Original Article

Sustainability of Exercise Behavior in Seniors: An Application of the Extended Theory of Planned Behavior

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Abstract:

The purpose of this study was to investigate the sustainability of seniors' exercise behavior by applying the theory of planned behavior (TPB). More specifically, preliminary knowledge was incorporated in the TPB to better comprehend seniors' exercise behavior and provide practical implications regarding how to encourage older adults to participate in exercise consistently. Convenience sampling was employed to collect data from participants aged 65 and over (N = 229). The results showed that attitude, subjective norms, and perceived behavioral control had positive influence on seniors' exercise intention, which in turn positively affected their exercise behavior. Moreover, perceived behavioral control and exercise intention both positively predicted exercise behavior. Finally, preliminary knowledge had a positive influence on seniors' attitude but no direct effect on their exercise intention. The results imply that educational activities and training support designed to improve older adults' attitude toward exercise could contribute to their health and quality of life.

Key words: extended theory of planned behavior, preliminary knowledge, senior exercise.

Introduction

According to a 2016 report by Statistics Korea, the number of people aged 65 and older will surpass the number of children aged 14 and under in 2017. Moreover, it is projected that the elderly will represent 42.5% of the total population by 2065. Therefore, we must seek ways to address senior citizens' decline in physical functioning and ability to earn an income, along with the related psychological difficulties that they often develop. There has been a growing focus on helping baby boomers to age successfully (Knickman & Snell, 2002). The main factors affecting seniors' quality of life have been classified in physical, economic, and interpersonal relationships categories in previous studies (Diener & Suh, 1997; Nijs, de Graaf, Kok, & van Staveren, 2006). According to the World Health Organization's quality of life scale (WHOQOL-BREF), seniors' quality of life is influenced by their degree of satisfaction with their physical and psychological functioning and their social relationships. Understanding and addressing the most significant variables can lead to a successful quality of life for seniors (Min et al., 2002).

For seniors, exercising is a representative leisure activity that can lead to greater happiness as well as maintaining physical capacities (Leonard, 2008). Decarlo (1974) argued that those who participated in physical leisure activities regularly from middle age to old age would show stronger signs of successful aging than those who did so intermittently. That is, seniors' participation in exercise is an essential factor to improve their degree of life satisfaction due to their healthier physical condition (Jindo, Fujii, Tsunoda, Fujii, Sriramatr & Okura, 2016; Lee & Paffenbarger, 2000). For this reason, several studies have found positive effects of exercise participation among seniors (e.g., Barrett & Smerdely, 2002).

Although the importance of preliminary knowledge has been addressed in the literature on exercise (Freidson, 1988), only a few attempts have been made to identify the role of preliminary knowledge in the context of seniors' physical activity. It is important to understand the role of preliminary knowledge in order to stimulate seniors' participation in physical activities. Therefore, in the present study, this construct is incorporated as an extension of the theory of planned behavior (TPB) to investigate seniors' exercise intention and behavior.

The Theory of Planned Behavior

The TPB has been used as a theoretical basis for predicting and explaining behavior in social sciences. Its usefulness has been demonstrated across many research fields, including health behavior, consumer behavior, and environmentally friendly behavior (Ahmad et al., 2014; Chuan, Yusof, Soon & Abdullah, 2014; Chiu, Lee, & Won, 2014; Cunningham & Kwon, 2003; Noar & Zimmerman, 2005; Ohtomo & Hirose, 2007; Wu, Li, & Sung, 2016). According to Ajzen (1991), attitude, subjective norms, and perceived behavioral control lead to

individuals' intention to perform a behavior. Moreover, their intention and perceived behavioral control have positive effects on actual behavior. Thus, we propose five hypotheses on the basis of the TPB:

Hypothesis 1: Seniors' attitude will have a positive influence on their exercise intention.

Hypothesis 2: Seniors' subjective norms will have a positive influence on their exercise intention.

Hypothesis 3: Seniors' perceived behavioral control will have a positive influence on their exercise intention.

Hypothesis 4: Seniors' perceived behavioral control will have a positive influence on their exercise behavior.

Hypothesis 5: Seniors' exercise intention will have a positive influence on their exercise behavior.

Preliminary Knowledge

Knowledge is information that can be drawn from memory or before an external search for a product occurs. It is important for a consumer to collect and organize information as a meaningful construct, and this information will ultimately influence the choice and use of the product (Alba & Hutchinson, 1987). Preliminary knowledge is a consumer's level of experience and familiarity with information on a particular subject (Duhan, Johnson, Wilcox, & Harrell, 1997; Smith & Ragan, 1999). The presence of preliminary knowledge can be expected to have a significant effect on seniors' attitudes and their exercise intention (Liebeskind, 1996), and it can contribute to enhancing the predictive power of the TPB as originally formulated. Although the original TPB can be used to explore seniors' exercise motivation and behavior, it has been suggested that the effectiveness of socio-psychological theories such as the TPB can be extended by adding additional constructs in specific contexts (Ajzen, 1991; Conner & Armitage, 1998). Thus, we contend that incorporating the additional variable of preliminary knowledge within our application of the TPB should provide a more comprehensive understanding of seniors' exercise behavior. Accordingly, we add two more hypotheses:

Hypothesis 6: Seniors' preliminary knowledge will have a positive influence on their attitude.

Hypothesis 7: Seniors' preliminary knowledge will have a positive influence on their exercise intention.

Methods

Participation and Procedure

We collected data by using the convenience sampling method, administering on-site surveys with people aged 65 and over who lived in the following South-Korean cities: Seoul, Ilsan, Cheonan, Daejeon, and Jeonju. A total of 250 questionnaires were distributed, and 229 valid questionnaires were identified after we eliminated 21 respondents with missing information or multiple answers to one or more questions. The final sample was almost gender-even (male 48%, female 52%) and between the ages of 65 and 70 (39.7%, $n = 91$). Most of the seniors exercised three to four times per week (46.3%, $n = 106$) or more than four times per week (38.9%, $n = 89$). The detailed sample characteristics are presented in Table 1.

Table 1. Sample demographic characteristics

Characteristics	<i>n</i>	%	Characteristics	<i>n</i>	%
Gender			Married		
Male	109	47.6	Yes	95	41.5
Female	120	52.4	No	134	58.5
Age			Frequency of exercise (per week)		
65–70	91	39.7	1–2 time(s)	34	14.8
71–75	65	28.4	3–4 times	106	46.3
More than 76	73	31.9	More than 4 times	89	38.9
Exercise time (min)			Exercise period (years)		
Less than 20	46	20.1	Less than 30	46	20.1
21–40	62	27.1	31–35	58	25.3
41–60	91	39.7	36–40	65	28.4
More than 61	30	13.1	More than 41	60	26.2
Income			Religious affiliation		
Yes	178	77.7	Yes	125	54.6
No	51	22.3	No	104	45.4
Residence condition					
Alone	103	45.0			
With spouse	73	31.9			
With children	29	12.7			
Other	24	10.5			

Instrument

The survey instrument was developed based on a literature review. It comprised six sections: attitude, subjective norms, perceived behavioral control, exercise intention, exercise behavior, and preliminary knowledge. The scale items for attitude, subjective norms, perceived behavioral control, and exercise intention were adapted from Baker, Al-Gahtani, and Hubona (2007) and Hrubes, Ajzen, and Daigle (2001). The scale

items for exercise behavior came from Whitehead, Winget, Fedoravicius, Wooley, and Blackwell (1982). Finally, the scale items for preliminary knowledge were adapted from Jones, Courneya, Fahey, and Mackey (2004). A back-translation approach (Brislin, 1970) was carried out to reduce the discrepancies between the Korean version and the original English version of the questionnaires. All items were evaluated on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Data Analysis

First, SPSS 23.0 was used for a preliminary test. Descriptive statistics were used to investigate the data for normality assumptions. Second, we also measured the reliability and validity of the observed and latent variables to assume the levels of the variables by using a confirmatory factor analysis (CFA). Lastly, structural equation modeling (SEM) was conducted to check the hypotheses in the proposed model. Through the structural model analysis, we applied the standard factor loading and *t*-value of the path coefficient to determine the path strengths and significance levels of the latent variables.

Results

Scale Reliability and Validity

Based on the results of the CFA, it was found that the model fit did not fulfill the scientific criteria: $\chi^2(260) = 620.06$, $\chi^2/df = 2.39$, CFI = .89, TLI = .88, RMSEA = .09 (Hair, Black, Babin, & Anderson, 2010). The values of CFI, TLI, and RMSEA were outside the recommended cutoff values. Therefore, we inspected the information using modification indices (MIs), which are chi-square tests for specific equality constraints. High values indicate that the respective parameter constraint is inappropriate and that the deletion of items should be considered (Hair et al., 2010). On the basis of the MI information, five items were removed because they had high levels of association with multiple significant MIs. Dropping these items improved the model without compromising the theoretical meaningfulness of the measure (Bentler & Chou, 1987; Byrne, 2001). The deletion of the items resulted in a much better fit with the indices of the measurement model, $\chi^2(155) = 275.81$, $\chi^2/df = 1.78$, CFI = .95, TLI = .94, RMSEA = .06, supporting the appropriateness of the model.

As a next step, reliability was measured by calculating Cronbach's alpha and composite reliability (CR). As reported in Table 2, the results showed that all measures had suitable reliability, as the values of Cronbach's alpha were all over .70, exceeding the recommended level proposed by Nunnally (1978). The values of CR ranged from .80 to .89, which fulfilled the prescribed criterion (.70) suggested by Fornell and Larcker (1981). Convergent validity and discriminant validity were also calculated to assess scale validity. Convergent validity was investigated by factor loading and the average variance extracted (AVE). The factor loadings of the construct indicators ranged from .65 to .91, which were all higher than the suggested value of .50. All AVE values were greater than .05, ranging from .57 to .74 (Hair et al., 2010). Moreover, discriminant validity was established when the AVE values were estimated for each construct, as they exceeded the squared correlations between the respective constructs (Fornell & Larcker, 1981). This indicated that the AVE values were reasonably greater than any squared correlations between the dimensions. Thus, the discriminant validity turned out to be suitable. Overall, these results supported the reliability and validity of the instrument.

Table 2. Reliability and validity of measures

Customer citizenship behavior	Factor loading
<i>Attitude</i> ($\alpha = .79$; CR = .80, AVE = .57)	
I like to exercise.	.83
Doing exercise is fun.	.78
Doing exercise is good for me.	.65
<i>Subjective Norm</i> ($\alpha = .92$; CR = .92, AVE = .74)	
People around me think positively about my exercise.	.87
People around me will help me exercise.	.87
People around me will encourage me to exercise.	.86
People around me, who are important to me, agree with me doing exercise.	.84
<i>Perceived Behavioral Control</i> ($\alpha = .80$; CR = .81, AVE = .59)	
I can exercise whenever I want.	.66
It is entirely up to me to exercise or not to exercise.	.84
I am in good enough physical condition and time to exercise.	.79
<i>Preliminary Knowledge</i> ($\alpha = .81$; CR = .82, AVE = .60)	
I know about exercise.	.81
I am very familiar with exercises called sports.	.79
I am well aware of exercise, and my current knowledge is sufficient enough to do exercise.	.72
<i>Exercise Intention</i> ($\alpha = .82$; CR = .83, AVE = .63)	
I intend to continue my exercise regardless of the circumstances.	.74

I am willing to continue my exercise program.	.77
I have a serious plan about participating in exercise.	.86
<i>Exercise Behavior</i> ($\alpha = .88$; CR = .89, AVE = .68)	
Frequently participate in exercise behavior.	.91
Search frequently for exercise-related data.	.78
Pay money to exercise.	.77
Invest money to exercise behavior.	.83

Note. α = Cronbach's alpha, CR = composite reliability, AVE = average variance extracted.

Finally, the Pearson's correlation results are reported in Table 3. All the values were under 0.8, indicating that the constructs were not highly correlated; also, no multi-collinearity of constructs was found in the measurements.

Table 3. Mean, standard deviation, and correlation matrix between constructs

	1	2	3	4	5	6
1. Attitude	-					
2. Subjective norm	.22**	-				
3. Perceived behavioral control	.42**	.45**	-			
4. Preliminary knowledge	.47**	.22**	.38**	-		
5. Exercise intention	.42**	.45**	.49**	.36**	-	
6. Exercise behavior	.33**	.54**	.62**	.27**	.47**	-
Mean	4.32	3.76	4.16	4.03	4.24	4.07
SD	.49	.62	.59	.43	.47	.57

** $p < .01$

Hypothesis Testing

The results showed that the model demonstrated a suitable fit, with $\chi^2(163) = 404.63$, $\chi^2/df = 2.45$, CFI = .91, TLI = .90, and RMSEA = .08 (Hair et al., 2010). As shown in Table 3, the results sufficiently supported hypotheses 1, 2, and 3. Attitude had a positive effect on exercise intention ($\beta = .22$, $t = 2.44$), as did subjective norms ($\beta = .29$, $t = 4.10$) and perceived behavioral control ($\beta = .35$, $t = 4.68$). Furthermore, the results supported hypotheses 4 and 5; perceived behavioral control had a positive effect on exercise behavior ($\beta = .56$, $t = 6.99$), as did exercise intention ($\beta = .17$, $t = 2.38$). Lastly, preliminary knowledge had a positive effect on attitude ($\beta = .50$, $t = 5.85$) but no significant influence on exercise intention ($\beta = .12$, $t = 1.44$), supporting hypothesis 6 but rejecting hypothesis 7 (see fig. 1).

Fig.1. Conceptual model path coefficients (* $p < .05$; *** $p < .001$)

Discussion

The primary purpose of this study was to investigate seniors' exercise intention and behavior applying the TPB with the extended variable of preliminary knowledge. The findings provide valuable contributions to better understand the sustainability of older adults' exercise intention and behavior.

First, the study found that seniors' attitude, subjective norms, and perceived behavioral control significantly affected their exercise intention, which in turn positively influenced their exercise behavior.

Moreover, perceived behavioral control and exercise intention were found to have a direct effect on exercise behavior. This is consistent with the findings of other recent studies (Ahmad et al., 2014; Wu, Li, & Sung, 2016). It appears that seniors' decision to engage in exercise is founded on their attitude toward physical activity, the perception that significant others want them to exercise and remain healthy, and their perceived capability to carry out exercise behavior.

Second, preliminary knowledge, as an extended variable of the TPB, was considered in this study. Although other researchers (e.g., Liebeskind, 1996) have found that preliminary knowledge has a direct influence on intention, seniors' preliminary knowledge did not directly affect exercise intention in this study. It should be noted that attitude fully mediated the relation between preliminary knowledge and exercise intention (Zhao, Lynch, & Chen, 2010). Seniors may know the importance of exercise as a means of staying healthy but they tend to go to the medical center to care about their health rather than going out to exercise. This results in a missing link between preliminary knowledge and exercise intention. However, preliminary knowledge clearly affects attitude, which in turn leads to exercise intention, indicating that seniors' preliminary knowledge could be a critical factor in exercise intention by enabling seniors to have a more positive attitude toward exercise.

The findings of this study not only confirm the TPB model but also verify the extended model. Moreover, they contribute to our understanding of seniors' exercise behavior, which is critical for their future health and quality of life. Our findings suggest that attitude is an essential factor in fostering seniors' exercise intention. Thus, more education programs related to exercise and health should be provided for older adults to build their positive attitude toward exercise. Practitioners can also provide books, images, or short video clips related to basic exercises so as to help seniors to feel more comfortable participating. Also, the availability of a professional athletic trainer specifically dedicated to seniors could enhance their exercise intention and behavior.

Limitations and Future Research

Among this study's limitations, first is that it was conducted in South Korea, which is one of the world's most rapidly aging societies. Future researchers should test the proposed model in other countries, as aging is a serious social concern in most developed nations. Second, the influence of social interaction among seniors was not considered in this study. Social interaction is one of the most important motivations for engaging in physical activities. Future research should take this factor into account in the proposed model to gain a better understanding of seniors was not considered

References

- Ahmad, M. H., Shahar, S., Teng, N. I. M. F., Manaf, Z. A., Sakian, N. I. M., & Omar, B. (2014). Applying theory of planned behavior to predict exercise maintenance in sarcopenic elderly. *Clinical Interventions in Aging*, 9, 1551-1561.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Alba, J. W., & Hutchinson, J. W. (1987). Dimensions of consumer expertise. *Journal of Consumer Research*, 13(4), 411-454.
- Baker, E. W., Al-Gahtani, S. S., & Hubona, G. S. (2007). The effects of gender and age on new technology implementation in a developing country: Testing the theory of planned behavior (TPB). *Information Technology & People*, 20(4), 352-375.
- Barrett, C., & Smerdely, P. (2002). A comparison of community-based resistance exercise and flexibility exercise for seniors. *Australian Journal of Physiotherapy*, 48(3), 215-219.
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185-216.
- Chuan, C. C., Yusof, A., Soon, C. C., & Abdullah, M. C. (2014). Application of theory of planned behavior to predict recreational sports activities participation of students in Malaysia. *Journal of Physical Education and Sport*, 14(2), 172-177.
- Chiu, W., Lee, K. Y., & Won, D. (2014). Consumer behavior toward counterfeit sporting goods. *Social Behavior & Personality*, 42(4), 615-624.
- Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, 28(15), 1429-1464.
- Cunningham, G. B., & Kwon, H. (2003). The Theory of Planned Behaviour and Intentions to Attend a Sport Event. *Sport Management Review (Sport Management Association of Australia & New Zealand)*, 6(2), 127-145.
- Decarlo, T. J. (1974). Recreation participation patterns and successful aging. *Journal of Gerontology*, 29(4), 416-422.
- Diener, E., & Suh, E. (1997). Measuring quality of life: Economic, social, and subjective indicators. *Social Indicators Research*, 40(1-2), 189-216.
- Duhan, D. F., Johnson, S. D., Wilcox, J. B., & Harrell, G. D. (1997). Influences on consumer use of word-of-mouth recommendation sources. *Journal of the Academy of Marketing Science*, 25(4), 283-295.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Cambridge,

- UK: Pearson.
- Hrubes, D., Ajzen, I., & Daigle, J. (2001). Predicting hunting intentions and behavior: An application of the theory of planned behavior. *Leisure Sciences*, 23(3), 165-178.
- Jindo, T., Fujii, K., Tsunoda, K., Fujii, Y., Sriramatr, S., & Okura, T. (2016). Effect of increased daily physical activity on lower-extremity physical function during an exercise program for older adults. *Journal of Physical Education and Sport*, 16(3), 812-822.
- Jones, L. W., Courneya, K. S., Fairey, A. S., & Mackey, J. R. (2004). Effects of an oncologist's recommendation to exercise on self-reported exercise behavior in newly diagnosed breast cancer survivors: a single-blind, randomized controlled trial. *Annals of Behavioral Medicine*, 28(2), 105-113.
- Knickman, J. R., & Snell, E. K. (2002). The 2030 problem: caring for aging baby boomers. *Health services research*, 37(4), 849-884.
- Lee, I.-M., & Paffenbarger, R. S. (2000). Associations of light, moderate, and vigorous intensity physical activity with longevity: The Harvard alumni health study. *American journal of epidemiology*, 151(3), 293-299.
- Leonard, T. C. (2008). Richard H. Thaler, Cass R. Sunstein, Nudge: Improving decisions about health, wealth, and happiness. *Constitutional Political Economy*, 19(4), 356-360.
- Liebeskind, J. P. (1996). Knowledge, strategy, and the theory of the firm. *Strategic Management Journal*, 17(S2), 93-107.
- Min, S. K., Kim, K., Lee, C., Jung, Y. C., Suh, S. Y., & Kim, D. K. (2002). Development of the Korean versions of WHO Quality of Life scale and WHOQOL-BREF. *Quality of Life Research*, 11(6), 593-600.
- Nijs, K. A. N. D., de Graaf, C., Kok, F. J., & van Staveren, W. A. (2006). Effect of family style mealtimes on quality of life, physical performance, and body weight of nursing home residents: Cluster randomised controlled trial. *British Medical Journal*, 332(7551), 1180-1183.
- Noar, S. M., & Zimmerman, R. S. (2005). Health behavior theory and cumulative knowledge regarding health behaviors: are we moving in the right direction? *Health Education Research*, 20(3), 275-290.
- Ohtomo, S., & Hirose, Y. (2007). The dual-process of reactive and intentional decision-making involved in eco-friendly behavior. *Journal of environmental psychology*, 27(2), 117-125.
- Smith, P. L., & Ragan, T. J. (1999). *Instructional design*. New York: Wiley New York.
- Statistics Korea. (2016). *Future Population Estimates, 2015-2016*. Seoul, South Korea: Statistics Korea.
- Whitehead, W. E., Winget, C., Fedoravicius, A. S., Wooley, S., & Blackwell, B. (1982). Learned illness behavior in patients with irritable bowel syndrome and peptic ulcer. *Digestive diseases and sciences*, 27(3), 202-208.
- Wu, J.-h., Li, S.-H., & Sung, W.-Y. (2016). The study of perceived environment and its relation to senior citizen's physical activity behavior intention. *Journal of Business Research*, 69(6), 2259-2264.
- Zhao, X., Lynch Jr., J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197-206.