating, and food budgeting and meal planning	Social cognitive theory	Research team at Texas Tech University

TABLE 1 (Continued)

Campaign, study authors (year)	Characteristics of target audience	Campaign setting	Social media platforms employed	Campaign duration	Campaign objectives	Campaign content	Theoretical foundations	Campaign developer
<i>The B'more Healthy Kids (BHCK)</i> , Trude et al. (2019) ²⁴	Low-income African American youth ages 10–14 and their families	US, (Baltimore, MD)	Facebook and Instagram (Meta Platforms, Inc)	8 months/wave, 2 waves in total	The BHCK social media campaign was a part of a multilevel intervention designed to improve the food environment outside of school by promoting healthful foods/beverages and behaviors	The social media content in the BHCK campaign had four sequential phases with different themes, each lasting 2 months: 1. Healthier beverage 2. Healthier snacks 3. Healthier cooking methods 4. Review main messages covered in the previous phases	Socio-ecological model	Johns Hopkins Bloomberg School of Public Health—Johns Hopkins Global Obesity Prevention Center (funded by NIH & CDC)

<i>Info-Nutriteen@</i> , Jeffreydin et al. (2020) ²⁵	Adolescents	Malaysia (Selangor)	Instagram (Meta Platforms, Inc)	12 weeks	The intervention was designed to introduce nutrition labels and the skills to interpret nutrition labels to choose healthier foods	Seven main topics of educational content were included: 1. Introduction to nutrition labeling 2. Serving size and macronutrient 3. Nutrition information panel 4. Nutrition claims 5. Energy labeling 6. Healthier choice logo 7. Nutrition labeling usage on food choices Campaign content included questions and answers (Q&A), short quizzes, polls, and feedback on the weekly message, making use of different Instagram features	Not specified	Research team from Community Health Center & Center for Artificial Intelligence Technology (CAIT)—Universiti Kebangsaan Malaysia, and Center of Nutrition and Dietetics Studies—Universiti Teknologi MARA
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TABLE 1 (Continued)

Campaign, study authors (year)	Characteristics of target audience	Campaign setting	Social media platforms employed	Campaign duration	Campaign objectives	Campaign content	Theoretical foundations	Campaign developer
Health Education in Shunyi District, Beijing. He et al. (2017) ²⁶	Occupational-based population (government employees)	China (Beijing)	WeChat	6 months	Health Education in Shunyi District, Beijing was designed to help participants who had overweight or obesity to lose weight	Content of Health Education in Shunyi District, Beijing's official WeChat account consisted of six components: Introduction, weight loss strategies, user rankings, weight loss Q&A, discussion board, and awards	Not specified	Shunyi Center for Disease Prevention and Control (SYCDC)
Healthy eating blog for adult women, Caplette et al. (2017) ²⁷	Women aged 18 and older who consumed less than five servings of fruits and vegetables per day	Canada	Blog	6 months	The healthy eating blog was designed to increase fruit and vegetable consumption	Content of the blog included several objectives 1. Eating fruit and vegetables at every meal 2. Planning fruit and vegetables purchase and preparation 3. Knowing a variety of fruit and vegetables 4. Healthy ingredient substitutions in recipes 5. Reading nutritional labels 6. Making better choices at restaurants	Not specified	Research team from Université Laval, CHU de Québec Research Center, and University of Toronto

TABLE 1 (Continued)

Campaign, study authors (year)	Characteristics of target audience	Campaign setting	Social media platforms employed	Campaign duration	Campaign objectives	Campaign content	Theoretical foundations	Campaign developer
Instagram campaign on adherence to physical activity, Al-Eisa et al. (2016) ²⁸	Saudi female college students	Saudi Arabia (Riyadh)	Instagram (Meta Platforms, Inc)	4 weeks	The campaign was designed to improve adherence levels of regular PA (using an online exercise program) among Saudi female college students	Content of the campaign included education about the benefits of PA and exercise program video links. Instagram (Meta Platforms, Inc) was also used as an alarm to remind participants to do the exercise sessions each week	Not specified	Research team from King Saud University
<i>Pretty and Picky</i> , Januraga et al. (2021) ²⁹	Urban, unmarried adolescent girls aged 16–19	Indonesia (Jakarta and Jogjakarta)	Multiplatform: Website, Facebook (Meta Platforms, Inc), Instagram (Meta Platforms, Inc), YouTube and LINE	2 months	<i>Pretty and Picky</i> was designed to promote healthier food choices among adolescent girls in Indonesia	Content of <i>The Pretty and Picky</i> campaign included several specific themes: 1. Increasing fruit, vegetable, and water intake 2. Reducing sugar, salt, and fat intake 3. Assessing food composition and labels Social media content types included activities, articles, recipes, and photos related to healthy food choices	Not specified	Global Alliance for Improved Nutrition Indonesia and its partners

(Continues)

TABLE 1 (Continued)

Campaign, study authors (year)	Characteristics of target audience	Campaign setting	Social media platforms employed	Campaign duration	Campaign objectives	Campaign content	Theoretical foundations	Campaign developer
#WeeStepsToHealth, O'Kane et al. (2022) ³⁰	Post-graduate students from Queen's University Belfast's Graduate School	Belfast, UK	Instagram	4 weeks	#WeeStepsToHealth was designed to promote more physical activity (PA), better nutrition, and better general wellbeing	Topics covered in campaign messaging included physical activity, nutrition, and general well-being Messages used one of two frames: (1) Educational framing, with a visual health message, or (2) humorous educational framing, with memes or references to popular culture		Center for Public Health, Queen's University Belfast
Swap Up, Wagner et al. (2022) ³¹	Teens aged 13–18	Oklahoma, US	Instagram, YouTube, Facebook, Snapchat, and an interactive website	Ongoing (5 months into the campaign)	Swap Up was designed to prevent and reduce obesity among Oklahoma teens by sharing practical tips to help them make healthier dietary choices. This campaign complemented a concurrent state-wide, adult-focused nutrition education program, shape your future	Content of Swap Up included short videos, memes, and GIFs that deliver nutrition-related facts	The Specific, Adaptable, Viable, and Impactful (SAVI) framework, which drew on social cognitive theory and social norm theory	Oklahoma Tobacco Settlement Endowment Trust

TABLE 2 Study characteristics.

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
Cooking Matters, Zhang, Panichelli, Hall (2021) ²¹	Pre-post survey	184	Low-income caregivers of young children (<6 years old)	<p>Cognitive outcomes:</p> <ol style="list-style-type: none"> Attitudes toward cooking Self-confidence in food planning and preparing healthy food for participants' household <p>Behavioral outcomes:</p> <ol style="list-style-type: none"> Fruit and vegetable consumption 	<ol style="list-style-type: none"> No significant difference was found in children's frequency of eating fruits and vegetables No significant pre-post difference was found in parents' attitudes toward cooking, self-confidence in food planning and preparing healthy food for the participants' households Significant increase in parents' self-efficacy in feeding healthy meals within budget
Healthy eating blog for Canadian mothers, Dumas et al. (2020) ²²	RCT	84	Canadian mothers of preschool- and school-aged children	<p>Cognitive outcomes:</p> <ol style="list-style-type: none"> Perceived skills around meal planning and cooking <p>Behavioral outcomes:</p> <ol style="list-style-type: none"> Daily intakes of vegetables, fruit, milk and milk alternatives <p>Anthropometric outcomes:</p> <ol style="list-style-type: none"> Body weight <p>Other outcomes:</p> <ol style="list-style-type: none"> Engagement with blog 	<ol style="list-style-type: none"> No significant difference in daily intakes of vegetables, fruit and milk and milk alternatives, body weight, self-reported meal planning enjoyment and confidence scores, and perceived meal planning and cooking skills between groups No significant association was found between blog engagement metrics and consumption of vegetables, fruit, milk, and milk alternatives
Jump2Health, Bakirci-Taylor et al. (2018) ²³	RCT	30	Parents and their preschool and school-aged children (3–8 years old)	<p>Behavioral outcomes:</p> <ol style="list-style-type: none"> Fruit and vegetables accessibility (parents and children) <p>Anthropometric outcomes:</p> <ol style="list-style-type: none"> Height/weight and BMI (children) <p>Other outcomes:</p> <ol style="list-style-type: none"> Level of skin carotenoids (parents and children) 	<ol style="list-style-type: none"> Significant increase in the variety of vegetables provided to children No significant change in the frequency of consumption of combined fruits/vegetables, total fruit, total vegetables, the sum of fruits high in provitamin A, or the sum of vegetables high in provitamin A

(Continues)

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
The B'more Healthy Communities for Kids (BHCK), Trude et al. (2019) ²⁴	Group RCT	373	Adult caregivers of youth aged 9–15	<p>Behavioral outcomes:</p> <ol style="list-style-type: none"> Food-related behaviors including acquisition, preparation, and fruit and vegetable consumption 	<ol style="list-style-type: none"> The evaluation of the overall intervention assessing the average treatment effects (ATE) showed no significant effect of the intervention on food acquisition, home food preparation, or daily consumption of fruit and vegetable (FV) among intervention adult caregivers The treatment-on-the-treated effect (TTE) analysis that emphasized 'dose received' (i.e., greater exposure to the social media component) was associated with a positive change (significant) in food-related behaviors among adult caregivers. The greater exposure to social media messages was positively correlated with improved daily fruit intake, daily FV intake, and unexpectedly with a higher frequency of unhealthy food acquisition

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
Info-Nutriteen®, Jefrydin et al. (2020) ²⁵	Quasi-experimental, pre-post study	125	Adolescents aged 13–14 from five public secondary schools in Gombak, Selangor	<p>Cognitive outcomes:</p> <ol style="list-style-type: none"> Nutrition knowledge and knowledge of nutrition labels Attitudes on nutrition labels <p>Behavioral outcomes</p> <ol style="list-style-type: none"> Practices on nutrition labels <p>Other outcomes:</p> <ol style="list-style-type: none"> Demand and acceptance of an Instagram-based nutrition labeling education 	<ol style="list-style-type: none"> Participants reported positive acceptance of the information on the Instagram page. The program was viewed as motivating and effective The project was shown to significantly improve participants' attitudes and practice on nutrition labels but had no significant effect on nutrition knowledge and nutrition labels knowledge
Health Education in Shunyi District, Beijing, He et al. (2017) ²⁶	Quasi-experimental study	15,310	Employees from 134 government agencies and enterprises in Shunyi District (Beijing, China)	<p>Anthropometric outcomes:</p> <ol style="list-style-type: none"> Body weight Waist circumference 	<ol style="list-style-type: none"> Overall, WeChat group had a higher probability of maintaining weight; weight loss from 1 to 2 kg, or weight loss for more than 2 kg, compared to the control group; both the WeChat group and the control group reported a decrease in waist circumference Compared to the control group, male participants in the WeChat group had a greater average decrease (significant) in weight Compared to the control group, female participants in the WeChat group had no significant decrease in weight

(Continues)

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
Healthy eating blog for adult women, Caplette et al. (2017) ²⁷	RCT	80	Women aged 18 and older who consumed less than five servings of fruits and vegetables per day	Behavioral outcomes: <ol style="list-style-type: none"> Consumption of fruits and vegetables Anthropometric outcomes: <ol style="list-style-type: none"> Height Weight Waist circumference 	<ol style="list-style-type: none"> Significant increase (1.0 servings of increase) in fruit and vegetable consumption was found in the healthy eating blog group at the 6-month visit compared with the control group No significant differences were found in BMI and waist circumference before and after the intervention between the intervention group and control group
Instagram campaign on adherence to physical activity, Al-Eisa et al. (2016) ²⁸	Quasi-Experimental Study	58	Female undergraduate students from the College of Applied Medical Sciences (CAMS), King Saud University, Riyadh	Behavioral outcomes: <ol style="list-style-type: none"> Adherence to regular PA 	<ol style="list-style-type: none"> The adherence rate to regular PA was 17% higher in the intervention group compared to the control group
Pretty and Picky, Januraga et al. (2021) ²⁹	Post-campaign qualitative study (interviews)	37	Girls aged 16 to 19 from Jakarta or Yogyakarta who were online campaign participants	Other outcomes: <ol style="list-style-type: none"> Participants' perspectives on the impact of the campaign 	<p>Five major themes were identified from the data analysis:</p> <ol style="list-style-type: none"> Perceived usefulness of the social media campaign content (e.g., provided new knowledge and practical information) Perceived ease of use of the social media campaign platform (e.g., user-friendly platform with attractive features) Usage behavior in the social media campaign (e.g., preferring Instagram and YouTube to Facebook) Intention for behavioral change as a result of exposure to the social media campaign (e.g., change in attitudes toward healthier food due to an increase in nutrition knowledge) Barriers to behavioral change and suggestions for campaign improvement (e.g., constant perception of healthy food being less tasty)

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
#WeeStepsToHealth, O'Kane et al. (2022) ³⁰	Pre-post survey, focus group	Two independent samples Pre-intervention survey: 43 Post-intervention survey: 41 focus group: 8	Followers of Queen's University Belfast's Graduate School Instagram page	<p>Cognitive outcomes:</p> <ol style="list-style-type: none"> 1. Knowledge of PA guidelines 2. Perceived importance of various health behaviors (e.g., eating healthy, exercise more, maintaining a healthy weight) 3. Perception of meeting recommended PA levels <p>Behavioral outcomes:</p> <ol style="list-style-type: none"> 1. Days with 30+ min of PA in the past week and past month 2. Frequency of looking at nutrition levels 3. Dietary behavior (daily portions of fruit/veg, frequency of fast-food intake, days/week eating sweets, cakes/pastries, fizzy drinks, diet drinks) 4. Days/week preparing own meals 	<p>The authors did not report the results of significance testing for this feasibility study</p> <ol style="list-style-type: none"> 1. Increased knowledge of PA guidelines 2. Increased perceived importance of nutrition-related behaviors such as having a healthy diet, exercising more, and maintaining healthy weight 3. Increase in percentage of respondents who believed they met the weekly PA guidelines (42.9% pre, 59.0% post)^a 4. Increase in percentage of respondents with self-reported weekly PA meeting or exceeding the recommended level (11.9% pre, 25.6% post) 5. Increase in percentage of respondents with self-reported monthly PA meeting or exceeding the recommended level (14.3% pre, 25.6% post) 6. Decrease in percentage of respondents reporting "always" looking at nutritional levels (33.3% pre, 23.1% post)^a 7. Increase in percentage of respondents reporting consumption of 3 or more servings of fruits and vegetables (52.4% pre, 74.4% post)^a 8. Decrease in percentage of respondents reporting zero fast food consumption (36.6% pre, 28.2% post)

(Continues)

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
Swap Up, Wagner et al. (2022) ³¹	Cross-sectional survey conducted 5 months into the campaign	200	Teens aged 13–19 in Oklahoma	<p>Anthropometric outcomes:</p> <ol style="list-style-type: none"> 1. Self-reported weight status <p>Cognitive/behavioral outcomes</p> <ol style="list-style-type: none"> 1. Trying/considering to increase water intake and associated actions 2. Trying/considering to decrease sugary drink intake and associated actions 3. Trying/considering to increase fruit/vegetable intake and associated actions 4. Trying/considering to decrease greasy, fried, or sugary food intake and associated actions 5. Campaign message awareness 6. Campaign brand awareness 7. Campaign digital engagement 8. Perceived campaign relevance 	<p>9. Decrease in percentage of respondents reporting frequent meal preparation (6–7 times/week) (66.7% pre, 48.7% post)</p> <p>Three key themes were identified from the focus group: Humor for engagement, the importance of a reliable source, and signposting</p> <ol style="list-style-type: none"> 1. 44% of participants had self-reported weight status of overweight 2. More than half of participants reported trying or considering at least one water consumption-increasing behavior, at least one sugary drink-decreasing behavior, at least one fruit/vegetable consumption-increasing behavior, and at least one unhealthy food-decreasing behavior in the past 30 days 3. 72% of participants reported aided awareness of the <i>Swap Up</i> brand and/or video advertisements 4. 83% reported awareness of at least one of the campaign's main messages 5. 44% of the participants reported at least one <i>Swap Up</i> digital engagement. 6. The average rating of <i>Swap Up</i>'s relevance to teens' nutritional mindset was 3.8 (five-point scale) 7. a. Both aware/engaged and aware/not engaged teens

TABLE 2 (Continued)

Campaign, study authors (year)	Study design	Sample size	Study population	Outcome variables	Main results
					<p>recognized significantly more unaided main messages compared to not aware teens</p> <p>b. Aware/engaged teens rated campaign relevance significantly higher than not aware teens</p> <p>c. Aware/engaged teens were more likely to report trying or considering increasing sugary beverages compared to teens who were aware/not engaged and who were not aware. Aware/engaged teens were more likely to report trying or considering increasing fruits and vegetables compared to teens who were not aware. Aware/engaged teens were significantly more likely than aware/not engaged and marginally more likely than not aware teens to report trying or considering decreasing greasy, fried, and sugary foods</p>

^aIn O'Kane et al.'s manuscript, there are some discrepancies between the data reported in the narrative and those reported in Table 3 of that paper. Through consultation with the authors, it was determined that the data in Table 3 are accurate; therefore, those data are included here.

participants matched those of the campaign's overall primary audience, while in the remaining six studies, those characteristics differed to some extent.

3.2.1 | Studies evaluating cognitive outcomes

Five studies evaluated changes in participants' cognitive outcomes (e.g., knowledge, attitudes, intentions) after exposure to the campaigns (*#WeeStepsToHealth*, *Cooking Matters*, *Info-Nutriteen®*, *Pretty and Picky*, and the healthy eating blog targeting Canadian mothers).^{21,22,25,29–31} Across studies, campaigns had inconsistent effects on cognitive outcomes. There were also variable effects within studies on different cognitive outcomes assessed. Favorable changes in some cognitive outcomes were observed in four of five studies; however, results from one of those four, the feasibility study of *#WeeStepsToHealth*, were based on pre and post-means without significance testing.^{21,25,29,30}

Two studies examined changes in cognitive outcomes among parents. The study of the *Cooking Matters* campaign, using a pre-post design, found a significant increase in parents' self-efficacy in preparing healthy meals within budget.²¹ However, participants from this campaign did not show significant pre-post improvement in attitudes toward cooking or self-efficacy for healthy food preparation.²¹ The study of a healthy eating blog targeting Canadian mothers also found no significant differences between the experimental and the control groups in changes in self-reported meal planning enjoyment or confidence or perceived cooking skills.^{21,22}

The influences of social media campaigns on cognitive outcomes in adolescents and college students were also mixed. The quasi-experimental, pre-post study of *Info-Nutriteen®* reported a significant improvement in participants' attitudes toward nutrition label reading, but their changes in overall nutrition or nutrition label knowledge were null.²⁵ However, preliminary evidence from the feasibility study of *#WeeStepsToHealth* suggested that more campaign followers (+12.5%) reported having knowledge of PA guidelines after campaign exposure compared with before.³⁰ In the post-campaign interviews with a group of adolescents from *Pretty and Picky*, participants acknowledged the usefulness of the campaign in delivering nutrition knowledge and practical information and also reported increased intention to make healthier food choices, but no pre-post comparison was made in this study.²⁹ This group of adolescents also described an increase in their awareness of unhealthy diet habits and indicated that they were motivated by the campaign to adopt a healthier lifestyle.²⁹

With regard to other factors that might influence the campaigns' effectiveness, such as content design, participants from *Info-Nutriteen®* and *Pretty and Picky* emphasized the importance of clear messages that highlighted the main takeaways.^{25,29} The younger adolescent participants from *Info-Nutriteen®* also suggested in open-ended survey responses that campaigns should avoid fear-based messages and include content that is currently trending on social media.²⁵ Interviewees from the focus group of *#WeeStepsToHealth*

reported that humorous content worked well in drawing their attention to the messages and facilitating higher engagement of the campaign.³⁰ They also noted the importance of basing the campaign messages on authorized sources and reported enjoying the external links to reputable sources as an addition.³⁰

3.2.2 | Studies evaluating behavioral outcomes

Ten of the included studies evaluated nutrition- or PA-related behavioral changes, including healthier food intake or food choices ($n = 8$), PA levels ($n = 2$), and nutrition label reading ($n = 2$).^{21–25,27–31} Increasing fruit and vegetable intake in particular was an overarching goal for most of the diet-related campaigns ($n = 8$), including *#WeeStepsToHealth*, *Swap Up*, *Cooking Matters*, *Jump2Health*, *BHCK*, *Pretty and Picky*, and the two healthy eating blogs. *#WeeStepsToHealth* and *Info-Nutriteen®* aimed to improve overall food choices with increased knowledge and frequency of nutrition label reading. *#WeeStepsToHealth* as well as the Instagram campaign targeting female college students were the only two campaigns that aimed to increase PA.

The effects of social media campaigns on behavior change were not consistent across studies. Among the five studies that evaluated changes in fruit and vegetable consumption using significance testing with either a single group pre-post design (*Cooking Matters*) or RCT (two healthy eating blogs targeting either Canadian mothers or adult women, *Jump2Health*, and *BHCK*), four reported no significant pre-post changes or differences in between-group changes in these outcomes.^{21–24,27} However, although no significant change in total fruit and vegetable consumption was observed among parents and their children from the *Jump2Health* campaign, there was a significant increase in the variety of vegetables provided to children.²³ Additionally, the increase in both parents' and children's skin carotenoid levels was significantly greater in the intervention group compared to controls in this study.²³ The study evaluating the effect of a healthy eating blog targeted toward adult women demonstrated a significant improvement in daily fruit and vegetable consumption between intervention and control groups at the end of the study.²⁷ *Pretty and Picky* was designed to improve fruit and vegetable consumption, but no data was collected to evaluate its effect on that outcome.²⁹

The study testing *#WeeStepsToHealth* found preliminary evidence of pre-post improvements in fruit and vegetable consumption (the proportion of respondents reporting consuming three or more servings per day increased from 52.4% to 74.4%) but not in other dietary behaviors; however, this study did not include tests of statistical significance.³⁰ Evidence from the cross-sectional study of *Swap Up* suggested a positive association between campaign awareness and engagement and participants' dietary behaviors, including trying or considering increasing water intake, decreasing sugary drinks, increasing fruits and vegetables, and decreasing greasy, fried, and sugary foods.³¹

The two studies examining PA behaviors found some evidence of potential benefit. In the Instagram campaign that aimed to improve

female college students' adherence to an online exercise program, greater adherence to regular PA was found in the intervention group compared with the control group.²⁸ The effective use of different campaign components with tailored functions (e.g., exercise reminders, motivational messages, home workout video programs) received positive responses from participants in this PA-oriented campaign.²⁸ #WeeStepsToHealth collected data on two similar but unmatched samples before and after the launch of the campaign. Although examples of positive behavioral changes were noted, the study lacked significance testing of pre-post data, making the effects of the campaign unclear.³⁰

On the other hand, an adverse behavioral outcome associated with high social media exposure was noted in the study of the BHCK campaign. While caregivers with greater exposure to the BHCK campaign had a positive change in food-related behaviors, their higher level of exposure was also correlated with a higher frequency of unhealthful food acquisition.²⁴ The authors hypothesized that this could be explained by participants with higher levels of exposure to the campaign simultaneously being exposed to online promotion of unhealthful foods.²⁴

3.2.3 | Studies evaluating anthropometric outcomes

Four studies (*Jump2Health*, the WeChat campaign targeting government employees, and the two healthy eating blogs) evaluated changes in anthropometric outcomes including weight, waist circumference, and height and found mixed effects.^{22,23,26,27,30}

All four studies measured changes in body weight; of those, only the WeChat campaign that targeted government employees found significant changes.^{22,23,26,27} This weight-loss-oriented campaign in China with a large cohort of government employees (greater than 15,000 participants) found significant weight reduction among male participants at the end of the 6 month intervention compared with controls.²⁶ Male participants in the intervention group (both active and inactive users) were more likely to maintain weight or lose more than 1 kg of body weight compared with those in the control group, although the control group had more male participants losing 0 to 1 kg.²⁶ Among female participants, individuals in the intervention group (both active and inactive users) were less likely to lose 0 to 1 kg of weight compared with controls. However, females in the active intervention group were more likely to lose more than 1 kg of weight compared with those in the inactive intervention group and the control group. There was no significant difference in pre-post weight maintenance or weight gain between the groups among female participants.²⁹

A healthy eating blog targeted toward adult women with low fruit and vegetable intake found no significant difference in changes in participants' anthropometric measures (waist circumference, weight, and BMI) between intervention and control groups.²⁷ Similarly, a healthy eating blog targeting Canadian mothers reported no effect of the blog on participants' body weight by comparing the blog group with the control group.^{22,23,26,27} Results of BMI change from

Jump2Health were also null between the intervention and control groups.²³

4 | DISCUSSION

The primary aim of this study was to review research testing the independent individual-level effects of social media campaigns focused on promoting healthy eating, PA, and healthy weight. To the best of the authors' knowledge, prior reviews examined social media interventions that were intensively moderated (e.g., social media groups or discussion boards) in ways that might limit campaign reach, and this review was the first study that focuses on messaging campaigns that did not include intensive moderation and therefore have the potential to reach broader audiences. The included studies found mixed effects of social media campaigns on diet- or PA-related cognitive outcomes such as beliefs, awareness, attitude, and knowledge; behaviors such as food choices and PA; and anthropometric outcomes such as weight and waist circumference.

This study found mixed results on the impact of social media campaigns on different types of outcomes, which is consistent with what previous reviews have reported. For example, a systematic review of studies testing heavily moderated social media interventions (e.g., Facebook groups) targeting teenagers and young adults reported improvements in cognitive outcomes such as awareness, motivation, and self-efficacy related to weight loss in only three out of seven studies.²⁰ With respect to behavioral outcomes, in Williams et al.'s systematic review and meta-analysis examining social media interventions targeting dietary and exercise-related behaviors (80% of which used electronic discussion boards as the exclusive social media component), no overall effects on the main behavioral outcomes were observed.¹⁸ However, in another systematic review evaluating 16 social media interventions that aimed to improve nutrition behaviors among adolescents and young adults, significant changes were found in either nutrition-related clinical identifiers or behavioral outcomes in 11 studies (with or without independent analysis of the social media component).⁴ That review also found mixed results for anthropometric outcomes such as changes in weight and waist circumference whereas most of the studies in the present review reported no significant improvement.^{32,33}

It is unclear which factors might explain the mixed results in this study and prior reviews, and further research is needed to explore those factors to help future campaign designers produce more effective health interventions.³²⁻³⁴ Potential influential factors include campaign design and dosage of delivered messages. Fewer than half of the studies in this review ($n = 4$) described behavioral theories used to inform the campaign content. Given that theory-based interventions tend to be more effective than non-theory-based ones, the limited use of theoretical frameworks in these campaigns may be one factor underlying their mixed results.³²⁻³⁴ Another possible explanation could be the dosage of the campaign messages that were delivered, as related to factors like campaign

duration, frequency of exposure, and engagement of participants, though few studies in this review examined these factors. Issues such as the highly competitive communication environment, insufficient dose of content delivered, or inadequate cultural tailoring of messages all have the potential to limit engagement.³⁵⁻³⁷ In addition, more than half of the studies ($n = 6$) from the present review included study samples that did not perfectly represent the campaigns' target audiences, and this lack of representativeness of the study samples could also explain the limited impact of the campaigns since some messaging might not appeal to individuals who were not specifically targeted.

This study identified several research gaps that should be addressed in future studies. Those include a need for more studies testing theory-based campaigns as well as the effects of campaign duration, frequency of exposure, and engagement of participants. It may be helpful for future studies of social media campaigns to provide more details about the campaign design, such as the rationale for using certain theoretical frameworks and processes for tailoring content to the audience's needs and preferences. Research with more diverse samples that allow for testing subgroup effects is also important to advance the understanding of whether such campaigns are equally effective for population subgroups, including communities experiencing inequities. In addition, this review identified only two studies that used qualitative methods to understand campaign effectiveness. More qualitative research is needed to help uncover how and why campaigns are effective or not, particularly in relation to cultural relevance and engagement with content.

Under optimal circumstances, communication efforts can serve as a bridge between the information environment and individual-level outcomes that result after a person accesses, filters, and makes sense of messages.^{38,39} However, cognitive, behavioral, and anthropometric changes related to health are fundamentally complex and can be influenced by many different factors. In particular, body weight is influenced by a wide array of factors beyond those that might be influenced directly by communications (e.g., knowledge, beliefs, attitudes). Notably, just one of the four studies in this review that examined campaigns' effects on weight or related outcomes found evidence of significant effects, suggesting that social media interventions alone may be insufficient to change those outcomes. The ecological model of health behavior suggests that factors at multiple levels, including intrapersonal, interpersonal, environmental, organizational, and policy factors, influence health behaviors.⁴⁰ Social media interventions' broad reach to audiences means that messages disseminated through these channels can be considered low- or medium-intensity interventions, which tend to have lower individual impact and smaller effect sizes, in comparison to more tailored, high-intensity interventions.⁵ Past nutrition-related campaigns using social media only, without concomitant intervention at other levels, have commonly reported difficulty promoting substantial changes in target outcomes.^{6,18,19,41} Future research is needed to elucidate how the effectiveness of nutrition, PA, and healthy weight social media campaigns may be dependent on other multilevel factors.³⁹

This study has several limitations. Overall, the review only captured 11 studies on social media campaigns that mainly focus on informational influences targeting individual-level outcomes. The relatively small number of included studies made it difficult to identify patterns or draw conclusions about factors that might influence effectiveness. It is also possible that the literature search failed to identify some studies meeting the inclusion and exclusion criteria; however, this limitation was minimized by using multiple engines, reviewing a high number of studies including the studies from all reference lists of the included studies, and obtaining guidance from an experienced research librarian to help ensure all relevant studies were included. Despite the relatively small sample of articles, the review provided some insight into the results of the currently available evidence along with several gaps in knowledge that should be addressed in future work.

This narrative review explored research testing the effects of social media campaigns focused on healthy eating, PA, and healthy weight on individual-level outcomes. It found mixed evidence of effectiveness but also surfaced a number of important gaps that future studies should address. Considering the potential of social media campaigns in terms of the breadth of reach and popularity among users, more efforts are needed to understand how to use these channels to influence cognitive and psychological outcomes, as well as to advance health behaviors and improve physical health outcomes.

AUTHOR CONTRIBUTIONS

Daniel P. Hatfield and Yajing Luo defined the research question and conceptualized the approach. Yajing Luo conducted the literature search, extracted findings, and drafted the paper, with guidance from Daniel P. Hatfield and Ana G. Maafs-Rodríguez. All authors read and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

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