An Exploratory Path Analysis of the Relationship Among Leisure Activities, Health and Subject Well-Being

Lina Zhao, Tao Ma, Dong Liu

Abstract — **According to published results, leisure activities can impact Subject Well-Being (SWB) through quality of health improvements. However, the following questions still need to be answered regarding the effect paths from leisure activities to subject health and finally to SWB: Is health a partially or completely intervening variable? What differences exist between females and males and between rural and urban populations? What is the final effect size of each kind of leisure activity on SWB inside each group? We offer China as a model; the data set from the Chinese General Social Survey 2013 (CGSS2013) provides partial answers to these questions. Path analysis and multiple group analysis have been done, with results showing that: Health transmits the effect of leisure activities on SWB completely; Gender affects the effect path from mental activities to physical health; living place is significant in effect chains, including "mental activities to mental health", "productive activities to mental health", "mental activities to physical health", "physical activities to physical health", and "productive activities to physical health"; for all groups: productive activities have a negative influence on SWB, mental activities have the strongest positive influence on SWB, compared to physical activities, social activities appear to be more important for SWB; for rural residents, physical activities have no effect on SWB. Our findings will provide key information for judging different people's actual life quality by figuring out at which stage Chinese people's leisure life has reached. Also, researchers and governments that are interested in improving individual's SWB level, as well as life quality through making use of leisure activity, can obtain a very in-depth view from our study.**

Index Terms—**leisure activities, health, subject well-being, gender, living place**

I. Introduction

A primary developmental goal for society should be enabling people to have a quality Subject Well-Being (SWB) [1]. Many "happiness economics" studies have determined that money does not raise SWB or by happiness [2]-[4]. Researchers in the field of SWB were surprised by this unexpected finding and focused attention on leisure activities' influence on SWB [5]. Additional research results pointed out that interventions designed to improve well-being through increasing participation in leisure activity should have taken health more into consideration [6]. So, we can project that there are effect chains linking leisure activities to improved levels of health and finally to SWB. However, the effect chains have not been studied with empirical data. The structural equation model (SEM), not to mention the multiple group analysis, have not been implemented to improve the research results on the chains.

Based on data from the Chinese General Social Survey 2013 (CGSS2013), this research will do an exploratory study to investigate the influence mechanism of the effect chains from leisure activities to health and further to SWB. Path analysis and multiple group analysis will be used. The following three questions will be explored: (1) To what degree could health explain the relationship between leisure activities and SWB? (2) What differences are there between females and males, rural populations and urban populations? (3) Taking health as an intervening variable, to what extent can each kind of leisure activity influence SWB? This study has significant value to enhance both social science study methodology and social policy.

The effect chains will be explored from leisure activities to health and further to SWB, for example, and conduct a comprehensive SEM analysis. This work could provide an application method for instructing academics on how to use SEM to detect the influence mechanism of the relationship between SWB with its influence factors, especially for judging the intervening variable's function. Also, since SEM has been used extensively in the management field but seldom within the social sciences, we expect that this research should provide an opportunity for social science researchers who want to use SEM in their studies.

As to multiple group analysis, we will evaluate the significance levels of the differences by *Z*-scores. Existing studies which have used multiple group analysis to complete group comparisons, have not determined the significance levels of their differences by Z-scores. Perhaps this is because the significance levels cannot be tested directly in AMOS, but this has been accomplished in our study. This work will attract researchers' attention by demonstrating the necessity of testing the significance levels of these differences when doing

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multiple group analysis.

Concerning social policy, this study could: (1) Provide key information about what stage Chinese people's leisure life has reached — if attached to health or is an independent meaningful system; (2) Show the important social signal about different people's quality of life; (3) Ascertain the details about different leisure activities' function on SWB. Based on all of the findings above, a country could access very useful information on how to improve the whole country's SWB level through a higher regard for leisure activities.

II. Literature Review

A. Health and SWB

SWB as self-reported happiness, refers to a complete view of a person's subjective quality of life [7][8]; it thus relies on people's cognitive labels of their feelings [9][10]. In the CGSS2013, SWB was investigated as a happiness item, e.g., taking all things together, would you say you are: Very Unhappy, Unhappy, Neutral, Happy, Very Happy? In the World Values Survey, SWB was evaluated with different happiness values, e.g., Very Happy, Rather Happy, Not Very Happy, Not At All Happy. Health and happiness are strongly correlated [11]-[13].

Ordinary least squares (OLS) regression, ordered logit regression, descriptive analysis, and ordered probit model were used to study the relationship between health and SWB, with results showing that healthier people reported greater happiness [15]-[20]. Existing studies suggest that mental health is more strongly associated with SWB than physical health [21]-[23]. A positive association between health and SWB has also been found in Chinese society [24][25]. In Carol Graham, et al.'s research, differences exist between rural and urban residents related to the relationship between health and happiness [26]. What is of a more challenging nature about the rating of health scores is that the concept of personal health is much more of a subjective judgment than a fact [27]. If physical health is only considered when self-reported health ratings are used, it is an important correlate of SWB. The correlation between SWB and objective health status is rather weak or even nil [28]-[30].

B. Leisure Activities and Health

Leisure is defined as "an action that takes place at a given time, develops an identifiable activity and is perceived as a pleasant experience by the actor" [31]. Leisure activities are defined as preferred and enjoyable activities one participates in during free time [32], or activities, such as exercise and socializing, that individuals take part in during spare time [33]. Leisure time indicators — like participation in activities such as sports, cultural events, and recreation — were used to measure leisure status [34]. Paillard-Borg, et al., divided leisure activities into five domains: mental, social, physical, productive, and recreational [35]. Silverstein and Parker divided leisure activities into six domains: culture-entertainment, productive-personal growth, outdoor-physical, recreation-expressive, friendship, and formal-group [36].

Mathematical models with optimal control, mixed-ANOVA analysis, OLS regression, and ordered logit regression were used for studying the relationship between leisure activities and health. There is a growing body of evidence showing that leisure activities contribute to an individual's health [37]-[39]. Periodicals focused on leisure have strengthened the value of leisure activities to enhance physical, psychological, and social-health benefits [40][41]. Increasingly, leisure is viewed to be the domain area of lifestyle, where people have the greatest control and, consequently, it is seen as an essential resource for health [40]. Leisure is an emerging force in contemporary society and holds great promise for enhancing the human condition and well-being of individuals [42]. It has been advocated as a means by which people could improve their health condition [43]. Individuals also derive more enjoyment through social leisure [44]. Surprisingly, leisure-time activities and cultural consumption even have an impact on decreasing body weight [45]. As a kind of leisure activity, running has three benefits: sense of accomplishment, health and fitness, and social affiliation [46]. By doing leisure activities with others, people can feel social support and, in turn, recover from stress [33]. Chang, et al., measured the relationship of health with four types of leisure activities: mental, e.g., reading books, watching TV; social, e.g., doing activities with grandchildren, going to a club; physical, e.g., maintaining one's home, walking; and productive, e.g., cooking, sewing and making clothes. They found that leisure activities can positively affect both physical and psychological health along with all four types of leisure activities on self-reported physical health. Mental, physical, and social activity can improve psychological condition, while productive activities had no measurable positive affect. [32]

C. Leisure Activities and SWB

Aristotle discussed the importance of leisure, arguing that leisure is more important than work because leisure provides pleasure and happiness in life. Just as Stiglitz, et al., pointed out that measurements of well-being and quality of life should be based on a multidimensional definition, and also include leisure time indicators, such as participation in activities like sports, cultural events, and recreation [34].

Previous studies have investigated the link between leisure activities and SWB by Meta-analysis, descriptive analysis, ordered response models, and so on. Some research has suggested that individuals derive more enjoyment from social leisure activities [44]. Several studies have analyzed the impact of leisure activities on the SWB of different populations, and they arrived at the same result: leisure activities have a relevant role in life satisfaction [47][48]. Pressman, et al., — using a sample representing a wide age range (19–89 years) — found that well-being was positively associated with the frequency of participating in enjoyable leisure activities, e.g., spending quiet time alone, or socializing with others [33]. Within older adult populations, a relationship between leisure activities and wellbeing was shown in a study of elderly Taiwanese [49]; in another study of older adults, results showed that the level of participation in leisure activities clearly predicted the subjects' life satisfaction seven years later [50]. Meanwhile, leisure is now considered a meaning-making space, which has been identified as a core mechanism in the promotion of SWB [51].

III. Data and Variables

A. Data

This study took advantage of the data from CGSS2013, which sampled subjects from 100 districts, plus Beijing, Shanghai, Tianjin, Guangzhou, and Shenzhen, as the primary sampling unit [52]. The data initially contained 11,438 observations, but after the removal of missing values across the set of dependent, independent, intervening, and grouping variables, this sample was reduced to 11,109 observations.

B. Variables

Table I provides definitions for all variables.

TABLE I
VARIABLE DEFINITIONS

Types of Variables		Definition	Value
Dependent Variables	Subject Well-Being	Taking all things together, how happy would you say you are?	'1'-Very unhappy; '2'-'Unhappy; '3'-Neutral; '4'-Happy; '5'-Very happy
Originally Independent Variables (leisure activities)	Watch TV	How often do you watch TV in spare time?	'1'- every day '2'-several times per week '3'- several times per month '4'- several times per year or less '5'- never
	Watch a film at the cinema	How often do you watch a film at the cinema in spare time?	
	Go shopping	How often do you go shopping in spare time?	
	Reading	How often do you read books, newspapers, or magazines in spare time?	
	Take part in cultural activities	How often do you take part in cultural activities in spare time?	
	Visit relatives	How often do you visit relatives in spare time?	
	Meet friends	How often do you meet friends in spare time?	
	Listen to music at home	How often do you listen to music at home in spare time?	
	Take part in physical exercise	How often do you take part in physical exercise in spare time?	
	Go to the sports spot to watch games	How often do you go to the sports spot to watch games in spare time?	
	Doing handicrafts	How often do you do handcraft in spare time?	
	Surf the internet	How often do you surf the internet in spare time?	
Intervening Variables (health)	Subject physical health (SPH)	Which option best describes your physical health?	'1' - Extremely unhealthy; '2'-'Unhealthy; '3'-Neutral; '4'-Healthy;' 5' Extremely healthy
	Subject mental health (SMH)	In the past four weeks, how often did you feel depressed or despondent	'1'-always; '2'-often; '3'-sometimes; '4'-seldom; '5'-never
Grouping Variable	Gender	What's your gender?	'1'-male; '2'-female
	Living place	Do you live in an urban or rural area?	'1'-Rural area; '2'-Urban area

According to the study results from Chang, et al., [34], our study categorized originally-independent variables — leisure activities — into four theoretical types: (1) Mental Activities, which include watching TV, watching a film at the cinema, reading, taking part in cultural activities, listening to music at home, going to the sports spot to watch games, and surfing the internet; (2) Physical Activities, which consist of going shopping and taking part in physical exercise; (3) Social Activities, which are comprised of visiting relatives and meeting friends; (4) Productive Activities, such as doing handicrafts. Confirmatory factor analysis (CFA) is used to judge if each category is reasonable. CFA results are showed in Fig. 1.

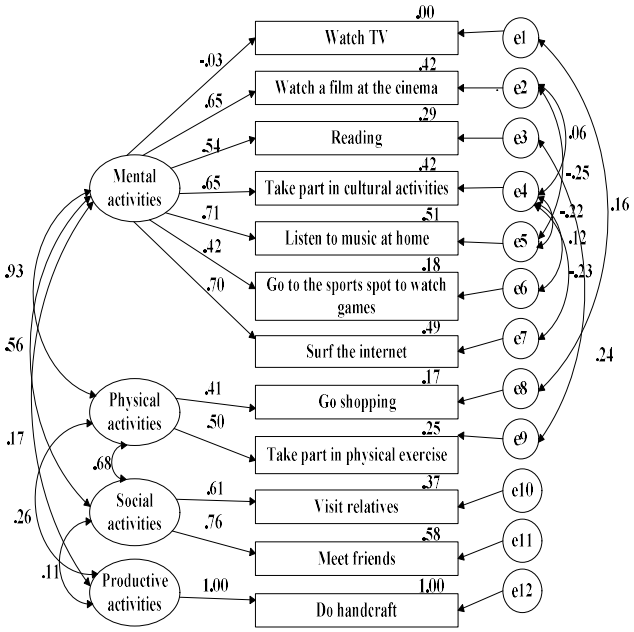

Fig. 1 Confirmatory Factor Analysis of leisure activities categories

The CFA model represented a good fit for the data: $\chi 2 = 3540.153$, $p = 0.000$, RMR = 0.039, RMSEA = 0.058, GFI = 0.977, AGFI = 0.956, CFI = 0.942, TLI = 0.907, NFI = 0.941, IFI = 0.942. So, leisure activities in this study can be divided into four types, as shown in Table II.

TABLE II
CODING OF FOUR DOMAINS OF INDEPENDENT VARIABLES

Independent variables	Coding
Mental Activities (MA)	(-0.029*watch TV+0.652*watch a film at the cinema+0.541*reading+0.645*take part in cultural activities +0.714*listen to music at home+0.424*go to the sports spot to watch games+0.699*surf the internet) /(-0.029+0.652+0.541+0.645+0.714+0.424+0.699)
Physical Activities (PA)	(0.414*go shopping+0.498*take part in physical exercise)/(0.414+0.498)
Social Activities (SA)	(0.609*visit relatives+0.759* meet friends)/(0.609+0.759)
Productive Activities (PDA)	1.000*do handicrafts

Finally descriptive statistics for study variables are shown in Table III.

TABLE III
DESCRIPTIVE STATISTICS FOR STUDY VARIABLES

Types of Variables		Mean	Std.	MIN	MAX
Dependent Variables (Y)	SWB	3.76	0.005	1	5
Independent Variables (X)	MA (X_1)	4.1236	0.008	0.99	5.03
	PA (X_2)	3.7886	0.112	1.00	5.00
	SA (X_3)	3.6599	0.007	1.00	5.00
	PDA (X_4)	2.8524	0.010	1.00	5.00
Intervening Variables (I)	SPH (I_1)	3.71	0.010	1	5
	SMH (I_2)	3.93	0.009	1	5
Grouping Variable	Gender	1.50	0.005	1	2
	Living Place	1.61	0.005	1	2
N		11108			

IV. METHODOLOGY

In this empirical exercise, all statistical analyses were performed in AMOS 21.0, and the path analysis model was used to:

Firstly, test if health is an intervening variable for leisure activities' affect on SWB; and find out to what degree health transmits the impact of leisure activities to SWB: full or partial?

In David P. MacKinnon, et al.'s study, the following three equations are used to estimate the basic intervening variable model [53].

$$Y = \beta_{0(1)} + \tau X + \varepsilon_{(1)} \quad (1)$$

$$Y = \beta_{0(2)} + \tau' X + \beta I + \varepsilon_{(2)} \quad (2)$$

$$I = \beta_{0(3)} + \alpha X + \varepsilon_{(3)} \quad (3)$$

τ represents the relationship between the independent and dependent variables in Equation (1). τ' represents the relationship between the independent and dependent variables adjusted by the effects of the intervening variable in Equation (2). α represents the relationship between the independent and intervening variables in Equation (3). B represents the relationship between the intervening and the dependent variables adjusted for the effect of the independent variable in Equation (2). *X* must predict *Y* (τ must be initially significant). If the independent variable coefficient (τ') becomes insignificant when *I* is introduced, then we could conclude that the effect of the independent variable on the dependent variable is completely transmitted through the intervening variable.

Secondly, detect the effect paths from *Xi* to *In* and further to *Y*, and then compare every path regression coefficient between male and female and between rural and urban residents. Just as shown in Table III, all leisure activity categories are exogenous variables, and both two-subjective health categories and SWB are endogenous variables. Here, unstandardized estimate coefficient will be used for multiple group analysis across gender groups and across living place groups by *Z*-scores and their significance levels.

Thirdly, compare the effect size of each *Xi* on *Y* via *In* within every gender group and living place group. The effect size of each *Xi* on *Y* via *In* can be compared after calculated with equation (4):

$$C_i = \sum_{n=1}^{2} (\alpha_{in} * \beta_n) + \tau_i' \quad (4)$$

C_i is the effect size of each *Xi* on *Y* via *In*; α_{in} is the standardized regression path coefficient of *Xi* on *In*; β_n is the standardized regression path coefficient of *In* on *Y*; τ_i' is the standardized direct path regression coefficient of *Xi* on *Y*. When health is a completely intervening variable, the value of τ_i' will be equal to zero. Whether variance in SWB is the result both of variances in leisure activities and health conditions, or only from variances in health conditions, will be determined by the results of using the intervening variables model. In that model, all variables are observed variables.

V. ANALYSIS AND RESULTS

A. Results of SEM Show That Health Is a Completely Intervening Variable Between Leisure Activities and SWB

Firstly, we determined if leisure activities could influence SWB. The results are shown in Fig.2 and Table IV.

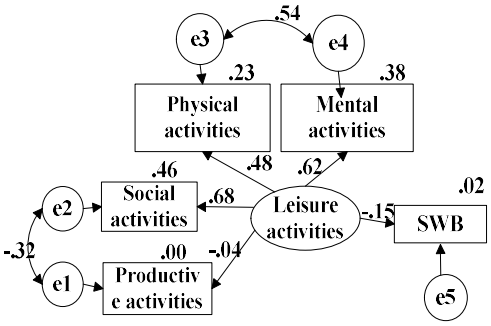

Fig.2 SEM related to the impact of leisure activities on SWB

For this model, $\chi 2 = 124.133$, p = 0.000, RMR = 0.022, RMSEA = 0.060, GFI = 0.996, AGFI = 0.978, CFI = 0.988, TLI = 0.960, NFI = 0.988, IFI = 0.988. So the above model has a reasonable model fit. The Regression Coefficients of this model are shown in Table IV.

TABLE IV
REGRESSION COEFFICIENTS OF SEM AND THE INFLUENCE OF LEISURE ACTIVITIES ON SWB

Path	Unstandardized Regression Weights				Standardized Regression Weights
	Estimate	S.E.	C.R.	P	Estimate
MA <--- Leisure activities	1.000				.620
PA <--- Leisure activities	1.123	0.024	46.844	***	.480
SA <--- Leisure activities	0.973	0.103	9.412	***	.679
PDA <--- Leisure activities	-0.089	0.033	-2.687	0.007	-.045
SWB <--- Leisure activities	-0.248	0.023	-10.584	***	-.148

*** significantly different from zero at the 0.001 level (two-tailed).

According to Fig.2 and Table IV, leisure activities can affect SWB. It is reasonable that the regression coefficient of leisure activities' influence on SWB is negative, because for SWB, '1'-Very unhappy, '2'-'Unhappy, '3'-Neutral, '4'-Happy, '5'-Very happy; for leisure activities, '1'- every day, '2'- several times per week, '3'- several times per month, '4'- several times per year or less, '5'- never. After adding intervening variable into the model, we can obtain Fig.3 and report the results of the path analysis in Table V.

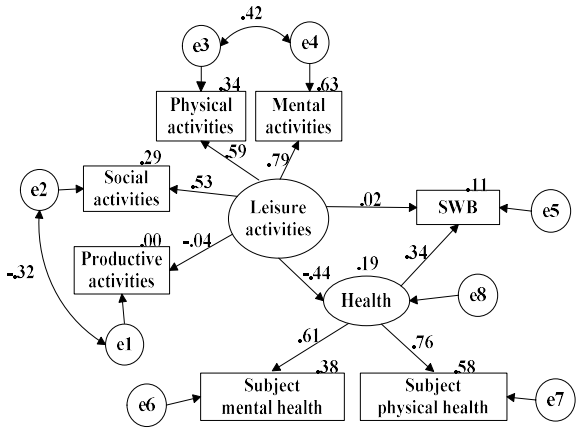

Fig.3 The finalized intervening variable SEM

For the intervening variable model (Fig.3), $\chi 2 = 530.125$, $p = 0.000$ (<.001), RMR = 0.030, RMSEA = 0.068, GFI = 0.987, AGFI = 0.962, CFI = 0.965, TLI = 0.927, NFI = 0.964, IFI = 0.965. Regression coefficients of this model are shown in Table V.

TABLE V
REGRESSION COEFFICIENTS OF INTERVENING VARIABLE SEM

Path	Unstandardized Regression Weights				Standardized Regression Weights
	Estimate	S.E.	C.R.	P	Estimate
health <--- Leisure activities	-0.397	0.020	-19.777	***	-.438
MA <--- Leisure activities	1.000				.792
PA <--- Leisure activities	1.071	0.022	49.276	***	.586
SA <--- Leisure activities	0.599	0.029	20.986	***	.534
PDA <--- Leisure activities	-0.057	0.019	-2.988	0.003	-.037
SWB <--- Leisure activities	0.028	0.018	1.523	0.128	.021
SMH <--- health	1.000				.613
SPH <--- health	1.423	0.048	29.686	***	.764
SWB <--- health	0.493	0.021	23.509	***	.342

*** significantly different from zero at the 0.001 level (two-tailed).

Fig.3 and Table V show that after adding health as an intervening variable in the model, the independent variable (leisure activities) coefficient equals to 0.02 and does not differ significantly from zero. Therefore, health is an intervening variable that provides a link between leisure activities and SWB, and the effect of leisure activities on SWB is completely transmitted through health.

B. Path Coefficients Comparison Shows the Differences Between Male and Female, and Between Rural and Urban Residents

(1) Construct baseline path model which includes all respondents for effect chains from Xi to In and further to Y

Based on results from the intervening variables model, variance in SWB is result only from variances in self-reported physical and self-reported mental health conditions. For variances in subject physical health and subject mental health, those are from variances in all four leisure activities types. The path analysis model, which includes all respondents, is shown as Fig.4.

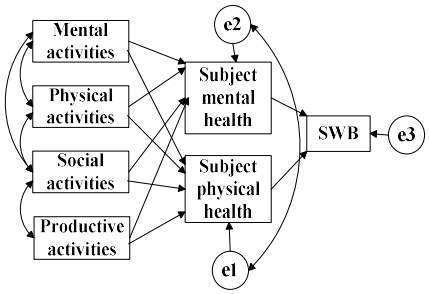

Fig.4 Baseline model includes all respondents of effect chains from *Xi* to *In* and further to *Y*

The model in Fig.4 is recursive. There is no variable in the model that has an effect upon itself. Therefore, in the path diagram of the model, it is not possible to start at any variable and, by following a path of single-headed arrows, return to the same variable. The regression-estimate results of Fig. 4 are shown in Table VI.

TABLE VI
REGRESSION ESTIMATE RESULTS OF BASELINE MODEL INCLUDES ALL RESPONDENTS

Path	Unstandardized Regression Weights				Standardized Regression Weights
	Estimate	S.E.	C.R.	P	Estimate
SMH <--- MA	-0.117	0.015	-7.581	***	-0.100
SMH <--- PA	-0.045	0.010	-4.445	***	-0.056
SMH <--- SA	-0.049	0.014	-3.436	***	-0.037
SMH <--- PDA	0.039	0.009	4.222	***	0.041
SPH <--- MA	-0.398	0.017	-23.526	***	-0.298
SPH <--- PA	0.047	0.011	4.180	***	0.051
SPH <--- SA	-0.134	0.016	-8.643	***	-0.089
SPH <--- PDA	0.058	0.010	5.681	***	0.053
SWB <--- SMH	0.192	0.009	21.098	***	0.217
SWB <--- SPH	0.090	0.008	11.308	***	0.116

*** significantly different from zero at the 0.001 level (two-tailed).

Baseline model includes all respondents of effect paths from *Xi* to *In* and further to *Y*, $\chi 2 = 144.334$, $p = 0.000$ (<.001), RMR = 0.018, RMSEA = 0.046, GFI = 0.996, AGFI = 0.983, CFI = 0.991, TLI = 0.967, NFI = 0.990, IFI = 0.991. The model fits all data well, and includes all respondents.

(2) Multiple group analysis with unstandardized estimate coefficient between male and female

Group data together by gender, then check if the path model shown as Fig.4 could be applied for both males and females. Results of this model are shown in Table VII:

TABLE VII
PATH MODEL RESULTS BY GENDER GROUPS

Gender Group	$\chi 2$	p	RMR	RMSEA	GFI
Male group	109.379	0.000	0.024	0.055	0.994
Female group	64.336	0.000	0.018	0.042	0.997
Gender Group	**AGFI**	**CFI**	**TLI**	**NFI**	**IFI**
Male group	0.974	0.986	0.952	0.985	0.986
Female group	0.985	0.992	0.972	0.991	0.992

If the estimated results of path model for male and female groups are acceptable, then the model is consistent with both male-group data and female-group data. Comparison of results of path coefficients between different genders is shown in Table VIII.

TABLE VIII
PATH COEFFICIENTS' DIFFERENCES BETWEEN MALE AND FEMALE

Path	Male		Female		Z-score
	Estimate	P	Estimate	P	
SMH <--- MA	-0.127	0.000	-0.108	0.000	0.586
SMH <--- PA	-0.034	0.014	-0.052	0.000	-0.858
SMH <--- SA	-0.042	0.041	-0.051	0.009	-0.331
SMH <--- PDA	0.042	0.001	0.041	0.002	-0.103
SPH <--- MA	-0.363	0.000	-0.433	0.000	-2.07**
SPH <--- PA	0.040	0.008	0.062	0.000	0.963
SPH <--- SA	-0.146	0.000	-0.120	0.000	0.821
SPH <--- PDA	0.061	0.000	0.060	0.000	-0.039
SWB <--- SMH	0.199	0.000	0.187	0.000	-0.691
SWB <--- SPH	0.104	0.000	0.080	0.000	-1.475

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10

As detailed in Table VIII, based on Z-scores, only the path coefficient of mental activities' impact on self-reported physical health is different between males and females. For both men and women, those doing more mental activities achieved improved mental health, but improvements among females were even more significant than in the male groups.

Table VIII shows that, for all gender groups, mental activities, physical activities, and social activities increased subject mental health; mental activities and social activities also increased subject physical health; frequency of productive activities had negative effects on subject mental health and subject physical health; frequency of physical activities had a negative relationship to subject physical health.

(3) Multiple group analysis with unstandardized regression weight between rural population and urban population

Model fit results of the path model for rural and urban residents are shown in Table IX.

TABLE IX
PATH MODEL FIT RESULTS OF LIVING PLACE GROUPS

Living Place Group	$\chi 2$	p	RMR	RMSEA	GFI
Rural area	53.833	0.000	0.019	0.043	0.996
Urban area	177.399	0.000	0.032	0.065	0.992
Living Place Group	**AGFI**	**CFI**	**TLI**	**NFI**	**IFI**
Rural area	0.983	0.992	0.971	0.991	0.992
Urban area	0.964	0.977	0.919	0.976	0.977

From the data in Table IX, the model fits both rural and urban data. Regression coefficients' differences of effect path between rural and urban residents are shown in Table X.

In Table X, it is notable that for both rural and urban groups: mental activities and social activities were found to have significant coefficients with subject mental health; meanwhile, frequency of mental and social activities has a positive contribution to subject physical health; while doing more productive activities will cause a decline in physical health. SWB is influenced by subject mental and subject physical health, but compared to subject physical health, subject mental health has a stronger effect on SWB.

TABLE X
PATH COEFFICIENTS' DIFFERENCES BETWEEN RURAL AND URBAN POPULATION

Path	Rural		Urban		Z-score
	Estimate	P	Estimate	P	
SMH <--- MA	-0.213	0.000	-0.072	0.000	3.854***
SMH <--- PA	-0.006	0.795	-0.043	0.000	-1.477
SMH <--- SA	-0.046	0.036	-0.050	0.007	-0.156
SMH <--- PDA	0.077	0.000	0.021	0.078	-2.923***
SPH <--- MA	-0.475	0.000	-0.353	0.000	2.907***
SPH <--- PA	-0.014	0.603	0.074	0.000	3.015***
SPH <--- SA	-0.106	0.000	-0.153	0.000	-1.446
SPH <--- PDA	0.094	0.000	0.040	0.001	-2.526**
SWB <--- SMH	0.204	0.000	0.187	0.000	-0.897
SWB <--- SPH	0.085	0.000	0.097	0.000	0.695

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10

Z-scores in Table X show that between rural and urban population, differences exist in the following chains:

First chain: "mental activities to subject mental health". Whether in rural or urban group, mental activities have a significant regression weight on mental health. But, rural residents obtain more mental health benefits from mental activities.

Second chain: "productive activities to subject mental health". For rural residents, doing more productive activities appear to negatively impact their mental health; whereas, for urban group, mental health condition is not affected by productive activities.

Third chain: "mental activities to subject physical health". Mental activities have contributed to subject physical health whether in the rural or urban group, but rural residents will experience improved physical health if their mental activities frequency is on par with urban residents.

Fourth chain: "physical activities to subject physical health". For rural group, the coefficient of this path is not significant. For urban group, the regression coefficient tells us that people who do more physical activities will report lower subject physical heath scores.

Fifth chain: "Productive activities to subject physical health". When the productive activities frequency is the same, rural residents' subject physical health will be worse than that of urban residents.

C. Inner Group Comparison on Effect Size of Each Kind of Leisure Activities on SWB Inside Every Group with Standardized Regression Weight

Standardized Regression Weights for males, females, rural residents, and urban residents are shown in Table XI.

TABLE XI
STANDARDIZED REGRESSION WEIGHTS FOR MALES, FEMALES, RURAL RESIDENTS, AND URBAN RESIDENTS

Path	Male		Female		Rural		Urban	
	Esti-mate	P	Esti-mate	P	Esti-mate	P	Esti-mate	P
SMH <--- MA	-0.107	0.000	-0.094	0.000	-0.139	0.000	-0.062	0.000
SMH <--- PA	-0.043	0.014	-0.062	0.000	-0.005	0.795	-0.054	0.000
SMH <--- SA	-0.031	0.041	-0.039	0.009	-0.034	0.036	-0.037	0.007
SMH <--- PDA	0.044	0.001	0.043	0.002	0.083	0.000	0.022	0.078
SPH <--- MA	-0.271	0.000	-0.325	0.000	-0.252	0.000	-0.283	0.000
SPH <--- PA	0.045	0.008	0.064	0.000	-0.010	0.603	0.086	0.000
SPH <--- SA	-0.097	0.000	-0.080	0.000	-0.065	0.000	-0.106	0.000
SPH <--- PDA	0.056	0.000	0.056	0.000	0.082	0.000	0.039	0.001
SWB <--- SMH	0.224	0.000	0.212	0.000	0.227	0.000	0.212	0.000
SWB <--- SPH	0.132	0.000	0.105	0.000	0.117	0.000	0.117	0.000

With Standardized Regression Weights, we can use Equation (4) to calculate the final effect size of each *Xi* on *Y* via *In* insideall groups, Results are shown in Table XII.

TABLE XII
FINAL EFFECT SIZE OF EACH XI ON Y VIA IN INSIDE MALE GROUP, FEMALE GROUP, RURAL GROUP, AND URBAN GROUP

Path	Male	Female	Rural	Urban
SWB <--- MA	-0.060	-0.054	-0.061	-0.046
SWB <--- PA	-0.004	-0.006	--	-0.001
SWB <--- SA	-0.020	-0.017	-0.015	-0.020
SWB <--- PDA	0.017	0.015	0.028	0.005

In Table XII, the frequency of productive activities of the "do handicrafts" code had a negative influence on SWB inside all four groups, people who reported less frequency of do handicrafts reported higher SWB. From Table XII we can also determine that mental activities have the highest positive influence on SWB, no matter in which group. Compared to physical activities, social activities appear to be more important for SWB, but for rural residents, physical activities had no affect on SWB.

VI. CONCLUSION

With the availability of data from CGSS2013, this research set out to explore the relationship between leisure activities, subject health, and SWB via SEM. CFA results showed that leisure activities could be divided into four types: as Mental Activities, Physical Activities, Social Activities and Productive Activities. Regression coefficients and P-values of intervening variable SEM showed that subject health, as an intervening variable, provided a link between leisure activities and SWB, and the effect of leisure activities on SWB was completely transmitted through health. The baseline model included all respondents within the effect chains from leisure activities to health further to SWB was recursive. The model integrated well with data of all respondents. By CFA, analyzing regression coefficients, testing those significant values, and constructing a baseline model, this study provides a procedure sample for social science researchers who want to use SEM in their research.

Using the baseline model, we did the multiple group analysis across gender groups and living place groups. Unstandardized estimate coefficients were used. To judge if every path's unstandardized estimate coefficients were significantly different between the gender groups or living place groups, a special Stats Tools Package in Excel was used to calculate *Z*-scores and their significance levels. *Z*-scores and their significance levels determined that path differences between two groups cannot be evaluated by the absolute unstandardized estimate coefficients' value. Even two groups could use different unstandardized estimate coefficients on the same path, which did not prove that the groups were really different. Only if the p-value of the Z-score was less than 0.10, could it be said that the difference really exists. Multiple group analysis showed that: (1) For gender groups, the path coefficients do not differ significantly between male and female except with the impact of mental activities on self-rated physical health. Females reported higher SWB than males when they are at the same mental activities frequency; (2) For living place groups, path analysis results showed that both frequency of mental activities and productive activities were found to have stronger associations with subject mental health and subject physical health in rural population than in urban population. Compared to urban residents, when mental activities frequency was the same, rural residents will feel better on health and in turn have increased SWB; but when the productive activities frequency was the same as that of urban population, rural population reported worse health condition than those that reported lower SWB score.

Based on the multiple group analysis, we obtained the standardized regression weight of each path inside every group. Taking health as an intervening variable, these standardized regression weights were used for comparing the four categories of leisure activities' impact on SWB inside every gender and living place group. The results suggest that: for all groups, mental activities generate the most SWB benefits, and social activities have a less positive effect on SWB; physical activities' positive value has the least effect and for rural residents it has no impact whatsoever on SWB.

Regarding these findings, what should be taken into account is that data for this research comes from only Chinese populations, it cannot be automatically assumed that these results can be generalized or used directly in countries other than China. Another consideration is that, due to the limitations of this study, no additional multiple group analyses except gender-group comparisons and living-place group comparison could be explored. Certainly, other groups and populations need to be examined and analyzed in the future.

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