

## Original Article

# PSYCHOSOCIAL CORRELATES OF KOREAN ADOLESCENTS' PHYSICAL ACTIVITY BEHAVIOR

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The purpose of this study was to test the association of psychological and social variables in explaining the physical activity behavior of a random sample of secondary school students in Korea. Participants included 1,347 students enrolled in the 7<sup>th</sup> to 12<sup>th</sup> grades (males, 943; females, 404). Four Korean-version questionnaires were used to explore possible associations between psychosocial variables and physical activity among adolescents. Data were analyzed using correlation analysis and structural equation modeling. Results indicated that all of the psychosocial variables showed statistically significant intercorrelations, and were clearly correlated with physical activity behavior. The psychosocial variables accounted for 40.6% of the variance in the adolescents' physical activity behavior, and the proposed model had an excellent fit for exploring relationships among psychological variables, social support, and physical activity behavior. This study offers the first evidence of psychosocial constructs as predictors of Korean adolescents' physical activity behavior.

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## Introduction

Regular physical activity participation among adolescents can enhance their physical, psychological, and social wellbeing (Kim 2004). Nevertheless, there is a trend of physical inactivity occurring in many countries (Australian Bureau of Statistics 2006; US Center for Disease Control and Prevention 2004; Ministry of Culture and Tourism 2000). Traditionally, efforts aimed at combating adolescents' physical inactivity have focused on providing information, education, and counseling programs without fully considering the psychological and social factors associated with adolescent physical inactivity behavior (Kim 2004). In Korea, for example, researchers have attempted to identify the socioeconomic

characteristics associated with physical activity involvement (Oh et al. 2010). Others have written about the benefits of or barriers to physical activity for individuals and provided "how to exercise" information (Lee 2001; Yi 1996). However, little attention has been paid to the mechanisms associated with adolescent physical activity behavior using comprehensive frameworks or approaches. This situation hampers our understanding of the factors that influence the acquisition of youth physical activity behavior. To resolve this, variables that affect adolescent physical activity behavior must be understood within the psychological, social, and behavioral domains (Rovniak et al. 2002). In this regard, self-efficacy, pros (i.e. benefits of exercise), cons (i.e. barriers to exercise), and social support (i.e. friend and family influences) have been commonly studied in Western countries as key psychosocial variables influencing adolescent physical activity behavior (Titze et al. 2005; Wu et al. 2003; Sallis et al. 2000).

Self-efficacy is a component of Bandura's (1997, 1986, 1977) social learning theory, which relates to one's perceived confidence in her/his ability to carry



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out a specific behavior. Self-efficacy is based on the premise that people can and do self-regulate their own motivation and behavior. Those with high self-efficacy tend to expend more effort, attempt more challenging tasks, and continue to persist to achieve tasks, even when faced with obstacles. For example, in the physical activity domain, someone with high exercise self-efficacy will partake in physical activity in spite of inclement weather, whereas a person possessing low self-efficacy may only do so when the weather is pleasant.

The pros and cons derive from the conflict model of decision-making (Janis & Mann 1977), and focus on the importance of perceived benefits (pros) and barriers (cons) of a behavior change. In decision theory, it is hypothesized that an individual will not change her/his behavior unless she/he perceives the benefits of change to outweigh the barriers. For exercise, examples of pros include health benefits such as stress relief, improved sleep patterns, and increased energy and stamina. Time constraints, competing commitments and/or tasks (e.g. less time to spend with family and friends), and inclement weather are all examples of cons (Prochaska & Marcus 1993). Nigg and Courneya (1998) demonstrated that the pros and cons are substantially related to adolescents' physical activity behavior.

Social support has many forms, most of which focus on resource provision or allocation by others in the form of materials, skills, money, or guidance (Vaux 1988). Social support is typically related to tasks or steps that significant others take to facilitate behavior (Dishman & Sallis 1994). In the exercise domain, social support can be instrumental (e.g. giving a non-driver a ride to a physical activity class), informational (e.g. telling a

neighbor about a community exercise program), emotional (e.g. calling a friend to see how their new exercise program is faring), or appraisal (e.g. providing encouragement or reinforcement for learning a new activity or skill) (Heaney & Israel 2002). Social support from family and friends has been found to be positively related to physical activity (Saunders et al. 2004). Furthermore, social support may potentially have a stronger influence on physical activity behavior than do other psychosocial variables, particularly if the behavior is not under complete volitional control and requires assistance to enact (Courneya & McAuley 1995).

For over a decade, studies across a wide range of populations and settings have demonstrated the existence of a significant relationship between physical activity behavior and psychosocial constructs (Duncan & Mummery 2005; Deforche et al. 2004; Leslie et al. 1999). However, these studies have mainly come from Western countries. Physical activity, especially in Korea, is only now being considered a crucial factor in the health status of Koreans, and this has fast become an important public health and social issue in Korean society (Oh et al. 2010). Moreover, data predicting the links between physical activity behavior and the psychosocial constructs are limited (Oh et al. 2010). Therefore, the purpose of this study was to test the integration of psychological and social variables for predicting physical activity behavior among a random sample of secondary school students. Specifically, this study explored the direct, indirect, and total effects of friend support, family support, self-efficacy, pros and cons in relation to physical activity. The hypotheses proposed in our model are shown in Figure 1: first, friend support and

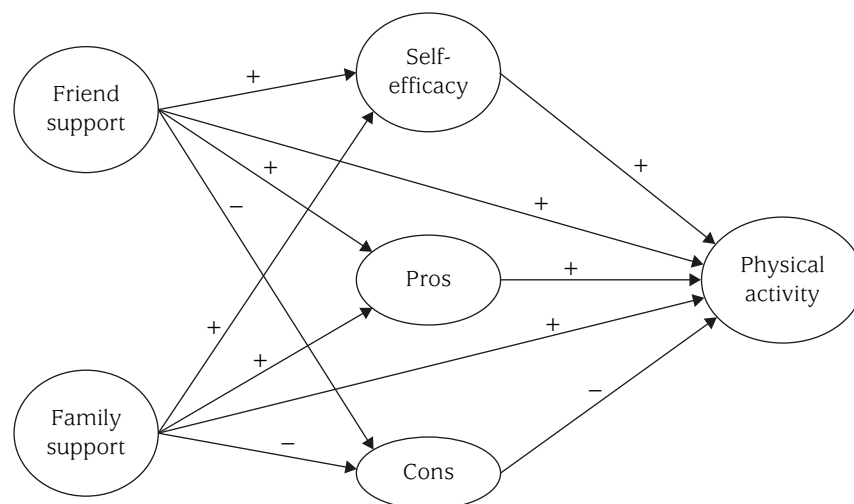


Fig. 1 Hypothesized model for explaining Korean adolescents' physical activity behavior.

family support will predict self-efficacy, pros and physical activity positively, and predict cons negatively; second, physical activity will be positively predicted by self-efficacy and pros while negatively predicted by cons.

## Methods

### Participants

Participants included 1,347 students enrolled in the 7<sup>th</sup> to 12<sup>th</sup> grades (males, 943; females, 404) in Nowon-gu, Northern Seoul, with the data collection being sponsored by the Korean Research Foundation. In the initial stage of this study, 11 schools in the Nowon-gu district were invited to participate, and all five eligible junior high and high schools in the district agreed to participate in the study. Within each school ( $N=5$ ), two classes in each grade from 7<sup>th</sup> to 12<sup>th</sup> were randomly chosen, and a total of 1,500 students were randomly selected from the class rosters. Students were ineligible to participate in this study if they were in a special classroom (e.g. severe learning disability), which might preclude valid responses on the survey instruments.

The consent forms were then mailed to the parents or guardians of all eligible participants. Ninety-six percent (1,440 of 1,500) of the parents/guardians provided a definitive response regarding their adolescents' permission to participate and 4% of them ( $N=60$ ) declined. This study required both written parental consent and adolescent consent (administrative approval of the study protocol was granted by the Research Committee of the Korean Research Foundation). Of the 1,440 students with parental permission, 1,347 (93.5%) gave their consent and completed the survey. The non-participants were not significantly different in age or sex from the students who participated.

### Measures

#### Self-efficacy

In order to measure an individual's self-confidence to exercise, the Korean version of the Exercise Self-efficacy Scale was used (Shin et al. 2001). The scale consists of 18 items with a 5-point scale ranging from 1 (*cannot do*) to 5 (*certain can do*). Individuals rated their confidence that they could perform exercise routines regularly (i.e. three or more times a week) under the various circumstances described (e.g. when I am feeling depressed, during a vacation). Cronbach's coefficient  $\alpha$  was calculated as a measure of internal consistency for the scale, and a standardized  $\alpha$  of 0.91 was

obtained. In addition, 2-week test-retest reliability was performed as a measure of instrument stability, resulting in a reliability coefficient of 0.86.

#### Decisional balance

For the pros and cons constructs, the Decision Balance Scale for Exercise, developed by Plotnikoff et al. (2001), was translated into Korean (Kim et al. 2006) and used in the present study. The questionnaire consisted of two subscales (i.e. pros and cons) with a total of 10 items (five each). Participants were asked to indicate on a 5-point Likert scale ranging from 1 (*not at all important*) to 5 (*extremely important*) how important each statement was in regard to their decision to exercise or not. Two-week test-retest reliability was performed as a measure of instrument stability, resulting in a reliability of 0.91 for exercise pros and 0.89 for exercise cons.

#### Social support

The Social Support for Exercise Questionnaire, developed by Sallis et al. (1987), was translated into Korean and used in the study. The translated scale consists of 24 items arranged around two subscales (i.e. family support, friend support) aimed at assessing social support for physical activity. Individuals responded to statements such as "I have a friend or acquaintance who encouraged me to exercise" on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*very often*). The scale has established factorial and criterion-related validity, as well as acceptable internal consistency, with  $\alpha$  coefficients of 0.85 for family and 0.88 for friends. In addition, in the present study, 2-week test-retest reliability was performed as a measure of instrument stability, resulting in a reliability coefficient of 0.83 for family and 0.89 for friends.

#### Exercise behavior

The weekly Leisure-Time Exercise Questionnaire, developed by Godin and Shephard (1985), was translated into Korean and used in this study to assess habitual physical activity behavior. On this measure, participants were asked to report how many times during a typical week they participated in strenuous (e.g. running, vigorous cycling), moderate (e.g. fast walking, easy swim), and mild (e.g. yoga, golf) physical activity for more than 15 minutes duration. From this, an exercise index score was calculated by multiplying each reported exercise session by its metabolic equivalent (MET) value and summing the result [i.e. (strenuous  $\times$  9) + (moderate  $\times$  5) + (mild  $\times$  3)]. In the present study, 2-week test-retest reliability was performed as a measure of instrument

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stability, resulting in a reliability coefficient of 0.86. The Leisure-Time Exercise Questionnaire has previously been employed in a sample of high school aged Korean youth (Cho et al. 2010).

### ***Processes of translation and validation of the measures***

In translating the instruments from English to Korean, the methodology outlined by Banville et al. (2000) was used. The initial translation methodology resulted in measures that appeared to be both culturally appropriate and psychometrically sound. In brief, this included translating the established instruments of the psychosocial constructs into Korean by the authors, with the assistance of two native speaking Koreans (all of whom have Masters degrees in exercise psychology). Next, two Korean students who had studied for doctoral degrees in the U.S. for 3 years back-translated the instrument into English (without access to the original English version). Similarly, the authors also back-translated the instrument into English without referring to the original version. These three versions were then compared, evaluated, and modified to reconcile any differences. Finally, the instruments were administered to two Korean scholars familiar with physical activity behavior, with small wording and/or phrasing changes incorporated on the basis of their feedback. Through this process, content validity suitable to the purposes of the study was established.

The Korean versions of the measures were then administered to a sample of 75 Korean youth of similar age to the target sample to evaluate item clarity, response variance, and to estimate reliability. An examination of the frequency distributions indicated that the full range of responses was being used for most items. The students completed the survey with no difficulty in understanding the items. In addition, data were analyzed for internal consistency of each measure on the first administration and for stability of each measure 2 weeks later.

### ***Procedures***

To collect the data, time intervals of 25 minutes, including approximately 5 minutes for questions and answers, were arranged at each participating school. During this time, the aims and processes of testing were explained to the students, with each questionnaire being introduced by a researcher. The students were told that confidentiality would be maintained and voluntary participation was emphasized. After the students had completed the questionnaires, they were collected and a control

sheet was attached to the front of the top paper for coding purposes.

### ***Data analysis***

Correlation analysis was carried out to identify the correlations of the psychosocial constructs with physical activity behavior. To explore the possible association between psychosocial variables (i.e. self-efficacy, pros, cons, friend support and family support) and physical activity behavior, data were analyzed using structural equation modeling (SEM). A simultaneous path analysis with latent variables was performed and a correlation matrix was used as input with maximum likelihood estimation. Maximum likelihood estimation was used to evaluate the fit of the measurement and the structural models to the empirical data. With maximum likelihood estimation, this study used the  $\chi^2$  statistic, a goodness of fit index (GFI), adjusted GFI (AGFI), and the root mean square error of approximation (RMSEA). Furthermore, the squared multiple correlation ( $R^2$ ) associated with the latent variable of physical activity was used to evaluate the effectiveness of the model in explaining the variance observed in the participants' physical activity behavior.

In the model, physical activity was represented by the participants' MET score, and all other latent variables were measured by single-indicator measures with various numbers of items for self-efficacy, pros, cons, friend support and family support. This exploratory model was tested to determine which variables were related to physical activity. To depict the central position of social support in Korean culture, the model indicated that family and friends had direct paths to physical activity, as well as indirect paths through self-efficacy, pros and cons among Korean adolescents. All statistical analyses were performed using SPSS Win 12.0 (SPSS Inc., Chicago, IL, USA) and AMOS 3.6 (SPSS Inc.), with alpha set at the  $p < 0.05$  level.

## **Results**

### ***Participants***

The participants had a mean age of  $16.40 \pm 0.48$  years (range, 14–19 years) and engaged in  $M_{METS} = 26.23 \pm 12.81$  of physical activity during the previous week.

### ***Correlation among physical activity behavior and psychosocial variables***

As shown in the Table, all the psychosocial variables were significantly intercorrelated, as well as related with

**Table.** Correlations among all of the study constructs

	1	2	3	4	5	6
Study constructs						
1. Friend support	1.00					
2. Family support	0.48*	1.00				
3. Self-efficacy	0.40*	0.37*	1.00			
4. Pros	0.34*	0.32*	0.39*	1.00		
5. Cons	-0.06†	0.09†	-0.04	-0.02	1.00	
6. Met score	0.28*	0.19*	0.45*	0.38*	0.25*	1.00
Mean ± SD	2.27 ± 0.96	2.08 ± 0.95	3.10 ± 0.58	3.45 ± 0.71	2.19 ± 0.76	26.23 ± 12.81

\* $p < 0.01$ ; † $p < 0.05$ .

MET score. Self-efficacy had the strongest correlation with MET score ( $r = 0.45$ ). On the basis of each variable's correlation coefficient, the effect of the psychosocial variables on physical activity were considered.

#### **SEM analysis exploring the relationships among the psychological variables, social variables and physical activity**

Before SEM analysis, an inspection of the normality of the data revealed that the data were normally distributed (i.e. skewness = -0.17, kurtosis = 0.18 for self-efficacy; skewness = 0.54, kurtosis = 0.26 for pros; skewness = 0.93, kurtosis = 0.90 for cons; skewness = 0.40, kurtosis = -0.71 for friend support; skewness = 0.53, kurtosis = -0.86 for family support).

A model based on the tenets of psychosocial theories that specified the relationships between self-efficacy, pros, cons, friend support, family support, and physical activity was evaluated using SEM procedures that have been recommended for theoretical models (MacCallum & Austin 2000). For the purposes of SEM analyses, manifest items were loaded uniquely on their relevant latent factors, the relationship among measurement error and disturbance terms were constrained to zero, and a factor loading was fixed at 1.0 to define the scale (Wilson & Rodgers 2004). To test this model, some recommendations regarding values for global model fit were adopted (Hu & Bentler 1999; Kline 1998). Specifically, a  $\chi^2/df$  ratio less than 3, GFI and AGFI values greater than 0.90, and RMSEA values less than 0.05 were deemed to be indicative of an acceptable model fit.

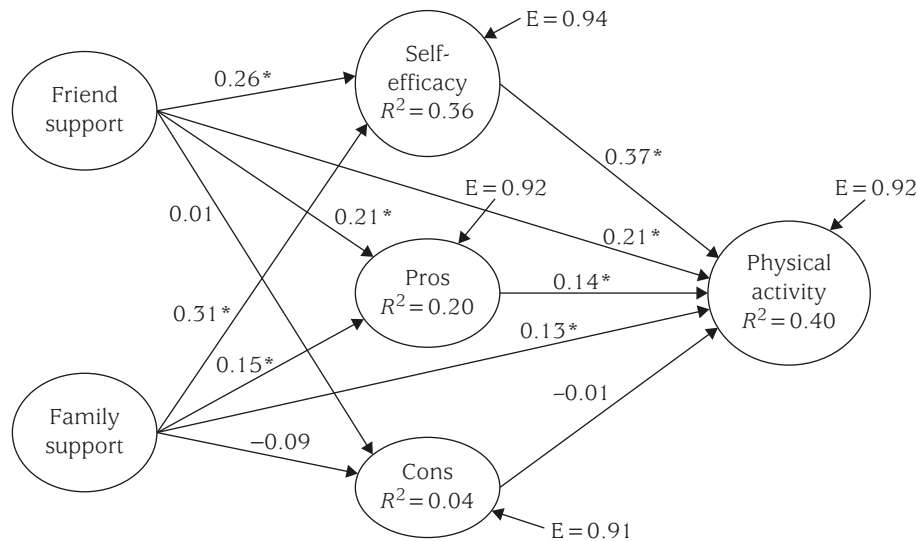
As sex differences in physical activity and its related psychosocial factors have been documented in previous studies (Beets et al. 2006, 2005), the proposed model was tested separately for both sexes to explore an association between physical activity and psychosocial variables in an initial stage of SEM analysis. However,

the results obtained from the separate SEM analyses for both male and female adolescents were not significantly different. That is, the standardized coefficients showed similar estimates in predicting direct relationships between psychosocial variables and physical activity and indirect relationships between social support and physical activity through the psychological variables. Therefore, for parsimony, this study integrated the data initially separated by sex and tested the combined sample using SEM analysis.

Figure 2 shows the results of the SEM analysis. The standardized coefficients are produced through direct paths from social support (i.e. friend support and family support) to physical activity, direct paths from psychological variables (i.e. self-efficacy, pros and cons) to physical activity, and indirect paths from family support and friend support to physical activity through self-efficacy, pros and cons.

The standardized coefficients embedded in the structural model indicate that both friend and family support had a significant direct effect, as well as indirect effect, on physical activity through self-efficacy and pros. However, friend and family support had no statistically significant effect on cons. Of the social support variables, friend support had a stronger relationship to physical activity than did family support. With regard to the psychological variables, all were significantly associated with physical activity, with self-efficacy having the strongest direct effect on physical activity. Overall, the psychosocial variables adopted in this model accounted for 40.6% of the variance in the adolescents' physical activity participation.

An important part of any statistical procedure that builds models from data is to establish model fit. According to indices of global model fit, the proposed model had an excellent fit for exploring the relationship among the psychological variables, social support and



**Fig. 2** Association of psychosocial variables for explaining Korean adolescents' physical activity behavior (\* $p < 0.05$ ).

physical activity behavior ( $\chi^2 = 20.71$ ,  $df = 7$ ,  $p < 0.05$ ;  $GFI = 0.98$ ,  $AGFI = 0.94$ ,  $RMSEA = 0.05$ ).

## Discussion

Investigating the role of psychosocial variables on Korean adolescents' physical activity behavior is important for at least these reasons. First, adolescents can make major contributions to their own health through the adoption of regular physical activity, and this health-enhancing behavior is related to positive psychological outcomes (Ratey & Hagerman 2008; Millstein et al. 1993). Second, adolescents spend roughly 18 years of their life with their family and friends; therefore, family and friends exert considerable influence on adolescents' health-enhancing behaviors, including physical activity (Sallis & Patrick 1994). Third, by understanding the processes that relate to regular physical activity participation, more effective exercise interventions for adolescents—a group that is at high risk for becoming sedentary in their later life—may be developed and implemented (Brodersen et al. 2005).

To achieve a deeper understanding of the processes that lead to regular physical activity involvement among Korean adolescents, this study examined the hypothesized model that social variables in the form of family and friend support would be related to psychological variables (e.g. self-efficacy, pros and cons), and that these associations would consequently exert a substantial influence on predicting physical activity behavior.

The model provided a good fit to the data and explained 40.6% of the variance in physical activity. This finding is consistent with previous Western research (Carron et al. 2003, 1996). These studies concluded that the degree to which people sense they receive social support can influence the development of psychological dispositions such as self-efficacy, intentions, and attitudes that are associated with involvement in physical activity.

In this study, self-efficacy exerted the largest total effect on Korean adolescents' physical activity behavior. Adolescents with high self-efficacy were more likely to participate in physical activity compared to those with lower levels of self-efficacy. Consistent with this, numerous other descriptive studies have found self-efficacy to be one of the strongest predictors of adopting and maintaining regular physical activity behavior (Levy et al. 2009; Flath & Cardinal 2006; Kim et al. 2006; Cardinal et al. 2005, 2004; Kim 2004; Rovniak et al. 2002). Furthermore, friend support and family support alone exerted a positive effect on physical activity, suggesting that supportive social networks can facilitate regular involvement in physical activity among Korean adolescents. For example, regularly scheduled exercise sessions with supportive friends or family members can help sustain an active lifestyle (Carron et al. 1996). In addition, study participants reported that friend support was a more important source for physical activity participation than was family support. This was in spite of the strong emphasis on the family bond in Korean culture. Though culture exerts a potent and enduring

influence on people's way of living, including physical activity, Korean society has been radically changed and westernized in many sectors. At least in this set of observations, it appears that among Korean adolescents, family-centered tendencies have shifted toward more individualism or interdependence with peers. If this is truly an accurate depiction of the evolving social climate in Korea, then adolescents are in the process of attempting to become independent from their parents and are strengthening their identification with their peers (Wu et al. 2003). Given these social tendencies, friends can be powerful models and sources of social support for physical activity.

Those with high self-efficacy to engage in physical activity, despite obstacles, tend to be more active. This finding has been observed in several studies (Levy et al. 2009; Flath & Cardinal 2006; Kim et al. 2006; Cardinal et al. 2005, 2004; Kim 2004; Rovniak et al. 2002; Dishman & Sallis 1994) and is consistent with Bandura's (1997, 1986, 1977) theory, which hypothesizes that an individual's level of confidence to engage in a specific behavior is related to their actual behavior. Self-efficacy is developed through previous performance accomplishments, vicarious experiences (modeling), verbal persuasion, emotional arousal, physiological states, and imagined experiences. For example, setting physical activity goals and sticking with them would result in a sense of accomplishment, thereby raising one's efficacy expectations. Similarly, seeing others (e.g. friends, siblings) receive recognition or rewards from significant others would increase one's efficacy expectations. Modeling and reinforcement may also occur through fictional characters, as was shown in the "Fit 'n' Fun Dudes" home-based physical activity intervention program among preadolescent girls (Hardman et al. 2009).

The pattern of relationships between physical activity behavior and the pros and cons found in the present study is supported by previous Western studies, which have found that individuals do not maintain or promote their physical activity levels unless they perceive the benefits of physical activity to outweigh the barriers (Berry et al. 2005; Prochaska & Marcus 1993). For example, perceiving that one's friends are energetic, healthy and popular as a result of their exercise involvement would constitute benefits. Conversely, believing that one would feel sore and tired after exercise would be a barrier that would likely decrease involvement. Practitioners are encouraged to emphasize the personal benefits of physical activity to facilitate physical activity adoption (Kim et al. 2006).

The primary focus of this study was to explore relationships among physical activity behavior and the psychosocial variables assessed in a Korean adolescent population. Interaction effects between psychosocial variables and demographic factors were not examined. All the measures used in this study underwent rigorous and systematic translation and validation processes. Nonetheless, they relied on self-report, which may result in some bias from item interpretation, recall and social desirability.

In spite of such methodological limitations, this study offers initial evidence of a relationship among psychosocial constructs and Korean adolescents' physical activity behavior. The ideas and issues identified in this study are consistent with the results of previous Western research in the field of adolescent health. In particular, the findings of this study provide the potential to influence the development of better physical activity programs that include sociopsychological attributes as a key component (Cardinal et al. 2009). Such programs have already begun to be successfully introduced to adult audiences in Korea (Kim & Cardinal 2009).

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