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ORIGINAL ARTICLE

Health-related life satisfaction and its influencing factors: A cross-sectional study in China

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Abstract

Aim: With the rapid development of science and technology, the pace of life has accelerated. Health and life satisfaction issues of persons are gaining more attention. China, Japan, Malaysia, and Taiwan conducted international cooperative research on health of four regional populations. This research was a part of the study in mainland China, which aimed to explore health-related life satisfaction and its influencing factors on large samples in mainland China.

Methods: A random group of 1404 persons from universities, factories, companies, and elderly centers in Changchun completed a structured questionnaire. This study centered on life satisfaction indicators, which included the current whole life, income, family relationships, peer relationships, relationships with the neighbors, living environment, personal health, family health, spare time, and housework share. Other collected data included the Body Mass Index, blood pressure, self-rated health, Breslow's seven health practices, medical treatment within the past 6 months, physical examinations, General Health Questionnaire (GHQ)-12 Scale, social activities, networking relationships with persons around the community, social support, and sociodemographic variables. Associations between life satisfaction, demographics, and health-related variables were analyzed through a multiway ANOVA.

Results: The living environment and income of Chinese persons were related to their low life satisfaction. The multiway ANOVA showed that the independent relationship of self-rated health, regular physical examinations, GHQ-12 Scale, trust in the community, communication with the neighbors, education, and age related with life satisfaction accounting for 20.3% of the variance. Education and age showed interactive effects on life satisfaction.

Conclusion: This study identified seven factors that influenced the life satisfaction of persons in mainland China. Life satisfaction can be enhanced through interventions to improve self-rated health, regular physical examinations, mental health, trust in the community, communication with the neighbors, education, and improvement in the health service.

Key words: China, health, influencing factors, life satisfaction.

INTRODUCTION

With the rapid development of science and technology andaccelerating pace of life, persons face increasing health problems. In 1948, the World Health Organization (WHO) defined health as "a state of physical, psychological, and social well-being, not just the absence of disease or weakness" (WHO, 1948). Forty years later, the WHO further defined the concept of healthiness, such that "One is sound in physical health, mental health, social health, and moral health" (WHO, 1989, 88–91). Individual physical health is a prerequisite to a quality of life, whereas life satisfaction reflects quality of life from the subjective feelings of persons and is also considered as an overall evaluation of the quality of life of individuals. Shin and Johnson (1978)

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argued that life satisfaction is a subjective assessment based on a set of criteria. Koohbanani, Dastjerdi, Vahidi, and Far (2013) thought that life satisfaction is an optimistic attitude in facing life. Life satisfaction is not persistent but can be changed according to specific circumstances and is based on self-perception and the understanding of persons (Aishvarya *et al.*, 2014). At present, the study of life satisfaction mainly focuses on three areas: mental health, quality of life, and gerontology research (Yao, Shi, & Fang, 2011). Growing evidence of life satisfaction, as a critical component of subjective well-being, plays a crucial role in healthy physical, social, psychological, and academic functioning (Heffner & Antaramian, 2016).

Studies in some developed countries explored the relationship between life satisfaction and disease, health, education, interpersonal relationships, and socioeconomic status (Corathers *et al.*, 2016). Grana, Camplan, and Carda (2016) explored the relationship between disability and life satisfaction in 30 adults with neuromuscular diseases with economic status, relationship with friends, daily activities, family life, and mental health affecting life satisfaction. Dumitrache, Rubio, and Rubio-Herrera (2016) revealed that limitations on daily activities and self-rated health influence life satisfaction. Self-rated health is a primary variable of life satisfaction. Kim and Sok (2012) studied 246 South Koreans who were aged ≥65 years and confirmed a positive correlation between self-rated health and family support and life satisfaction.

The individual level of overall life satisfaction varies over time, but becomes constant in larger populations (Fugl-Meyer, 2016). Life satisfaction must be explored in order to understand the life goals and current life condition of persons and to identify areas in which they might need compensatory or complementary information and/or support. However, no study has centered on the different life domains and their associations with demographic and health-related factors in Asian countries. Based on this background, an international collaborative study was conducted in mainland China, Japan, Malaysia, and Taiwan, focusing on the health-related aspects of four different regional populations. This research is part of the study in mainland China.

In studying the relationship between life satisfaction and health in mainland China, mental health (Lv, Yue, & Zheng, 2014; Tai & Zheng, 2009), social health (Cui & Yao, 2012; Yang *et al.*, 2011), and life satisfaction are more related, whereas few studies have mentioned physical health (Qu, 2016). Research on life satisfaction and its influencing factors mainly have focused on the elderly (Han, Gao, Zhang, & Liu, 2016; Luo *et al.*, 2016; Zhu, 2016) and less on the whole population, especially with the lack of a large sample size and life satisfaction of all age groups and influencing factors. Given the differences in cultural backgrounds, values, economic conditions, and social conditions, the findings that have been derived from studies in developed countries might be inapplicable to the entire population of mainland China.

The city of Changchun in Jilin is located in northeastern China. The total land area of the city measures 20,565 km^2 and is divided into nine districts. In 2015, the total population reached 7.793 million. A survey showed a 54.7% prevalence rate of chronic diseases in the residents of the Chaoyang district in Changchun, which is a serious threat to the physical and mental health of the city's inhabitants (Li *et al.*, 2014). The general mental health of Jilin adult residents exhibited a positive rate on the General Health Questionnaire (GHQ)-12 Scale and such a result was higher than that in the majority of provinces in China. The results showed that attention was paid to the mental health status of women, students, unemployed, persons with a low cultural level and low family income, and those with recently diagnosed chronic diseases (Xu *et al.*, 2013). A study showed that the elderly in north and south China feature different living habits, hobbies, sickness, and medical services (Li, Liu, & Wang, 2016). This present study investigated the relationship between life satisfaction and physical, mental, and social health and explored life satisfaction and its influencing factors in all age groups. This study included a large sample size and the results provide an in-depth understanding of health-related life satisfaction and identified the subgroups that are at greater risk of lower life satisfaction in meeting their needs through appropriate healthcare interventions.

METHODS

Design, setting, and sample

A cross-sectional questionnaire was conducted in Changchun city. Changchun is the capital city of Jilin and is divided into nine districts. Using a random cluster sampling method, universities, factories, companies, and elderly centers were extracted from each district according to the principle of randomization. A nursing schoolteacher contacted the leaders of each district and

selected a community member, a nursing schoolteacher, and three students who conducted the survey. Unified training was conducted prior to the survey. The sample size was calculated using by using a power analysis with an α of 0.05, power of 0.80, and high effect size for multivariate analysis, and anticipated 30% attrition rate of the potential sample to the questionnaire (Newton & Rudestam, 2000). The sample included individuals who were ≥18 years and who could complete the questionnaire independently. A total of 180 questionnaires was distributed in each district, totaling 1620. Among the selected participants, 23 declined to participate, 129 did not complete the survey, and 64 were unqualified. The final recovery rate was 1404, yielding a response rate of 86.8%.

Ethical considerations

The purpose of the study was explained to all the participants during the delivery of the anonymous self-reported questionnaire. A returned questionnaire was considered to be indicative of consent to participate. All the procedures that were conducted in this study were in accordance with the 1964 Declaration of Helsinki and its later amendments and the study was approved by Jilin University School of Nursing Research Ethics Committee. The research did not include any animal study.

Measurements

Dependent variable

The life satisfaction questionnaire was based on the existing Life Satisfaction Checklist (Fugl-Meyer, Melin, & Fugl-Meyer, 2002) and was prepared in accordance with Chinese national conditions, with modification and deletion of unclear, difficult-to-understand, or ambiguous entries. The conceptual framework of life satisfaction includes satisfaction with life as a whole and forms four different aspects: (i) provision (satisfaction with the economy and environment); (ii) spare time (satisfaction with leisure and the housework share); (iii) closeness (satisfaction with the family, partner, and neighbor relationships); and (iv) health (satisfaction with personal and family physical health). The dependent variable was life satisfaction and included 10 items: current whole life, income, family relationships, peer relationships, relationships with neighbors, living environment, personal health, family health, spare time, and housework share. The participants answered each item by selecting one of the five possible options from "Strongly satisfied = 1" to "Strongly dissatisfied = 5," with lower scores indicating higher satisfaction. In this study, the Cronbach's α coefficient of life satisfaction was 0.88.

Independent variables

In this study, the examined independent variables included physical, mental, and social health and sociodemographic variables. Among the variables, physical health comprised the Body Mass Index (BMI), blood pressure, self-rated health, Breslow's health practices, medical treatment within the last 6 months, and physical examinations. Self-rated health was measured on a five-point scale from "Very good = 1" to "Very poor = 5." Breslow's seven health practices included smoking, drinking, regularity of meals, eating snacks, weight, physical activity, average hours of sleep, and sleep quality. The participants were asked whether they underwent medical treatment within the last 6 months or a physical examination; the scale used was a "Yes" or "No" response format.

Mental health was measured by using the GHQ-12 Scale. In accordance with the scoring method that is used by the WHO, each question was scored as either "0" or "1" (Von Korff, Üstün, Üstün, & Sartorious, 1995). The total score ranged between 0 and 12 and higher scores indicated more significant psychological morbidity (Shen, 2010). A GHQ score of ≤2 was classified as "Good mental health," whereas a GHQ score of ≥3 represented "Low mental health." In this study, the Cronbach's α coefficient was 0.65.

The social health factors included social activities, networking relationships with persons around the community, and social support. The social activity-related questions involved the participation and volunteering of individuals in activities for the past year; the "Yes" or "No" response format was used in answering the questions. In order to assess the networking relationships with persons around the community, the participants were asked whether they communicated with their neighbors. The answers included three items: "No communication" = 1, "Occasional communication" = 2, and "Frequent communication" = 3. Trust in persons in the community was assessed by using three options: "Distrust" = 1, "Trust only a few people" = 2, and "Completely trust people" = 3. The social support-related questions asked the participants whether they helped their neighbors in the past year, whether someone or an organization had listened and encouraged them through emotional support within the last 1 year, and whether persons received financial help from a

person or organization in the past year during times of difficulties; the answers were either "Yes" or "No."

Data collection

This study was approved by Jilin University School of Nursing Research Ethics Committee. The data were collected between July and September, 2016. For each district, the survey's respondents included a nursing schoolteacher, three students, and community members; 45 data collectors were assigned in nine districts. The data were collected at randomly selected universities, factories, companies, and elderly centers in regions with an approximately similar scope in terms of area and population. One week later, the questionnaires were collected and the data were entered into Epidata 3.1 (EpiData Software is from EpiData Entry version 2.0 and above released by the nonprofit organization "The EpiData Association" Odense, Denmark In Danish: EpiData foreningen).

Statistical analysis

The data were analyzed by using IBM SPSS Statistics for Windows v. 24.0 (IBM Corporation, Armonk, NY, USA). The participants' characteristics were described by using descriptive statistics, including the mean, medium, standard deviation (SD), score range, frequency, and percentage. In order to investigate the factors that were related to life satisfaction, bivariate and multivariate analyses were conducted. Life satisfaction was evaluated by using a Likert scale in order to yield ordinal data (Polit & Beck, 2012). Therefore, the Mann–Whitney U-test and Kruskal–Wallis test were used to explore the relationships between life satisfaction and each independent variable. Subsequently, the variables with statistically significant relationships with life satisfaction in the bivariate analyses were entered into a multiway ANOVA model, which is suitable when independent variables are categorical and the dependent variables are continuous (Tabachnick & Fidell, 2006). Additionally, the original data of life satisfaction were replaced with ranks ("rank of life satisfaction") in order to permit an ANOVA. Levene's test for homogeneity of variance ($P > 0.05$) suggested that the error variance of the independent factor was equal across groups, signifying appropriateness of the ANOVA model.

RESULTS

Participants' characteristics

The men and women presented almost similar proportions (male: 49.9%; female: 50.1%) and the ratios of the participants from the high schools and universities also were almost the same (junior high school: ≤50.7%; university and college: ≥49.2%). The participants' age ranged from 18–92 years old, with a mean age of 44.1 years (SD = 16.6). A total of 77.6% of the participants reported a low economic status (low: 32.2%; medium-to-low-to-low: 45.4%) (Table 1).

The majority (62.6%) of the participants reported a low level (5.8%) or medium-to-low-low level (56.8%) BMI; 69.2% rated their health as "good;" 21.6% reported average health; and 9.3% reported a poor health status. More than four-fifths (80.4%) of the 1129 participants had normal blood pressure. A majority (68.2%) of the the participants reported good Breslow's health practices. Approximately three-quarters (76.9%) of the participants had not been to hospital within the last 6 months. More than half (56.3%) reported no regular physical examination (Table 1).

The total score for the GHQ-12 Scale ranged from 0 to 12. More than half (51.3%) of the 720 participants indicated a good health mental condition. In addition, more than four-fifths (81.6%) of the 1145 participants did not participate in social activities. A majority (60.7%) of the participants reported no communication (37.1%) or occasional communication (23.6%) with their neighbors and distrust (7.1%) or trust of only a few people (51.4%). Moreover, 60.7% of all the participants did not participate in any voluntary community activities (Table 1).

A majority (69.6%) of the participants reportedly helped their neighbors within the last 1 year. More than four-fifths (82.5%) of the 1159 participants had emotional support within the last 1 year and most (69.1%) received economic support within a similar period (Table 1).

Life satisfaction of the participants

Table 2 shows the distribution of each item in the life satisfaction scale. Most (>75.0%) of the participants rated highly on their relationship with their family (80.3%) and relationship with friends or acquaintances (76.0%). More than half reported their satisfaction in their current whole life status (64.5%), neighborhood relationship (57.8%), housework share (56.3%), personal health (55.8%), and spare time (52.1%). In contrast, more than half (55.0%) reported dissatisfaction with their living environment (neither satisfied nor dissatisfied: 44.0%; strongly dissatisfied/dissatisfied: 11.0%), inadequate family income (52.1%) (neither satisfied nor dissatisfied: 36.5%; strongly dissatisfied/dissatisfied: 15.5%), and family health (50.5%) (neither

Table 1 Mann–Whitney U-test or Kruskal–Wallis test of the variables on the rank of life satisfaction

Variable	N (%)	Mean rank	*P*-value
Age (years)			0.001
18–29	318 (22.6)	754.90	
30–44	400 (28.5)	642.75	
45–59	417 (29.7)	725.90	
≥60	269 (19.2)	693.13	
Sex			0.362
Male	701 (49.9)	692.65	
Female	703 (50.1)	712.32	
Educational level			<0.001
Primary school	405 (28.8)	621.02	
Junior high school	308 (21.9)	682.66	
University and college (including Master's degree or above)	691 (49.2)	759.10	
Economic level[†]			0.001
Low	452 (32.2)	692.66	
Medium-to-low	637 (45.4)	675.00	
Medium-to-high	215 (15.3)	800.01	
High	100 (7.1)	712.49	
Health-related variables			
Body Mass Index			0.002
Low	81 (5.8)	782.33	
Medium-to-low	797 (56.8)	727.16	
Medium-to-high	458 (32.6)	658.13	
High	68 (4.8)	617.26	
Self-rated health[‡]			<0.001
Poor	130 (9.3)	460.72	
Neutral	303 (21.6)	581.97	
Good	971 (69.2)	772.48	
Blood pressure			0.123
Hypertension	250 (17.8)	659.51	
Normal	1129 (80.4)	710.28	
Hypotension	25 (1.8)	781.12	
Breslow's seven health practices			<0.001
No health	446 (31.8)	640.44	
Health	958 (68.2)	731.39	
General Health Questionnaire-12			<0.001
No health	684 (48.7)	631.59	
Health	720 (51.3)	769.86	
Medical-related variables			
Medical treatment within the last 6 months			<0.001
No	1080 (76.9)	724.52	
Yes	324 (23.1)	629.09	
Regular physical examination			<0.001
No	791 (56.3)	628.69	
Yes	613 (43.7)	797.75	
Participation in social events			<0.001
No	1145 (81.6)	678.15	
Yes	259 (18.4)	810.16	
Volunteer in activities			<0.001
No	852 (60.7)	652.07	
Yes	552 (39.3)	780.34	
Communication with the neighbors			<0.001
No communication	521 (37.1)	617.18	

Table 1 Continued

Variable	N (%)	Mean rank	*P*-value
Occasional communication	332 (23.6)	703.61	
Frequent communication	551 (39.2)	782.51	
Trust in the community			<0.001
Distrust	100 (7.1)	462.67	
Trust only a few people	721 (51.4)	660.62	
Trust	583 (41.5)	795.43	
Helped the neighbors in the past year			<0.001
No	427 (30.4)	642.92	
Yes	977 (69.6)	728.54	
Sought emotional support within the last 1 year			0.556
No	245 (17.5)	716.34	
Yes	1159 (82.5)	699.57	
Sought financial support within the last 1 year			0.982
No	434 (30.9)	702.15	
Yes	970 (69.1)	702.66	

† Economic level was categorized per participant's monthly income, which included property, business, pension, and income from other sources.
‡ Participants who rated their health as "Good" or "Very good" were categorized into the "Good" group and those who rated their health as "Poor" or "Very poor" were categorized into the "Poor" group.

satisfied nor dissatisfied: 37.5%; strongly dissatisfied/dissatisfied: 13.0%).

Factors related to life satisfaction

Based on the bivariate analyses, life satisfaction was significantly correlated with age, education, income, BMI, self-rated health, Breslow's health practices, medical treatment within the last 6 months, regular physical examinations, the GHQ-12 Scale, participation in social activities and voluntary activities, communication with neighbors, trust in the community, and helping neighbors in the past 1 year (Table 1).

In the ANOVA model, life satisfaction was significantly associated with self-rated health, regular physical examinations, the GHQ-12 Scale, trust in the community, communication with the neighbors, education, and age, accounting for 20.3% of the total variance (Table 3).

As shown in Table 4, a high level of life satisfaction was notable in the participants who reported good health, regular physical examinations, mental health, trust in the community, and frequent communication with neighbors.

Age and education both influence life satisfaction. Furthermore, these two factors demonstrated a significant interaction. In general, the participants with a high level of education reported high life satisfaction. However, the effect of education on life satisfaction varied across different age groups (Table 5). Among those with

Table 2 Frequency and percentage for each item of life satisfaction

	Strongly satisfied/satisfied		Neither satisfied nor dissatisfied		Strongly dissatisfied/dissatisfied	
Item	N	%	N	%	N	%
Current whole life	906	64.5	387	27.6	111	7.9
Income	673	47.9	513	36.5	218	15.5
Family relationships	1127	80.3	233	16.6	44	3.1
Relationships with friends/acquaintances	1067	76.0	309	22.0	28	2.0
Neighborhood relationships	812	57.8	544	38.7	48	3.4
Living environment	632	45.0	618	44.0	154	11.0
Personal health	783	55.8	426	30.3	195	13.9
Family health	695	49.5	527	37.5	182	13.0
Spare time	731	52.1	517	36.8	156	11.1
Housework share	790	56.3	531	37.8	83	5.9

Table 3 Multiway ANOVA on the rank of life satisfaction

Source of variation	*F*-ratio	*P*-value	Partial η^2
Self-rated health	40.810	<0.001	0.056
Regular physical examination	37.969	<0.001	0.027
General Health Questionnaire-12 Scale	27.552	<0.001	0.019
Trust in the community	23.487	<0.001	0.033
Communication with the neighbors	10.829	<0.001	0.015
Education	9.932	<0.001	0.014
Age	8.516	<0.001	0.013
Age × education	2.444	0.024	0.010

R^2 = 0.211; adjusted R^2 = 0.203.

a primary school education, the 30–40 year age group reported a lower level of life satisfaction than the ≥60 year age group, which reported the highest level of life satisfaction. However, among those who went to junior high school, the 18–29 year age group had a significantly lower level of life satisfaction than did the 45–59 year and ≥60 year age groups; the 45–59 year age group reported the highest level of life satisfaction. Among those with a university or higher level of education, the 30–40 year age group presented a significantly lower level of life satisfaction than did the 18–29 year and 45–59 year age groups. The 18–29 year and 45–59 year age groups displayed an insignificant difference in life satisfaction.

Table 6 shows a comparison of life satisfaction across all age groups and variations (self-rated health, trust in the community, GHQ-12 Scale, communication with the neighbors, and regular physical examinations). Age and self-rated health exhibited a significant difference. In addition to the 30–44 year age group, the other age groups thought that the life satisfaction of the neutral-health population was higher than that of the poor-health group. In addition to the 18–29 year age group, the other age groups thought that the life satisfaction of the good-health population was higher than that of the poor and neutral-health populations. In the "good" self-rated health item, the 30–44 year age group presented the lowest level of life satisfaction. Significant differences were noted with the other three groups (P = 0.003, P = 0.001, and P = 0.001, respectively). Meanwhile, the 30–44 year age group manifested lower life satisfaction in the "neutral" self-rated health item than did the 45–59 year and ≥60 year age groups and their differences were significant (P = 0.007 and P = 0.009, respectively). However, no significant difference was noted among all the age groups in the "poor"

Table 4 Predictors' estimated marginal mean and 95% confidence interval (CI) of the rank of life satisfaction

Variable	N	Estimated marginal mean	95% CI
Self-rated health			
Poor	130	460.72	393.65–527.78
Neutral	303	581.97	538.05–625.90
Good	971	772.48	747.94–797.02
Regular physical examination			
No	791	628.69	601.07–656.30
Yes	613	797.75	766.38–829.11
General Health Questionnaire-12			
No health	684	631.59	601.68–661.50
Health	720	769.87	740.71–799.02
Trust in the community			
Distrust	100	462.67	385.37–539.97
Trust only a few people	721	660.62	631.84–689.41
Trust	583	795.43	763.41–827.44
Communication with the neighbors			
No communication	521	617.18	582.94–651.41
Occasional communication	332	703.61	660.72–746.49
Frequent communication	551	782.51	749.22–815.80

Table 5 Estimated marginal mean and the 95% confidence interval of the rank of life satisfaction for age × education

Variable	Age (years)			
	18–29	30–44	45–59	≥60
Educational level				
Primary school	574.88 (292.83–856.92)	526.42 (438.29–614.54)	598.74 (538.09–659.40)	685.18 (621.72–748.65)
Junior high school	488.79 (314.70–662.87)	602.72 (529.65–675.79)	777.89 (712.19–843.59)	702.04 (582.26–821.83)
University and college (including Master's degree or above)	779.22 (732.30–826.15)	706.45 (653.21–759.68)	813.45 (751.10–875.81)	711.73 (594.36–829.10)

self-rated health item. A significant difference existed between age and trust in the community. Among the different age groups, those who trusted the community expressed a higher level of life satisfaction than those who distrusted the community or trusted only a few persons. The 45–59 year age group exhibited a higher level of life satisfaction in the distrust-in-the-community item than did the 30–44 year and ≥60 year age groups and their differences were significant ($P = 0.002$ and $P = 0.007$, respectively). Meanwhile, the 18–29 year age group showed a high level of life satisfaction in the trust-in-the community item and significantly differed from that of the 30–44 year age group ($P = 0.003$). Significant differences were noted between age and the GHQ-12 Scale. Regardless of age, the life satisfaction of the mentally healthy population was higher than that of unhealthy persons. The 18–29 year age group had a high level of life satisfaction in the mental health item and was significantly different from the 30–44 year and ≥60 year age groups ($P = 0.002$ and $P = 0.033$, respectively). Meanwhile, the 18–29 year age group presented a high level of life satisfaction in the mentally unhealthy item and showed a significant difference, compared with the other three groups ($P = 0.000$, $P = 0.041$, and $P = 0.005$, respectively), whereas the life satisfaction of the 45–59 year age group was higher than that of the 30–44 year age group ($P = 0.011$). Significant differences were noted between age and communication with the neighbors. Regardless of age, the life satisfaction of persons constantly communicating with neighbors was higher than those without or with occasional communication. The 18–29 year age group had a high level of life satisfaction in the item for frequently communicating with neighbors and significant differences were noted with the 30–44 year and ≥60 year age groups ($P = 0.002$ and $P = 0.009$, respectively). A significant difference was noted between age and regular physical examinations. Regardless of age, the life satisfaction of the population that undergoes regular physical examinations was higher than those in the no-regular-physical-examination group. The 30–44 year age group showed a low level of life satisfaction in the no-regular-physical-examination item, which was significantly different compared with the 18–29 year and 45–59 year age groups ($P = 0.003$ and $P = 0.032$, respectively). The 18–29 year age group presented the highest level of life satisfaction in the regular-physical-examination item and showed a significant difference, compared with the other three groups ($P = 0.000$, $P = 0.003$, and $P = 0.000$, respectively). Meanwhile, the 30–44 year age group had a lower level of life satisfaction than did the 45–59 year age group ($P = 0.040$).

DISCUSSION

This study explored health-related life satisfaction and its influencing factors in mainland China by using a large sample population. Previous studies showed that the life satisfaction of residents increased with age (Zhang, Yao, & Fang, 2009). However, in this study, different age groups demonstrated significant differences in life satisfaction. In relation to the educational level, approximately half of the participants received university and college education and significant differences were observed in the life satisfaction between those with less than junior high school and higher university and college educational levels. Consistent with previous research (Yuan *et al.*, 2009), studies of life satisfaction in Chinese rural residents showed low satisfaction among persons who were illiterate or semiilliterate and who had reached the junior high school educational level. Thus, for adult and old persons, the government can increase their educational attainment and provide them with more opportunities. Most of the persons in this study reported low economic levels and more than half of the study's population was dissatisfied with their family income. Although most of the participants were financially supported within the last 1 year, no difference was noted in the life satisfaction of those without

Table 6 Comparison of the variations in age by using the estimated marginal mean and 95% confidence interval of the rank of life satisfaction

	Age (years)			
	18–29	30–44	45–59	≥60
Self-rated health				
Poor (1)	528.50 (205.64–851.36)	385.08 (230.15–540.02)	453.71 (341.46–565.97)	490.07 (387.72–592.42)
Neutral (2)	535.50 (414.90–656.10)△△△	471.03 (374.68–567.47)	627.31 (555.97–698.65)△	626.22 (545.82–706.61)△
Good (3)	795.02 (746.80–843.24)	696.34 (653.51–739.17)§§§***	805.92 (761.73–850.12)§§§***	847.54 (775.48–919.60)§§§***
Trust in the community				
Distrust (1)	467.09 (320.21–613.97)	349.75 (215.13–484.37)	645.69 (505.57–785.81)	297.41 (56.01–538.81)
Trust only a few people (2)	706.17 (644.14–768.20)△△	626.14 (574.57–677.72)△△△	677.14 (624.95–729.34)	638.10 (569.70–706.50)△△
Trust (3)	873.02 (805.63–940.41)§§§ ***	729.39 (667.21–791.56)§§§*	795.83 (739.43–852.23)**	791.41 (718.62–864.19)§§§**
General Health Questionnaire-12				
No health (1)	716.39 (665.58–767.20)	523.92 (463.07–584.76)	635.78 (577.80–693.77)	589.64 (513.43–665.85)
Health (2)	888.88 (794.10–983.66)△△	719.52 (670.62–768.43)△△△	786.10 (738.71–833.49)△△△	768.09 (703.23–832.95)△△
Communication with the neighbors				
No communication(1)	622.83 (549.48–696.18)	607.18 (552.16–662.19)	648.50 (587.36–709.63)	553.31 (441.24–665.39)
Occasional communication (2)	759.53 (674.59–844.47)△	646.78 (564.80–728.75)	730.52 (655.88–805.15)	660.54 (549.51–771.57)
Frequent communication (3)	878.12 (806.33–949.91)§§§*	706.48 (630.88–782.02)§	795.20 (736.16–854.24)§§	749.73 (685.63–813.84)§§
Regular physical examinations				
No (1)	673.50 (622.83, 724.16)	562.27 (509.59, 614.94)	643.29 (592.77, 693.80)	633.28 (561.87, 704.70)
Yes (2)	967.67 (885.76–1049.57)△△△	733.50 (677.57–789.44)△△△	815.54 (762.92–868.16)△△△	750.79 (680.69–820.88)△

3 Compared with 2: *$P < 0.05$, **$P < 0.01$, and ***$P < 0.001$.
3 Compared with 1: §$P < 0.05$, §§$P < 0.01$, and §§§$P < 0.001$.
2 Compared with 1: △$P < 0.05$, △△$P < 0.01$, and △△△$P < 0.001$.

support. Many persons received emotional support within the last 1 year, but no difference existed in their life satisfaction, compared with those without emotional support. These findings suggested that economic and emotional support is insufficient in influencing the life satisfaction of persons. A Chinese social science survey showed that social support from different sources, such as spouses, parents and children, colleagues, neighbors, and friends, and two different types of social support, including emotional and economic support, significantly influenced adult life satisfaction (Xue & Zhao, 2013). Differences in these study results possibly arose from different measurement tools, parameters measured at different times, and other factors. In the future, efforts should aim at providing social support in order to improve the life satisfaction of residents.

Consistent with previous studies, this study revealed that self-rated health significantly affects life satisfaction (Yang, Wang, Fu, & Cui, 2013; Yuan *et al.*, 2009). As diseases significantly harm the physical and mental health of patients, these factors can significantly affect life satisfaction (Jie, Liu, & Long, 2017; Lim, Min, Thorpe, & Lee, 2016). In this study, a low level of life satisfaction was observed in the 30–44 year age group with a "good" and "neutral" self-rated health status. This observation is consistent with previous results on the life satisfaction of middle-aged Chinese empty nesters (Li & Wu, 2012). Middle-aged persons experienced more pressure, probably because of economic status, marriage, career, and interpersonal pressure. Such pressure caused them to overlook their health when completing their work, leading to poor health, physical and mental stress, further affecting their life satisfaction.

Trust in the community and the life satisfaction of Chinese persons were significantly related. Those persons who trusted the community showed a higher level of life satisfaction than those who distrusted the community or trusted only several individuals. This result was possibly caused by the capacity of the community to provide appropriate living care, medical services, spiritual comfort, recreational activities, and health knowledge to meet the daily needs of persons, thereby improving their life satisfaction. The 18–29 year age group trusted their community and showed the highest life satisfaction, which is a possible result of education and other factors.

Similar to previous studies, higher life satisfaction lowers the risk of mental health (D'Ambrosi *et al.*, 2016; Hannaford, Moore, & Macleod, 2017). A study from Japan showed the worst mental health status in middle-aged and young persons (Hori *et al.*, 2016). The present study discovered that the GHQ-12 Scale evaluation for health was significantly associated with life satisfaction. Regardless of good mental health, and compared with other age groups, the 18–29 year age group presented the highest level of life satisfaction, possibly because young groups with Chinese social and cultural backgrounds face less social and life stresses.

This study indicated that most of the population did not or only occasionally communicated with their neighbors, but those persons who communicated often with their neighbors featured a high level of life satisfaction. This observation was consistent with the findings in Chengdu, China (Deng, Yang, & Zhu, 2016). In recent years, most of the Chinese urban population, particularly young persons, live in apartment-style housing and do not communicate with each other; these persons must strengthen the neighborhood communication in order to meet their emotional needs. Communicating with the neighbors also can ease loneliness in the elderly who are living alone and away from their children.

Regular physical examinations played a dominant role in studying life satisfaction. This study showed a higher level of life satisfaction among those who had regular physical examinations than those with irregular check-ups. A survey of female patients with breast cancer in China showed that life satisfaction was closely related to a healthy lifestyle, including an understanding of relevant knowledge and undergoing regular physical examinations (Bai *et al.*, 2016). This study showed that the 30–44 year age group exhibited a low level of life satisfaction if they were in the irregular-physical-examination group and this result could be related to poor physical and mental health and the social stress of middle-aged persons. Among the regular-physical-examination group, the life satisfaction level of the 18–29 year age group was the highest and this observation is possibly related to a good physical condition and less pressure on young persons. Regular physical examinations can help in the early detection, diagnosis, and treatment of diseases, thus improving health and life satisfaction. In the irregular-physical-examination group, interventions included carrying out early health education and enhancing physical awareness.

Consistent with previous research, this study revealed that education is a predominant factor of life satisfaction (Wu, 2009). Additionally, an in-depth analysis on the role of educational attainment in different age groups was necessary, as an interaction effect on life satisfaction was notable between education and age, and this result was previously unreported. Some studies

revealed that older persons who were highly educated possibly reported a higher level of life satisfaction as the improvement of education increased their self-care awareness (Wu, 2009). However, this study showed that in primary school education, the ≥60 year age group reported the highest level of life satisfaction, whereas the 30–44 year age group reported the lowest level of life satisfaction. Given the unique historical reasons and cultural background, most persons who were ≥60 years only received a primary school education and some did not even go to school. As for middle-aged persons, the level of primary education was equivalent to illiteracy or semiilliteracy in current society and this condition negatively affected their work and life, leading to low life satisfaction. Among those who went to junior high school and university or who reached a higher educational level, the 45–59 year age group had the highest level of life satisfaction. These results indicated that the 45–59 year age group, who were highly educated, possibly experienced a more stable social status and good economic level, thus resulting in high satisfaction in life.

China is a developing country with wide regional and uneven economic development. In the future, the country needs to adapt to local conditions and to take practical measures that ensure the physical and mental health of its persons to improve their life satisfaction. Simultaneously, communities should increase publicity, improve health awareness, and promote regular physical examinations. Communities also can organize a variety of activities to enhance neighborhood communication and to promote an improvement of life satisfaction.

The limitations of this study should be considered. First, this study was a cross-sectional survey. Therefore, only the relationships at specific time points were evaluated. Information was possibly subject to error. Simultaneously, the influencing factors and life satisfaction did not show causal relationships. In addition, the sample comes from the economically deprived and agricultural city of Changchun and it significantly differs from those of the coastal cities of mainland China. Thus, the findings may not be used to generalize the conditions of other developed countries. Finally, self-reported data could reflect socially desirable responses and recall bias.

CONCLUSION

The study used a large sample size and was one of the few studies that focused on the health-related life satisfaction and its influencing factors in mainland China. The results showed that physical, mental, and social health were important to the life satisfaction of Chinese persons. The key factors for better life satisfaction included age, good self-rated health, trust in the community, satisfactory mental health, communication with the neighbors, regular physical examinations, and a high educational level. Among these variables, the factors yielded different results in different age groups. By understanding the factors that influence life satisfaction in mainland China, health and social care providers and policy-makers can develop strategies to improve life satisfaction. This study suggests the need for interventions and policy development that address physical, mental, and social health.

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DISCLOSURE

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

W. S. searched and reviewed the literature, distributed the questionnaires for research, analyzed the data, and wrote the manuscript; Y. J., Z. M., and S. Y. assisted in finding documents, issuing questionnaires, analyzing data, and examining the manuscript; L. Y., X. Z, and L. H. helped with issuing the questionnaires; S. J. critically reviewed the manuscript and supervised the whole study process. All the authors read and approved the final manuscript.

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