
A LEISURE CONSTRAINED PARTIAL MEDIATION MODEL ON THE PSYCHOLOGICAL MECHANISM OF PHYSICAL ACTIVITY BEHAVIOR FOR THE ELDERLY

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Abstract

Based on the leisure constraint theory, this paper establishes a partial mediation model to study the mechanism of physical activity behavior for the elderly. A total of 863 people over 60 were selected, and evaluated by curve fitting in structural equation modeling (SEM). The partial mediation model was found to be reliable and available, due to its high goodness-of-fit with the evaluated results, the significance of the path coefficient and the value of explained variance (42.7%). Furthermore, it is learned that self-efficacy has a major impact on participation, and leisure-time physical activity behavior can be easily altered by leisure constraints. To sum up, the partial mediation model with leisure constraints is suitable for explaining the mechanism of physical activity behavior for the elderly.

Key words: Leisure Constraints Theory, Partial Mediation Model, Leisure Physical Activity, Structural Equation Modeling.

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INTRODUCTION

The aging of population has been a widespread social problem for China as well as the developed countries. Data show that the number of the elderly aged 60 and over in China had reached 249 million by the end of 2018, accounting for 17.9% of the total population. It is expected that in the middle of the 21st century, the population of the elderly aged 60 and over in China will be close to 500 million, accounting for about 35% of the total population. Besides, the elderly is facing a decline in health and a rising incidence of kinds of chronic diseases. According to the survey on the national fitness activities state by General Administration of Sport of China in 2014, the number of elderly people aged 60-69 who had participated in physical activities, only accounted for 36.2%.

As one of the key populations concerned by the strategy of Healthy China 2030, the lower participation rate of in physical activities has become one of the most important obstacles to the prevention and control of chronic diseases for the elderly.

Leisure constraint was explained as any factors affecting leisure preference, leisure decision-making process and leisure experience, therefore, leading to individual's inability, unwillingness or reduction of participation in leisure and their mechanisms of inherent hindrance. Based on the early theory of leisure barriers, (Crawford & Godebey, 1987) classified the main constraining factors affecting leisure behaviors into three categories: intrapersonal constraints, interpersonal constraints and structural constraints. Lately, Crawford et al. further constructed hierarchical model on leisure constraints in the analysis of the relationship between these three types of leisure constraints and leisure behaviors to explain the corresponding relationships among different types of leisure

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constraints in the process of participating in actual leisure behavior (Crawford, Jackson, & Godbey, 1991). Subsequently, they verified the reliability of the model by taking Canadian high school students as subjects (Raymore, Godbey, Crawford et al., 1993), and further demonstrated that these three types of leisure constraints together with other levels of multiple factors, would have a complex impact on individual's leisure behaviors (Jackson, Crawford & Godbey, 1993). Subsequent studies mainly verified the universality of the theory for different groups. Crawford et al. summarized the research results in this field over the past decades, re-evaluated and established cross-culturally relevance of leisure constraints theory (Godbey, Crawford, & Shen, 2010). So far, the research on theory of leisure constraints had entered a new stage where the main contents were to explore the differences in measurable variables of different types of leisure behaviors.

The theory of leisure constraints was applied to explain the mechanism of physical activity behaviors, can also be traced back to the 1990s. One of the significant researches was that, for example, Frederick (Frederick & Shaw 1995) and the collaborators exerted that theory to explicate the aerobic physical activity behavior in young women, of which the conclusions supported the correlation between leisure constraints and physical activity behavior. Hereafter, with continuous development of theory of leisure constraints, researches began to integrate leisure constraints into other models to elucidate the complex leisure behavior by construction of partial mediation model on leisure constraints. Losier (Losier, Bourque, & Vallerand, 1993) introduced leisure constraints as the mediation variables to construction of motivation models, and took the perspective of motivation theory on the relationship between self-determination motivation and leisure participation behavior for the elderly, and the results clarified that motivation was with the positive effects on the satisfaction of leisure activity behaviors. Compared with the initial model that only took the motivation as the main variable to determine the participative behavior, the mediation model that took leisure constraints as variables can undoubtedly more intuitively show the various obstacles which actually exerted the effects on hindering to participate the leisure activities, thus the reliability of mediation model was greatly improved in predictive ability and practical application.

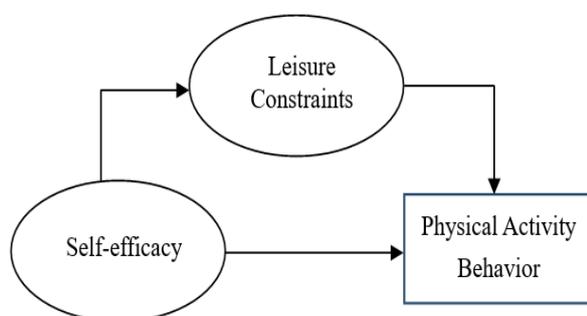
However, there were also some limitations of this model. The one was the leisure motivation not linked with individual's negotiation strategy overcoming leisure constraints, the other was these findings only focused on the participation of leisure behaviors. Subsequent studies also showed that leisure physical activity behavior related to lasting for a long period of time, it would be varied of the impact of motivation on behavior due to the duration of the individual physical activity (Landry & Slomon, 2004). And now, more and more researches about the effects of leisure constraints took into account the pathway of partial mediation on physical activity behaviors or leisure behaviors with the insight into understanding and constantly improving the theory. Based on above consideration, the impact of motivation on leisure behavior (Alexandris, Funk, Pritchard, 2011) and leisure intentions (Moghimehfar, & Halpenny, 2016) was explicated using the model of partial mediation leisure constraints. These studies filled the vacancy of leisure constraints theory in the aspect of motivation having an impact on leisure activity behavior. Although those researches, based on motivation theory, integrated leisure constraints and negotiation strategy, and also investigated the pathways in which leisure constraints have the partial mediation effect, they were only complementary explanation of motivation theory in leisure activities. The focuses had always been on motivation, and the model did not pay attention to the impact of leisure constraints on the level of leisure activities or physical activity behavior. Thus, it can be seen that the theory of motivation alone was not enough to support the leisure physical activity behavior which was at least involved in the 3 dimensions of "Frequency × Intensity × Duration".

Based on the above reviews related to physical activity behavior of the theory of leisure constraints, this work was aimed to construct the model of partial mediation on leisure constraints, and then test its reliability and availability in the comprehensive assessment of the participation and the level of activity of leisure physical activity behavior for the elderly with the help of PARS-3 (Physical Activity Rating Scale-3). Compared with models of motivation, in this study, the self-efficacy variable was introduced into the model of partial mediation on leisure constraints, which can better describe the multifaceted process of actual leisure physical activity behavior, and more suitably explicate the mechanisms of leisure behavior using the theory of leisure constraints.

CONSTRUCTION OF THE HYPOTHETICAL MODEL OF PARTIAL MEDIATION ON LEISURE CONSTRAINTS

In this study, the following hypothetical model of mediation effect on physical activity behavior was constructed to explicate the mechanisms of the partial mediation effect according to the theory of leisure constraints introducing the self-efficacy variable affect to physical activity behavior. The construction the hypothetical model was based on classical theory of leisure constraints, combined with the researches on the correlation between the level of self-efficacy and physical activity behavior in the self-efficacy theory from view of cross-culturally (Lova, Valdez, Bell et al., 2018; Abasi, Eslami, Rakhshani et al., 2016; Ciciurkaite, Tarasenko, Schoenberg et al., 2018; Stone, 2018), and drew on the principal of mediating variables inserting in the self-efficacy model (Briki, 2018; Litman, Rosen, Spierer et al., 2015; Connolly, Pivarnik, Feltz et al., 2015), the hypothetical model was constructed as Figure 1.

Figure 1. Hypothetical model of partial mediation effect on leisure constraints for the physical activity behavior



ANALYSIS OF THE HYPOTHETICAL MODEL

Leisure Constraints Factors

According to the theory of leisure constraints, different age groups faced different leisure constraints factors, had been confirmed by (McGuire, 1984) from A Factor Analytic Study of Leisure Constraints in Advanced Adulthood, which concluded that there were differences on leisure constraints between the elderly and other age groups. It also had been confirmed further by (Qiu & Xu, 2014) from the ANOVA statistical results in the level of structural constraints among different age groups on her researches, Research on the

Characteristics of Constraints to Women's Leisure Sports Activity and the Relationship with Behaviors. Therefore, given the particularity for the elderly on leisure constraints, the variables of the hypothetical model were determined according to the study on the leisure behavior of the elderly groups in multi-dimensions (Dhurup, 2012). In this research, the authors had summarized the cross-cultural generality of leisure constraints factors though there were different leisure constraints factors of elderly groups with different races, genders and cultural background. Their research ultimately confirmed three common constraints factors (variables): time and security, economic and structural, and personal constraints (Dhurup, 2012). And then, the above three common constraints factors were divided into intrapersonal constraints and structural constraints (Qiu, 2008).

Negotiation Strategy

According to theory of leisure constraints, the role of leisure constraints is only to hinder or decline the behavior of participation, but not completely determine whether individuals participate in leisure activities. In fact, individuals can often use negotiation strategy to overcome these constraints, which an observation variable must be introduced into the hypothetical model to reflect the individuals' enthusiasm. The related studies had been confirmed in the construction of structural model under leisure constraints theory by White (White, 2008) that the same behavior in the same type of self-efficacy has the mediating effect and positive influence on the efficacy and negotiation efficacy of individuals using negotiation strategies. And some other researchers also reach the same conclusion in the field of leisure constraints (Ito, Kono, & Walker, 2018; Kim, Ferguson, Hickerson et al., 2019; Kono, Ito, & Loucks-Atkinson, 2018). Therefore, negotiation strategy of the elderly in physical activity behavior can also be used as the latent variable in coping with the subjective and objective self-efficacy.

TEST OF THE HYPOTHETICAL MODEL

A total of 1000 questionnaires were circulated to the elderly aged 60 and over whose were normal state of movement (without dyskinesia or movement disorders in clinic) from Hunan Province. After the collection, invalid questionnaires such as missing personal

information, item answers and regular answers, were excluded, and eventually 863 valid questionnaires were obtained, with an effective rate of 86.3%. The survey was that the average age of the subjects was 66.4 years old, with the highest age 86 and the lowest 60; and among them, there were 457 males and 406 females, accounting for 52.9% and 47.1% respectively according to the statistics of personal information.

Selection and Evaluation of Measuring Tools

Questionnaires Designing.

According to leisure constraints theory, and referring to the similar questionnaires from China and foreign related studies, the questionnaire on physical activity behaviors for the elderly was divided into two dimensions (intrapersonal constraints and structural constraints), with a total of 15 questions, in which the former were 8 questions and the other are 7 ones. Finally, 13 items (8 intrapersonal constraints and 5 structural constraints questions) were used in the formal investigation stage, via pre-testing the reliability and validity of the questionnaire, and the part of structural constraints excluding two lower items. The results showed that Cronbach coefficient α was 0.916 following the revised items, which showed the better reliability. Using principal components analysis (PCA) of factor analysis to extract two factors whose total value was greater than 1, the obtained accumulated variance contribution rate (AVCR) was 69.659%, which also showed the better structural validity. The remaining test results were shown as Table 1.

Table 1. Results of reliability and validity after the revised questionnaire

Variables	KMO	Cronbach's	Items	Factor Loadings
Structural Constraints	0.770	0.831	SC1	0.719
			SC2	0.746
			SC3	0.777
			SC4	0.820
			SC5	0.818
Intrapersonal Constraints	0.901	0.888	PC1	0.641
			PC2	0.818
			PC3	0.773
			PC4	0.788
			PC5	0.749
			PC6	0.717
			PC7	0.804
			PC8	0.729

Physical Activity Rating Scale

The PARS-3 developed by a Chinese scholar of

Liang was used for measurement of physical activity for the elderly (Liang, 1994), and we revised the physical activity intensity, according to the National Fitness Activities Survey 2014 (NFAS 2014) issued by General Administration of Sport of China about the elderly physical activity intensity (low intensity physical activity of the elderly group accounts for 42.2%, moderate intensity for 53.8%, and high intensity only for 4%). The revised scale (PARS-3) were also composed of three items that represented frequency, intensity and duration, and also using the 5-level scoring method of "Frequency \times Intensity \times Duration". On the item of physical activity intensity, "the not-lasting but intense physical activity with rasping breath and sweats" and "the lasting and intense physical activity with rasping breath and sweats" in the Liang's scale which represented highly intensive activity, were combined as "with rasping breath and sweats" in the revised edition. In addition, "the physical activity of moderate intensity" in the Liang's scale was divided into "not-lasting physical activity of moderate intensity" and "lasting physical activity of moderate intensity" to ensure the reliability in the revised edition. It was examined that the revised scale edition with the good reliability (Cronbach Coefficient is 0.851), and factor loadings ranging from 0.772 to 0.881 indicated that its structural validity was also viable for the following study, which enable to offer us a viable scale for factor analysis in the following study.

The self-efficacy Scale

The self-efficacy scale of China (SEE-C), translated by scholar Lee, was selected to measure the self-efficacy of physical activity in the elderly and also had been revised to be applicable for elderly (Lee, Perng, Ho, Hsu, Lau, Arthur, 2009). This scale consisted of 9 items, which were used to test the level of self-confidence. Using 10-point Likert scale in which "0 means little confidence" and "10 means very confident", the higher the score is, the more confidence one has. Given the principle of negotiation strategy, 9 items were divided into intrapersonal efficacy and structural efficacy, which represented the effectiveness of overcoming intrapersonal Constraints and structural constraints respectively in physical activity behavior for the elderly.

Data Analysis

Descriptive in Statistics

A total of 863 pieces of valid data were

obtained, their scores of variables on the mean value (M), standard deviation (SD), maximum value (Max) and minimum value (Min) are shown as Table 2.

Table 2. Scores of variables

Variables	M	SD	Min	Max
Physical activity Behavior	43.96	30.988	1.00	100.00
Intrapersonal Constraints	16.45	6.338	8.00	40.00
Structural Constraints	10.04	4.256	5.00	25.00
Intrapersonal Efficacy	12.35	5.286	2.22	20.00
Structural Efficacy	15.37	6.068	2.78	25.00

*Note: The table of self-efficacy uses the 10-grading system, and the statistics have been shifted into 5-grading system by the algorithm of $(5-1) * (\text{The score} - 1) / (10-1) + 1$. According to the Likert scale, shifts of grading system among grade 5/7/10 have no effects on the conclusions (Dawes, 2008).*

Data Types and Collinearity Analysis

When taking advantage of the method of Maximum likelihood to test the hypothetical model in structural equation model, the data must meet some requirements for their distribution in statistics. Based on the characteristics of the data obtained from the questionnaire, Skew-Kurtosis benchmark (Kline, 2015) was employed in terms of the testing of data distribution in statistics. On testing, all variables meet the demands of absolute Skewness < 3 and absolute Kurtosis < 8. That was, there was no significant skewed distribution in statistics, and those data meet the requirements for Maximum likelihood. The test results of the skewness and kurtosis of univariate are as Table 3.

Table 3. Distribution in statistics of data

Variable	Skewness	Kurtosis
Physical activity Behavior	0.635	0.371
Intrapersonal Constraints	0.751	0.201
Structural Constraints	0.975	0.238
Interpersonal Efficacy	0.318	1.296
Structural Efficacy	0.292	1.203

If there is significant multicollinearity in statistics among variables in the analysis of path coefficient, the conclusion will be influenced or inaccurate. Given physical activity behavior as dependent variable, the testing results of multicollinearity were obtained as below, see Table 4. Based on the test benchmark that tolerance shall be less than 0.2 and the variance inflation factor (VIF) shall be less than 5, it was concluded that there was no multicollinearity

among all variables in the data.

Table 4. Testing results of multicollinearity

Variable	Tolerance	VIF
Intrapersonal Constraints	0.549	1.822
Structural Constraints	0.528	1.894
Intrapersonal Efficacy	0.310	3.228
Structural Efficacy	0.297	3.370

Software

The SPSS 22.0 software was used to test the reliability and the validity of scales, and the Amos 22.0 software was utilized to construct the structural equation model of physical activity behaviors of the elderly, it was also used to the data fitting so as to test and verify the hypothetical model.

RESULTS

Correlation Matrix of the Variables

The analysis of correlation on observational variables was as Table 5. It was demonstrated that the correlation coefficients among variables of Structural Constraints, Intrapersonal Constraints, Structural Efficacy, Intrapersonal Efficacy and Physical Activity Behavior had reached a significant difference in statistics ($P < 0.01$). Moreover, the analysis of collinearity suggested that there was no multicollinearity among data, which illustrated that physical activity behavior had a significantly negative correlation in statistics with two types of leisure constraints ($r = -0.499$ and $r = -0.475$ respectively, $P < 0.01$), while having a significantly positive correlation in statistics with two kinds of self-efficacy ($r = 0.502$ and $r = 0.541$ respectively, $P < 0.01$). However, it was worth noting that two kinds of leisure constraints and self-efficacy had a significantly negative correlation in statistics, and that was accordance with the anticipation in theoretical assumption. However, there were no differences in corresponding relationships of Structural Constraints and Structural Efficacy ($r = -0.356$) or Intrapersonal Constraints and Intrapersonal Efficacy ($r = -0.356$). The reason must be that the correlation generated from the two independent systems (the one is leisure constraints, the other is self-efficacy) rather than from some specific processes.

Testing Results of the Partial Leisure Constraints Hypothetical Model

The path coefficients and fit index of partial

leisure constraints hypothetical model were acquired after using AMOS software to plot the model diagram and using the method of Maximum likelihood for data fitting, as were shown in Table 6 and Figure 2.

Table 5. The correlation matrix of the observational variables

	PAB	SC	IC	SE	IE
PAB	1.000	-0.499**	-0.475**	0.502**	0.541**
SC		1.000	0.664**	-0.356**	-0.398**
IC			1.000	-0.311**	-0.356**
SE				1.000	0.830**
IE					1.000

Note: * refers to $P < 0.05$; ** refers to $P < 0.01$. Physical Activity Behavior (PAB); Structural Constraints (SC); Intrapersonal Constraints (IC); Structural Efficacy (SE); Intrapersonal Efficacy (IE)

As for the benchmarks of goodness-of-fit testing, the fitting index put forward by (Hu & Bentler, 1998) and the cut-off value of the benchmarks raised by (Wen, 2004). Based on their research, Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), Comparative Fit Index (CFI) and Normed Fit Index (NFI) > 0.9 for all; Standardized Root Mean square Residual (SRMR) < 0.08 ; Root Mean Square Error of Approximation (RMSEA) < 0.08 , it could be inferred that the hypothetical model constructed on Figure 1 fits

well the survey data obtained from the 863 samples. And also, the path coefficient of the hypothetical model reached a significant level, the overall Explained Variance was 42.7% ($R^2 = 0.427$) for physical activity behavior in the elderly groups.

Table 6. The summary of fitting index of the hypothetical model

χ^2	d	χ^2/df	TLI	IFI	CFI	NFI	SRMR	RMS
6.6	5	1.3	0.9	0.9	0.9	0.9	0.03	0.04
89		38	92	96	96	84	79	5

Testing Results of Nested Model

Although all fit indexes in the hypothetical model (Figure 2) reached the cut-off value of the benchmarks raised by Wen, the Explanation Variance for leisure constraints was relatively low ($R^2 = 0.201$). To further tested the reliability of partial mediation effect of leisure constraints in the hypothetical model, nested model T1, T2, T3 were exerted to verify the changes of fitness in terms of non-mediated, fully mediated and without effect of leisure constraints on physical activity behavior.

Figure 2. The path coefficients of partial leisure constraints hypothetical model (N=863)

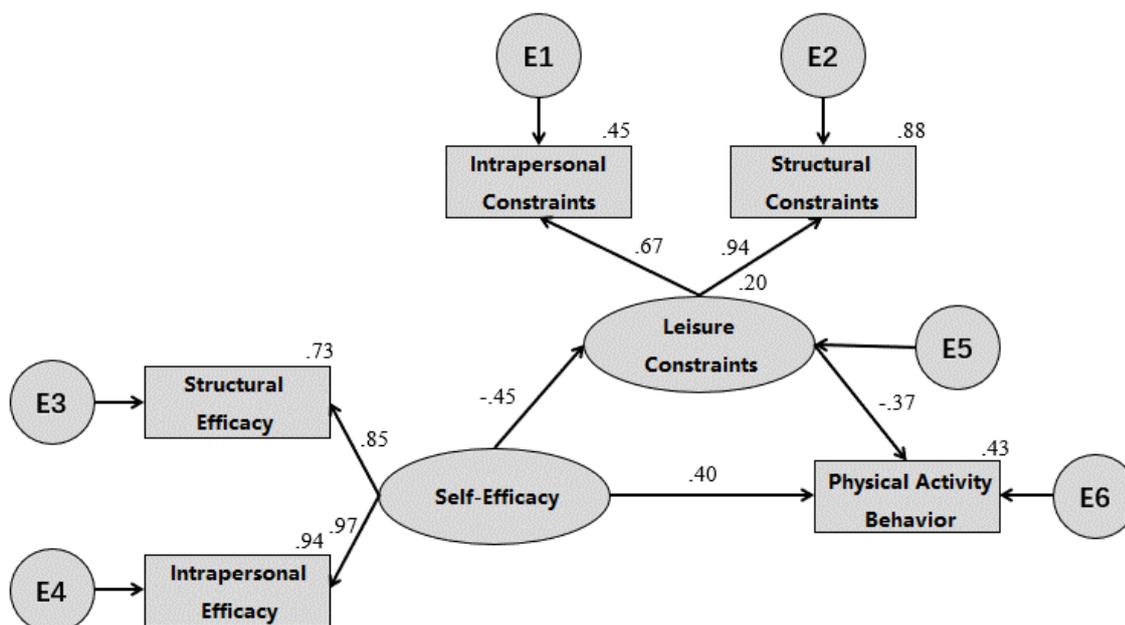
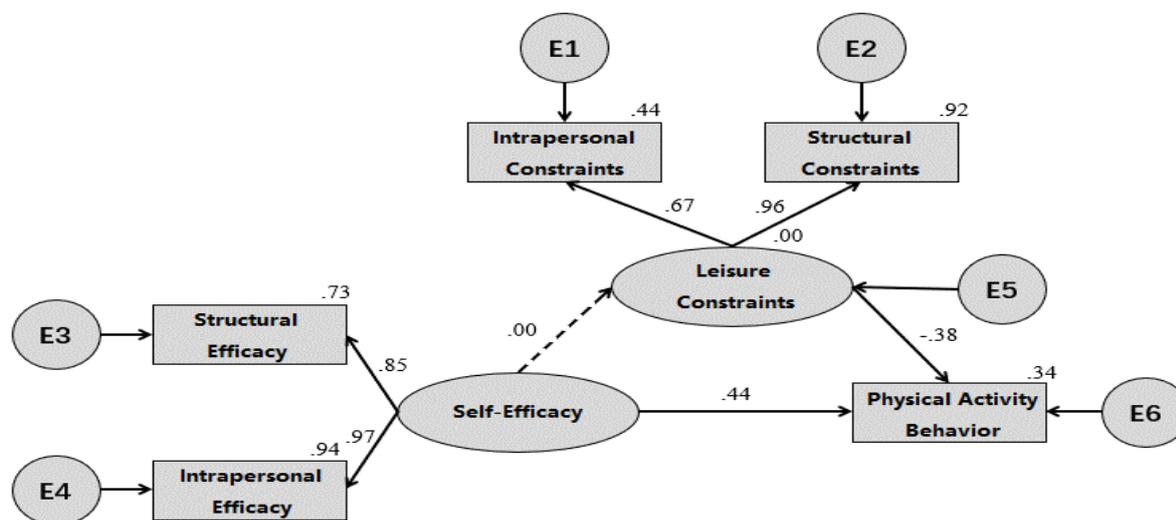


Figure 3. The path coefficients of Non-Mediated leisure constraints nested model T1 (N=863)



Nested Model T1: Non-Mediated Leisure Constraints on Physical Activity Behavior

Given the path coefficient from self-efficacy to leisure constraints was postulated to be zero (Figure 3), that was, it was postulated that leisure constraints did not play a mediation role in the hypothetical model. The fitting results were presented in Table 7 and Figure 3. In consideration of goodness of fit testing, the benchmarks showed that TLI, RMSEA, and SRMR had not reached the requirement of cut-off value level put forward by Wen (Wen, 2004), and the index (χ^2/df) of goodness of fit was relatively higher. And also, the testing results of the variation χ^2 value ($\Delta\chi^2=37.763-6.689=31.074$, and the $\Delta df=6-5=1$;

Nested Model T2: Fully Mediated Leisure Constraints on Physical Activity Behavior

Given the path coefficient form self-efficacy to physical activity behaviors was postulated to zero (Figure 4), that was, it was postulated that leisure constraints had a role of fully mediated effect on the physical activity behaviors in the hypothetical model. The results were shown as Table 8 and Figure 4. In consideration of the goodness of fit, the benchmarks showed that TLI, RMSEA, and SRMR had not reached the requirements of cut-off value level raised by Wen, and the indexes (χ^2/df) of goodness of fit was relatively higher, while the testing results of variation χ^2 value ($\Delta\chi^2=32.228-$

$P<0.001$ was tested by Chitest function) had reached a significantly different level, so it can be deduced that the overall goodness-of-fit of the nested model T1 had a significant decrease compared to the partial leisure constraints hypothetical model.

Table 7. The summary of fit index of nested model T1

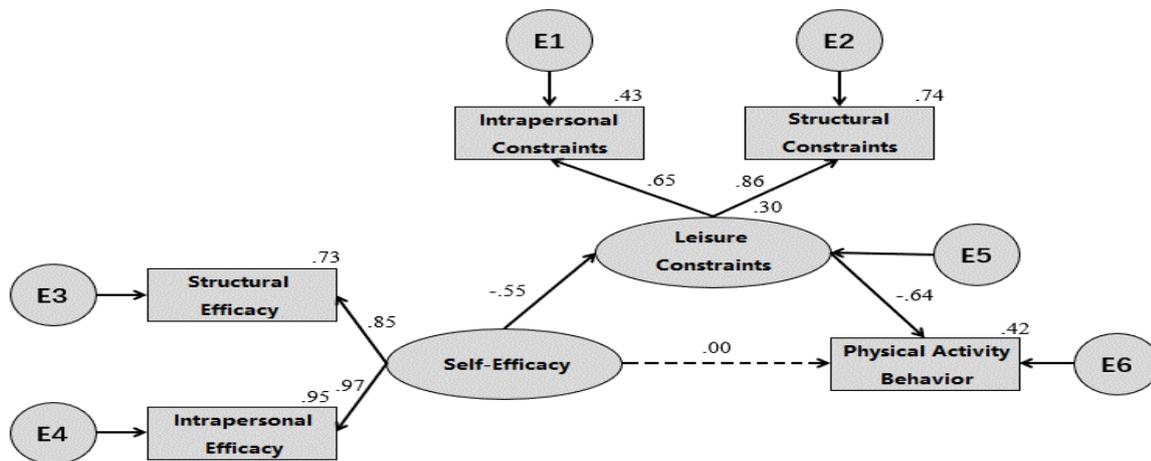
χ^2	d f	χ^2/df	TLI	IFI	CFI	NFI	SRMR	RMS EA
37.7	6	6.2	0.8	0.9	0.9	0.9	0.20	0.17
63		94	71	23	22	10	03	7

$6.689=25.539$, and the $\Delta df=6-5=1$; $P<0.001$ was tested by Chitest function) had reached a significant level, so it can be deduced that the overall goodness-of-fit of the nested model T2 had a significant decrease compared to the partial leisure constraints hypothetical model.

Table 8. The summary of fit index of nested model T2

χ^2	d f	χ^2/df	TLI	IFI	CFI	NFI	SRMR	RMS EA
32.2	6	5.3	0.8	0.9	0.9	0.9	0.08	0.16
28		71	93	37	36	23	24	1

Figure 4. The path coefficients of fully mediated leisure constraints nested model T2 (N=863)



Nested Model T3: Without Effect of Leisure Constraints on Physical Activity Behavior

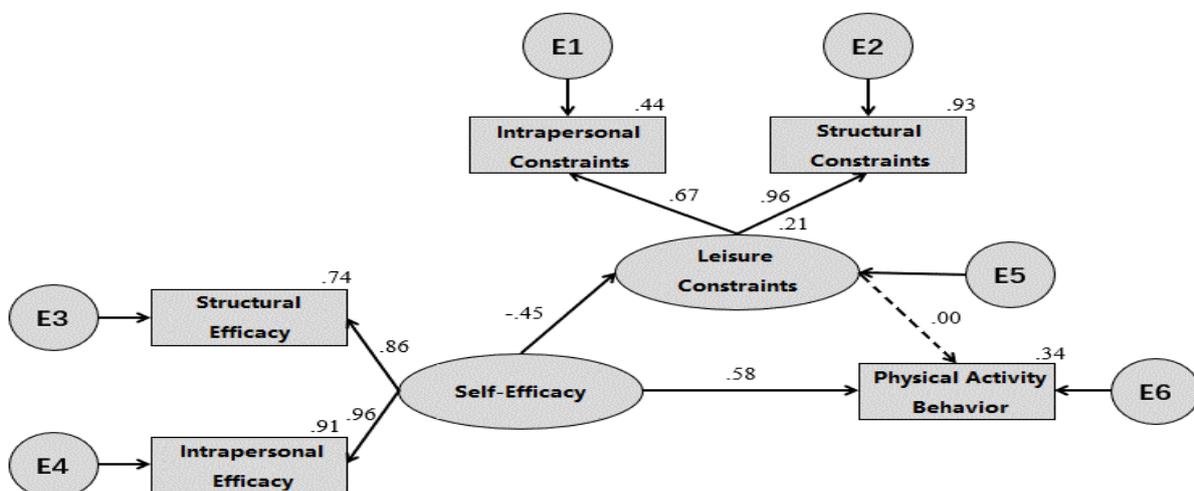
Given the path coefficient from leisure constraints to physical activity behavior was postulated to zero (Figure 5), it was postulated that the leisure constraints had no direct effect on physical activity behavior and self-efficacy fully played a mediation role in the nested model T3. The fit indexes results were shown in Table 9 and as Figure 5. In consideration of the goodness-of-fit, the benchmarks showed that RMSEA and SRMR had not reached the requirements of cut-off value level raised by Wen , and the indexes (χ^2/df) of goodness-of-fit was relatively higher, while the testing results of variation χ^2 value ($\Delta\chi^2=30.332-6.689=23.633$, and the $\Delta df=6-5=1$; $P<0.001$ was

tested by Chitest function) had reached a significant level, so it can be deduced that the overall goodness-of-fit of the nested model T3 had a significant decrease compared to the partial leisure constraints hypothetical model.

Table 9. The summary of fit index of nested model T3

χ^2	d	χ^2/df	TLI	IFI	CFI	NFI	SRM R	RMS EA
30.3	6	5.0	0.9	0.9	0.9	0.9	0.10	0.15
22	5	4.4	0.9	0.9	0.9	0.9	0.07	0.10

Figure 5. The path coefficients of nested model T3 (N=863)



It is postulated that the leisure constraints have no direct effect of leisure constraints on physical activity behavior and self-efficacy fully plays a mediation role

Comparison of Partial Leisure Constraints Hypothetical Model with Nested Model

It is well known, the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are the common criterion utilized to determine the optimal model. Generally, the smaller value represents the better model. Based on the above analysis and comparison of the fit indexes of the partial leisure constraints hypothetical model with the 3 types of nested models, combination with the value of AIC and BIC (see Table 9), it can be proved that the partial leisure constraints hypothetical model is generally superior to the 3 types of nested model.

Table 10. The AIC Value and BIC Value

	AIC Value	BIC Value
Hypothetical Model	26.689	58.047
Nested Model T1	55.763	83.985
Nested Model T2	50.228	78.450
Nested Model T3	48.322	76.544

Note: AIC and BIC refer to Akaike Information Criterion and Bayesian Information Criterion respectively.

DISCUSSION

China as the same with the most developed countries, is about to enter a highly aging society, improving awareness of physical activity or exercise and promoting active and healthy aging of the elderly groups are of great significance for decreasing social medical expenditure and reducing social burden. Therefore, a hypothetical model of partial mediation leisure constraints was constructed to investigate the obstacle factors affecting the elderly's physical activity behavior based on the theory of leisure constraints. And then, the hypothetical model was tested with AMOS via a sampling survey from 863 elderly. It was proved that the partial mediation leisure constraints model was in line with our expectations for explanation of relations of self-efficacy, leisure constraints and physical activity behavior. The goodness-of-fit of the hypothetical model was as expected with data obtained from sampling survey. The testing results of 3 types of nested model suggested a decreasing goodness-of-

fit in comparison with the hypothetical model respectively, which rejected the 3 presumptions of "non-mediated leisure constraints", "fully-mediated leisure constraints" and "leisure constraints without effect on physical activity behavior". However, the hypothetical model of leisure constraints exerting partial mediation was accordance with our anticipation. The mechanical effects of partial mediation leisure constraint on elderly group's physical activity behavior in the hypothetical model can be illustrated as below.

The Influence Mechanisms of Self-efficacy on Leisure Constraints

The self-efficacy can exert the effect on the leisure constraints at the tendency of perception. The special groups, such as pregnant women, the disabled, the elderly, children, etc. would have substantial changes due to their perceived differences (personality traits, leisure orientation, social background, etc.) in physical activity behavior. A survey on 606 Norwegian pregnant women, it was found that the levels of self-efficacy can affect the perception of leisure constraints (Prince, Reed, Martinello et al, 2016). Similarly, it was also found that self-efficacy can impact on leisure constraints in investigation of graduate students' tourism (Hung & Petrick, 2012). Based on above researches from Prince and Hung, it could explain the testing results of decreasing goodness-of-fit, therefore, rejection the influence of self-efficacy on leisure constraints in the nested model T1. That was, there were significant effects of self-efficacy on leisure constraints at the perceptual level. Combination with the path coefficient of hypothetical model ($\beta=-0.369$ which is -0.37 in the AMOS graphics, $t=-4.700$; $P<0.001$. See Figure 2) from self-efficacy to leisure constraints, it also can explain that the tendency of perception of leisure constraints would be influenced on the level of self-efficacy in the physical activity behavior for the elderly groups. The higher the confidences of physical activity behavior represented by self-efficacy, the lower the obstacles of physical activity behavior in the tendency of perception represented by leisure constraints.

The Influence Mechanisms of Self-efficacy and Leisure Constraints on Physical Activity Behavior

The structural constraints of special groups above mentioned but not limitation in physical activity behavior, would not be altered greatly due to the tendency of perception in terms of objective obstacles (such as physical disability, disease

status, lower income level, etc.). It was confirmed that self-efficacy can significantly affect the participation of leisure activities surveyed from Spanish and American seniors by Perkins (Perkins, Multhaup, & Perkins, 2008). Another survey on the United States' seniors above 50 years old confirmed that leisure constraints can affect the leisure activity behavior in multiple dimensions such as frequency, intensity and duration etc. (Son, Kerstetter, & Mowen, 2008) Based on the above research results from Perkins and Son, it can explain the testing results of decreasing goodness-of-fit, therefore, rejection the influence of self-efficacy and leisure constraints on physical activity behavior in the nested models T2 and T3. That was, the influence of self-efficacy and leisure constraints on leisure activities was mainly expressed via activity participating and activity level. Combination the path coefficients from self-efficacy to physical activity behavior ($\beta=0.398$ which is 0.40 in the AMOS graphics; $t=5.469$; $P<0.001$. See Figure 2) and leisure constraints to physical activity behavior ($\beta=-0.369$ which is -0.37 in the AMOS graphics; $t=-4.700$; $P<0.001$. See Figure 2) in the hypothetical model, it can indicate that both self-efficacy and leisure constraints had influences on the actual physical activity behavior for the elderly in their leisure activities. Self-efficacy focuses on the participation of physical activity behavior, while leisure constraints focus on the frequency, intensity and duration of physical activity behavior. The higher the level of physical activity self-confidence represented by self-efficacy, the more active the tendency of participation of physical activity behavior, while the higher the obstacles of physical activity behavior represented by leisure constraints, the lower the level of physical activities for the elderly groups.

Mechanisms of Partial Mediation Effect of Leisure Constraints: Indirect Influence of Self-efficacy on the Level of Physical Activities for the Elderly

According to the views of Crawford and et al. (Jackson, Crawford, & Godbey, 1993), the perceived leisure constraints of an individual's leisure activities tended to be complex and varied, including both that vary greatly (The different tendency of perception had significant effects on intrapersonal constraints in terms of subjective leisure obstacles) due to perceived differences and those that did not alter greatly (The different tendency of perception have not significant effects

on structural constraints in terms of objective leisure obstacles). In the actual leisure activities, therefore, the influence of self-efficacy and leisure constraints was always exerted on leisure activity behaviors simultaneously (including participation and level of activity). That was, self-efficacy and leisure constraints not only affected the participation and the level of activity respectively, but self-efficacy can also affect indirectly the level of activity via partial mediation on leisure constraints at the tendency of perception.

CONCLUSIONS

According to the above researches, the hypothetical model of partial mediation on leisure constraints for the elderly groups was demonstrated principally that self-efficacy exerted the effects on the physical activity behavior directly and that of leisure constraints, and also, self-efficacy could effect on the physical activity behavior indirectly via the path of partial mediation on leisure constraints in terms of tendency of perception for the elderly's physical activities. Moreover, self-efficacy had a greater impact on the participation of physical activity behavior, and leisure constraints had a greater impact on the level of physical activity, including the frequency, intensity and duration of physical activity behavior for the elderly groups. And it need to be sure, self-efficacy could only overcome some parts of leisure constraints on the tendency of perception for the physical activity behavior for the elderly groups because of their weaker ability of physical activity. It is necessary to promote their levels of health that some appropriate social support to overcome the obstacles of the objective leisure constraints is very important for the elderly groups.

DECLARATION OF CONFLICTING INTERESTS

There are no potential conflicts of interests for any of the authors, and the authors alone are responsible for the content and writing of the paper.

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