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## Research article

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# Factors influencing happiness in the elderly based on the Anderson model

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## Abstract:

**Background:** The happiness of elderly people is an important indicator of successful aging. Research shows that happiness among the elderly is not only affected by physical conditions, social relations and other factors, but is also used as a measure of other aspects of happiness. This study examined the relationship between happiness and social relationships, contextual characteristics, and the medical outcomes of the elderly in China.

**Methods:** Using multistage sampling method, a cross-sectional survey was conducted in Heilongjiang Province, China. 1003 elderly people participated in this study. We used the Life Satisfaction Scale, social isolation scale and EQ-5D to measure the happiness, social participation and health status of the elderly. In this study, structural equation modeling and descriptive analysis were used for analysis.

**Results:** The main factors for happiness in the elderly were social relationships ( $\gamma = 0.507$ ,  $P < 0.001$ ), contextual characteristics ( $\gamma = 0.256$ ,  $P < 0.001$ ), and medical outcomes ( $\gamma = 0.232$ ,  $P = 0.015$ ). Among these, the most important factor in the dimension of social relationships was social isolation ( $\gamma = -0.757$ ,  $P < 0.001$ ), the most important factor in the dimension of contextual characteristics was monthly income ( $\gamma = 0.955$ ,  $P < 0.001$ ), and the most important factor in the dimension of medical outcomes was physical health ( $\gamma = 0.600$ ,  $P < 0.001$ ). There were also some relationships among three other dimensions.

**Conclusions:** For the elderly, we must pay attention to social relations and reduce the sense of social isolation. At the same time, we should provide more medical resources for the elderly and maintain their health.

**Key words:** the elderly, happiness, Anderson model

## **Background**

Happiness refers to an individual's subjective feelings about his or her lifestyle, including positive and negative evaluation. It can be regarded as the subjective performance of individual welfare, including self-evaluations of health and life satisfaction<sup>1234</sup>. Scholars have conducted extensive research on happiness and put forward several major theories: firstly, multiple discrepancy theory of satisfaction refers to the theory that individuals compare themselves with others' standards. Satisfaction judgments are then based on discrepancies between current conditions and these standards<sup>5</sup>. Secondly, Diener put forward the goal theory, which holds that people react to positive ways when making progress of desired goals and react negatively when they fail to achieve goals<sup>6</sup>. Thirdly, Personality- Situation interactions theory proposed that the effect of traits on emotions may be mitigated by the individual's environment. Therefore, the influence of personality may go beyond straight forward main effects; personality may interact with the environment and situation to affect happiness<sup>7</sup>. With an aging population, happiness among the elderly is generally considered an important indicator of successful aging<sup>8</sup>. Research shows that elderly happiness is influenced by health, living conditions, social relations, and other factors<sup>9</sup>.

There are some differences in the factors affecting life happiness in different periods. According to an early theory of happiness, happiness comes directly from the objective environment of one's life. According to this theory, happiness pertains to personal income and consumption, which can increase the standard of living<sup>10</sup>. Therefore, many policy decisions are based on objective data. As research progressed, however, scholars have questioned this theory. Although objective environmental factors can reliably predict happiness, they only account for relatively small variances<sup>11</sup>. According to subsequent research, in addition to the objective environment, which has a direct impact on happiness, other factors affect happiness. Indeed, some studies explored the intermediary role between happiness and various variables.

Income is one of the main factors affecting happiness. A study from 24 countries shows that personal income has a predictive effect on happiness. In countries with high income inequality, income level has a higher impact on individual happiness<sup>12</sup>. But the relationship between money and happiness is complex. Long-term income and wealth have a stronger predictive effect on happiness than current wealth, such as, permanent real estate, financial and commercial property are more important to happiness<sup>13</sup>. In addition, the family is an important part of the society, and the financial situation of the family may have an impact on the individual's happiness. A study in Australia shows that the financial situation of the family is one of the important determinants of the overall happiness of the individual. Although the net wealth and asset level are positively related to the happiness, the debt factor in the family should be considered<sup>14</sup>.

Social support plays an important role in predicting individual happiness. The main effect model and stress buffering effect model show that good social support can reduce psychological stress and improve individual happiness<sup>1516</sup>. For the group of the elderly, the scale of social network and social

support have a positive impact on happiness, and the impact of social support is more significant. Therefore, paying attention to the social network of the elderly and transforming social network into social support can effectively improve the happiness of the elderly<sup>17</sup>. Due to the decline in the physical health of the elderly, the scope of communication is also gradually narrowing, and the regional restrictions make the elderly more likely to have a sense of social isolation<sup>18</sup>.

With the increase of life expectancy, people want to live in a healthy and happy way. Health status plays a key role in influencing happiness. Participants with poor self-reported health status are more likely to lead to a decline in happiness<sup>48</sup>. The degree of disease damage to individual life ability is inversely proportional to happiness. In addition, the relationship between health and happiness depends on how health is measured<sup>19</sup>. It has also been confirmed that long-term unhappiness will have an impact on health, such as immune system disorders, depression and high blood pressure, which will hinder the improvement of happiness<sup>20</sup>.

Happiness is also affected by other factors. Di Tella used the Eurobarometer, which collects data on life satisfaction, to study the relationship between unemployment, inflation, and happiness<sup>21</sup>. Happiness can also be used to measure external economic indicators. For example, Nordhaus and Krueger used happiness to evaluate changes in the consumer price index and household income<sup>22,23</sup>. After discovering the potential value of happiness, the company surveyed their employees' satisfaction and happiness<sup>24</sup>.

Subjective well-being is a measure of a person's overall "health", including people's emotional response, domain satisfaction (such as health, work, social relations) and overall judgment of life satisfaction. Later, subjective well-being is divided into three categories: evaluation (such as life satisfaction), experience (such as yesterday's happiness) and ideal field (such as life value). These factors together describe a person's subjective well-being<sup>25</sup>. According to Diener, subjective well-being can be called 'happiness'<sup>26</sup>. Life satisfaction and the positive influence of happiness are the most commonly used indicators of experiential well-being<sup>27</sup>. In many international surveys, life satisfaction is used as a representative of happiness. Therefore, this paper uses life satisfaction indicators to measure the happiness of the elderly<sup>28,29</sup>.

Happiness of the senior group is an eternal topic, since it is influenced by social environment in different times and has different research significance. There are two aspects of innovation in this paper. First of all, individual happiness is affected by material conditions and living environment. The survey site of this paper is Heilongjiang Province, China, which is located in a high latitude and cold climate region, and the economy is in the middle and lower class of China. This study hopes to understand the current situation of happiness of the elderly in this kind of area. Secondly, China has implemented the policy of integrated eldercare services with medical care since 2013. The elderly can enjoy more medical resources and eldercare resources, and their lives have been greatly guaranteed and improved. Among the three regions we selected, Harbin and Qiqihar are the first batch of pilot cities for the integrated eldercare services with medical care in China. After that, Jiamusi immediately launched a new model of integrated eldercare services with medical care for the elderly to provide more complete medical resources and life security. Therefore, this study hopes to understand the current situation of happiness of the elderly under the existing policies.

## **Methods**

### **Data and sample**

We divided Heilongjiang into three economic levels, and one city was selected at each level:

Harbin, Qiqihar, and Jiamusi. Similarly, according to the economic level, three communities and three villages were selected from each city, for a total of nine communities and nine villages. Individuals were included in the study if they met the following criteria: aged 60 years or older, with clear consciousness, and competence at verbal communication.

### **Data collection**

A field questionnaire survey was conducted from March 1, 2016 to August 31, 2016. The investigators were postgraduates and undergraduates who received unified training. Data were collected through face-to-face interviews using a structured questionnaire. At the early stage of the survey, the questionnaire was standardized by issuing an operation manual to ensure that the questions asked by the investigators were consistent. A preliminary survey was first carried out. Then, the questionnaire was modified and the investigators were re-trained. In total, 1200 questionnaires were distributed (600 urban and 600 rural). Participants who did not respond to the survey or did not answer questions about willingness to receive eldercare were excluded. Ultimately, a total of 1003 valid questionnaires (581 from urban elderly, and 422 from rural elderly) were obtained, with an effective response rate of 83.6%.

### **Research hypothesis**

Hypothesis 1. Medical outcomes will influence happiness of the elderly.

Hypothesis 2. Social relationships will influence happiness of the elderly.

Hypothesis 3. Contextual characteristics will influence happiness of the elderly.

Hypothesis 4. Medical outcomes, social relationships, contextual characteristics interact with each other.

### **Assessment tools**

Based on the health behavior model proposed by Anderson, we analyzed the factors influencing elderly happiness. A questionnaire with five sections was used.

The first section focused on the demographics of the respondents, including gender, age, marital status, medical insurance, real estate, and monthly income.

The second section investigated happiness. The five-item version of Pavot and Diener's life-satisfaction scale was used for the measurement. In this dimension, different aspects of happiness were measured by five items, life expectancy satisfaction, life state satisfaction, self-evaluation of life, sense of life acquisition, life choice satisfaction, respectively, which gives a more comprehensive assessment of individual happiness. Respondents were asked to indicate their level of agreement with the respective statements from a score of 1 (strongly disagree) to 7 (strongly agree). Greater scores indicated higher levels of satisfaction with life. Then, the scores of each item were averaged. The reliability of the scale was reasonable in our sample, and the Cronbach's  $\alpha$  was 0.96.

The third section was mainly about social relations, with questions regarding social isolation, satisfaction with interpersonal relationships, and satisfaction with the support received by friends. The social isolation scale mainly adopted that proposed by Hawthorne. There were six questions in the scale, among which the second, fifth, and sixth questions needed to be scored reversely. A Likert five-point scale was adopted: a higher score indicated a stronger sense of social isolation. The Cronbach's  $\alpha$  was 0.83, which indicates high specificity. Satisfaction with interpersonal relationships and support from friends was respectively determined with two questions: Are you satisfied with your interpersonal relationships? And are you satisfied with the support you receive from your friends? Respondents were asked to use a five-point scale to indicate their satisfaction, ranging from 1 (not satisfied at all) to 5 (very satisfied).

The fourth section investigated the quality of life of the elderly, mainly using an EQ-5D scale. The EQ-5D scale was developed by the British EuroQol Group to provide a simple and universal method of measuring health for clinical and economic evaluations. It contains five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.

The fifth section mainly evaluated medical treatment of the elderly. Specifically, the participants were asked whether they had been hospitalized in the last year. They were also asked whether they have had chronic diseases in the last year. In both cases, if they had, the answers were scored with 1 point, and otherwise they were scored with 0.

### **Data analysis**

Data were processed using Epidata and were double-entered to ensure quality. Sample characteristics were analyzed using SPSS V.19.0. Descriptive statistics were reported for socioeconomic and demographic characteristics, physical health, and life satisfaction in urban and rural areas. According to the actual situation of the elderly in China, we used social relations to replace healthy behavior in Anderson's model. In addition, demographic variables could not be included in the structural equation modeling as explicit variables, so the path of individual characteristics was excluded. Finally, the structural equation modeling was used to measure the relationship among contextual characteristics, social relationships, medical outcomes, and happiness. The following indices were used to evaluate the overall model fit: the goodness-of-fit statistic, the goodness-of-fit index (GFI), the Tucker–Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA).

## **Results**

### **Demographic characteristics**

Table 1 shows the socioeconomic and demographic characteristics of the participants. In the sample, 47.3% respondents were male, and 52.7% were female. The age of the elderly was mainly concentrated between 60 and 70 years old (50.6%), 27.9% were between 70 and 79 years old, and 21.4% were older than 80 years old. Most respondents had children (94.7%). The proportion of the elderly who owned property was 61.3%. In addition, the monthly income of the elderly was such that 35.3% had less than 999 RMB, 19.8% had between 1000 RMB and 1999 RMB, 27.7% had between 2000 RMB and 2999 RMB, and 17.1% had more than 3000 RMB.

### **Structural equation modeling**

The Andersen model shows that each coupled dimension is related. We connect every two exogenous variables to build a structural equation modeling for happiness (Figure 1). The regression weights and standardized regression weights are shown in Table 2. As can be seen from Table 2, the path of satisfaction with community medical institutions is not statistically significant ( $p = 0.193, > 0.05$ ), and so the path was eliminated. In light of this, we rebuilt the model after correcting it (Figure 2). The regression weights and standardized regression weights of this model are shown in Table 3, showing that every path is meaningful. The goodness-of-fit index of the model was suitable for the requirements of the structural model (Table 4).

Table 5 presents the complete standardized direct and indirect effects. The total effect of happiness and medical outcomes is 0.232, the direct effect is 0.232, the indirect effect is 0.000; the total effect of happiness and social relationships is 0.507, the direct effect is 0.507, the indirect effect is 0.000; the total effect of happiness and contextual characteristics is 0.256, the direct effect is 0.256, the indirect effect is 0.000.

The path coefficient from social relationships to happiness is 0.507, which is statistically significant at  $p < 0.001$ . Social relationships thus had a positive effect on elderly happiness. The relationship between contextual characteristics and happiness is 0.256, which is statistically significant at  $p < 0.001$ . Thus, contextual characteristics had a positive effect on elderly happiness. The relationship between medical outcomes and happiness is 0.232, which is statistically significant at  $p < 0.001$ . Thus, medical outcomes had a positive effect on elderly happiness.

## Discussion

The Anderson model provides a mature framework in which social relationships, contextual characteristics, and medical outcomes were included to observe their impact on elderly happiness. In recent years, the happiness of Chinese people has significantly improved<sup>30</sup>. The results of this study show that social relations, environmental factors, and medical outcomes have the greatest impact on the happiness of the elderly.

First, Table 3 shows that social relationships are the most influential factors for the happiness of the elderly. This is consistent with the results of Moeini<sup>3132</sup>. A good social support network can increase quality of life<sup>33</sup>, thus improving happiness. Xiaotong proposed the difference model to explain the composition of China's social network. Compared to Western society, relatives account for a higher proportion of Chinese social networks<sup>34</sup>. Research has shown that satisfaction with interpersonal relationships and support from friends importantly impact happiness. Due to family and work, adult children rarely have time to accompany their parents<sup>35</sup>, so the role of the community with regard to the happiness of the elderly should be emphasized. In developed countries, social isolation is a problem that needs attention. The elderly is vulnerable to a loss in social relationships, since community resources to form social networks in old age are limited<sup>36</sup>. Reducing social isolation of the elderly and promoting their integration into society is an urgent problem.

Second, contextual characteristics played the second-biggest role in the happiness of the elderly, according to our study. In this dimension, the main influential factor was monthly income, which is consistent with the results of Shamsk and other studies<sup>3738</sup>. Quality of life has an important impact on individual happiness. Higher income can provide a good living environment, high-quality education and health services for the elderly. A study in the United States shows that the elderly with less disposable income have lower happiness<sup>39</sup>. But the relationship between income and happiness is complex. The relationship between income and happiness is not linear. When income meets basic needs, the increase of income does not necessarily lead to the increase of happiness<sup>40</sup>. In addition, the relationship between income and happiness also depends on the individual's psychological state<sup>41</sup>, larger income gaps have a negative impact on happiness<sup>42</sup>. According to the official website of China's National Bureau of Statistics, in 2016, Heilongjiang ranked 18th in terms of per capita disposable income. Therefore, we should pay more attention to the income of the elderly to improve their happiness.

Finally, there is a correlation between medical outcomes and the happiness of the elderly, and there is a positive correlation between self-assessment of health and happiness, which is consistent with the results of another research<sup>4344</sup>. Indeed, the deterioration of health will lead to a decline in happiness<sup>45</sup>. According to our survey, elderly who were not hospitalized or ill were happier. This is consistent with the results of a survey<sup>46</sup>. A decline in health as a result of stroke or cancer, for example, negatively affects happiness<sup>47</sup>. The relationship between disease and happiness is complex, and disease can affect happiness through its impact on health. The extent of disease has various

effects on the ability of the elderly to care for themselves, which, in turn, affects their overall level of happiness<sup>48</sup>. According to hedonic adaptation theory, however, people adapt to disease over time, and the effect of physical health on happiness gradually decreases<sup>49</sup>. In addition, mental health must be considered. Better screening, diagnosis, and treatment for depression, social phobia, and other mental disorders that afflict the elderly cannot be ignored.

The influence of contextual characteristics, social relationships, and medical outcomes on the happiness of the elderly is not independent. Retired elderly, especially those in poor health, spend most of their time in the community<sup>50</sup>. Due to the physical health and family life of the elderly, social networks in later years are shrinking, the happiness of the elderly decreases as loneliness increases<sup>51</sup>. Therefore, interpersonal communication in the community and elderly satisfaction with the acquisition of medical resources are important. Good social support is conducive to the improvement of happiness and life satisfaction of the elderly<sup>5253</sup>. They help the elderly to maintain their health and reduce their loneliness.

### **Limitations**

Firstly, since this is a cross-sectional study, it is inevitable that such design is not able to establish causality between the variables. Secondly, structural equation modeling is used to build the model in this study. Due to the limitation of methodology, only the correlation between variables can be found, and the causal relationship between variables cannot be determined.

### **Conclusions**

Increasing attention has been paid to the happiness of the elderly. Regarding this, we should attach importance to social communication networks for the elderly. Good social communication can reduce the sense of social isolation. In addition, sufficient medical resources should be provided for the elderly to ensure their health and improve their well-being.

### **Declarations**

Ethics approval and consent to participate

Approval for this study was granted by the Institutional Research Board of Harbin Medical University. The data were collected anonymously. Respondents were assured that participation in this survey was voluntary, with the return of completed questionnaires taken as consent to participate.

Consent for publication

All presentations of case reports received consent for publication.

Availability of data and materials

Data will not be shared. We promised not disclose information regarding the respondents when we signed the informed consent form.

Competing interests

The authors declare that they have no competing interests.

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#### Author contributions

LL conceived and designed the experiments. XW performed the experiments. LJ analyzed the data. ZL, LJ, and LL contributed reagents/materials/analysis tools. XZ and SH wrote the paper. XS and XW provided technical support. LL critically revised the paper. All authors checked and proofread the final version of the manuscript.

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Figure 1

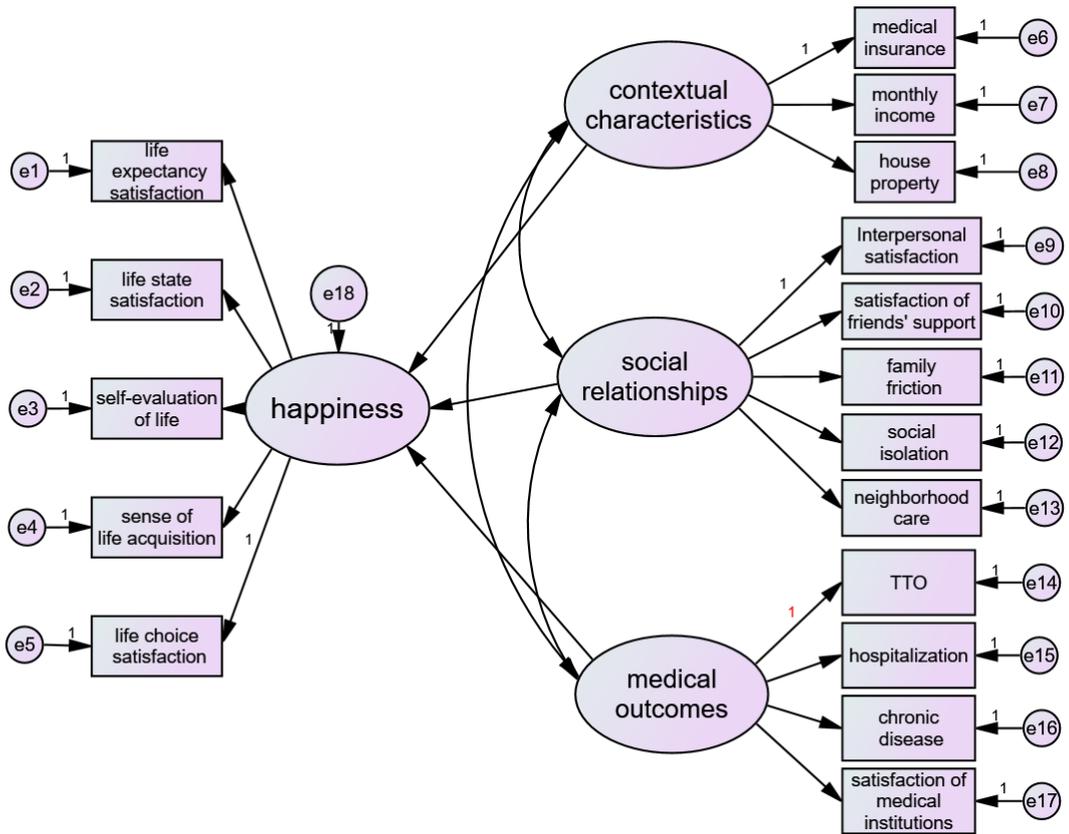
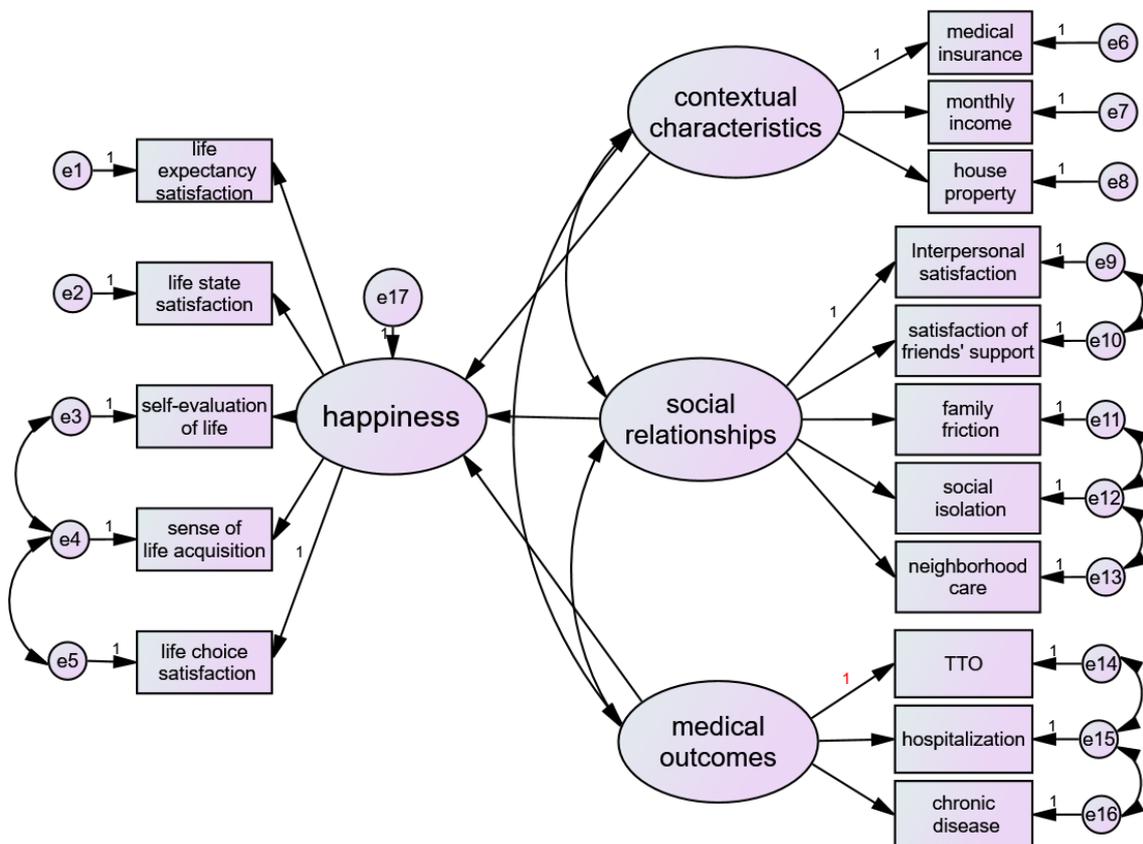


Figure 2



**Table 1.** Socioeconomic and demographic characteristics of the elderly.

Variables	Total 1003 N	%
sex		
male	474	47.3
female	529	52.7
age		
< 70	508	50.6
70-79	280	27.9
> =80	215	21.4
marriage status		
having partner	410	40.9
without partner	593	59.1
have children		
yes	950	94.7
no	53	5.3
house property		
yes	615	61.3
no	388	38.7
monthly income		
< =999	354	35.3
1000-1999	199	19.8
2000-2999	278	27.7
> =3000	172	17.1

**Table 2.** Regression weights and standardized regression weights

Variables	Unstandardize d direct effects	Standardized direct effects	P
happiness<---contextual characteristics	4.536	.262	***
happiness<---social relationships	.855	.470	***
happiness<---medical outcomes	2.239	.235	***
SWLS 4 <---happiness	1.153	.921	***
SWLS 3 <---happiness	1.220	.966	***
SWLS 2 <---happiness	1.260	.978	***
medical insurance <---contextual characteristics	1.000	.215	
monthly income <---contextual characteristics	21694.106	.954	.001
house property <---contextual characteristics	1.258	.158	***

satisfaction of friends' support<---social relationships	1.048	.828	***
family friction<---social relationships	-.424	-.315	***
social isolation<---social relationships	-5.675	-.714	***
TTO<---medical outcomes	1.000	.641	
hospitalization <---medical outcomes	-1.458	-.333	***
chronic disease <---medical outcomes	-1.474	-.377	***
satisfaction of medical institutions <---medical outcomes	-.920	-.053	.193
SWLS 1<---happiness	1.229	.938	***
SWLS 5<---happiness	1.000	.759	
Interpersonal satisfaction <---social relationships	1.000	.817	
neighborhood care<---social relationships	1.037	.513	***

\*\*\*p<0.001

**Table 3.** Regression weights and standardized regression weights

Variables	Unstandardized direct effects	Standardized direct effects	P
happiness<---contextual characteristics	4.363	.256	***
happiness<---social relationships	1.029	.507	***
happiness<---medical outcomes	2.320	.232	.015
SWLS 4 <---happiness	1.155	.909	***
SWLS 3 <---happiness	1.232	.959	***
SWLS 2 <---happiness	1.289	.985	***
medical insurance <---contextual characteristics	1.000	.215	
monthly income <---contextual characteristics	21767.406	.955	.002
house property <---contextual characteristics	1.260	.158	***
satisfaction of friends' support<---social relationships	1.047	.729	***
family friction <---social relationships	-.473	-.310	***
social isolation<---social relationships	-6.806	-.757	***
TTO<---medical outcomes	1.000	.600	
hospitalization<---medical outcomes	-1.000	-.214	***
chronic disease<---medical outcomes	-1.451	-.347	***
SWLS 1<---happiness	1.252	.939	***
SWLS 5<---happiness	1.000	.747	
Interpersonal satisfaction <---social relationships	1.000	.721	
neighborhood care <---social relationships	1.170	.510	***

\*\*\*p<0.001

**Table 4.** The model estimates the fitting index value

GFI	TLI	CFI	RMSEA
0.963	0.970	0.977	0.046

**Table5. Direct and indirect effects.**

	Happiness		
	Standardized Total Effects	Standardized Direct Effects	Standardized Indirect Effects
medical outcomes	.232	.232	.000
social relationships	.507	.507	.000
contextual characteristics	.256	.256	.000

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# Figures

Figure 1

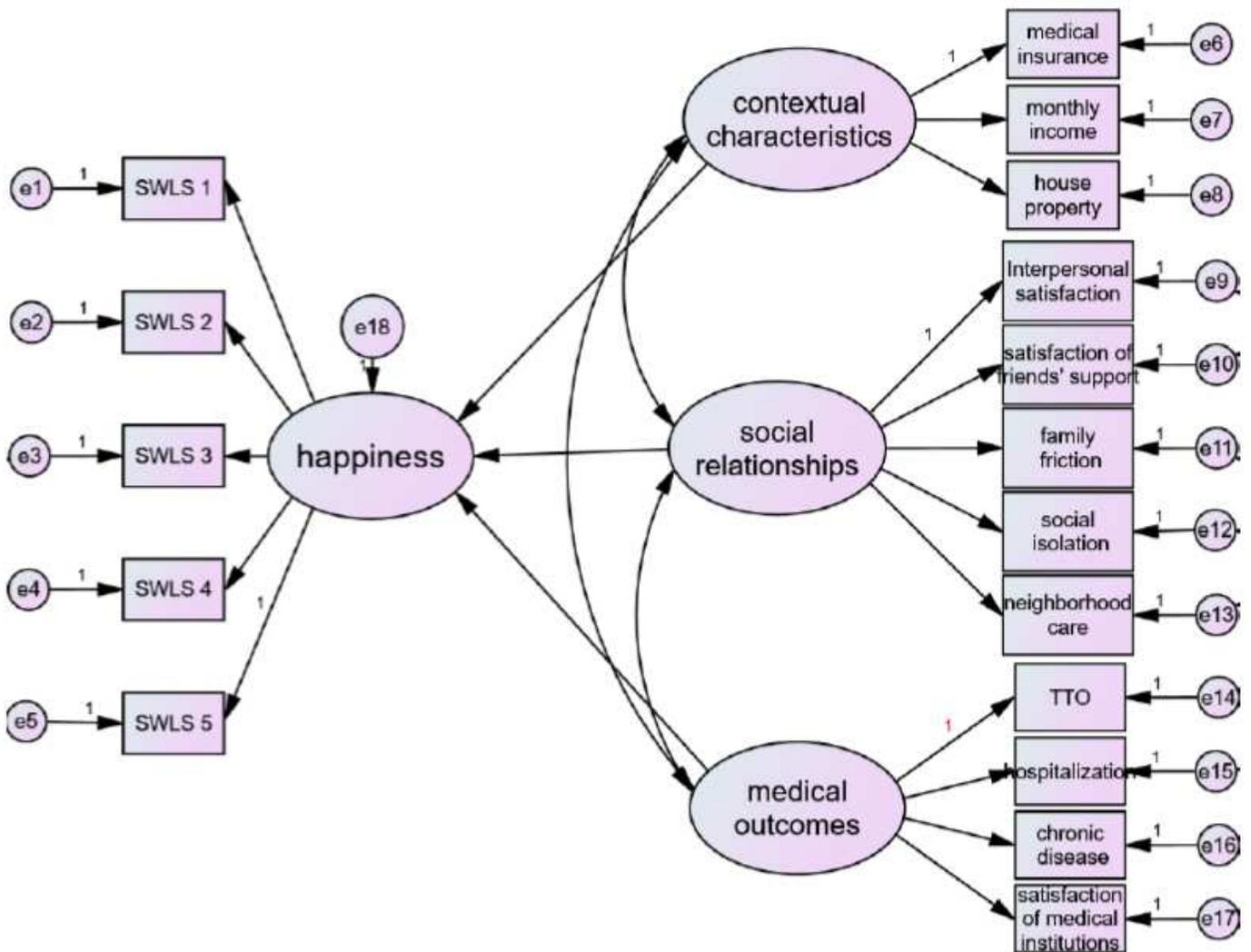


Figure 1

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Figure 2

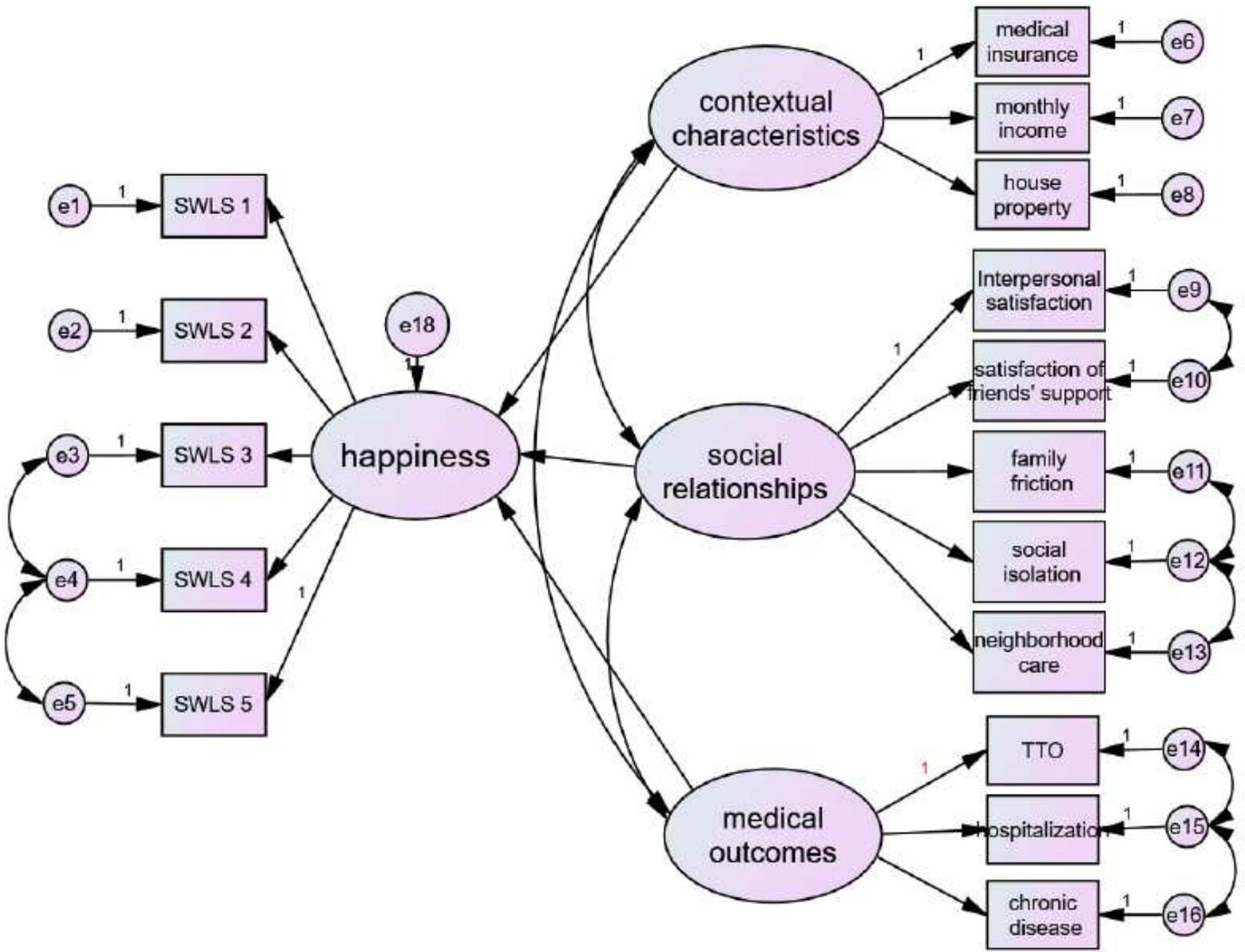


Figure 2

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