The influence of prior knowledge structures on website attitudes and behavioral intentions

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Abstract

The Persuasion Knowledge Model identifies three knowledge structures (i.e., topic knowledge, persuasion knowledge and agent knowledge) that an individual has prior to exposure to a persuasive attempt. This study extends these knowledge structures by distinguishing between objective and subjective topic knowledge conceptualizations. Specifically, this study examined empirically how an individual's different knowledge structures, held prior to exposure to a web-based intervention, influence subsequent website attitudes and behavioral intentions. The UK's National Health Service (NHS) Live Well website relevant to weight control was used as the web-based intervention in this study. Results suggest that agent (i.e., NHS) knowledge is the most important predictor of website attitudes, while both agent and persuasion knowledge are associated with behavioral intentions to take weight control actions. The results also revealed that the distinction between objective and subjective weight control knowledge is essential given their differential effects on agent and persuasion knowledge. Goal frames, as indicated by the choice between the "healthy eating" and "lose weight" Live Well intervention web pages, were found to moderate the identified Knowledge-Attitude-Behavior links. Theoretical contributions, implications for practice and public policy and future research directions are discussed.

Keywords: website attitudes, behavioral intentions, objective topic knowledge, subjective topic knowledge, persuasion knowledge, agent knowledge

Highlights:

1. Prior knowledge structures influence website attitudes and behavioral intentions.
2. Objective and subjective knowledge have different effects on agent and persuasion knowledge.
3. Agent knowledge is the most important predictor of website attitudes.
4. Agent and persuasion knowledge predict behavioral intentions.
5. Goal frames moderate the Knowledge-Attitude-Behavior links.

The influence of prior knowledge structures on website attitudes and behavioral intentions

1. Introduction

The use of the Internet as a health information source has become increasingly common (Myrick 2017), especially for health conditions such as obesity (Faith, Thorburn and Sinky 2016). Particularly in the UK, the National Health Service (NHS) website is one of the most popular sources of online health information among the British public with 583 million visits in 2015 (NHS Traffic Report 2015). Losing weight and healthy eating are two of the most popular reasons for visiting the NHS website (NHS Weight Loss Traffic Report March 2016; NHS Annual Report 2012), as the UK is among the top seven countries with the highest obesity rates worldwide (OECD Health Statistics 2013) and it has the highest obesity percentage rate in Europe (NHS England 2014). The NHS website offers a variety of weight loss information, tools and plans and advice on healthy eating.

Despite existing research studies, evidence on the efficacy of web-based weight loss interventions is inconclusive (Arem and Irwin 2011). Lowe, Fraser, and Souza-Monteiro (2015), who examined digital health technologies and food consumption, have recently called for further research to assess the interaction between technology and weight loss behavior. Responding to this call for research, this paper uses the UK's NHS Live Well website to investigate the impact of an individual's knowledge structures, prior to exposure to a web-based intervention, on British consumers' website attitudes and behavioral intentions to control their weight. The term "*weight control*" will be used from here onwards to refer not only to actions to lose weight, but also actions to maintain a healthy weight through healthy eating. This definitional approach is justified by the fact that the NHS website is targeted at the general public rather than specific segments of the population that require a specific health action.

Many studies have investigated a range of factors related to weight loss initiatives and resulting behaviors (e.g., public commitment, Nyer and Dellande 2010; obesity stigma and social consequences, Puhl and Heuer 2010; motivation and health literacy, Bolton, Bhattacharjee, and Reed 2015; labelling of low-fat products, Wansink and Chandon 2006; labeling of nutrition content, Andrews, Burton, and Kees 2011; caloric intake, Khare and Inman 2009). However,

limited research has investigated how knowledge structures held by individuals prior to exposure to a web-based health intervention affect subsequent website attitudes and behavioral intentions. Another key research gap in the extant literature is the lack of empirical research on Brucks' (1985) concepts of objective topic knowledge (i.e., information stored in memory) and subjective topic knowledge (i.e., perception of how much an individual thinks he/she knows) together with Friestad and Wright's (1994) concepts of persuasion knowledge (i.e., beliefs about the marketing tactics and effects of web-based interventions) and agent knowledge (i.e. beliefs about the party communicating the information on the web-based intervention). Research on the relationships between objective versus subjective topic knowledge, persuasion knowledge and agent knowledge is lacking in any context, including web-based interventions. More specifically, within a computer mediated environment, only recently a limited number of studies have investigated persuasion knowledge (e.g., Vashish and Royne 2016; Ham and Nelson 2016), while others, separately, have looked at the objective versus subjective topic knowledge distinction (e.g., Lee and Koo 2012; Chan, Song and Yao 2015; Schneider, Weinmann, Roth, Knop and Vorderer 2016; Ran, Yamamoto and Xu 2016). However, when it comes to understanding how individuals may respond to persuasion attempts such as after encountering a web-based intervention (i.e., the persuasive attempt), all these prior knowledge structures of a target audience need to be taken into account.

Therefore, this study fills this gap in research by recognizing that when individuals encounter persuasion attempts, such as a web-based health intervention designed to motivate health behavior change, they may use multiple prior knowledge structures (existing prior to the intervention) to cope with the attempt at persuasion. This could ultimately influence their behavior after the intervention. The Persuasion Knowledge Model (PKM) by Friestad and Wright (1994) identifies topic knowledge, persuasion knowledge and agent knowledge as prior knowledge structures of a target audience, which influence the target audience's responses to information, based on the perceived aim of the communicated information. We propose a conceptual framework extending Friestad and Wright's PKM knowledge structures of the target with Brucks' (1985) objective and subjective knowledge, as prior topic knowledge constructs. Such an extension of the PKM's knowledge structures of the target is a noteworthy and relevant contribution because Eisend's (2015) recent study on persuasion knowledge and third-person effects reports that persuasion knowledge is a type of subjective knowledge about persuasion

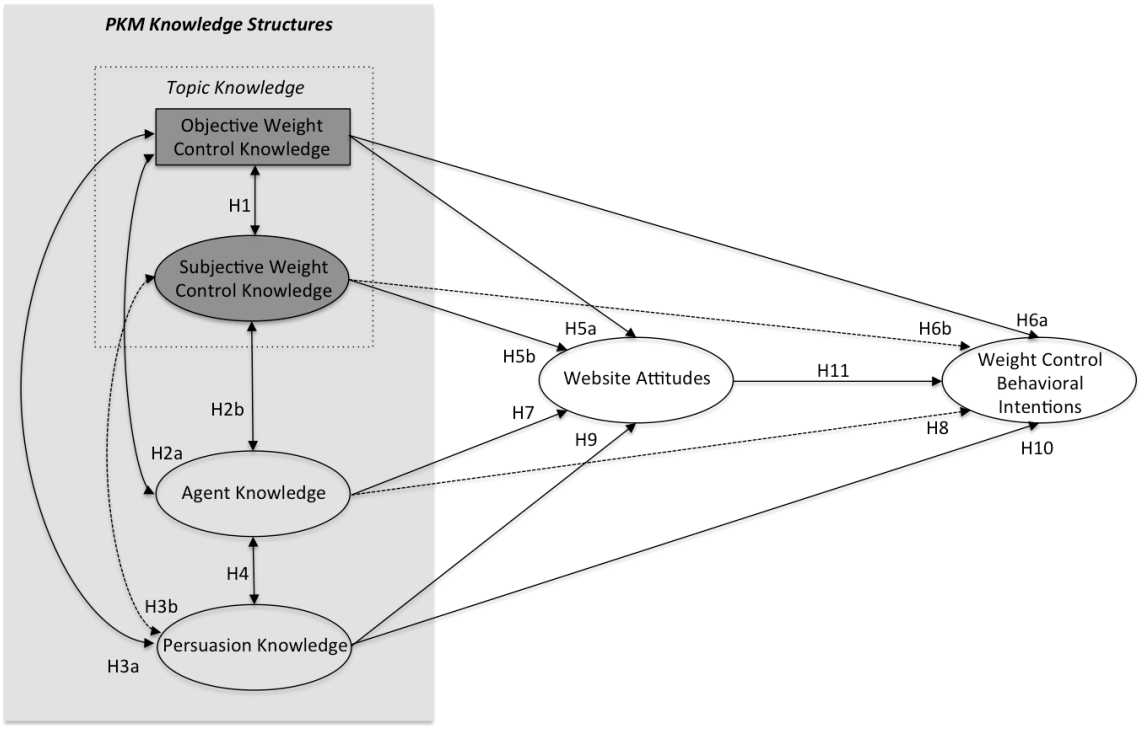
attempts and as such could be relevant to Brucks' (1985) subjective topic knowledge. The subjective nature of persuasion knowledge is also noted in Nam and Nelson (2016), who argue that persuasion knowledge could also be objective and subjective in nature. However, in the present study we focus on the subjective nature of the persuasion knowledge construct as per the PKM. Additionally, we put forward a conceptual model hypothesizing that all knowledge structures identified prior to exposure to a web-based intervention can in turn influence website attitudes and behavioral intentions, as per the Knowledge-Attitude-Behavior model (KAB; Schrader and Lawless 2004). It must be noted that, in the present study, we use behavioral intentions as a proxy measure of behavior.

The following section will introduce our conceptual model, review relevant prior literature and outline our hypotheses.

2. Literature Review

This paper examines how an individual's knowledge structures, held prior to exposure to a web-based weight control intervention, may impact subsequent website attitudes and intentions to control weight. The conceptual model examined is depicted in Figure 1.

Figure 1: Conceptual model and hypotheses



As per Figure 1, our model identifies four knowledge structures that exist prior to exposure to a web-based weight control intervention, namely objective weight control knowledge, subjective weight control knowledge, agent knowledge, and persuasion knowledge. After exposure to the intervention these prior knowledge structures are expected to influence website attitudes and weight control behavioral intentions. Below we first review the literature on the PKM, extended by the objective versus subjective knowledge distinction, which is reviewed subsequently. We outline our hypotheses and discuss the moderating role of goal frames on knowledge-attitudes-behavior links, as this may have implications for the design of web-based weight control interventions.

2.2 The Persuasion Knowledge Model

According to the Persuasion Knowledge Model (PKM) (Friestad and Wright 1994), individuals employ three knowledge structures to understand and respond to persuasion attempts: 1) topic knowledge i.e., beliefs about the subject matter of a persuasive message; 2) agent knowledge i.e., beliefs about the party responsible for the message; and 3) persuasion knowledge i.e., beliefs about the tactics and effects of a persuasive message. Activation of one or more of these knowledge types guides individuals in selecting a coping behavior (Campbell and Kirmani 2008), in order to achieve desired goals during persuasion encounters (Ball, Manika and Stout 2013). Additionally, over time, individuals develop knowledge about the tactics used in persuasion attempts (Friestad and Wright 1994).

Persuasion knowledge follows schematic functions, guides attention, and provides inferences and predictions. Individuals often invoke persuasion knowledge to judge the appropriateness of agent motives and persuasion tactics (Friestad and Wright 1994). Perceived appropriateness reflects a sense of fairness or manipulative intent, which scholars have extended to encompass skepticism and credibility (Ball, Manika and Stout 2013). These manifestations of perceived appropriateness often represent an operationalization of persuasion knowledge (e.g., Hibbert et al. 2007; Tutaj and Van Reijmersdal 2012). Generally, research shows that individuals become more skeptical when equipped with more topic and agent knowledge (Hove, Paek, and Isaacson 2011; Nelson, Wood, and Paek 2009; Obermiller and Spangenberg 1998). However, Friestad and Wright (1994) caution against automatically presuming negative responses when PKM knowledge structures are activated. Instead, it is more appropriate to consider the valence of

beliefs contained within each knowledge structure to determine the effect of using topic, agent, or persuasion knowledge in a persuasion encounter (Ball, Manika and Stout 2013). The framework we adopt in this study proposes that more favorable evaluations of topic, agent, and persuasion knowledge will facilitate positive responses and outcomes.

2.3 Objective versus subjective topic knowledge conceptualizations

Topic knowledge often dictates how individuals cope with persuasion attempts (Friestad and Wright 1994) and it affects behavior (Brucks 1985). Although the consumer behavior literature distinguishes between objective and subjective prior topic knowledge (Brucks 1985), the PKM fails to take this distinction into account. Objective knowledge typically refers to "*what is actually stored in memory*," while subjective knowledge reflects "*what individuals perceive they know*" (Brucks 1985, p. 2) and includes knowledge confidence. Subjective knowledge is a psychological experience of topic knowledge (Chan, Song and Yao 2015) based on someone's perceptions of their amount of knowledge about a given topic. Most studies have reported that objective and subjective knowledge have unique influences on decision-making and behavior (Alba and Hutchinson 2000; Brucks 1985), despite being highly correlated (Carlson et al. 2009; Raju, Subhash, and Mangold 1995). Moorman et al. (2004) have examined the difference between objective and subjective nutritional knowledge and shown that when people think they know a great deal about a particular topic, they are likely to locate themselves close to the stimuli related to their subjective knowledge.

Objective knowledge is associated with more efficient searching (Brucks 1985). On the other hand, the "*illusion of knowing*" may pose dangers to consumers by leading to reduced information receptivity and unhealthy behaviors, because those with higher subjective knowledge "*tend to be oblivious to their vulnerability to manipulation*" (Pearson and Liu-Thompkins 2012, p. 45). Knowledge, skills, and confidence are essential to become more engaged in managing health and well-being. For example, Chandon and Wansink (2007) find that consumers often underestimate their caloric intake, which then affects their food consumption choices. Therefore, the accuracy of someone's weight control knowledge and what they think they know about weight control differs. This gap between perceived knowledge and actual knowledge may affect health behavior and it is therefore important to examine it in the context of a weight control web-based intervention. Additionally, although computer mediated

communications literature has noted the objective versus subjective knowledge distinction and its importance (Lee and Koo 2012; Chan, Song and Yao 2015; Schneider, Weinmann, Roth, Knop and Vorderer 2016; Ran, Yamamoto and Xu 2016), it has not investigated it along with the PKM knowledge structures of the target.

2.4 Hypotheses formulation

As depicted in Figure 1, four prior knowledge structures of the target are identified: objective weight knowledge, subjective weight control knowledge, persuasion knowledge and agent knowledge. Based on our conceptualized model, an individual holds these prior knowledge structures at any given point in time. When an individual is exposed to a web-based intervention, he/she can use these prior to the intervention knowledge structures to cope with persuasion episodes i.e., when the individual perceives a message as an attempt to influence him/her. A web-based weight control intervention, which aims to motivate weight control actions, may also be perceived as a persuasion attempt. Thus, the target audience may use all or some prior knowledge structures to cope with this attempt. As per Carlson et al.'s (2009) meta-analysis, objective and subjective topic knowledge are often positively correlated and, therefore, the same is expected within the context of a weight control web-based intervention.

H_1: Objective weight control knowledge is positively associated with subjective weight control knowledge.

Given this is the first study investigating the interrelationships among subjective topic knowledge, agent knowledge, and persuasion knowledge, the hypotheses follow the standard PKM relationships for objective topic knowledge. We expect that the PKM knowledge structures, as well as subjective topic knowledge, will be positively inter-correlated. In other words, people who have accurate objective knowledge about weight control will be more likely to confirm the accuracy of the agent's website information (i.e., NHS website information) and, thus, they will have favorable agent knowledge beliefs. Positive perceptions of the NHS (i.e., agent knowledge) are also more likely to lead to favorable persuasion knowledge, as the trust in the agent will make it possible for individuals to interpret the NHS communication tactics in a favorable manner. Additionally, the more people think they know about weight control, the more

confident they will be about their knowledge. As such, they are likely to view their knowledge of the agent and persuasion tactics more favorably due to this high confidence associated with their perception of topic knowledge. Given H_1 and the PKM relationships, we expect that the effects of both objective and subjective knowledge on agent and persuasion knowledge will also be positive.

H_2: Higher levels of (a) objective and (b) subjective weight control knowledge are associated with more favorable agent knowledge.

H_3: Higher levels of (a) objective and (b) subjective weight control knowledge are associated with more favorable persuasion knowledge.

H_4: Favorable agent knowledge is positively associated with favorable persuasion knowledge.

The Internet offers many opportunities for people to consume information and build up health and medical knowledge (Diviani and Meppelink 2017; Quinn, Bond and Nuggett, 2017; Jiang and Beaudoin, 2016), which can then be used to meet their set goals. Using the PKM's main tenets, we hypothesize that the extended PKM knowledge structures of a target audience will influence their website attitudes and behavioral intentions. The underpinning theoretical model is the Knowledge-Attitude-Behavior model (KAB; Schrader and Lawless 2004), which is commonly used in health behavior change (e.g. Miller et al. 1990; Baranowski et al. 2003) and educational/learning (Schrader and Lawless 2004) contexts. The KAB model assumes that knowledge leads to attitudinal and/or behavioral changes (Baranowski et al. 2003). In the present study, when applying the KAB model, we use behavioral intentions as a proxy measure of behavior, as per Figure 1.

According to Alba and Hutchinson (2000), objective and subjective knowledge have different impacts on behavior, with subjective knowledge directing behavior more than objective knowledge. We hypothesize that individuals with greater objective weight control knowledge will have more positive website attitudes and behavioral intentions, due to their factual knowledge accuracy. Users with high objective knowledge may be better able to validate the

accuracy of the website information, leading to positive attitudes toward the website because of the consistency of the information with their accurate knowledge of the health topic. Consistent with the principles of health education and health behavior change initiatives (Glanz, Rimer and Viswanath 2008), individuals with high objective knowledge may also be better able to understand the importance of taking weight control actions (with the risk associated with not taking action as a mediator of the knowledge–behavior link). Thus, high (vs. low) objective health knowledge is more likely to lead to greater behavioral intentions.

Perceptions related to health, such as perceived health status, have been shown to affect both frequency of information search and the diversity of search for health information (Xiao et al. 2014). Specifically, based on Moorman et al.'s (2004) findings, individuals are likely to choose a website that is more consistent with their subjective knowledge and develop positive attitudes toward that website. This is in line with user behavior in other contexts (Ness et al, 2017; Papagiannidis et al 2012). We also expect respondents with high subjective knowledge to have greater behavioral intentions due to their confidence in their perceived knowledge (Pearson and Liu-Thompkins 2012), even though our behavioral measure does not specifically pertain to the purchasing of a product or service. Moreover, similarly to the impact of objective knowledge on website attitudes, respondents who think they know a great deal about a topic should have greater confidence in judging the web-based intervention information and therefore develop positive attitudes toward that information.

H_5: Higher levels of (a) objective and (b) subjective weight control knowledge lead to more favorable website attitudes.

H_6: Higher levels of (a) objective and (b) subjective weight control knowledge lead to higher behavioral intentions to control weight.

The success of an online initiative depends not only on the subjective benefits it brings, but also on the level of trust users have in the agent communicating the information (Beldad, de Jong and Steehouder 2010) within the web-based intervention in this case. Therefore, we expect agent knowledge, as well as persuasion knowledge, to positively influence website attitudes and behavioral intentions. Overall, the NHS is considered a trusted agent, confirmed by the number

of visits to its website on an annual basis (NHS Traffic Report 2015). As the NHS says on its website "The user is at the heart of everything we [NHS] do" (NHS 2017). On the other hand, recent news coverage and reports related to the associated costs of obesity (Tovey 2017) and the NHS's cost cutting approaches (Cooper, 2016; Stewart and Taylor 2016) could result in increasing skepticism towards the NHS and its website information. Therefore, it is important to understand how agent and persuasion knowledge beliefs affect website attitudes and behavioral intentions to control weight. Agent and persuasion knowledge may also be important in affecting responses to other private web-based weight control interventions, aside from the NHS one. Although Van Reijmersdat et al. (2015) find that persuasion knowledge has a negative relationship to brand attitudes, we examine a favorable application. Such favorable applications can facilitate positive responses and outcomes. Thus, favorable persuasion knowledge, as well as favorable agent knowledge, is likely to lead to positive website attitudes and behavioral intentions.

H_7: Favorable agent knowledge positively affects website attitudes.

H_8: Favorable agent knowledge positively affects behavioral intentions to control weight.

H_9: Favorable persuasion knowledge positively affects website attitudes.

H_{10}: Favorable persuasion knowledge positively affects behavioral intentions to control weight.

Finally, we expect website attitudes to influence behavioral intentions to control weight positively (Ajzen 2011). The more favorable the perception of the website, the more likely individuals are to intend to engage in the weight control actions recommended by the web-based intervention.

*H_{11}**:** Website attitudes positively affect behavioral intentions to control weight.*

However, as noted in prior literature, attitudes do not always translate into behavior. This is why it is important to consider the health goals of the individuals exposed to the weight control

intervention and how these may affect the attitude-behavior link, and also the knowledge-attitudes links. Prior literature on health goals and frames, and the specifics of the NHS web-based intervention for weight control examined here are discussed in the next section.

2.5 Health goals and frames

According to Keller and Lehmann (2008), consumers often set health goals to prevent the onset of a health problem, to detect the development of a health problem, or to treat an existing health problem. Health goals are knowledge-dependent and they either encourage taking action or discourage behavior. Information consistent with one's health goal tends to be more strongly associated with behavioral intentions (Floyd, Prentice-Dunn, and Rogers 2000). Generally, health goals are important in driving behavior, such as choosing a web page and controlling weight. Despite goal intentions being an immediate and important predictor of behavior, some people with strong intentions still fail to attain their goal (Sheeran and Webb 2012). Goals do not always translate into behavior. Guthrie, Mancino, and Lin (2015) find that despite nutrition information provision being the most used public strategy for motivating people's food choices, some consumers apply a short-term view to their eating choices that neutralizes the provided nutrition information. Therefore "*messages that elevate the salience of long-term goals may be useful, but their design and effectiveness requires research*" (Guthrie, Mancino, and Lin 2015, p. 507).

As previously noted in the introduction, this study also investigates the moderating role of health goal frames on the strength, valence, and significance of the relationships in H_1–H_{11}. The NHS Live Well intervention website, relevant to weight control, offers website visitors the choice of clicking on a web page entitled "*Healthy eating*" (http://www.nhs.uk/livewell/healthy-eating/) or one called "*Lose weight*" (http://www.nhs.uk/livewell/loseweight/). Both pages offer website visitors the opportunity to calculate their BMI. Under the assumption that an individual's health goal will guide the choice of message frame, relevant to the NHS weight control intervention, we use the term "*health goal frame*" to refer to the choice visitors have made on the NHS website. Therefore, we examine how the health goal frame may affect the Knowledge-Attitude-Behavior links. According to Barsalou's (1991) definition, health goal frames entail knowledge schemas, and thus the distinction between objective and subjective weight control knowledge is important. Our approach is also in line with the view that both positive and

negative goal frames are geared toward promoting the same end result (Levin, Schneider, and Gaeth 1998). In this study, a health goal frame is a proxy for goal-setting behavior and also reflects the message frame of the web-based intervention. We treat the choice between the "*Healthy eating*" and "*Lose weight*" web pages as an indicator of respondents' health goal frames (both positive frames) and use it as a proxy for goal setting because it would be difficult to assert that the website choice was entirely representative of all respondents' weight control intentions (Strecher et al. 1995).

Prior research has also highlighted the importance of examining BMI and its relationship to other health behaviors or variables. For example, Jaworowska and Bazylak (2009) show that BMI levels are related to desired/goal body weight and that there are significant differences in dieting history among young male and female adults belonging to four BMI categories (underweight, normal weight, overweight, and obese). Adults with a BMI between 18.5 and 24.9 have a healthy weight. "Adults with a BMI from 25 to 30 are defined as overweight, and those with a BMI of 30 or over as obese" (OECD Health Statistics 2013). Research has also found that dieting is a behavior more commonly employed by females who are overweight or obese (e.g., Malinauskas et al. 2006; Wardle and Johnson 2002). Research employing BMI as a moderator of various constructs has found inconclusive results (Fett et al. 2009; Lattimore 2005; Nguyen-Rodriguez et al. 2008). Thus, we also expect the relationships in the proposed extended PKM model to vary depending on respondents' BMI category (i.e., healthy vs. overweight/obese adults). However, given the exploratory nature of the two moderators (health goal frame and BMI group) and the absence of prior literature, we do not propose specific moderating effects. We explore differences between groups with a combination of health goal frame and BMI post hoc, to add novel findings to the web-based interventions literature.

3. Methodology

3.1 Research design and data collection

This study examined the effects of a web-based intervention for weight control among UK adults using a quantitative methodology. We used a 3 (choice: healthy eating vs. lose weight vs. no click [control group]) × 2 (BMI: healthy vs. unhealthy) experimental design in the form of a self-completed online questionnaire. We regarded the choice of web page as a reflection of respondents' health goals, as self-reported or declared goals have been criticized in the past

because of the manifestation of the intention–behavior gap (Rhodes and Dickau 2012). Using a real weight control web-based intervention to examine the aforementioned effects is better than laboratory experiments, which have been criticized for artificiality and lack of generalizability (Jiménez-Buedo and Miller 2010; Levitt and List 2007; Schram 2005). That is, the NHS intervention makes it possible to overcome social desirability bias (Davis, Thake, and Vilhena 2010; Miller et al. 2008). We collected the data with the help of an internationally recognized consumer panel (Qualtrics Consumer Panels). Each of the panelists in the database received an invitation by e-mail to participate in the survey. We used quotas to ensure a balance between gender and age groups.

The data collection included three stages, with the term "*weight control*" being defined as "*both weight loss and management practices*" at the beginning of the survey, before data collection started. First, the *pre-exposure stage* measured respondents' objective and subjective knowledge, agent knowledge, and persuasion knowledge, to understand how these knowledge structures of the target prior to exposure to the intervention may affect responses to and outcomes of the intervention. In the second stage, participants were asked to choose one of the following: the "Healthy eating" page, the "Lose weight" page, or neither page. This was called the *exposure choice stage,* where respondents self-reported their behavior/choice of website. Third, the *post-exposure stage* of the questionnaire measured respondents' attitudes toward the NHS website and their resulting behavioral intentions to control their weight. During this stage data were collected from all the participants, namely those who chose to look at specific web pages and those that chose neither web page (in other words the non-exposure/control group). It should be noted here that even those participants who chose not to be exposed to any of the web pages in the post-exposure data collection stage may still hold attitudes towards the NHS website given its popularity among the general public, even without being exposed to it; while also they may have intentions to control their weight. Hence, it is relevant to measure both website attitudes and weight control intentions for the control group of those who chose not to be exposed to the website intervention during our exposure stage, as well as those who chose to do so.

Time-tracking metrics embedded in the online survey indicated that there were significant differences between the time respondents first interacted and last interacted with the "lose weight" versus "healthy eating" web pages, respectively. *Interact* in this case refers to

respondents clicking on the content of the web page, after having opened the page in their browser, without taking into account the time they spent reading the content prior to interacting. Specifically, respondents spent significantly more time reading content between clicks on the weight loss page than on the healthy eating one ($t_{(264)} = 2.32$, $p < .05$). Though these results do not reflect the time respondents spent on each page exactly, we can use them as indicators of user engagement with each of the web pages. These metrics serve as manipulation checks for the self-reported exposure to the website, verifying that the respondents who said they did view one of the web pages actually did so.

3.2 Sample characteristics and measures

Data were collected from 369 UK respondents. Based on Westland's (2010) lower bounds on sample size in structural equation modeling (which is the analysis method used to analyze the data), using the ratio (r) of indicators (p) to latent variables (k) to assess sample size adequacy (r = p / k = 20 / 5 = 4) and the formula: $n \geq 50r^2 - 450r + 1100$, the lower bound for this study's sample size is $n \geq 100$ (the objective knowledge construct is an observed variable, not latent, and hence it is not included in the ratio calculation). This indicates the adequacy of this study's sample size. In addition, this lower bound is also met for the three groups, based on "goal frame/website choice", which vary in sample size between 103 and 144 observations. Kline (2005) also confirms this by recommending a minimum sample size of 100 for multi-group structural equation modeling.

Table 1 outlines the demographic profile of the final set of respondents. We calculated respondents' BMI (weight in kilograms divided by the square of height in meters, or kg/m^2) after the data collection based on self-reported height and weight data (Leahey et al. 2011). This technique is considered to yield valid measures of BMI in large population samples (Venn et al. 2007). Given our intention to compare differences based on BMI values, the data collected had a balance between adults with a healthy BMI level (n = 189) and adults with a BMI above healthy levels (n = 180; i.e., overweight/obese adults). The sample also had a good approximate balance between adults who chose to view the weight loss (n = 122) and healthy eating (n = 144) web pages and those who chose not to view either web page (n = 103).

INSERT TABLE 1 ABOUT HERE

All the variables used to operationalize the framework were based on existing scales with

known psychometric properties and were measured with five-point Likert-type scales. The only exception was the objective weight control knowledge test, for which we generated a list of items using information from the NHS website. Prior obesity studies have used general knowledge tests related to weight control (e.g., Andrews, Burton, and Kees 2011). Following a similar procedure to Andrews, Burton, and Kees (2011), an NHS doctor (British general practitioner) with high objective knowledge and expertise in weight control evaluated the generated items for content accuracy and completeness. The final objective weight control knowledge test can be seen in the Appendix.

We measured subjective weight control knowledge with the adapted subjective knowledge measure of Flynn and Goldsmith (1999). We assessed agent knowledge with an adapted scale from Gefen and Straub (2004) and Grazioli and Jarvenpaa (2000), who focus on trust-related beliefs about the agent. Persuasion knowledge has been operationalized in the literature in various ways (Ham, Nelson, and Das 2015). We adapted Ball, Manika, and Stout's (2015) measure, which focuses on beneficial consequences of and views about health advice/guidelines. We measured attitudes toward the NHS website with Mathwick and Rigdon's (2004) scale. Finally, we assessed behavioral intentions to control weight with adapted scales from Chandran and Morwitz (2005) and the Consumer Health Informatics Research Resource (http://chirr.nlm.nih.gov/). According to this research group, behavioral intentions (e.g., "*I intend to control my weight")* can be measured at a more specific level (e.g., how, when). "How" refers to specific goals and "when" to the implementation (Gollwitzer and Brandstätter 1997; Milne, Orbell, and Sheeran 2002). Consequently, we measured behavioral intentions on a four-week time scale ("*On a scale of 1 to 5, please indicate what your intentions are to control your weight in the next 4 weeks*"). This approach ensured that there was no overlap between the intentions measure and long-term goals, which we explored through the choice of web page.

We pretested the questionnaire online with a subset of 50 British respondents who were members of the online panel. Podsakoff et al. (2003) and Reid, Worsley, and Mavondo (2015) note that pretesting survey constructs with known properties minimizes issues of common method bias by reducing the potential for item ambiguity. In addition, a Harman single factor test, assessed through a principal component analysis with no rotation, was performed on the total sample of 369 British participants (which took into account all variables in Figure 1 including BMI and Goal Frame/Website Choice). The analysis showed that one factor explains

31.71% of the variance in the sample, compared to a three-factor solution explaining 61.31% of the variance in the sample. This analysis suggests that CMB is not a threat to the interpretation of the results.

3.3 Reliability, validity, and multicollinearity diagnostics

We checked the construct reliability and validity for the total sample. All multi-item constructs had average variance extracted (AVEs) scores above or equal to .64 and a construct reliability of above or equal to .86, indicating good construct reliability and validity. We also checked Cronbach's alphas and multicollinearity, with variance inflation factor and tolerance, all being within acceptable values (see Table 2). A confirmatory factor analysis conducted with Mplus indicated a theoretically and statistically good measurement model fit for the total sample (χ^2 = 360.76, d.f. = 160, p = .00; RMSEA = .05; 90% CI = .05–.06; CFI = .96; TLI = .96; SRMR = .03; N = 369; see Table 2). No correlations between constructs reached .85, and the data also resulted in acceptable values for Fornell and Larcker's (1981) criterion (AVE > $[r]^2$) for all multi-item scales, thus confirming discriminant validity. Table 3 shows the correlations among constructs and descriptive statistics for the main constructs.

INSERT TABLES 2 & 3 ABOUT HERE

4. Analysis and results

The results indicate that participants with a healthy BMI were more likely to click on the "Healthy eating" frame than on the "Lose weight" frame, while participants who had a BMI above the recommended levels were more likely to choose the "Lose weight" frame than the "Healthy eating" frame ($\chi^2_{(1)}$ = 29.79, p < .01, n = 266, without the control group). Thus, participants' choice of web page (a proxy for goal frame) is consistent with their BMI value. The control group with no goal frame, which chose not to click on the NHS website, had a balance between adults with healthy and unhealthy BMI values. This shows that individuals, irrespective of their BMI, may choose not to take any action, including deciding not to be exposed to information via the NHS website. A breakdown of the groups in terms of BMI values and goal frame/website choices appears in Table 1.

4.1 Structural equation model results

We tested the structural equation model (SEM) depicted in Figure 1 with Mplus, based on the total sample, and found a statistically good model fit (χ^2 = 376.98, d.f. = 175, p =.00; RMSEA = .05; 90% CI = .04–.06; CFI = .96; TLI = .96; SRMR = .03; N = 369; see Table 4), accounting for 32% of the variance in behavioral intentions to control weight and 55.7% in website attitudes. According to the results of the analyses (see Table 4), H_1, H_{2a}, H_{3a}, H_{3b}, H_4, H_7, H_8, H_{10}, and H_{11} are supported, while H_{2b}, H_{5a}, H_{5b}, H_{6a}, H_{6b}, and H_9 were not.

INSERT TABLE 4 ABOUT HERE

Subjective and objective knowledge were positively associated with each other (H_1). Objective knowledge was positively associated with agent knowledge (H_{2a}) and persuasion knowledge (H_{3a}). Subjective knowledge was positively associated with persuasion knowledge (H_{3b}), but not agent knowledge (H_{2a}). As expected, based on the PKM, agent knowledge was positively associated with persuasion knowledge (H_4). Neither objective nor subjective knowledge was significantly associated with website attitudes (H_{5a}–H_{5b}) or behavioral intentions (H_{6a}–H_{6b}). Agent knowledge was positively associated with both website attitudes (H_7) and behavioral intentions (H_8), while persuasion knowledge was only positively and significantly associated with behavioral intentions (H_{10}), not website attitudes (H_9). Lastly, website attitudes were positively and significantly associated with behavioral intentions (H_{11}).

These findings indicate that objective and subjective knowledge do not directly affect attitudes toward the website and behavioral intentions; the latter contributes to the known knowledge–behavior gap. Differences between objective and subjective knowledge do exist, though, and should be taken into account in web-based health intervention designs because their effects on agent and persuasion knowledge may differ. Objective knowledge positively influences the extended PKM knowledge structures of the target, while subjective knowledge is only associated with objective and persuasion knowledge. The results also show that agent and persuasion knowledge are important for behavioral intentions, while agent knowledge is only important for website attitudes, providing further support for the importance of the PKM's knowledge structures for web-based health interventions. In other words, we found some knowledge structures are more important for website-related attitudinal outcomes and others for behavioral outcomes.

4.2 Differences based on health goal frame/website choice: multigroup SEM results

A multigroup SEM analysis on the total sample, with the health goal frame as the grouping variable, examined whether the proposed hypotheses varied by health goal frame. The chi-square difference between this multigroup model, which allowed paths to vary, and the original model was 553.21, with 116 degrees of freedom ($p < .01$). This suggests that significant differences in the hypothesized model exist across the three groups. The results also indicate that the hypothesized model fits the data from the "Lose weight" group the best ($\chi^2 = 303.33$), followed by the control group, which chose not to be exposed to the NHS website ($\chi^2 = 310.5$), and then the "Healthy eating" group ($\chi^2 = 316.40$). The model for all groups had significant R-squares for behavioral intentions, which ranged from 29% ("healthy eating" group) to 38.7% ("Lose weight" group). The multigroup model had an acceptable model fit ($\chi^2 = 930.19$, d.f. = 59, $p = .00$; RMSEA = .06; 90% CI = .05–.07; CFI = .94 TLI = .94; SRMR = .08; N = 369).

Only two relationships were consistent across the three groups: the positive correlation between objective and subjective knowledge (H_1) and the positive relationship between agent knowledge and website attitudes (H_7). These relationships remained positive and significant for each group, as in the initial SEM analysis with the total sample. Other relationships varied across the three groups (Table 5). Moreover, website attitudes were positively related to behavioral intentions (H_{11}), but only for the two groups that viewed information on the NHS website (this is consistent with expectations since the control group that chose not to view any web page still had to answer questions about their attitudes towards the NHS website information, but as the results show these attitudes did not predict the behavioral intentions of this control group). These results indicate that weight control interventions and information can affect behavioral intentions through website attitudes for those exposed to the NHS website. However, differences may exist depending on the framing of the website and its relationship to one's health goals. As noted previously, the website choice of frame was a proxy for personal health goals. Overall, the findings suggest that health goal framing is important in developing successful web-based health interventions and that it moderates the Knowledge-Attitudes-Behavior links identified in our proposed model.

INSERT TABLE 5 ABOUT HERE

4.3 Differences based on BMI: multigroup SEM results

A multigroup SEM analysis on the total sample, with *BMI* as the grouping variable, examined whether the proposed hypotheses varied by BMI levels. The chi-square difference between this multigroup model, which allowed paths to vary, and the original model was 315.02, with 210 degrees of freedom ($p < .01$). Consequently, there are significant differences in the hypothesized model for the two BMI groups. The results indicate that the hypothesized model fits the data from the healthy BMI group better ($\chi^2 = 321.66$) than the above healthy BMI group ($\chi^2 = 370.34$). Both groups had a significant R-square, with the constructs explaining 32.5% and 33.7%, respectively, of the variance in consumers' behavioral intentions to control weight. The multigroup model had a good model fit ($\chi^2 = 692.00$, d.f. = 385, $p = .00$; RMSEA = .06; 90% CI = .05–.07; CFI = .95 TLI = .94; SRMR = .06; N = 369).

The multigroup SEM results with BMI group as the moderator showed that the following relationships were positive and significant across the two BMI groups: objective and subjective knowledge (H_1), subjective knowledge and agent knowledge (H_{2a}), agent knowledge and persuasion knowledge (H_4), agent and website attitudes (H_7), and website attitudes and behavioral intentions (H_{11}). All other relationships varied (see Table 6). Consequently, agent knowledge seems to be the most important PKM knowledge structure, as it influences website attitudes and is associated with both objective weight control knowledge and persuasion knowledge.

INSERT TABLE 6 ABOUT HERE

4.4 Post hoc analysis

Given that we did not have an adequate sample size to explore the differences between groups based on the BMI × health goal frame as the grouping variable in a multigroup SEM analysis, we used a series of analyses of variance in SPSS to investigate differences across the main study constructs. We considered the following groups: (1) healthy BMI & losing weight, (2) above healthy BMI & losing weight, (3) healthy BMI & healthy eating, (4) above healthy BMI & healthy eating, (5) healthy BMI & control group, and (6) above healthy BMI & control group. Levene's test showed that only objective weight control knowledge, website attitudes, and behavioral intentions did not violate the homogeneity of variance assumption ($p > .05$); thus, only these results can be interpreted. Of these three constructs, we found significant differences

only for objective weight control knowledge ($F(5, 363) = 2.51$, $p < .05$) and website attitudes ($F(5, 363) = 6.24$, $p < .01$).

The findings showed that participants with high objective knowledge scores (mean scores of 9.4 and 9.7 out of 15) before the intervention, regardless of BMI level, were more likely to view the weight loss NHS information (Groups 1 and 2). The rest of the groups had lower objective knowledge scores (mean scores between 8 and 9 out of 15), with Group 4 having the lowest objective weight control knowledge. For website attitudes, users with above healthy BMI who viewed either the "Lose weight" (Group 2) or "Healthy eating" (Group 4) web pages had more positive attitudes toward the website than the rest of the groups (mean scores of 4.21 and 4.04 out of 5, respectively). Respondents with above healthy BMI in the control group (Group 6) had the least favorable attitudes toward the website (mean score of 3.46 out of 5). We could not interpret differences for subjective weight control knowledge, agent knowledge, or persuasion knowledge. Unbalanced sample sizes may also have contributed to these results; therefore, these findings should be interpreted with caution. Nevertheless, they hint at potential differences across groups with different levels of BMI and who are exposed to different NHS web pages.

5. Discussion

According to PKM, objective and subjective weight control knowledge, agent knowledge, and persuasion knowledge are intercorrelated, with the exception of the relationship between subjective and agent knowledge. This relationship, however, had not been tested empirically before this study. The results suggest that respondents' beliefs about the NHS as the agent are not affected by how much they think they know about a topic, but rather from what they objectively know about the topic. The results also show that both objective and subjective knowledge are associated with persuasion knowledge. This could be because subjective knowledge is conceptualized with an element of confidence (Brucks 1985), which is also captured in the way persuasion knowledge is measured (i.e., respondents state the extent to which they can distinguish the genuine nature of the agent's advice or guidelines). Although neither objective nor subjective weight control knowledge has a direct influence on website attitudes and behavioral intentions (H_5 and H_6), contrary to Pearson and Liu-Thompkins's (2012) findings, they indirectly influence these outcomes after exposure to the web-based intervention through agent and persuasion knowledge.

These findings could be explained by the fact that Pearson and Liu-Thompkins (2012) examined these relationships in a different context, which could assume a higher risk and thus attribute a more direct and more substantial role to objective and subjective knowledge in the evaluation of websites and the formation of behavioral intentions. Therefore, our study findings highlight the fact that while both types of knowledge and PKM elements play an important role in understanding individuals' beliefs and behavior, the precise relations between them might vary according to the examined context and nature of the decision. The present research thus contributes to a better understanding of extant research connected to objective versus subjective topic knowledge and the PKM.

Agent knowledge influences both website attitudes and weight control intentions. This indicates that the more favorable beliefs consumers hold about the agent communicating the message, the more likely they are to have positive attitudes toward the message and form high behavioral intentions to act consistently with the recommended behavior. Consequently, trust in the agent is vital for web-based health interventions. This is consistent with past research which identifies trust as an important antecedent to perceptions and behavior, especially within a health context (Ball, Manika and Stout 2015).

Persuasion knowledge is only associated with weight control behavioral intentions, suggesting that the more favorable views consumers have about the persuasion tactics being employed, the more likely they are to form intentions consistent with the suggested health action. This positive relationship between persuasion knowledge and website attitudes contradicts Van Reijmersdat et al.'s (2015) findings. Nonetheless, these findings seem logical and plausible because the object of the subjective knowledge measure (i.e., weight control) differs from the object of attitudes (i.e., website information); as opposed prior research has only investigated the knowledge-attitudes behavior when referring to the same object. Similar to prior evidence that web-based interventions can result in positive behavioral outcomes, we found a moderately positive link between website information attitudes and behavioral intentions.

Altogether, all these results suggest that the inclusion of objective and subjective topic knowledge in the PKM framework is an important and significant contribution to the literature. The intercorrelations between the knowledge structures of the extended PKM framework, proposed for the first time in this paper, also make an empirical contribution to the relevant literature.

Given our experimental data collection method and the unique approach of the NHS web-based weight control intervention, which makes it possible for respondents to select the information that is more reflective of their health goal frames, we were able to explore whether the results of the knowledge–behavior link examined (Figure 1) vary depending on their health goal frame/web page choice. The results indicate that even two positively framed messages (Krishnamurthy, Carter, and Blair 2001) can have different impacts on responses to a web-based weight control intervention because of the personal health goals individuals hold. This is a contribution to the literature and it shows that individuals are more likely to engage with information consistent with their health goals (even though goals do not always translate into health behavior).

We also explored differences in terms of the interrelationships between the knowledge structures of our extended PKM, website attitudes, and behavioral intentions across two BMI groups: adults with a healthy BMI and adults with above healthy BMI. We found that the influence of agent knowledge was the most vital for the formation of website attitudes for any BMI group and for any health goal frame/website choice group. Respondents were more likely to select the web pages consistent with their BMI, indicating that they were aware of their weight control needs, which may be due to increased access to health knowledge (Scammon et al. 2011). This kind of analysis by BMI and health goal frame has not been explored by past research in relation to the extended PKM knowledge structures proposed here, and therefore the present novel findings can serve as a building block for future studies wanting to explore these differences further. The results also showed that website attitudes predicted behavioral intentions only for respondents exposed to the two web pages, but not the control group, suggesting that health goal framing does matter for the success of web-based health interventions. Both health goals and message framing are important in designing health communications (Keller and Lehmann 2008). Moreover, BMI groups may vary in how they form attitudinal and behavioral outcomes after exposure.

6. Conclusion

6.1 Theoretical contributions and implications for practice and public policy

In this study we extended the PKM knowledge structures of the target with Brucks' (1985) objective and subjective prior topic knowledge constructs. From a theoretical standpoint, it is

important to distinguish between objective and subjective conceptualizations and operationalizations of topic knowledge that an individual/user has prior to exposure to a persuasive attempt, such as a website, due to the unique effects of knowledge structure on each other and their unique attitudinal and behavioral effects. Our conceptual model hypothesised that all the knowledge structures identified by the PKM and the extension we introduced here can in turn influence website attitudes and behavioral intentions, as per the Knowledge-Attitude-Behavior model (Schrader and Lawless 2004). The results illustrate that not all knowledge structures affect the attitudinal and behavioral effects examined here. Agent knowledge is an important knowledge structure influencing both website attitudes and behavioral intentions, while persuasion knowledge only influences behavioral intentions. Neither objective nor subjective topic knowledge constructs affect website attitudes or behavioral intentions. However, these types of knowledge should not be neglected by researchers or practitioners, as they are important due to their relationship to persuasion knowledge, while objective topic knowledge is also related to agent knowledge.

Our findings also offer valuable insights related to online health interventions, which can be useful in the context of public policy. Implications are not restricted only to the NHS and the particular web-based intervention used in the UK, but could also offer insights for health interventions worldwide. Consistent with Bolton, Bhattacharjee, and Reed (2015), we found that weight control related information affected behavioral intentions. Thus, understanding how the success of these initiatives can be enhanced through public policy initiatives is very important. Given that consumers may view web-based weight control interventions as persuasion attempts, practitioners and public policy makers should take into account users' agent and persuasion knowledge before exposing them to a health message. Healthy behavioral intentions are undermined by unfavorable agent and persuasion knowledge. Governmental bodies and the NHS (as well as other organizations using similar online approaches) should ensure that they address any lack of trust or skepticism towards any web-based health intervention before its implementation. Trust in the source/agent is an important construct in the design of both traditional marketing and health marketing communication initiatives (Ball, Manika, and Stout 2015). Policy makers should also encourage the activation of favorable persuasion knowledge (e.g. via specific cues or message content) when individuals encounter their health initiatives, such as a web-based health intervention. In the present case, favorable agent and persuasion

knowledge could be enhanced by ensuring that any negative aspects (e.g., NHS cutting costs) are counterbalanced with the dissemination of positive information about the NHS's endeavors related to fighting the obesity epidemic, as well as the benefits for consumers.

We also found that the effects of both objective and subjective knowledge are relatively independent of each other, given the different effects on agent and persuasion knowledge. This suggests the need to address both types of knowledge when implementing web-based weight control initiatives. What consumers objectively know helps them judge the agent's beliefs and hold more favorable persuasion knowledge, whereas what they think they know matters more for persuasion knowledge. This indicates that, even with the knowledge–behavior gap, it is important to educate the public and increase objective weight control knowledge. However, there is a big difference between health education and behavior change (Glanz, Rimer and Viswanath 2008); our results did not find support for the relationship between objective knowledge and behavioral intentions.

Health goal frames were found to matter for the success of web-based health interventions because they influence how consumers cope with the intervention's information and how this translates into attitudinal and behavioral outcomes. Our health goal frame moderator shows that there needs to be consistency between consumers' health goals and the message/intervention frame in order to elicit information receptivity, which would then influence behavioral intentions. Web-based health interventions tackling the obesity epidemic should try to motivate consumers above healthy BMI levels to lose weight and encourage consumers with healthy BMI to continue eating healthily. Because the public may not always choose to take action, the NHS should also employ passive communication channels to communicate necessary health information, rather than relying only on its website. Additionally, there is a need to increase the accuracy of self-perceptions for BMI to direct behavior, such as the choice of correct goal frame and website information. Relevant to the moderating role of BMI for the knowledge–behavior link in this study, Andrews, Burton, and Kees (2011) suggest careful segmentation in enhancing health education and knowledge, which can vary by BMI, among other characteristics. Last, the importance of agent knowledge for website attitudes across health goal frame groups and BMI groups illustrates the vital importance of agent beliefs for web-based health interventions.

6.2 Limitations and further research

As with all studies, the present results should be generalized with caution due to inherent limitations. Firstly, a health goal may differ across message frames, even though we treated these in the same way because of the web page choice. Secondly, setting a goal does not necessarily lead to motivations to achieve that goal (Strecher et al. 1995). Furthermore, BMI is not an accurate measure of adiposity (Burkhauser and Cawley 2008), and thus other measures could be employed to assess whether consumers need to lose or maintain their weight. We treated BMI as a moderator, but it could also be controlled for in the main SEM analysis. Nonetheless, our multigroup SEM analysis, with BMI as the grouping variable, was more appropriate for examining the chosen intervention, as BMI group differences may exist in terms of the effects of knowledge on attitudes and behavior (i.e., the relationships rather than mean score differences in the constructs themselves). The findings regarding potential differences across groups with different BMI and exposure to different NHS web pages (i.e., BMI group x Health Goal Frame post-hoc tests) should also be interpreted and generalized carefully, given the unequal sample sizes in this post-hoc test. Lastly, the results may have been affected by the use of a non-probability sampling method.

Several recommendations for future research can be put forward based on our approach and present findings. We explored differences for the combined health goal frame × BMI groups post hoc, but could not interpret subjective weight control knowledge, agent knowledge, and persuasion knowledge; therefore, further research is required. Also, topic knowledge often directs behavior (Brucks 1985), such as the choice visitors must make on the NHS website depending on their health goal frame. Research should also explore the impact of knowledge confidence, which Brucks (1985) originally conceptualized as part of the subjective knowledge construct but was not measured as such until Moorman et al. (2004), and its relationship to PKM knowledge structures of the target, website attitudes, and behavioral intentions. Future studies could also examine differences between age and gender groups for our model, given that persuasion knowledge may differ across generations (Friestad and Wright 1995). Finally, follow-up studies should explore weight control initiatives further. For example, in relation to our proposed conceptual model, future research could explore if/why prevention-focused messages may be more effective than promotion-focused messages regardless of message frame (Lauriola et al. 2005) and if/why discouraging unhealthy behaviors rather than promoting healthy ones

may be more effective in fighting the obesity epidemic (Smith 2014).

References

Agrawal, Nidhi, Geeta Menon, and Jennifer L. Aaker (2007), "Getting Emotional About Health," *Journal of Marketing Research*, 44 (1), 100-113.

Ajzen, Icek (2011), *Attitudes, Personality and Behavior*, 2d ed. New York: Open University Press.

Alba, Joseph W. and J. Wesley Hutchinson (2000), "Knowledge Calibration: What Consumers Know and What They Think They Know," *Journal of Consumer Research*, 27 (2), 123-56.

Andrews, J. Craig, Scot Burton, and Jeremy Kees (2011), "Is simpler always better? Consumer evaluations of front-of-package nutrition symbols," *Journal of Public Policy & Marketing*, *30* (2), 175-190.

Arem, Hannah and Melinda Irwin (2011), "A review of web-based weight loss interventions in adults," *Obesity Review*, 12 (5), 236-243.

Bagozzi, Richard P. and Utpal Dholakia (1999), "Goal Setting and Goal Striving in Consumer behavior," *Journal of Marketing*, 63 (Special Issue), 19-32.

Ball, Jennifer G., Danae Manika, and Patricia. A. Stout (2013), "Presenting Causes and Consequences of Trust in Direct-to-consumer Pharmaceutical Advertising," *International Communications Association Conference* in London, UK.

Ball, Jennifer G., Danae Manika, and Patricia.A. Stout (2015), "Causes And Consequences Of Trust In Direct-To-Consumer Pharmaceutical Advertising," *International Journal of Advertising: The Review of Marketing Communications,* http://dx.doi.org/10.1080/02650487.2015.1009346

Baranowski, T., Cullen, K. W., Nicklas, T., Thompson, D. and Baranowski, J. 2003. 'Are current health behavioral change models helpful in guiding prevention of weight gain efforts?'. Obesity Research, 11:S10, 23S-43S.

Barsalou, Lawrence W. (1991), "Deriving Categories to Achieve Goals," in *The Psychology of Learning and Motivation*, Vol. 27, Gordon H. Bower, ed. New York: Academic Press, 1-64.

Beldad, A., de Jong, M., and Steehouder, M. (2010) How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust, *Computers in Human Behavior*, 26 (5), 857-869.

Bolton, Lisa E., Bhattacharjee, Amit, and Americus Reed II (2015), "The Perils of Marketing Weight-Management Remedies and the Role of Health Literacy," *Journal of Public Policy & Marketing*, 34 (1), 50-62.

Brennan, Linda and Wayne Binney (2010), "Fear, guilt, and shame appeals in social marketing," *Journal of Business Research*, 63 (2), 140-146.

Brucks, Merrie (1985), "The Effects of Product Class Knowledge on Information Search Behavior," *Journal of Consumer Research*, 12 (1), 1-16.

Burkhauser, Richard V. and John Cawley (2008), "Beyond BMI: the value of more accurate measures of fatness and obesity in social science research," *Journal of Health Economics*, 27 (2), 519−529.

Campbell, Margaret C. and Anna Kirmani (2008), "I Know What You're Doing and Why You're Doing It: The Use of Persuasion Knowledge Model in Consumer Research" in the *Handbook of Consumer Psychology*, Haugvedt, Curtis P., Paul M Herr, and Frank R. Kardes ed., New York: Taylor and Frances, 549-571.

Carlson, Jay P., Leslie H. Vincent, David M. Hardesty, and William O. Bearden (2009), "Objective and Subjective knowledge Relationships: A Quantitative Analysis of Consumer Research Findings," *Journal of Consumer Research*, 35 (5), 864-876.

Chan, Siew H., Qian Song, and Lee J. Yao (2015) "The moderating roles of subjective (perceived) and objective task complexity in system use and performance," *Computers in Human Behavior*, 51, 393–402.

Chandon, Pierre and Brian Wansink (2007), "Is Obesity Caused by Calorie Underestimation? A Psychophysical Model of Meal Size Estimation," *Journal of Marketing Research*, 44 (1), 84-99

Chandran, Sucharita and Vicki G. Morwitz (2005), "Effect of Participating pricing on Consumers Cognitions and Actions: A Goal Theoretic Perspective," *Journal of Consumer Research*, 32 (2), 249–259.

Chernev, Alexander (2011), "The Dieter's Paradox," *Journal of Consumer Psychology*, 21 (2), 17-183.

Cooper, Charlie (Feb 2016), "NHS Cost-cutting Plans 'Could Prompt Staff Reductions and Rationing of Care'", (accessed September 7, 2016), [available at http://www.independent.co.uk/life-style/health-and-families/health-news/nhs-cost-cutting-plans-could-prompt-staff-reductions-and-rationing-of-care-a6856896.html]

Datamonitor (2003), "NHS: Improvement Online" (accessed June 15, 2015), [available at http://www.datamonitor.com/store/News/nhs_improvements_online?productid=E8E87E22-EA3F-482A-A124-AB0FF37E82EC].

Davis, Christopher G., Jennifer Thake, and Natalie Vilhena (2010), "Social Desirability Biases In Self-reported Alcohol Consumption and Harms," *Addictive Behaviors*, 35 (4), 302-311.

Diviani, N., and Corine S. Meppelink (2017), "The impact of recommendations and warnings on the quality evaluation of health websites: An online experiment," *Computers in Human Behavior*, 71 (June), 122-129.

Eisend, Martin (2015), "Persuasion Knowledge and Third-Person Perceptions in Advertising: The Moderating Effect of Regulatory Competence," *International Journal of Advertising: The review of Marketing Communications*, 34 (1), 54-69.

Faith, Jennifer, Sheryl Thorburn, and Tassnym H. Sinky (2016) "Exploring healthcare experiences among online interactive weight loss forum users" *Computers in Human Behavior*, 57, 326-333.

Fett, Anne-Kathrin, Paul Lattimore, Anne Roefs, Nicole Geschwind, and Anita Jansen (2009), "Food Cue Exposure and Body Image Satisfaction: The Moderating Role of BMI and Dietary Restraint," *Body Image*, 6 (1), 14-18.

Floyd, Donna L., Steven Prentice-Dunn, and Ronald W. Rogers (2000), "A Meta-Analysis of Research on Protection Motivation Theory," *Journal of Applied Social Psychology*, 30 (2), 407–429.

Flynn, Leisa Reinecke and Ronald E. Goldsmith (1999), "A Short, Reliable Measure of Subjective Knowledge," *Journal of Business Research*, 46 (1), 57–66.

Fornell, Claes and David F. Larcker (1981), "Evaluating Structural Equation Models With Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18 (1), 39-50.

Friestad, Marian and Peter Wright (1994), "The Persuasion Knowledge Model: How People Cope with Persuasion Attempts," *Journal of Consumer Research*, 21 (2), 1-31.

Gefen, David and Detmar W. Straub (2004), "Consumer Trust in B2C e-Commerce and the Importance of Social Presence: Experiments in e-Products and e-Services," *The International Journal of Management Science,* 32 (6) 407_24.

Glanz, Karen, Barbara K. Rimer and K. Viswanath (2008), *Health Behavior and Health Education: Theory, Research and Practice,* San Fransisco: Wiley & Sons.

Gollwitzer, Peter M. and Veronika Brandstätter (1997), "Implementation intentions and effective goal pursuit," *Journal of Personality and Social Psychology*, 73 (1), 186-199.

Grazioli, Stefano and Sirkka L. Jarvenpaa (2000), "Perils of Internet Fraud: An Empirical Investigation of Deception and Trust with Experienced Internet Consumers. *IEEE Transactions on Systems, Man, and Cybernetics _ Part A: Systems and Humans*, 30, 395_410.

Guthrie, Joanne, Lisa Mancino, and Chung-Tung Jordan Lin (2015), "Nudging Consumers toward Better Food Choices: Policy Approaches to Changing Food Consumption Behaviors," *Psychology & Marketing*, 32 (5), 501–511.

Ham, Chang-Dae, and Michelle R. Nelson (2016) "The role of persuasion knowledge, assessment of benefit and harm, and third-person perception in coping with online behavioral advertising," *Computers in Human Behavior*, 62, 689-702.

Ham, Chang-Dae, Michelle R. Nelson, and Susmita Das (2015), "How to Measure Persuasion Knowledge," *International Journal of Advertising: The review of Marketing Communications*, 34 (1), 17-53.

Hibbert, Sally, Andrew Smith, Andrea Davies and Fiona Ireland (2007), "Guilt appeals: Persuasion Knowledge and Charitable Giving," *Psychology & Marketing*, 24 (8), 723-42.

Hove, Thomas, Hye-Jin Paek, and Thomas Isaacson (2011), "Using Adolescent eHealth Literacy to Weigh Trust in Commercial Web Sites: The More Children Know, the Tougher They Are to Persuade', *Journal of Advertising Research*, 51(3),524-37.

Jasper, John D., Jonathan Woolf, and Stephen D. Christman (2014), "Responding to Framed Health Messages: Different Strokes for Different (handedness) Folks. *Psychology & Health*, *29* (6), 671-686.

Jaworowska, Agnieszka and Grzegorz Bazylak (2009), "An Outbreak of Body Weight Dissatisfaction Associated with Self-perceived BMI and Dieting among Female Pharmacy Students," *Biomedicine & Pharmacotherapy*, 63 (9), 679-692.

Jiménez-Buedo, Maria and Luis M. Miller (2010), "Why a Trade-off? The Relationship Between the External and Internal Validity of Experiments," *THEORIA. Revista De Teoría, Historia Y Fundamentos De La Ciencia,* 25 (3), 301–321.

Jiang, S. and Beaudoin, C.E., (2016) Health literacy and the internet: An exploratory study on the 2013 HINTS survey, *Computers in Human Behavior*, 58 (May), 240-248.

Keller, Punam A. and Donald R. Lehmann (2008), "Designing Effective Health Communications: A Meta-analysis.," *Journal of Public Policy & Marketing*, 27 (2), 117-130.

Khare, Adwait and J. Jeffrey Inman (2009), "Daily, Week-part, and Holiday Patterns in Consumers' Caloric Intake," *Journal of Public Policy & Marketing*, 28 (2), 234-252.

Kline, R. B. (2005), "Principles and Practice of Structural Equation Modeling" (2nd ed.). New York: Guilford.

Krishnamurthy, Parthasarathy, Patrick Carter, and Edward Blair (2001), "Attribute Framing and Goal Framing Effects in Health Decisions," *Organizational Behavior and Human Decision Processes*, 85 (2), 382-399.

Lattimore, Paul (2005), "Body Dissatisfaction in Females Varies According to Deprivation State and is Modified by Weight Rather Than Restraint Status," *Appetite*, 45 (3), 356–359.

Lauriola, Marco, Paolo M. Russo, Fabio Lucidi, Christiano Violani, and Irwin Levin. (2005), "The Role of Personality in Positively and Negatively Framed Risky Health Decisions," *Personality and Individual Differences*, *38* (1), 45-59.

Leahey, Tricia M., Jessica Gokee LaRose, Joseph L. Fava, and Rena R. Wing (2011), "Social Influences Are Associated With BMI and Weight Loss Intentions in Young Adults," *Obesity,* 19 (6), 1157-1162.

Lee, Kyung-Tag, and Dong-Mo Koo (2012) "Effects of attribute and valence of e-WOM on message adoption: Moderating roles of subjective knowledge and regulatory focus," *Computers in Human Behavior*, 28, 1974–1984.

Levin, Irwin P., Sandra L. Schneider, and Gary J. Gaeth (1998), "All Frames Are Not Created Equal: A Typology and Critical Analysis Of Framing Effects," *Organizational Behavior and Human Decision Processes*, 76 (2), 149-188.

Levitt, Steven D. and John A. List (2007), "What Do Laboratory Experiments Measuring Social Preferences Reveal About The Real World?" *Journal of Economic Perspectives*, 21 (2), 153–174.

Lowe, Ben, Iain Fraser, and Diogo M. Souza-Monteiro (2015), "A Change for the Better? Digital Health Technologies and Changing Food Consumption Behaviors," *Psychology & Marketing*, 32 (5), 585–600.

Lowry, Richard, Deborah A. Galuska, Janet E. Fulton, Howell Wechsler, Laura Kann, and Janet L. Collins (2000), "Physical Activity, Food Choice, and Weight Management Goals and Practices Among U.S. College Students," *American Journal of Preventative Medicine*, 18 (1), 18-27.

Malinauskas Brenda M, Thomas D. Raedeke, Victor G. Aeby, Jean L. Smith, and Matthew B. Dallas (2006), "Dieting Practices, Weight Perceptions, and Body Composition: A Comparison of Normal Weight, Overweight, and Obese College Females," *Nutrition Journal*, 5 (11), 1-8.

Mathwick, Charla and Edward Rigdo (2004), "Play, Flow, and the Online Search Experience," *Journal of Consumer Research*, 31 (2), 324-332.

Mick, David Glen (2006), "Meaning and Mattering Through Transformative Consumer Research," In *Advances in Consumer Research*, Vol. 33, Cornelia Pechmann and Linda Price, eds. Duluth, MN: Association for Consumer Research, 1–4.

Miller, T.E., Booraem, C., Flowers, J.V. and Iversen, A.E. 1990. 'Changes in knowledge, attitudes, and behavior as a result of a community-based AIDS prevention program'. AIDS Education and Prevention, 2:1, 12-23.

Miller, Tracy M., Madina F. Abdel-Maksoud, Lori A. Crane, Al C.Marcus, and Tim E. Byers (2008), "Effects Of Social Approval Bias On Self-Reported Fruit And Vegetable Consumption: A Randomized Controlled Trial," *Nutrition Journal*, 7 (18), 1858-8696.

Milne, Sarah, Sheina Orbell, and Paschal Sheeran (2002), "Combing Motivational and Volitional Interventions to Promote Exercise Participation: Protection Motivation Theory and Implementation Intentions," *British Journal of Health Psychology*, 7 (2), 163-184.

Moorman, Christine, Kristin Diehl, David Brinberg, and Blair Kidwell (2004), "Subjective Knowledge, Search Locations, and Consumer Choice," *Journal of Consumer Research*, 31 (3), 673-80.

Myrick, Jessica Gall (2017), "The role of emotions and social cognitive variables in online health information seeking processes and effects," *Computers in Human Behavior*, 68, 422-433.

Nelson, Michelle R., Michelle L. M. Wood, and Hye-Jin Paek (2009), "Increased Persuasion Knowledge of Video News Releases: Audience Beliefs About News and Support For Source Disclosure," *Journal of Mass Media Ethics*, 24 (4), 220-37.

Ness, Alisha M., Genevieve Johnson, Michael K. Ault, William D. Taylor, Jennifer A. Griffith, Shane Connelly, Norah E. Dunbar, Matthew L. Jensen (2017), "Reactions to ideological websites: The impact of emotional appeals, credibility, and pre-existing attitudes," *Computers in Human Behavior*, 72 (July), 496-511.

Nguyen-Rodriguez, Selena T., Chih-Ping Chou, Jennifer B. Unger, and Donna Spruijt-Metz (2008), "BMI as a Moderator of Perceived Stress and Emotional Eating in Adolescents," *Eating Behaviors,* 9 (2), 238-246.

NHS Annual Report (2012), "NHS Choices Annual Report," (accessed June 15, 2015),[available at http://www.nhs.uk/aboutNHSChoices/professionals/developments/Documents/annual-report/nhs-choices-annual-report-2012.pdf].

NHS England (2014), "NHS England's Action to Obesity," (accessed June 15, 2015), [available at http://www.england.nhs.uk/2014/12/26/nhs-englands-action-on-obesity/].

NHS Traffic Report (2015) "Choices in 2015," (accessed July 2, 2017), [available at http://www.nhs.uk/aboutNHSChoices/aboutnhschoices/Documents/2015-NHSC-traffic-report.pdf].

NHS (2017) "About Us," (accessed July 2, 2017), [available at http://www.nhs.uk/aboutNHSChoices/Pages/NHSChoicesintroduction.aspx].

NHS Weight Loss Traffic Report (2016) "Weight Loss Information on NHS Choices - March 2016," ," (accessed July 2, 2017), [available at http://www.nhs.uk/aboutNHSChoices/aboutnhschoices/how-we-

perform/Documents/traffic%20reports/2016/weight-loss-content-report-march-2016.pdf].

Nyer, Prashanth U. and Stephanie Dellande (2010), "Public Commitment as a Motivator For Weight Loss," *Psychology & Marketing*, *2 7*(1), 1-12.

Obermiller, Carl and Eric R. Spangenberg (1998), "Development of a Scale To Measure Consumer Skepticism Toward Advertising," *Journal of Consumer Psychology,* 7 (2), 159-86.

OECD Health Statistics (2013), "Health at a Glance 2013" (accessed June 15, 2015), [available at. http://www.oecd.org/els/health-systems/Health-at-a-Glance-2013.pdf].

Papagiannidis, S., Coursaris, C. & Bourlakis, M. (2012), "Do web sites affect voting decisions? The case two general elections in Greece," *Computers Human Behavior*, 28, 300-307.

Pearson, Yvetter E. and Yuping Liu-Thompkins (2012), "Consuming Direct-To-Consumer Genetic Tests: The Role Of Genetic Literacy and Knowledge Calibration," *Journal of Public Policy & Marketing*, 31 (1), 42-57.

Pechmann, Cornelia and Liangyan Wang (2010), "Effects of Indirectly and Directly Competing Reference Group Messages and Persuasion Knowledge: Implications for Educational Placements," *Journal of Marketing Research*, 47 (1), 134-45.

Podsakoff, Philip M., Scott B. MacKenzie, Jeong-Yeon Lee, and Nathan P. Podsakoff (2003), "Common Method Biases in Behavioral Research: A Critical Review Of The Literature and Recommended Remedies. *Journal of Applied Psychology*, 88 (5), 879–903.

Puhl, Rebecca M. and Cheslea A. Heuer (2010), "Obesity Stigma: Important Considerations For Public Health," *American Journal of Public Health*, *100 (6)* , 1019-1028.

Purpura, Stephen, Victoria Schwanda, Kaiton Williams, William Stubler, and Phoebe Sengers (2011), "Fit4Life: The Design of a Persuasive Technology Promoting Healthy Behavior and Ideal Weight," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York: ACM, 423-32.

Quinn, S., Raymond Bond, Chris Nugent (2017), "Quantifying health literacy and eHealth literacy using existing instruments and browser-based software for tracking online health information seeking behavior," *Computers in Human Behavior*, 69 (April), 256-267.

Raju, P.S., Subhash C. Lonial, and W Glynn Mangold (1995), "Differential Effects of Subjective Knowledge, Objective Knowledge, and Usage Experience on Decision Making: An Exploratory Investigation," *Journal of Consumer Psychology*, 4 (2), 153-80.

Ran, Weina, Masahiro Yamamoto, and Shan Xu (2016), "Media multitasking during political news consumption: A relationship with factual and subjective political knowledge," *Computers in Human Behavior*, 56, 352-359.

Reid, Mike, Anthony Worsley, and Felix Mavondo (2015), "The Obesogenic Household: Factors Influencing Dietary Gatekeeper Satisfaction with Family Diet," *Psychology & Marketing*, 32 (5), 544–557.

Rhodes, Ryan E. Leanne Dickau (2012), "Experimental Evidence For The Intention–Behavior Relationship in The Physical Activity Domain: A Meta-Analysis," *Health Psychology*, 31 (6),

724-727.

Scammon, Debra L., Punam A. Keller, Pia A. Albinsson, Shalini Bahl, Jesse R. Catlin, Kelly L. Haws, Jeremy Kees, Tracey King, Elizabeth Gelfand Miller, Ann M. Mirabito, Paula C. Peter, and Robert M. Schindler (2011), "Transforming Consumer Health," *Journal of Public Policy & Marketing*, 30 (1), 14-22.

Schram, Arthur (2005), "Artificiality: The Tension Between Internal And External Validity In Economic Experiments," *Journal of Economic Methodology*, 12 (2), 225–237.

Sheeran, Paschal and Thomas L. Webb (2012), "From Goals to Action," In *Goal-Directed Behavior,* Aaarts, Henk and Andrew Elliot, *New York:* Taylor & Francis Group.

Schneider, Frank M., CarinaWeinmann, Franziska S. Roth, Katharina Knop, and Peter Vorderer (2016) "Learning from entertaining online video clips? Enjoyment and appreciation and their differential relationships with knowledge and behavioral intentions," *Computers in Human Behavior, 54,* 475-482.

Schrader, P. G. and Lawless, K. A. 2004. 'The knowledge, attitudes, and behaviors approach: how to evaluate performance and learning in complex environments'. Performance Improvement, 43:9, 8-15.

Smith, Suzanna J. (2014), "Framing Health Care Messages: Why Interpersonal Context Matters," (*accessed* June 15, 2015), [available at https://www.ama.org/publications/eNewsletters/MHSNewsletter/Pages/framing-health-care-messages-why-interpersonal-context-matters.aspx].

Stewart, Heather and Diane Taylor (Aug 2016), "NHS Plans Closures and Radical Cuts to Combat Growing Deficit in Health Budget" (accessed September 7, 2016), [available at https://www.theguardian.com/society/2016/aug/26/nhs-plans-radical-cuts-to-fight-growing-deficit-in-health-budget]

Stewart, Paul (2015), "Healthy Living," (*accessed* June 15, 2015), [available at http://iuhealth.org/blog/detail/healthy-living/#.VWyeuGRVhBc].

Strecher, Victor J., Gerard Seijts, Gerjo Kok, Gary P. Latham, Russell Glasgow, Brenda DeVellis, Ree M. Meertens, and David W. Bulger (1995), "Goal Setting as a Strategy fir Health Behavior Change," *Health Education Quarterly*, 22 (2), 190-200.

Tovey, Mark (2017), "Obesity and the Public Purse: Weighing up the True Cost to the Taxpayer", (accessed February 15, 2017), [available at https://iea.org.uk/wp-content/uploads/2017/01/Obesity-and-the-Public-Purse-PDF.pdf]

Tutaj, Karolina and Eva A. van Reijmersdal (2012), "Effects of Online Advertising Format and Persuasion Knowledge On Audience Reactions," *Journal of Marketing Communications*, 18 (1), 5-18.

Van Reijmersdat, Eva A., Nienke Lammers, Esther Rozendaal, and Moniek Buijzen (2015), "Disclosing the Persuasive Nature of Advertgames: Moderation Effects of Mood on Brand Responses via Persuasion Knowledge," *International Journal of Advertising: The review of Marketing Communications*, 34 (1), 70-84.

Vashisht, D., and Royne, M. B. (2016) Advergame speed influence and brand recall: The moderating effects of brand placement strength and gamers' persuasion knowledge, *Computers*

in Human Behavior, 63 (October), 162-169.

Venn, Alison J., Russell J. Thomson, Michael D. Schmidt, Verity J. Cleland, Beverley A. Curry, Hanni C. Gennat, and Terence Dwyer (2007), "Overweight and Obesity From Childhood to Adulthood: A Follow-Up Of Participants in The 1985 Australian Schools Health and Fitness Survey," *Medical Journal of Australia*, 186 (9), 458-460.

Wansink, Brian and Pierre Chandon (2006). Can "Low-Fat" Nutrition Labels Lead to Obesity?" *Journal of Marketing Research*, *4 3*(4), 605-617.

Wardle Jane and F Johnson (2002), "Weight And Dieting: Examining Levels of Weight Concern in British Adults," *International Journal of Obesity*, 26 (8), 1144-1150.

Westland, J.C. (2010), "Lower bounds on sample size in structural equation modelling." *Electronic Commerce Research and Applications*, 9(6), 476-487.

Xiao, N., Sharman, R., Rao, H.R., and Upadhyaya Shambhu(2014) Factors influencing online health information search: An empirical analysis of a national cancer-related survey, *Decision Support Systems*, 57 (2014), 417-427.

TABLES

Table 1. Sample Characteristics

		Frequency	Percentage
Gender (N=369)	Male	185	50.1%
	Female	184	48.9%
Age (N=369)	18-26	82	22.2%
	27-37	91	24.7%
	38-49	94	25.5%
	50+	102	27.6%
Education (N=369)	Some high school or less	32	8.7%
	High school graduate or equivalent	90	24.4%
	Vocational/technical school (two year program)	41	11.1%
	Some college but no degree	68	18.4%
	College graduate (four year program)	89	24.1%
	Some graduate school	39	10.6%
	Graduate degree	3	.8%
	Professional degree (M.D., J.D., etc.)	7	1.9%
BMI groups (N=369)	Healthy BMI	189	51.22%
	Above healthy BMI (overweight or obese)	180	48.78%
Goal Frame/Website Choice groups (N=369)	Healthy eating	122	33.06%
	Lose weight	144	39.02%
	Control (did not click on either)	103	27.92%
BMI × Goal Frame/Website Choice Groups (N=369)	Healthy BMI & losing weight group	43	11.65%
	Above healthy BMI & losing weight group	79	21.41%
	Healthy BMI & healthy eating group	99	26.83%
	Above healthy BMI & healthy eating group	45	12.20%
	Healthy BMI & control group	47	12.74%
	Above healthy BMI & control group	56	15.17%

Table 2. Confirmatory Factor Analysis, AVE, CR, Reliability, and Multicollinearity Diagnostics

Variables	Scale Items	Loadings
Subjective Weight Control Knowledge	(1 = "strongly disagree," 5 = "strongly agree") AVE=.67; CR=.86; a=.86; VIF=1.03; Tolerance=.96	
STK1	I do not feel very knowledgeable about weight control. (Reverse Coded)	.76**
STK2	Compared to most other people I know less about weight control. (Reverse Coded)	.85**
STK3	When it comes to weight control, I really do not know a lot. (Reverse Coded)	.84**
Persuasion Knowledge	(1 = "strongly disagree," 5 = "strongly agree") AVE=.64; CR=.90; a=.90; VIF=1.17; Tolerance=.85	
PK1	I know when a health advice/guideline is too good to be true.	.77**
PK2	I can tell when a health advice/guideline has strings attached.	.79**
PK3	I have no trouble understanding the health advice/guideline tactics used in advertising.	.81**
PK4	I can see through health advice/guideline gimmicks used to get individuals to buy products or change behavior.	.80**
PK5	I can separate fact from fantasy in health-related campaigns.	.84**
Agent Knowledge	(1 = "strongly disagree," 5 = "strongly agree") AVE=.72; CR=.94; a=.94; VIF=2.13; Tolerance=.47	
AK1	The NHS information is trustworthy.	.84**
AK2	NHS information provided on the website can be relied upon.	.87**
AK3	The NHS information provided on the website has individual's best interests in mind.	.86**
AK4	I expect that the advice given by the NHS website is their best judgment.	.83**
AK5	The NHS knows how to provide information that is needed.	.83**
AK6	The NHS knows about weight control.	.86**
Attitude toward the Website	On a scale of 1 to 5, please indicate what you think about the NHS website: AVE=.80; CR=.92; a=.92; VIF=1.96; Tolerance =.51	
WATT1	Unfavorable/favorable	.90**
WATT2	Dislike/like	.93**
WATT3	Low quality/high quality	.86**
Behavioral Intentions to Control Weight	On a scale of 1 to 5, please indicate what your intentions to control your weight in the next 4 weeks: AVE=.74; CR=.89; a=.89	
BI1	Improbable: probable	.70**
BI2	Impossible: possible	.83**
BI3	Uncertain: certain	.81**

** $p < .001$, CR = Construct Reliability, a= Cronbach's Alpha, VIF = variance inflation factor.

Measurement Model: $\chi^2 = 360.76$, df = 160, $p = .00$; RMSEA = .05; 90% CI = .05–.06; CFI = .96; TLI = .96; SRMR = .03; N = 369.

Table 3. Descriptive Statistics and Correlations

Constructs	N	M (SD)	Correlations					
Objective knowledge	369	8.95 (3.04)	1					
Subjective knowledge	366	3.48 (.98)	.42**	1				
Persuasion knowledge	369	3.66 (.70)	.19**	.16**	1			
Agent knowledge	364	3.84 (.73)	.19**	.01	.35**	1		
Attitudes toward the website	369	3.91 (.89)	.18**	.06	.22**	.70**	1	
Behavioral intentions	369	3.69 (1.00)	.19**	.13*	.30**	.45**	.45**	1

** $p < .01$; * $p < .05$; Objective knowledge: Min-Max = 0–15; all other constructs: Min-Max = 1–5.

Table 4. SEM Results Based on the Total Sample

Hypothesized Relationships	Std. Loadings	SE	z-scores	Hypotheses Supported?
H1: Objective Weight Control Knowledge WITH Subjective Weight Control Knowledge	.45**	.05	9.84	Yes
H2a: Objective Weight Control Knowledge WITH Agent Knowledge	.20**	.05	3.83	Yes
H2b: Subjective Weight Control Knowledge WITH Agent Knowledge	.02	.06	.41	No
H3a: Objective Weight Control Knowledge WITH Persuasion Knowledge	.20**	.05	3.81	Yes
H3b: Subjective Weight Control Knowledge WITH Persuasion Knowledge	.19**	.06	3.31	Yes
H4: Agent Knowledge WITH Persuasion Knowledge	.37**	.05	7.60	Yes
H5a: Objective Weight Control Knowledge → Website Attitudes	.01	.05	.26	No
H5b Subjective Weight Control Knowledge → Website Attitudes	.07	.05	1.49	No
H6a: Objective Weight Control Knowledge → Weight Control Behavioral Intentions	.04	.05	.66	No
H6b: Subjective Weight Control Knowledge → Weight Control Behavioral Intentions	.07	.06	1.16	No
H7: Agent Knowledge → Website Attitudes	.76**	.03	22.90	Yes
H8: Agent Knowledge → Weight Control Behavioral Intentions	.17*	.08	2.01	Yes
H9: Persuasion Knowledge → Website Attitudes	-.06	.05	-1.37	No
H10: Persuasion Knowledge → Weight Control Behavioral Intentions	.18**	.05	3.24	Yes
H11: Website Attitudes → Weight Control Behavioral Intentions	.32**	.08	4.16	Yes

** $p < .01$; * $p < .05$; **SEM Model:** $\chi^2 = 376.98$, df = 175, $p = .00$; RMSEA = .05; 90% CI = .04–.06; CFI = .96; TLI = .96; SRMR = .03; N = 369.

Table 5. Multigroup SEM Results with *Goal Frame/Website Choice* as the Grouping Variable

	LOSING WEIGHT (n=122)			HEALTHY EATING (n=144)			CONTROL (n=103)		
Hypothesized Relationships	**Std. Loadings**	**SE**	**z-scores**	**Std. Loadings**	**SE**	**z-scores**	**Std. Loadings**	**SE**	**z-scores**
H1: Objective Weight Control Knowledge WITH Subjective Weight Control Knowledge	.46**	.07	6.19	.45**	.07	6.59	.43**	.09	4.19
H2a: Objective Weight Control Knowledge WITH Agent Knowledge	.24**	.08	2.88	.15	.08	1.69	.13	.10	1.27
H2b: Subjective Weight Control Knowledge WITH Agent Knowledge	.02	.09	.23	.11	.09	1.24	-.11	.11	-.95
H3a: Objective Weight Control Knowledge WITH Persuasion Knowledge	.35**	.08	4.19	.10	.08	1.26	.15	.11	1.33
H3b: Subjective Weight Control Knowledge WITH Persuasion Knowledge	.26**	.09	2.71	.15	.08	1.83	.17	.13	1.30
H4: Agent Knowledge WITH Persuasion Knowledge	.21	.09	2.39	.53**	.06	8.15	.31**	.10	3.06
H5a: Objective Weight Control Knowledge → Website Attitudes	-.01	.09	-.03	.03	.07	.39	.01	.08	.03
H5b Subjective Weight Control Knowledge → Website Attitudes	.11	.09	1.29	.09	.08	.22	-.04	.10	-.35
H6a: Objective Weight Control Knowledge → Weight Control Behavioral Intentions	.07	.09	.71	.01	.09	.01	.09	.10	.89
H6b: Subjective Weight Control Knowledge → Weight Control Behavioral Intentions	.01	.09	.90	.08	.09	.86	.15	.13	1.17
H7: Agent Knowledge → Website Attitudes	.71**	.05	15.01	.76**	.06	13.35	.71**	.05	12.43
H8: Agent Knowledge → Weight Control Behavioral Intentions	.13	.12	1.08	.07	.15	.48	.16	.14	1.17
H9: Persuasion Knowledge → Website Attitudes	-.11	.08	-1.38	-.09	.08	-1.12	.03	.09	.36
H10: Persuasion Knowledge → Weight Control Behavioral Intentions	.12	.09	1.39	.26**	.09	2.78	.22*	.11	2.02
H11: Website Attitudes → Weight Control Behavioral Intentions	.47**	.12	4.01	.30*	.14	2.16	.24	.12	1.89
	χ^2=303.33 R^2 Behavioral Intentions = 38.7% R^2 Website Attitudes = 49.5%			χ^2=316.40 R^2 Behavioral Intentions = 29.0% R^2 Website Attitudes = 55.1%			χ^2=310.50 R^2 Behavioral Intentions = 29.6% R^2 Website Attitudes = 52.9%		

** $p < .01$; * $p < .05$; **Multigroup SEM Model:** $\chi^2 = 930.19$, df = 59, $p = .00$; RMSEA = .06; 90% CI = .05–.07; CFI = .94 TLI = .94; SRMR = .08; N = 369.

Table 6. Multigroup SEM Results with *BMI* as the Grouping Variable

	HEALTHY BMI (n=189)			ABOVE HEALTHY BMI (n=180)		
Hypothesized Relationships	**Std. Loadings**	**SE**	**z-scores**	**Std. Loadings**	**SE**	**z-scores**
H1: Objective Weight Control Knowledge WITH Subjective Weight Control Knowledge	.40**	.06	6.39	.50**	.06	7.87
H2a: Objective Weight Control Knowledge WITH Agent Knowledge	.24**	.07	3.34	.16*	.07	2.19
H2b: Subjective Weight Control Knowledge WITH Agent Knowledge	.10	.08	1.29	-.05	.08	-.63
H3a: Objective Weight Control Knowledge WITH Persuasion Knowledge	.26**	.07	3.64	.14	.08	1.85
H3b: Subjective Weight Control Knowledge WITH Persuasion Knowledge	.21**	.08	2.80	.15	.09	1.78
H4: Agent Knowledge WITH Persuasion Knowledge	.43**	.06	6.64	.32**	.07	4.51
H5a: Objective Weight Control Knowledge → Website Attitudes	.01	.06	.09	.03	.07	.46
H5b Subjective Weight Control Knowledge → Website Attitudes	.05	.06	.44	.08	.07	1.09
H6a: Objective Weight Control Knowledge → Weight Control Behavioral Intentions	.03	.07	.42	.05	.08	.59
H6b: Subjective Weight Control Knowledge → Weight Control Behavioral Intentions	.15*	.07	2.07	-.04	.09	-.39
H7: Agent Knowledge → Website Attitudes	.78**	.04	18.35	.74**	.04	18.13
H8: Agent Knowledge → Weight Control Behavioral Intentions	.24*	.12	1.99	.10	.11	.85
H9: Persuasion Knowledge → Website Attitudes	-.09	.06	-1.43	-.01	.06	-.22
H10: Persuasion Knowledge → Weight Control Behavioral Intentions	.14	.08	1.84	.21**	.07	2.77
H11: Website Attitudes → Weight Control Behavioral Intentions	.25*	.11	2.25	.39**	.11	3.65
	χ^2=321.66 R^2 Behavioral Intentions = 33.7% R^2 Website Attitudes = 57%			χ^2=370.34 R^2 Behavioral Intentions = 32.5% R^2 Website Attitudes = 55.5%		

** $p < .01$; * $p < .05$; **Multigroup SEM Model:** χ^2 = 692.00, df = 385, p = .00; RMSEA = .06; 90% CI = .05–.07; CFI = .95 TLI = .94; SRMR = .06; N = 369.

Appendix: Objective Weight Control Knowledge Instrument

1. A healthy BMI is:
___< 16.5
___16.5 to 18.5
_X_18.5 to 24.9
___25 to 29.9
___30 to 39.9
___40 and above
___Don't know/Not sure

2. The range of a healthy BMI differs from men to women.
___True
_X_False
___Don't know/Not sure

3. The BMI Index is not suitable for people with a very muscular build (e.g., professional sports players)
_X_True
___False
___Don't know/Not sure

4. To stay in good health one should:
___Eat a balanced diet
___Exercise
_XBoth answers above
___None of the answers above
___Don't know/Not sure

5. Adults should be active for:
_X_At least 2 ½ hours every week
___At least 2 hours every week
___Only 10 minutes every day
___As long as they want to lose weight
___Don't know/Not sure

6. The calorie allowance for men and women can vary depending on age and levels of physical activity.
_X_True
___False
___Don't know/Not sure

7. A slow metabolism is the only reason for being overweight.
___True
_X_False
___Don't know/Not sure

8. On average the calorie allowance for men is:
___2000 kcal
_X_2500 kcal
___minimum 2500 kcal
___3000 kcal
___Don't know/Not sure

9. On average the calorie allowance for women is:
___1500 kcal
_X_2000 kcal
___2500 kcal
___minimum 2500 kcal
___Don't know/Not sure

10. Starving myself is NOT the best way to lose weight
_X_True
___False
___Don't know/Not sure

11. Healthy foods are more expensive
___True
_X_False
___Don't know/Not sure

12. Foods labelled 'low fat' or 'reduced fat' are always a healthy choice
___True
_X_False
___Don't know/Not sure

13. Cutting out all snacks CANNOT help you lose weight
___True
_X_False
___Don't know/Not sure

14. Skipping meals is a good way to lose weight
___True
_X_False
___Don't know/Not sure

15. A radical exercise regime is the only way to lose weight
___True
_X_False
___Don't know/Not sure