

A longitudinal study of the changes of economic status, health condition and social supports on the life satisfaction of the elderly

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Abstract

The population aged 65 and over was 11.5 % of the total population in 2013 and 10.75% in 2010 in Taiwan. The increasing number of the seniors is obviously observed. For the coming of aging society, the issues of life satisfaction for the elderly are very important. Elderly people need more and more social supports while losing income and health. Chen and Lin (2010) explored the living arrangement and life satisfaction of the elderly aged 65 and over with cross section data without tracing the elderly in different stages. This study employs the hierarchical multinomial logit choice models and the panel data of "Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan" to analyze the changes of economic status, health condition, family characters and social supports on the changes of life satisfaction. This study would like to explore the key variables influencing the changes of life satisfaction. This study suggests that the changes of economic status, health condition, numbers of family members living together and emotional social supports influence the changes of their life satisfaction. The results of this study provide some useful suggestions on the welfare policy for the elderly in our aging society.

Key words: economic status, health condition, social support, life satisfaction, longitudinal study

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1. Introduction

1.1 Background

According to the standard set by World Health Organization (WHO), an aging country means that the elderly account for 7 percent of the country's total population. By this definition, Taiwan has become an aging country since September, 1993. The elderly population has rapidly increased. In 2010, the population aged 65 and over was 10.75 %. It soon reached 11.5 % of the total population in 2013. According to the statistics compiled by the Ministry of the Interior in 2009, life satisfaction of the elderly decreased with ages; however, life dissatisfaction was not related to the increases of age (Table 1). While aging, the elderly may encounter the problems such as less income, weaker physical conditions, declining health, fewer contacts with the society. These are potential factors influencing the elderly's life satisfaction. The current study intends to explore the key variables influencing the changes of life satisfaction among the elderly, which is helpful in recognizing the factors of successful aging.

Table 1: Life satisfaction of the elderly aged 65 and over (%)

Ages	Total	Satisfied			Not Satisfied			No ideas or No answers
		Subtotal	Very satisfied	Satisfied	Subtotal	Not very satisfied	Very unsatisfied	
65-69	100.00	78.08	24.58	53.50	13.66	9.92	3.74	8.26
70-74	100.00	77.15	25.89	51.25	10.35	7.06	3.30	12.50
75-79	100.00	76.07	24.13	51.94	10.95	8.55	2.40	12.97
80 or over	100.00	82.23	31.66	50.56	9.91	7.02	2.89	7.86

Source: Report of the senior citizen condition survey, Ministry of Interior, 2009

According to the survey of the elderly conducted by Ministry of Interior of Taiwan in 2009, the issues that the elderly aged 65 and over worried most was health, followed by financial sources and living arrangement. However, the worries of these issues decreased with ages while the concern of healthcare in illness increased with ages. Therefore, it is an issue worth of great attention whether the problems of health, finance and healthcare could bother the elderly and further affect their life satisfaction.

Table 2: Concerns of the elderly aged 65 and over (%)

Ages	Health	Healthcare in illness	Health of the spouse	Healthcare of the spouse	Financial source	Safety	Interpersonal Safety	Living arrangement
65-69	39.11	16.46	6.44	2.15	21.57	1.71	0.13	1.29
70-74	35.45	16.07	4.01	1.04	17.77	0.89	0.31	0.34
75-79	30.27	15.76	3.25	2.16	12.89	1.54	0.35	0.81
80 and over	30.61	17.37	3.73	0.86	12.03	1.09	0.26	0.55

Source: Report of the senior citizen condition survey, Ministry of Interior, 2009

People aged 65 and over may face the problems of losing job income, and are becoming more dependent on the pension, assets and children’s support. From the asset maintenance of the elderly in Table 3, the rate of the maintenance of real estate decreased with ages. The elderly probably may leave their property to the children while aging. The current study intends to explore whether the declining economic condition while aging would affect life satisfaction of the elderly.

Table 3: The asset reserve of the elderly aged 65 and over (%)

Age	Total	Types of asset reserve						No maintenance	No ideas or no answers
		Housing, land and other real estate	Savings	Investment and property	Savings & insurance	Misc.	No ideas or no answers		
65-69	100.00	36.43	41.47	12.30	15.08	0.15	1.22	41.25	3.19
70-74	100.00	32.21	37.65	7.00	8.52	0.60	0.80	45.49	3.92
75-79	100.00	25.56	36.61	7.62	5.55	0.80	2.09	48.57	3.78
80 and over	100.00	23.62	44.06	5.03	3.70	0.61	2.11	41.19	6.37

Source: Report of the senior citizen condition survey, Ministry of Interior, 2009

Consequently, in a rapidly aging society with a sharp decline in birthrates, it is an important issue to age successfully. It is essential that the elderly’s financial sources are secured so as to maintain their fundamental ability to consume after retirement. Meanwhile, it is also important that the elderly can overcome the problems of declining health and take care of themselves. When the elderly are satisfied with the living arrangement and keep the harmonious relationship with their family, they are more likely to live in dignity. In other words, life satisfaction of the elderly is an important factor of aging successfully in an aging society. Given that the elderly depend on family more than the young people do, they receive support from children and spouse through living arrangement. Investigating the living arrangement and life satisfaction of the elderly aged 65 and over, Chen and Lin (2010) did not trace and compare their requirements and living quality at different age stages. The current study therefore would like to further explore the changes of economic status, health condition and social supports on the life satisfaction of the elderly. Tracing the same target at different age stages, this current study investigates the influence of the changes of economic status, health condition, decision- making, living arrangement and family support on life satisfaction of the elderly.

Few studies have explored the influence of economic status and family support on life satisfaction of the elderly. Exploring the relationship between the elderly's living arrangement and intergenerational resources transfer, Chen (2007) found that parent-child living arrangement and money transfer were closely related in Taiwan. Parents who downwardly financed their children tended to motivate their children to live closer while the reverse was not true for children upwardly financed their parents. He suggested that downward money transfer was to purchase social care from the children and upward money transfer privacy of living. This phenomenon suggests that the between money transfer and living arrangement within the family is simultaneously decided. However, it remains unclear whether the elderly with more property are more likely to receive care and concern from their children, and whether the elderly's wealth and their children's filial duty and feedback are positively related to their life satisfaction. It would thus be of interest to learn the changes of the elderly's economic status and their children's support on life satisfaction of the elderly. This study is a longitudinal research of the changes of economic status, health condition and social supports on the life satisfaction of the elderly. While little attentions have been paid on these fields, the result of the current study would contribute to related research.

2. Literature Review

2.1 Life satisfaction

Life satisfaction is one of the key factors of successful aging (Palmore, 2002). It is multi-dimensional incorporating the individual perception of satisfaction of different aspects of life and subjectively self- evaluation of their various life abilities. Therefore, most of the previous research investigated life satisfaction by conducting quantitative survey with the indices of health, self-owned residence, and family among others. However, researchers such as Neugarten (1967) contended that the measurement of life satisfaction should go beyond accomplishment and ability and include individual's own perception of life satisfaction and happiness. Therefore, this study discusses successful aging in terms of the elderly's perceived happiness and satisfaction from their life experiences.

Regarding the measurement of life satisfaction, Larson (1978) argued that self-rated satisfaction provided limited information which could not reveal enough life experiences of the elderly. Therefore, Wood and Johnson (1987) proposed to collect quantitative and qualitative data to investigate the elderly's life satisfaction of health, self-owned housing, spouse, accomplishment and friends. However, other

researchers contended that based on the elderly's physical and mental conditions, single items of surveys were efficient tools to measure the elderly's finance, physical and mental health, life satisfaction and happiness. The quantitative items were simple, practical, feasible and easy to measure especially for those with lower educational background and physical illness (Mangen & Peterson, 1982; Cutler; 1982). The longitude data in the current study were the questionnaire with scales to check life satisfaction of the elderly. The question items were easy and direct to answer.

Lawton et al. (1999) measured the elderly's happiness with their subjective perception and the objective indices. Their study concluded that community involvement of the elderly had positive effect on their mental health. The engagement of social activities, quality of time and friend would bring positive effect on the elderly's mental health. Their research employed the objective indices including health, finance, social network (numbers of friends and family and the frequencies of their contact), social support and individual characteristics to measure life quality. However, their study did not include the indices such as relationship and interaction with the family. The current study proposes that it is a tradition to show filial obedience to the elderly and to support them in the Chinese society. Therefore, this current study incorporates the factors of family's emotional support and intends to explore its influence on life satisfaction of the elderly following Lawton et al. (1999).

2.2 Factors influencing life satisfaction of the elderly

Life satisfaction is one of the subjective indexes to measure the elderly's life quality. Factors such as gender, marital status, educational background, personality, economic status, health conditions, leisure activities and social support are liable to influence life satisfaction of the elderly (Liu, 1999; Huang, 1999; Markides & Martin, 1979; Liang, 1982). The elderly feel more satisfied with their life when they perceive healthier, are more independent in daily life, participate in more social activities, and receive more support from family and friends (Huang, 1992; Zhong, 1988; Thomas, 1988; Markides & Martin, 1979).

Wu (2010) categorized four types of factors influencing life satisfaction of the elderly: health condition (the ability to perform activities in daily living), economic status, social support and exchange, and leisure activities and community involvement. Among them, social support includes: (1) instrumental support such as daily care, finance and other concrete supports, (2) emotional and esteem support such as other people's concern and care to evaluate the self-value and raise their esteem, (3) social companionship support such as leisure activities with companion to transfer their stress; (4) informational support such as providing information, advice and guidelines. According to the previous studies, the more instrumental and

emotional support the elderly received, the more satisfied with their life the elderly perceived (Chou, Yang & Chung, 1998).

The influence of intergeneration financial support on life satisfaction of the elderly remains unclear. Yeh et al. (2004) found that lower life satisfaction among the elderly who had chronic diseases (poor health conditions) and were supported financially by their family. Chen and Lin (2010) also indicated a negative correlation between the elderly's life satisfaction and the intergenerational mutual benefits in finance and daily care.

Concluding the above researches, the elderly have a higher sense of achievement when they contribute more to their family, and thus are more likely to feel satisfied with their life. On the other hand, the elderly feel less satisfied with their life when they are in poor health condition and do not live with their children even though their children supported them financially. This verifies the hypothesis of the parents' altruism to their children implying that mutual family supports between the elderly and the children do not necessarily guarantee life satisfaction of the elderly. It is worthy to investigate whether the elderly take care of their grandchildren and finance their children to purchase housing can contribute to have higher life satisfaction. Another issue is whether the elderly receive support and feedback from their children can contribute to have higher life satisfaction. The current study intends to explore the influences of these factors.

Life satisfaction is one of the important indices of successful aging. It is therefore important to realize the elderly's perception of life satisfaction. In the old ages, intergeneration relationship and life satisfaction are highly correlated. Research has indicated that family is what the elderly concern the most, followed by their own well-being (Nolan et al., 2001). Therefore, family support is an important factor of the elderly's life satisfaction. In the survey of the expectation and practice of family care, Liu (2002) reported that emotional connection and companionship are the most important when taking care of the elderly. Children's affections and emotional support for their parents increases their aging parents' life satisfaction (Lang & Schutze, 2002). However, the above studies are cross sectional research focusing on analyzing the influence of the emotional support on the life satisfaction of the elderly.

The study of Lu and Chen (2002) revealed that the elderly's economic status influenced the transitions of their family roles. They suggested that the elderly with better economic status had positive attitudes toward their family roles owing to their assumed ability to help the youth. Focusing on the Taiwanese elderly, Hsu's study (2010) found that the elderly's satisfaction with their economic status was significantly correlated with their life satisfaction. Investigating life satisfaction and

assets of the Korean elderly aged 50 and over, Han and Hong (2011) found that assets and debts were significantly associated with life satisfaction, consistent with assets effect theory. The above previous research findings suggest that the elderly's life satisfaction can be maintained or promoted through economic security. Employing longitudinal data, the current study would further investigate the influence of the changes of the elderly's economic status and the family's support on their life satisfaction. Moreover, the study explores the potential influence of the interaction of the declining economic status and family's emotional support on life satisfaction. The analysis expects to discover the key factors influencing the life satisfaction of the elderly.

According to Zhan (1992), the primary concern of successful aging relies on good physical condition, which is the objective index of life quality. To better understand the elderly's actual health condition, it is essential to evaluate their physical health subjectively and objectively. Tang (1999) indicated that compared with the objective facts of health condition, the elderly's subjective perception of health had more influence on their life satisfaction and life quality and could better predict death rate. Lien et al. (2008) pointed out that there were significantly positive correlation among personality hardiness, social support, and life satisfaction. The elderly with poorer health condition, lower social support and government subsidiary had lower life satisfaction. They also found that the elderly with lower level of personality hardiness and more social support had higher life satisfaction than those with higher level of personality hardiness and less social support. Therefore, although studies have demonstrated that health condition and life satisfaction are correlated, subjective perceptions of health condition can have more influence on life satisfaction than objective fact of poor health condition. Moreover, the elderly with high level of social support may perceive themselves to have higher life satisfaction positively.

Huang (2008) explored the impacts of different living arrangement and social support on life satisfaction of the elderly aged 57 and over. Her study revealed that the elderly living with family had higher life satisfaction than those living alone. Emotional social support increases more life satisfaction than instrumental social support can do. Females had a better life satisfaction who had higher education, reported better self-rated health, showed normal function of instrumental activities of daily life, felt less stressful, having no depression, were satisfied with living environment or economic status, and attended leisure activities. However, her study did not explore how the changes of these variables could affect their life satisfaction.

A lot of research of social support for the elderly has tended to focus on their living arrangement, the frequency of their family's and friends' visits, and their

financial support (Lu, 2000; Liu, 1999; Chen, 1996; Chen, 2001; Siebert et al. 1999; Thompson & Krause, 1998). Targeting at the Chinese aged 60 and over, Krause and Liang (1993) found that the financial and diet support from friends and family would have positive impacts on emotional support when the elderly faced financial difficulties, which would promote their subjective perception of well-being. In the research of social network and social support of the rural elderly, Cheng (1997) found that the elderly with more children received more social support. Men tended to have more financial support while women tended to have more emotional support. Barrett (1999) indicated that emotional social support (including interaction, positive support and trust) would increase life satisfaction among the elderly.

2.3 A longitudinal study of living arrangement and life satisfaction

Investigating the factors influencing the elderly's living arrangement with panel data, Chang and Chang (2010) found that deteriorating health and losing of spouse were not the significant variables influencing the changes of living arrangement. On the other hand, changes of the economic decision-making power played the vital role of the elderly's living arrangement. Family values have had less impact on the elderly's living arrangement while the exchange theory has had more influence. Huang (2010) compared and analyzed the impacts of the important life events (such as getting married and having children) on the housing tenure choice of different generations. Her studies revealed that the impact of the important life events on the housing tenure choice has lessened. More and more young people tend to live in the place owned by parents. Resources and support from family have important impacts on the housing tenure choice for young generations.

Using the panel data sets, Han and Hong (2011) examined the association of assets and life satisfaction among the Korean older adults aged 50 and over. Their study found that assets and debts were significantly correlated with life satisfaction changes, consistent with the asset effect theory. They suggested that older adults' life satisfaction could be maintained or promoted through economic security. Financial planning programs combined with asset accumulation might assist older adults to achieve economic security and life satisfaction.

The current study intends to further investigate the influence of family and social support on the changes of life satisfaction of the elderly. Different from most of the other research focusing on cross-section data, the current study traced the influence of the changes of economic status, the right of important economic decision-making, self-rated health condition, living arrangement, assets, housing tenure decision, and family support on the changes of life satisfaction of the same group of people during the 4-year period. Since little research has been conducted

comprehensively in these areas. The current study expects to clarify the changes of life satisfaction of the elderly with dynamic variables and thereby provide suggestions to successful aging for relevant policy making in order to promote life quality of the elderly.

3. The Data and Descriptive Statistics

Using “Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan” (the fifth and sixth wave) conducted by the Bureau of Health Promotion in Taiwan in 2003 and 2007, the current study established an analytical model to investigate the changes of the economic status, health condition, social support and life satisfaction of the elderly in Taiwan. Hypotheses were proposed and tested.

The Department of Health Promotion in Taiwan, formerly the Institute of Family Planning, started investigating the health and living status of the middle aged and elderly in Taiwan in 1987. The baseline survey in the non-aboriginal townships citizens aged 60 and over was completed in 1989. Follow-up surveys have been conducted every three to four years since then. Since 1996, the targeted population has included the people aged 50 and over. The sixth wave of survey was completed in 2007. The current study employed the data of the fifth and the sixth wave of surveys.

The items of the survey include: the family structures, living arrangements, social support, occupation, socioeconomic status, leisure activity, retirement, life attitudes, healthy condition, hygiene habits, and awareness and utilization of elder welfare provided by the government. Data was collected with face-to-face interview questionnaires. The target population was the household registration of residents aged 60 and over in non-aboriginal townships in 1988. A multiple-stage stratified random sampling method was used. Samples of different age cohorts of 2003 and 2007 are shown in Table 4.

Table 4: Samples of different age cohorts in 2003 and 2007

Year	Age Cohort	Code	Age	Completed interviews	Total	Uncompleted Interviews	Completed percentage
2003	I.	B	74 and over	1,743	2,133	173	91.00%
	II.	A	57-73	2,035	253	174	92.10%
	III.	C	50-56	1,599	4	423	79.10%
2007	I.	B	78 and over	1,268	2,661	120	91.40%
	II.	A	61-77	1,864	410	188	90.80%
	III.	C	54-60	1,402	38	159	89.80%

Note: The completed percentage does not include the deceased interviewees.

Source: “Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan (the fifth

wave in 2003 and the sixth wave in 2007) conducted by the Bureau of Health Promotion in Taiwan

The current study adopts the following sections of the surveys conducted in 2003 (the fifth wave) and 2007 (the sixth wave): (1) background information, marital status and living environments, (2) household structure, living arrangement, and relative and social contacts, (3) health status, health care utilization and health behavior, (4) social support and exchange, (5) working status, retirement planning, (6) leisure activities and social participation, (7) emotions, (8) economic status and so on. These two surveys revealed the changes of life satisfaction, economic status, health condition and social support of the elderly. The information is suitable for the current study to investigate the changes of life satisfaction of the elderly. Among them, information such as “the number of persons receiving pension, retirement fund, insurance payment, compensation”, “the number of persons receiving social welfare, government subsidy, subsidy for low-income, subsidy for the elderly”, “the number of people with earnings from work”, and “satisfaction of economic condition”, is suitable for exploring the economic status of the elderly. Information such as the “elderly’s self-evaluation of health” is suitable for measuring the elderly’s health condition. Information such as “with spouse”, “the number of children living together”, “the frequency of visits from the children not living together”, “phone contacts with the children not living together”, “family’s willingness to listen to the elderly”, “family’s care”, “dependence on family”, “ability to take care the grandchildren”, “financial support from children and relatives”, is suitable for analyzing the social support of the elderly. The survey provides sufficient and valuable data for analyzing the issues proposed in this study.

The total subjects of the “2003 Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan -the 5th Wave of Survey” were 5,377 and the subjects in 2007 were 4,537. Targeting at the subjects aged 65 and over and excluding those living in the retirement homes, the current study trace those who are in the target group and survive in both surveys with deleting the missing ones, the sample subjects in the current study were 1,970. The current study used descriptive statistics to analyze the basic information of the sample.

Table 5. Descriptive statistics of the economic status and health conditions of the elderly

Variable		2003 (%)	2007 (%)
With earnings from work	None of the couples	86.4	89.4

	One of the couples	11.9	9.1
	Both of the couples	1.7	1.4
With pension or retirement fund, insurance payment, compensation	None of the couples	78.9	9.5
	One of the couples	20.3	54.6
	Both of the couples	0.9	35.9
With social welfare, government subsidy, subsidy for low-income families, subsidy for the elderly	None of the couples	23.5	64.4
	One of the couples	44.4	21.3
	Both of the couples	32.1	14.3
Satisfaction of current economic status	Very unsatisfied	5.7	4.8
	Unsatisfied	17.5	15.7
	Average	34.5	37.2
	Satisfied	37.2	37.3
	Very satisfied	5.2	5.0
Self-rated health condition	Very bad	5.8	7.4
	Not very bad	27.6	30.6
	Average	32.7	36.8
	Good	24.3	19.2
	Very good	9.6	6.0

From Table 5, the percentage of the couples without work earnings increased from 86.4% in 2003 to 89.4% in 2007. However, the percentage of one of the couples and both of the couples having work earnings decreased.

In 2003, 78.9% of the couples did not receive any pension or retirement fund, insurance payment, or compensation; however, in 2007, over 91% of one or both of the couples received them. While aging, the elderly couples receiving pension or retirement fund increased. The percentage of the elderly's satisfaction of economic status remained about the same from 2003 to 2007; however, the percentage of their dissatisfaction with economic status dropped a little from 2003 to 2007.

While aging, there was a little decrease in the percentage of elderly's self-rated health condition as good. The percentage of self-rated health condition as bad and very bad increased from 33.4% in 2003 to 38% in 2007. Meanwhile, the percentage of self-rated health condition as good and very good decreased from 33.9% in 2003 to 25.2% in 2007. The statistics revealed obvious differences in the economic status and health condition among the same group of the elderly during the 4-year period.

Table 6 Description statistics of social support of the elderly

Variable	2003	2007
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		(%)	(%)
Marital Status	Have no spouse	38.4	45.4
	Have a spouse	61.6	54.6
Number of children living together		1.15	1.13
Frequency of children's visits	Every day	11.87	8.7
	Every few days	11.00	9.5
	Every week	16.86	16.2
	Every month	22.76	22.5
	Every few months	26.74	29.9
	Every year	6.87	9.0
	Every few years or not visited for a while	3.89	4.2
Frequency of phone contacts with children	Every day	4.54	1.4
	Every few days	21.92	8.6
	Every week	23.78	10.3
	Every month	19.05	9.8
	Every few months	10.71	33.1
	Every year	0.83	28.0
	Every few years or not contacted for a while	19.18	8.7
The family are willing to listen to the elderly's worries and problems	Not at all	3.1	1.9
	Very little	16.3	7.6
	Some	9.8	16.0
	Quite a lot	44.7	50.0
	A great deal	26.1	24.5
The family care about the elderly.	Not at all	0.5	0.6
	Very little	4.3	2.5
	Some	7.8	10.3
	Quite a lot	45.8	47.2
	A great deal	41.6	39.4
The elderly are dependent on family in illness	Not at all	1.4	1.2
	Very little	6.5	4.3
	Some	6.2	7.7
	Quite a lot	43.2	46.8
	A great deal	42.8	40.0
The necessity to take care of the grandchildren	Yes	99.2	88.8
	No	0.8	11.2

Financial support from children or other relatives	For none of the couples	33.6	29.2
	For one of the couples	38.2	37.7
	For both of the couples	28.2	33.1

In summary, the panel data of 2003 and 2007 revealed that more elderly took care of grandchildren and received children's financial support while aging. This finding indicates that more elderly were dependent on family support over time.

From Table 6, the percentage of the elderly with a spouse decreased from 61.6% in 2003 to 54.6% in 2007. The percentage of the highly frequent visits from children not living together decreased from 22.87% in 2003 to 18.2% in 2007, while there was an increase for those visiting every year or every few years, from 33.61% in 2003 to 38.9% in 2007. Phone contacts with children not living together decreased from 50.42% in 2003 to 20.3% in 2007. In other words, children's phone contacts and visits with the elderly decreased over time. The percentage of family care and concern decreased from 87.4% in 2003 to 86.6% in 2007. In both years, approximately 86% of the elderly thought they had children to count on when they were sick. Because the average age of the elderly in the sample subjects in our study were 78, most of them did not take care of their grandchildren. However, the percentage of taking care of grandchildren showed dramatic increase from 0.8% in 2003 to 11.2% in 2007. Meanwhile, the percentage of the elderly receiving financial support from children and relatives increased from 28.2 % in 2003 to 33.1% in 2007.

Table 7 Comparison of the attributes of the elderly between 2003 and 2007

Variable	2003 (%)	2007 (%)	z-score ¹	Significance
The elderly had a spouse.	61.6%	54.6%	-9.71	*
The elderly were satisfied with the economic status.	42.4%	42.3%	2.34	
The elderly were in good health condition.	33.9%	25.2%	-3.59	*
Family was willing to listen.	70.8%	74.5%	8.54	*
Family cared about the elderly.	87.4%	86.6%	2.53	*
The elderly had family to count on in illness.	86.0%	86.8%	3.21	*

¹ Z Score: Comparison of the differences between the two percentages. The formula follows: $Z = (p1 - p2) / \sqrt{((a + d) / N)}$ where P1 is the percentage of 2007 and p2 is the percentage of 2003; a and d are the observations which changes between those two periods. N is the sample size.

The elderly took care of the grandchildren.	0.8%	11.2%	13.70	*
There was financial support from the children.	66.4%	70.8%	3.73	*

Table 7 reveals that all the attributes shows significantly different in 2003 and in 2007 except satisfaction with economic status. Specifically, there are significant differences in the changes of the family economic support, health condition and social support of the elderly during the 4-year period.

4.1 Choice model of the changes of the satisfaction of residence of the elderly

Employing the panel data of the same group of the elderly in 2007 and 2003, the study compared the changes of their life satisfaction during the 4-year period. The study employs multinomial logit choice models to analyze the changes of satisfaction. The changes of life satisfaction can be categorized into 4 types: satisfied in both years, dissatisfied in both years, satisfied to dissatisfied, dissatisfied to satisfied.

In the multinomial logit choice models, the choice set includes “no changes of satisfaction” (satisfied and dissatisfied in both years), “changes from satisfied to dissatisfied”, “changes from dissatisfied to satisfied”. The sum of the probability of the three alternatives is 1. The probability of one alternative follows:

$$p_{ij}(j = m) = \frac{\exp Z_{im}}{\sum_{j=1}^3 \exp Z_{ij}} \dots \dots \dots \text{Formula (1)}$$

$$Z_{im} = \beta_{m1}X_{i1} + \beta_{m2}X_{i2} + \beta_{m3}X_{i3} \dots \dots \dots \text{Formula (2)}$$

We set “no changes of satisfaction” for the reference group and the coefficient β_{3r} are set to 0; then we compare other two alternatives with it. Three alternatives in the choice model can be generalized 2 probability equations. They are as follows.

$$\log \frac{P_{i1}}{P_{i3}} = \sum_{r=1}^R (\beta_{1r} - \beta_{3r})X_{ir} = \sum_{r=1}^R \beta_{1r} X_{ir} \dots \text{Formula (3)}$$

$$\log \frac{P_{i2}}{P_{i3}} = \sum_{r=1}^R (\beta_{2r} - \beta_{3r})X_{ir} = \sum_{r=1}^R \beta_{2r} X_{ir} \dots \text{Formula (4)}$$

Where, $\frac{p_{i1}}{p_{i3}}$ is the probability odd of the “changes from dissatisfied to satisfied” and $\frac{p_{i2}}{p_{i3}}$ is the probability odd of the “changes from satisfied to dissatisfied” (compared with “satisfied in 2 years”). Most of the explanatory variables are the changes of demographic attributes of individual elderly. β is the estimated coefficient for the explanatory variable.

X_i is the variable influencing the changes of life satisfaction. Employing the variables of the changes of health condition, economic status and social support of the elderly in 2003 and 2007, this study used the multinomial logit choice models to analyze the changes of life satisfaction of the elderly. With the maximum likelihood method, this study estimated the model fit and the significance of coefficients in Multi-nominal logit Model.

4.2 Explanatory Variables

4.2.1 Changes of economic status

This study expects that there would be a significant influence on the changes of life satisfaction when the elderly’s economic status changes. Therefore, “the changes of numbers of persons with earnings from work” and “the changes of satisfaction level with economic status” were assigned as the explanatory variable in this study.

4.2.2 Changes of self-rated health condition

It has been suggested that the health condition of the elderly is one of the important factors influencing life satisfaction of the elderly (Wood & Johnson, 1989; Lawton et al., 1999). The better the elderly perceive their health is, the more satisfied they feel with their life (Markides & Martin, 1979; Chung, 1988; Thomas, 1988; Huang, 1992). Tang (1999) indicated that compared with the objective health condition, the elderly’s subjective perception of health condition had more influence on their life satisfaction and life quality. Chen (2001) pointed out that declining health had negative influence on the elderly’s life satisfaction. Cheng (2007) also showed that the relationships of perceived health status and health-promoting lifestyles were significantly positive. Overall, the elderly perceiving declining health status have lower life satisfaction. This study assigns “better self-rated health status” as the explanatory variable in the model and expects that it has positive impact on the changes of the elderly’s life satisfaction.

4.2.3 Changes of social support

A lot of research about living arrangement has revealed that the elderly living with a spouse or children have a higher sense of well-being than those staying with their children alternately or living at the retirement homes (Liu, 2000; Tang, 2003; Tsai, 2004). Chen (2000) indicated that the elderly living with children had better life satisfaction. Moreover, living arrangement also shows positive impact on life satisfaction (Chen, 2001; Yeah, Shih, Chuang & Tsai, 2004; Chen & Lin, 2010). The current study intends to further explore whether the change of the number of the children the elderly living with has a significant influence on the changes of life satisfaction of the elderly.

The elderly receiving more support are more satisfied with life (Chen, 1996). When the elderly have more emotional support, they feel more satisfied with their life (Chou, 1998). Barrett (1999) verified that emotional social support (interaction, positive support, trust) would raise life satisfaction of the elderly. Chen (2001) found that the correlation of marital status and the life satisfaction of the elderly were positive and statistically significant. Chen and Lin (2010) reported that intergenerational financial supports were positively correlated with the life satisfaction of the elderly. Overall, these researches verify that the change of the elderly's family relationship has obvious impact on life satisfaction of the elderly. Therefore, this study expects that the elderly would be more satisfied with life when there is more emotional social support. When the elderly has a spouse, more children living with them, more visits and phone contacts with their children not living together, more dependent on family in illness, are able to take care of the grandchildren, and when the family are more willing to listen to the elderly's problems and worries, they are more satisfied with life. Meanwhile, instrumental social support such as more financial support from children or relatives can also have positive impact on life satisfaction of the elderly.

The explanatory variables with description and expectation are listed in Table 8.

Table 8: Explanatory variables of life satisfaction of the elderly in Multi-nominal logit Model

Variable		Definition	Expectation
Dependent Variable	Changes of life satisfaction	0 : No change 1 : Change to be more satisfied -1 : Change to be dissatisfied	+
Economic status	Changes of the number of people with earnings from work	0 : No change 1 : more people -1 : less people	+
	Changes of satisfaction with economic status	0 : No change 1~4 : Change to be more	+

		satisfied -1~-4: Change to be dissatisfied	
Health condition	Changes of self-rated health condition	0 : No change 1 : Change to better condition -1 : Change worse condition	+
Emotional social support	Change to have a spouse	1: Change to have a spouse	+
	Change to have no spouse	1: Change to have no spouse	-
	No changes in marital status	0 (default group)	
	Changes of the number of children living together	Continuous variable	+
	Family more willing to listen to their problems and worries	1: More	+
	Family less willing to listen to their problems and worries	1: Less	-
	No changes in family's willingness to listen to their problems and worries	0 (default group)	
	More family's concerns and care	1: More	+
	Less family's concerns and care	1: Less	-
	No changes in family's concerns and care	0 (default group)	
	More dependency on family in illness	1: More	+
	Less dependency on family in illness	1: Less	-
	No changes in dependency on family in illness	0 (default group)	
Instrumental social support	More financial support from children and relatives	0: Others; 1: More	+
	Less financial support from children and relatives	0: Others; 1: More	-
	No changes in financial support from children and relatives	0 (default group)	

4.3 Empirical Results

The current study employs the multi-nominal logit model to estimate the alternatives of the changes of life satisfaction. With the maximum likelihood method, this study employed the differences of the likelihood ratio statistics ($\Delta \chi^2$)

$(k(m-1))$) to test the significance of each variable. Among them, $\Delta\chi^2$ is $[-2\log(L_2) - 2\log(L_1)]$. L_2 is the maximum - likelihood function for all the coefficients are 0 in the null hypothesis. L_1 is the maximum - likelihood function for all the coefficients are not zero in the alternative hypothesis. Likelihood ratio index is to test the model fit the data. The likelihood ratio index ρ^2 is between 0 and 1. The closer the likelihood ratio is to 1, the better the model fits the data. Besides, the odds ratio⁷ will be computed to measure the specific effect of an explanatory variable on changes of life satisfaction under other things being equal.

Table 9 is the statistical results of changes of life satisfaction model. The results of the likelihood ratio statistics suggest that at least one of the parameters is not zero. In other words, the explanatory variables of the model have significant effects on the dependent variables.

For every additional score that the elderly self-rated health status as good, the odds of the changes from dissatisfaction to satisfaction increased by 17.8%. When the elderly perceived themselves as mentally and physically healthy, they are more satisfied with life (Kataoka et al., 1995; Hilleras et al., 2001).

For every additional score that the elderly felt satisfied with their economic status, the odds of the changes from dissatisfaction to satisfaction increased by 35.7% and the odds of satisfaction to dissatisfaction decreased by 22.1%. What should be noticed is that the elderly reaching retirement age may feel exhausted for the time pressure and workload. Therefore, for every one person that is still working in the family of the elderly aged 65 and over, the odds of the changes from satisfaction to dissatisfaction increased significantly by 54.4%.

Research has indicated that the elderly have a higher sense of well-being when they live with their children, receive family and social support, and have better intergenerational relationship (Yeah et al., 2004; Chen, 2000; Chen & Lin, 2010; Lou, 2010). However, the current study suggests that there is no significant difference in life satisfaction of the elderly if the elderly become lose spouse. On the other hand, the increase in the number of children living with the elderly decreases their life satisfaction. In addition, for every additional score that the family are willing to listen to the elderly's problems and worries, the probability of the changes from dissatisfaction to satisfaction increased by 21.9%. For every additional score that the family are unwilling to listen to the elderly's problems and worries, the probability of the changes from satisfaction to dissatisfaction increased by 29%. For every additional score that the family show less concern and care for the elderly, the probability of the changes from satisfaction to dissatisfaction increased by 79%.

⁷ odds ratio = $\exp(\beta)$. It's the estimated multi-plicative change in the odds for one unit change of the predictor. β is the parameter of the explanatory variable in the multi-nominal logit model.

When the elderly are less dependent on family in illness, the probability of changes from satisfaction to dissatisfaction increased by 28.2%. It is obvious that the elderly are in desperate need of emotional social support from the family. In Chen & Lin (2010), it had a positive impact on life satisfaction of the elderly that the elderly live with their children. However, the current study finds that the main factors influencing the elderly's life satisfaction is listening, concern and care more than merely living together with the children.

Finally, while examining the interaction term, the current study finds that the elderly change their life satisfaction to dissatisfaction significantly when they are in better economic status but are less dependent on their family in illness. This finding proves again that the elderly feel less satisfied with life if there is less concern and care from the family even though the elderly are satisfied with the economic status. Specifically, emotional social support is the important factor influencing the life satisfaction of the elderly.

Chen and Lin (2010) indicated that financial support from children had positive impacts on the life satisfaction of the elderly. However, the empirical results of this study reveal that there is no significant difference in the changes of elderly's life satisfaction whether the children increased or decreased the financial support to their parents. Accordingly, the amount of the financial support from the children is not the main factor influencing the changes of elderly's life satisfaction. Life satisfaction of the elderly shows significant difference when the elderly feel satisfied with their economic status and perceive their family's concerns and care. Emotional social support is more influential than the instrumental social support on the changes of life satisfaction of the elderly.

Table 9: Estimated results of multinomial logit model of the changes of elderly's life satisfaction

Variable		Satisfaction to no change			Dissatisfaction to no change		
		Coefficient		Odds ratio	Coefficient		Odds ratio
Intercept		-2.2019	***	--	-2.0642	***	--
Changes of economic status	Changes of the number of people with work earnings	0.2775		NS	0.4344	**	1.544
	Changes of satisfaction with economic status	0.3056	***	1.357	-0.2502	***	0.779

Changes of health status	Changes of self-rated health status	0.1638	**	1.178	-0.089	NS
Changes of emotional social support	Changes to have no spouse	0.1888		NS	-0.1227	NS
	The log of changes of the numbers of children living together	1.037		NS	2.307 ***	10.044
	Family is more willing to listen to the elderly's problems and worries.	0.1981	**	1.219	0.011	NS
	Family is less willing to listen to the elderly's problems and worries.	0.0351		NS	0.2428 **	1.275
	Less concerns and care from the family	0.2547	*	1.290	0.0433	NS
	More concerns and care from the family	0.114		NS	0.582 ***	1.790
	More dependency on the family's care in illness	0.1182		NS	-0.0713	NS
	Less dependency on the family's care in illness	-0.1459		NS	0.2486 **	1.282
Changes of instrumental social support	More financial support from children and relatives	-0.0646		NS	0.1998	NS
	Less financial support from children and relatives	0.2173		NS	0.1468	NS
Interaction term	Less dependency on family's care in illness even though in better economic status	-0.093		NS	1.417 **	4.126

Log likelihood statistics: -2LogL : 1682.14***

observation : 1,970

5. Conclusion and suggestions

5.1 Conclusion

The current study aims to examine the economic status, health condition and social support of the elderly aged 65 and over in Taiwan and explore the main factors influencing life satisfaction of the elderly. Following the previous research of life satisfaction among the elderly, the current study focuses on investigating the influence of the changes of the elderly's economic status, emotional and instrumental social support on their life satisfaction. Multinomial logit choice models are employed to estimate the alternatives of the changes of each variable on the elderly's life satisfaction.

Using the panel data of "Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan" (the fifth and sixth wave) conducted by the Bureau of Health Promotion in Taiwan in 2003 and 2007, the descriptive statistical analysis of the elderly aged 65 and over reveals that the couples without work earnings increased from 2003 to 2007. While aging, more elderly had stopped working and there is a little decrease in their self-rated health condition as good. There are no obvious changes in the aging people's satisfaction with economic status.

While aging, more elderly were losing spouses and family had fewer visits and contacts over time, there is a significant decrease of emotional social support of the elderly. The panel data of the two years reveal that there are more elderly taking care of grandchildren and receiving financial support from their children while aging. This result indicates that the elderly depend on instrumental social support increasingly.

In the results of multinomial legit choice models, when the elderly become more satisfied with their economic status, the probability of life dissatisfaction to satisfaction increases and the probability of life satisfaction to life dissatisfaction decreases. When the elderly reaching retirement age and still working, they may feel exhausted for the time pressure and workload. Therefore, it has significantly negative influence on their life satisfaction. Moreover, the changes of the elderly's health condition have significant influence on the changes of life satisfaction of the elderly.

In terms of social support, we find that life satisfaction of the elderly increases when their families become more willing to listen to their problems and worries and show more concerns and care. There is no significant influence on the elderly's life satisfaction no matter how much their children or family provide financial support. Specifically, the elderly care more about their family's emotional support such as concerns and listening instead of the financial support when aging. The findings

suggest that companion and respect are what the elderly need most when they are aging.

When the elderly are in good economic status and health condition, they may choose to be independent of family and take care of themselves, which lead them to think that they live in dignity. Even though there are more children living with the elderly, there is no positive influence on their changes of life satisfaction. The elderly need more emotional instead of instrumental social support while aging. Life satisfaction of the elderly decreases especially when the elderly have better economic status but receive less care from children.

5.2 Suggestions

Because of the changes of modern society, more women go to work leaving their children and elderly at home unattended. With the increase of single-parent families, the traditional functions of family are weakening. Even so, family still plays the basic role of socialization of an individual. Family provides people with emotional and instrumental social supports so that it's hard to be replaced by other social institutions. To promote life satisfaction among the elderly, it is essential to strengthen social support. The current study suggests that family's emotional support replace financial support. Family's care and companion is what the elderly need most instead of financial support. Good health condition is one of the factors influencing life satisfaction of the elderly. While aging, more medical care is required. The long-term medical care system in Taiwan is not complete; therefore, the elderly would rely more on the family's care in illness. Thus, the elderly feel less satisfied with life when they receive less family care. Medical care for the elderly is an issue worth of attention. When family is unable to take care of the elderly, more nursing homes or retirement homes are required. Accordingly, the study proposes that more resources of elderly care system should be provided. It is essential for government to pay attentions to this issue that help the elderly aging at home or provide more affordable nursing homes and retirement homes. Moreover, economic status is another factor influencing the elderly's life satisfaction. It is suggested that the elderly plan their own financial sources after retirement earlier to live independently and in dignity.

The study intended to explore the influence of the number of the children living with the elderly on life satisfaction among the elderly; therefore, the elderly living in the nursing homes or retirement homes were not included in this study. It is worthwhile to explore and trace the satisfaction of the elderly living in the nursing homes or retirement homes for future study.

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