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Can the Theory of Planned Behavior Predict Dietary Intention and Future Dieting in an Ethnically Diverse Sample of Overweight and Obese Veterans Attending Medical Clinics?

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Abstract

Obesity has become a world-wide epidemic; in the United States (U.S.) approximately two-thirds of adults are classified as overweight or obese. Military veterans' numbers are even higher, with 77% of retired or discharged U.S. veterans falling in these weight categories. One of the most common methods of changing one's weight is through dieting, yet little is known regarding the factors that facilitate successful dieting behavior. The current investigation tested the Theory of Planned Behavior's (TPB) ability to predict dietary intention and future dieting in a sample of 84 overweight and obese patients attending medical clinics at a Veterans Affairs Hospital in the southwestern part of the U.S. Participants primarily were male (92%) and ethnic/racial minorities (58%). Perceived need and anticipated regret were added to the standard TPB model. While the TPB predicted dietary intention, it did not significantly account for improved dietary behaviors. Anticipated regret significantly enhanced the basic TPB's ability to predict intention to diet, while perceived need did not. These findings highlight the difficulty in predicting sustained change in a complex behavior such as dieting to lose weight. The need for more work with older, overweight/obese medical patients attending veterans' facilities is stressed, as is the need for such work with male patients and ethnic minorities in particular.

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Keywords

Theory of Planned Behavior; anticipated regret; weight loss; dieting; veterans

Obesity has been declared a “major global health challenge”, given that rates have increased by 27.5% for adults and 47% for children in the last 33 years (Ng et al., 2014). The U.S. has been identified as having among the highest obesity rates worldwide, as approximately two-thirds of adults are either overweight or obese (CDC, 2011). Some studies report these numbers to be even higher for retired or discharged U.S. military veterans, with estimates of up to 77% falling into these weight categories (Kahwati, Lance, Jones, & Kinsinger, 2011). As obesity prevalence grows, so do its serious comorbid health conditions, including cardiovascular disease, type-2 diabetes, and certain cancers (Chrostowska, Szyndler, Hoffmann, & Narkiewicz, 2013; De Pergola & Silvestris, 2013; Garber, 2012). Importantly, veterans are already prone to increased health risks due to their smoking and drinking histories (Hoerster et al., 2012) and certain demographic characteristics (e.g., lower socioeconomic status), and excess body weight is correlated with an exaggeration of these risks (Calle, Rodriguez, Walker-Thurmond, & Thun, 2003; Thompson, Edelsberg, Colditz, Bird, & Oster, 1999).

It is exceedingly difficult for individuals to maintain the behavior changes associated with weight loss (see Byrne, Cooper, & Fairburn, 2003), and many overweight individuals cite dieting’s poor success rate as a reason for not attempting weight loss in the first place (Powell & Amsbury, 2004). Recognizing the dilemma, in 2006 the Veterans Health Administration launched the MOVE! Weight Management Program for Veterans. Although some early modest MOVE! success was reported (Garvin, Marion, Narsavage, & Finnegan, 2015; Romanova, Liang, Deng, Li, & Heber, 2013), several programs noted that only 5–13% of eligible veterans participated, and women were more likely than men to do so (Jackson et al., 2015; Littman, Boyko, McDonell, & Fihn, 2012). Other weight loss programs for veterans noted limited weight loss as well (Masheb et al., 2015), in addition to high treatment dropout (Skoyen, Rutledge, Wiese, & Woods, 2015). Interestingly, when overweight/obese veterans were surveyed about barriers to weight management, 49% said they could “lose weight when I need to” (Ruelaz et al., 2007). Hence, understanding individuals’ attitudes and perceptions regarding dieting decisions, and whether they follow through with them, could facilitate overweight and obese veteran’s weight loss.

The Theory of Planned Behavior

The Theory of Planned Behavior (TPB; Ajzen, 1991; 2002a) is a widely-used model for predicting health-related behavior intentions and behavior change itself (Ajzen, 2011; Rivis & Sheeran, 2003). The TPB maintains that the intention to perform a behavior is the most important factor in behavioral performance, although perceived behavioral control (i.e., confidence in one’s ability to execute a new behavior) also can directly influence behavior. In turn, intention is influenced by one’s attitude towards the behavior (i.e., the perception of how beneficial or costly the new behavior will be), as well as the perception of the subjective

norm for the behavior (i.e., what significant others would want the individual to do as far as the behavior) and perceived behavioral control (Ajzen, 1991; 2011).

A recent meta-analysis determined that the TPB accounted for 44.3% of the variance in intentions across a variety of health-related behaviors (McEachan, Conner, Taylor, & Lawton, 2011). As is commonly found (e.g., Riebl et al., 2015), the amount of variance accounted for in behavior was considerably less at 19.3%, and was lower than the 27% reported in Armitage and Conner's (2001) meta-analysis. Importantly, McEachan and colleagues argued strongly for the need to control for past ("baseline") behavior when examining the TPB's predictive ability in the applied health behavior field, as they believed it offered more of a contribution to *explaining* improved health behaviors, and to ultimately developing new treatments. A second recent meta-analysis in the health behavior field examined the TPB's ability to predict adherence to treatment recommendations for chronically ill individuals, such as those dealing with diabetes and heart disease (Rich, Brandes, Mullan, & Hagger, 2015). The theory explained 33% of the variance for intention but only 9% for adherence behavior. Conceivably less variance was accounted for in this meta-analysis because these samples of chronically ill individuals were older and likely more socially disadvantaged (Alwan, 2011), thereby having more unexpected barriers to following through with healthy behaviors.

Although the TPB overall has been found to be a useful tool for predicting health behavior intentions, the model has limitations. Since the model leaves approximately 55% – 67% of the variance in *intention* unexplained, and 80% – 91% of the variance in *behavior* unexplained (McEachan et al., 2011; Rich et al., 2015), critics wonder whether the TPB only reliably measures intentions as opposed to actual behavior (Conner, Norman & Bell, 2002; Norman & Conner, 2005; Schwarzer, 2014), or whether it should be retired altogether (Sniehotta, Presseau, & Araújo-Soares, 2014). Many researchers have responded to this issue by adding variables to the basic model in an effort to improve its ability to predict future behavior.

The TPB and Dieting or Healthy Eating

Despite these limits, there *is* support for the TPB's ability to predict dieting and healthy eating. In fact, the recent meta-analysis (McEachan et al., 2011) discovered that diet behaviors were among the TPB's best-predicted behaviors. In terms of a common dieting behavior; increasing fruit/vegetable consumption, a review of 23 studies reported that the TPB is a solid theory for predicting this type of healthy eating (Guillaumie, Godin, & Vezina-Im, 2010). However, the review excluded studies that focused on individuals above age 65; individuals (including veterans; Nelson, 2006) who often suffer from medical problems that might benefit from better diet behaviors.

Relatively few of the TPB studies focused on healthy eating in older or medically-compromised individuals. In the recent meta-analysis that addressed adherence behaviors in chronically-ill individuals (Rich et al., 2015), five studies examined diet as part of the adherence outcome measure. However, the studies included other self-care behaviors, such as glucose monitoring and medication management (diabetes) (Didarloo et al., 2012; Gatt &

Sammut, 2008), thereby making it difficult to tease out the healthy eating component. In a separate study, the TPB predicted increased fruit/vegetable consumption for older African Americans who were participating in a cardiovascular risk-reduction project (O'Neal et al., 2014). Another study discovered that the TPB predicted healthy eating intentions for medical patients recruited from health promotion clinics, *and* that these intentions predicted healthy eating behavior at a six-year follow-up (Conner et al., 2002). Still, intention only explained 9% of the variance in eating behavior. Finally, in another study of medical patients, partial support was found for the TPB (White, Terry, Troup, Rempel, & Norman, 2010) as far as predicting lower fat consumption at the 1-month follow-up. Yet the researchers wondered if participants had been unusually motivated due to their involvement in a healthy behaviors treatment. Although these studies provide some support for the TPB's ability to predict healthier eating in medical patients, researchers report that the standard TPB variables do not provide a complete picture of the mechanisms underlying dietary behavior (Gardner & Hausenblas, 2004; Nejad, Wertheim, & Greenwood, 2004).

Limited TPB work has focused on examining dieting behaviors/healthy eating in individuals who may be at risk for later medical problems as a correlate of their weight status. Schifter and Ajzen's 1985 study used a mixture of overweight and normal weight college students who all desired to lose weight. Although the TPB was moderately successful at predicting weight loss, the theory's predictive ability for their overweight sub-sample was not presented separately. Gardner and Hausenblas (2004) offered overweight women a treatment that targeted diet and exercise. Partial support for the TPB was found in terms of predicting diet adherence, yet the TPB did not predict exercise adherence or diet intention. Similarly, although Godin et al. (2010) found partial support for the TPB in terms of fruit/vegetable intake of overweight/obese individuals, the study was limited to highly educated participants younger than age 55 who already consumed more than the recommended daily fruit/vegetable servings on average at baseline.

Perceived Need and Anticipated Regret

As noted, although the TPB is a robust theory for predicting intention, a large portion of the variance in health behavior often remains unexplained. Among the additional constructs examined in an effort to increase the predictive power of the TPB are perceived need and anticipated regret (e.g., Abraham & Sheeran, 2004; Payne, Jones, & Harris, 2004).

Perceived need

Paisley and Sparks (1998) showed a relationship between perceived need and the expectation of reducing fat intake over six months. Yet "expectation" differed somewhat from the TPB's "intention" construct, and participants' extensive food monitoring prior to completing the TPB questionnaire may have affected their responses. Perceived need also increased the variance explained by the standard TPB as far as intention to eat a low-fat diet and to eat fruits/vegetables (Povey, Conner, Sparks, James, & Shepherd, 2000). Payne and colleagues (2004) determined that perceived need significantly improved the TPB's prediction of intention to eat healthy, but did not predict healthy eating one week later. Overall, perceived need has frequently improved the prediction of intention to eat healthier,

but either has been less successful at predicting healthy eating itself, or has not been used to do so.

Anticipated regret

Anticipated regret can bolster the TPB's efficacy in predicting intention and future behavior (Abraham & Sheeran, 2004; van der Plight & de Vries, 1998). A review of 35 studies that examined predictors of fruit/vegetable intake named anticipated regret as one of the constructs with reasonable support but requiring further study (Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). Additionally, a recent meta-analysis that covered a variety of behaviors similarly concluded that it was worthwhile to include anticipated regret in TPB studies, as it significantly added to the prediction of intentions, and there was a moderate relationship with behavior (Sandberg & Conner, 2008). Godin et al. (2010) determined that the intention-behavior relationship was stronger at higher levels of anticipated regret (over not eating five servings of fruits/vegetables daily) in an overweight/obese sample.

Purpose and Predictions

The current study applied the TPB to a sample of overweight and obese medical patients. As several studies found that the TPB predicted dietary intention in participants who were not selected according to weight or health status, it was believed that the theory would hold predictive ability in an overweight/obese sample. Further, the current investigation was unique as it recruited veterans from a Department of Veterans Affairs (VA) medical facility. When compared to non-VA hospitals, VA hospitals typically treat patients who are of a lower socioeconomic status (SES), have less education, have more health problems, are older, and are more likely to be overweight or obese (Koepsell, Forsberg, & Littman, 2009; Wang et al., 2005), and veterans overall tend to have more health problems than non-veterans (Hoerster et al., 2012; Park, Zhu, Potter, & Kolonel, 2011).

To our knowledge, this is the first study with an overweight/obese sample to examine both perceived need and anticipated regret within the TPB model, and the first to examine this constellation of constructs with military veterans. A 3-month follow-up was conducted to determine whether participants' reported intentions were associated with dietary behavior (while controlling for baseline behavior). At least minimal improvement was anticipated despite the lack of a formal intervention, given the "question-behavior effect" (QBE) which shows that individuals who complete a series of questions about a health-related behavior are more likely to actually change their behavior than individuals who do not answer such questions (Rodrigues, O'Brien, French, Glidewell, & Sniehotta, 2014; Wood et al., 2015). A recent TPB-specific meta-analysis on the mere measurement effect, which is a common name for the QBE, showed that reductions in undesirable health-related behaviors (e.g., sugar snack consumption) in non-intervention studies appeared to be due to the measurement of intention at baseline (Mankarious & Kothe, 2015). Additionally, there is evidence that asking participants to imagine a healthy behavior (as our TPB questionnaire did) has a significant effect on promoting that behavior (Murru & Martin Ginis, 2010). The hypotheses were: (1) the TPB would predict dietary intention and future dietary behavior; and (2) perceived need and anticipated regret would each account for additional variance

above that predicted by the standard TPB model for dietary intention and future dietary behavior.

Materials and Methods

Participants

Data were gathered at the New Mexico Veterans Affair's Health Care System (NMVAHCS). IRB approval was obtained from both the University of New Mexico and the NMVAHCS. Participants were recruited through announcements during patient psychoeducation groups or via mass mailings. Primary care providers permitted a mailing of the study notification letter to their eligible patients. The letters and announcements informed the patients about an ongoing study that was investigating factors that made it easier or harder to lose weight. Patients who called or signed up were screened on the telephone by the principal investigator (PI) according to pre-established criteria: (1) Body Mass Index (BMI; weight in kg/height in meters^2) between 25.0 – 39.9, (2) not homeless, and (3) no preexisting diagnosis of schizophrenia or mental retardation.

Three hundred letters were sent to eligible patients and the study was announced in six psychoeducation groups. A total of 139 patients either signed up during group (36%) or called after receiving letters (64%). Sixteen (11.5%) of these individuals were unable to be reached by phone. Altogether 123 telephone screens were conducted, which resulted in excluding 12 patients (9.7%) who were outside of the weight range (n = 10), homeless (n = 1), or thought disordered (n = 1). The remaining 111 patients were scheduled for an appointment. Seven patients (6.3%) failed to attend the baseline assessment and two patients (1.8%) terminated in session due to discomfort with signing the HIPPA consent form. A total of 102 patients completed the baseline assessment. An additional two participants (1.9%) were removed from the study at that time (N = 100) because it became apparent that they could not comprehend the instructions due to a traumatic brain injury (n = 1) or alcohol intoxication (n = 1). An additional two participants (N = 98) were excluded during the baseline assessment because their weight was above the weight range.

Fourteen participants did not complete the follow-up, thus the final sample consisted of 84; an 86% follow-up rate for the eligible participants. Of the 14 participants who did not attend the follow-up, two were uninterested in participating and 12 neither returned phone calls nor responded to the reminder letter. A series of chi-squares and t-tests were conducted on the baseline demographics to examine whether participants who completed the follow-up differed from those who did not. Groups did not differ in age, gender, ethnicity, marital status, height, weight, or BMI. Only the 84 follow-up participants were used in the following analyses and tables (See Table 1 for demographic variables and sample characteristics).

Materials

Demographics—Participants completed a demographics questionnaire and had their weight and height measured.

Theory of Planned Behavior Questionnaire—Attitudes toward behavior, subjective norm, perceived behavioral control, intention, perceived need, and anticipated regret were

measured in the 'structured' TPB format commonly used in TPB studies and recommended by the TPB author (Ajzen, 2002b). As this study was investigating dietary behavior, the TPB questionnaire was designed around dieting. To control for various perceptions of dieting, participants were told:

> "The following forms ask about dieting. Dieting can mean many different things. For example, people may go on a low salt diet to control their blood pressure or a low carbohydrate diet to control diabetes. These questionnaires are talking about dieting for weight loss. Imagine that you are going to try to lose weight. Would you try to lose weight by making changes in your diet? What sort of changes would you make?"

All items were measured on a 7-point scale. Cronbach's alpha reliability was .87 for the entire measure. The Theory of Planned Behavior Questionnaire was comprised of six scales (see Table 2 for descriptive statistics):

- Attitude toward dieting was calculated as an average of six semantic differential scales: "Dieting during the next three months would be/is". . *bad-good, harmful-beneficial, unpleasant-pleasant, unenjoyable-enjoyable, foolish-wise, unnecessary-necessary*. Cronbach's alpha reliability was .79.
- Subjective norm was examined with one item: "People who are important to me think that I should diet," *unlikely - likely* (Ajzen, 2002b).
- Perceived behavioral control was an average of five items. Examples include: "For me to diet during the next three months would be". . *difficult - easy*; and "I am confident that I could diet" . . *strongly disagree -strongly agree* (Ajzen, 2002b). Cronbach's alpha was .82.
- Intention to diet was an average of three items. An example is: "I intend to diet during the next three months". . *definitely do not - definitely do.* Cronbach's alpha was .93.
- Perceived need was the average of two items: "I need to diet" and "I need to eat more healthfully". . *strongly disagree - strongly agree* (adapted from Payne et al., 2004).
- Anticipated regret was the average of two items: "If I do not diet during the next 3 months, I would feel regret"; "If I do not diet during the next 3 months, I would feel upset"… *very unlikely - very likely* (derived from Sheeran & Orbell, 1999).

Food Frequency Questionnaire (FFQ; Thompson, Byers, & Kohlmeier, 1994)— A slightly revised version of the 63-item FFQ (e.g., "biscuits" became "cookies") was used to compare change in participants' diet between baseline and the 3-month follow-up. Foods are placed into categories, such as dairy, meat, bread, fruits and vegetables, sweets, and beverages. Participants rated the frequency with which they ate food in different food categories during the last week on a 7-point Likert scale (Povey et al., 2000). Separate scores were tallied for the frequency of consumption of healthy foods (e.g., high fiber, produce, foods low in fat) and unhealthy foods (e.g., high fat content, junk food). High scores represented the frequent consumption of healthy foods, and low scores signified the frequent

consumption of unhealthy foods. A composite score was derived from these scores. If the past week was not representative (e.g., vacation, illness), participants were asked to complete the FFQ such that it represented a typical week. In addition, the PI gave participants a calendar of the past week to help them remember any food-related functions (e.g., birthdays). The current study was interested in dietary change, which was defined as the difference between baseline and follow-up FFQ total scores (FFQ total), as well as differences reported on fruit/vegetable consumption (FFQ fruit/veg).

Procedure

To avoid any potential coercion, participants were informed after their appointment had been scheduled by the PI that the study included financial compensation. During this appointment the consent form was discussed and signed. Participants then completed the baseline assessment and weight and height were measured. They were compensated $20 for completing the baseline assessment and were told that they would be contacted in 2 ½ months in order to schedule their 3-month appointment. The follow-up appointment was scheduled on the same day as the participant's 3-month clinic check-up whenever possible. During the follow-up appointment the participants completed the FFQ, and were asked if they had attempted to change their diet during the previous three months. They then were weighed, debriefed, and compensated $30.

Results

Behavioral Changes between Baseline and Follow-up

Paired sample t-tests were conducted to explore the relationship between baseline and follow-up measurements for BMI, FFQ total, and FFQ fruit/veg scores (see Table 2 for mean baseline and follow-up scores). There was no significant change in BMI, $t = -.98$, $p = .331$ or in FFQ fruit/veg scores, $t = -.83$, $p = .410$. There was a significant change in FFQ total scores, $t = -2.59$, $p = .011$, with participants' diets significantly improving during the three months of the study. Because the only significant behavioral change from baseline to follow-up was overall dietary behavior (FFQ total), the BMI and FFQ fruit/veg were omitted from subsequent analyses.

Predicting Dietary Intention

The hypotheses that the TPB would predict intention, and that anticipated regret and perceived need would enhance these predictions, were tested through hierarchical linear regression using mean centered values for each predictor. Regression coefficients for this model can be found in Table 3. Before conducting regression analyses, we examined the correlation between anticipated regret and perceived need variables to determine their degree of overlap. The results showed that they were significantly but modestly correlated at $r = .32$, $p = .003$. Hence, both perceived need and anticipated regret were entered into the analyses.

Consistent with past research (Paisley & Sparks, 1998; Payne et al., 2004), attitude and subjective norm were added in the first step of the regression model. The first step of the model was significant, $F(2, 83) = 22.93$, $p < .001$, accounting for 34.6% of the variance in dietary intention. Attitude was statistically significant, while subjective norm was not. In the

second step, perceived behavioral control was added to the model. This model was significant, $F(3, 83) = 20.28$, $p < .001$, and accounted for 41.1% of the variance in intention, which was significantly more variance than accounted for in the first step ($p = .002$). Perceived behavioral control and attitude were significant predictors of intention, while subjective norm was not statistically significant.

In the third step, anticipated regret and perceived need were both added to the model. This model significantly predicted intention, $F(5, 83) = 18.92$, $p < .001$, and accounted for 51.9% of the variance in intention, which was a significant increase from step two ($p < .001$). Anticipated regret significantly predicted intention, but perceived need did not. Attitudes and perceived behavioral control retained significance, and subjective norms remained non-significant. Thus, anticipated regret, but not perceived need, significantly improved the TPB's ability to predict intention to diet in this sample.

Predicting Future Dietary Behavior

A similar hierarchical regression approach was used to test whether TPB predicted weight loss-related *behaviors* at follow-up. One participant did not complete the FFQ at baseline, and was excluded from analyses. As noted, in a meta-analysis examining the use of the TPB to predict future health-related behavior, McEachan and colleagues (2011) recommended controlling for previous behavior. In the current study, we controlled for baseline/past dietary behavior by including it in each step of the hierarchical regression model. Intention was added in the second step, perceived behavioral control was added in the third step, and perceived need and anticipated regret were added in the fourth step. Regression coefficients for this model can be found in Table 4. The first step of the model was statistically significant, $F(1, 81) = 69.14$, $p < .001$, with baseline dietary behavior accounting for 45.7% of the variance in follow-up dietary behavior. While subsequent steps resulted in significant models, the only statistically significant predictor in each step was baseline dietary behavior, and none of the steps accounted for significantly more variance in follow-up dietary behavior than step one. These findings suggest that the TPB did not add to the prediction of future dietary behavior beyond that already predicted by past behavior.

Conclusions

The purpose of the study was to test the TPB's ability to predict dietary intention and future dietary behavior within a sample of overweight/obese medical patients. In line with expectations, almost 87% of participants reported that they had, in fact, attempted to eat healthier. Unique aspects of this study were that participants were veterans, and the majority of them (58.4%) were ethnic/racial minorities. Unlike most of the TPB studies that examine healthy eating or dieting, the sample was primarily male. Finally, perceived need and anticipated regret were added to the model to explore their contribution to the theory's predictive ability.

Predicting Intention to Diet

The current study's standard TPB model predicted 41.1% of the variance in participants' *intentions* to change their dietary behavior, which is similar to the 44.3% reported by

McEachan et al. (2011) for a variety of health behaviors, and is in line with studies examining diet behavior (Armitage & Conner, 1999; Godin & Kok, 1996). The variance explained by the current study is higher than the 33% reported for intended adherence to complex medical regimens (some of which included dietary changes) for chronically ill individuals (Rich et al., 2015). Moreover, attitude and perceived behavioral control consistently and independently predicted intention in the current study. As expected, anticipated regret significantly improved the standard TPB's ability to predict dietary intention in this sample of overweight/obese adults, and thus bolsters past findings (Abraham & Sheeran, 2003; Sandberg & Conner, 2008). Hence, participants' intentions to diet were partially influenced by their belief that they would experience a negative reaction (e.g., disappointment, guilt) if they failed to do so. Sandberg and Conner (2008) noted that the ability to avoid aversive emotions was a powerful motivator, whereas Ajzen (2011) believed that anticipated affective reactions (e.g., anticipated regret) might add predictive value to the TPB simply because they focus on *in*action as opposed to engaging in a behavior.

The hypothesis that perceived need also would enhance the prediction of dietary intention was not supported. This is in contrast to Payne et al. (2004), who asked participants to *explain* their rating to the perceived need question. Conceivably this request for a justification influenced the relationship between perceived need and intention. Furthermore, the perceived need construct sometimes has been criticized as being an ambiguous term (Payne et al., 2004). Overall, it appears that anticipated regret, but not perceived need, merits inclusion in the TPB when predicting intention of dietary change in an overweight or obese primarily male sample.

Predicting Future Dietary Behavior

The hypotheses for predicting future dietary *behavior* were not supported, which is in line with researchers who have questioned the TPB's intention-behavior gap (e.g., Hagger & Luszczynska, 2014; Kothe, Mullan, & Butow, 2012; Rich et al., 2015; Sniehotta et al., 2014). Although this is in contrast to the results of several studies that *did* find TPB support when examining somewhat similar samples as the current study's, as noted in the Introduction, several of these prior findings require qualification due to factors such as limited generalizability, measurement issues, or having accounted for only small amounts of variance (Conner et al., 2002; Gardner & Hausenblas, 2004; Gatt & Sammut, 2008; Godin et al., 2010; O'Neal et al., 2014). Additionally, the current study controlled for baseline behavior (McEachan et al., 2011), in an effort to determine the TPB's contribution to predicting future dieting above and beyond what typically can be predicted simply from knowing an individual's past eating behavior.

Importantly, several specific demographic differences might account for the discrepancy between the current results and those studies that predicted dietary behavior. In particular, each of the prior studies had at least a majority of female participants, whereas the current study had a predominately male sample (92%). Participants in the current study also had the highest BMI (32.1) of those reported, as well as the greatest representation of participants of Hispanic ethnicity (50%) relative to those studies that reported their ethnic/racial

composition. Thus, one may wonder whether the TPB's predictive ability for dieting is influenced by sample demographics. Finally, the current study did not contain a formal intervention that might have influenced the findings about dieting behavior, whereas all but one study (Godin et al., 2010) either entailed treatment or involvement in health promotion clinics.

In addition to these considerations, it is conceivable that the lack of evidence for the intention-behavior relationship in the current study was influenced by the time interval between assessments (Ajzen, 2011; Ajzen & Fishbein, 1980; Kothe & Mullan, 2015; McEachan et al., 2011). Brenes, Strube, and Storandt (1998) found that the TPB predicted fat intake at the 1-month but not the 3-month follow-up. Such findings coincide with evidence suggesting that weight loss attempts frequently last 4–6 weeks (Williamson, Sedula, & Anda, 1992). As noted, most of the current study's participants *had* attempted to change their diets, and their slightly (but significantly) improved FFQ total scores *did* suggest they were eating healthier at follow-up. Nonetheless, this improvement was neither maintained nor associated with weight loss, and the behavior was not explained by the TPB. Potentially a weak intention-behavior relationship can be explained by the underestimation of barriers to change (DiBonaventura & Chapman, 2008). Also, the TPB may be more limited at predicting multifaceted, complex health behaviors (Rich et al., 2015), such as sustained dietary behavior improvement (Dunn, Mohr, Wilson, & Wittert, 2011).

Possibly the current sample's efforts to modify their diets (and for the TPB to predict actual behavior) were affected by participants' veteran status. It has been suggested that the external motivation to maintain a healthy weight during active duty interferes with establishing an internal motivation for weight management upon discharge (Almond, Kahwati, Kinsinger, & Porterfield, 2008). Focus groups consisting primarily of overweight or obese (87.5%) male veterans were conducted about the manner in which military service eating influenced post-service eating habits and weight. One representative theme was that military personnel developed a routine of eating fast and excessively when food was available, both due to food insecurity and because such behaviors were associated with survival in combat (Smith, Klosterbuer, & Levine, 2009). There was speculation that many veterans' strong preference for sweets grew from their habit of dealing with chronic stress or depression by overeating foods high in carbohydrates or fat (Wansink, Cheney, & Chan, 2003).

Limitations and Strengths

The correlational nature of the design was limiting, as other researchers have stressed the need for experimental designs to test the relationship between intention and behaviors (Rhodes & Dickau, 2012; Shaikh et al., 2008). Additionally, the ability to generalize findings is limited by the current study's low representation of female veterans and the restricted age range. In terms of strengths, this is one of the few TPB studies to examine dietary behavior intention and future dieting behavior in an overweight/obese sample of older patients (primarily males) attending VA medical clinics. Weight loss is particularly difficult for older populations because of the physiological changes that effect metabolism (Janssen & Ross, 2005) as well as exercise ability (Rosqvist et al., 2009). In fact, 18.4% of

the current study participants reported that they were physically incapable of exercising. Furthermore, this study was unique inasmuch as the majority of the participants were ethnic/racial minorities.

Future Directions

Small improvements in healthy eating were detected in the current study with no "intervention" other than the possible question-behavior/mere measurement effect. Conceivably these improvements would have been more pronounced had the participants been able to maintain the dietary changes the vast majority reported making. Thus, in the future it might be useful to assess participants earlier and more often post-baseline, so that the progress of any improvements can be tracked, and barriers to further progress can be identified and addressed. Additionally, such assessments would determine whether the TPB's predictive ability is, in fact, dependent upon the length of the delay between the assessment of intention and the future behavior of interest (McEachan et al., 2011). It also might be worthwhile to further test the TPB's ability to predict a more objective indicator of sustained successful dieting, such as weight loss maintenance or improvements in other health indicators (sugar levels, cholesterol), given the inconsistent findings regarding the theory's ability to predict objective versus self-report outcome variables (Armitage & Conner, 2001; McEachan et al., 2011; Rich et al., 2015).

Examining the indirect influence of the sample's demographic characteristics (Ajzen, 2011) and environmental factors could also prove worthwhile (Rich et al., 2015). For example, a recent TPB study with pregnant Latino women determined that women with higher baseline social support showed greater improvement in healthy eating (Shah, Keiffer, Choi, Schuman, & Heisler, 2015). Given the gravity of the obesity challenge worldwide, it is important to continue investigating factors involved in the initiation and maintenance of weight loss behaviors, with some additional focus on older medical patients, military veterans, males, ethnic/racial minorities (or all of the above) as priorities.

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Table 1

Sample Characteristics for Participants Available for Follow-Up (n =84)

	M	*SD*
Age (years)	61.01	10.66
Height (inches)	68.56	3.26
Weight (pounds)	216.12	37.10
Gender n (%)		
Female	7 (8.3)	
Male	77 (91.7)	
Ethnicity n (%)		
White	35 (41.7)	
Hispanic	42 (50.0)	
Native American	1 (1.2)	
African American	4 (4.8)	
Biracial	2 (2.4)	
Marital Status n (%)		
Single	9 (10.7)	
Married	51 (60.7)	
Divorced	19 (22.6)	
Widowed	5 (6.0)	

Note: Body Mass Index = (weight in kilograms/height in meters^2)

Table 2

Study Variable Means and Standard Deviations (n = 84)

	Baseline		Follow-up	
	M	***SD***	***M***	***SD***
Body Mass Index	32.16	3.96	32.29	4.18
FFQ total	74.59	19.65	79.55	20.18
FFQ fruit/veg	14.01	5.56	14.48	5.30
Theory of Planned Behavior (TPB)				
Attitude	4.55	1.13		
Subjective Norm	5.08	0.82		
Perceived Behavioral Control	4.21	1.27		
Perceived Need	5.15	1.10		
Anticipated Regret	4.43	1.64		

Note: FFQ = Food Frequency Questionnaire.

Table 3

Regression Analyses for TPB Variables as Predictors of Dietary Intention

	Step 1			Step 2			Step 3		
	R^2	β	*p*	R^2	β	*p*	R^2	β	*p*
Dietary Intention	.346			.411			.519		
Attitude		.625	<.001		.500	<.001		.335	.001
Subjective Norm		−.171	.067		−.150	.092		−.113	.163
Perceived Behavioral Control					.292	.002		.353	<.001
Perceived Need								.052	.540
Anticipated Regret								.351	<.001

Note: TPB = Theory of Planned Behavior

Table 4

Regression Analyses for TPB Variables as Predictors of Future Dietary Behavior

	Step 1			Step 2			Step 3			Step 4		
	R^2	β	*p*	R^2	β	*p*	R^2	β	*p*	R^2	β	*p*
FFQ at follow-up	.457			.450			.445			.449		
FFQ at baseline		.681	<.001		.676	<.001		.698	<.001		.651	<.001
Intention					.015	.866		.031	.741		.013	.906
Perceived Behavioral Control								−.049	.652		.018	.878
Perceived Need											−.137	.151
Anticipated Regret											.101	.319

Note: TPB = Theory of Planned Behavior; FFQ = Food Frequency Questionnaire.