Received: 30 November 2021 | Revised: 13 December 2021 | Accepted: 23 December 2021

DOI: 10.1002/osp4.586

ORIGINAL ARTICLE

Obesity Science and Practice Open Access WILEY

Expert opinions on reducing dietary self-monitoring burden and maintaining efficacy in weight loss programs: A Delphi study

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Abstract

Objective: Dietary self-monitoring is consistently related to both short- and long-term weight loss, but typically declines over time. Adopting an abbreviated approach to self-monitoring might reduce burden and potentially increase engagement while maintaining efficacy.

Methods: Using a Delphi-type study, experts were queried about abbreviated self-monitoring approaches that might best balance efficacy and burden and asked to identify when these approaches might best be implemented within a behavioral weight loss program. Experts were surveyed three times until consensus was reached.

Results: Experts identified three main categories of promising strategies for abbreviated self-monitoring regardless of whether individuals have been successful with weight loss or full dietary self-monitoring: (1) self-weighing only, (2) reducing the foods/beverages self-monitored to those that are often less routine and higher in caloric density, and (3) reducing the number of days per week to engage in full dietary self-monitoring. Experts recommended transitioning to abbreviated self-monitoring after 2 weeks of no self-monitoring among individuals who were struggling and after reaching 5%–10% weight loss among successful individuals.

Conclusions: These expert opinions offer a foundation to experimentally manipulate promising strategies for reducing burden and increasing long-term engagement in self-monitoring, with a goal of enhancing long-term weight control.

KEYWORDS
Delphi study, dietary self-monitoring, weight loss, weight maintenance

1 | INTRODUCTION

Obesity is a significant public health challenge. Although effective behavioral weight control treatments are available,[1–3] it will be important to ensure that these interventions are broadly utilized to have optimal impact on overall population health. Dietary self-monitoring is a core component of "gold standard" behavioral weight management programs,[4] and adherence to dietary self-monitoring is one of the best predictors of weight loss success.[4–7] However, dietary self-monitoring is associated with significant burden,[8] with recent estimates indicating that dietary self-monitoring takes about 23 min per day in the first month of a structured behavioral weight control program and only slight decreases in burden observed in subsequent months.[9] In addition, adherence to self-monitoring typically declines over time.[10,11] However, there are limited data on how long it is necessary to complete detailed dietary self-monitoring for optimal weight outcomes and when, or how, individuals can transition to less burdensome monitoring approach yet still achieve successful weight control.

Currently, a common recommendation is for individuals in a behavioral weight control program to record detailed dietary intake information daily for at least 6 months and to continue this detailed self-monitoring until their desired weight is achieved, at which point it is suggested that they transition to less frequent dietary self-monitoring.[12,13] Individuals in weight loss programs may experience diminishing returns on the time "costs" required for detailed self-monitoring after several months (i.e., after awareness of eating patterns has increased, after calorie knowledge has been acquired). However, there are few data to guide selection of briefer and less burdensome approaches,[8,14–16] as well as the appropriate timing for this transition.

The current study utilized a Delphi methodology to survey experts in behavioral weight management and dietary self-monitoring research for their opinions about the likely burden and efficacy of a range of possible abbreviated dietary self-monitoring approaches and which abbreviated strategies are most promising. Expert opinions were also sought as to when these briefer approaches might best be implemented. Insights gained could guide future research testing different self-monitoring approaches to identify those that sustain high adherence to dietary self-monitoring, reduce burden, and promote successful long-term weight loss outcomes.

2 | METHODS

2.1 | Procedure

The Delphi method is a practical and structured method of obtaining opinions on a given question from a range of experts using an iterative process that seeks to establish consensus among the experts on the Delphi panel.[17] The respondents completed 3 sequential surveys, and each round was refined based on feedback from the previous version. Previous research has indicated that consensus can be reached within 3 rounds.[18] The rounds were conducted between June and August 2021. The project was reviewed and approved as exempt by the University of South Carolina Institutional Review Board.

Each survey was sent to the experts via a unique, secure REDCap link. Participants were asked to rate the abbreviated dietary self-monitoring approaches, as well as indicate the time point that the transition would be optimal. After each round was completed, each panel member was sent aggregated results in an infographic that provided feedback on the overall scores for each item from the recently completed survey (e.g., mean and proportions; see Supporting Information S1). In other words, panel members who completed the first round were sent a summary of the first round results as an introduction to the second round survey, and a summary of the second round results were sent with the third round survey. No identifying information was included in the summaries.

Similar to previous research using the Delphi method,[19,20] consensus was defined a priori as greater than 33% agreement of the top five abbreviated self-monitoring strategies, as well as 33% agreement in the best time during a weight management program to transition to an abbreviated self-monitoring strategy. Item retention criteria were established a priori to assure that items retained in subsequent rounds demonstrated a balance between expected weight loss efficacy and burden. Specifically, possible abbreviated self-monitoring approaches were dropped from the list if they had a mean score lower than 3 on the efficacy item (out of 9, with a rating of 9 indicating highest or best efficacy) or a mean score higher than 7 on the burden item (out of 9, which indicated the highest or greatest burden). Possible transition time periods with less than 10% endorsement were dropped in subsequent surveys.

2.2 | Participants

Experts in self-monitoring for behavioral weight management research from English-speaking countries ($N = 158$) were identified and invited to participate (Figure 1).

2.3 | Inclusion/exclusion eligibility criteria

To be eligible for this study, participants had to be considered experts in behavioral weight management research with experience implementing dietary self-monitoring as part of a behavioral weight loss program. Individuals who authored at least one publication in a peer-reviewed journal that described a randomized clinical trial of a lifestyle intervention that incorporated dietary self-monitoring for the purpose of weight loss or maintenance were considered as experts in the field. Only those listed as first, second, or last (senior) author were included. Experts were identified by the research team using literature searches and databases (e.g., PubMed, Google Scholar).

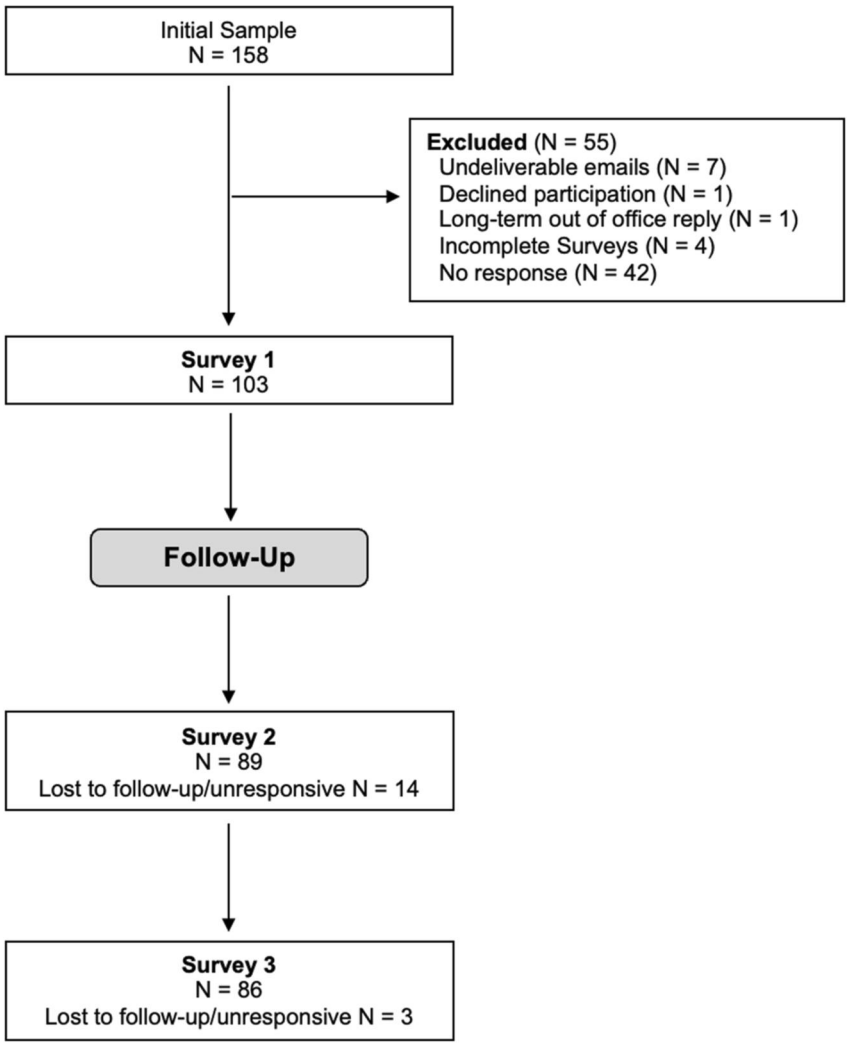

FIGURE 1 Recruitment and retention of the expert panelists

2.4 | Recruitment

Identified experts were sent an email invitation, which included an explanatory statement about the project, the timeline for the project, the number of rounds of data collection (i.e., up to three rounds of online surveys in the iterative process of obtaining consensus), and information about data confidentiality. The email also contained a REDCap link unique to that individual to access the Round 1 survey to complete if they were willing to participate. Only those participants who completed the first round were invited to complete the survey for the second round, and only those participants who completed the second round were invited to complete the survey in the third round. Participants had up to 4 weeks to submit their responses to a given survey before the link closed. In the 2 weeks after the initial survey link was sent, both a personal email request from the authors to complete the survey and an automated REDCap reminder email were sent to those who had not yet responded to the survey during that round. Surveys were designed to take no more than 5–10 min to complete, with each subsequent survey shorter than the previous.

2.5 | Retention

Experts received an electronic gift card for each round of the surveys that they completed. Specifically, they were eligible for a $3 electronic gift card for completing the Round 1 survey, $5 for completing the Round 2 survey, and $7 for completing the Round 3 survey. Thus, a total of $15 was offered for those who completed all three surveys. Additionally, experts were provided with the information learned in each round of the survey as part of efforts to retain them for subsequent surveys.

2.5.1 | Procedures

Round 1

Experts completed a sociodemographic questionnaire in Round 1 only, providing information on their gender, age, race/ethnicity and professional training. They were also asked about their level of expertize in conducting weight management interventions (limited, moderate, extensive) and the number of their peer-reviewed publications that addressed dietary self-monitoring for weight loss

purposes (the survey items for each round are available in the Supporting Information S1). If experts indicated that they have conducted and published research in which they experimentally manipulated two or more dietary self-monitoring methods and provided these citations, the citations were removed from the questionnaire dataset by the research staff member who was providing the incentives and reported in aggregate to the investigators only after being separated from survey responses.

In addition, experts were asked to rate 13 distinct abbreviated dietary self-monitoring methods, which were abstracted from previous research studies,[14,15,21–28] with respect to how **effective** they thought each approach would be for inducing weight loss and weight loss maintenance (1 = least effective to 9 = most effective). They were also asked to rate how **burdensome** the 13 abbreviated dietary self-monitoring methods would be (1 = least burdensome to 9 = most burdensome). An option was also available to add other self-monitoring approaches to the list. Experts were then asked to select the top 5 approaches (from among the 13 listed) that they believed would achieve the best balance of high effectiveness and low burden. They were also asked when in the course of a comprehensive behavioral weight loss intervention (6 months of weight loss induction treatment followed by 12 months of a weight maintenance intervention) they believed switching to a briefer form of dietary self-monitoring would allow individuals to achieve weight losses comparable to those achieved with traditional "full" self-monitoring approaches. Finally, experts could submit open-text responses indicating their rationale regarding the time to transition, as well as provide any further feedback for the study team.

Round 2

The opinions of the panel obtained in the Round 1 survey were summarized and shared with the experts at the beginning of the Round 2 survey to allow individuals to reflect on their perspectives in light of the greater community of experts. Then, each expert was asked to rate the 13 abbreviated self-monitoring strategies from the first survey, as well as the new strategies that were nominated by experts in Round 1, on efficacy only. Experts selected the top five approaches that they believed would achieve the best balance of high effectiveness and low burden and indicated the best timing for the transition to an abbreviated approach. Open-text responses were available for experts to provide any additional comments that might shed light on their responses.

Round 3

The list of abbreviated dietary self-monitoring methods that experts were asked to rate in Round 2 was distilled and shortened for the third round based on the responses in Round 2 as consensus emerged using the a priori decision criteria. Experts were asked to rank order the top approaches from most promising to least promising with respect to the perceived balance of efficacy and burden. They were also asked to indicate what "trigger" (e.g., at a particular weight regain threshold, periodically throughout the year, when they anticipate a high-risk situation) should be utilized to suggest an individual should return to full dietary self-monitoring.

2.5.2 | Statistical analyses

The majority of published Delphi studies included 100 participants or fewer in the final round of data collection,[18] so this served as our sample size target. Invitations were sent to 158 scholars, with the expectation that not all of the experts would be interested in participating and that there would be some attrition over time.

With each round, a descriptive analysis of the data was conducted (means, proportions for quantitative data, and thematic analysis for qualitative data). Responses were examined to determine whether consensus had been achieved before developing the specific items for the next round. All analyses are descriptive and were conducted using SPSS version 27.

3 | RESULTS

A total of 103 experts participated on the first round of the panel, representing a 65% response rate among enumerated experts invited (see Figure 1). The panel consisted predominantly of women (80.6%) from the United States (97.1%) who self-rated their expertize in behavioral weight control programs as extensive (54.4%) and reported ≥6 peer-reviewed publications that addressed dietary self-monitoring (78.7%; Table 1). Retention was high, with 89 experts participating in Round 2 (86%) and 86 (83%) in Round 3 of the process.

3.1 | Iterative ratings and feedback on surveys

3.1.1 | Round 1

Numerous experts (20.4%) indicated that it was important to distinguish between two scenarios for both the strategy ratings and the transition point: individuals who are not self-monitoring (and likely have not had success in weight loss) and individuals who have been successful in full dietary self-monitoring and weight loss (These scenarios will hereafter be referred to as Scenario 1 ["struggling"] and Scenario 2 ["successful"]). They indicated that collapsing across these two important clinical subgroups potentially obscured critical differences in the rankings they would give the approaches and in the recommendations they would make. For example, one expert indicated that:

> It will likely differ between participants. Some people have the hang of logging after only a few weeks of doing it and get into such a routine with their eating habits that it's less necessary. Others go the whole weight loss and weight maintenance intervention without getting

TABLE 1 Sociodemographic characteristics of the expert participants ($N = 103$)

	N (%)
Gender	
Man	20 (19.4%)
Woman	83 (80.6%)
Race	
Asian	3 (3.0%)
Black, African American, or of African descent	7 (6.9%)
White	89 (88.1%)
Other	3 (3.0%)
Nationality	
American	100 (97.1%)
Australian	3 (2.9%)
Professional training	
Psychology	54 (52.4%)
Exercise science	8 (7.8%)
Nutrition/food science	17 (16.5%)
Public health	12 (11.7%)
Other	12 (11.7%)
Publications on dietary self-monitoring	
Limited (1–5 publications)	22 (21.4%)
Moderate (6–10 publications)	32 (31.1%)
Extensive (≥11 publications)	49 (47.6%)
Level of experience in conducting or supervising behavioral weight control interventions	
Limited	10 (9.7%)
Moderate	37 (35.9%)
Extensive	56 (54.4%)
Setting (*Participants could select multiple options*)	
Research	98 (95.1%)
Clinical	37 (35.9%)
Community	25 (24.3%)

> into a "weight loss routine". Since most people tend to eat a lot of the same foods, especially once they start a weight loss program, I think it would be appropriate to switch to the abbreviated version when they hit some sort of a priori criterion of success…

Another expert reflected on the delicate balance between full/abbreviated self-monitoring adherence and weight loss success:

> Introducing abbreviated self-monitoring may lead to lower weight losses during initial intervention; however, a lower-burden approach may help improve adherence longer-term and can be consistent with the "something is better than nothing" approach.

A consensus emerged regarding the time to transition to abbreviated self-monitoring; 40.8% of the experts indicated that transitioning to an abbreviated self-monitoring strategy should occur during the weight loss phase of the intervention (i.e., in the first 6 months in the described scenario). The rationale for this time of transition ranged from "People need to do full dietary self-monitoring long enough to generate a good working knowledge of serving sizes and the caloric content of the foods" to "Switching before the end of weight loss can help people practice these skills before moving to the weight maintenance phase". Other experts noted that, "Given data that weight within the first 1–2 months of a program is associated with long-term weight loss, this supports switching during this (weight loss induction) period."

However, 9.7% of the experts indicated in an open-text response that the timing of the transition to abbreviated self-monitoring should be individualized or be based on the level of success the individual has experienced with weight loss and self-monitoring adherence (or lack thereof). Ten additional abbreviated self-monitoring approaches were suggested in Round 1 by panel members, and these were added to the survey for Round 2.

3.1.2 | Round 2

In Round 2, the experts were asked to rate 23 abbreviated self-monitoring strategies separately for the two different scenarios on efficacy. They were also asked to rate which strategies they would categorize as the most promising top 5 abbreviated strategies that balanced efficacy and burden (Table 2). For Scenario 1 ("struggling"), the 6 strategies that reached consensus for the top strategies were: (1) only log dinner on weekdays plus weekend and holiday meals (32.6% placed it in the top 5 strategies); (2) monitor all foods and beverages on 4 days a week (39.3%); (3) only log challenging foods (e.g., sweets, restaurant food, sugar-sweetened beverages, fried foods) (40.4%); (4) track only yellow/red foods and beverages from the Traffic Light diet[29] (43.8%); (5) monitor all foods and beverages on 3 days a week (46.1%); and (6) monitor only body weight (65.2%). However, several experts expressed their skepticism that any of the abbreviated strategies would be successful for an individual in Scenario 1. One expert indicated:

> Many of my ratings of alternative strategies for non-responders is based on my concern that prognosis is not good under any scenarios/options. Even if alternative self-monitoring strategies are employed, the chance this will significantly improve self-monitoring adherence AND weight loss is not promising.

Perhaps reflecting this skepticism or the need for quick action to catch this individual before they totally disengage, the consensus

TABLE 2 Descriptive statistics on items rated in Round 2

Items	Scenario 1: Participant is struggling with self-monitoring and weight loss		Scenario 2: Participant has been successful with self-monitoring and weight loss	
	M (SD)	Proportion rated as a top strategy *N* (%)	*M* (SD)	Proportion rated as a top strategy *N* (%)
Only log dinner on weekdays plus weekend and holiday meals	4.2 (1.9)	29 (32.6%)	5.1 (2.0)	29 (32.6%)
Only log rough estimates of serving sizes (i.e., checkboxes for small, medium, large, or supersize) plus estimates of fat content of each meal/snack and make notes when skipped meals/snacks	3.5 (1.5)	9 (9%)	4.6 (1.8)	10 (11.2%)
Only log rough estimates of serving sizes (i.e., checkboxes for small, medium, large, or supersize)	4.1 (1.7%)	25 (28.1%)	4.7 (1.9)	15 (16.9%)
Only log challenging foods (e.g., sweets, restaurant foods, sugar-sweetened beverages, fried foods)	4.4 (1.8)	36 (40.4%)	5.4 (1.8)	29 (32.6%)
Monitor anything eaten after the main meal of the day, but not items consumed earlier in the day	3.1 (1.5)	7 (7.9%)	3.9 (1.7)	3(3.4%)
Take pictures of all food and beverages consumed	4.1 (1.8)	26 (29.2%)	4.1 (1.8)	9 (10.1%)
Audio record a description of all food and beverages consumed	3.3 (1.6)	11 (12.4%)	3.5 (1.7)	6 (6.7%)
Monitor all foods and beverages on 3 days a week (including at least 1 weekend day and 1 weekday	4.6 (1.6)	41 (46.1%)	5.9 (1.7)	46 (51.7%)
Monitor all foods and beverages on 4 days a week (including at least 1 weekend day)	4.7 (2.0)	35 (39.3%)	6.3 (1.8)	45 (50.6%)
Track only 2 eating occasions (i.e., meals or snacks) per day	3.3 (1.4)	7 (7.9%)	4.4 (1.6)	10 (11.2%)
Record only "new" foods and beverages not consumed earlier	N/A[a]	N/A	3.8 (1.8)	10 (11.2%)
Monitor only body weight	5.1 (1.8)	58 (65.2%)	6.0 (1.7)	59 (66.3%)
Monitor use of weight loss strategies using checklist	4.3 (1.7)	25 (28.1%)	4.5 (1.9%)	23 (25.8%)
List foods and beverages without amount	3.7 (1.4)	19 (21.3%)	4.3 (1.7)	15 (16.9%)
Monitor diet only through passive eating detection	3.4 (1.6)	13 (14.6%)	3.6 (1.7)	3 (3.4%)
Monitor diet fully every other week	3.7 (1.7)	11 (12.4%)	5.2 (1.9)	25 (28.1%)
Monitor an estimate of total caloric intake each day	2.7 (1.3)	8 (9%)	4.1 (1.8)	14 (15.7%)
Track only yellow/red foods and beverages from the Traffic light diet	4.6 (1.7)	39 (43.8%)	4.9 (1.9)	26 (29.2%)
Monitor only hunger levels before and after eating	3.1 (1.5)	8 (9%)	3.2 (1.4)	2 (2.2%)
Monitor only cravings and the strategies used	3.2 (1.6)	10 (11.2%)	3.4 (1.6)	9 (10.1%)
Monitor only slips (e.g., impulsive eating)	3.6 (1.7)	12 (13.5%)	4.1 (1.7)	14 (15.7%)
Use a system for estimating intake (e.g., diabetic exchange food groups)	3.6 (1.8)	14 (15.7%)	4.2 (1.7)	11 (12.4%)
Pre-log foods and beverages to create a meal plan	N/A[a]	N/A	5.4 (1.8)	23 (25.8%)

[a]This item was not included for this scenario, given the previous challenges that a participant of this type has had with full dietary self-monitoring.

among the experts for Scenario 1 was that this individual should be transitioned to abbreviated self-monitoring after 2 weeks of no self-monitoring (41.6%) (Table 3).

For Scenario 2 ("successful"), the 5 strategies that reached the level of consensus for being top strategies were similar to those identified for Scenario 1: (1) only log dinner on weekdays plus weekend and holiday meals (32.6% placed it in the top 5 strategies); (2) only log challenging foods (e.g., sweets, restaurant food, sugar-sweetened beverages, fried foods) (32.6%); (3) monitor all foods and beverages on 4 days a week (50.6%); (4) monitor all foods and beverages on 3 days a week (51.7%); and (5) monitor only body weight (66.3%) (Table 2). For Scenario 2, the consensus of the experts was that the transition to the abbreviated self-monitoring approach should occur after reaching a weight loss benchmark set by the program (Table 3), with varying opinions of whether that benchmark should be 3%, 5%, 7%, or 10%. One expert explicitly reflected on this overlap in the top abbreviated self-monitoring strategies between Scenarios 1 and 2, but commented that the distinction between Scenarios 1 and 2 may be in the appropriate triggers for the transition:

TABLE 3 Recommended transition points for switching to the abbreviated self-monitoring strategy (Round 2)

Scenario 1: The participant is struggling with self-monitoring and weight loss	
	N (%)
After 1 week of no self-monitoring	7 (7.9%)
After 2 weeks of no self-monitoring	37 (41.6%)
After 3 weeks of no self-monitoring	15 (16.9%)
After 1 month of no self-monitoring	23 (25.8%)
After 2 months of no self-monitoring	2 (2.2%)
After 3 months of no self-monitoring	2 (2.2%)
After 4 months of no self-monitoring	1 (1.1%)
At another time	2 (2.2%)
Scenario 2: The participant is doing well with self-monitoring and/or weight loss	
	N (%)
At a particular time point in the program (e.g., a certain month of the program)	8 (9.0%)
After reaching a benchmark weight loss goal set by the program	35 (39.3%)
3% weight loss	1 (1.1%)
5% weight loss	13 (14.6%)
7% weight loss	8 (9.0%)
10% weight loss	13 (14.6%)
When the individual has reached their personal weight loss goal	22 (24.7%)
When the individual is on a steady trajectory of weight loss	9 (10.1%)
Never	3 (3.4%)
Other (e.g., fatigue with self-monitoring)	12 (13.5%)

> It is interesting - when I was thinking about weighing both effectiveness and burden, it did not seem to matter too much whether someone was successful or not in terms of the method that could be used when making the switch - but would seem to make a difference when it comes to the timing to try an abbreviated method.

3.1.3 | Round 3

In Round 3, the experts were asked to rank the top abbreviated self-monitoring strategies separately for the two different scenarios that were identified in Round 2 (6 strategies for Scenario 1, 5 strategies for Scenario 2). For both scenarios, self-weighing emerged most frequently as the experts' #1 strategy for abbreviated self-monitoring (Scenario 1: 60%, Scenario 2: 51%; Figure 2). However, for both scenarios, there was support for the other strategies that broadly form two categories: (1) reducing the foods/beverages self-monitored to those that are often less routine and higher in caloric density (i.e., only log dinner on weekdays plus weekend and holiday meals, only log challenging foods) and (2) reducing the number of days per week to engage in full dietary self-monitoring (i.e., 3–4 days, including at least one weekend day).

For Scenario 2, experts were also asked to recommend a trigger for when an individual should be asked to resume full dietary self-monitoring. The majority of the experts (86.0%) indicated that the trigger should be a particular weight regain threshold. Among experts who indicated this weight regain threshold as the recommended trigger for resuming full dietary self-monitoring, there was a nearly even split between 2% weight regain (33.7%) and 3% regain (31.4%).

4 | DISCUSSION

The findings from this Delphi study indicate that there is expert consensus on promising strategies for abbreviated self-monitoring regardless of whether individuals have been successful with weight loss or full dietary self-monitoring. These strategies can be grouped into three main categories: self-weighing only, reducing the foods/beverages self-monitored to those that are often less routine and higher in caloric density, and reducing the number of days per

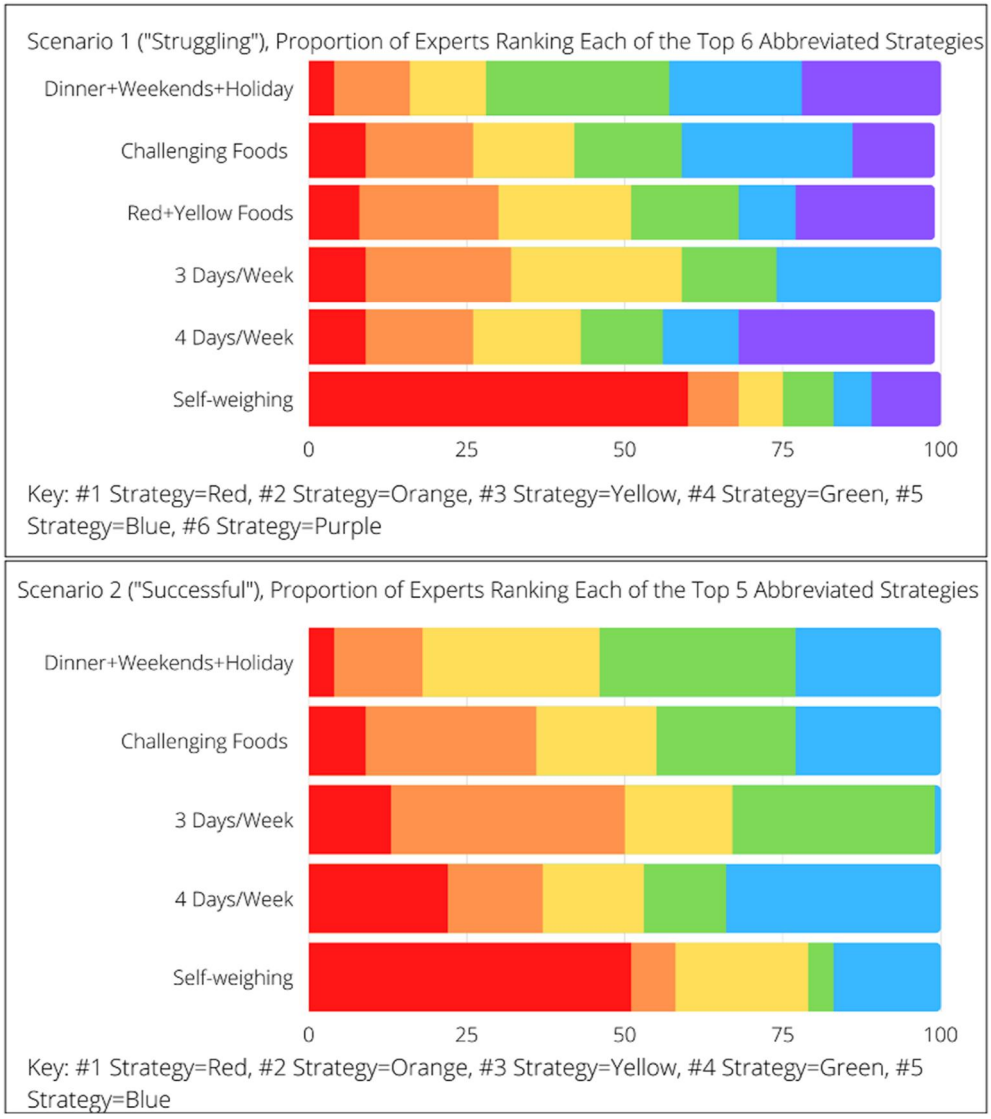

FIGURE 2 Descriptive data on items rated in Round 3

week to engage in full dietary self-monitoring. The experts indicated that there is an important distinction between the appropriate triggers for transitioning to these abbreviated strategies between those who have struggled and those who have been successful with full self-monitoring and/or weight loss. Specifically, when the individual is struggling, the experts indicated that the abbreviated strategies should be considered in situations where the individual has not engaged in self-monitoring for 2 weeks; in contrast, for those who have been successful, they indicated that the transition to abbreviated self-monitoring should be tested when individuals reach clinically significant weight loss benchmarks.

To reduce burden and potentially increase long-term engagement in weight management, it will be essential to test these abbreviated self-monitoring strategies, some of which have been shown to be feasible or promising in previous research.[15,21,25,26,28,30] The panel's opinions may offer a foundation to future research testing the application of these expert recommendations for abbreviated self-monitoring and potentially compare these strategies. Specifically, it will be important to test how long full dietary self-monitoring is necessary and the impact of transitioning to abbreviated self-monitoring approaches, both for individuals who have been successful (e.g., do they regain weight?) and those who have struggled (e.g., do they become more engaged in self-monitoring?). Personalization of abbreviated self-monitoring strategies to particular challenges (e.g., times that cravings occur vs. foods/beverages that are challenging throughout the day) is another consideration. In addition, it will be crucial to test the recommended transition points to evaluate whether they are sensitive enough to identify individuals who are struggling, and to transition successful individuals when they have gained sufficient knowledge (e.g., calories, portion sizes) and self-regulatory skills but before they become fatigued with full dietary self-monitoring.

This study has notable strengths and limitations. Strengths of this study include the substantial number of experts who

participated, retention of experts throughout the iterative three rounds of the study, diversity of relevant disciplines represented by the experts, level of expertize of the panelists in conducting/supervising behavioral weight management interventions and publishing about self-monitoring, and use of a priori criteria for determining consensus. An additional strength is the use of the open-text responses to provide additional context for the experts' responses. A main limitation of this study is the small number of experts identified (and who participated) from outside of the United States, which may limit the generalizability of the findings. In addition, there are numerous ways to define consensus that have been used in the previous literature, without clear agreement about the best consensus metric to use.[18]

The study is the first step in identifying promising abbreviated self-monitoring strategies and triggers for transitioning to these strategies to test in future research. The strategies and triggers identified in this study should be tested experimentally in future research to determine which ultimately produce the best outcomes for self-monitoring engagement and long-term weight loss.

ACKNOWLEDGMENT

This work was supported by the University of South Carolina Technology Center to Promote Healthy Lifestyles.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Curry SJ, Krist AH, Owens DK, et al. Behavioral weight loss interventions to prevent obesity-related morbidity and mortality in adults: US Preventive Services Task Force recommendation statement. *JAMA*. 2018;320(11):1163-1171
2. LeBlanc ES, Patnode CD, Webber EM, Redmond N, Rushkin M, O'Connor EA. Behavioral and pharmacotherapy weight loss interventions to prevent obesity-related morbidity and mortality in adults: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*. 2018;320(11):1172-1191.
3. Wadden TA, Tronieri JS, Butryn ML. Lifestyle modification approaches for the treatment of obesity in adults. *Am Psychol*. 2020;75(2):235-251.
4. Patel ML, Wakayama LN, Bennett GG. Self-monitoring via digital health in weight loss interventions: a systematic review among adults with overweight or obesity. *Obesity*. 2021;29(3):478-499.
5. Butryn ML, Webb V, Wadden TA. Behavioral treatment of obesity. *Psychiatr Clin*. 2011;34(4):841-859.
6. Goldstein SP, Goldstein CM, Bond DS, Raynor HA, Wing RR, Thomas JG. Associations between self-monitoring and weight change in behavioral weight loss interventions. *Health Psychol*. 2019;38(12):1128-1136.
7. Burke LE, Wang J, Sevick MA. Self-monitoring in weight loss: a systematic review of the literature. *J Am Dietetic Assoc*. 2011;111(1):92-102.
8. Turner-McGrievy GM, Yang C-H, Monroe C, Pellegrini C, West DS. Is burden always bad? Emerging low-burden approaches to mobile dietary self-monitoring and the role burden plays with engagement. *J Technol Behav Sci*. 2021:1-9.
9. Harvey J, Krukowski R, Priest J, West D. Log often, lose more: electronic dietary self-monitoring for weight loss. *Obesity*. 2019;27(3):380-384.
10. Krukowski RA, Harvey-Berino J, Bursac Z, Ashikaga T, West DS. Patterns of success: online self-monitoring in a web-based behavioral weight control program. *Health Psychol*. 2013;32(2):164-170.
11. Farage G, Simmons C, Kocak M, et al. Assessing the contribution of self-monitoring through a commercial weight loss app: mediation and predictive modeling study. *JMIR mHealth uHealth*. 2021;9(7):e18741.
12. Laitner MH, Minski SA, Perri MG. The role of self-monitoring in the maintenance of weight loss success. *Eat Behav*. 2016;21:193-197.
13. Diabetes Prevention Program Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes Care*. 2002;25(12):2165-2171.
14. Dunn CG, Turner-McGrievy GM, Wilcox S, Hutto B. Dietary self-monitoring through calorie tracking but not through a digital photography app is associated with significant weight loss: the 2SMART pilot study—a 6-month randomized trial. *J Acad Nutr Dietetics*. 2019;119(9):1525-1532.
15. Helsel DL, Jakicic JM, Otto AD. Comparison of techniques for self-monitoring eating and exercise behaviors on weight loss in a correspondence-based intervention. *J Am Dietetic Assoc*. 2007;107(10):1807-1810.
16. Patel ML, Hopkins CM, Brooks TL, Bennett GG. Comparing self-monitoring strategies for weight loss in a smartphone app: randomized controlled trial. *JMIR mHealth uHealth*. 2019;7(2):e12209.
17. Helmer O. *Analysis of the Future: The Delphi Method*. Rand Corp; 1967.
18. Diamond IR, Grant RC, Feldman BM, et al. Defining consensus: a systematic review recommends methodologic criteria for reporting of Delphi studies. *J Clin Epidemiol*. 2014;67(4):401-409.
19. Danial-Saad A, Kuflik T, Weiss PL, Schreuer N. Building an ontology for assistive technology using the Delphi method. *Disabil Rehabilitat Assistive Technol*. 2011;8(4):275-286.
20. Danielson BBM, Pearcey R, Bass B, et al. Development of indicators of the quality of radiotherapy for localized prostate cancer. *Radiother Oncol*. 2011;99(1):29-36.
21. Raynor HA, Thomas JG, Cardoso CC, Wojtanowski AC, Foster GD. Examining the pattern of new foods and beverages consumed during obesity treatment to inform strategies for self-monitoring intake. *Appetite*. 2019;132:147-153.
22. Illner A, Freisling H, Boeing H, Huybrechts I, Crispim S, Slimani N. Review and evaluation of innovative technologies for measuring diet in nutritional epidemiology. *Int J Epidemiol*. 2012;41(4):1187-1203.
23. Turner-McGrievy GM, Dunn CG, Wilcox S, et al. Defining adherence to mobile dietary self-monitoring and assessing tracking over time: tracking at least two eating occasions per day is best marker of adherence within two different mobile health randomized weight loss interventions. *J Academy Nutr Dieteti*. 2019;119(9):1516-1524.
24. Hutchesson MJ, Tan CY, Morgan P, Callister R, Collins C. Enhancement of self-monitoring in a web-based weight loss program by extra individualized feedback and reminders: randomized trial. *J Med Internet Res*. 2016;18(4):e4100.
25. Peterson ND, Middleton KR, Nackers LM, Medina KE, Milsom VA, Perri MG. Dietary self-monitoring and long-term success with weight management. *Obesity*. 2014;22(9):1962-1967.
26. Crane MM, Lutes LD, Ward DS, Bowling JM, Tate DF. A randomized trial testing the efficacy of a novel approach to weight loss among men with overweight and obesity. *Obesity*. 2015;23(12):2398-2405.

27. Adachi Y, Sato C, Yamatsu K, Ito S, Adachi K, Yamagami T. A randomized controlled trial on the long-term effects of a 1-month behavioral weight control program assisted by computer tailored advice. *Behav Res Ther*. 2007;45(3):459-470.
28. Steinberg DM, Tate DF, Bennett GG, Ennett S, Samuel-Hodge C, Ward DS. The efficacy of a daily self-weighing weight loss intervention using smart scales and e-mail. *Obesity*. 2013;21(9):1789-1797.
29. Epstein LH, Wing RR, Koeske R, Andrasik F, Ossip DJ. Child and parent weight loss in family-based behavior modification programs. *J Consult Clin Psychol*. 1981;49(5):674-685.
30. Pagoto S, Tulu B, Waring ME, et al. Slip Buddy for weight management: a randomized feasibility trial of a dietary lapse tracking app. *JMIR mHealth uHealth*. 2021;9(4):e21219. PMID: 33792547. https://doi.org/10.2196/24249

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Krukowski RA, Harvey J, Borden J, Stansbury ML, West DS. Expert opinions on reducing dietary self-monitoring burden and maintaining efficacy in weight loss programs: a Delphi study. *Obes Sci Pract*. 2022;8(4):401-410. https://doi.org/10.1002/osp4.586