Exploring Physical Activity by Ethnicity and Gender in College Students Using Social Cognitive Theory

by Eric J. Nehl, Emory School of Public Health, Atlanta, GA; Chris M. Blanchard, Dalhousie University Health Science Center, Halifax, CA; Janet Kupperman, Clark Atlanta University, Atlanta, GA; Phillip Sparling, Georgia Institute of Technology, Atlanta, GA; Ryan Rhodes, University of Victoria, Victoria, CA; Mohammad R. Torabi, Indiana University, Bloomington, Indiana; Kerry S. Courneya, University of Alberta, Alberta, CA

Author Note

This project was supported by a Research Centers in Minority Institutions award, #G12RR03062, from the National Center for Research Resources, National Institutes of Health.

Abstract

The psychological determinants of physical activity (PA) among college students may vary by ethnicity and gender, but few studies have considered these characteristics. This study tested constructs from Social Cognitive Theory (SCT) by ethnicity and gender to explain differences in PA. A total of 231 Blacks (70% female) and 218 White college students (28% female) completed the SCT questionnaire and a PA assessment two months later. Sequential regressions with interactions were used to examine how SCT constructs were associated with ethnic and gender when predicting PA. The results indicated that self-efficacy and self-regulation were significant predictors of PA for both ethnic groups and both genders. In addition, PA was statistically moderated by gender, but not by ethnicity, for perceptions of available PA facilities, with a stronger association for females. This study suggests that SCT may aid in understanding collegiate PA and help explain differences in PA between genders. Last, because of strong associations between self-efficacy and PA shown in this study, self-efficacy should be considered when developing ethnic-specific PA interventions in college students.

Keywords: university, exercise, theoretical frameworks

It is clear that physical activity participation relates directly to health. For instance, the American Cancer Society (ACS, 2010) has identified physical inactivity as one of the largest risk factors for developing cancers. Taken as a whole, inactivity has now been linked to the majority of chronic diseases and premature mortality (Warburton, Charlesworth, Ivey, Nettlefold, & Bredin, 2010). Conversely, the health benefits of being physically active on a regular basis are also well-known (United States Surgeon General [USSG], 1996). Even in small amounts, physical activity lends great benefit to disease prevention, overall fitness and well-being (Kesaniemi, Riddoch, Reeder, Blair, & Sorensen, 2010).

Despite the benefits of being physically active, the majority of Americans continue to be completely sedentary or fail to engage in recommended levels of activity (Cory et al., 2010; Hughes et al., 2010). Less than half of Americans meet recommended levels of moderate physical activity, and over two-thirds do not meet vigorous physical activity marks. In addition, two correlates that seem to be consistent predictors of participation in physical activity are gender and ethnicity (United States Department of Health and Human Services [USDHHS], 2009). Data show that men (68.9%) are more likely than women (60.4%) and that Whites (67.5%) are more likely than Blacks (56.5%) to be physically active (Centers for Disease Control and Prevention [CDC], 2008). Research has also shown that physical activity decreases over the lifespan, with large decreases happening from adolescence into early adulthood (American College Health Association [ACHA], 2010; Haase, Steptoe, Sallis, & Wardle, 2004). Currently, less than half of college students meet the recommended amount of physical activity for health benefits (ACHA, 2010). Although there are known disparities in physical activity for different groups, the findings of research into the psychological and theoretical correlates of physical activity by gender and ethnicity have often been inconsistent regarding what correlates predict physical activity, and/or relevant studies have not fully used theoretical frameworks in identifying correlates of physical activity (Blanchard et al., 2008; Egli, Bland, Melton, & Czech, 2011; McArthur & Raedeke, 2009).

A primary step in designing physical activity interventions is to ensure that they are based upon an appropriate theoretical framework and take into account correlates such as ethnicity and gender that influence successful uptake and maintenance equally across groups (Taylor, Baranowski, & Young, 1998). One framework that has been successfully used to explain physical activity is Social Cognitive Theory (SCT) (Bandura, 2004).

SCT is based on a multi-dimensional model that represents human behavior as dynamic and includes intrapersonal / interpersonal characteristics, behavior, and environmental factors. The overlying mechanism in SCT is reciprocal determinism (Bandura, 1986; Glanz, Rimer, & Viswanath, 2008). Reciprocal determinism recognizes that elements of the person and the environment interact in ways that may help to shape future motivations, behavior, and well being (Bandura, 2004). This hypothesized relationship is in opposition to the idea that cognitive or environmental correlates of physical activity singly determine behavior or act as sole change agents. For example, from the perspective of reciprocal determinism, an individual's interpretation of the consequences of his/her behavior may inform and adjust the environment and his/her own intrapersonal and interpersonal factors, which then may have the ability to change the person's future behaviors.

According to reciprocal determinism, any signal factor will not be sufficient for the maintenance of behavior (Glanz et al., 2008). For example, the existence of environmental opportunities alone for physical activity may not motivate people to use them. Instead, physical activity is most likely to occur when both positive environmental opportunities *and* strong affirmative behavioral correlates exist. In addition, reciprocal determinism implies that the nterplay of the whole model in a synergistic and circular relationship has the ability to affect all levels of physical activity behavior. Not only have SCT constructs shown promise in physical activity prediction and interventions, they also provide

a well-tested framework of potential physical activity correlates and hypothesized methods that can be used to translate research findings into successful health education practices (Bandura, 2004; Glanz et al., 2008).

SCT states, and most research has shown, that the primary and most direct facilitator of health behavior is perceived self-efficacy, or one's confidence or belief in his/her ability to perform a behavior. Although self-efficacy, as the main SCT construct, is theorized to influence behavior directly, it in turn is posited to have the influences of past behavior, social modeling, social support, and mood states (Bandura, 1997). Self-efficacy also is posited to have indirect effects on behavior through several other mechanisms, including outcome expectations, perceptions of the environment, social modeling, and social support (Glanz et al., 2008; Rhodes & Pfaeffli, 2010). An additional construct of interest in SCT is self-regulation of behavior (Rovniak, Anderson, Winett, & Stephens, 2002). Of particular importance to the field of physical activity research, self-regulation posits that individuals have control over their own behavior and have the ability to develop strategies that will aid in their behavioral change and maintenance (Bandura, 2005). If health promotion efforts could help develop self-regulatory skills, then the mixed results of longitudinal physical activity interventions with collegiate samples may be improved (Rhodes & Pfaeffli, 2010). Each of these constructs, and others included in SCT such as mood states, have shown at least some promise to predicting physical activity in different groups, but Bandura has cautioned that the effectiveness of SCT constructs may differ over various cultural contexts (Bandura, 2002; Keating, Guan, Pinero, & Bridges, 2005).

SCT approaches have been used successfully to explain physical activity in groups of elementary school children, multi-ethnic samples of high school girls, middle-aged and older adults (Ayotte, Margrett, & Hicks-Patrick, 2010; Dishman, Dunn, Sallis, Vandenberg, & Pratt, 2010; Ramirez, Kulinna, & Cothran, 2012). However, few studies have examined SCT among college students with a significant number of key SCT constructs, and even fewer have examined how SCT constructs could explain physical activity disparities between men and women and between Whites and Blacks. Rovniak et al. (2002) used SCT to account for 55% of variance among a sample of mostly White college students over a two-month period. Their study also found that self-regulation was the only SCT construct that had direct effects on physical activity, and that the effects of self-efficacy on physical activity were mediated by self-regulation. But their study did not examine how SCT constructs were related to physical activity in terms of gender or ethnicity. Similarly, studies by Petosa, Suminski and Hortz (2003) and Doerksen, Umstattd and McAuley (2009) provide support for a relatively long-period prediction of physical activity among college students, but they did not examine models by ethnicity or gender. Others have found differences in race and gender as predictors of physical activity, but did not completely employ a theoretical framework (Egli et al., 2011; McArthur & Raedeke, 2009).

There is evidence, however, to suggest that race and gender have moderating influences on physical activity among college students (Miller, Staten, Rayens, & Noland, 2005; Suminski, Petosa, Utter, & Zhang, 2002). These finding are consistent with reviews and studies in teenage girls (Motl et al., 2002; Sallis, Prochaska, & Taylor, 2000), which have consistently found that Whites and males generally participate in higher levels of physical activity than other ethnic groups and females. However, because limited research has explicitly examined ethnicity and gender in conjunction with theoretical constructs, the literature can give few answers about the mechanisms of these disparities (King, Stokols, Talen, Brassington, & Killingsworth, 2002).

The purpose of the present study was to determine whether SCT predicts physical activity over a two-month period by ethnicity and gender for college students. Based upon the tenets of SCT and previous research it was hypothesized that the SCT constructs, particularly self-efficacy, would significantly predict PA for all students. Second, it was also hypothesized that significant differences in the prediction of PA by the SCT constructs would exist for both ethnicity and gender. In addition, given the exploratory nature of these relationships by both ethnicity and gender, the null hypotheses that these associations would be similar were tested.

Method

Participants and Procedure

Prior to starting the study, approval was sought and obtained from the ethical review boards of two universities within a major city in the southern USA. One institution is a four-year historically black private university and the second is a four-year public state university. The SCT questionnaire was administered to 610 students at the beginning of the study after the consent forms were obtained, and then participants were given a $15.00 grocery coupon and asked to construct and memorize a 4-digit number which they would recognize for survey matching. Two months later, participants were assessed with a survey measuring their physical activity levels, and the four-digit numbers were used for survey matching. After completing the physical activity survey, participants were given a $20.00 grocery coupon.

Measures

Demographic information. Demographic characteristics consisted of age, gender, ethnicity, year in school, residence type, employment status, employment hours per week, credit hours being taken, and Body Mass Index (BMI) (calculated from height and weight).

Physical activity. Physical activity was assessed by the leisure score index (LSI) of the Godin Leisure Time Physical Activity Questionnaire (Godin & Shephard, 1985). The LSI contains three questions that assess the frequency of mild, moderate, and strenuous physical activity performed for at least 15 minutes in duration during free time in a typical week. Moderate-intensity exercise was defined as "activities such as brisk walking, tennis, easy bicycling, or dancing; such exercise may work up a light perspiration but is not exhausting." Vigorous-intensity exercise was defined as "activities like running, aerobics, fast bicycling, or basketball. Such exercise causes significant sweating and large increases in breathing and heart rate." Given that the focus of this study was on moderate and vigorous activity, the LSI was modified, by asking the average duration per physical activity session for only moderate and vigorous intensities. The total number of sessions, ranging from zero to 14, that each participant

was physically active was then calculated by adding the reported number of days in which they reported moderate and vigorous activity for at least 15 minutes during free time during a typical week over the past two months.

SCT constructs. A review of the literature was employed in the selection of the surveys used in this study. The surveys were chosen to measure SCT intrapersonal, interpersonal, and perceived environmental characteristics in the following seven areas: (a) self-efficacy, (b) social modeling, (c) social support, (d) attitude about physical activity, (e) self-regulation, (f) mood states, and (g) perceived campus recreational facilities.

Self-efficacy. Self-efficacy was assessed with eight items from the Exercise Self-efficacy Scale rated on a scale from 0% (No confidence at all) to 100% (Complete confidence) (Mcauley, 1993). Items were asked in the following manner "How confident are you that you can complete 30 minutes of moderate-intensity exercise on at least 5 days per week OR 20 minutes of vigorous exercise on at least 3 days per week:" (a) for the next week, (b) for the next two weeks, (c) etc. The composite score of self-efficacy is the average score of the eight items, ranging from zero to 100, and a large score indicates a high level of self-efficacy. Internal consistency for this sample (Cronbach's α) was .98, with similar results by gender and ethnicity.

Social modeling. Social modeling was assessed with a three-item measure adapted from cardiac rehabilitation patients. Items were asked in the following manner; "Seeing (a) family, (b) friends, and (c) other college students being active makes me want to be active." The respondents were asked to rate the questions on a 4 point scale from 1 "Strongly disagree" to 4 "Strongly agree". The composite score of social modeling is the average score of the three items, ranging from one to four, and a large score indicates a high level of social modeling. Internal consistency from this sample (Cronbach's α) was .81, with similar results by gender and ethnicity.

Social support. Social support was assessed by the 10-item Friend Participation component of the Social Support and Exercise Survey rated on a 5-point scale from 1 "none" to 5 "very often" and were asked in the following manner: "During the past three months, my friends" (a) Exercised with me, (b) Offered to exercise with me, (c) etc... Consistent with instructions for using the scale, the composite score of social support is the average score of the 10 items, ranging from one to five, and a large score indicates a high level of social support (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). The internal consistency from this sample (Cronbach's α) was .92, with similar results by gender and ethnicity.

Attitude about physical activity. Attitude about physical activity was assessed by four items used in previous collegiate research and refined through use in Black and White college students (Blanchard et al., 2003). The four items were rated on 5-point strongly disagree – strongly agree scales in the following manner: "For me to accumulate 30 minutes of moderate-intensity physical activity at least 5 days over the next week will be…": (a) extremely enjoyable, (b) extremely wise, (c) extremely fun, and (d) extremely beneficial. The composite score of attitude about physical activity is the average score of the four items, ranging from one to five, and a large score indicates a high level of attitude about physical activity. The internal consistency from this sample (Cronbach's α) was .77, with similar results by gender and ethnicity.

Self-regulation. Self-regulation was assessed by the Exercise Goal Setting Scale (Rovniak et al., 2002). The ten self-regulation items, developed through the use of a collegiate sample, were rated on a 5-point scale from 1 "Does not describe" to 5 "Describes completely" and were asked in the following manner: "Please indicate the extent to which each of the statements below describes you" (a) I often set exercise goals, (b) I usually have more than one major exercise goal, (c) I usually set dates for achieving my exercise goals, (d) etc… The composite score of self-regulation is the average score of the ten items, ranging from one to five, and a large score indicates a high level of self-regulation. The internal consistency from this sample (Cronbach's α) was .85, with similar results by gender and ethnicity.

Mood. Mood was assessed with an abbreviated Profile of Mood State (POMS) (McNair, Lorr, & Dropplemann, 1992; Nies, Chruscial, & Hepworth, 2003). The eighteen items were rated on a 5-point scale from 0 "Not at all" to 5 "Extremely," and they were asked as in the following: "During the last 7 days, I have been feeling": (a) cheerful, (b) restless, etc… The composite scores for vigor, depression, and anxiety are the average scores of the six items for each, ranging from one to five, and larger scores indicate higher levels of vigor, depression, or anxiety. The internal consistency from this sample (Cronbach's α) ranged from .81-.90, with similar results by gender and ethnicity.

Perceptions of the campus recreational facilities. Last, to measure the perceptions of the campus recreational facilities, nine items were drawn from the Project GRAD measurement set (Sallis, Calfas, Alcaraz, Gehrman, & Johnson, 1999). The nine perceived facilities availability questions, which were developed for use on collegiate campus settings, were answered either "yes" or "no" and were asked in the following manner: "During the next 2 months, please indicate whether each of the following facilities" will be available for you to use on your campus. The facilities were (a) basketball court, (b) tennis court, (c) racquetball court, etc… Each affirmative response was added to create a facility availability score that ranged from zero to nine, with higher scores indicating greater perceived access to facilities.

Data Analysis

Preliminary Analyses. The first set of analyses examined possible personal demographic differences by ethnicity and gender using Chi-square tests and between-subjects ANOVAs. Statistically significant differences were further explored using zero-order correlations or between subjects ANOVAs to determine relationships with physical activity. This step was taken to determine if a particular demographic variable was a potential confounder that should be controlled for in the main analyses. Then, basic descriptive statistics and zero-order correlations among the SCT scales and physical activity were calculated in addition to one-way ANOVAs using race and then gender as between-subjects factors.

Regression Analyses. The main hypothesis concerning SCT was tested using sequential regression analyses with forced entry at each step. For example, physical activity was regressed onto gender (Step 1), then self-efficacy, social modeling, social support, attitude about physical activity, self-regulation goal setting, vigor,

and perceived facilities (Step 2), and then interaction terms between ethnicity and the SCT variables (Step 3). The associations between gender and physical activity were explored in a similar fashion.

Results

Of the 610 students who finished SCT questionnaires at the beginning of the study, 49 Asian and 21 "Other" ethnicities were excluded from the analyses based upon the purpose of the current paper and the small sample sizes for these ethnic groups. Additionally, 90 (16.70%) of the Black and White students who participated in the baseline did not complete the PA assessment two month later. Therefore, a total of 449 (83.33%) Black and White students completed both SCT questionnaires and the PA assessment, and were final participants in this study. The personal demographic characteristics of these students are presented in Table 1. Analyses comparing non-response by demographic variables revealed no statistically significant differences. Black students were similar in age p = .88 (Mean = 19.8, SD = 1.89) to White students (Mean = 19.8, SD = 1.75). They were also distributed in a similar way across employment status χ^2 (1) = .03, p = .87 with a third of both groups being employed, and over half of both lived in university dormitories. However, Blacks were more likely to be female (69.3% Black female vs. 27.7% White female), χ^2 (1) = 77.63, p < .001. White students reported taking significantly fewer credit hours per semester (Mean = 14.8, SD = 1.89) than Black students (Mean = 15.7, SD = 1.99). Last, BMI was statistically similar across race when divided into typical underweight to obese categories, χ^2 (3) = 1.89, p = .59, with over one quarter being overweight or obese.

Table 1. ***Demographic Characteristics of the Sample***

Variable	*n*	%
Gender		
Male	235	(52.2)
Female	215	(47.8)
Race		
White	231	(51.4)
African American	218	(48.6)
Residence		
Dorm	244	(54.3)
Apartment	123	(27.4)
House	82	(18.3)
Living Situation (Live with)		
Friends	341	(77.0)
Significant other	10	(2.3)
Family	44	(9.9)
Alone	48	(10.8)
School Year		
Freshman	130	(29.0)
Sophomore	207	(46.1)
Junior	80	(17.8)
Senior	32	(7.1)
Employment		
Employed	152	(34.0)
Not employed	295	(66.0)

Correlations among the SCT scales and physical activity were calculated for the overall sample. The alpha level for these analyses was set to .05. As can be seen from summary Table 2, the seven SCT scales had statistically significant correlations with physical activity. The scales anxiety and depression were not retained for regression analyses because of non- significant correlations with physical activity.

Table 2. ***Overall Pearson Correlations among Social Cognitive Scales and Physical Activity***

	2.	3.	4.	5.	6.	7.	8.	9.	10.	Mean	SD
1. Self-Efficacy	.17***	.35***	.41***	.44***	.35***	.002	-.08	.24***	.36***	71.98	26.25
2. Social Modeling		.22***	.35***	.35***	.23***	.03	-.02	.13**	.14**	3.21	0.65
3. Social Support			.34***	.47***	.34***	.05	.01	.10*	.28***	2.60	1.00
4. PA Attitude				.48***	.29***	-.02	-.08	.13**	.18***	4.21	0.62
5. SR (Goal Setting)					.41***	.06	-.06	.04	.34***	2.84	1.03
6. Mood (Vigor)						-.05	-.24***	.21***	.26***	2.24	0.88
7. Mood (Anxiety)							.66***	.03	.08	1.43	0.85
8. Mood (Depression)								-.12**	.03	0.74	0.83
9. Perceived Facilities									.15**	7.59	2.09
10. Physical Activity									-		

Note. PA = physical activity; SR = self-regulation.
* p < .05. ** p < .01. *** p < .001.

Descriptive statistics and zero-order correlations among the demographics (other than ethnicity and gender) and SCT variables were calculated. These analyses revealed no statistically significant differences, so no demographic variables were controlled for in the main analyses. For the SCT scales, Whites had significantly higher scores for self-efficacy (p < .001), social support (p < .01), attitude toward physical activity (p < .01), vigor (p < .001), and perceived facility availability (p < .001) compared with Blacks. When comparisons were made between sexes, men had significantly higher self-efficacy (p < .01), vigor (p < .01), and perceived facility availability (p < .001).

The main purpose of the study was tested with sequential regression analyses, with moderation effects examined as recommended in previous studies (Frazier, Tix, & Barron, 2004). The association of the SCT constructs with physical activity was first conducted by ethnicity. These analyses regressed physical activity onto scales with which there was a preliminary physical activity relationship established. As can be seen from the regression coefficients (or β's) in Table 3, self-efficacy (β = .24) and self-regulation goal setting (β =.17), significantly predicted physical activity. This model accounted for 20% of the variance in physical activity. Second, similar regression analyses were conducted by gender. These analyses also regressed physical activity onto scales with which there was a priori relationship with physical activity. As can be seen in Table 4, this model by gender accounted for 21% of the variance in physical activity, with race (β = -.13), self-efficacy (β = .29), and self-regulation goal setting (β =.15) significantly predicting physical activity. Interestingly, although the main effect for perception of facilities was non-significant (β = -.17) its interaction with gender was significant (β = .20), suggesting that the relationship between perceived facilities and gender was stronger for males than females.

Table 3. ***Results from the Sequential Regression Analyses for Physical Activity by Ethnicity***

Predictors	β^1	β^2	β^3	R^2
Gender (0 = Male)	-.02	.06	.05	.00
Self-efficacy		.23***	.24**	
Social Modeling		.02	.06	
Social Support		.11*	.14	
Physical Activity Attitude		-.07	-.05	
Self-Regulation Goal Setting		.18**	.17*	
Vigor		.06	.10	
Perceived Facilities		.09	.16	.19
Self-efficacy × Race			-.03	
Social Modeling × Race			-.05	
Social Support × Race			-.05	
Physical Activity Attitude × Race			-.04	
Self-Regulation Goal Setting × Race			.02	
Vigor × Race			-.06	
Perceived Facilities × Race			-.08	.20

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

Table 4. ***Results from the Sequential Regression Analyses for Physical Activity by Gender***

Predictors	β^1	β^2	β^3	R^2
Race (0 = White)	-.18***	-.10*	-.13*	.03
Self-Efficacy		.22***	.29***	
Social Modeling		.03	.08	
Social Support		.11*	.12	
Physical Activity Attitude		-.08	-.04	
Self-Regulation Goal Setting		.18**	.15*	
Vigor		.06	.06	
Perceived Facilities		.01	-.17	.19
Self-efficacy × Gender			-.11	
Social Modeling × Gender			-.08	
Social Support × Gender			-.04	
Physical Activity Attitude × Gender			-.03	
Self-Regulation Goal Setting × Gender			.04	
Vigor × Gender			.003	
Perceived Facilities × Gender			.20*	.21

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

Discussion

The purpose of the present study was to determine whether SCT worked similarly for college students by ethnicity and gender in predicting their physical activity in a two-month interval. Based upon the tenets of the theory and previous research it was hypothesized that SCT constructs, and especially self-efficacy, would significantly predict PA for all students. Overall, results showed that self-efficacy was the strongest correlate of physical activity over both gender and ethnicity. Our hypothesis that there would be ethnic and gender differences were not supported. Regardless of ethnicity and gender, university students with higher levels of self-efficacy participated in greater levels of physical activity two months later. This finding is not unexpected, as self-efficacy is a foundation of SCT and previous research has consistently demonstrated its importance (Bandura, 2004; Trost, Owen, Bauman, Sallis, & Brown, 2002). However, it must be pointed out that although the relationships between physical activity and self-efficacy were not different by gender or ethnicity, Whites and men had significantly higher scores for physical activity self-efficacy. Consequently, there may be room to improve the self-efficacy for physical activity among Blacks and women.

The present study results also show that self-regulation goal setting made a significant and unique contribution to predicting physical activity over a two-month interval, which is consistent with previous research (Rovniak et al., 2002). In addition, the results of predicting physical activity from self-regulation goal setting did not differ by ethnicity or by gender, which is of particular importance, as promoting self-regulation is an actionable concept for health promotion programs that can be integrated as skill objectives for health promotion programs (Anderson, Winett, Wojcik, & Williams, 2010; Bandura, 2005).

A promising research and intervention approach is examining environmental correlates that enable or discourage physical activity (Wendel-Vos, Droomers, Kremers, Brug, & van Lenthe, 2007). The current results indicate the relationship between facility awareness and physical activity to be particularly important for women. Specifically, those women who had a greater sense that facilities were available for their use were more likely to participate in physical activity. Similar findings have been found in other studies as well (Bengoechea, Spence, & McGannon, 2005). Obviously, without knowledge of physical activity facilities one would be less likely to use those facilities. Greater efforts must be undertaken to advertise the existence of facilities and doing so will likely have an impact on all students.

Several SCT scales tested in our study had significant correlations with physical activity but did not exert significant effects in the final models. Based on these findings, it would appear that future research efforts should focus on other constructs which may be more effective at explaining physical activity in college populations. However, the non-significant findings are most likely due to the strong effects that were found for self-efficacy and self-regulation. It is important to note that many of the SCT constructs that did not show significant relationships with physical activity in this study have shown promise in previous studies and that more research is needed to investigate the correlations between some subscales of the SCT constructs and physical activity before the design of physical activity interventions (Anderson, Wojcik, Winett, & Williams, 2006; Hughes et al., 2009; Nies et al., 2003; Sylvia-Bobiak & Caldwell, 2006; Trost et al., 2002).

Despite the promising findings, several limitations need to be addressed. First, there may be a selection bias in the sample due to the convenience sampling methodology. It will be important that future studies attempt to randomly select students to increase the representativeness of the sample. Second, self-reported physical activity is inferior to an objective assessment (Keating et al., 2005; Reilly et al., 2008). Therefore, future studies should increase the validity of physical activity assessment by using objective measurements. Third, in Table 1, some statistically significant correlation coefficients may have limited meaning because they are small in absolute values (less than |0.3|), thus having small effect sizes or accounting for very small proportions of variance (less than 0.09). The relatively large sample in this study makes it easier for the correlation coefficients to reach significant levels. Finally, while a two-month interval was used in this study in predicting physical activity from the SCT constructs, it is desirable to examine the prediction with a longer interval in future research.

In summary, this study examined physical activity levels among college students by gender and by ethnicity from the perspective of SCT constructs. The results indicate that self-efficacy and self-regulation of goal setting are two subscales associated with

physical activity levels among college students, and the association is roughly similar across gender and ethnicity with female students indicating a more positive relationship between facility awareness and physical activity participation compared with male students. The findings may imply that improving self-efficacy and self-regulation of goal setting might result in promoting physical activity levels among college students, across gender and ethnicity.

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