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## Information Processing Versus Social Cognitive Mediators of Weight Loss in a Podcast-Delivered Health Intervention

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### Abstract

Podcasting is an emerging technology, and previous interventions have shown promising results using theory-based podcast for weight loss among overweight and obese individuals. This study investigated whether constructs of social cognitive theory and information processing theories (IPTs) mediate the effect of a podcast intervention on weight loss among overweight individuals. Data are from Pounds off Digitally, a study testing the efficacy of two weight loss podcast interventions (control podcast and theory-based podcast). Path models were constructed ( $n = 66$ ). The IPTs—elaboration likelihood model, information control theory, and cognitive load theory—mediated the effect of a theory-based podcast on weight loss. The intervention was significantly associated with all IPTs. Information control theory and cognitive load theory were related to elaboration, and elaboration was associated with weight loss. Social cognitive theory constructs did not mediate weight loss. Future podcast interventions grounded in theory may be effective in promoting weight loss.

### Keywords

elaboration; information processing theory; mediators; podcasting intervention; social cognitive theory; weight loss

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Overweight and obesity constitute a leading public health problem in the United States. In 2004, 66.4% of adults were classified as overweight or obese in the United States (body mass index [BMI]  $\geq 25$  kg/m<sup>2</sup>; Ogden et al., 2006). Individuals who are overweight or obese have increased incidence of many chronic diseases, including cardiovascular disease,

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### Declaration of Conflicting Interests

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hypertension, Type 2 diabetes, and some forms of cancer (Banning, 2005; Jee, Kim, & Lee, 2005). Previous research studies have used electronic media to effectively deliver weight loss interventions (Berkel, Poston, Reeves, & Foreyt, 2005; Turner-McGrievy et al., 2009). Podcasting, in particular, is an emerging technology relevant for weight loss interventions (Gordon-Larsen, Nelson, & Popkin, 2004). This medium allows individuals to download electronic audio files to portable audio players (MP3 players) or computers. In contrast to other electronic media (nonportable computers and televisions) that increase sedentary time, individuals can listen to podcasts on the go (during workouts, walking to school; Gordon-Larsen et al., 2004). In addition, since podcasting can be easily recorded, produced, and downloaded, this approach has become increasingly important as a public health education tool in the information age. A podcast intervention shows success on weight loss in overweight and obese individuals when messages are strategically designed using health behavior/psychology theories (Turner-McGrievy et al., 2009; Turner-McGrievy, Kalyanaraman, & Campbell, 2013; Turner-McGrievy & Tate, 2011).

However, little is known about the mechanism through which a theory-based intervention delivered through podcasting works to produce its effect. Mostly, what is published on causal mechanisms of weight loss interventions focuses on print- and telephone-based (Ko, Campbell, Lewis, Earp, & DeVellis, 2011; Shaikh, Vinokur, Yaroch, Williams, & Resnicow, 2011), group-based (Teixeira et al., 2010), Internet-based (White et al., 2004), and text message-based health education (Patrick et al., 2009). Over the past three decades, the rate of obesity consistently increased in the United States and globally in other developed countries (Finucane et al., 2011; Ogden et al., 2006). As researchers are now beginning to learn about the potential benefits of using electronic technology to promote weight loss, studies examining causal mechanisms can help identify which processes can be enhanced and promoted in future interventions to curb the rate of obesity.

The Pounds off Digitally (POD) study was a randomized controlled weight loss podcasting trial testing the effect of theory-based intervention messages (vs. non-theory based) among overweight and obese individuals (BMI = 25–40 kg/m<sup>2</sup>) in the Raleigh–Durham, North Carolina, U.S. metropolitan area. Results from POD revealed that theory-based intervention messages (intervention arm) resulted in greater weight loss of 2.9 kg (vs. 0.3 kg in the nontheory, control arm) after 12 weeks and a decrease in BMI of 1.0 kg/m<sup>2</sup> (vs. 0.1 kg/m<sup>2</sup> in the control arm; Turner-McGrievy et al., 2009).

The development of the POD intervention was guided by social cognitive theory (SCT) of behavior change as well as by three information processing theories (IPTs). SCT describes human behavior as a triadic and dynamic interaction of personal factors, behavior, and the environment (Bandura, 2004). SCT delineates theoretical constructs or mediators for weight loss that can inform the development of the intervention. The POD intervention was developed based on the SCT constructs of self-efficacy, behavioral capability, outcome expectation, and expectancy (defined in the Method section). The description of the intervention components and how they targeted the SCT constructs has been previously reported in the literature (Turner-McGrievy et al., 2009).

Information processing (IP) refers to an individual's effort to attend to an intervention message and the level of involvement with the topic of the message (Petty, Priester, & Wegener, 1994). Past research has found that IP mediates the relationship between health interventions and dietary change, and information that is more processed or elaborated appears to influence behavior change to a greater degree (Ko et al., 2011; Kreuter et al., 2004). The IPTs guiding the intervention were the following: elaboration likelihood model (ELM; Petty, Cacioppo, Strathman, & Priester, 1994), cognitive load theory (CLT; Paas, Tuovinen, Tabbers, & Van Gerven, 2003), and information control theory (ICT; Eveland & Dunwoody, 2001).

ELM states that information influences an individual via a process of cognitive elaboration, that is, the recipient evaluates new information and forms a judgment about its use (Petty, Priester, et al., 1994). The main assumption of ELM is that people are active information processors, and when individuals deem information as personally relevant, they are likely to process it more deeply. Research suggests that when individuals elaborate on the information more rigorously, the expected change in attitude and behavior is greater than if the information is deemed of little importance (Hawkins, Kreuter, Resnicow, Fishbein, & Dijkstra, 2008; Ko et al., 2011; Petty, Cacioppo, et al., 1994). CLT states that people have limited cognitive abilities to process new information. As a result, when individuals are able to make less effort during initial processing, they are likely to elaborate more on the message (Brunken, Plass, & Leutner, 2003). Finally, ICT states that allowing an individual to have control over the pace and content of instruction leads to more motivation to learn, better understanding, and more effective learning (Eveland & Dunwoody, 2001). Past research shows that motivation is related to elaboration, such that when motivation is high, it leads to more elaboration and ultimately to greater behavior change (Petty, Cacioppo, et al., 1994; Petty, Priester, et al., 1994). The purpose of this study was to examine whether these mediating variables of SCT and IPT in fact mediated the relationship between the POD intervention and weight loss.

## Conceptual Model

Guided by the SCT and the three IPTs, we developed a new conceptual model to examine the relationship between (a) the theory-based podcast intervention, (b) SCT (self-efficacy, behavioral capabilities, outcome expectation, and expectancy) and IPT (elaboration, cognitive load, and information control) mediating constructs, and (c) weight loss (Figure 1). As shown in Figure 1, the relationship between the intervention and weight loss can occur directly, as well as indirectly through mediating variables of the SCT and IPTs.

## Method

### Sample

Data used here are from the POD study, a randomized, weight loss podcast intervention that tested the efficacy of two health communication strategies to promote weight loss among overweight and obese participants (Turner-McGrievy et al., 2009). The two different strategies were a popular weight loss podcast available for free in the World Wide Web (control podcast group; Paton, 2010) and a theory-based weight loss podcast designed by the

researchers (enhanced podcast group) guided by the theoretical framework of SCT (Bandura, 2004), ELM (Petty, Cacioppo, et al., 1994; Petty, Priester, et al., 1994), CLT (Brunken et al., 2003; Paas et al., 2003), and ICT (Eveland & Dunwoody, 2001). The control group podcast consisted of discussions on how to lose weight, were conducted by two hosts, and focused on avoidance of overeating to achieve a healthy weight. The content of the enhanced group podcast was designed to increase four constructs of SCT: self-efficacy (the participant's confidence to lose weight), behavioral capabilities (the participant's knowledge and skills to perform behaviors required to lose weight), outcome expectation (what the participant expects will occur when attempting to lose weight), and expectancy (the value a participant places on weight loss). ELM helped guide the design of the messages, making them personally relevant to the participants. CLT and ICT guided the formatting of each episode and lent support to the use of podcasting over other intervention delivery methods. The enhanced podcast format for each episode included an introduction, an audio blog of someone trying to lose weight, information on nutrition and physical activity, an audio soap opera, and a goal-setting exercise.

Participants were recruited through newspaper advertisements and university e-mails in the Raleigh–Durham, North Carolina, U.S. metropolitan area. Eligibility criteria required men and women classified as overweight and obese ( $BMI = 25\text{--}40\text{ kg/m}^2$ ) to be medically stable, with either no or a controlled thyroid condition, no diagnosis of diabetes mellitus, no history of an eating disorder, no mental illness, not pregnant, no report of alcohol and drug abuse, and no report of tobacco use. Of the 120 volunteers who inquired about the study between September 2007 and January 2008, 94 (78%) were enrolled in the study, 10 declined participation, and 16 did not meet eligibility criteria. Of the 94 who were accepted into the study, 16 did not attend the introductory meeting and 78 individuals (83%) completed the baseline survey (37 control podcast group and 41 enhanced podcast group). Of those 78 participants, 66 (85%) completed the follow-up survey (28 control podcast group and 38 enhanced podcast group); the remaining 12 participants withdrew from the study mostly due to time constraints. The analyses for this study used data only from participants who completed the follow-up survey ( $n = 66$ ).

Participants attended an introductory meeting, were measured for weight and height, and completed information on baseline demographics and SCT constructs (self-efficacy, behavioral capabilities, outcome expectation, and expectancy). At the 12-week follow-up meeting, participants completed questionnaires that assessed SCT constructs, elaboration (Marks et al., 2006), information control (Franz et al., 2007), and cognitive load (Brunken et al., 2003), as well as weight and height.

All participants received two podcasts per week for 12 weeks, as well as a book with calorie and fat gram amounts of popular foods to enable them to self-monitor caloric intake. An e-mail reminder was sent out when a new podcast was available, and participants were told to log on to the study website to record how many podcasts they had listened to that week and to describe the topics covered. Participants who failed to record in their weekly online journal were contacted by e-mail and phone and encouraged to listen to the most recent podcasts. Detailed recruitment and intervention procedures have been previously described (Turner-McGrievy et al., 2009).

## Measures

### Dependent Variables

**Weight loss:** Weight loss was calculated by taking the difference between follow-up weight and baseline weight. Weight was a continuous variable. Participants were weighed in light clothing with a Tanita digital body weight scale accurate to 0.1 kg.

**Self-efficacy:** Self-efficacy was assessed by asking participants one question about their confidence in their ability to lose weight, on a scale of 1 to 7 where 1 = *not at all* confident and 7 = *very confident*.

**Behavioral capability:** Behavioral capability was assessed by asking each participant a series of 10 statements that measured participants' knowledge and skill on healthy eating and exercise to lose weight, on a scale of 1 to 7 where 1 = *totally disagree* and 7 = *totally agree*. An example of the item included "I know the right foods to eat in order to lose weight." Answers were averaged across the 10 statement to establish an overall score, which could range from 1 from 7 (Bandura, 2004).

**Outcome expectation:** Outcome expectation was assessed by asking participants one question: "How do you feel the outcome is when you try to lose weight, on a scale of 1 to 7 where 1 = *not very good* and 7 = *very good*."

**Expectancy:** Expectancy was assessed with one question about how much participants valued losing weight, on a scale of 1 to 7 where 1 = *do not value it at all* and 7 = *value it very much*.

**Elaboration:** Elaboration was slightly revised from the Marks et al. (2006) scale and was assessed using nine items from the ELM questionnaire, on a scale of 1 to 7 where 1 = *not at all* and 7 = *very much*, to measure how much an individual processed and thought about the intervention's information. An example of elaboration item included "How much would you say the information in the podcasts held your attention?" Answers were summed to establish an overall score, which could range from 9 to 63. The internal consistency coefficient for this measure was high (Cronbach's  $\alpha = .92$ ; Nunnally, 1978).

**Cognitive load:** Cognitive load was assessed by asking participants two questions: "How difficult or easy was it to process the information presented during the study?" and "How much mental effort did you have to spend when getting the information for this study?" on a scale of 1 to 7 where 1 = *very easy* and 7 = *very difficult*. Answers were summed to establish an overall score and could range from 2 to 14 (Brunken et al., 2003). The internal reliability for this measure was adequate (Cronbach's  $\alpha = .73$ ; Nunnally, 1978).

**Information control:** Information control was assessed by asking each participant a series of 10 questions about how much control he or she felt over the learning environment, on a scale of 1 to 7 where 1 = *strongly disagree* and 7 = *strongly agree*. An example of information control item included "I felt that I had a lot of control while going through the Podcast." Answers were summed to establish an overall score, and could range from 10 to

70 (Franz et al., 2007). The internal reliability for this measure was inadequate (Cronbach's  $\alpha = .63$ ; Nunnally, 1978).

**Condition Groups:** Participants were randomized to two groups: generic weight loss podcast group (control) or theory-based weight loss podcast group (intervention).

**Demographic Variables:** Age, a continuous variable, was calculated using the date of birth and the date of the interview. Race was self-reported based on the 2000 U.S. Census race and ethnicity categories and trichotomized into non-Hispanic White, non-Hispanic Black, and Other, where Other included individuals self-reporting Latino/Hispanic ethnicity, Asian, American Indian, and Native Hawaiian or Other Pacific Islander. Gender was self-reported as male or female. Marital status was collected as five categories: "single," "married," "living together with a partner," "divorced," and "widowed." These categories were dichotomized as married or living with a partner versus unmarried. Education included six categories and was collapsed into four: high school equivalent or less, some college or currently in college, college graduate, and graduate degree. Occupational status included seven categories but was collapsed into two categories, employed and unemployed.

## Analysis

Descriptive statistics were generated using chi-square analyses for categorical variables using SAS Version 9.2. For cells with fewer than five participants, Fisher's exact test was performed. *T* tests and analysis of variance were used to analyze continuous variables. An alpha level of .05 (two-tailed) was used in all analyses. Path models were constructed to identify the constructs of SCT and IPTs that mediated the relationship between the interventions and weight loss. The analyses for this study used data from the 66 participants who provided information on baseline weight, mediating variables, and outcome weight. The model was estimated using Mplus Version 6.

## Criteria for Establishing Mediation

Evidence of mediation requires statistically significant intervention effects on both hypothesized mediator variables (SCT and IPTs) and the outcome variable (weight loss). It also requires a statistically significant mediator effect on the outcome variable (weight loss) while controlling for the intervention effect, and a reduction in the intervention-to-weight loss relationship when the mediator variable is controlled (Baron & Kenny, 1986). Alternatively, the path model provides a multivariate method for evaluating mediation by first allowing the user to evaluate the effect of the intervention on the outcome (Model 1). A second model (Model 2) is tested to simultaneously evaluate the effects of the intervention on the proposed mediators and their effects on the outcome (MacKinnon & Dwyer, 1993).

## Model Fit

Multiple fit indices were used to assess model fit. These included the chi-square test statistic, the root mean square error of approximation (RMSEA), the standardized root square mean residual (SRMR), the comparative fit index (CFI), and the Tucker–Lewis index (TLI; Hu & Bentler, 1999). For the RMSEA and the SRMR, values approximating .05 indicate close fit.

For the CFI and the TLI, values greater than or equal to .95 suggest a model with proportionate improvement in fit from the baseline model.

### Model Specification

Path models were built to test the relationship between the hypothesized variables, including the intervention variables, mediating variables, and weight loss. The first path model was specified for the SCT mediators, and a second path model was then built for the IPT mediators. The intervention assignment was coded as enhanced = 1 and control = 0 as shown in Figure 1.

## Results

### Demographic Characteristics of the Study Participants

Participants' baseline age was 39 ( $\pm 11.6$ ; Table 1). Most participants were female (73%) and non-Hispanic White (77%). More than half were not married (64%). Many reported having some college education or having completed college (65%), and the majority (71%) was currently employed. Participants weighed on average 90.4 kg ( $\pm 14.2$ ), and average BMI was 31.4 ( $\pm 3.5$ ). There were no significant differences in demographic variables between the two intervention groups.

### Bivariate Relationship Between Intervention Strategies and Cognitive Processes

In bivariate analysis, there were significant differences between intervention groups in reports of elaboration, information control, and cognitive load (Table 2). Individuals in the enhanced podcast group reported greater elaboration ( $43.4 \pm 7.8$  vs.  $30.8 \pm 10.1$ ;  $p < .01$ ), greater information control ( $55.6 \pm 9.8$  vs.  $46.8 \pm 11.2$ ;  $p < .01$ ), and less cognitive load ( $4.9 \pm 2.0$  vs.  $7.9 \pm 2.8$ ;  $p < .01$ ) compared to individuals in the control podcast group. However, there were no significant between-group differences in SCT.

### Mediational Analysis With SCT Mediators of Weight Loss

Intervention group had a significant direct effect on weight loss ( $\beta = 0.38$ ,  $p < .05$ ). Individuals in the enhanced podcast group lost more weight compared to the control group ( $-3.1 \pm 3.5$  kg enhanced group vs.  $-0.4 \pm 2.1$  kg control group,  $p < .001$ ). The model testing the hypothesized relationship between intervention, SCT mediators, and weight loss had a good fit:  $\chi^2(1, N = 66) = 0.65$ , CFI = 1.00, TLI = 1.00, RMSEA = .00, and SRMR = .02. However, this model did not show a mediational relationship.

### Mediational Analysis With IPT Mediators of Weight Loss

The initial model testing the hypothesized relationship between IP measures of elaboration, cognitive load, information control, and weight loss did not have a good fit:  $\chi^2(3, N = 66) = 31.46$ , CFI = .71, TLI = .05, RMSEA = .37, and SRMR = .12. Three additional paths were specified between (a) information control and elaboration, (b) cognitive load and elaboration, and (c) information control and cognitive load, as indicated by modification indices, and were deemed conceptually sensible (Bollen, 1989). Two further additional paths were released because they were not statistically significant: (a) cognitive load and weight

loss and (b) information control and weight loss. Elaboration and weight loss were left as they were because they were significantly related. The modified model with additional paths specified and released improved the model fit significantly, producing a good fit:  $\chi^2(2, N=66) = 1.09$ , CFI = 1.00, TLI = 1.05, RMSEA = .00, and SRMR = .02. The path estimates are shown in Figure 2.

The relationship between intervention and weight loss was mediated through elaboration, cognitive load, and information control through three paths (Figure 2). In the first path, the intervention was related to elaboration ( $\beta = 0.30, p < .01$ ); being in the enhanced podcast group was associated with a 0.30 standard deviation higher in elaboration. Greater elaboration was related to more weight loss ( $\beta = 0.30, p < .05$ ); 1 standard deviation higher in elaboration was associated with a 0.30 standard deviation greater weight loss. In the second path, the intervention was related to decreased cognitive load ( $\beta = -0.54, p < .001$ ); being in the enhanced podcast group was associated with a  $-0.54$  standard deviation less cognitive load. Lower cognitive load was associated with greater elaboration ( $\beta = -0.22, p < .05$ ), and elaboration was related to weight loss ( $\beta = 0.30, p < .05$ ). Last, the intervention was related to greater information control ( $\beta = 0.39, p < .001$ ). Greater information control was associated with greater elaboration ( $\beta = 0.43, p < .001$ ); greater elaboration, in turn, was related to weight loss ( $\beta = 0.30, p < .05$ ). The total indirect effect was statistically significant ( $\beta = 0.17, p < .05$ ), and elaboration explained 56% of variance in weight loss.

## Discussion

This study examined the mediational relationship between podcasting interventions, constructs of SCT and IPTs, and weight loss among overweight and obese adults. The relationship between intervention and weight loss was not mediated through the constructs of SCT. However, we found mediation through elaboration, cognitive load, and information control. Additionally, although both intervention groups (enhanced and control) received the information through podcasting, the enhanced podcast group reported significantly greater elaboration, less cognitive load, and greater information control compared to the control group. The enhanced podcast group also reported higher self-efficacy, behavioral capability, outcome expectation, and expectancy compared to the control group, but this group difference was not statistically significant. These findings suggest that simply providing weight loss information via podcast is not enough to have an effect on mediating variables and that intervention messages may be more effective when developed using appropriate theories, such as SCT and IPT.

Our findings showed that elaboration was an important mediator of the relationship between the podcast intervention and weight loss, and elaboration was present in all three mediating pathways. ELM posits that when information is processed and elaborated more thoughtfully by individuals, it can change attitudes and promote behavior change (Hawkins et al., 2008; Petty, Priester, et al., 1994). At the core of the ELM is the idea that individuals tend to elaborate more when information is perceived as personally relevant (Petty, Cacioppo, et al., 1994; Petty, Priester, et al., 1994), and research has shown that intervention messages based on well-grounded theories tend to be perceived as more relevant than messages not based on theories (Campbell & Quintiliani, 2006; Ko et al., 2011). Studies by Ko et al. revealed that



individuals who received print messages based on theory tended to find the information personally relevant, had greater trust in the message, and better recalled the information received, compared to those receiving print messages not based on theory. Our study showed similar findings as the print messages, which suggested that message structure and content (in this case theory-based messages) may be mainly responsible for increasing elaboration, rather than the channels used to deliver the intervention. However, we do not have evidence to rule out the effect of podcasting on elaboration as we did not have a comparison group using other mediums. Future studies may examine whether same messages delivered through print versus podcast differ in elaboration.

Cognitive load was another mediator of weight loss among overweight and obese individuals. According to McGuire (1985), high cognitive load occurs when information exceeds an individual's ability to process it both cognitively and emotionally. This situation can be minimized when the new information is kept simple and short. The enhanced podcast followed the same format with each episode: an introduction, an audio blog of someone trying to lose weight, information on nutrition and physical activity, an audio soap opera, and a goal-setting exercise. This expected format every week may have encouraged a sense of structure, reducing cognitive load. The format of the control podcast, however, varied with each episode, possibly resulting in some difficulty adapting to the new format and increasing cognitive load.

Individuals from the enhanced podcast group also showed a greater mediation effect of information control compared to the control group. Research shows that people learn in different ways, and when new information is presented in ways suited to diverse learning styles, learners perceive greater control over their experience (Ariely, 2000). The individuals in the enhanced podcast group received information in multiple ways: the audio blog, audio soap opera, and goal-setting exercise. These different methods of information delivery may have served to reinforce the information, and increase their motivation to learn and ultimately to change behavior.

Interestingly, contrary to our hypothesized model, both cognitive load and information control mediated weight loss through elaboration. Studies focused on how individuals learn and make decisions have shown that when individuals experience reduced cognitive load or increased information control, they tend to think more thoroughly about the topic (Drolet & Luce, 2004; Shiv & Huber, 2000). In our study, although decreased cognitive load and increased information control were not sufficient to lead to weight loss, the simple and short learning format and multiple learning styles of the enhanced podcast may have facilitated greater attention to and elaboration of the intervention messages, ultimately leading to more weight loss.

It is important to note that although the intervention messages were guided by constructs of SCT, namely, self-efficacy, behavioral capabilities, outcome expectation, and expectancy, these constructs did not mediate the relationship between the podcast intervention and weight loss. Previous research has been inconsistent about the mediating role of SCT constructs on behavior change (Baranowski, Anderson, & Carmack, 1998; Campbell et al., 2009; Jeffery, 2004; Pasick, Burke, & Joseph, 2009). Anderson, Winett, Wojcik, Winett, and

Bowden (2001) demonstrated that self-efficacy and outcome expectation mediated dietary behaviors. Other studies, however, described them as weak predictors of weight loss (Jeffery, 2004) and inconsistent across study populations and gender (Jeffery, 2004; Baranowski et al., 1998; Pasick et al., 2009). Among studies that found a mediational relationship, researchers used multiple-item measures to assess SCT (Anderson et al., 2001; Teixeira et al., 2010). In our study, we used one question each to assess self-efficacy, outcome expectation, and expectancy; this method may be partly responsible for the lack of sensitivity to assess differential changes in the groups. Similar results were found by other researchers who have used one item to measure self-efficacy and outcome expectation (Campbell et al., 2009). Further studies using multiple items are warranted to accurately measure these constructs in intervention studies and to advance our understanding of SCT mediators of intervention studies.

Although SCT constructs did not mediate weight loss, the intervention messages for the enhanced podcast group that were based on SCT constructs may have contributed to stimulating elaboration and processing. Although it would have been desirable to see a mediation effect of the enhanced podcast on the SCT variables, the findings suggest that the persuasive effect of a theory-based intervention can affect other mediating variables that may play a role in behavior change. Therefore, rather than dismissing a SCT-based intervention as having no impact on SCT constructs, researchers may consider capitalizing on its ability to stimulate IP that appears to be in the causal pathway to weight loss and further explore the relationship between SCT and IPT.

### Study Strengths and Limitations

A major strength of our study was our ability to build on previous research and expand on key findings on the impact of podcasting intervention on weight loss (Turner-McGrievy et al., 2009). Past research studies have investigated a mediational relationship of the SCT and IPT constructs, but none have examined them delivered via mobile technology. Several limitations of the study should be noted. First, the participants were mostly White and highly educated; therefore, results from this study may not be generalizable to a heterogeneous group, particularly across race/ethnicity and educational status. Second, our study may have been open to self-selection bias, and/or may have been resource dependent. Overweight and obese individuals enrolled in the study were required to own their own podcasting device, and they may have been motivated to lose weight. However, when we examined demographic characteristics between dropouts and completers, we did not find significant differences. Third, similar to other studies that examined IP, our methodology allowed for the measurement of IPT at one point as it assesses the IP about the content of the received messages (Kreuter et al., 2004; Ko et al., 2011). Four, the internal reliability for the measure, information control, was inadequate. Given that this is the first study showing the application of this construct to a podcast-delivered intervention, more research on how to improve the reliability of this measure likely deserves consideration. Finally, our study participants may have received other competing messages about weight loss through TV, radio, and/or their social environment. Obesity is currently a major public health problem and has garnered a great deal of attention, including an increase in media coverage (Ogden

et al., 2006). Randomization of individuals into intervention groups, however, may have equalized the effect of competing messages.

## Conclusions

This study provides evidence that IPT variables are mediators of the effect of a podcast intervention on weight loss. Future interventions that focus on weight loss may consider combining SCT and IPT constructs with novel and innovative approaches for intervention delivery. These approaches have the potential to maximize weight loss by increasing elaboration and information control, while decreasing cognitive load. As weight loss intervention studies continue to evolve, it will be important to develop a more refined understanding of what kinds of processes “matter” for which types of interventions. Exploring new media will advance the field as well; podcasting is a technology that allows for greater participant freedom and control. Improved modes of delivery as well as the potential influence of IP on weight loss can enhance public health professionals’ ability to combat the obesity epidemic in the United States.

## Implications for Research and Practice

This study provides evidence that IPTs can be considered mediators of a podcast weight loss intervention. Future intervention studies aimed at increasing weight loss among overweight and obese individuals may consider developing their messages based on theories and enhance message relevance to the participants to improve elaboration. This study has many important implications for public health. Studies on podcasting show that theory-based weight loss messages are more effective than generic information in promoting health behavior change. Since podcasting can be easily recorded, produced, and downloaded, this approach may become increasingly important as a public health education tool in the information age (Pratt et al., 2012). In the past few years, podcasting has emerged as a unique and prominent medium. More adults are accessing audio using portable devices, with 46% reporting they own an MP3 player (Smith, 2010) and 19% of Internet users reporting that they have downloaded a podcast (Madden & Jones, 2008). These numbers are expected to increase as podcasting becomes increasingly popular as portable content media players such as app-ready Android and smartphones have proliferated.

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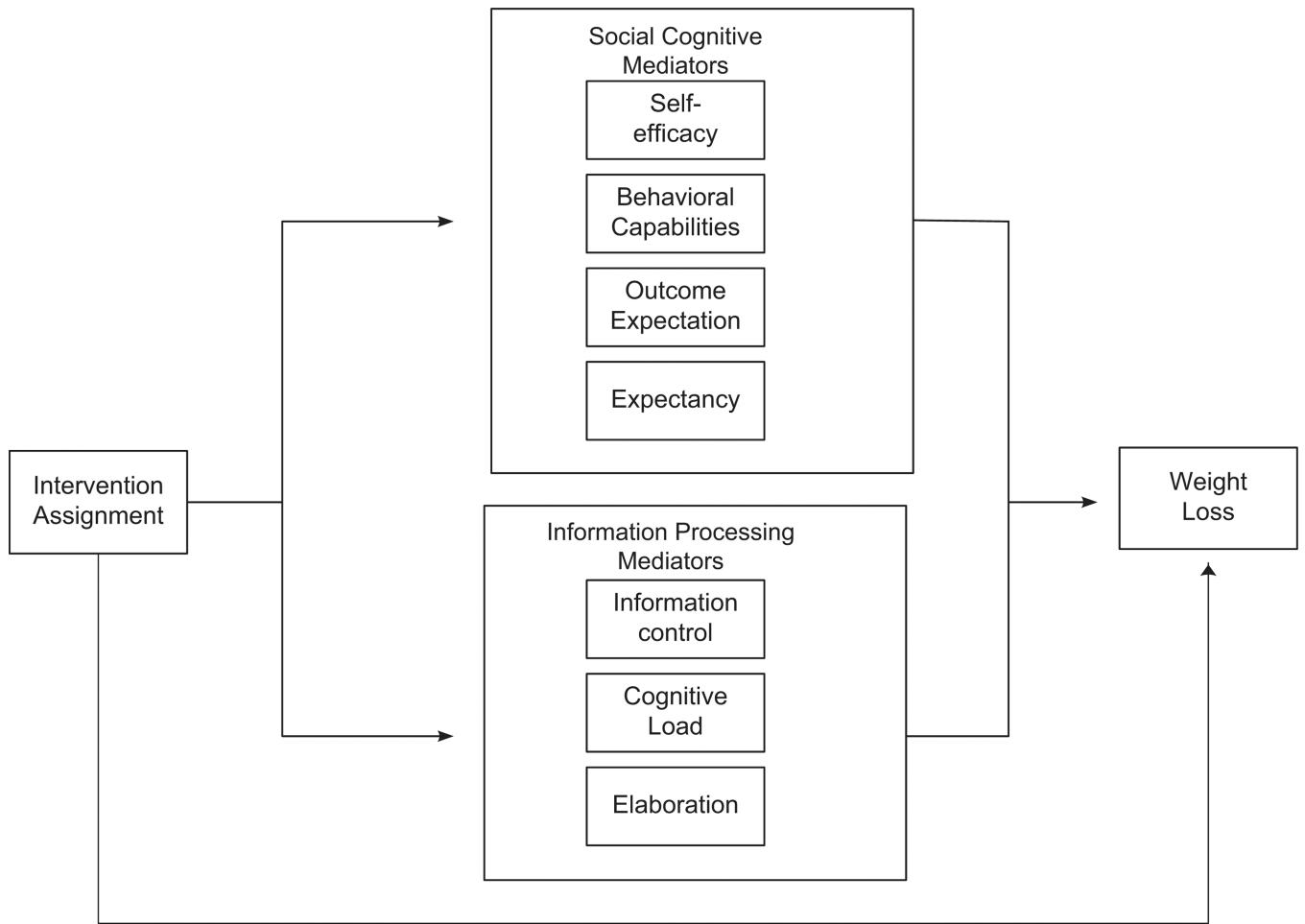
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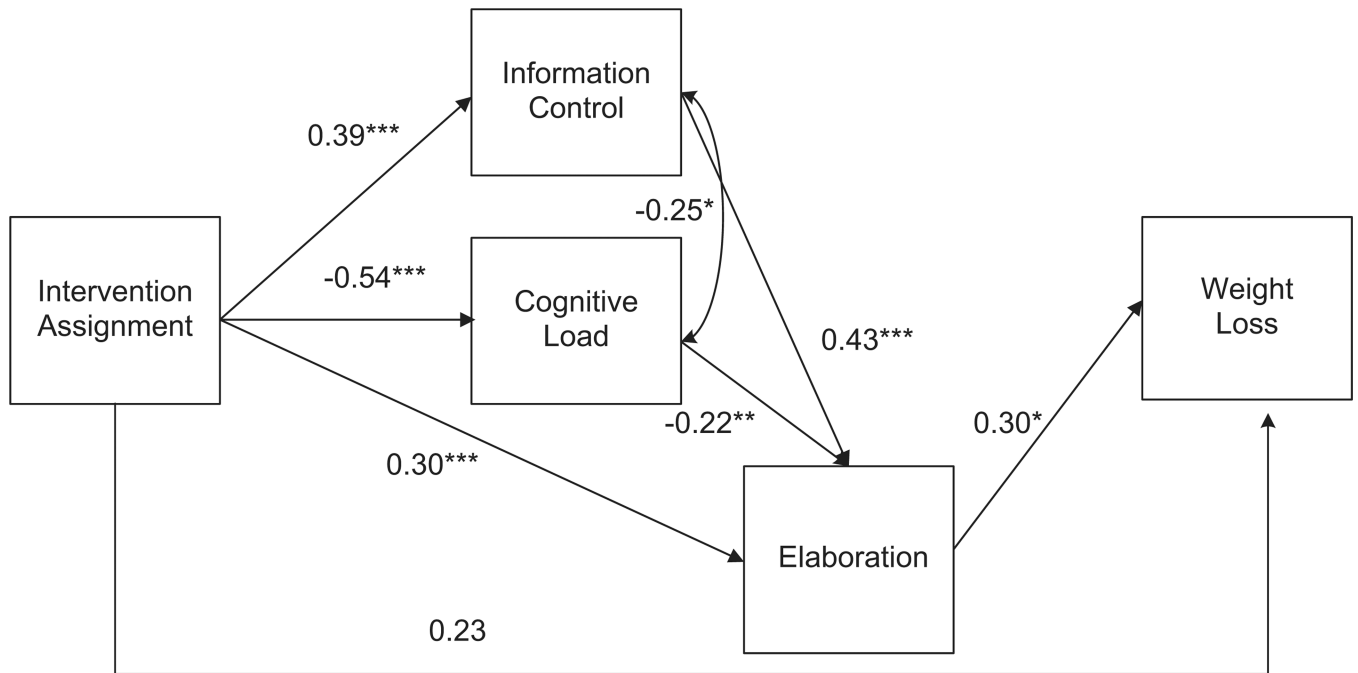
**Figure 1.** Conceptual model of the relationship between intervention, SCT and IPT mediators, and weight loss.  
*Note.* SCT = social cognitive theory; IPT = information processing theory.

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**Figure 2.**

The relationship between intervention, IPT mediators (information control, cognitive load, and elaboration), and weight loss.

*Note.* IPT = information processing theory. Standardized beta parameters are shown in the model.  $N = 66$ .

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



**Table 1**

Baseline Demographic Data for Control and Enhanced Podcast Group Participants.

Variable	Total (66)	Control (28)	Enhanced (38)	<i>p</i>
Age, years, <i>M</i> ( <i>SD</i> )	39.4 (11.6)	40.3 (11.7)	38.7 (11.6)	.58
Gender				
Male	18 (27)	6 (21)	12 (32)	.36
Female	48 (73)	22 (79)	26 (68)	
Race/ethnicity				
Non-Hispanic Black	8 (12)	4 (14)	4 (10)	.60
Non-Hispanic White	51 (77)	20 (72)	31 (82)	
Other	7 (11)	4 (14)	3 (8)	
Marital status				
Not married	42 (64)	17 (61)	25 (66)	.67
Married or living with a partner	24 (36)	11 (39)	13 (34)	
Education				
Some college or currently in college	12 (18)	6 (21)	6 (16)	.14
College graduate	31 (47)	16 (57)	15 (39)	
Graduate degree	23 (35)	6 (21)	17 (45)	
Employment				
Not employed	19 (29)	9 (32)	10 (26)	.61
Employed	47 (71)	19 (68)	28 (74)	
Baseline weight in kg, <i>M</i> ( <i>SD</i> )	90.4 (14.2)	89.2 (13.9)	91.4 (14.6)	.53
Body mass index	31.4 (3.5)	31.2 (4.1)	31.6 (3.0)	.71

Note. Data are *M*(*SD*) or *n*(%) unless otherwise indicated.

Table 2

Differences Between Intervention Groups in SCT and IPT Mediators.

Variable	Control ( <i>n</i> = 28), <i>M</i> ( <i>SD</i> )		Enhanced ( <i>n</i> = 38), <i>M</i> ( <i>SD</i> )		<i>p</i>		
	Pre	Post	Difference	Pre		Post	Difference
Social cognitive theory mediators							
Self-efficacy	4.3 (1.7)	3.9 (1.8)	-0.4 (1.9)	4.7 (1.6)	4.8 (1.7)	0.1 (2.0)	.33
Behavioral Capabilities <sup>a</sup>	5.2 (1.3)	5.6 (1.4)	0.4 (1.7)	5.8 (1.1)	6.6 (0.7)	0.8 (1.1)	.26
Outcome Expectation	5.0 (1.9)	4.7 (2.2)	-0.3 (1.3)	5.2 (1.5)	5.5 (1.6)	0.3 (1.7)	.24
Expectancy	6.4 (0.8)	6.3 (1.0)	-0.1 (1.1)	6.3 (0.9)	6.4 (0.9)	0.1 (0.8)	.31
Information processing mediators							
Elaboration score <sup>b</sup>		30.8 (10.1)			43.4 (7.8)		<.01
Information control score <sup>c</sup>		46.8 (11.2)			55.6 (9.8)		<.01
Cognitive load score <sup>d</sup>		7.9 (2.8)			4.9 (2.0)		<.01

Note. SCT = social cognitive theory; IPT = information processing theory.

<sup>a</sup>Possible scores range = 1–7.

<sup>b</sup>Possible scores range = 9–63.

<sup>c</sup>Possible scores range = 10–70.

<sup>d</sup>Possible scores range = 2–14.