

AN ABSTRACT OF THE DISSERTATION OF

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Title: Ethnic Minorities' Leisure-Time Physical Activity in the Context of Acculturation

Abstract approved:

Bradley J. Cardinal

Eliminating physical activity disparities among ethnic minorities in the U.S. is important. Cultural differences have been found to be plausible contributing factors associated with such disparities. Therefore it is important to investigate and understand the mechanisms by which diverse aspects of cultural experiences affect physical activity participation among ethnic minorities, which should aid in the design and implementation of culturally relevant intervention programs. The purpose of this dissertation was to investigate the psychosocial mechanisms through which an ethnic minority individual's cultural experiences are translated into physical activity behaviors.

The first manuscript reviews empirical findings about the association between acculturation and physical activity among ethnic minorities. Then, mediation and moderation perspectives of the mechanisms by which the effects of acculturation on leisure-time physical activity can be explained were extracted from various theories of health behaviors. Adopting the theory of triadic influences' (Flay et al., 2009) typology, such mechanisms were converged into intrapersonal, interpersonal, and sociocultural streams of influences.

Next two empirical studies tested cultural influences on leisure-time physical activity participation in Korean Americans, using the theory of planned behavior (Ajzen, 1985; 1991) as a framework. In the first empirical study, the mediating effects of

perceived behavioral control (PBC; intrapersonal stream), subjective norm (interpersonal stream), and attitude (sociocultural stream) on the relationship between acculturation and leisure-time physical activity intention and participation were tested. We found that acculturation was positively and negatively associated with PBC and subjective norm, respectively, and all tested relationships were gender invariant. Since the theory of planned behavior constructs only partially mediated the effects of acculturation on leisure-time physical activity, future studies should test additional potential mediators. Overall our findings suggest that intervention programs for physical activity promotion should target improving subjective norm among Korean Americans.

The second empirical study tested the moderation effects of cultural value orientation (horizontal and vertical individualism/collectivism), an aspect of value acculturation, on the association between PBC, subjective norm, and attitude and the leisure-time physical activity intention of Korean Americans. Findings indicated that the association between subjective norm and intention was magnified when horizontal collectivism was high; the relationship between PBC and intention was diminished as both horizontal individualism and horizontal collectivism was high. Future studies should further explore the latent structures of the theory of planned behavior constructs to more clearly interpret the findings of this study.

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Ethnic Minorities' Leisure-Time Physical Activity in the Context of Acculturation

by
Hyo Lee

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APPROVED:

Major Professor, representing Exercise and Sport Science

Chair of the Department of Nutrition and Exercise Sciences

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Hyo Lee, Author

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CONTRIBUTION OF AUTHORS

Hyo Lee, M.S., conceptualized, drafted, collected data, and conducted all data analyses presented.

Bradley J. Cardinal, Ph.D., provided editorial comments and suggestions on the interpretation of the findings.

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This dissertation is dedicated to my family.

Chapter 1. General Introduction

General Introduction

Eliminating physical activity disparities among ethnic minorities is a public health priority. Empirical findings suggest that a substantial portion of such disparities may be attributable to cultural differences among ethnic groups. Nevertheless, there is a paucity of research regarding comprehensive theories aimed at demonstrating how culture affects physical activity participation. Therefore, the psychosocial mechanisms through which an ethnic minority individual's cultural experiences are translated into physical activity were investigated in this dissertation.

The first manuscript of this dissertation is titled, "Understanding Psychosocial Mechanisms of the Influences of Acculturation on Physical Activity Participation Among Ethnic Minorities in the United States". Empirical studies about acculturation and physical activity relationship were reviewed, and the psychosocial theoretical frameworks to explain the mechanisms (i.e., mediation and moderation) of acculturative effects on physical activity participation are introduced.

Next, two empirical studies tested the usefulness of the theory of planned behavior as a theoretical framework for explaining how acculturation and cultural values affect Korean Americans' leisure-time physical activity behaviors. The first empirical study titled, "Korean American's Acculturation and the Theory of Planned Behavior in the Leisure-Time Physical Activity Context" tested the mediating effects of socio-cognitive variables (i.e., attitude, subjective norm, and perceived behavioral control) on the relationship between acculturation and leisure-time physical activity intention and participation. The second empirical study titled, "Moderating Effects of Individualism and Collectivism on Associations in the Theory of Planned Behavior Within the Context of Korean Americans' Leisure-Time Physical Activity Behavior" tested how the effects of three socio-cognitive variables from the theory of planned behavior on the leisure-time physical activity intention are moderated by individualism/collectivism, an aspect of value acculturation, in Korean Americans.

Chapter 2: Manuscript 1

Understanding Psychosocial Mechanisms of the Influences of Acculturation on Physical
Activity Participation Among Ethnic Minorities in the United States

Hyo Lee and Bradley J. Cardinal
Oregon State University

Journal: *Quest*
Address: Diane L. Gill, Ph.D., Editor
Department of Kinesiology
University of North Carolina at Greensboro
P.O. Box 26170
Greensboro, NC 27402-6170
Status: In review

Abstract

Culture has been studied as a factor that may account for physical activity disparities among different ethnicities in the U.S. Accordingly, acculturation has been one of the most prominent topics studied to explain mechanisms by which an individual or group may adopt a healthy or unhealthy lifestyle. Nevertheless, many studies lack the use of comprehensive theoretical frameworks, hence they are less informative for intervention design and implementation. This study was purposed to: 1) review important concepts of acculturation, and empirical findings regarding its association with physical activity participation, and 2) propose plausible syntheses of psychosocial theories of physical activity behavior and acculturative variables. The pros and cons of unidirectional and bidirectional models of acculturation were compared in terms of their theoretical plausibility as well as practicality. Acculturation has generally been found to be positively associated with leisure-time physical activity. Nevertheless, its impact on non leisure-time physical activity is still inconclusive. Lastly, we proposed that acculturation may affect physical activity participation through intrapersonal, interpersonal, and sociocultural streams of influence, adopting the typology of Flay et al.'s (2009) theory of triadic influence.

Introduction

The benefits of regular physical activity are well documented (Kesaniemi et al., 2001). The American Heart Association and American College of Sports Medicine recommend that adults who are healthy enough to do so participate in at least 30 minutes of moderate-intensity physical activity 5 days a week, 20 minutes of vigorous-intensity physical activity 3 days a week, or the equivalent combination of the two modes of activity, to achieve a minimal level of desirable health benefits (Haskell et al., 2007).

Unfortunately, whether measured subjectively by self-report recall questionnaire or objectively by accelerometer, no more than 51%, and as few as 5%, respectively, of adults appear to be achieving this recommendation (Centers for Disease Control and Prevention [CDC], 2011; Troiano et al., 2008). Furthermore, in 2009, 24.2% of U.S. adults did not engage in any physical activity during the past month (CDC, 2011). As such, getting more people to be physically active and having fewer people remain inactive (i.e., reducing sedentarism) are important objectives in the *Healthy People 2020* document (U.S. Department of Health and Human Services, n.d.).

Moreover, physical activity disparities exist by ethnicity among U.S. adults, with the non-Hispanic white sub-population being the most active, though still far below recommended levels (Kruger, Kohl, & Miles, 2007). For example, between 1997 and 2008, the proportion of adults who were classified as inactive (i.e., currently not engaging in any bouts of light to vigorous physical activity lasting 10 or more minutes) was highest among Hispanics (50.6%), and lowest among non-Hispanic whites (34.0%). Even after controlling for social class (i.e., education, income, employment, and marital status) leisure-time physical inactivity disparities among ethnic minority groups appear to remain (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000; Marshall et al., 2007). These data suggest that culture may be at least partially accounting for the physical activity disparities observed across ethnic groups.

Interestingly, immigrants to the U.S. are initially found to be healthier than their U.S. born counterparts, but the longer their length of residence in the U.S., the more likely this advantage is to diminish (Singh & Siahpush, 2001, 2002). This may be because their health behaviors generally begin to resemble those of native-born populations the longer their length of residence (Koya & Egede, 2007; Singh & Siahpush, 2002), suggesting that

acculturation may play a role in ethnic minorities' health behaviors, including leisure-time physical activity. Accordingly, acculturation has been one of the most prominent topics for researchers who study the role of culture in physical activity disparity (Crespo, 2000; Espinosa de los Monteros, Gallo, Elder, & Talavera, 2008).

Conceptualizing and Measuring Acculturation

Acculturation is a multi-faceted change in individuals or ethnic groups resulting from first-hand contact between two or more cultural systems. According to the International Organization for Migration (IOM), acculturation refers to the progressive adoption of new cultural ideas, language, values, norms, behaviors, and institutions by person and/or groups (as cited in Sam, 2006, p. 11). Therefore, individuals who undergo acculturative changes experience shifts in their preference for not only behavioral patterns such as language, lifestyle, interpersonal contact, and ethnic identity (Berry, 2003), but also value systems regarding family dynamics, gender roles, need for achievement, and collectivism and individualism (Marín & Gamba, 2003). Also, acculturation is associated with mental health problems such as anxiety and depression, which can be attributed to acculturative stress (Revollo, Qureshi, Collazos, Valero, & Casas, 2011).

Even though the IOM's definition of acculturation implies acculturation is bipolar in nature, there has been ongoing discourse about the dimensionality of acculturation. In the bipolar model of acculturation individuals are assumed to lose their original culture as they adopt a new culture. However, Berry (1970; 2003; 2006) asserted that an individual's acquisition of a new culture may not necessarily result in the total loss of the heritage culture. Rather Berry suggested that acculturation is a bidimensional construct consisting of a cultural preference and contact preference axis which render four acculturation strategies of individuals: assimilation (i.e., losing original cultural identity and pursuing a new cultural contact), integration (i.e., pursuing a new cultural contact, but still maintaining original cultural identity), separation (i.e., losing original cultural identity and avoiding a new cultural contact), and marginalization (i.e., maintaining original cultural identity and avoiding a new cultural contact). In addition, individuals' selection of these four acculturation strategies are affected by the larger society's acculturation strategy where the sociocultural environment encourages, forces, or hinders one's cultural shift and contact. Despite the theoretical plausibility of Berry's bidimensional acculturation model,

many studies continue to rely on the bipolar assumption of acculturation (e.g., Diaz, Marshak, Montgomery, Rea, & Backman, 2009; Guinn & Vincent, 2008; Hosper, Nierkens, van Valkengoed, & Stronks, 2008). This may reflect the statistical parsimony of the bipolar model and/or methodological challenges associated with clearly demarcating the four hypothesized acculturation strategies.

Numerous measures of acculturation have been developed and tested along with varying conceptualization of acculturation (Table 1). Most of these measures were designed to assess individual acculturative variations with regard to Anglo American culture (Zane & Mak, 2003). Nevertheless, Zane and Mak identified the lack of consensus among many of the measures of acculturation and the domains and patterns of acculturation. Specifically, acculturation measures selectively include language use, preference, and proficiency; preference and practice in social affiliations; cultural identity; and/or other proxy indicators such as generation status and length of residence in the U.S. In addition, and as noted above, the acculturation measures also vary in their assumptions regarding dimensionality (e.g., whether original heritage cultural is lost as the new host culture is increasingly accepted).

----- Insert Table 1 about here -----

Acculturation and Health Behavior with an Emphasis on Physical Activity Behavior

Depending on the health behavior being studied (e.g., alcohol consumption, diet, physical activity, smoking, sun-safe behaviors), acculturation has been reported to either be a protective or risk factor for immigrants' health. For example, among Hispanics, acculturation was positively associated with not only unhealthy behaviors such as poor diet (Abraido-Lanza, Chao, & Florez, 2005; Hubert, Snider, & Winkleby, 2005), smoking and alcohol consumption (Abraido-Lanza et al., 2005; Masel, Rudkin, & Peek), but also with healthy behaviors such as sunscreen use (Andreeva et al., 2009), and leisure-time physical activity (Abraido-Lanza et al., 2005; Berrigan, Dodd, Troiano, Reeve, & Ballard-Barbash, 2006).

The effects of acculturation on health behaviors, however, cannot be generalized to other ethnic groups because it can also depend on the ethnic group's culture of origin. For example, the more acculturated Bosnian refugees in the U.S. were, the more likely they were to perceive smoking as a risk factor of heart and lung disease (Helweg-Larsen

& Stancioff, 2008), which is opposite to what was found for Hispanics (Abraido-Lanza et al., 2005). In a similar vein, Ma et al. (2004) found that the more acculturated Asian adult males were, the less likely they were to smoke.

Though not yet conclusive, the overall body of empirical evidence suggests that acculturation may be a protective factor for leisure-time physical activity (see Table2). That is, among the 24 empirical studies that have examined the relationship between acculturation and leisure-time physical activity, 18 found acculturation to the mainstream U.S. culture to be positively associated with leisure-time physical activity participation, 5 reported null associations, and 1 found an inverse association. Among the five studies with no significant association, three were conducted among older adult samples only (Dergance, Mouton, Lichtenstein, & Hazuda, 2005; Masel et al., 2006; Parikh, Fahs, Shelley, & Yerneni, 2009), and one study focused on middle age Korean immigrant women only (Yang et al., 2007). In sum, age, gender, and ethnicity may all be factors moderating the effects of acculturation on leisure-time physical activity. Future studies should pay more attention to these factors.

Meanwhile, the association between acculturation and non leisure-time physical activity (e.g., household, occupational, transportational) is an understudied area, but the limited available evidence suggests the pattern might be quite different between this and leisure-time physical activity. For example, Marquez and McAuley (2006) found the effect of acculturation on leisure-time physical activity to be insignificant, but for non leisure-time physical activity it was negative. Among the four studies identified in this review, acculturation was inversely associated with occupational physical activity in three studies, transportation physical activity in one study, and overall non leisure-time physical activity in one study. Nevertheless, acculturation was positively associated with women's occupational physical activity in a multi-ethnic minorities study conducted in Massachusetts (Wolin, Colditz, Stoddard, Emmons, & Sorensen, 2006). Lastly, acculturation was not significantly associated with the odds of having a physically active occupation in a sample of Asian women (Kandula & Lauderdale, 2005).

----- Insert Table 2 about here -----

Toward Theory-Based Investigations

Comprehensive theories provide insights about predicting future events, can help guide data analyses, and they serve as frameworks for the design and delivery of intervention programs. There have been numerous studies examining behavioral shifts concomitant with the acculturation process. There are also relatively well understood links between acculturation and health as a result of such behavioral shifts. Nevertheless, as Myers and Rodriguez (2002) noted, most studies have drawn conclusions on the basis of descriptive relationships between acculturation and health or health behaviors. Also, Abraido-Lanza, Armbrister, Florez, and Aguirre (2006) argued that the majority of acculturation studies employed proxy measures (e.g., country of birth, generation status, and length of residence in the U.S.) or composite scores of multi-faceted scales of acculturation, which limit the studies' ability to capture diverse nuances of acculturation (e.g., attitudinal change, adherence to specific American values, etc.) on health.

On the basis of Sallis, Owen, and Fotheringham's (2000) behavioral epidemiology framework, the sequence of studies necessary for ultimately designing evidence-based intervention programs are: 1) establishing links between behaviors and health; 2) developing methods for measuring the behavior; 3) identifying factors that influence the behavior; 4) evaluating interventions to change the behavior; and 5) translating research into practice. Specifically, the third step, identifying factors that influence behavior, should include not only identifying correlates of the behavior, but also testing the pathways and interactions through which the identified factors influence the behavior. Therefore, as Myers and Rodriguez (2002) suggested, comprehensive models that consider demographic characteristics, preexisting risk factors, acculturation processes, and proximal mediators and moderators such as psychological factors and health behaviors should be tested, in addition to the relationship between acculturation and health behavior and health outcomes.

Since acculturation itself implies multidimensional changes encompassing a worldview of specific behaviors in an ethnic group and individuals (Berry, 2003), its implication on leisure-time physical activity can be most comprehensively understood using psychosocial and ecological frameworks. At the psychosocial level, a number of well-tested models including the health belief model, social cognitive theory (Bandura,

1986), theory of planned behavior (Ajzen, 1991), and transtheoretical model (Prochaska & DiClemente, 1983) can provide plausible frameworks for testing mechanisms of acculturative change in leisure-time physical activity.

According to the health belief model, individuals are most likely to engage in health promoting behaviors when they perceive their health to be threatened, there are perceived benefits associated with choosing to perform healthy behaviors, barriers to engage in health behaviors are reduced, self-efficacy is high, and cues to action are provided. The social cognitive theory hypothesizes that people are most likely to choose to engage in health promoting behaviors when the behavior is modeled by others, the benefits for doing so are recognizable (outcome expectancy), and self-efficacy is high, all of which helps motivate action. The theory of planned behavior identifies attitude, subjective norm, perceived behavioral control, and intention as the key predictors of health behaviors. Within the transtheoretical model the processes of change, stages of change, decisional balance, and self-efficacy are thought to be the main factors for successful health behavior change. In sum, despite various construct operationalization and different pathways among the constructs, a great deal of commonality exists among the different psychosocial theories (Table 3).

----- Insert Table 3 about here -----

Applying the theory of triadic influence's (Flay, Snyder, & Petraitis, 2009) typology, health behavior can be most proximally predicted by behavioral intention (or goal or motivation), which is affected by an intrapersonal stream (converging on self-efficacy or perceived behavioral control), an interpersonal stream (converging on subjective norm), and a sociocultural stream (converging on attitude, outcome expectation, decisional balance, or perceived threat or benefit).

Mediation Models

Flay et al. (2009) explained that the ultimate and relatively stable causes of health behavior(s) are personal dispositions, social situation, and cultural environment. Through the intrapersonal stream, in turn, personal dispositions determine the level of perceived behavioral control mediated by self-perception and social competence. Second, through the interpersonal stream, social situation affects subjective norm mediated by interpersonal bonding and observation and perception about others' behaviors and beliefs.

Third, through the sociocultural stream, cultural environment shapes one's attitude toward the behavior mediated by one's interactions with social institutions and exposure to pertinent information.

Recalling that acculturation accompanies value, norm, and behavioral changes, as well as changes in language preference and interpersonal relationships, research should test the effects of acculturation on health behaviors mediated through the intrapersonal, interpersonal, and sociocultural streams of influences. That is, acculturation may not only imply a shift in cultural exposure, but also changes in quality of self-perception, social competence, interpersonal relationships and influences. Researchers may thus hypothesize that acculturation affects perceptions about regular leisure-time physical activity participation through: 1) ability and control (i.e., acculturation → self-efficacy or perceived behavioral control; intrapersonal stream), 2) observation of or pressure from significant others regarding doing leisure-time physical activity on a regular basis (i.e., acculturation → subjective norm; interpersonal stream), and 3) cognitive and affective appraisal about pros and cons (i.e., acculturation → attitude, outcome expectation, decisional balance, or perceived threat or benefit; sociocultural stream).

While not comprehensive in scope, several health behavior studies have investigated the role of acculturation on the relationships between the mediators that have been proposed. For example, Helweg-Larsen and Stancioff (2008) found that acculturation was positively related to perception of smokers' health risk within a Bosnian refugee sample. Unger et al. (2000) found that attitude, perceived norms, and perceived control regarding experimental smoking behaviors are correlated with acculturation among Hispanic and Asian American adolescents. Using regression analysis, Diaz, Marshak, Montgomery, Rea, and Backman (2009) reported acculturation to be a negative predictor of intention for healthy diet, but not attitude, subjective norm, or perceived behavioral control within a sample of Latino adolescents in California. Meanwhile, Liou and Contento (2001) found that acculturation was inversely related to subjective norm regarding low-fat diet in a convenience sample of Chinese Americans. In an illicit drug use study, Carvajal, Photiades, Evans, and Nash (1997) reported that acculturation moderates the relationships between adolescents' intention and attitude, norm, and perceived behavioral control. Finally, Hosper, Nierkens, van Valkengoed, and Stronks

(2008) found that acculturation was positively associated with Turkish women's exercise participation, and culturally negative beliefs about exercise decreased as they became more acculturated to the Netherlands' culture.

Moderation Models

According to Schwartz and Bilsky (1987), values serve as guiding standards for choosing and evaluating behaviors, and the relative priorities of values characterize cultures. According to Hofstede (1980), power distance (i.e., acceptance of social inequity), individualism/collectivism, masculinity/femininity, and uncertainty avoidance (i.e., feeling comfortable with uncertainty and ambiguity) are four important dimensions of the individual-level cultural value system.

According to Marín and Gamba (2003), acculturative changes accompany shifts in cultural values. This value acculturation has been reported to be manifested as changes in familiarism (strong identification and attachment with extended families), gender roles, need for achievement, and individualism/collectivism (Marín & Gamba, 2003). Among these, individualism/collectivism has received the most attention from researchers as a potential explanation for cross-cultural differences regarding the relative influences of intrapersonal, interpersonal, and sociocultural variables on leisure-time physical activity. For example, Nigg, Lippke, and Maddock (2009) found that the subjective norm-intention relationship was stronger in Japanese Hawaiians (i.e., thought to be a collectivistic group) compared to Anglo Hawaiians (i.e., thought to be an individualistic group). Also, Hagger and colleagues' (2007) found that perceived behavioral control was not significant, but subjective norm was, in predicting intention only among Hungarian college students, a group thought to be more collectivistic in nature compared to Western Europeans.

These studies imply that acculturation at an individual-level may also moderate the influences of intrapersonal, interpersonal, and sociocultural variables on leisure-time physical activity. For example, individualism/collectivism may moderate the relative importance of the three streams of influences in the theory of triadic influence.

Individualism is characterized by independent self, personal goals, each individual's uniqueness, rationality, attitudes, and personal control, whereas collectivism emphasizes interdependent self with group, group goal, relatedness, social norms, and cooperation within the group (Hofstede, 1980; Triandis, 1995). Deriving from this line of thought, it

can be hypothesized that individualism may attenuate the effect of perceived social pressure to participate in leisure-time physical activity, and magnify the effects of attitude and perceived ability and control on leisure-time physical activity intention, respectively. On the contrary, collectivism may be a factor that magnifies the effect of subjective norm, and diminishes the influences of attitude and perceived ability and control. In the physical activity domain, Terry and Hogg (1996) empirically demonstrated that perceived norm was more salient for persons who strongly identified themselves with the group (i.e., collectivists), and perceived self-control was more important for those who had a lower sense of group affiliation (i.e., individualists).

Conclusion

Culture has been identified as a factor contributing to physical activity disparities across ethnic groups. In addition, empirical findings suggest that acculturation can play an important role as a determinant of ethnic minorities' leisure-time physical activity participation. Psychological acculturation implies behavioral and value change of an individual. Studies have found that acculturation as a whole is positively associated with leisure-time physical activity, even though variations by age, gender, and ethnicity can exist.

Comprehensive theories are crucial for understanding the mechanisms through which acculturation influences leisure-time physical activity participation, and planning and evaluating intervention programs to promote the leisure-time physical activity of ethnic minorities. Extracting commonalities from the health belief model, social cognitive theory, the theory of planned behavior, and the transtheoretical model, the effects of acculturation on leisure-time physical activity can be summarized into intrapersonal, interpersonal, and sociocultural streams, by adopting the typology of Flay and colleagues' (2009) theory of triadic influence. Mediation and moderation models were suggested as psychological mechanisms by which acculturation affects leisure-time physical activity. In the mediation model, acculturation was hypothesized to affect an individual's intention to partake in leisure-time physical activity through intrapersonal, interpersonal, and sociocultural streams. Meanwhile, the moderation model suggests that changes in cultural value orientation such as individualism/collectivism that accompany behavioral acculturation may differentiate the relative importance of the three streams of influence.

We suggest that intervention programs designed to promote ethnic minorities' leisure-time physical activity behavior should be based on empirical evidence and organized by comprehensive theoretical frameworks that put key pieces of information together. From that standpoint, the suggested mediation and moderation models can play a role in guiding empirical research, as well as intervention design and evaluation.

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Table 1. Summary of selected acculturation measures.

Acculturation Scales	Domains							
	Language	Social Affiliation	Daily living habits	Cultural traditions	Communication style	Cultural identity	Generation	Cultural values
Behavioral Acculturation Scale ^a	√		√	√	√			
Value Acculturation Scale ^a					√			√
Short Acculturation Scale ^b	√	√	√			√	√	
Acculturation Rating Scale for Mexican Americans-II ^c	√	√	√			√	√	
Acculturation, Habits, and Interests Multicultural Scale for Adolescents ^d	√	√	√	√		√		
Suinn-Lew Asian Self-Identity Acculturation Scale ^e	√	√	√					

Adopted and modified from Zane, N., & Mak, W. (2003). Major approaches to the measurement of acculturation among ethnic minority populations: a content analysis and an alternative empirical strategy. In K. M. Chun, P. B. Organista & G. Marin (Eds.), *Acculturation: Advances in Theory, Measurement, and Applied Research*. Washington, DC: American Psychological Association.

^a Szapocznik, Scopetta, Fernandez, & de los Angeles Aranalde (1978); ^b Marín, Sabogal, VanOss Marín, Otero-Sabogal, & Pérez-Stable (1987); ^c Cuellar, Arnold, & Maldonado (1985); ^d Unger et al (2002); ^e Suinn, Rickard-Figueroa, Lew, & Vigil (1987)

Table 2. Summary of empirical studies testing the acculturation-physical activity relationship

Sample	Measure of acculturation	Mediators tested	Association with PA		Reference
			LTPA	NLTPA	
Hispanic adolescents in Texas	Language use at home		+		(Springer et al., 2009)
Older Chinese in New York	Language use and years in the U.S.		0		(Parikh et al., 2009)
Hispanic adolescents	Language use at home Generation		+		(Liu, Probst, Harun, Bennett, & Torres, 2009)
			+		
Hispanic adults	Language use and years in the U.S.		+		(Neighbors, Marquez, & Marcus, 2008)
Low-income Mexican American females in border communities	ARSMA-II		+		(Monteros, Gallo, Elder, & Talavera, 2008)
Mexican American females in border communities	Language preference		+		(Guinn & Vincent, 2008)
Hispanic pregnant women	Language preference		+		(Gollenberg, Pekow, Markenson, Tucker, & Chasan-Taber, 2008)
Hispanic adults	Language preference		+		(DuBard & Gizlice, 2008)
Middle age Korean immigrant women in Central Texas	SL-ASIA		0		(Yang et al., 2007)
Hispanic women in San Diego	ARSMA-II	Perceived neighborhood safety (ns)	+		(Pichon et al., 2007)

Table 2. Summary of empirical studies testing the acculturation-physical activity relationship (continued)

Sample	Measure of acculturation	Mediators tested	Association with PA		Reference
			LTPA	NLTPA	
Hispanic pregnant women	Language preference		+		(Chasan-Taber et al., 2007)
Multi-ethnic minorities in Massachusetts	Language preference		+	Occupational: - (men), +(women)	(Wolin et al., 2006)
Hispanic women in Southwestern U.S.	Language preference		+		(Slattery et al., 2006)
Hispanic older adults	Country of origin, contact with Anglo-Americans, Language proficiency		0		(Masel et al., 2006)
Hispanics adults in central Illinois	Short Acculturation Scale		0	Occupational: -	(Marquez & McAuley, 2006)
Hispanic adults	Language preference		+	Transportational, occupational: -	(Berrigan et al., 2006)
Asian American adults	Years in the U.S., country of origin, language preference		+	Overall NLTPA: - (men), 0(women)	(Kandula & Lauderdale, 2005)
Older Indian American immigrants	Length of residence, ethnic identity		+		(Jonnalagadda & Diwan, 2005)

Table 2. Summary of empirical studies testing the acculturation-physical activity relationship (continued)

Sample	Measure of acculturation	Mediators tested	Association with PA		Reference
			LTPA	NLTPA	
Older Mexican Americans	English proficiency and preference, attitude toward Mexican culture, attitude toward traditional gender role	Psychosocial, lifestyle, chronic diseases	0		(Dergance et al., 2005)
Asian and Hispanic adolescents in urban areas	AHIMSA		-		(Unger et al., 2004)
Hispanic immigrant women in North Carolina	Language, length of residence, age at arrival in the U.S.		+	(including NLTPA)	(Evenson, Sarmiento, & Ayala, 2004)
Mexican American adults	Language		+		(Crespo, Smit, Carter-Pokras, & Andersen, 2001)
Korean American adults	Structural and cultural assimilation		+		(Lee, Sobal, & Frongillo, 2000)

+ positive association; - inverse association; 0 no significant association

Acronyms: PA = physical activity, LTPA = leisure-time physical activity, NLTPA = non-leisure-time physical activity, ns = non-significant

Table 3. Commonalities among intra- and interpersonal level health behavior models and theories

Theory/Model	Theory of planned behavior	Health belief model	Social cognitive theory	Transtheoretical model
Major predictors	Attitude	Perceived susceptibility, perceived severity, perceived benefits	Self-evaluative outcome expectancy	Decision balance
	Subjective norm		Social outcome expectancy	
	Perceived Behavioral Control	Perceived barriers, Self-efficacy	Self-efficacy	Self-efficacy
	Intention	Health motivation Cues to action		Stages of change Processes of change

Note: Predictors on the same row represent conceptually similar constructs

Chapter 3: Manuscript 2

Korean American's Acculturation and the Theory of Planned Behavior
in the Leisure-Time Physical Activity Context

Hyo Lee and Bradley J. Cardinal
Oregon State University

Journal: *Journal of Sport and Exercise Psychology*
Address: Robert C. Eklund, PhD, Editor
Florida State University
Educational Psychology and Learning Systems
3204K Stone Bldg
Tallahassee, FL 32306 USA
Status: In review

Abstract

Ethnic minorities', including Korean Americans', leisure-time physical activity participation is less than ideal. Eliminating physical activity disparities in ethnic groups is a public health priority. Empirical studies suggested that acculturation may be an important factor explaining physical activity disparity, but there is a scarcity of studies testing psychosocial theories by which the association between acculturation and leisure-time physical activity can be understood. Therefore, this study tested the theory of planned behavior (Ajzen, 1985; 1991) as a framework where sociocognitive variables mediate the effects of acculturation on leisure-time physical activity in Korean Americans. A multiple-group structural equation model revealed that the mechanisms by which acculturation affects leisure-time physical activity was invariant by gender. Acculturation was positively associated with perceived behavioral control ($\beta=.31$), but negatively associated with subjective norm ($\beta=-.23$). In turn, subjective norm ($\beta=.15$), perceived behavioral control ($\beta=.46$), and attitude ($\beta=.24$) positively predicted behavioral intention ($R^2=.40$); and intention ($\beta=.42$), perceived behavioral control ($\beta=.22$), and acculturation ($\beta=.11$) jointly predicted leisure-time physical activity ($R^2=.33$). These results suggest that the theory of planned behavior constructs only partially mediate the effect on acculturation on leisure-time physical activity. Practically, this study suggests that culturally relevant intervention programs to promote Korean Americans' leisure-time physical activity should focus more on increasing subjective norm.

Introduction

Among various health behavior domains, regular physical activity participation is a public health priority. That is because physical inactivity is a modifiable risk factor related to cardiovascular disease, stroke, hypertension, type-2 diabetes, osteoporosis, obesity, some kinds of cancer, depression, and anxiety (Kesaniemi et al., 2001). Moreover, Mokdad, Marks, Stroup, and Gerberding (2004, 2005) found the combination of poor diet and physical inactivity to be the second leading cause of death in both 1990 and 2000. In spite of this, the 2008 National Health Interview Survey (National Center for Health Statistics [NCHS], n.d.) indicated that only 43.5% of adults met the Federal physical activity guideline (i.e., 150 min/wk of moderate-intensity physical activity or 75 min/wk of vigorous intensity-physical activity, or equivalent combination) in 2008. Accordingly, *Healthy People 2020* has as one of its objectives to increase the proportion of adults who engage in no leisure time physical activity to 32.6% (U.S. Department of Health and Human Services, n.d.).

Meanwhile, various national health statistics suggest that Asian Americans are largely healthier than their White American counterparts. For example, according to Singh and Siahpush (2002), Asian/Pacific Islanders' cardiovascular disease (CVD) and cancer mortality rates adjusted for sociodemographic covariates were significantly lower than their U.S.-born counterparts. Furthermore, the mortality advantage of foreign-born (immigrant) people was greater than those born in the U.S. (Singh & Siahpush, 2001, 2002). These data suggest the presence of sociocultural and behavioral protective mechanisms that promote Asian Americans' health; however, this may diminish by generational status.

Given this backdrop one might assume Asian Americans are more physically more active than White Americans. However, the proportion of Asians who meet neither aerobic nor anaerobic physical activities (54.7%) was higher than White American (47.9%), and highest next to African Americans (56.8%) in 2009 (NCHS, 2011). In addition, compared to the year 2000, the prevalence of physical inactivity among Asian Americans decreased only 3%, whereas for White and African American's the prevalence of inactivity decreased 5.2% and 7.8%, respectively. Clearly physical activity promotion efforts must not neglect Asian Americans.

Within the U.S. about 12 million people or 3.6% of the total population identify themselves as Asian (Barnes & Bennett, 2002). Among them, approximately 1.2 million are Korean Americans, which is the fourth largest Asian American subpopulation next to Chinese, Filipino, and Indian. Despite their population proportion in the U.S., only a small number of studies report on Korean American's physical activity participation levels.

On the basis of the studies that do exist, Korean Americans' overall physical activity participation appears to be less than ideal. For example, Sohng, Sohng, and Yeom (2002) found Korean immigrant older adults engaged in lower levels of exercise compared to other domains of health behaviors (e.g., nutrition intake). Also, Lee, Sobal, and Frongillo (2000) found that only about 29% and 17% of Korean American adults participated in light- and vigorous-intensity physical activity, respectively. Other studies with different Korean American subpopulation by age, region, and sex have revealed largely similar results (e.g., Hofstetter et al., 2008; Yang et al., 2007).

In sum, Korean Americans should be identified as an at-risk population in terms of physical inactivity. Nevertheless, there are a limited number of studies testing well-established behavior change models with cultural considerations.

Acculturation and Health Behaviors

Acculturation at a psychological level, which is the main focus of this study, refers to an individual's identity, value, attitude, and behavioral changes accompanied with one's ethnic groups' acculturative changes (Berry, 2003; Graves, 1967). Studies about acculturation and health behavior at least partially explain why Asian Americans, including Korean Americans, are relatively healthier than White Americans, and why such discrepancies decrease as the length of stay in the U.S. increases (Singh & Siahpush, 2001, 2002).

Interestingly, acculturation seems to not only be a protective mechanism, but also a risk factor. This may be because the effects of adapting to the U.S. lifestyle appear to depend on the ethnic group's culture of origin and domain of the behavior. For example, Berrigan, Dodd, Troiano, Reeve, and Ballard-Barbash (2006) and Lee et al. (2000) found that acculturation was positively related to leisure-time physical activity among Hispanic and Korean Americans, respectively. On the other hand, acculturation was a positive predictor of high caloric food consumption among Hispanics (Pérez-Escamilla & Putnik,

2007; Unger et al., 2004) and Asian Americans (Chen & Kennedy, 2005; Unger et al., 2004). Regarding the differential effects of acculturation, descriptive studies testing the direct effects of acculturation on health behavior are not fully informative about its psychosocial mechanisms. Therefore, studies need to test a theoretical model whereby the effects of acculturation on health behaviors are mediated and/or moderated.

Since acculturation refers to multidimensional changes encompassing value systems and behaviors in individuals (Berry, 2003), comprehensive models can better predict the dynamic effects of acculturation and provide testable theoretical frameworks. Also, testing theoretical models as psychosocial mechanisms by which culturally diverse individuals experience different behavioral outcomes are imperative for culturally relevant intervention design and as data analytic guidance. Despite a scarcity of empirical studies testing comprehensive psychosocial models of the acculturation and physical activity behavior relationship, the theory of planned behavior (Ajzen, 1985, 1991) may provide a useful theoretical framework for examining the acculturation and behavior relationship at a psychosocial level while concurrently considering sociocultural influences.

The Theory of Planned Behavior

The theory of planned behavior (TPB) suggests that an individual's behavior is most proximally predicted by intention to perform the behavior, and intention mediates the effects of attitude (i.e., the degree to which an individual values performing the behavior), subjective norm (i.e., an individual's perception of social pressure to perform or not to perform the behavior), and perceived behavioral control ([PBC] i.e., one's beliefs about doing regular exercise is under volitional control) on intention.

The TPB has been validated in the physical domain with various populations. For example, the TPB successfully predicted physical activity behaviors of African Americans (Martin et al., 2005), Mexican Americans (Martin, Oliver, & McCaughy, 2007), cancer survivors (Keats, Culos-Reed, Courneya, & McBride, 2007), and Asian Americans (Nigg et al., 2009). Also, its cross-cultural generalizability was supported by Hagger et al. (2007) with two noted exceptions, the effects of subjective norm and PBC may vary by country. Lastly, in a meta-analysis, Hagger, Chatzisarantis, and Biddle (2002) found the TPB constructs predicted 45% and 27% of the variance in intention and exercise behavior, respectively.

Also, the TPB has served as a foundation for the design and evaluation of physical activity intervention programs. For example, Chatzisarantis and Hagger (2005) implemented a TPB-based intervention program to promote adolescents' physical activity. They found the program was effective for increasing intention to engage in physical activity, which was mediated by attitude enhancement. In addition, Keats and Culos-Reed (2009) found that a TPB-based program to enhance core values of attitude, subjective norm, PBC, and intention was largely effective for enhancing intention to be physically active.

While useful for predicting physical activity behavior and providing guidance for the design and evaluation of physical activity interventions, some researchers have tried to extend the theory to better predict and understand diverse aspects of physical activity behaviors. For example, self-identity and group norms (Hamilton & White, 2008), consciousness (Conner & Abraham, 2007), and planning (Norman & Conner, 2005) added predictability to the TPB for intention and/or actual leisure-time physical activity participation.

Meanwhile, the TPB does not explicitly explain how an individual's sociocultural environment can determine her/his physical activity participation, because the focus is on intrapersonal and interpersonal levels of influence on a person's volitional behavior. On the contrary, theories and models incorporating an ecological perspective such as the social ecological model (McLeroy, Bibeau, Steckler, & Glanz, 1988) and the theory of triadic influence (Flay et al., 2009) suggest that the physical, social, and cultural environment are distal predictors of a person's health behavior, in addition to intrapersonal and interpersonal level variables. According to Flay et al. (2009), specifically, the sociocultural environment and personal traits are the ultimate causes of an individual's behavior, mediated by psychosocial variables such as self-efficacy, social normative beliefs, and attitude toward the behavior. The three psychosocial mediators, in turn, are the key predictors of intention and physical activity behavior as like in the TPB. Therefore, the TPB provides a plausible and testable theoretical framework whereby acculturation affects on the leisure-time physical activity behavior of Korean Americans can be considered.

Several empirical studies testing the TPB constructs as mediators of acculturation and the health behavior relationship support the usefulness of the TPB in acculturation research. For example, in their study of Latino adolescents' substance use, Carvajal, Photiades, Evans, and Nash (1997) found acculturation measured by inter-ethnic relationship in the U.S. culture was inversely associated with attitude toward marijuana use and smoking. Regarding dietary behaviors, Diaz, Marshak, Montgomery, Rea, and Backman (2009) found that higher acculturation predicted lower intention for healthy eating among Latino adolescents in California. Finally, Hosper, Nierkens, van Valkengoed, and Stronks (2008) found that acculturation was a positive predictor of Turkish women's physical activity, as culturally negative beliefs about exercise decreased as one became more acculturated to the Netherlands' culture. In sum, the aforementioned studies support the value and feasibility of pursuing research aimed at integrating the TPB and acculturation constructs.

The aim of the current study was to examine the effect of acculturation on the leisure-time physical activity behavior of Korean Americans. Since we are interested in psychosocial mechanisms of acculturation-leisure-time physical activity, we tested the mediating effects of psychosocial variables (i.e., attitude, subjective norm, PBC, and intention). Also, some studies have reported gender invariance among the TPB constructs (e.g., Nigg et al., 2009). Therefore, a secondary aim of this study was to test gender invariance of the tested relationship in the extended TPB framework that incorporates the acculturation component.

Methods

Participants

Data were collected for the doctoral dissertation of the first author of the present study (Lee, 2011). After being approved by Oregon State University Institutional Review Board, recruitment announcements were posted on Korean American-related websites (e.g., churches, student associations, businesses, cultural groups, and professional organizations). A link to the survey website (www.surveymonkey.com/oregonstate) was embedded in every announcement. There was no monetary compensate for partaking in the survey, but a dollar per complete survey was donated to the Haiti Relief Fund via the American Red Cross. Four hundred sixty eight 18 years of age or older adults who

identified themselves as Korean or Korean American who resided in the U.S. participated in the web survey. After screening out respondents with abnormal response patterns and/or more than 16 missing values, the responses of 449 participants (216 males and 233 females) remained for the main analyses.

Instrumentations

The participants chose their preferred language (i.e., English or Korean) for the informed consent form and online survey. Two hundred and two hundred forty nine participants chose to respond to the questionnaires in English or Korean, respectively. Upon agreeing to participate, they were next asked to disclose their age, gender, height and weight from which body mass index (BMI) was calculated, income, education, and marital status.

The main survey instrument was comprised of the TPB questionnaires, a leisure-time exercise questionnaire, and a measure of acculturation (i.e., the Suinn-Lew Asian Self-Identity Acculturation Scale [SL-ASIA]). All original survey instruments were in English and translated into Korean using appropriate translation and back translation procedures (Brislin, 1970), except for the SL-ASIA. The Korean version of SL-ASIA was obtained from Yang et al. (2007).¹

The TPB constructs (i.e., attitude, subjective norm, PBC, and intention) were adapted from previous studies (Blanchard et al., 2008; Kosma, Ellis, Cardinal, Bauer, & McCubbin, 2007), referring to Ajzen (2006).

¹ To test the measurement invariance between English and Korean responses, we compared measurement models with and without equal factor loadings constraint using a multiple-group confirmatory factor analysis (CFA). Even though the measurement models in English (n=200) and Korean (n=249) separately rendered excellent model fits, a factor loading equality constraint CFA model fitted substantively worse than an unconstrained CFA model. When the factor loadings on the acculturation scale (SL-ASIA) were freed, other factor loadings, variances, covariances were invariant (Table 3), suggesting only SL-ASIA was the main source of the non-invariance. Nevertheless, we are not conclusive that the measurement non-invariance between English and Korean responses implies either inadequate translation or response bias rendered by language, because language preference is one of the key facets of the SL-ASIA. That means, the non-invariance by language may also imply non-invariance by levels of acculturation. Since we did not mean to test the moderating effects of acculturation, testing English and Korean models separately without further consideration about its meanings may blur the interpretation of the results. Therefore, language non-invariance was not considered in the subsequent analyses even though we recognize it was a limitation of this study. Future studies need to confirm the moderation effects of acculturation especially on the responses to the items.

Attitude. Attitude toward leisure time physical activity was measured using 6-item attitude questionnaires. For the statement, “A week ago, I thought exercising regularly was”, six adjectives (boring, pleasant, enjoyable, good, useful, and harmful) were anchored to construct the six items. Response options were on a 5-point Likert scale with response options ranging from strongly disagree (1) to strongly agree (5).

Subjective norm. Subjective norm was measured on a 5-point Likert scale using 2 items. The two items were: 1) “A week ago, most people who are important to me thought I should have exercised regularly during last 7 days”; and 2) “A week ago, the people in my life whose opinions I value wanted me to exercise regularly during last 7 days”

PBC. was measured using four items. The four items were: 1) “A week ago, I believed that I could exercise regularly if I wanted to,” 2) “A week ago, I believed that it was extremely easy to exercise during last 7 days”, 3) “A week ago, I believed that I had a complete control over exercising regularly during last 7 days”, and 4) “A week ago, I believed that it was mostly up to me whether I exercise during last 7 days”. Again, participants used a 5-item Likert scale to respond to each statement.

Intention. Intention was measured using three items assessed with a 5-point Likert scale. The items were: 1) “A week ago, I intended to exercise regularly during last 7 days”, 2) “A week ago, I was going to try to exercise regularly during last 7 days”, and 3) “A week ago, I planed to exercise regularly during last 7 days”.

Leisure-time Physical Activity. The Leisure-Time Exercise Questionnaire (Godin & Shepard, 1985) was used to measure the study participants’ leisure-time physical activity behavior. Respondents were asked to choose their frequencies of strenuous, moderate, and mild exercise for more than 15 minutes during the previous 7 days. Exercise level was expressed as a weekly leisure activity score, which was derived from the following formula: $[(\text{strenuous} \times 9) + (\text{moderate} \times 5) + (\text{mild} \times 3)]$. The measure’s test-retest reliability ($r=.74$) and construct validity have been found to be acceptable (Cardinal, 1996; Godin & Shepard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993).

Acculturation. The SL-ASIA Scale (Suinn et al., 1987), a multi-faceted measure of Asian American’s acculturation to the U.S. mainstream culture, was used. It consisted of 21 items addressing five facets (i.e., reading/writing/cultural preference, ethnic interaction, affinity for ethnic identity and pride, generational identity, and food

preference) of behavioral aspects of acculturation (Suinn, Ahuna, & Khoo, 1992; Suinn, Khoo, & Ahuna, 1995). The measure has been shown to have high internal consistency (Atkinson & Gim, 1989; Suinn et al., 1992; Suinn et al., 1995; Suinn et al., 1987) and adequate validity (Ponterotto, Baluch, & Carielli, 1998; Suinn et al., 1992; Suinn et al., 1995).

Statistical Analyses

Preliminary and missing data analyses were performed using Stata 11.0 (StataCorp, 2009). Mplus 6.0 (Muthén & Muthén, 2010) was used for confirmatory factor analysis (CFA) and structural equation modeling (SEM) with maximum likelihood parameter estimation, and standard errors and a mean-adjusted chi-square test (Satorra-Benter χ^2) robust enough to handle non-normality (MLM). An insignificant Satorra-Benter χ^2 test implies an excellent model fit, but this test has been criticized due its sensitivity to the size of correlation and sample size. Therefore, additional model fit indices were used including the comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). This study used the cut-off criteria for goodness-of-fit indices from Hu and Bentler (1999), which are TLI and CFI close to .95, and RMSEA smaller than .06. Lastly, since leisure-time physical activity behavior was treated as a single-item latent variable (i.e., indicated by the summed weekly leisure activity score), the error variance was fixed to .54 based on the test-retest reliability of .74 from Godin and Shepard (1985) and variance in the current samples (i.e., variance of the log-transformed weekly leisure activity score = 2.25).

Results

Preliminary and Missing Data Analyses

Participant characteristics. The average age of participants was 30.42 years ($SD=10.41$). The majority of participants were born in Korea (75.56%), students (60.59%), and received at least some college education (94.56%). More detailed descriptive statistics about the sociodemographic characteristics of the participants are presented in Table 1.

----- Insert Table 1 about here -----

Missing data analysis and multiple imputation. Among those who were retained for analyses ($N=449$), only 374 participants answered every single question leaving 75 participants with at least one missing value. After examining the patters of missing data,

we identified the type of missing values to be missing at random (MAR) because any missing value did not seem to depend on levels of other variables. Since the use of listwise deletion for MAR may cause biased estimations (Acock, 2005), the multiple imputation method in Stata's user-written program, *ice* (Royston, 2004, 2005a, 2005b) was employed. Descriptive statistics and internal consistencies of the questionnaires from the original data and the multiple-imputation data are presented in Tables 2 and 3, respectively.

----- Insert Table 2 about here -----

----- Insert Table 3 about here -----

Item parceling.

The original 21-items from the SL-ASIA were parceled to maximize their estimation advantages. Item parceling has merits especially when the focus of the study is to understand the relationships among the latent constructs rather than the factor structure, and sample size is limited (Little, Cunningham, Shahar, & Widaman, 2002). The original 21 items were parceled into five parcels, using an internal-consistency approach for multi-dimensional item sets, as suggested by Kishton and Widaman (1994). Specifically, the facets identified in the factor analyses in Asian American college students and Singaporean samples (Suinn et al., 1992; Suinn et al., 1995) were used as the grouping criteria. Each parcel was created by averaging the items in each facet. As a result, acculturation was indicated by reading/writing/cultural preference, ethnic interaction, affinity for ethnic identity and pride, generational identity, and food preference parcels. Parceled items were used for all subsequent CFAs and SEMs.

----- Insert Table 4 about here -----

Testing Invariance by Gender

Upon appropriate model fit in a single-group SEM for each gender, the multiple-group SEM compared seven nested models: 1) no constraint model, 2) equal factor loading model, 3) equal factor variance model, 4) equal factor covariance model, 5) equal residual variance, 6) equal residual covariance, and 7) equal path coefficient model.

Since the scaling correction factor, which is necessary for calculating Satorra-Bentler χ^2 difference (Muthén & Muthén, n.d.) is not available for CFA and SEM with multiple imputation data, we relied on differences in other indices (i.e., Δ CFI, Δ TLI, and

Δ RMSEA). Cheung and Rensvold (2002) suggested that the model is invariant at the corresponding level if Δ CFI is less than .01 in comparison with a model with less constraint. In addition, if other model fit indices of the constrained model were not substantively poorer than the unconstrained model, we preferred the constrained model, which was more parsimonious.

Model fit indices of the female and male models, and a series of nested models are presented in the Table 5. First, the model fit indices suggest that the hypothesized model fit the data well for both female and males. Second, measurement and structural invariance by sex was supported by no substantive change in the model fit indices. In all comparisons of the nested models, none of the changes in CFI, TLI and RMSEA were greater than .01. Therefore, the model with full constraint, the most parsimonious model, was selected as the final model. In sum, multiple-group SEM suggests that not only the measurement model, but also relationships among the tested factors are equivalent in females and males.

----- Insert Table 5 about here -----

The final model explained 32.6% of the leisure-time physical activity variance. The proportion of explained variance of intention by acculturation, affective attitude, instrumental attitude, subjective norm, and PBC was 40.8%. Acculturation explained 0%, 5.2%, and 9.4% of the variance in attitude, subjective norm, and PBC, respectively.

Figure 1 depicts the interrelationships among the latent variables. Every path coefficient was standardized to represent the number of standard deviation change in the dependent variable associated with 1 standard deviation change in the independent variable. In the current study, intention ($\beta=.42, p<.001$) was a positive predictor of intention and the strongest predictor overall. In addition, PBC ($\beta=.22, p<.01$) and acculturation ($\beta=.11, p<.059$) significantly predicted leisure-time physical activity, albeit with smaller effect sizes compared to intention. In turn, intention was positively and strongly predicted by PBC ($\beta=.46, p<.001$). The effects of attitude ($\beta=.24, p<.001$) and subjective norm ($\beta=.15, p<.001$) on intention were small to medium, but also significant and positive. Nevertheless, the direct effect of acculturation on intention ($\beta=.07, p=.10$) was not significant. Acculturation negatively predicted subjective norm ($\beta=-.23, p<.001$),

but positively predicted PBC ($\beta=.31, p<.001$), with substantive effect sizes. Lastly, the effect of acculturation on attitude ($\beta=-.01, p=.92$) was not significant.

----- Insert Figure 1 about here -----

Discussion

Gender Invariance

The final model that included acculturation and the TPB constructs were gender invariant. This implies structures of the latent variables as well as the ways that Korean Americans realize cultural, interpersonal, and intrapersonal factors into regular leisure-time physical activity participation are equivalent for men and women. From White, Japanese, Native Hawaiian, and Filipino American samples in Hawaii, Nigg et al. (2009) also found gender invariance, except for higher intention-physical activity relationship in women compared to men. Largely, our study finding is similar to Nigg et al.'s study except for the gender invariance of the intention-actual behavior relationship. Also, our study extended Nigg et al.'s study by testing gender invariance of the distal factor (acculturation) and the TPB constructs.

Relations among the TPB Constructs

Direct effects of intention and PBC on leisure-time physical activity. The TPB was useful in predicting Korean American's leisure time physical activity as a whole. First, we found that leisure-time physical activity was most proximally and strongly predicted by intention. Also, PBC directly predicted leisure-time physical activity with smaller effect size compared to intention. These findings are consistent with Ajzen's (1985; 1991) contention that an individual can act when he/she has volitional control over the behavior, in addition to intention.

Predictors of intention. Among the predictors of intention within the TPB framework, PBC most strongly and positively influenced intention. This was followed by attitude and subjective norm. Hausenblas, Carron, and Mack (1997) found the same order as our study in their meta analysis. Nevertheless, more recent studies have found inter-ethnic and international variability regarding the relative importance of attitude, subjective norm, and PBC (Hagger et al., 2007; Nigg et al., 2009).

According to Ajzen (2001), collectivism and individualism can determine the relative importance of attitude and subjective norm in predicting intention. Specifically, it

is plausible to hypothesize that subjective norm is more important for collectivists, who highly value the group norm, rather than for individualists, for whom personal attitude may be more important. Empirically, in the physical domain, Nigg et al. (2009) found that the subjective norm-intention relationship was higher for Japanese Americans compared to White Americans in Hawaii. In addition, in a study with ethnically diverse workers in the Netherlands, Van Hooft and De Jong (2009) found that individuals with high collectivistic cultural value orientation were more strongly motivated by subjective norm, whereas attitude was a stronger motivator for individuals who scored low on collectivism using the TPB framework to predict job seeking behavior. Lastly, Liou and Contento (2001) found that the effect of subjective norm on intention to reduce dietary fat was diminished for relatively more acculturated Chinese Americans. We suggest future studies in the physical domain continue testing the moderating effects of acculturation on the inter-relationships among the TPB constructs.

Acculturation and the TPB

Direct effects of acculturation on intention and physical activity. The direct path from acculturation to intention was not significant. This implies the sufficiency and/or robustness of the TPB constructs for explaining the mediating mechanisms of social cognitive variables by which acculturation increases intention to partake in leisure-time physical activity participation among Korean Americans. Nevertheless, acculturation was found to directly affect leisure-time physical activity, implying the TPB constructs only partially mediated the relationship between acculturation and leisure-time physical activity. This suggests that social cognitive variables are useful but not enough to explain the mechanisms by which cultural adaptation to the U.S. influence Korean Americans' leisure-time physical activity. Indeed, according to Trost, Owen, Bauman, Sallis, and Brown (2002), physical activity participation is determined by demographic and biological factors, behavioral skills, and environmental factors, in addition to psychosocial factors. Therefore, future studies should test additional mediation effects of a wider range of potential determinants of physical activity behavior. In addition, future studies should test the moderating effects of acculturation on the inter-relationships among the TPB constructs.

Effect of acculturation on attitude. Even though there were significant associations between attitude and intention, acculturation was not associated with attitude in this sample. Therefore, while attitude is an important source of behavioral intention, attitude toward leisure-time physical activity may be cross-culturally (i.e., Korean vs. American culture) invariant. Supporting this contention, a cross-cultural study found decisional balance, an important predictor of exercise behavior in the transtheoretical model and which is conceptually similar to attitude (Cardinal, 1997; Prochaska & DiClemente, 1983), was not significantly different in a convenience sample of Korean and American college students (Kim, 2004).

Effect of acculturation on subjective norm. In this study acculturation was inversely associated with subjective norm. That is, Korean Americans who were more acculturated to the American mainstream felt less pressure to be physically active on a regular basis. Acculturation has many aspects of change not limited to accepting new cultural values and attitudes, but also qualities, perceptions, and kinds of interpersonal influences. The measure of acculturation in our study, SL-ASIA (Suinn et al., 1992), mainly depicts the behavioral aspects acculturation. Therefore, our study is not sufficient to disclose more detailed effects of acculturation on one's perception about social pressure to be physically active. We have three suggestions for future studies that could supplement our insufficiency in depicting various aspects of acculturation.

First, the effects of the quality of interpersonal relationships on subjective norm should be tested. For example, an acculturation gap among family members can result in low family cohesion (Smokowski, Rose, & Bacallao, 2008). Lowered family cohesion, in turn, may decrease the likelihood of receiving positive influences regarding health behaviors, including physical activity, from family members, who are potentially important sources of social support and social influence (Beets, Cardinal, & Alderman, 2010; Kim & Cardinal, 2010).

Second, acculturation can be related to bias in perception of an individual about social pressure. We used a global measure, but subjective norm can also be measured by a *normative belief* \times *motivation to comply* model. According to Kim and Atkinson (1999), meanwhile, value acculturation, which includes change in individualism and collectivism, is distinct from behavioral acculturation as measured by the SL-ASIA. Triandis (2001)

said individualists, compared to collectivists, are less dependent on their family and peer-group in decision making, and pay less attention to situational determinants than to psychological components as determinants of behavior. Therefore, individuals may have lower levels of *motivation to comply*, and, therefore, underestimate social pressure to be physically active regularly, as they became acculturated in an individualistically-oriented society.

Third, change in the persons who one interacts with is also concomitant of the acculturation process. Subjective norm, by definition, implies perceived social pressure from the reference group. Therefore, future studies should test whether the reference groups and their norms with regard to exercise behavior change as a result of acculturation.

Effect of acculturation on PBC. Acculturation was positively associated with PBC, which is the degree to which one believes doing regular physical activity is under volitional control. To our knowledge no study has identified the relationship between acculturation and PBC or similar psychological constructs (e.g., self-efficacy) in the health behavior domain. Even though the mechanisms to enhance PBC is unclear within the boundary of the TPB, the social cognitive theory (Bandura, 1997, 2004) and the theory of triadic influence (Flay et al., 2009) are useful inferential frameworks.

Bandura (Bandura, 1997) said that mastery and vicarious experiences, persuasion, and physiological and affective states are sources of self-efficacy beliefs. This suggests that PBC can be under intra- and interpersonal influences. Nevertheless, according to Flay et al. (2009), the social situation and cultural environment also help to determine these competence/control beliefs by mediation and moderation effects, though it is recognized that self-efficacy or PBC are under the strongest influence of intrapersonal causes. In addition, Kim and Cardinal (2010) found that family and peer social supports' influences on physical activity behaviors among Korean adolescents were mediated by enhanced self-efficacy. From these we can infer that there may be diverse missing links between acculturation and PBC. Future studies should test how significant others' behaviors (i.e., descriptive norm or modeling) mediate the relationship between acculturation and PBC. Also, from a moderation perspective, one can reasonably hypothesize that the effects of the social situation and environment (e.g., others' behavior and accessibility to the exercise facilities) on PBC may be magnified by acculturation.

Implications for intervention programs. Regarding intervention programs designed to promote leisure-time physical activity among Korean American adults, our study implies all four psychosocial predictors of intention (i.e., affective and instrumental attitude, subjective norm, and perceived behavioral control) should be considered as target variables. This is because we found significant positive relationships between these psychosocial predictors and intention. Particularly for culturally relevant intervention programs it is likely especially important to focus more on elevating people's level of subjective norm, because it may have decreased as a result of cultural adaptation to the U.S. society.

Limitations

There are two main limitations to this study. First, the use of a convenience sample, with all participants recruited through the internet. Web-based surveys are often criticized for lower response rates compared to traditional survey media such as in-person contact or paper-based survey (Leece et al., 2004). Nevertheless, Ritter, Lorig, Laurent, and Matthews (2004) found that the responses from the web surveys are not significantly different from content-equivalent paper-and-pencil surveys. Despite limited evidence, therefore, it seems reasonable to assume the internal validity of our study is not threatened by the web-based survey administration. External validity, rather than internal validity, may be limited, however, due to nonprobability sampling combined with an indeterminate response rate. As noted, for example, more than 60% of the current study participants were students, which suggests that the results of the study may not be generalized to the overall Korean American population.

Second, potential response biases due to the retrospective study design, which might impact recall, and the use of self-report questionnaires, which might be influenced by item interpretation and social desirability issues. Physical activity recall questionnaires are particularly prone to such issues, often resulting in overestimation of physical activity level (Sallis & Saelens, 2000; Sirard & Pate, 2001). Where possible, future studies should consider prospective designs and the use of objective physical activity measures such as accelerometers or pedometers.

Conclusion

There are three main conclusions from this study. First, the TPB was useful for understanding the Korean Americans' leisure-time physical activity behavior. Second, the effect of acculturation on leisure-time physical activity was partially mediated by subjective norm and PBC. More specifically, acculturation showed negative and positive effects on subjective norm and PBC, respectively. Third, the measurement properties and interrelationships among all latent variables were equivalent for females and males.

Before closing we also suggest four recommendations for practitioners and researchers. First, culturally relevant intervention efforts should focus more on increasing subjective norm regarding leisure-time physical activity participation. Second, whenever feasible, prospective research designs and objective measures of physical activity behavior should be used. Third, the potential confounding, mediation, and/or moderation effects of additional variables such as demographic, behavioral skills, and environmental characteristics should be tested. Fourth, we suggest future studies test the mediating and moderating effects of different aspects of acculturation (e.g., value acculturation).

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Table 1. Demographic characteristics of the study samples

Demographic variables	<i>n (M)</i>	% (<i>SD</i>)
Age	(30.42)	(10.41)
Body mass index	(23.05)	(3.67)
Sex		
Male	216	48.21
Female	232	51.79
Generation status		
1st generation	340	75.56
2nd generation	106	23.56
3rd generation	4	.89
Marital status		
Married/Living with partner	175	40.42
Divorced/Widowed/Separated	13	3.00
Never married	245	56.58
Employ status		
Employed	112	25.51
Self-employed	19	4.33
Student	266	60.59
Housewife/Unemployed	42	9.57
Income in U.S. Dollars		
Less than 20k	88	25.43
20k-40k	79	22.83
40k-60k	75	21.68
60k-100k	60	17.34
More than 100k	44	12.72
Education		
Less than college	24	5.44
Some college or higher	417	94.56

Note: 1st generation=born in Korea; 2nd generation=born in the USA with both parents born in Korea; 3rd generation=born in the USA with either parent born in the USA

Table 2. Descriptive statistics of the indicators of the latent variables

Variables	Original data				Multiple-imputed data			
	<i>M</i>	<i>SD</i>	Ku.	Sk.	<i>M</i>	<i>SD</i>	Ku.	Sk.
Acculturation								
AC1	2.89	0.82	.45	2.28	2.89	0.82	.45	2.28
AC2	2.95	1.18	.26	2.15	2.94	1.18	.26	2.16
AC3	3.08	0.83	.40	2.85	3.07	0.83	.40	2.85
AC4	3.05	0.93	.48	2.45	3.04	0.93	.49	2.47
AC5	1.80	1.27	1.37	3.47	1.80	1.27	1.37	3.49
AC6	2.08	1.30	.85	2.38	2.08	1.30	.85	2.38
AC7	2.67	1.03	.51	2.63	2.67	1.03	.51	2.64
AC8	2.83	0.76	-.18	3.94	2.82	0.76	-.18	3.91
AC9	3.17	1.04	.24	2.47	3.17	1.04	.24	2.47
AC10	3.42	0.84	.09	3.13	3.42	0.84	.09	3.13
AC11	2.34	0.78	.31	3.23	2.34	0.78	.31	3.23
AC12	2.80	0.75	.18	3.31	2.80	0.75	.19	3.30
AC13	2.89	1.04	.38	1.33	2.89	1.03	.38	1.33
AC14	2.16	0.56	3.21	11.70	2.16	0.56	3.21	11.67
AC15	2.20	0.63	3.03	10.73	2.20	0.63	3.01	10.72
AC16	2.69	1.53	.35	1.61	2.69	1.53	.35	1.62
AC18	2.70	1.03	.31	2.73	2.70	1.03	.31	2.73
AC20	1.25	0.45	1.44	3.83	1.25	0.45	1.44	3.83
AC21	1.50	1.06	2.26	7.17	1.49	1.06	2.23	7.19
Attitude								
AT1	3.84	1.03	-0.72	2.90	3.84	1.03	-0.72	2.89
AT2	3.83	0.93	-0.62	3.07	3.83	0.93	-0.62	3.06
AT3	3.86	0.92	-0.57	2.89	3.86	0.92	-0.56	2.88
AT4	4.45	0.67	-1.49	7.04	4.45	0.67	-1.48	6.99
AT5	4.46	0.67	-1.53	7.29	4.46	0.67	-1.49	7.23
Subjective norm								
SN1	3.63	1.04	-0.57	2.86	3.63	1.04	-0.56	2.87
SN2	3.61	1.05	-0.58	2.83	3.61	1.05	-0.58	2.84
PBC								
PBC1	3.78	1.07	-0.82	2.84	3.78	1.07	-0.82	2.94
PBC2	3.19	1.20	-0.10	1.93	3.19	1.19	-0.10	1.93
PBC3	3.67	1.06	-0.71	2.82	3.67	1.06	-0.71	2.83
PBC4	3.85	1.02	-0.95	3.45	3.85	1.02	-0.95	3.46
Intention								
INT1	3.67	1.14	-0.62	2.42	3.67	1.14	-0.62	2.42
INT2	3.62	1.14	-0.60	2.42	3.62	1.14	-0.60	2.42
INT3	3.54	1.19	-0.47	2.13	3.54	1.19	-0.47	2.13
LTPA	26.64	35.45	5.21	50.41	26.70	35.43	5.19	50.18
Log-transformed LTPA	2.58	1.44	-0.63	2.42	2.58	1.44	-0.63	2.42

Abbreviation: Ku. = kurtosis; Sk. = skewness; PBC = perceived behavioral control; LTPA=leisure-time physical activity

Table 3. Internal consistencies of the questionnaires

Scales	Original	Imputed	
		Item-level	Parceled
Acculturation	.93	.93	.94
Affective attitude	.92	.91	n/a
Instrumental attitude	.88	.87	n/a
Subjective norm	.93	.93	n/a
Perceived behavioral control	.85	.84	n/a
Intention	.95	.95	n/a

Table 4. Multiple-group confirmatory factor analysis for testing language invariance

	S-B χ^2 (df)	CFI	TLI	RMSEA	Model comparison	Δ CFI	Δ TLI	Δ RMSEA
English	163.37(154)	.995	.994	.017				
Korean	206.46(154)	.982	.978	.037				
Model1	460.41(322)	.972	.967	.044				
Model2	538.89(336)	.959	.954	.052	Model2 – Model1	-.013	-.013	.008
Model3	515.53(332)	.963	.958	.050	Model3 – Model1	-.009	-.009	.006
Model4	519.69(337)	.963	.958	.049	Model4 – Model3	.000	.000	-.001
Model5	537.46(343)	.961	.956	.050	Model5 – Model4	-.002	-.002	.001
Model6	845.24(362)	.902	.898	.077	Model6 – Model5	-.059	-.058	.027

Model1 = Unconstrained model, Model2 = Factor loadings are invariant, Model3 = Factor loadings are invariant except for SL-ASIA, Model4 = Factor loadings and variances are invariant except for SL-ASIA, Model5 = Factor loadings, variances, and covariances are invariant except for SL-ASIA, Model5 = Factor loadings, variances, covariances, and residual variances are invariant except for SL-ASIA, Model6 = Factor loadings, variances, covariances, residual variances, and residual covariances are invariant except for SL-ASIA

Table 5. Multiple-group structural equation modeling for testing gender invariance

	S-B χ^2 (df)	CFI	TLI	RMSEA	Model comparison	Δ CFI	Δ TLI	Δ RMSEA
Female	235.33(156)	.968	.961	.047				
Male	204.93(156)	.982	.978	.038				
Model1	476.76(326)	.971	.966	.045				
Model2	493.53(340)	.970	.967	.045	Model2 – Model1	-.001	.001	.000
Model3	497.39(345)	.971	.968	.044	Model3 – Model2	.001	.001	-.001
Model4	500.27(348)	.971	.968	.044	Model4 – Model3	.000	.000	.000
Model5	527.31(367)	.969	.968	.044	Model5 – Model4	-.001	.000	.000
Model6	522.43(369)	.970	.970	.043	Model6 – Model5	.001	.002	-.001
Model7	536.86(379)	.970	.969	.043	Model7 – Model5	.000	-.001	.000

Model1 = Unconstrained model, Model2 = Factor loadings are invariant, Model3 = Factor loadings and variances invariant, Model4 = Factor loadings, variances, and covariances are invariant, Model5 = Factor loadings, variances, covariances, and residual variances are invariant, Model6 = Factor loadings, variances, covariances, residual variances, and residual covariances are invariant, Model7 = Factor loadings, variances, covariances, residual variances, residual covariances, and path loadings are invariant

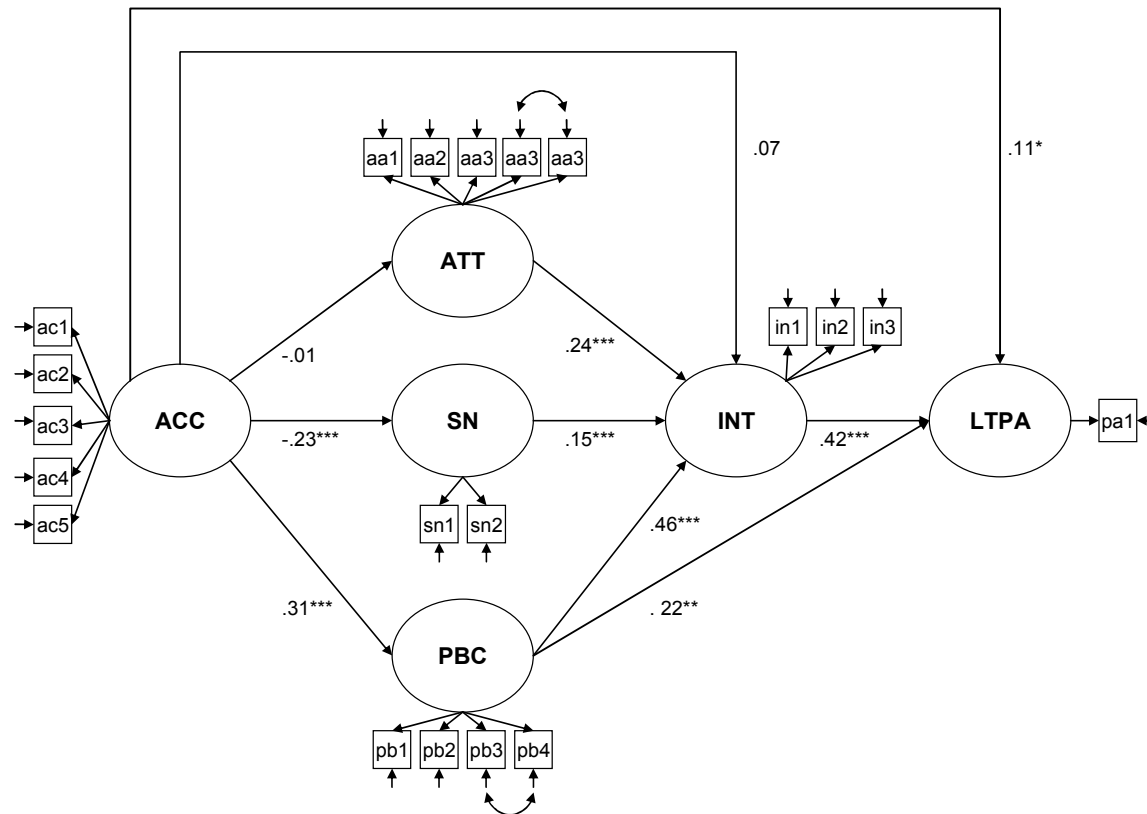


Figure 1. Final structural model with full equality constraints.

Abbreviation: ACC=acculturation; ATT=attitude; SN=subjective norm; PBC=perceived behavioral control; INT=intention; LTPA=leisure-time physical activity

Note. All coefficients are standardized. Factor loadings, residuals, and disturbances are not presented to clarify the diagram.

Chapter 4: Manuscript 3

Moderating Effects of Individualism and Collectivism on Associations
in the Theory of Planned Behavior Within the Context of Korean Americans'
Leisure-Time Physical Activity Behavior

Hyo Lee and Bradley J. Cardinal
Oregon State University

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Address: Martin Hagger, Ph.D., Editor
School of Psychology
University of Nottingham
University Park
Nottingham NG7 2RD, UK
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Abstract

Despite its well-documented health benefits, the physical activity levels of Korean Americans is disappointing. Even though Korean Americans are an understudied population, a limited number of studies suggest that they should be regarded as an at risk population in need of physical activity promotion efforts. Identifying factors and interrelationships among the factors that influence physical activity participation is an important step that is crucial for designing and implementing intervention programs. The theory of planned behavior (Ajzen, 1985, 1991) has been found to be a valid framework in understanding leisure-time physical activity in various populations. Nevertheless, empirical studies found that the relative importance of attitude, subjective norm, and perceived behavioral control (PBC) in predicting behavioral intention vary by ethnicity, suggesting culture may moderate these relationships. This study tested the moderating effects of horizontal individualism, vertical individualism, horizontal collectivism, and vertical collectivism on the relationships between attitude and intention, subjective norm and intention, and PBC and intention in the leisure-time physical activity context. The original theory of planned behavior was found to be a strong model explaining a large variance of leisure-time physical activity ($R^2=.41$) and intention ($R^2=.32$). The strongest predictor of intention was PBC ($\beta=.55$), followed by attitude ($\beta=.29$) and subjective norm ($\beta=.15$). Structural equation models indicated that horizontal collectivism magnified the association between subjective norm and intention ($\beta=.26$); and both horizontal collectivism ($\beta=-.40$) and horizontal individualism ($\beta=-.19$) diminished the effect of perceived behavioral control on intention to partake in leisure-time physical activity. Future studies should further explore the latent structures of the theory of planned behavior constructs to clearly understand meaning of the research findings of the current study.

Introduction

The health benefits of regular physical activity participation are well-established. For example, dose-response relationships between physical activity and all-cause mortality, cardiovascular disease, coronary heart disease, and type-2 diabetes have been documented (Kesaniemi et al., 2001). To achieve such health benefits, however, people must partake in a minimum dose of physical activity. The empirically based dose recommended by the American College of Sports Medicine and the American Heart Association for adults is at least 30-minutes of moderate-intensity physical activity 5 or more days per week, 20-minutes of vigorous-intensity physical activity 3 or more days per week, or some combination of the two (Haskell et al., 2007).

The prevalence rate of achieving this dose among American adults does not exceed 51% and 5%, when physical activity was measured by self-report questionnaire and accelerometer, respectively (Troiano et al., 2008). Furthermore, the age-adjusted proportion of the adults who did not engage in any leisure-time physical activity was estimated to be as high as 38.3% between 1997 and 2008 (National Center for Health Statistics [NCHS], n.d.). The consequences of insufficient physical activity are quite tangible. For example, the number of deaths in the U.S. that are attributable to physical inactivity in combination with poor diet was estimated to be 400,000 in the year 2000, making this the second highest cause of death only behind tobacco (Mokdad et al., 2004, 2005). As such, one of the *Healthy People 2020* objectives is to decrease the proportion of adults who engage in no physical activity to equal to or less than 32.6% by the year 2020 (U.S. Department of Health and Human Services, n.d.).

Physical inactivity is not an equal opportunity condition though. Disparities exist across ethnic groups and this can result in morbidity and mortality disparities. For example, it has been repeatedly reported that African Americans and Hispanics are the two most physically inactive ethnic groups in the U.S. (e.g., Marshall et al., 2007; McCracken, Jiles, & Blanck, 2007). Also, according to the NCHS (2011), only about 45% of Asian Americans participate in the recommended level of aerobic or anaerobic physical activity, which is slightly higher than African Americans (about 43%), but substantially lower than White American (about 52%). Nevertheless, Asian Americans have received

less research attention as a population at risk compared to African Americans and Hispanics.

As for the population size, there are more than 12 million Asian Americans in the U.S. (Barnes & Bennett, 2002). Among them, Korean Americans (1.2 million) are the fourth largest Asian American subpopulation in the United States. Korean American's physical activity participation is less than ideal, similar to that observed for the overall Asian American population. For example, Lee, Sobal, and Frongillo (2000) found that less than 30% of Korean American adults participated in at least light-intensity physical activity. Hofstetter et al. (2008) reported that only 32.8% of Korean Americans in California engaged in walking or vigorous exercise. Lastly, Yang et al. (2007) estimated that as many as 32% of Korean American middle-age women did not participate in any leisure-time physical activity. In sum, Korean Americans should be regarded as an at risk population in need of physical activity promotion.

Meanwhile, applying Sallis, Owen, and Fotheringham's (2000) five-phase behavioral epidemiology framework to the physical activity domain, research should: 1) establish links between physical activity and health, 2) develop measures of physical activity, 3) identify factors influencing physical activity participation, 4) evaluate interventions to promote physical activity, and 5) translate research into practice. The current study is focused on phase three of this framework, which includes understanding the interrelationships among the correlates of physical activity in an attempt to develop, modify, and validate theories. This is because only solid theoretical frameworks can be used to most appropriately and meaningfully guide intervention design, implementation, and evaluation, and enable prediction of future events. One such theory is the theory of planned behavior (Ajzen, 1985, 1991), which has received attention across various domains of health behavior research, and been validated within the physical activity domain (Hagger et al., 2002; Hausenblas et al., 1997).

The Theory of Planned Behavior

The theory of reasoned action (TRA), from which the theory of planned behavior (TPB) evolved, hypothesized that an individual's volitional behavior is most proximally predicted by behavioral intention to perform the behavior in question. Intention, in turn, indicates the degree of willingness and planned effort to perform a specific behavior such

as leisure-time physical activity. In the TRA, it was posited that intention fully mediates the effects of attitude and subjective norm (Ajzen & Fishbein, 1980). Attitude is an individual's favorable or unfavorable appraisal of the behavior, and subjective norm is perceived social pressure to engage in the behavior. For example, attitude toward leisure-time physical activity reflects an individual's cognitive and affective beliefs about producing effective outcomes by engaging in said behavior (e.g., being healthier and feeling refreshed) and evaluations of such expected outcomes (e.g., the degree to which improving health is important). Also in the leisure-time physical activity context, subjective norm represents the degree to which an individual perceives that her/his significant others want her/him to participate in leisure-time physical activity.

One of the most important premises of the TRA was that the behavior in question be fully under an individual's volitional control. Nevertheless, this assumption was rarely achieved. In response, Ajzen proposed the TPB (Ajzen, 1985, 1991), which included the addition of perceived behavioral control (PBC), a component that reflects an individual's ability to perform the behavior, and whether the behavior is under an individual's volitional control. According to Ajzen, PBC not only affects an individual's intention to perform the behavior, but also directly dictates the behavior itself along with intention.

As noted, the TPB has been effective in predicting physical activity behaviors (Hagger et al., 2002; Hausenblas et al., 1997). Nevertheless, there is no study testing the TPB in Korean Americans in the physical activity domain. In addition, there are studies reporting interethnic and international variations regarding the relative importance of the social cognitive predictors of intention to engage in physical activity (e.g., Hagger et al., 2007; Nigg et al., 2009). For example, Nigg et al. (2009) found that the attitude-intention relationship was significantly weaker in Filipinos compared to other ethnic subgroups in Hawaii. In the same study they also found the subjective norm-intention relationship was stronger in Japanese compared to White Hawaiians. Similarly, Hagger et al. (2007) found that the subjective norm-intention relationship was only significant in Hungarian high school students, whereas this relationship was null in British, Estonian, Greek, and Singapore samples. On the contrary, the attitude-intention relationship was stronger in British and Estonian samples compared to the others. Lastly, the influence of PBC on

intention was not significant in Hungarians even though it was significant for all the other countries.

Overall, Nigg et al.'s (2009) and Hagger et al.'s (2007) studies empirically suggest that cultural differences may moderate the effects of social cognitive influences on motivation to be physically active. Regarding this, Ajzen (2001) said that individualism and collectivism and domain of the behavior can determine the relative importance of the social cognitive predictors.

Individualism/Collectivism

The concept of individualism/collectivism has been a salient topic in cross-cultural psychology since the 1980s. Nevertheless, individualism/collectivism is not a novel theme as it is rooted in ancient philosophies and appears in the early era of contemporary thought (Kagitçibasi, 1997). For example, individualism themes appear from ancient Greek to modern thoughts such as Sophists' teaching, British capitalism, utilitarianism, and empiricism. On the other hand, collectivism has been an important theme since ancient Confucian and Plato, and it appears in major religions such as Buddhism, Christianity, Hinduism, Islam, and Judaism. Collectivism also appeared in modern continental European thoughts supporting the idea for the contemporary social welfare system. Therefore, even though individualism and collectivism have been thought to be prominent characteristics of Western and Eastern cultures, respectively, it is natural that most humankind shares some degree of individualism and collectivism (Kagitçibasi, 1997), and individualism and collectivism are manifested differently in different cultures and countries (Triandis, 1995).

Generally, though, individualism emphasizes independent self, personal goals, each individual's uniqueness, rationality, attitudes, and personal control, whereas collectivism stresses on interdependent self with (in)group, group goal, relatedness, social norms, and cooperation within the group (Hofstede, 1980; Triandis, 1995). Even though a single dimensional or continuum view of individualism and collectivism seems attractive due to its parsimoniousness merit, cross-cultural psychologists have suggested the coexistence of individualism and collectivism, and empirical evidence supports their proposition (Kagitçibasi, 1997; Sinha & Tripathi, 1994; Triandis, 1995; Triandis & Gelfand, 1998).

Furthermore, based on the criticism that individualism/collectivism may be too simplistic of a taxonomy to explain different manifestation within different countries, Triandis and colleagues (Singelis, Triandis, Bhawuk, & Gelfand, 1995; Triandis, 1995; Triandis & Gelfand, 1998) suggested that horizontal (i.e., interpersonal equality is emphasized) and vertical (i.e., hierarchical interpersonal competition and inequality is emphasized) dimensions of individualism and collectivism exists. This resulted in a four-dimensional model of individualism/collectivism (i.e., horizontal individualism [HI], horizontal collectivism [HC], vertical individualism [VI], and vertical collectivism [VC]). Specifically, Triandis (1995) said that horizontal individualists tend to be highly self-reliant and not interested in achieving high status. Vertical individualists, meanwhile, are likely to express that they are independent entities from the group, but also want to do their best to achieve higher status. Horizontal collectivists tend to see themselves as parts of the group, but do not easily accept inequality and authority. Lastly, vertical individualists are likely to emphasize the integrity of the group, and support and accept between- and within-group competitions as well as authority.

The TPB and Individualism/Collectivism: A Synthesis

Given the preceding review of conceptual definitions and distinctions, it should become evident that individualism/collectivism may moderate the attitude-intention and subjective norm-intention relationships. Specifically, individualism is a tendency to view self as independent from others, thus directing individuals to prioritize personal interest and achievements. On the contrary, collectivism, a tendency to view self as an interdependent part of the group, directs individuals to behave up to social expectations (Markus & Kitayama, 1991; Oyserman, Coon, & Kimmelmeier, 2002; Triandis, 1995).

Bandura (2002) asserted that self-efficacy, an overlapping psychosocial construct to PBC, should be salient for both individualists and collectivists. Nevertheless, Terry and Hogg (1996) found the relative influences of perceived norm and perceived self-control depended on the degree to which an individual identifies with the reference group in the exercise domain. Specifically, they found that the perceived norm-intention relationship was stronger in high identifiers (collectivists), whereas the perceived self-control-intention relationship was stronger in low identifiers (individualists). Therefore, studies should test the moderating effects of individualism/collectivism on the relationship between intention

and variously operationalized personal ability and control perception (e.g., self-efficacy or PBC).

Even though it may seem a straightforward prediction regarding the moderating effects of individualism/collectivism on attitude, subjective norm, and PBC would be possible, it is not clear whether and how the horizontal-vertical dimension can differentiate the prediction as no empirical study has tested these relationships using the TPB framework within the context of leisure-time physical activity behavior.

Therefore, the purpose of this study was to test the moderating effects of HI, VI, HC, and VC on attitude-intention, subjective norm-intention, and PBC-intention relationships, in addition to testing the overall utility of the original TPB in predicting leisure-time physical activity of Korean Americans. The moderation hypotheses were: 1) HI would magnify the effect of attitude on intention; 2) HI would diminish the effect of subjective norm on intention; 3) HI would magnify the effect of PBC on intention; 4) VI would magnify the effect of attitude on intention; 5) VI would diminish the effect of subjective norm on intention; 6) VI would magnify the effect of PBC on intention; 7) HC would diminish the effect of attitude on intention; 8) HC would magnify the effect of subjective norm on intention; 9) HC would diminish the effect of PBC on intention; 10) VC would diminish the effect of attitude on intention; 11) VC would magnify the effect of subjective norm on intention; and 12) VC would diminish the effect of PBC on intention.

Methods

Participant Recruitment

The sample for this study was collected as part of Lee's (2011) doctoral dissertation. Following the approval of Oregon State University's Institutional Review Board, recruitment announcements were posted on various Korean American-related websites. Participants were invited to a survey website (www.surveymonkey.com/oregonstate) to complete all survey questionnaires. No monetary compensation was granted to the participants, but a dollar per completed survey was donated to the Haiti Relief Fund via the American Red Cross.

Instrumentation

The first page of the web survey site elaborated on the eligibility of the survey participation by age and ethnicity. Next, on the same page, participants were asked to

choose their preferred language (i.e., English or Korean) for the informed consent form and the main survey instruments. After reading the informed consent form and upon agreeing to participate in the study, participants disclosed demographic characteristics such as age, gender, income, education, marital status, and height and weight from which body mass index was calculated.

The main survey instrument was comprised of the TPB questionnaires (Ajzen, 2006; Blanchard et al., 2008; Kosma et al., 2007), a leisure-time exercise questionnaire (Godin & Shepard, 1985), and the individualism/collectivism scale (Triandis & Gelfand, 1998). With the exception of the leisure-time exercise questionnaire, responses on the remaining questionnaires were answered using a 5-point Likert scale format with response options ranging from strongly disagree (1) to strongly agree (5). Translation and back translation procedures (Brislin, 1970) were used to form equivalent versions of the original survey instruments in English into Korean versions.

The TPB questionnaires. Attitude toward leisure-time physical activity was measured using a 5-item questionnaire. A sample item is, “A week ago, I thought exercising regularly was useful.” Subjective norm was measured using 2 items. An example item is, “A week ago, most people who are important to me thought I should have exercised regularly during last 7 days.” PBC was measured using four items, including the following sample item: “A week ago, I believed that I could exercise regularly if I wanted to.” Lastly, intention was measured using three items. One of the three items is: “A week ago, I intended to exercise regularly during last 7 days.”

Leisure-Time Exercise Questionnaire. Respondents reported their frequencies of strenuous, moderate, and/or mild exercise that lasted for 15 minutes or longer during the previous 7 days. A weekly leisure activity score for each participant was calculated using the following formula: [(strenuous × 9) + (moderate × 5) + (mild × 3)]. This measure has demonstrated acceptable test-retest reliability ($r=.74$) and construct validity evidence (Cardinal, 1996; Godin & Shepard, 1985; Jacobs et al., 1993).

Individualism/Collectivism Scale. The individualism/collectivism scale consists of four dimensions: 1) horizontal individualism (HI), 2) vertical individualism (VI), 3) horizontal collectivism (HC), and 4) vertical collectivism (VC). Sample questions are: “I often do ‘my own thing’” (HI); “It is important to me that I do my job better than others”

(VI); “To me, pleasure is spending time with others” (HC); and “It is important to me that I respect the decisions made by my groups” (VC). This scale was validated with Korean college student samples and multi-ethnic American college samples by Triandis and Gelfand (1998).

Analyses

Stata 11.0 (StataCorp, 2009) was used for descriptive and missing data analyses. Mplus 6.0 (Muthén & Muthén, 2010) was used for confirmatory factor analysis (CFA) and structural equation modeling (SEM) with maximum likelihood parameter estimation with standard errors and mean-adjusted chi-square test statistic (Satorra-Bentler χ^2 ; when applicable) that are robust against non-normally distributed data. Satorra-Bentler χ^2 , comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA) were used when applicable. For the analyses where the above fit indices were not available, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used. Even though significant model χ^2 implies poor model fit, this index has been criticized for its sensitivity to sample size (Kline, 2005). Therefore, TLI and CFI close to .95, and RMSEA smaller than .06 were considered indicators of a good model fit (Hu & Bentler, 1999). There is no criterion value for AIC or BIC, but smaller values indicate better model fit in comparison with nested or non-nested model(s). Lastly, exercise level was treated as a single-item (i.e., the summed weekly leisure activity score) latent variable with fixed error variance at .54, based on the test-retest reliability of .74 from a previous study (Godin & Shepard, 1985) and the variance of 2.25 from the current samples (the weekly leisure activity score was log-transformed due to high positive skewness of the original scores).

Analytic strategies. To test measurement invariance of English and Korean questionnaires, a multiple-group confirmatory factor analysis (CFA) was performed. The first step of the multiple-group CFA was testing single-group CFAs to examine the adequacy of the measurement model in each Language. Second, a multiple-group CFA with a series of nested models with equality constraints were compared to find the best model considering model fit and parsimoniousness. Specifically, five nested models were fitted to the data: 1) no constraint, 2) equal factor loadings, 3) equal factor loadings and variances, 4) equal factor loadings, variances, and covariances, and 5) equal factor

loadings, variances, covariances, and residual variances. Since the Satorra-Bentler scaled χ^2 difference test is not available for multiple-imputation data (Muthén & Muthén, n.d.), we relied on Δ CFI with a cut-off value of .01, which was suggested by Cheung and Rensvold (2002), and Δ TLI and Δ RMSEA supplemented Δ CFI.

Upon supporting evidence of the measurement invariance between the two language instruments, the moderating effects of vertical individualism, horizontal individualism, vertical collectivism, and horizontal collectivism on the relationships between attitude, subjective norm, and PBC and intention were tested using SEM. The interaction between latent variables were tested using a quasi-maximum likelihood (QMA) approach which was initially proposed by Klein and Moosbrugger as a latent moderated structural model LMS approach, and refined by Klein and Muthén (2007). The QMA approach was implemented in Mplus 6.0 using the *XWITH* command (Muthén & Muthén, 2010). Lastly, given the complexity of the tested model and the orthogonal relationships (i.e., covariances between the latent structures were close to zero; see Table 5) of horizontal individualism, vertical individualism, horizontal collectivism, and vertical collectivism, the effect of each of these moderators was tested separately, resulting in separate structural equation models (Figure 2). Lastly, there is no available model fit indices except for AIC and BIC for the latent interaction models using QMA approach, up to the present (Klein & Muthén, 2007).¹ Therefore, untested goodness of fits of the latent interaction models was one of the limitations of this study.

¹ Even though the model fit indices were not available for the latent interaction models in this study, the following steps were used to at least heuristically infer the goodness of the model fits. First, goodness-of-fit indices of the models without interaction term were obtained to see if the TPB with HI, VI, HC, and VC respectively fit the data well. Upon reasonable model fit, each model's AIC and BIC were compared with the corresponding interaction model. If the interaction model's AIC and BIC were not substantially bigger compared to the corresponding model without the interaction term, we inferred that the interaction model also fits to the data reasonably well. All of the models without interaction term (but includes corresponding HI, VI, HC, or VC latent constructs having direct effect on intention) fit the data well, CFI, TLI, and RMSEA ranging .961-.977, .952-.972, .036-.050, respectively. Also, the discrepancies in AICs and BICs of the models without interaction term and corresponding interaction term were trivial (Table 6). In sum, we were able to assume that the models with latent interaction term fit the data reasonably well.

Results

Preliminary and Missing Data Analysis

Participant characteristics. A total number of 468 Korean or Korean American adults living in the U.S. participated in the web survey. After screening out responses with abnormal patterns and/or 17 or more missing values, 450 participants (216 males and 232 females, and 2 missing values on sex) remained for the main analyses. Sociodemographic characteristics of the participants are presented in Table 1.

----- Insert Table 1 about here -----

Missing data analysis. After examining the patterns of missing data, the type of missing values were identified to be missing at random (MAR), where missing values do not depend on levels of other variable(s). Listwise deletion for MAR can result in biased estimation (Acock, 2005). Therefore, we created five multiple-imputed datasets, using Stata's user-written program, *ice* (Royston, 2004, 2005a, 2005b). Descriptive statistics and reliabilities of the questionnaires are presented in Table 2 and Table 3, respectively.

----- Insert Table 2 about here -----

----- Insert Table 3 about here -----

Measurement Equivalence by Language

Two hundred participants and two hundred fifty participants elected to take part in the study using the English and Korean language versions of the questionnaires, respectively. Single-group confirmatory factor analyses for English and Korean version survey instruments revealed that the hypothesized relationships among observed variables and latent variables account for the data reasonably well. Specifically, for the English instruments, Satorra-Bentler $\chi^2(397)=552.60$, $p<.001$, CFI=.942, TLI=.936, and RMSEA=.044. For the Korean instruments, Satorra-Bentler $\chi^2(397)=165.85$, $p<.001$, CFI=.946, TLI=.937, and RMSEA=.047. CFIs and RMSEAs of the instruments in both language were higher than the cut-off criteria suggested by Hu and Bentler (1999). Even though the TLIs in the English and Korean instruments were slightly lower than Hu and Bentler's cut-off criterion, it was higher than .90 which is the suggested value by Kline (2005).

A multiple-group CFA revealed that the Korean and English measurement models are invariant at an equal covariance-level. Specifically, in the step-by-step comparison of

five nested models (Table 4), the only step producing ΔCFI greater than .1 was the comparison between model 4 (factor loadings, variances, and covariances equivalent) and model 5 (model 4 + residual variances equivalent).

This suggests that the English and Korean users understood the overall questionnaires in the same way (equal factor loadings), and the questionnaires showed similar latent structure variability (equal variances) and the interrelationships among the latent structures (equal covariance), even though the effects of measurement error on the observed variables (indicators) were non-invariant for English and Korean language users. In sum, our result support that not fitting hypothesized models separately to English and Korean version data is a reasonable option.

----- Insert Table 4 about here -----

The Original TPB predicting Leisure-Time Physical Activity

The model fit of the original TPB model to our data was good. Even though the model χ^2 was significant, Satorra-Bentler $\chi^2(401)=633.06, p<.001$, other indices that are less affected by the sample size were well over Hu and Bentler's (1999) criteria, CFI=.964, TLI=.958, and RMSEA=.036 (Table 6). The proportion of explained leisure-time physical activity variance by the model was 41%, $R^2=.41$. In turn, attitude, subjective norm, and PBC accounted for 32% of the intention variance, $R^2=.32$ (Figure 1). While intention was the most proximal and strongest predictor of leisure-time physical activity ($B=.46, \beta=.39, p<.001$), PBC also showed a significant direct effect on leisure-time physical activity ($B=.33, \beta=.24, p<.01$). The strongest predictor of intention was PBC ($B=.55, \beta=.49, p<.001$), followed by attitude ($B=.29, \beta=.23, p<.001$), and subjective norm ($B=.15, \beta=.13, p<.01$).

----- Insert Table 5 about here -----

----- Insert Table 6 about here -----

----- Insert Figure 1 about here -----

Moderation Models

SEMs with latent interaction terms revealed that HI and HC significantly moderate the relationships between social cognitive variables and intention. Specifically, the interaction between PBC and HI was negatively significant, $B=-.19, p<.05$. Nevertheless, the interactions between attitude and HI and subjective norm and HI were

not significant (Figure 2a). HC was found to significantly moderate the effects of subjective norm, $B=.26$, $p<.05$, and PBC on intention, $B=-.40$, $p<.05$ (Figure 2c). Lastly, VI and VC did not show any significant moderation effect (Figures 2b and 2d).

----- Insert Figure 2a, 2b, 2c, and 2d about here -----

Discussion

Appropriateness of the TPB for Predicting Korean American' Leisure-Time Physical Activity Behavior

Overall the TPB was found to be an appropriate theoretical model for predicting Korean Americans' leisure-time physical activity behavior. According to the tested original TPB model, a fairly large proportion of leisure-time physical activity behavior (41%) and intention (32%) variance were accounted for in the model. Intention was the stronger predictor of leisure-time physical activity, compared to PBC. This finding is consistent with Ajzen's (1985, 1991) notion that intention can be translated into behavior when the behavior in question is under one's volitional control, thus the degree to which the person has control over the behavior should have a joint effect with intention. Empirically, our findings are consistent with the cross-gender, cross-age, and cross-ethnic findings of Nigg et al. (2009) and the meta-analysis of Hagger et al. (2002), in that PBC directly predicts leisure-time physical activity in addition to intention.

In turn, leisure-time physical activity behavior was most strongly predicted by PBC, followed by attitude and subjective norm as mediated by intention. The relative effect sizes of PBC, attitude, and subjective norm on intention are consistent with Hausenblas et al. (1997) and Hagger et al.'s (2002) meta analyses and other recent studies (e.g., Blanchard et al., 2008; Jones et al., 2007; Nigg et al., 2009) on the TPB in the physical activity domain.

That said, there are some inconsistencies between our findings and previous studies' findings with regard to whether subjective norm and PBC significantly predict leisure-time physical activity intention. We found the effect of subjective norm on intention was significant, albeit a relatively smaller effect size, in comparison to attitude and PBC. Others have reported mixed findings about whether the effect of subjective norm and PBC was significant, depending on ethnicity and nationality (Blanchard et al., 2008; Hagger et al., 2007; Martin et al., 2007; Nigg et al., 2009). In sum, the discrepancy

between our study and previous studies suggest the need for investigating whether and how culture moderates the effects of PBC, attitude, and subjective norm.

Moderating Effects of Vertical/Horizontal Individualism/Collectivism

Our study provides supporting evidence for an orthogonal factor structure of VI, HI, VC, and VI. Our motivation to test the moderation effects of each of the four latent constructs with four models was mainly based on the desire to achieve model parsimony. Nevertheless, the orthogonal relationship among VI, HI, VC, and VI provides another justification for our analytical strategy.

Empirically this is consistent with Triandis and Gelfand's (1998) original study testing the construct validity of VI, HI, VC, and VI in Korean college students. On the contrary, several studies have questioned the validity of the horizontal and vertical distinctions. For example, Li and Aksoy (2007), Soh and Leong (2002), and Gouveia, Clemente, and Espinosa (2003) found that the covariances between horizontal and vertical individualism and collectivism were substantial, which implies horizontal and vertical dimensions may not be orthogonal, whereas there was a clear distinction between individualism and collectivism in their respective convenience samples of Singaporean, Spanish, Turkish, and U.S. college students. Such discrepancies among studies may be attributable to cross-cultural differences, which suggest the need for future studies to continue testing the cross-cultural generalizability of the latent structures.

Overall, our study revealed that the effects of the social cognitive predictors of intention in the theory of planned behavior were moderated by cultural value orientations. Specifically, the degree to which an individual views self as a part of a group with an egalitarian worldview (i.e., HC) magnified the effect of subjective norm, and diminished the effect of PBC on intention. On the contrary to HC, the degree to which one views self as an independent entity from group with a hierarchical worldview (i.e., VI), or a part of group with a hierarchical worldview (VC) did not significantly moderate any of the effects of the social cognitive predictors of intention. Lastly, the degree to which an individual views self as an independent entity from group with an egalitarian worldview (i.e., HI) also diminished the effect of PBC on intention. These at least partially explain previous studies' observed cross-cultural variations for the interrelationships among the TPB constructs.

For example, Nigg et al. (2009) reported stronger subjective norm-intention relationships among Hawaiians of Japanese decent compared to Anglo Hawaiians, which could be attributed to collectivism and individualism (i.e., relative to their Western culture counterparts, Japanese culture is thought to be highly collectivistic). The current findings are also partially consistent with Hagger et al.'s (2007) cross-national study, where PBC and subjective norm were respectively non-significant and significant predictors of intention only among Hungarian college students who are assumed to be more collectivistic compared to Western European students.

This is also similar to Van Hooft and De Jong (2009) who found that collectivism decreased the effect of subjective norm on intention to seek a temporary job, whereas individualism had a null moderating effect among workers in the Netherlands. Unlike our study, however, Van Hooft and De Jong found that collectivism had a negative moderating effect on the attitude-intention relationship, and a null effect on the PBC-intention relationship.

Potential In-Depth Mechanisms of the Observed Moderation Effects: Implications for Future Studies

In our set of observations, HC and HI both had a negative moderation effect on the relationship between PBC and intention. That is, the effect of the degree to which a person believes he/she has control over doing leisure-time physical activity diminished as the degree to which he/she was: 1) self-reliant and not interested in achieving high status; or 2) interested in merging into the group, but not submissive to authority. Considering PBC is a perception about personal ability and controllability to perform a behavior, our finding is unexpected and counterintuitive. Therefore, future studies should further investigate several possible unobserved mechanisms lying behind our findings.

For example, it is plausible that HC and HI affect a missing link between PBC and intention. While no study has yet tested this possibility, Bandura's (1986; 1997) social cognitive theory supports this idea. According to Bandura (2004), self-efficacy, a conceptually overlapping construct with PBC, affects a person's perception about barriers to adopt and maintain health behavior. Retrospectively applying our finding to Bandura's notion, it is hypothetically possible that HC and HI differentiate the kinds and magnitudes of actual barriers (e.g., being high on HI may result in a lack of exercise partners, and HC

may increase other interpersonal obligations that hinder participation in leisure-time physical activity behavior), and, in turn, moderate the degree to which self-efficacy affects perceived easiness or difficulty in hurdling the barriers.

A positive moderation effect of HC on the association between subjective norm and intention is self-explanatory at a glance. Nevertheless, there is also a point that future studies should further investigate. Generally, individualism-collectivism at an individual level is thought to be a personal trait that is stable across context and time (Triandis, 2001). According to Ajzen's (1985; 1991; 2006) theorizing, meanwhile, subjective norm can be expressed as an aggregation of the normative expectations from others multiplied by motivation to comply. Motivation to comply is a contextual factor, which conceptually moderates the effect of the corresponding normative expectation from other on intention. For example, even if a person recognize high expectation from a significant other (e.g., a sibling) to partake in physical activity, that recognition is not likely to be translated into intention to do physical activity unless he/she is motivated to comply with her/his sibling's expectation. In turn, it is plausible that an individual who is high on HC may be also high on overall motivation to comply with, because HC is a stable trait and motivation to comply is a contextual factor. Hence, future studies may hypothesize and test how horizontal collectivism, an aspect of personality, influences motivation to comply which is the actual but latent moderator of the relationship between normative expectations and behavioral intention.

Limitations

Convenience sampling, the retrospective study design, and the subjective measure of leisure-time physical activity are the main limitations of this study. First, there have been criticisms levied against web-based surveys, particularly with regard to their external validity (Leece et al., 2004). Readers should, therefore, be cautious about trying to generalize the findings of this study to all Korean Americans. However, given the psychometric support found for the measures employed in the present study, as well as Ritter, Lorig, Laurent, and Matthews's (2004) demonstration that web-based survey responses are not necessarily different from content-equivalent paper-and-pencil surveys, the integrity of the present study's internal validity would appear to be intact.

Second, the retrospective study design coupled with the subjective measurement of leisure-time physical activity is related to two forms of bias, namely recall and social desirability. Physical activity recall questionnaires have been criticized because they tend to overestimate physical activity levels (Sallis & Saelens, 2000; Sirard & Pate, 2001). In the current study, the participants recalled their past thoughts (i.e., “what did you think ... ?”) which may have caused recall bias. Where possible, therefore, future studies should consider prospective designs (i.e., measuring psychosocial constructs at time 1 asking “what do you think ...?” and then collecting leisure-time physical activity data at time 2 that have been measured between time 1 and 2) and the use of objective physical activity measures (e.g., accelerometer, pedometer).

Conclusion

The TPB was an adequate theory for explaining and predicting Korean Americans’ leisure-time physical activity behavior. In addition, this study demonstrated that the horizontal dimension of individualism/collectivism appears to have a significant moderating effect on the relationship between subjective norm-intention and PBC-intention. Specifically, the effect of subjective norm on leisure-time physical activity intention was magnified when HC was high. In addition, high on either HC or HI diminished the effect of PBC on intention. Future studies should test the adequacy of the operational definitions of attitude, subjective norm, and PBC in an effort to more clearly explain our partially counter-theoretical findings. Lastly, it is suggested that future research employ prospective designs and objective leisure-time physical activity measures whenever feasible.

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Table 1. Demographic characteristics of the study samples

Demographic variables	<i>n</i> (<i>M</i>)	% (<i>SD</i>)
Age	(30.42)	(10.41)
Body Mass Index	(23.05)	(3.67)
Sex		
Male	216	48.21
Female	232	51.79
Generation status		
1st generation	340	75.56
2nd generation	106	23.56
3rd generation	4	.89
Marital status		
Married/Living with partner	175	40.42
Divorced/Widowed/Separated	13	3.00
Never married	245	56.58
Employ status		
Employed	112	25.51
Self-employed	19	4.33
Student	266	60.59
Housewife/Unemployed	42	9.57
Income in U.S. Dollars		
Less than 20k	88	25.43
20k-40k	79	22.83
40k-60k	75	21.68
60k-100k	60	17.34
More than 100k	44	12.72
Education		
Less than college	24	5.44
Some college or higher	417	94.56

Note: 1st generation=born in Korea; 2nd generation=born in the USA with both parents born in Korea; 3rd generation=born in the USA with either parent born in the USA

Table 2. Descriptive statistics of the indicators of the latent variables

Variables	Original data				Multiple-imputed data			
	<i>M</i>	<i>SD</i>	Ku.	Sk.	<i>M</i>	<i>SD</i>	Ku.	Sk.
Horizontal individualism								
HI1	3.87	0.91	-0.85	3.62	3.87	0.91	-0.85	3.62
HI2	3.66	0.92	-0.49	2.64	3.66	0.92	-0.49	2.64
HI3	3.48	0.96	-0.28	2.33	3.48	0.96	-0.28	2.33
HI4	4.01	0.72	-0.23	2.57	4.01	0.72	-0.23	2.58
Vertical Individualism								
VI1	3.98	0.79	-0.71	3.86	3.98	0.79	-0.71	3.86
VI2	2.55	0.97	0.52	2.91	2.55	0.97	0.52	2.91
VI3	3.18	1.03	-0.27	2.41	3.18	1.03	-0.27	2.42
VI4	3.38	0.96	-0.49	2.70	3.38	0.96	-0.49	2.70
Horizontal Collectivism								
HC1	3.67	0.70	-0.37	3.27	3.68	0.70	-0.37	3.28
HC2	3.93	0.62	-0.55	4.56	3.93	0.62	-0.55	4.56
HC3	4.02	0.74	-0.66	3.79	4.02	0.74	-0.66	3.79
HC4	4.03	0.69	-0.37	3.36	4.04	0.69	-0.37	3.36
Vertical Collectivism								
VC1	3.40	1.03	-0.07	2.13	3.40	1.03	-0.07	2.13
VC2	3.74	0.95	-0.59	2.81	3.74	0.95	-0.59	2.81
VC3	3.69	1.02	-0.63	2.90	3.69	1.01	-0.63	2.91
VC4	3.86	0.77	-0.54	3.35	3.86	0.77	-0.54	3.35
Attitude								
AT1	3.84	1.03	-0.72	2.90	3.84	1.03	-0.72	2.89
AT2	3.83	0.93	-0.62	3.07	3.83	0.93	-0.62	3.06
AT3	3.86	0.92	-0.57	2.89	3.86	0.92	-0.56	2.88
AT4	4.45	0.67	-1.49	7.04	4.45	0.67	-1.48	6.99
AT5	4.46	0.67	-1.53	7.29	4.46	0.67	-1.49	7.23
Subjective norm								
SN1	3.63	1.04	-0.57	2.86	3.63	1.04	-0.56	2.87
SN2	3.61	1.05	-0.58	2.83	3.61	1.05	-0.58	2.84
PBC								
PBC1	3.78	1.07	-0.82	2.84	3.78	1.07	-0.82	2.94
PBC2	3.19	1.20	-0.10	1.93	3.19	1.19	-0.10	1.93
PBC3	3.67	1.06	-0.71	2.82	3.67	1.06	-0.71	2.83
PBC4	3.85	1.02	-0.95	3.45	3.85	1.02	-0.95	3.46
Intention								
INT1	3.67	1.14	-0.62	2.42	3.67	1.14	-0.62	2.42
INT2	3.62	1.14	-0.60	2.42	3.62	1.14	-0.60	2.42
INT3	3.54	1.19	-0.47	2.13	3.54	1.19	-0.47	2.13
LTPA	26.64	35.45	5.21	50.41	26.70	35.43	5.19	50.18
Log-transformed LTPA	2.58	1.44	-0.63	2.42	2.58	1.44	-0.63	2.42

Note. Log-transformed LTPA= $\ln(\text{LTPA}+1)$

Abbreviation: Ku.=kurtosis, Sk.=skewness

Table 3. Internal consistencies of the scales

Scales	Original	Multiple imputed
HI	.75	.75
VI	.75	.75
HC	.75	.75
VC	.80	.80
Attitude	.86	.86
Subjective norm	.93	.93
Perceived behavioral control	.85	.85
Intention	.95	.95

Abbreviation: HI=horizontal individualism; VI=vertical individualism; HC=horizontal collectivism; VC=vertical collectivism

Table 4. Multiple-group confirmatory factor analysis for testing measurement invariance between English and Korean questionnaire users

	Model χ^2 (df)	CFI	TLI	RMSEA	Model comparison	Δ CFI	Δ TLI	Δ RMSEA
Model1	1357.16(816)	.922	.911	.054				
Model2	1422.98(838)	.915	.906	.056	Model2 – Model1	-.007	-.005	.002
Model3	1435.01(847)	.915	.907	.056	Model3 – Model2	.000	.001	.000
Model4	1489.92(880)	.912	.907	.056	Model4 – Model3	-.003	.000	.000
Model5	1672.16(894)	.887	.883	.062	Model5 – Model4	-.025	-.024	.006

Model1 = Unconstrained model, Model2 = Factor loadings are invariant, Model3 = Factor loadings and variances invariant, Model4 = Factor loadings, variances, and covariances are invariant, Model5 = Factor loadings, variances, covariances, residual variances are invariant

Table 5. Covariance matrix of the latent variables from the measurement model with factor loadings, variances, and covariances invariant by language (Model4 of Table 4)

	1	2	3	4	5	6	7	8	9
1. HI	-								
2. VI	.06	-							
3. HC	.03	-.03	-						
4. VC	-.02	.03	.06	-					
5. Attitude	.04	.02	.11	.09	-				
6. Subjective norm	.00	.01	.08	.06	.07	-			
7. PBC	.07	.07	.09	.05	.09	.03	-		
8. Intention	.05	.02	.10	.04	.10	.22	.50	-	
9. log(LTPA+1)	.05	.03	.09	-.05	.09	.08	.46	.65	-

Table 6. Model fit indices of non-nested models.

	Model χ^2 (df)	CFI	TLI	RMSEA	AIC	BIC
Original TPB	633.06(401)	.964	.958	.036	30747.38	31265.14
TPB + HI (w/o interaction)	269.39(139)	.967	.959	.046	18824.91	19112.55
TPB + HI (w/ interaction)	n/a	n/a	n/a	n/a	18825.27	19125.24
TPB + VI (w/o interaction)	273.94(139)	.966	.958	.046	19074.17	19361.82
TPB + VI (w/ interaction)	n/a	n/a	n/a	n/a	19077.52	19377.49
TPB + HC (w/o interaction)	292.82(139)	.961	.952	.050	17944.73	18232.37
TPB + HC (w/ interaction)	n/a	n/a	n/a	n/a	17933.99	18233.96
TPB + VC (w/o interaction)	231.33(139)	.977	.972	.038	18920.55	18855.06
TPB + VC (w/ interaction)	n/a	n/a	n/a	n/a	18859.14	19159.11

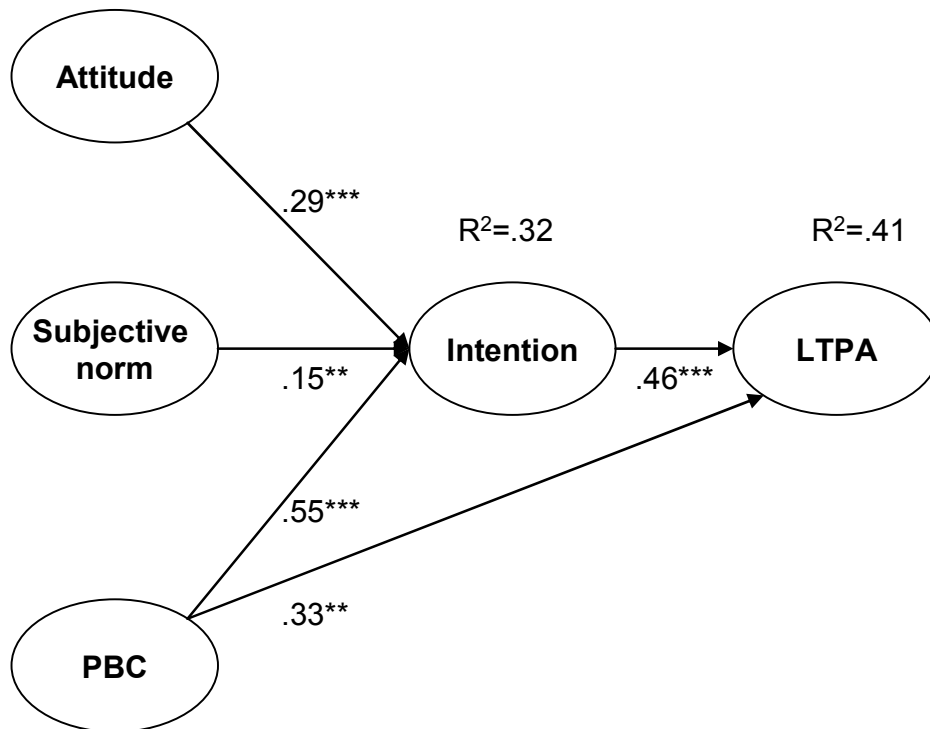


Figure 1. The original TPB structural model.

Note: Measurement components, variances, and covariances are not shown for clear presentation of the structural relationships.

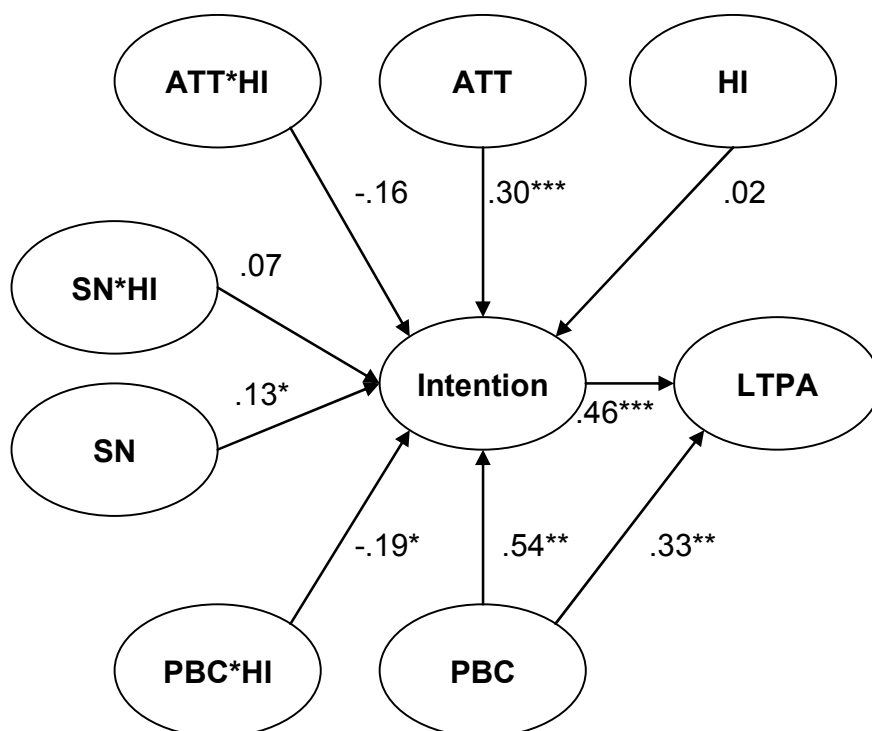


Figure 2a. HI-TPB moderation model

Note: Measurement components, variances, and covariances are not shown for clear presentation of the structural relationships.

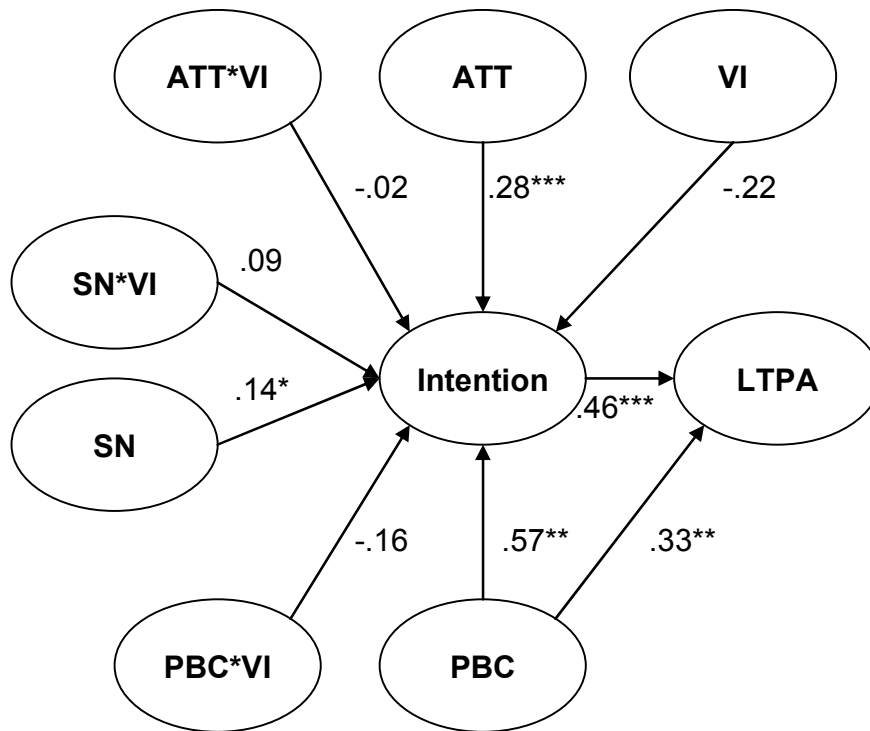


Figure 2b. VI-TPB moderation model

Note: Measurement components, variances, and covariances are not shown for clear presentation of the structural relationships.

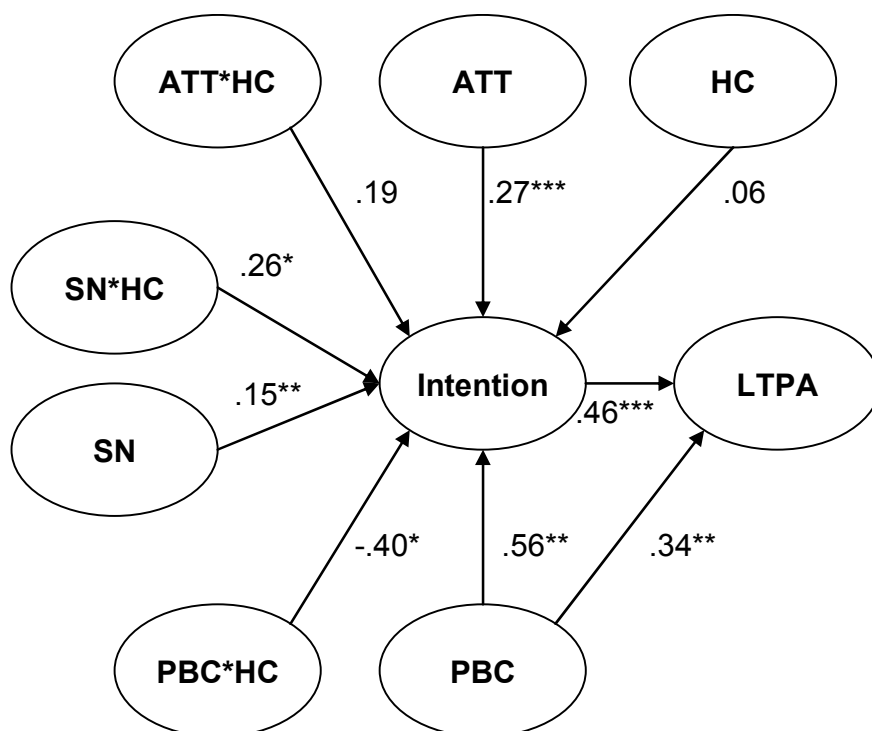


Figure 2c. HC-TPB moderation model

Note: Measurement components, variances, and covariances are not shown for clear presentation of the structural relationships.

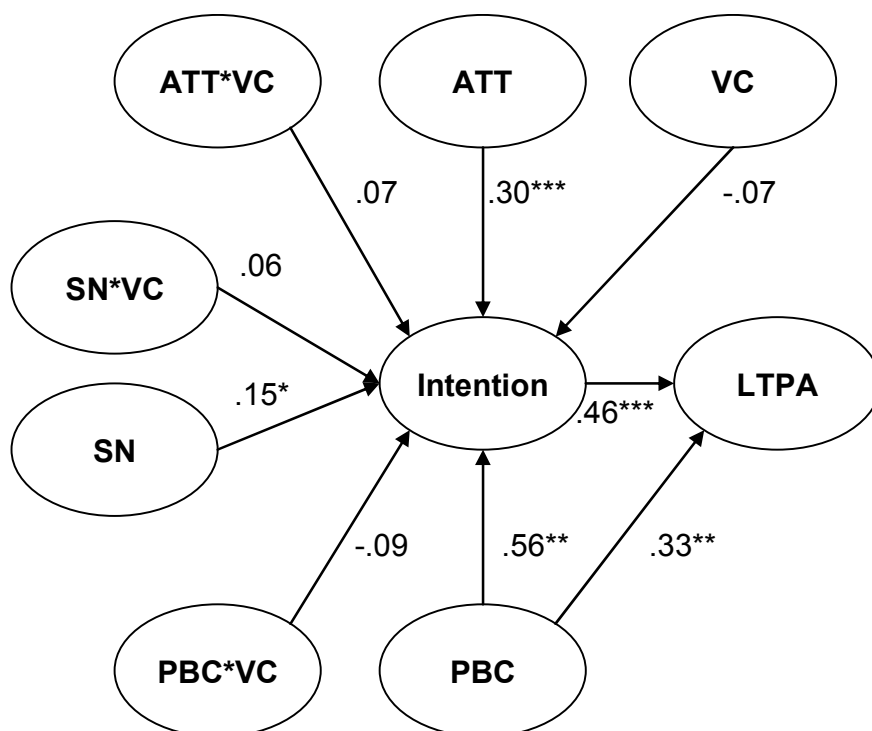


Figure 2d. VC-TPB moderation model

Note: Measurement components, variances, and covariances are not shown for clear presentation of the structural relationships.

Chapter 5: General Conclusion

General Conclusion

Acculturation has been studied as a factor that can play an important role as a determinant of ethnic minorities' physical activity participation in the U.S. Studies have found that acculturation as a whole is positively associated with leisure-time physical activity, even though variations by age, gender, and ethnicity can exist. Nevertheless, the association between acculturation and non leisure-time physical activity is understudied, thus inconclusive at this time.

Studies using comprehensive theories can better explain the mechanisms by which acculturation affects leisure-time physical activity participation compared to descriptive studies. Also, planning and evaluating intervention programs to promote the leisure-time physical activity of ethnic minorities can be better guided by such theoretical frameworks. The health belief model, social cognitive theory, the theory of planned behavior, the transtheoretical model, and the theory of triadic influence suggest that the effects of acculturation on leisure-time physical activity can be summarized into intrapersonal, interpersonal, and sociocultural streams.

Mediation and moderation models were suggested as psychological mechanisms by which acculturation affects leisure-time physical activity. In the mediation model, acculturation was hypothesized to be associated with an individual's intention to partake in leisure-time physical activity through intrapersonal, interpersonal, and sociocultural streams. Meanwhile, the moderation model suggests that individualism/collectivism, an aspect of value acculturation that accompanies behavioral acculturation, may differentiate the relative importance of the three streams of influence.

The theory of planned behavior was found to be a useful framework for understanding the Korean Americans' leisure-time physical activity behavior. The effect of acculturation on leisure-time physical activity was partially mediated by subjective norm, perceived behavioral control (PBC), and intention, and it was gender invariant. Acculturation had negative and positive effects on subjective norm and PBC, respectively.

Lastly, it was found that the horizontal individualism (HI) and horizontal collectivism (HC) moderate the associations between subjective norm and intention and PBC and intention. The effect of subjective norm on leisure-time physical activity

intention was magnified when HC was high. In addition, scoring high on either HC or HI diminished the effect of PBC on intention.

Future studies should, whenever feasible, consider using prospective research designs and objective measures of physical activity behavior to minimize recall and social desirability biases. Second, additional variables such as demographic, behavioral skills, and environmental characteristics should be tested as potential confounders, mediators, and/or moderators of the acculturation and leisure-time physical activity relationship. Lastly, future studies should test the nature of the intrapersonal, interpersonal, and sociocultural variables within the context of acculturation to more clearly understand the findings from this dissertation.

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Appendices

Appendix A: Recruitment Material

The Relationship between Acculturation and Leisure-Time Physical Activity Behavior of Korean Americans

If you are over 18 years of age and believe that you are Korean or Korean American living in the US, you are eligible to participate in an Oregon State University research project that investigates Korean Americans' acculturation and leisure-time physical activity relationship.

Just take a 20-minute online survey. The research team in Oregon State University will donate a dollar per participant to the Haiti Relief Fund via American Red Cross in honor of Korean Americans.

Please use the web link provided below, follow all instructions on the study website, and complete the survey no later than [DATE]. We look forward to your participation and thank you in advance for your help!

[INSERT WEBLINK HERE]

Sincerely,

Bradley Cardinal
Principal Investigator, Professor
Department of Nutrition and Exercise Sciences
220 Langton Hall
Oregon State University
Corvallis, OR97331
Brad.Cardinal@oregonstate.edu
541-737-2506

Hyo Lee
Project Director, Doctoral Candidate
Department of Nutrition and Exercise Sciences
230 Langton Hall
Oregon State University
Corvallis, OR97331
leeh@onid.orst.edu
541-737-9849

Recruitment Material (Korean version)

재미한국인의 문화적응과 여가시간 신체활동의 관계

18 세 이상 미국에 거주하는 모든 한국인 혹은 한국계 미국인은 오리곤 주립대 *Oregon State University* 에서 주관하는 본 연구에 참여할 수 있습니다. 본 연구는 재미 한국인 및 한국계 미국인의 문화적응과 여가 운동 참여의 관계를 밝힐 것으로 기대됩니다.

약 20 분 동안만 온라인 설문조사에 응해주시면 감사하겠습니다. 한 분 한 분이 설문을 마치실 때마다 저희 연구 팀에서는 여러분의 이름으로 American Red Cross 를 통해 Haiti Relief Fund 에 \$1 씩 기부할 것입니다.

아래 링크를 클릭 하시면 설문조사 웹사이트로 이동합니다. 설문에 참여해주시는 분께 미리 감사 드립니다.

[INSERT LINK HERE]

Bradley Cardinal
 연구책임자
 Professor
 Department of Nutrition and Exercise Sciences
 220 Langton Hall
 Oregon State University
 Corvallis, OR97331
 Brad.Cardinal@oregonstate.edu
 541-737-2506

이효 올림
 연구담당자
 Doctoral Candidate
 Department of Nutrition and Exercise Sciences
 230 Langton Hall
 Oregon State University
 Corvallis, OR97331
 leeh@onid.orst.edu
 541-737-9849

Appendix B: Informed Consent Form

INFORMED CONSENT DOCUMENT FOR ONLINE SURVEY

Project Title:	The Relationship between Acculturation and Leisure-Time Physical Activity Behavior of Korean Americans
Principal Investigator:	Bradley J. Cardinal, Ph.D.
Student Researcher:	Hyo Lee, M.S.
Version Date:	4/16/2010

1. WHAT IS THE PURPOSE OF THIS FORM?

This form contains information you will need to help you decide whether to be in this study or not. Please read the form carefully and contact the study team member(s) regarding questions about anything that is not clear.

2. WHY IS THIS STUDY BEING DONE?

The purpose of this study is to examine how your adaptation to the US culture affects the degree to which you believe: 1) you would benefit from physical activity participation; 2) your important others are doing physical activity regularly; 3) you are confident to participate in physical activity regularly; 4) you intend to participate in physical activity. Also, we want to understand how the above-mentioned changes resulted in your actual participation in physical activity during the past week. Finally, we will test if the relationships among your benefit belief, important others' behaviors, your confidence, and your intention regarding physical activity participation can be differentiated by your degree of being individualist and collectivist. This study is conducted by Hyo Lee for the completion of a dissertation. Up to 250 females and 250 males will be invited to take part in this study.

3. WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?

You are being invited to take part in this study because this study is purposed to investigate the cultural adaptation and physical activity relationship among Korean Americans.

4. WHAT WILL HAPPEN IF I TAKE PART IN THIS RESEARCH STUDY?

Survey components: The study will be conducted by an internet-based survey only. The survey consists of five parts: 1) The Suinn-Lew Asian Self-Identity Acculturation Scale (30 items; SL-ASIA), 2) The Theory of Planned Behavior Questionnaires (17 items; TPB-Q), 3) Leisure-Time Exercise Questionnaire (3 items; LTEQ), 4) Individualism-Collectivism Scale (16 items; INDCOL), and 5) Demographic Questionnaire (9 items). In SL-ASIA, your historical background as well as more recent behaviors which may be related to your cultural identity will be asked. In TPB-Q, we will ask you about your benefit belief, important others' behaviors, confidence, and intention regarding leisure-time physical activity. In LTEQ, we will ask your actual physical activity behavior during the past week's leisure-time. In INDCOL, we will ask your degree of being individualist

and collectivist. Finally, we will ask your demographic information because we want to statistically control the effects of your demographic characteristics in the study results.

Survey Duration: This survey participation will take approximately 20 minutes, assuming each question item takes about 15 to 20 seconds.

Survey Results: The survey result will not be directly shared with the participants including you. Nevertheless, this survey result will be a part of the student researcher's doctoral dissertation, and presented and published in an internationally recognized academic conference meeting and academic journal. Meanwhile, any of aforementioned presentation and publication will not include your personal information.

5. WHAT ARE THE RISKS AND POSSIBLE DISCOMFORTS OF THIS STUDY?

There is no foreseeable direct risk to you, but you might be concerned about secure transmission of information via the Internet. SurveyMonkey.com is registered with Federal Trade Commission as a Safe Harbor, and is certified to be secure for keeping stored data confidential by Oregon State University. The data file will be locked and secured in the office of the student researcher.

6. WHAT ARE THE BENEFITS OF THIS STUDY?

This study is not designed to benefit you directly. Nevertheless, this project has the potential to unveil unknown psychosocial mechanisms that immigrants' physical activity behavior resembles those of the US-born people. Also, the results of this project will provide a solid theoretical framework to promote physical activity of ethnic minority groups including Korean Americans.

7. WILL YOU BE PAID FOR BEING IN THIS STUDY?

You will not be paid for being in this research study. Nevertheless, if you complete the survey, the research team in Oregon State University will donate 1 dollar per complete survey participant to the Haiti Relief Fund via the American Red Cross, in honor of the Korean American study participants.

8. WHAT OTHER CHOICES DO I HAVE IF YOU DO NOT TAKE PART IN THIS STUDY?

Participation in this study is voluntary. If you decide to take part in the study, it should be because you really want to volunteer. You can stop at any time during the study. You are free to skip any questions that you prefer not to answer.

9. WHO DO I CONTACT IF I HAVE QUESTIONS?

If you have any questions about this research project, please contact the principal investigator, Bradley J. Cardinal, Ph. D. at 541-737-2506 or by email at Brad.Cardinal@oregonstate.edu, or the student researcher, Hyo Lee, M.S., at 541-737-9849 or by email at leeh@onid.orst.edu.

If you have questions about your rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or by email at IRB@oregonstate.edu

By clicking the “I Agree” button below, you indicate that you are at least 18 years of age and that you agree to take part in this study. Thank you in advance for your time and cooperation. Your participation is greatly appreciated!

온라인 설문조사 참여동의서

연구과제명: 재미한국인의 문화적응과 여가시간 신체활동의 관계
연구책임자: Bradley J. Cardinal, Ph.D.
학생연구자: Hyo Lee (이효), M.S.
작성일자: 4/16/2010

1. 본 설문조사 참여동의서의 목적

본 동의서는 여러분이 본 연구에 참여할 것인지 스스로 결정하는데 필요한 정보를 제공합니다. 내용을 주의 깊게 살펴보고 궁금하신 점은 연구책임자 및 학생연구자에게 문의하여 주십시오.

2. 본 연구의 목적

본 연구의 목적은 여러분이 경험하는 미국문화에 대한 적응이 운동의 이로움, 주변 분들의 참여, 자신감에 관련된 믿음과 어떠한 관련이 있는지, 또한 운동 의도 형성과 실제 운동 행동에 어떠한 영향을 주는지 알아보는 데에 있습니다. 부수적으로, 본 연구는 개인주의 및 집합주의 성향이 앞서 말한 관계 형성에 어떠한 영향을 주는지 알아볼 것입니다. 본 연구는 이효 (Hyo Lee) 학생 연구원의 박사학위 논문 연구의 일부이며, 남녀 각각 250 분씩 설문조사에 참여하게 될 것입니다.

3. 여러분이 본 설문조사에 참여하시는 이유

여러분이 본 설문조사에 참여하시는 이유는 본 연구가 재미한국인의 문화적응과 신체활동의 관계를 알아보고자 하기 때문입니다.

4. 본 설문조사의 내용

설문내용: 본 연구는 전적으로 인터넷기반 설문조사를 통해 이루어집니다. 설문내용은 다음과 같습니다: 1) 30 문항 자아정체성 문화적응 척도(The Suinn-Lew Asian Self-Identity Acculturation Scale; SL-ASIA), 2) 17 문항 계획된 행동이론 질문지(The Theory of Planned Behavior Questionnaires; TPB-Q), 3) 3 문항 여가시간 운동 질문지(Leisure-Time Exercise Questionnaire; LTEQ), 4) 16 문항 개인주의-집합주의 질문지 (Individualism-Collectivism Scale; INDCOL), 5) 9 문항 인구통계학적 질문지. SL-ASIA 은 여러분의 문화적 배경 및 정체성에 관련된 최근 행동을 물을 것입니다. TPB-Q 는 운동의 이로움 관련 믿음, 주변 분들의 운동행동, 운동참여 자신감, 운동참여 의도를 물을 것입니다. LTEQ 는 지난 주 동안 여러분이 운동을 실제로 얼마나 하셨는지 물을 것입니다. 마지막으로, 인구통계학적 질문지의 목적은 본 연구 결과가 여러분의 인구통계학적 특성에 따라 왜곡될 수 있는지 알아보는 것입니다.

설문 소요 시간: 본 설문조사에 걸리는 시간은 한 문항당 15-20 초 걸린다는 전제하에 약 20 분입니다.

연구결과: 본 설문조사 결과는 여러분과 직접 공유하지 않습니다. 하지만 본 설문조사 결과는 학생연구자의 박사학위논문의 일부가 될 것이며, 국제적으로 저명한 학술대회 및

학술지에 발표될 것입니다. 한편, 상기한 학술활동에 여러분의 개인정보는 공개되지 않습니다.

5. 설문조사 참여로 인한 불편

본 설문조사 참여로 인해 예상되는 위험은 없습니다만, 행여 인터넷을 통한 안전한 정보전달에 관해 우려를 하실 수도 있습니다. 하지만 SurveyMonkey.com 은 Federal Trade Commission 에 Safe Harbor 로 등록되어 있으며, Oregon 주립대에서는 데이터 보관 안전성에 대해 인증을 한 바 있습니다. 여러분의 참여로 만들어지는 데이터 파일은 시건 장치가 된 학생연구자의 연구실에 안전하게 보관될 것입니다.

6. 설문조사 참여로 인한 혜택

본 설문조사 연구는 여러분에게 직접적인 혜택을 제공하지 않습니다. 하지만 본 연구는 이민자들의 운동행동 패턴이 미국인을 닮아가는 과정에 대한 사회심리학적 메커니즘을 밝힐 수 있을 것으로 기대됩니다. 또한 본 연구결과는 재미한국인을 포함한 미국 내 소수민족의 운동참여를 증진시키기 위한 프로젝트의 이론적 기반이 될 것입니다.

7. 설문조사 참여에 대한 금전적 보수

본 설문조사에 관련된 금전적 보수는 없습니다. 하지만 여러분이 설문을 마치실 때마다 저의 연구팀에서는 재미한국인의 이름으로 American Red Cross 를 통해 Haiti Relief Fund 에 1 달러씩 기부할 것입니다.

8. 본 설문에 참여하고 싶지 않을 경우

본 설문조사 참여는 전적으로 자발적이어야 합니다. 또한 여러분은 설문 중간에 언제든지 중지하실 수 있습니다. 또한 답하고 싶지 않은 질문은 건너뛰셔도 됩니다.

9. 연락처

본 연구에 관해 질문이 있으시면 연구책임자인 Bradley J. Cardinal, Ph. D.(541-737-2506 혹은 Brad.Cardinal@oregonstate.edu) 또는 학생연구자 이효 (Hyo Lee), M.S. (541-737-9849 혹은 leeh@onid.orst.edu)로 연락 주십시오.

참여자의 권리 및 복지에 관련된 질문은 Oregon 주립대 연구윤리위원회 (Oregon State University Institutional Review Board) 사무실 (541-737-8008 또는 IRB@oregonstate.edu)로 연락 주십시오.

18 세 이상이며 본 설문에 의하시고자 하시면 “동의합니다”를 클릭하십시오. 시간을 내주셔서 감사합니다.

Appendix C: Survey Instruments**Demographic Questionnaire**

Gender: _____

Age: _____ years

Current Height: _____

Current Weight: _____

Employment status:

- I work at a job or business (including unpaid work in a family business).
- I do NOT work at job or business

Main occupation:

- Employee
- Self-employed
- Student
- Homemaker

Marital status

- Single
- Married or living with partner
- Separated, widowed, or divorced

Annual Household Income

- Less than \$20,000
- \$20,001-\$40,000
- \$40,001-\$60,000
- \$60,001-\$100,000
- \$100,000 or more

Education Level:

- Elementary school
- Middle school
- Some of high school
- High school degree
- Some college
- Associate's or Bachelor's degree

인구통계학적 질문

성별: _____

나이: _____ 세

키: _____

몸무게: _____

취업여부:

- 나는 직장 혹은 내 사업체에서 일한다 (패밀리 비즈니스에서 무보수로 일하는 것 포함)
- 나는 직장에서 일하지 않는다.

주된 직업:

- 셀러리맨
- 자영업
- 학생
- 주부

결혼여부

- 미혼
- 기혼 혹은 동거
- 별거, 이혼, 사별

연간 가계소득

- \$20,000 이하
- \$20,001-\$40,000
- \$40,001-\$60,000
- \$60,001-\$100,000
- \$100,000 이상

교육 수준:

- 초등학교 졸업
- 중학교 졸업
- 고등학교 중퇴
- 고등학교 졸업
- 대학 중퇴
- 대학 졸업

Suinn-Lew Asian Self-Identity Acculturation Scale

INSTRUCTIONS: The questions which follow are for the purpose of collecting information about your historical background as well as more recent behaviors which may be related to your cultural identity. Choose the one answer which best describes you.

1. What language can you speak?
 - 1) Korean only
 - 2) Mostly Korean, some English
 - 3) Korean and English about equally well (bilingual)
 - 4) Mostly English, some Korean
 - 5) Only English

2. What language do you prefer?
 - 1) Korean only (for example, Chinese, Japanese, Korean, Vietnamese, etc.)
 - 2) Mostly Korean, some English
 - 3) Korean and English about equally well (bilingual)
 - 4) Mostly English, some Korean
 - 5) Only English

3. How do you identify yourself?
 - 1) Korean
 - 2) Korean-American
 - 3) American

4. Which identification does (did) your mother use?
 - 1) Korean
 - 2) Korean-American
 - 3) American

5. Which identification does (did) your father use?
 - 1) Korean
 - 2) Korean-American
 - 3) American

6. What was the ethnic origin of the friends and peers you had, as a child up to age 6?
 - 1) Almost exclusively Asians, Asian-Americans, Orientals
 - 2) Mostly Asians, Asian-Americans, Orientals
 - 3) About equally Asian groups and Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 4) Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 5) Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

7. What was the ethnic origin of the friends and peers you had, as a child from 6 to 18?
 - 1) Almost exclusively Asians, Asian-Americans, Orientals
 - 2) Mostly Asians, Asian-Americans, Orientals
 - 3) About equally Asian groups and Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 4) Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 5) Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

8. Whom do you now associate with in the community?
 - 1) Almost exclusively Asians, Asian-Americans, Orientals
 - 2) Mostly Asians, Asian-Americans, Orientals
 - 3) About equally Asian groups and Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 4) Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 5) Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

9. If you could pick, whom would you prefer to associate with in the community?
 - 1) Almost exclusively Asians, Asian-Americans, Orientals
 - 2) Mostly Asians, Asian-Americans, Orientals
 - 3) About equally Asian groups and Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 4) Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
 - 5) Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

10. What is your music preference?
 - 1) Only Asian music (for example, Chinese, Japanese, Korean, Vietnamese, etc.)
 - 2) Mostly Asian
 - 3) Equally Asian and English
 - 4) Mostly English
 - 5) English only

11. What is your movie preference? (with Korean and English subtitles)
 - 1) Korean-language movies only
 - 2) Korean-language movies mostly
 - 3) Equally Korean/English-language movies
 - 4) Mostly English-language movies only
 - 5) English-language movies only

12. Where were you born?
 - 1) Korea
 - 2) USA
 - 3) Other country

13. Where was your mother born?
 - 1) Korea
 - 2) USA
 - 3) Other country

14. Where was your father born?
 - 1) Korea
 - 2) USA
 - 3) Other country

15. Where was grandmother on your mother's side [your maternal grandmother] born?
 - 1) Korea
 - 2) USA
 - 3) Other country

16. Where was grandfather on your mother's side [your maternal grandfather] born?
 - 1) Korea
 - 2) USA
 - 3) Other country

17. Where was grandmother on your father's side [your paternal grandmother] born?
 - 1) Korea
 - 2) USA
 - 3) Other country

18. Where was grandfather on your father's side [your paternal grandfather] born?
 - 1) Korea
 - 2) USA
 - 3) Other country

19. Where were you raised?
 - 1) In Korea only
 - 2) Mostly in Korea, some in U.S.
 - 3) Equally in Korea and U.S.
 - 4) Mostly in U.S., some in Korea
 - 5) In U.S. only

20. Have you been in Korea for one year or more?
 - 1) Yes
 - 2) No

21. Have you been in Korea for less than one year, EXCLUDING occasional visit?
 - 1) Yes
 - 2) No

22. Do you occasionally visit Korea?
1) Yes
2) No
23. Do you communicate (emails, letter, phone calls, etc) with people in Korea?
1) Yes
2) No
24. What is your food preference at home?
1) Exclusively Asian food
2) Mostly Asian food, some American
3) About equally Asian and American
4) Mostly American food
5) Exclusively American food
25. What is your food preference in restaurants?
1) Exclusively Asian food
2) Mostly Asian food, some American
3) About equally Asian and American
4) Mostly American food
5) Exclusively American food
26. Do you
1) read only an Korean language
2) read an Korean language better than English
3) read both Korean and English equally well
4) read English better than an Korean language
5) read only English
27. Do you
1) write only an Korean language
2) write an Korean language better than English
3) write both Korean and English equally well
4) write English better than an Korean language
5) write only English
28. How much pride do you have in being Korean or Korean-American?
1) Extremely proud
2) Moderately proud
3) Little pride
4) No pride but DO NOT feel negative
5) No pride but DO fell negative

29. How would you rate yourself?

- 1) Very Korean
- 2) Mostly Korean
- 3) Bicultural
- 4) Mostly Westernized
- 5) Very Westernized

30. Do you participate in Korean occasions, holidays, traditions, etc.?

- 1) Strongly agree
- 2) Agree
- 3) Neither agree or disagree
- 4) Disagree
- 5) Strongly disagree

자아정체성 문화적응척도

아래의 질문들은 당신의 문화적 정체성과 관련될지도 모르는 당신의 역사적 배경과 최근의 행동들에 대한 정보에 관한 것들입니다. 가장 적합하다고 생각되는 하나를 골라주십시오.

1. 당신이 사용할 수 있는 언어는 무엇입니까?
 - 1) 한국어만
 - 2) 한국어 유창하게, 영어 조금
 - 3) 한국어와 영어 비슷하게
 - 4) 영어 유창하게, 한국어 조금
 - 5) 영어만

2. 당신은 어떤 언어를 선호하십니까?
 - 1) 오직 한국어
 - 2) 한국어 많이, 영어 조금
 - 3) 한국어와 영어 비슷하게
 - 4) 영어 많이, 한국어 조금
 - 5) 영어만

3. 당신의 정체성에 대해서 어떻게 설명하시겠습니까?
 - 1) 한국인 (Asian)
 - 2) 한국계 미국인(Korean American)
 - 3) 미국인(American)

4. 당신의 어머니는 어떤 정체성을 가지셨습니까?
 - 1) 한국인 (Asian)
 - 2) 한국계 미국인(Korean American)
 - 3) 미국인(American)

5. 당신의 아버지는 어떤 정체성을 가지셨습니까?
 - 1) 한국인 (Asian)
 - 2) 한국계 미국인(Korean American)
 - 3) 미국인(American)

6. 6살까지 당신은 어떤 주로 어떤 인종과 어울려 지냈습니까?
 - 1) 거의 모두 아시아인
 - 2) 대체로 아시아인
 - 3) 아시아인과 비 아시아인 (백인, 흑인, 히스패닉, 기타) 비슷하게
 - 4) 대체로 비 아시아인 (백인, 흑인, 히스패닉, 기타)
 - 5) 거의 모두 비 아시아인 (백인, 흑인, 히스패닉, 기타)

7. 6 살에서 18 살까지 당신은 누구와 어울려 지냈습니까?
- 1) 거의 모두 아시아인
 - 2) 대체로 아시아인
 - 3) 아시아인과 비 아시아인 (백인, 흑인, 히스패닉, 기타) 비슷하게
 - 4) 대체로 비 아시아인 (백인, 흑인, 히스패닉, 기타)
 - 5) 거의 모두 비 아시아인 (백인, 흑인, 히스패닉, 기타)
8. 현재 당신은 어떤 사람들과 어울려 지냅니까?
- 1) 거의 모두 아시아인
 - 2) 대체로 아시아인
 - 3) 아시아인과 비 아시아인 (백인, 흑인, 히스패닉, 기타) 비슷하게
 - 4) 대체로 비 아시아인 (백인, 흑인, 히스패닉, 기타)
 - 5) 거의 모두 비 아시아인 (백인, 흑인, 히스패닉, 기타)
9. 다음 중 하나를 고른다면, 당신은 어떤 사람들과 어울려 지내기를 원하십니까?
- 1) 거의 모두 아시아인
 - 2) 대체로 아시아인
 - 3) 아시아인과 비 아시아인 (백인, 흑인, 히스패닉, 기타) 비슷하게
 - 4) 대체로 비 아시아인 (백인, 흑인, 히스패닉, 기타)
 - 5) 거의 모두 비 아시아인 (백인, 흑인, 히스패닉, 기타)
10. 다음 중 어떤 음악을 좋아합니까?
- 1) 한국음악만
 - 2) 대체로 한국음악
 - 3) 한국음악과 미국음악 똑같이
 - 4) 대체로 미국음악
 - 5) 미국음악만
11. 다음 중 어떤 영화를 좋아합니까? (한글/영문 자막 있음)
- 1) 한국어로 된 영화만
 - 2) 대체로 한국어로 된 영화
 - 3) 한국어나 영어로 된 영화 비슷하게
 - 4) 대체로 영어로 된 영화
 - 5) 영어로 된 영화만
12. 당신은 어느 나라에서 태어났습니까?
- 1) 한국
 - 2) 미국
 - 3) 다른 나라
13. 당신의 어머니는 어느 나라에서 태어났습니까?
- 1) 한국
 - 2) 미국
 - 3) 다른 나라

14. 당신의 아버지는 어느 나라에서 태어났습니까?
 - 1) 한국
 - 2) 미국
 - 3) 다른 나라

15. 당신의 외할머니는 어느 나라에서 태어났습니까?
 - 1) 한국
 - 2) 미국
 - 3) 다른 나라
16. 당신의 외할아버지는 어느 나라에서 태어났습니까?
 - 1) 한국
 - 2) 미국
 - 3) 다른 나라

17. 당신의 친할머니는 어느 나라에서 태어났습니까?
 - 1) 한국
 - 2) 미국
 - 3) 다른 나라
18. 당신의 친할아버지는 어느 나라에서 태어났습니까?
 - 1) 한국
 - 2) 미국
 - 3) 다른 나라

19. 당신은 어느 나라에서 성장했습니까?
 - 1) 한국에서만
 - 2) 대부분은 한국에서, 미국에서는 조금
 - 3) 한국과 미국에서 반반씩
 - 4) 대부분은 미국에서, 한국에서는 조금
 - 5) 미국에서만

20. 당신은 한국에서 1년 이상 살아본 경험이 있습니까?
 - 1) 예
 - 2) 아니오

21. 가끔 방문하는 것을 제외하고, 당신은 한국에서 1년보다 짧게 살아본 경험이 있습니까?
 - 1) 예
 - 2) 아니오

22. 가끔이라도 한국을 방문하십니까?
 - 1) 예
 - 2) 아니오

23. 한국에 있는 사람들과 편지, 이메일, 혹은 전화를 하십니까?
 1) 예
 2) 아니오
24. 집에서 어떤 음식을 즐겨먹습니까?
 1) 완전히 한국 및 동양음식
 2) 대체로 한국 및 동양음식
 3) 한국 및 동양음식과 미국음식을 비슷하게
 4) 대체로 미국음식
 5) 완전히 미국음식
25. 음식점에서 어떤 음식을 즐겨먹습니까?
 1) 완전히 한국 및 동양음식
 2) 대체로 한국 및 동양음식
 3) 한국 및 동양음식과 미국음식을 비슷하게
 4) 대체로 미국음식
 5) 완전히 미국음식
26. 당신의 한국어 및 영어 읽기 수준은 어느 정도입니까?
 1) 한국어만 읽을 수 있다
 2) 영어보다는 한국어를 더 잘 읽는다
 3) 영어와 한국어를 똑같이 잘 읽는다
 4) 한국어보다 영어를 더 잘 읽는다
 5) 영어만 읽을 수 있다
27. 당신의 한국어 및 영어 쓰기 수준은 어느 정도입니까?
 1) 한국어만 쓸 수 있다
 2) 영어보다는 한국어를 더 잘 쓸 수 있다
 3) 영어와 한국어를 똑같이 잘 쓸 수 있다
 4) 한국어보다 영어를 더 잘 쓸 수 있다
 5) 영어만 쓸 수 있다
28. 당신은 한국인 혹은 한국계 미국인에 대해 얼마나 자랑스럽게 생각하십니까?
 1) 매우 자랑스럽다
 2) 그럭저럭 자랑스럽다
 3) 거의 자랑스럽지 않다
 4) 자랑스럽지 않지만 반감도 없다
 5) 자랑스럽지 않을 뿐더러 반감도 있다
29. 문화적으로 당신을 어떻게 평가하시겠습니까?
 1) 매우 한국적이다.
 2) 대체로 한국적이다.
 3) 한국적인 면과 서구적인 면이 비슷한 정도이다.
 4) 대체로 서구화되어있다.
 5) 매우 서구화되어있다.

30. 당신은 한국관련 전통 행사나 명절 등을 얼마나 지키는 편입니까?
- 1) 매우 그렇다
 - 2) 그렇다
 - 3) 보통
 - 4) 그렇지 않다
 - 5) 전혀 그렇지 않다

The Theory of Planned Behavior Questionnaires

Recall your thoughts about exercise from ONE WEEK AGO.

Subscales	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
<i>Attitude toward exercise</i>					
I thought exercise was boring.	1	2	3	4	5
I thought exercise was pleasant.	1	2	3	4	5
I thought exercise was enjoyable.	1	2	3	4	5
I thought exercise was good.	1	2	3	4	5
I thought exercise was useful.	1	2	3	4	5
I thought exercise was harmful.	1	2	3	4	5
<i>Subjective norm</i>					
Most people who are important to me wanted me to exercise during the past 7 days.	1	2	3	4	5
The people in my life whose opinions I value wanted me to exercise regularly during the past 7 days.	1	2	3	4	5
The people in my life whose opinions I value exercised regularly.	1	2	3	4	5
Most people who are important to me exercised regularly.	1	2	3	4	5
<i>Perceived behavioral control</i>					
I believed that I was able to exercise if I wanted to during the past 7 days.	1	2	3	4	5
I believed that it would be easy to exercise during the past 7 days.	1	2	3	4	5
I believed that I had a control over exercising during the past 7 days.	1	2	3	4	5
It believed that it was mostly up to me whether I exercise during the past 7 days.	1	2	3	4	5
<i>Intention</i>					
I intended to exercise during the past 7 days.	1	2	3	4	5
I was going to try to exercise during the past 7 days.	1	2	3	4	5
I planned to exercise during the past 7 days.	1	2	3	4	5

계획된 행동이론 질문지

일주일 전의 본인의 생각을 회상해 보십시오.

하위척도	매우 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
운동관련 태도					
나는 운동은 지루한 것이라고 생각했다.	1	2	3	4	5
나는 운동은 유쾌한 것이라고 생각했다.	1	2	3	4	5
나는 운동은 즐거운 것이라고 생각했다.	1	2	3	4	5
나는 운동이 내게 좋은 것이라고 생각했다.	1	2	3	4	5
나는 운동이 내게 쓸모 있다고 생각했다.	1	2	3	4	5
나는 운동이 내게 이롭다고 생각했다.	1	2	3	4	5
주관적 규범					
나에게 중요한 대부분의 사람들은 내가 지난 7일간 운동을 하길 바랬을 것이다.	1	2	3	4	5
내 삶에 가치 있는 의견을 제공하는 사람들은 내가 지난 7일간 운동을 하길 바랬을 것이다.	1	2	3	4	5
내게 가장 중요한 대부분의 사람들은 꾸준히 운동을 해왔다.	1	2	3	4	5
내 삶에 가장 가치 있는 의견을 제공하는 사람들은 꾸준히 운동을 해왔다.	1	2	3	4	5
지각된 행동통제					
나는 마음만 먹으면 지난 7일간 운동을 할 수 있다고 생각했다.	1	2	3	4	5
나는 지난 7일간 운동을 하는 것이 쉬울 것이라고 생각했다.	1	2	3	4	5
나는 지난 7일간 운동을 하는 것은 나에게 완전한 결정권이 있다고 생각했다.	1	2	3	4	5
나는 지난 7일간 운동을 하는 것은 거의 전적으로 나에게 달려있다고 생각했다.	1	2	3	4	5

의도

나는 지난 7일간 운동을 할 의도가 있었다.	1	2	3	4	5
나는 지난 7일간 운동을 해보려고 마음 먹었다.	1	2	3	4	5
나는 지난 7일간 운동을 하려고 계획했다.	1	2	3	4	5

Leisure-Time Exercise Questionnaire

Considering **THE PAST 7-DAY PERIOD**, **HOW MANY TIMES (neither hours nor minutes)** did you do the following levels of exercise **FOR MORE THAN 15 MINUTES DURING YOUR FREE TIME?**

DO NOT include occupational-, household-, NOR transportation-related activities.

Only **COUNT** exercises that **LAST AT MORE THAN 15 MINUTES**. **REGARDLESS OF HOW LONG EACH SESSION LASTS, IT WILL ONLY BE COUNTED AS ONE SESSION.**

EXAMPLE:

- If you jogged five times this past week for 30 minutes each time, you would count this as 5 sessions of vigorous exercise.
- If you played doubles tennis for 3 hours on Sunday, you would count this as 1 session of moderate exercise.

Your responses on this form would look like this:

Strenuous = 5 times Moderate = 1 times Mild = 0 time

Considering a **7-Day period**, how many times did you do the following levels of exercise for **more than 15 minutes** during your free time? Write on each line the appropriate number.

	Times (Number of Sessions)
<p>A. VIGOROUS EXERCISE (HEART BEATS RAPIDLY) (e.g., running, jogging, hockey, football, soccer, basketball, singles tennis, cross country skiing, judo, vigorous swimming, etc.)</p>	_____
<p>B. MODERATE EXERCISE (NOT EXHAUSTING) (e.g., fast walking, baseball, doubles tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing, etc.)</p>	_____
<p>C. MILD EXERCISE (MINIMAL EFFORT) (e.g., yoga, archery, bowling, horseshoes, golf, easy walking, etc.)</p>	_____

여가시간 운동 질문지

지난 7일간 여가 시간 중 귀하는 다음에 해당하는 강도의 운동을 총 몇 번 15분 이상 하셨습니까?

업무, 가사, 교통수단으로서의 신체활동은 포함되지 않습니다.

한 번에 15분 이상 지속한 것만 세어 주십시오. 15분이나 한 시간이나 모두 한 번으로 셉니다.

예:

- 만일 귀하께서 지난 주에 30분 정도의 조깅을 다섯 번 하셨으면 고강도의 운동을 다섯 번 하신 것입니다.
- 만약 귀하께서 지난 일요일에 테니스 복식을 세 시간 동안 치셨다면 중강도 운동을 한 번 하신 것입니다.
- 만약 귀하께서 지난 토요일에 골프를 네 시간 동안 치셨다면 저강도 운동을 한 번 하신 것입니다.

따라서 아래와 같이 적으시면 됩니다.

고강도 운동 = 세 번 중강도 = 한 번 저강도 = 한 번

지난 7일간 귀하는 다음에 해당하는 강도의 운동을 총 몇 번 15분 이상 하셨습니까?
해당하는 횟수를 빈 칸에 적어주십시오.

총 횟수

A. 고강도 운동

(심장이 빠르게 고동치는 수준)

(예: 달리기, 조깅, 하키, 축구, 미식축구, 농구,
단식테니스, 크로스컨트리 스키, 유도, 빠른 수영,
기타 등등)

B. 중강도 운동

(녹초는 되지 않을 정도의 수준)

(예: 빠르게 걷기, 야구, 배구, 복식테니스,
여유 있게 자전거 타기, 천천히 수영하기,
알파인 스키, 포크댄스, 기타 등등)

C. 저강도 운동

(최소한의 신체 움직임)

(예: 요가, 양궁, 볼링, 승마, 골프, 천천히 걷기,
기타 등등)

Individualism-Collectivism Scale

	Strongly disagree	disagree	Neither agree nor disagree	Agree	Strongly agree
I'd rather depend on myself than others.	1	2	3	4	5
I rely on myself most of the time; I rarely rely on others.	1	2	3	4	5
I often do "my own thing."	1	2	3	4	5
My personal identity, independent of others, is very important to me.	1	2	3	4	5
It is important that I do my job better than others.	1	2	3	4	5
Winning is everything.	1	2	3	4	5
Competition is the law of nature.	1	2	3	4	5
When another person does better than I do, I get tense and aroused.	1	2	3	4	5
If a coworker gets a prize, I would feel proud.	1	2	3	4	5
The well-being of my coworkers is important to me.	1	2	3	4	5
To me, pleasure is spending time with others.	1	2	3	4	5
I feel good when I cooperate with others.	1	2	3	4	5
Parents and children must stay together as much as possible.	1	2	3	4	5
It is my duty to take care of my family, even when I have to sacrifice what I want.	1	2	3	4	5
Family members should stick together, no matter what sacrifices are required.	1	2	3	4	5
It is important to me that I respect the decisions made by my groups.	1	2	3	4	5

개인주의-집합주의 질문지

	매우 그렇지 않다	그렇지 않다	보통이 다	그렇다	매우 그렇다
나는 남에게보다는 나 자신에게 의지하는 편이다.	1	2	3	4	5
대체로 나는 나 자신에게 의지하며, 남에게는 기대는 일은 별로 없다.	1	2	3	4	5
나는 남에게 신경 쓰기보단 내 방식대로 사는 편이다.	1	2	3	4	5
타인으로부터 독립적인 나만의 정체성은 나에게 매우 중요하다.	1	2	3	4	5
나에게 주어진 일을 남들보다 더 잘하는 것은 중요하다.	1	2	3	4	5
승리하는 것이 전부이다.	1	2	3	4	5
경쟁은 세상의 이치이다.	1	2	3	4	5
다른 사람이 나보다 좋은 성과를 얻었을 때 나는 긴장하고 분발하게 된다.	1	2	3	4	5
내 동료가 상을 탄다면 나 역시 자랑스럽게 생각할 것이다.	1	2	3	4	5
내 동료의 행복은 나에게도 중요하다.	1	2	3	4	5
남들과 시간을 보내는 것은 나에게 즐거운 일이다.	1	2	3	4	5
나는 남들과 협동 할 때 기분이 좋다.	1	2	3	4	5
부모와 자식은 가능한 함께 살아야 한다.	1	2	3	4	5
내가 원하는 것을 희생하더라도 가족을 돌보는 것은 나의 의무이다.	1	2	3	4	5
어떠한 희생이 있더라도 가족끼리는 단결해야 한다.	1	2	3	4	5
내가 속한 집단의 결정사항을 존중하는 것은 나에게 중요하다.	1	2	3	4	5