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Do ethnicity and gender matter when using the theory of planned behavior to understand fruit and vegetable consumption?

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Abstract

A majority of Americans do not meet the recommendation to eat five servings of fruits and vegetables per day (5-A-Day). The purpose of the present study was to examine the utility of the theory of planned behavior (TPB) for understanding 5-A-Day intentions and behavior and to determine whether any of the TPB relationships were moderated by ethnicity or gender. A total of 413 participants completed a baseline TPB questionnaire and a fruit and vegetable consumption measure 2 weeks later. Path analyses showed that affective attitude and perceived behavioral control significantly predicted intention for blacks, whites, males and females (R^2 ranged from .32 to .40), whereas subjective norm was a significant predictor for blacks, males, and females only. Intention significantly predicted 5-A-Day (R^2 ranged from .17 to .22) for all groups. Follow-up invariance analyses showed that the subjective norm/intention relationship was significantly stronger for black compared to white students. Finally, several key beliefs were identified for all four demographic groups. Therefore, the current results suggest that the TPB may be a useful framework to utilize when developing 5-A-Day interventions.

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Keywords

5-A-Day; Theory of planned behavior; Ethnicity; Gender

Introduction

Low fruit and vegetable consumption has been identified as a significant risk factor for negative health consequences (World Health Organization, 2007). Unfortunately, up to 77% of Americans fail to consume the recommended five servings of fruits and vegetables per day (5-A-Day) (National Centre for Chronic Disease Prevention and Health Promotion, 2007) suggesting the need for interventions. Therefore, it is important that studies attempt to identify the key correlates of 5-A-Day that can be subsequently used to inform intervention development (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Blanchard et al., in press).

The stages of change (Beech, Rice, Myers, Johnson, & Nicklas, 1999; Cullen, Bartholomew, Parcel, & Koehly, 1998) and social cognitive theory (Baranowski et al., 2000; Resnicow et al., 1997) have been used to understand fruit and vegetable consumption in various populations, however, the theory of planned behavior (TPB) (Ajzen, 1991) has received significant attention more recently (Blanchard et al., in press; Bogers, Brug, van Assema, & Dagnelie, 2004; Brug, de Vet, de Nooijer, & Verplanken, 2006; Conner, Norman, & Bell, 2002; Kvaavik, Lien, Tell, & Klepp, 2005; Povey, Conner, Sparks, James, & Shepherd, 2000). According to the TPB (Ajzen, 1991), a central predictor of behavior is an individual's intention to perform the behavior. Behavioral intention, in turn, is predicted by attitudes toward the behavior (i.e., affective and instrumental evaluations of performing the behavior); subjective norms (i.e., perceived social pressure to perform a behavior or not); and perceived behavioral control (PBC) (i.e., the perceived ease or difficulty of performing the behavior). Furthermore, each of these three major variables reflects a set of underlying accessible beliefs, which are behavioral beliefs (i.e., the perceive advantages and disadvantages of performing a behavior) in the case of attitudes; normative beliefs (i.e., perceptions of the extent to which significant others want the person to perform the behavior) for subjective norm, and control beliefs (i.e., the perceived barriers and facilitators of engaging in a behavior) for PBC (Ajzen, 1991).

To date, research has shown that 31–52% of the variance in intention to eat fruits and vegetables has been accounted for by the significant and unique contributions of attitudes, subjective norm, and PBC (Blanchard et al., in press; Bogers et al., 2004; Brug et al., 2006; Conner et al., 2002; Kvaavik et al., 2005; Lien, Lytle, & Komro, 2002; Povey et al., 2000; Sjoberg, Kyungwon, & Reicks, 2004). Furthermore, intention (Blanchard et al., in press; Brug et al., 2006; Conner et al., 2002), PBC (Bogers et al., 2004; Kvaavik et al., 2005), or both (Lien et al., 2002; Povey et al., 2000; Sjoberg et al., 2004) have been found to be significant predictors of fruit and vegetable consumption and explained up to 39.5% of the variance in this behavior. Therefore, the TPB appears to be a viable theoretical framework to utilize when examining fruit and vegetable consumption.

Although these preliminary findings are promising, there are limitations that need to be considered. First, only two studies (Blanchard et al., in press; Povey et al., 2000) have focused on the 5-A-Day recommendation and the results have been mixed. Specifically, although attitudes, PBC, and intention were significant predictors in both studies, the role of subjective norm in explaining 5-A-Day intentions was not (i.e., it was a significant predictor in one study and not the other). Therefore, clarifying subjective norm's role within the 5-A-Day domain is needed. Second, the two aforementioned 5-A-Day studies used different attitudinal approaches. In particular, Povey et al. (2000) used a unidimensional measure of attitude, whereas Blanchard et al. (in press) differentiated affective (e.g., eating five servings of fruits and vegetables per day is enjoyable) vs. instrumental (e.g., eating five servings of fruits and vegetables per day is beneficial) attitude and showed that the affective component was the only attitudinal predictor of intention. Given that Blanchard et al. (in press) is the only 5-A-Day TPB study to examine this issue, however, it would be premature to conclude that instrumental attitude be ignored within the 5-A-Day domain until replication is established over longer time intervals (i.e., greater than the 1-week time interval used by Blanchard et al., in press). Third, only one study (Blanchard et al., in press) examined whether the TPB is invariant by ethnicity and/or gender from a 5-A-Day perspective over a 1-week time interval and showed that it was (i.e., none of the TPB relationships were moderated by ethnicity or gender). However, one study is not sufficient to argue for ethnic and/or gender invariance from a 5-A-Day perspective, particularly when previous studies examining the ethnic/gender issue for fruit and vegetable consumption in general have been inconclusive (Kvaavik et al., 2005; Lien et al., 2002; Weber Cullen et al., 2002). Finally, a fourth limitation is that no 5-A-Day or fruit and vegetable consumption studies in general have examined the association of the behavioral, normative, or control beliefs with behavior and whether these relationships are moderated by ethnicity or gender. Importantly, Sutton (2002) has suggested that the most important belief relationship to establish within the TPB is with behavior; otherwise, the inclusion of such a belief in an intervention would be futile. Given that 5-A-Day interventions need to be potentially tailored to the needs of various ethnic/gender groups simultaneously, examining this issue is of utmost importance.

The present study had two main purposes. The first purpose was to determine whether the TPB explained significant variation in 5-A-Day intentions and behavior over a 2-week period within ethnic and gender categories and whether any of these relationships were moderated by ethnicity or gender. It was hypothesized that affective attitudes and PBC would significantly predict intention for all groups, whereas subjective norm would not. Additionally, it was hypothesized that intention would significantly predict 5-A-Day behavior. In all cases, it was hypothesized that the TPB relationships would be invariant by ethnicity and gender (Blanchard et al., in press). The second purpose was to examine the relationships between 5-A-Day and the behavioral, normative, and control beliefs for the total sample and within ethnic and gender categories and whether any of these relationships were moderated by ethnicity or gender. Given the infancy of this question, the role of ethnicity and gender in moderating the beliefs/5-A-Day relationships was considered exploratory.

Methods

Participants

The demographic breakdown for the total sample ($N = 413$) and by ethnicity and gender can be found in Table 1. Briefly, for the total sample and ethnic/gender breakdowns, it can be seen that the average age was approximately 20 years old with the majority of students being normal weight, living in a dorm, and living with friends, whereas a small to moderately large percentage were freshmen.

Procedure

Students were recruited from three universities located in a major city in the United States. Ethical approval was obtained from the institutional review boards of all universities. The TPB questionnaire was administered following a standardized procedure. Specifically, at the beginning of an undergraduate health or fitness class, one of the study investigators explained the study and informed the students orally and in writing that they were not required to participate, obtained written consent, and implemented the TPB questionnaire. Students who chose not participate were asked to read silently until all students completed the questionnaire. Because 90% of the student body in these classes was black or white, the questionnaires were administered to all of the students given the minimal cost and to avoid any uneasiness between the minority students not included and the other students/class instructors. Upon completion of the questionnaire in the particular class the student was recruited from, they were given an American Cancer Society t-shirt. Two weeks later, students were given a one-page questionnaire in the same class they were recruited from that measured the past 2 weeks' fruit and vegetable consumption, after which they were given a $10.00 grocery coupon. In order to ensure the students' anonymity and allow the researchers to match the time one and time two questionnaires, the last four digits of the students' social security numbers were used. All data were collected within the same 2-week time period at both universities.

Measures

Demographics were assessed by self-report and consisted of age, gender, ethnicity, height, weight, residence (on or off campus), employment status, and year of school.

Prior to completing the TPB questionnaire, students were provided numerous examples of a serving size for a fruit (e.g., 1 medium piece of fruit, 1/2 cup of fruit salad, etc.) and vegetable (e.g., 1 medium carrot or other fresh vegetable, 1/2 cup of fresh or cooked vegetables, etc.) and any ambiguities were clarified.

Attitude

Affective attitude was measured by two items modified from a previous 5-A-Day TPB study (Blanchard et al., in press) rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The items were, "During the next 2 weeks, it will be (a) extremely enjoyable and (b) extremely boring to eat five servings of fruits and vegetables each day". For instrumental attitude, the two modified items were (a) extremely bad and (b) extremely beneficial and

used the same stem and scale. Internal reliability was good for the affective (α = .69) and instrumental (α = .69) scales (Cronbach, 1951).

Subjective norm was measured by two items modified from a previous study (Blanchard et al., in press) and were rated on scales that ranged from 1 (strongly disagree) to 5 (strongly agree). The items were: "During the next 2 weeks, most people who are important to me definitely (a) think I should, and (b) want me to eat five servings of fruits and vegetables each day". Internal reliability was good (α = .80) (Cronbach, 1951).

Perceived behavioral control was measured by four items that were modified from a previous study (Blanchard et al., in press) and were rated on a 1 (strongly disagree) to 5 (strongly agree) scale. The items were, "During the next 2 weeks, if I wanted to, (a) I am completely confident that I could…, (b) I am in complete control as to whether or not I…, (c) it would be extremely easy for me to, and (4) it is completely up to me to eat five servings of fruits and vegetables each day". Internal reliability was good (α = .80) (Cronbach, 1951).

Intention was assessed by two items modified from previous research (Blanchard et al., in press). The items were: (1) "During the next 2 weeks, I definitely intend to eat five servings of fruits and vegetables each day" rated on a scale from 1 (strongly disagree) to 5 (strongly agree), and (2) "During the next 2 weeks, I definitely intend to eat five servings of fruits and vegetables (insert a number from 0 to 7) ____ days per week. Given the different scaling formats, the items were converted to *z*-scores prior to aggregation. Internal reliability was good (α = .71) (Cronbach, 1951).

Fruit and vegetable consumption was measured by two items validated by Prochaska and Sallis (2005). Specifically, students were provided examples of a serving size for fruit and were asked, "Over the past 2 weeks, I had (insert a number) ____ servings of fruit in a typical day". Next, they were provided with serving size examples for vegetables and were asked, "Over the past 2 weeks, I had (insert a number) ____ servings of vegetables in a typical day". The two items were then summed to form a total fruit and vegetable score. Internal reliability was good (α = .91) (Cronbach, 1951).

Behavioral/normative/control beliefs

The underlying accessible beliefs were generated via pilot work in 75 ethnically diverse college students using the procedure outlined by Ajzen (2001). The beliefs can be seen in Table 2. The behavioural beliefs were preceded by the statement, "During the next 2 weeks, if I eat five servings of fruits and vegetables each day, it will definitely…" rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The normative beliefs were preceded by the statement, "During the next 2 weeks, the following people definitely think I should eat five servings of fruits and vegetables each day," rated on the same 5-point scale. Finally, the control beliefs were preceded by the statement, "During the next 2 weeks, it will be extremely easy for me to eat five servings of fruits and vegetables each day, even if…" rated on the same 5-point scale.

Analytical strategy

Preliminary analyses were conducted to determine the pattern of missingness using the SPSS missing value analysis. Next, zero-order correlations between the demographics and 5-A-Day were performed. Those demographics that were significantly correlated to 5-A-Day were then correlated to the TPB predictors of interest to determine whether they were potential confounders in the main analyses. Once determined, TPB means and standard deviations adjusted for the potential confounders and ethnicity (for gender analyses) or gender (for ethnicity analyses) were calculated in addition to partial correlations among the TPB constructs and one-way ANCOVAs to examine ethnic and gender differences across the TPB constructs. Path analyses were then conducted using maximum likelihood procedures in LISREL 8.8. The comparative fit index (CFI) and incremental fit index (IFI) were used to determine the adequacy of model fit, which had a model acceptability cut point of >0.94 (Hu & Bentler, 1999). The first path analysis tested the TPB separately for black and white students (see Fig. 1a). To determine whether the TPB relationships were moderated by ethnicity, the structural coefficients were subjected to an invariance analysis (Byrne, Shavelson, & Muthen, 1989). For example, an unconstrained model (e.g., the baseline structural coefficients for black and white students) was compared to a model that constrained the structural coefficients to be equal between groups. To determine moderation, the change in χ^2 and CFI was used (i.e., a CFI change > .01 is recommended to reject the invariant null hypothesis and argue for moderation) (Cheung & Rensvold, 2002). The same path analytical approach was then used for gender. Finally, in order to identify critical beliefs associated with 5-A-Day for the total sample and by ethnicity/gender, a series of multiple regression analyses were performed where 5-A-Day was regressed onto each belief controlling for potential demographic confounders and gender/ethnicity for the total sample. The same analysis was then used within each ethnic (controlling for gender) and gender (controlling for ethnicity) category. The unstandardized betas between the ethnic (i.e., black vs. white belief betas) and gender (i.e., male vs. female belief betas) categories were then statistically compared using the procedure suggested by Baron and Kenny (1986) for dichotomous moderators.

Results

Out of 510 eligible students, 473 agreed to participate (i.e., 92.7%). Of the 473 students recruited, 35 Asian and 25 Hispanic students were excluded from the analyses given the purpose of the current paper and the small sample sizes for these two ethnic groups. Although complete data were available at baseline (N = 413), 104 did not complete the 2-week fruit and vegetable assessment due to non-attendance at follow-up. The missing value analysis showed that the follow-up fruit and vegetable assessment was missing at random (i.e., the probability of missing a 5-A-Day data point was not related to its particular value, but was dependent upon other variables in the model) (Allison, 2002). Unfortunately, using listwise deletion when one has data missing at random may lead to biased estimates. Therefore, missing values were imputed using the expectation maximization algorithm (Allison, 2002) in SPSS 14. The zero-order correlations showed that BMI was significantly correlated to 5-A-Day (r = .19) and intention (r = .12) and was thus controlled for in subsequent analyses. The descriptives and partial correlations among the TPB constructs by

ethnicity/gender are presented in Table 1. Further, the one-way ANCOVAs showed that whites had significantly higher instrumental attitudes $F(1,409) = 19.67$, $p < .001$, PBC $F(1,409) = 4.09$, $p < .05$, and intentions $F(1,409) = 18.53$, $p < .01$ compared to blacks. For gender, females had significantly higher instrumental attitudes $F(1,409) = 14.23$, $p < .001$, subjective norms $F(1,409) = 3.95$, $p < .05$, and intentions $F(1,409) = 10.05$, $p < .01$ compared to males.

In terms of the path analyses, Fig. 1a and b showed that 32–40% of the variance was explained in intention across the ethnic and gender-based models with affective attitude and PBC being the significant predictors in all models. However, subjective norm significantly predicted intention for males, females, and blacks, but not whites. Nonetheless, intention significantly predicted fruit and vegetable consumption in all models and accounted for 18–24% of the fruit and vegetable variability. The invariance analyses showed that the unconstrained and constrained models had CFIs and IFIs of .97 for ethnicity ($\Delta\chi^2(7) = 8.50$, $p > .05$) and .94 for gender ($\Delta\chi^2(7) = 3.26$, $p > .05$) suggesting the TPB was invariant by ethnicity and gender. Furthermore, although examination of the individual subjective norm/intention relationship was variant by ethnicity ($\Delta\chi^2(1) = 4.93$, $p < .05$) according to the χ^2-test, it was not based on the change in CFI/IFI (i.e., it was stable at .97 for both models).

Finally, the belief analyses identified several common beliefs associated with 5-A-Day (see Table 3) consumption for the total sample and across ethnic and gender groups. However, although there were several ethnic and gender-specific beliefs associated with 5-A-Day (i.e., statistically significant for one ethnic and/or gender group, but not the other), particularly concerning the behavioral and normative beliefs, only the significant other (i.e., normative belief)/5-A-Day relationship was statistically moderated by gender (i.e., the relationship was significantly stronger for females compared to males).

Discussion

The first purpose of this study was to determine whether the TPB explained intentions and consumption of five servings of fruits and vegetables per day over a 2-week period. The hypothesis that affective attitude and PBC would be the dominant predictors of intention was supported in addition to the fact that intention significantly predicted 5-A-Day behavior. Furthermore, all of these relationships were invariant by ethnicity and gender. These findings are in line with previous 5-A-Day studies (Blanchard et al., in press; Povey et al., 2000). Of note is the fact that a multicomponent measure of attitude (i.e., by differentiating affective and instrumental attitude) may be preferable when considering 5-A-Day behavior as the instrumental component did not appear to play a role in explaining 5-A-Day intentions in the current or previous study (Blanchard et al., in press), which is actually consistent with an emerging physical activity literature (Blanchard et al., 2003; Rhodes & Blanchard, 2006; Rhodes, Blanchard, & Matheson, 2006). As such, reinforcing the affective component of attitude and perceptions of control over eating five servings of fruits and vegetables per day may be key intervention targets if the goal is to change an intention to eat five servings of fruits and vegetables per day regardless of ethnicity and gender.

Interestingly, subjective norm significantly predicted intention for blacks, males, and females, whereas it did not for whites and this ethnic difference was found to be statistically significant in the individual invariance analyses. The ethnic difference may not be surprising, however, as it has been reported in the physical activity literature (Blanchard et al., 2008). Ashing-Giwa (1999) has suggested the importance of capturing the interconnectedness within the black community that will likely influence health behaviors and she argues that subjective norm may partially tap into this construct. Nonetheless, the role of subjective remains inconsistent across 5-A-Day studies as it was not found to be a significant predictor in our previous study in a similar sample (Blanchard et al., in press), but it was in a community-based sample (Povey et al., 2000). Therefore, further research is warranted pertaining to this construct from a 5-A-Day perspective.

The second purpose of the present study was to examine the associations between the underlying accessible beliefs and 5-A-Day behavior and whether any of these relationships were moderated by ethnicity or gender. In terms of the behavioral beliefs, although various belief/5-A-Day relationships were statistically significant for a given ethnic- and/or gender group, the moderating analyses showed that none of these relationships were significantly moderated by ethnicity or gender. This suggests that a generic behavioral belief 5-A-Day intervention may be warranted. Fortunately, all five behavioral beliefs were significantly related to 5-A-Day behavior and therefore could be potential targets in future interventions. An interesting point worth noting is that affective attitude was the sole predictor of attention (i.e., instrumental attitude did not predict intention), whereas the underlying behavioral beliefs related to behavior were instrumental in nature. Therefore, it will be important that future studies attempt to generate affective behavioral beliefs to further inform intervention development.

With respect to the normative beliefs, all five ethnic analyses showed that the belief/5-A-Day behavior relationships were similar for blacks and whites. Therefore, utilizing perceived social pressure from family, friends, significant others, and professors/coaches is warranted regardless of ethnicity. On the other hand, the significant other/5-A-Day relationship was significantly stronger for females compared to males suggesting the potential need to tailor this source of perceived social pressure to females in an intervention. However, based on the fact that subjective norm was a significant predictor of intention for males, the lack of correlation between the normative beliefs/5-A-Day was surprising. In other words, although subjective norm significantly predicted intention for males in the global model, the beliefs utilized in the current study do not provide further direction from an intervention standpoint. Therefore, it will be important that future studies attempt to replicate the current finding and/or expand the current normative beliefs to better capture potential intervention targets.

In terms of the key control beliefs, none of the belief/5-A-Day relationships were moderated by ethnicity or gender, however, all of the beliefs were significantly related to 5-A-Day behavior. Therefore, strategies to overcome these barriers should include individual (i.e., tailored to individual demographic groups) and policy-level (i.e., common to all demographic groups) interventions. For example, creating educational materials pertaining to 5-A-Day barriers in addition to increasing the variety of fruits and vegetables served in university cafeterias and providing greater access across campus are individual and policy-

level interventions that could be considered. Given that the control beliefs had the most consistent and strongest relationships with 5-A-Day behavior, it will be crucial to optimize these beliefs in any future intervention while taking the ethnic and gender differences into account.

Despite the inherent strengths of the current study (i.e., examining the moderating role of gender and ethnicity, belief-based analyses), there are limitations that need to be considered. First, there may have been a selection bias in the sample due to the convenience sampling of fitness and health classes that future studies should correct for via random selection of students. Second, the 5-A-Day measure, although validated, will likely lead to an over- or under-estimation of actual fruit and vegetable consumption. Future studies will want to utilize 7-day dietary records if possible. Third, future studies should recruit larger numbers of various ethnic groups and males/females to examine potential interactional influences of these variables on the TPB relationships. Fourth, although a short-term (i.e., 2-week) time interval was used, longer term time intervals (e.g., 6 months to 1 year) should be considered in future studies. Finally, the average fruit and vegetable consumption hovered around five servings per day for all demographic groups. Therefore, it will be important to recruit a more heterogeneous group of participants to get a better understanding of the TPB's role in explaining 5-A-day behavior from multiple perspectives (e.g., for those who are and are not meeting the 5-A-Day recommendation).

In lieu of the above limitations, the present study demonstrated that affective attitudes and perceived behavioral control are significant predictors of 5-A-Day intention regardless of ethnicity and gender, whereas the role of subjective norm is less clear from an ethnic perspective. Nonetheless, it will be very important that interventions target the affective or enjoyment component of eating 5-A-Day and the control issues (e.g., barriers) that prevent individuals from doing it. Furthermore, the perceived social pressure to meet the 5-A-Day guideline should be considered for blacks, males, and females. Importantly, 5-A-Day interventions should include behavioral, normative, and control beliefs that are common to blacks, whites, males, and females. Given the novelty of the current findings, replication is warranted before any firm conclusions can be drawn.

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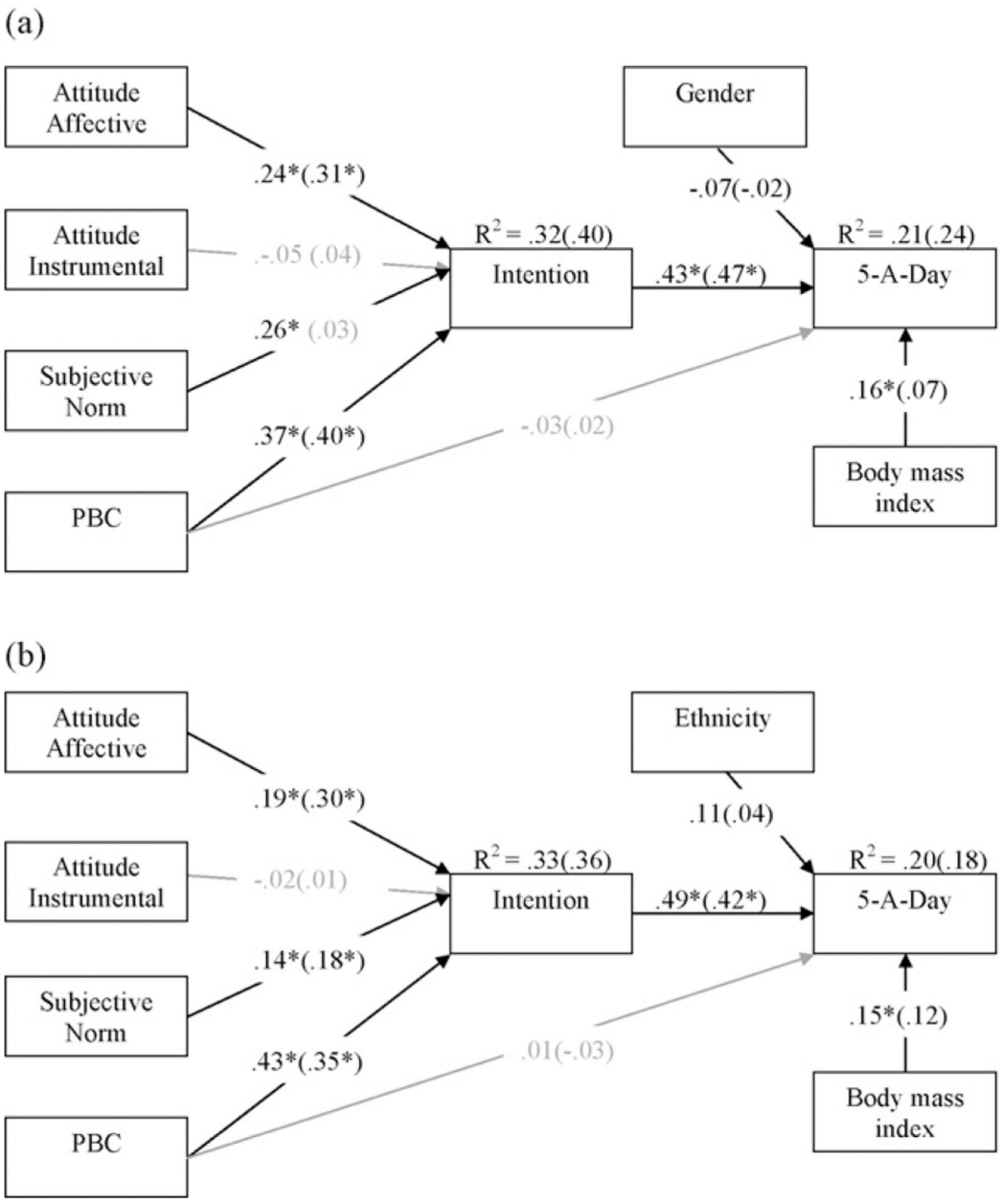

Fig. 1.

(a) Theory of planned behavior structural coefficients for the black/white students. *Note*. *p < .05; black structural coefficients (white structural coefficients are in parentheses). R^2 = variance explained. (b) Theory of planned behavior structural coefficients for the male/female students. *Note*. *p < .05; male structural coefficients (female structural coefficients are in parentheses). R^2 = variance explained.

Table 1

Demographic breakdown for the total sample and by ethnicity and gender

Construct	Mean	S.D.	Percentage
Total sample (N = 413)			
1. Age	20.36	3.32	–
2. Normal weight	–	–	66.3
3. Live in a dorm	–	–	45.5
4. Live with friends	–	–	67.2
5. Freshmen	–	–	29.9
6. Employed	–	–	42.9
Blacks (n = 237)			
1. Age	20.20	2.77	–
2. Normal weight	–	–	58.3
3. Live in a dorm	–	–	59.1
4. Live with friends	–	–	63.2
5. Freshmen	–	–	21.2
6. Employed	–	–	38.7
Whites (n = 176)			
1. Age	20.57	3.94	–
2. Normal weight	–	–	77.0
3. Live in a dorm	–	–	54.0
4. Live with friends	–	–	72.4
5. Freshmen	–	–	41.5
6. Employed	–	–	39.2
Males (n = 178)			
1. Age	20.36	3.59	–
2. Normal weight	–	–	64.4
3. Live in a dorm	–	–	54.5
4. Live with friends	–	–	73.1
5. Freshmen	–	–	34.3
6. Employed	–	–	42.1
Females (n = 235)			
1. Age	20.37	3.10	–
2. Normal weight	–	–	67.7
3. Live in a dorm	–	–	40.4
4. Live with friends	–	–	62.6
5. Freshmen	–	–	26.5
6. Employed	–	–	43.4

Note. S.D.: standard deviation; Normal weight = body mass index ≥ 18.5 and <25.

Table 2

Descriptives and zero-order correlations among the theory of planned behavior model constructs by ethnicity and gender

Construct	2	3	4	5	6	Mean	S.D.
Blacks[a]							
1. Attitude—affective	.46***	.20**	.37***	.43***	.10	3.95	.77
2. Attitude—instrumental		.32***	.22***	.21**	−.02	4.81	.55
3. Subjective norm			.01	.29**	.06	3.91	.91
4. PBC				.45***	.17**	3.78	.86
5. Intention					.42***	3.61	1.21
6. 5-A-Day					–	4.96	2.73
Whites[a]							
1. Attitude—affective	.29***	.18**	.48***	.48***	.21**	3.95	.81
2. Attitude—instrumental		.37***	.32***	.24***	.17**	4.58	.38
3. Subjective norm			.12	.14	.02	4.05	.77
4. PBC				.55***	.27***	3.96	.77
5. Intention					.47***	4.17	1.33
6. 5-A-Day					–	5.17	2.05
Males[b]							
1. Attitude—affective	.40***	.24**	.41***	.42***	.10	3.86	.78
2. Attitude—instrumental		.35***	.26***	.21**	.08	4.57	.56
3. Subjective norm			.11	.23**	.03	3.87	.83
4. PBC				.52***	.27**	3.85	.84
5. Intention					.50***	3.62	1.29
6. 5-A-Day					–	4.96	2.45
Females[b]							
1. Attitude—affective	.38***	.15**	.42***	.48***	.17**	4.02	.77
2. Attitude—instrumental		.33***	.23***	.22***	−.02	4.76	.42

Construct	2	3	4	5	6	Mean	S.D.
3. Subjective norm			.01	.23***	.06	4.05	.84
4. PBC				.47***	.15*	3.86	.81
5. Intention					.38***	4.03	1.26
6. 5-A-Day					–	5.13	2.59

*$p < .05$;

**$p < .01$;

***$p < .001$.

[a]Correlations and means adjusted for gender and body mass index.

[b]Correlations and means adjusted for ethnicity and body mass index.

Table 3

Results from multiple regression analyses regressing 5-A-Day onto each belief by ethnicity, gender, and the total sample

Belief	Correlation to 5-A-Day				
	Blacks[a]	White[a]	Males[b]	Females[b]	Total sample[c]
Behavioral					
Health	.10	.17*	.18**	.09	.13*
Vitamins and minerals	.09	.13	.11	.09	.10*
Nutritious	.08	.16*	.10	.11	.11*
Energy	.17**	.14	.21**	.13	.17**
Provide fiber	.13*	.17*	.19**	.11	.15**
Normative					
Family	.16**	.09	.09	.18**	.15**
Friends	.12	.15*	.05	.18**	.13**
Health care worker	.07	.09	.03	.12	.09
Significant other[d]	.17**	.09	−.04	.26***	.15**
Professor/coach	.16**	.01	.03	.17**	.12*
Control					
Cafeteria problems	.06	.27***	.12	.14*	.13**
No access (F&V)	.25***	.18**	.25***	.20**	.23***
Do not like F&V available	.14*	.31***	.28***	.13	.20***
Too expensive	.17**	.28***	.29***	.13*	.20***
No place to store or prepare	.10	.25***	.23***	.09	.15**

Note.

*$p < .05$;

**$p < .01$;

***$p < .001$.

[a]Standardized beta coefficients adjusted for gender and body mass index.

[b]Standardized beta coefficients adjusted for ethnicity and body mass index.

[c]Standardized beta coefficients adjusted for ethnicity, gender, and body mass index.

[d]Relationship between belief and 5-A-Day was significantly stronger for females compared to males.