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Predictors of Quality of Life in Old Age: A Multivariate Study in Chile

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Abstract There have been few studies that examine quality of life among older adults in the Latin American region. Using a recent representative national survey on quality of life among older adults in Chile, we examine the effects of eight potentially important factors (nutrition, physical activity, going outside the home, reading, quality of family relations, conflict, social support, self-efficacy) on three major dimensions of quality of life (functional capacity, material conditions, general satisfaction with life). The regression models confirm that the major predictive factor of satisfactory functional capacity is the practice of physical activities, while for satisfaction, the major predictive factors are self-efficacy, good quality of social relations, and the performance of significant activities such as reading and going outside the home. Educational level is a variable that cuts across all these predictors, in a context of great unequal social opportunities in Latin America. These results have implications for the development and implementation of social policies and programs to achieve an improvement in living conditions of the growing elderly population in the region, and reduce costs that societies face as a product of this new demographic scenario.

Keywords Quality of life · Well-being · Life conditions · Social support · Family relations · Ageing

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Introduction

Currently, life expectancy has increased in most of the countries of the world, which has resulted in an accelerated shift in the population toward a much higher percentage of older people. Although this process is an extremely positive phenomenon for humanity, it brings with it a series of new challenges, especially the need for the elderly to maintain good life conditions with satisfactory levels of autonomy and independence. This is especially relevant to Latin America, to the extent that the increase in the aging population is occurring at a faster rate than that experienced historically by the developed countries, while the theoretical and empirical research on aging in the region has not yet achieved the levels of knowledge or maturity to be able to predict future scenarios and take appropriate action for the benefit of older people and societies (Aranibar 2001).

Within this context, the major objective of this article is to construct and test a hypothetical model of the factors that are associated with “quality of life” being understood in terms of two interrelated dimensions: satisfactory living conditions and a high degree of subjective well-being (Palomba 2003). Satisfactory living conditions include the basic dimensions of functional capacity and of economic conditions. It refers to adequate objective circumstances and to perceptions regarding these circumstances (Lawton 1991). Well-being is the subjective perception of feeling well, of feeling satisfied. Diener et al. (1985) defines life satisfaction as a cognitive judgemental process dependent upon a comparison of one’s circumstances with what is thought to be an appropriate standard. One would achieve greater satisfaction with life if there is little difference between the circumstances of life and one’s perceived achievements and benchmarks. It is a long-term cognitive appraisal of the past, present, and lifetime, and is relatively stable.

Predictive Factors of the Quality of Life

According to the literature, certain factors are directly related to the subjective perception of well-being, others are directly related to life conditions, and yet others are common to both dimensions of the quality of life.

Among the factors directly related to functional capacity are nutrition and the ability to carry out physical activities (Rowe and Kahn 1997). If eating habits are satisfactory, they reduce the risk factors of morbidity and mortality, since they contribute to decreasing the disposition for infections and for chronic illness associated with ageing that end up reducing the quality of life (Restrepo et al. 2006). Various studies have confirmed that programmed and regular physical exercise is very beneficial for the physical and mental health of the aged, as such activity improves physical condition and bone mass, cardiovascular functions, and muscle tone. Thus, the regular practice of moderate physical activity, such as a daily regimen of walks, is a habit related to satisfactory ageing (Reig Ferrer et al. 1996). Continued physical activity affects multiple physical capabilities and offsets physical losses due to ageing (Bassey 2000; Hogan 2005).

Other factors mentioned as protecting the capacity for functional capacity, as well for increasing subjective well-being, are what Rowe and Kahn (1997) call

“engagement with life.” These are: carrying out selective activities, the existence of quality social relations, and having a support network (Davey and Eggebeen 1998; WHO 2002; Wilhelmsen et al. 2005).

A number of studies have demonstrated positive associations between high levels of social relations (social cohesion or solidarity) and improved conditions of health. It has been shown that countries that have stronger social networks have lower rates of mortality (Field 2003; Fine and Green 2000; Putnam 2000). Putnam (2000) points to four mechanisms through which social networks have a positive impact on health: they provide resources of material assistance that reduce stress; they reinforce healthy lifestyle norms; they increase pressures for medical services; and they stimulate the immunological system.

As Rowe and Kahn (1997) find, successful ageing is also associated with carrying out selective activities such as hobbies, vacations, going out of the home, and so on. Empirical studies in Chile have shown that not going outside the home daily and not reading newspapers, magazines or books are meaningful predictors for losing the functional capacity and for having a lower level of well-being (Barros et al. 2004, 2006; Herrera 2008).

The availability of social support fulfils expressive, affective, and instrumental functions. The affective and expressive functions stem from the fact that feeling attached to others through affective links increases self-esteem, provides a feeling of accomplishment, and makes it possible to express negative feelings. “Instrumental functions” refer to the fact that support is a resource that facilitates the carrying out of daily activities, and is useful in the face of whatever may happen to the individual (Grundy 2005; Guzmán et al. 2003).

Nevertheless, in the literature there is no agreement with regard to the impact of such support on well-being. Lee et al. (1995) found that receiving support increases distress among elderly persons, because this is interpreted as a loss of independence. Davey and Eggebeen (1998) also found a negative effect as a result of elderly individuals having received support regarding their mental health—even when controlling for the level of dependence. Other studies have not found effects of support. In different studies carried out in Chile, social support does not appear to affect the well-being of the elderly (Barros et al. 2006; Herrera and Kornfeld 2008; Silva et al. 2003).

The absence of a direct effect of support may be explained by the fact that the effect of support is more indirect, serving to mitigate the negative effect that may be produced by stressful situations experienced by the elderly—particularly when they have health problems (Silverstein and Bengtson 1994). There is agreement in regard to the importance of the reciprocity of exchanges (Lowenstein et al. 2007). When exchange is reciprocal, positive effects are generated among participants. When one gives more than one receives, one may experience frustration and overload; when one receives more support than one gives, it is possible to feel dependence and indebtedness. In this context, people may not wish to establish support links unless these can be reciprocal (Guzmán et al. 2003).

Considering social relations solely from the perspective of the availability of support seems insufficient for explaining the impact of these social relations on well-being. One should also assess subjective perceptions of the quality of relations—especially family relations, looking at the way that family climate is perceived, in terms of unity and trust in mutual aid, or in negative terms of being abused, left

aside, and misunderstood (Lowenstein and Ogg 2003). The importance of such negative conflicting or disturbing relations lies in the fact that they can have an even greater impact on psychosocial well-being than positive supportive relations (Newsom et al. 2005; Rook 1984).

Other protective factors noted by Rowe and Kahn are the perception of *self-efficacy* and the ability to face situations. As Lawton (1991) states, the ability to adapt oneself to changing circumstances permits individuals to experience well-being. The perception of self-efficacy reflects belief in the ability to control the changing demands of the environment through adaptive actions (Bandura 1997; Steffena et al. 2002). This sense is a valuable personal resource in human adaptation, since those who possess it perceive changes that affect them as challenges that result in actions (Jerusalem and Mittag 1999). On the other hand, those who possess a low level of self-efficacy perceive changes as threats, thus creating apprehension, apathy, or despair.

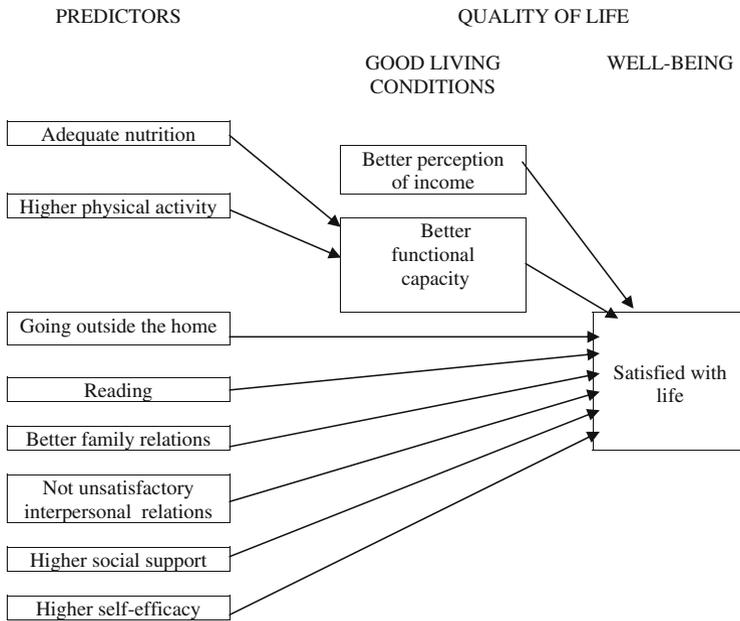
The focus of Rowe and Kahn has been criticized for concentrating primarily on how to age in a healthy manner. Rowe accepts the fact that his approach is partial, and highlights as complementary the psycho-social approach of Baltes (1993) and of Riley and McCarthy (2003) who emphasize factors related to social structure. Gender can be viewed as an indicator of the manner of insertion in the societal structure. It is true that women have more possibilities than men to reach an advanced age, but this is not synonymous with enjoyment of a healthier life (Palloni and McEniry 2007; WHO 2002).

Education is mentioned as one of the most important protective factors of good physical and cognitive functioning, and it has been indirectly shown to have an effect on the quality of life of individuals (Fernández Ballesteros 2001). Education influences the access to knowledge, life habits, and better income opportunities. The acquisition of a high level of education provides a cumulative advantage that increases with the passage of time. Educational levels are also related to what Baltes (1993) calls the “pragmatic knowledge of life,” or the way individuals deal with the situations of daily life, in which persons with higher levels of education will be more able to adapt themselves to changing situations (Bandura 1997; Lawton 1991). To the above is added the fact that a higher level of education of adults offers them more tools to be mentors and advisors, to offer emotional and financial support to younger generations, and thus favours the linkage and quality of those relations (Crosnoe and Elder 2002).

Dittman-Kohli and Baltes (1990) offer an additional element in establishing that the elderly construct a positive meaning of their advanced age through various cognitive-affective strategies. The elderly modify their standards, attributing more value to what they still have. In short, a wise decrease in their aspirations provides them with mental peace that allows them to sense a feeling of well-being. Within this context, it is perfectly understandable that persons of an advanced age feel more satisfied with life, even when their objective life conditions have worsened (Luszczynska 2005).

The Current Study

Our purpose in this study is to further understanding of the predictors of good quality of life in old age. Quality of life includes two related dimensions, life



Control variables: gender, age, education.

Diagram 1 Hypothetical model of predictors of quality of life

conditions and subjective well-being. Life conditions refer to functional capacity and to economic conditions. Subjective well-being will be measured as the auto-perception of satisfaction with life. We examine the following hypothesis (see Diagram 1): Better functional capacity depends on having adequate nutrition and practicing moderate and constant physical activity, both influenced by education. Economic conditions are related only to educational levels.

Subjective well-being is mainly influenced by life conditions, but there are some additional factors associated with it: significant activities such as going outside the home and reading several times a week, the quality of social relations, and the existence of social support. It is also influenced by educational level and the perception of self-efficacy. As we have seen in the literature review above, the importance of these predictors has been amply demonstrated but not in Latin America.

Methods

Data Source

The data source is the First and Second National Survey of the Quality of Life in Old Age carried out in 2007 and 2010 by the Department of Sociology of the *Pontificia Universidad Católica de Chile* and *Caja de Compensación Los Andes*. It is a face-to-face survey, carried between September and November of each year. Both used a

probabilistic random sample at all stages: in the first stage towns were selected, blocks in the second, homes in the third and people in the last stage. The survey universe of 2007 is the population 60 and over living in private housing in cities of more than 30,000 people in Chile. The survey represents 75% of the adult population of Chile. The sample size is of 1,613 cases. In 2010 we expanded the representativeness of the national population survey of Chile. The study kept a sample of 1,600 cases equivalent to that made in 2007, representing people aged 60 and over who live in cities of over 30,000. We added a sample of 400 cases of urban population living in towns of fewer than 30,000 inhabitants. Both samples did not differ significantly in most variables of the study, so we decided to include the entire sample of 2,000 cases in 2010, including the cities of less than 30,000 inhabitants, which is representative of 86% of the total older Chilean population. Descriptive statistics of the sample are shown in Table 1.

Statistical Procedures

We calculated two different regressions for two of the dimensions of quality of life: functional capacity (see Table 5) and satisfaction with life (see Table 6). For the first one, we calculated linear regression, because the dependent variable is a summative index. The independent variables included are nutrition and physical exercise as well as the control variables. For the second one, in order to test the correlations between the predictors and the different dimensions of satisfaction with life, we perform multivariate logistic regression models, because the dependent variable is dichotomous (“very satisfied” or “satisfied” in comparison to “not satisfied” or “dissatisfied”). We computed two models on satisfaction for each year: Model 1 includes all the predictors and control variables except for the living conditions (functional capacity and economic conditions) that are included in Model 2. These two models allow us to test the importance of the other predictors, even when we control for the living conditions that we suppose are the principal factors associated with satisfaction with life.

Measures

Almost all of the predictors included in the regression models were calculated using indices that combine various indicators in order to assure greater validity and reliability of the measures. In most cases, principal components analyses were carried out in order to confirm unidimensionality, and Cronbach’s alpha reliability tests were calculated.

Quality of Life

As stated above, quality of life is defined in terms of two dimensions: life conditions and perception of well-being. Life conditions include both economic conditions and functional capacity, with regressions calculated for each. For *economic conditions*, the question was: “Is the money that you have enough to satisfy your needs?” with options for answers including “Yes, more than enough;” “Yes, just enough;” or “No.” We constructed dummy variables for each of these categories.

Table 1 Descriptive statistics

		YEAR	
		2007	2010
Perception of satisfaction	Not satisfied or dissatisfied	44,1%	40,7%
	Satisfied or very satisfied	55,9%	59,3%
Functional capacity index		mean: 4,90; standard deviation:1,59	mean: 4,98; standard deviation:1,62
Gender	Men	37,4%	35,8%
	Women	62,6%	64,2%
Age	60 to 74 years of age	62,4%	59,9%
	75 years and over	37,6%	40,1%
Education	Primary education o less	61,6%	55,4%
	Some secondary education	25,6%	29,7%
	Some higher education	12,8%	14,9%
Physical exercise	Low	51,5%	62,4%
	Medium	21,8%	10,3%
	High	26,7%	27,3%
Nutrition	Adequate	37,3%	43,8%
	Not adequate	62,7%	56,2%
Going outside home several times a week		64,6%	65,0%
Reading several times a week		43,9%	53,2%
Self-efficacy	Low	20,5%	12,3%
	Medium	42,3%	37,8%
	High	37,2%	49,9%
Unsatisfactory interpersonal relations		18,7%	18,6%
Perception of income adequacy	No	35,9%	25,7%
	Yes, just enough	48,4%	54,5%
	Yes, more than enough	15,7%	19,8%
Quality of family relations index		mean: 2,59; standard deviation:0,46	mean: 2,60; standard deviation:0,45
Social support index		mean: 2,64; standard deviation:0,78	mean: 2,58; standard deviation;0,84

In order to classify health conditions we opted for considering the capacity for physical and cognitive functioning, which is the indicator proposed by the World Health Organization (2001). We consider a scale of instrumental daily activities that is commonly used for people without serious disabilities based on the scales proposed by Lawton and Brody (1969) and on the multi-dimensional Online Assessment Reporting System (OARS) of Duke University (Fillenbaum and Smyer 1981). To avoid cultural and gender bias of including tasks that people do not

undertake for socio-cultural reasons in Latin America, we have only incorporated six activities that are widely carried out by both men and women: walking 100 meters or one block, going up more than one flight of stairs, managing one's own money, heating water for coffee or tea, administering one's own medications, and driving a car or travelling by bus or subway. The response alternatives are somewhat different for each year of the survey. For the year 2007: 1. "Can or could do so without difficulty;" 2. "Can or could do so, but with difficulty;" 3. "Cannot do so." For the year 2010: 1. "Can or could do so without difficulty;" 2. "Can or could do so, but with difficulty;" 3. "Need help to do it;" 4. "Cannot do so." We dichomized all the variables as: 1 = cannot do so; 0 = can do it with or without some difficulty. The scale sums the six indicators, so the range is from 0 to 6. It behaves in a unidimensional manner (in carrying out component principal analysis, it has factor loadings from .765 for "walking" to .703 for "managing money") and has a good level of reliability (Cronbach's $\alpha = .823$). The final scale has inverted the sign, so it goes from 0 (worst functioning) to 6 (best functioning).

Perception of well-being is studied by inquiring about subjective judgments of *general satisfaction with life* in the last six months (1 = "very satisfied or satisfied;" 0 = "not very satisfied or not satisfied").

Predictors

Nutrition It is a dichotomous variable coded as "0" for "not adequate" and "1" for "adequate" when all or all but one of the following are ingested: dairy products daily; legumes at least once a week; meat, fish, poultry, or eggs at least three times per week; bread, rice, or pasta at least three times per week; at least two portions per day of vegetables or fruits; and six or more glasses of liquids per day. The standards of what is considered adequate nutrition were agreed upon in meetings with experts in the field of geriatrics in Chile.

Physical Activity For the year 2007, it combines two questions: "How often do you engage in gymnastics, sports, dance, etc." and "how many consecutive blocks do you walk daily." If the person engages in a specific physical activity once a week or less and walks less than 6 blocks per day, this is classified as *low physical activity*; if the person engages in a physical activity more than once a week or walks more than 14 blocks daily, or engages in a specific physical activity once a week and walks daily 6 or more blocks, is classified as *high physical activity*. The other combinations are considered as *medium physical activity*. For the year 2010, the question was simpler: "Do you perform physical exercise, gymnastics, hard dance, or walking more than 6 consecutive blocks... 1. Several times a week, 2. Once a week, 3. Once a month, 4. Less often." We recoded the categories as: 1 = high, 2 = medium; 3–4 = low, with dummy variables for each one.

Selected Activities We utilize two variables that in previous studies (Barros et al. 2004, 2006; Herrera 2008) have appeared to be most strongly related to the well-being of the elderly: "going outside the house" and "reading newspapers, magazines, or books." These are dichotomized as 0: once a week or less; 1: several times per week.

Quality of Family Relations Index It is a scale of perceptions of the quality of family relations that averages (after inverting the items in an opposite direction) the responses to the following questions with three response categories (1. Yes, often; 2. Sometimes; 3. Never): “Do you trust that the members of your family will help you under any circumstances?”, “Do you believe that your family takes you into account very little?”, “Do you feel that some members of your family abuse you?”, “Do you feel that your family is very united?”, “Do you feel that your family doesn’t understand you?”, “Do you feel that in your family there are many disputes and disagreements?”. The scale is a simple mean of these indicators, so it goes from 1 (bad family relations) to 3 (excellent family relations). It behaves in a unidimensional manner (in carrying out component principal analysis, it has factor loadings from .699 for “Do you feel that your family doesn’t understand you?” to .674 for “Do you trust that the members... will help”) and has a good level of reliability (Cronbach’s $\alpha = .770$).

Presence of Unsatisfactory Relations It is coded as “0” when the individual has one or more “unsatisfactory or not very satisfactory” relationships with someone with whom the individual lives or with his or her children and as “1” when he or she does not have such unsatisfactory relations.

Social Support This index goes from “0” (without social support) to “3” when the individual has three of the following types of potential supports: expressive (“if you felt alone or sad, would you have someone to whom to turn?”); instrumental (“if you were ill or if you had some kind of financial problem, would you have someone to whom to turn?”); and affective (“do you have someone who you consider to be very close?”).

Self-Efficacy This combines two questions: 1) “How able have you felt to face difficult events that have occurred to you in recent years? Very able, not very able, unable”; 2) “During the last year, have you felt confident that, if you make the effort, you can obtain what you wish? Quite often, sometimes, almost never.” Individuals are classified as: having *low self-efficacy* when they have felt unable to face difficult situations and/or almost never have felt that if they make the effort, they can obtain what they wish; *high self-efficacy* when they have felt very able to face difficult situations and quite often have felt that if they make the effort, they can obtain what they wish; *medium self-efficacy* for the other mixed combinations of these variables. We constructed dummy variables for each of these categories.

Control Variables

Gender. 0: Male; 1: Female.

Age. 0: 60–74 years of age; 1: 75+ years of age.

Education. 1: Without formal education, some years or completed primary education (6 years of schooling); 2. Some years or completed secondary education (12 years of schooling); 3. More than 12 years of schooling (incomplete or complete professional or graduate studies).

Results

The descriptive statistics of the variables, comparing each year, are in Table 1. In the year 2007, 63% of the sample were women; 62% were aged 60 to 74 years old and 38% were 75 or more years old; 62% had primary education or less; 26% some years of secondary education, and only 13% some higher education. In 2010, Chile had slightly more women in the sample (64% of the old population), more older people (40% had 75 or more years old), and they were better educated (55% had primary education or less; 30% some years of secondary education, and 15% some higher education).

The level of satisfaction with life increased from 56% the year 2007 to 59% in 2010, in the context where Chile suffered a major earthquake February 27, 2010 and where the old population is increasing. If we see major changes occurring in the other variables included in the study, we can understand that it is due to the amelioration of living conditions, because in only three years we can see that old people are more educated, which is also associated with better perception of income adequacy (64% in 2007 and 74% in 2010 perceived that they had enough income), better sense of self-efficacy (37% in 2007 and 50% in 2010 had high self-efficacy), even better functional capacity (mean: 4,90 in 2007 and 4,98 in 2010), and increased reading habits (44% in 2008 and 53% in 210) (see Table 1).

All of the supposed predictors have bivariate significant associations with quality of life in the directions expected and documented in the literature review. Table 2 shows bivariate associations in respect to functional capacity: more aged people, less

Table 2 Bivariate associations with functional capacity

		Year 2007		Year 2010	
		Functional capacity index (mean)		Functional capacity index (mean)	
Gender	Men	5,11	+++	5,03	
	Women	4,78		4,95	
Age	60 to 74 years of age	5,24	+++	5,37	+++
	75 years and over	4,33		4,40	
Education	Primary education o less	4,61	+++	4,74	+++
	Some secondary education	5,34		5,24	
	Some higher education	5,41		5,34	
Physical exercise	Low	4,23	+++	4,65	+++
	Medium	5,53		5,22	
	High	5,70		5,63	
Nutrition	Adequate	4,73	+++	4,83	+++
	No adequate	5,00		5,10	

*** Chi-square statistically significant at $p < 0,01$

** Chi-square statistically significant at $p < 0,05$

+++ T-test for mean differences for independent samples statistically significant at $p < 0,01$ (equal variance is asumed)

educated, who practice low physical exercise and with inadequate nutrition exhibited lower functional capacity in 2007 and 2010; the only difference observed in both surveys is that women had statistically significant lower functional capacity in 2007 but not in 2010. In relation to perception of income adequacy, we can observe that it was associated with education (more education, more income), but not with gender for either age range.

Table 3 shows the bivariate associations with perception of satisfaction. It should be noted that all of the factors hypothesized as predictors have statistically significant associations with satisfaction in the direction expected, both in 2007 and 2010. Old people are more satisfied with life when they have better living conditions of income and functional capacity, have a higher sense of self-efficacy, perform significant activities such as going outside the home or reading several times a week, have good social relations such as better family relations and greater availability of social support, and do not have unsatisfactory interpersonal relations.

In Table 4 we have the bivariate associations between the independent variables of the models. When the variables are nominal, we perform chi-square statistics; for a dichotomous and a continuous variable, t-test for difference of means; for two continuous variables, Pearson correlations. Although there were many statistically significant associations, the strength of these were not very large with the exception of only a few, such as between greater quality of family relations, more social support, and lower presence of unsatisfactory relations, or between going outside the home, practicing more physical activity, having higher functional capacity, and self-efficacy. In regard to the control variables, it should be emphasized that higher education is associated with more frequent reading, higher sense of self-efficacy, better functional capacity, and, of course, with higher income. Greater age is related to reduced functional capacity and to less frequency in going outside the home, but not to well-being or to income. Being female is associated with having a worse perception of well-being as well as a lesser functional capacity and lower income, but these correlations are somewhat low.

Table 5 exposes the results of the linear regression models on functional capacity. As expected, age is one of the main predictors (greater age is associated with lower functional capacity). However, even when we control by age, to practice physical exercise and to have adequate nutrition remain as significant predictors of better functional capacity. It is also important to remark that people with secondary education are better in this dimension than people with primary or no schooling. At the bivariate level, we have found that women had lower functional capacity, but in the regression models the association is not statistically significant. This is probably because gender is associated with the other variables of the models: women used to perform less exercise than men, and old women in Chile are less educated than old men. These results are robust over time (2007 and 2010).

In regard to well-being measured as satisfaction with life, it should be noted that almost all of the variables hypothesized as predictive factors effectively function as such except secondary education and social support (Table 6). Secondary education in comparison to primary education is correlated with various other predictive factors such as income, functional capacity, self-efficacy, and carrying out significant activities. So, more education is indirectly associated with life satisfaction. Having a higher perception of availability of social support is not associated with greater

Table 3 Bivariate associations with perception of satisfaction

	2007			2010		
	NOT Satisfied with life	Satisfied with life	N	NOT Satisfied with life	Satisfied with life	N
Gender						
	40,9%	59,1%	603	**	63,2%	714
Men	46,0%	54,0%	1008		56,8%	1283
Women	44,3%	55,7%	1005		60,9%	1197
Age	42,8%	57,2%	606		56,4%	800
60 to 74 years of age	48,8%	51,2%	991	***	54,0%	1106
75 years and over	39,5%	60,5%	413		62,9%	592
Education	31,2%	68,8%	207		74,1%	299
Primary education o less	59,5%	40,5%	576	***	40,6%	509
Some secondary education	36,7%	63,3%	778		63,1%	1081
Some higher education	29,1%	70,9%	253		24,6%	392
Perception of income adequacy	55,4%	44,6%	568	***	47,5%	697
No	38,5%	61,5%	1039		65,3%	1292
Yes, just enough	50,0%	50,0%	894	***	49,9%	926
Yes, more than enough	36,2%	63,8%	698		32,3%	1055
Going outside home several times a week	69,0%	31,0%	329	***	29,0%	244
No	45,1%	54,9%	678		53,3%	753
Yes	29,7%	70,3%	597		28,7%	991
Reading several times a week	39,6%	60,4%	1309	***	35,9%	1627
No	61,6%	38,4%	302		60,2%	370
Yes	media: 2,67	media: 2,86		+++	media: 2,66	
Self-efficacy	media: 2,48	media: 2,67		+++	media: 2,46	
Low	media: 2,54	media: 2,72		+++	media: 2,44	
Medium						
High						
Unsatisfactory interpersonal relation						
No						
Yes						
Functional capacity index						
Quality of family relations index						
Social support index						

*** Chi-square statistically significant at $p < 0,01$

** Chi-square statistically significant at $p < 0,05$

+++ F-test for independent samples statistically significant at $p < 0,01$ (equal variance is assumed)

Table 4 Statistical significance of bivariate associations between predictor variables

	1	2	3	4	5	6	7	8	9	10	11
Year 2007											
1. Women ^a		ns	---	ns	---	ns	ns	ns	ns	ns	---
2. 75+ years old ^a	ns		---	ns	---	---	---	ns	ns	ns	---
3. Higher education ^a	---	---	---	+++	+++	+++	+++	---	+++	ns	+++
4. Higher Income adequacy ^a	ns	ns	+++	+++	+++	+++	+++	---	+++	ns	+++
5. Going outside home several times a week ^a	---	---	+++	+++	+++	+++	+++	ns	+++	ns	+++
6. Reading several times a week ^a	ns	---	+++	+++	+++	+++	+++	ns	+++	ns	+++
7. Self-efficacy (from lower to higher) ^a	ns	---	+++	+++	+++	+++	---	---	+++	---	---
8. Unsatisfactory interpersonal relation ^a	ns	ns	+++	---	ns	ns	---	---	---	---	---
9. Quality of family relations index ^{b c}	ns	ns	+++	+++	+++	+++	+++	---	+++	+++	+++
10. Social support index ^{b c}	ns	ns	ns	ns	ns	ns	+++	---	+++	+++	+++
11. Functional capacity index ^{b c}	---	---	+++	+++	+++	+++	+++	---	+++	+++	+++
Year 2010											
1. Women ^a		ns	---	ns	---	ns	ns	ns	ns	ns	---
2. 75+ years old ^a	ns		---	ns	---	---	---	ns	ns	ns	---
3. Higher education ^a	---	---	---	+++	+++	+++	+++	---	+++	ns	+++
4. Income adequacy (from better to worse) ^a	ns	ns	+++	+++	+++	+++	+++	---	+++	ns	+++
5. Going outside home several times a week ^a	---	---	+++	+++	+++	+++	+++	ns	+++	ns	+++
6. Reading several times a week ^a	ns	---	+++	+++	+++	+++	+++	ns	+++	ns	+++
7. Self-efficacy (from lower to higher) ^a	ns	---	+++	+++	+++	+++	---	---	+++	---	---
8. Unsatisfactory interpersonal relation ^a	ns	ns	+++	---	ns	ns	---	---	---	---	---
9. Quality of family relations index ^{b c}	ns	ns	+++	+++	+++	+++	+++	---	+++	+++	+++
10. Social support index ^{b c}	ns	ns	ns	ns	ns	ns	+++	---	+++	+++	ns
11. Functional capacity index ^{b c}	ns	---	+++	+++	+++	+++	+++	---	+++	+++	ns

Variables 1 to 8 are nominal; variables 9 and 11 are scalar; variable 10 is ordinal (from 0 to 3)

+++ Positive association statistically significant at $p < 0,01$

--- Negative association statistically significant at $p < 0,01$

^a Bivariate associations based on Chi-square statistics (nominal variables)

^b Bivariate associations between variables 9, 10 and 11, in relation to variables 1 to 8, are based on Test-t of differences of means

^c Bivariate associations between variables 9 to 11, and variables 9 to 11, based on R-Pearson correlations

Table 5 Linear regression models on functional capacity (2007 and 2010)

	Year 2007		Year 2010			
	B	Standardized B	B	Standardized B		
Women	−,067	−,020	−,052	−,016		
75+ years old	−,656	−,200	***	−,882	−,267	***
Secondary education ^a	,465	,128	***	,344	,097	***
Higher education ^a	,457	,096	***	,297	,066	***
Low physical exercise ^b	−1,132	−,357	***	−,462	−,138	***
High physical exercise ^b	,118	,033	**	,349	,096	***
Adequate Nutrition	,144	,044	***	,221	,068	***
Constant	6,197		***	6,223		***
N	1578			1981		
R	,511			,399		
R-square	,261			,159		
Adjusted R-square	,257			,156		

*** Coefficient is statistically significant at $p < 0,01$

** Coefficient is statistically significant at $p < 0,05$

^a Category of reference: primary education

^b Category of reference: medium physical exercise

satisfaction. People with more social support are not necessary happier, in part because this can threaten their sense of independence.

As predicted, having good social relations and having active ageing are associated with better well-being. People with better good family relations who did not have unsatisfactory social relations were more likely to be satisfied with their lives both in 2007 and in 2010. The selected activities of reading newspapers, books, or magazines, and going outside the home more than once a week are associated with satisfaction, even when controlling for education and functional capacity.

As expected, life conditions (perception of income and functional capacity) are strongly related to satisfaction, whereas people who have enough or more than enough income (in comparison to inadequate income) and those with better functional capacity are more satisfied with life. It is important to note that when we control the other predictive variables by income and functional capacity (Model 2), the importance of the predictors remains relatively stable.

In regard to the control variables, one should note the following: there is no direct relation between gender and satisfaction and the associations with age are somewhat unsettled. Only in the year 2007 did we find that people of 75 or more years of age were more satisfied with their life than people between 60 and 74 years. We could not observe this association at the bivariate level, because age is negatively associated whit several variables that are positively related to well-being, such as physical activity, going outside the home, self-efficacy, and functional capacity.

Table 6 Logistic regression models (odds ratio) on dimensions of satisfaction with life (2007 and 2010)

	MODEL 1 odds ratio exp(Beta)		MODEL 2 odds ratio exp(Beta)		
	Year 2007	Year 2010	Year 2007	Year 2010	
Women	,850	,820	,864	,808	**
75+ years old	1,412	*** 1,133	1,507	*** 1,166	
Secondary education ^a	1,090	1,184	,984	1,121	
Higher education ^a	1,197	1,773	*** ,964	1,629	***
Going outside home several times a week	1,458	*** 1,637	*** 1,229	1,396	***
Reading several times a week	1,329	*** 1,402	*** 1,238	1,274	**
Low self-efficacy ^b	,413	*** ,451	*** ,489	*** ,558	***
High self-efficacy ^b	1,660	*** 1,678	*** 1,487	*** 1,495	***
Unsatisfactory interpersonal relation	,582	*** ,549	*** ,610	*** ,601	***
Quality of family relations index	1,724	*** 2,023	*** 1,601	*** 1,956	***
Social support index	1,107	1,124	1,120	1,129	
Only enough income ^c			2,096	*** 2,676	***
More than enough income ^c			1,903	*** 1,923	***
Functional capacity index			1,203	*** 1,164	***
Constant	,120	*** ,088	*** ,041	*** ,030	***
N	1566	1935	1562	1921	
-2 log likelihood	1923,961	2278,141	1865,792	2201,367	
R-square Cox y Snell	,133	,158	,162	,184	
R-square Nagelkerke	,178	,213	,217	,248	

*** Coefficient is statistically significant at $p < 0,01$

** Coefficient is statistically significant at $p < 0,05$

^a Category of reference: primary education

^b Category of reference: medium self-efficacy

^c Category of reference: not enough income (inadequate income)

Conclusions, Discussion and Limitations of the Study

We have sought to develop and contrast a hypothetical conceptual model in regard to protective factors associated with a good quality of life during old age.

We have confirmed that life conditions are indeed related to the level of well-being in old age, but the variations in this measure in old age are better explained by incorporating other factors such as self-efficacy and the quality of family relations.

The study evidences the importance of physical activity for maintaining good functional capacity, reiterating what has been found in almost all other studies of this type, but here showing a lower importance of the quality of nutrition, which does not have too much variability in Chile.

Carrying out activities such as going outside the home and reading are highly associated with the perception of satisfaction, although one should note that the

direction of the relation may be in the sense that individuals who are happier are those who can maintain a more active lifestyle.

The quality of social relations has disparate associations, depending upon how this is measured. In this study we used three indicators: potential availability of social support; a subjective assessment of the quality of family functioning; and the existence of relations classified as not satisfactory with children and persons with whom elderly adults live. The importance of not having unsatisfactory relations and having better family relations is one of the most important predictors of being satisfied with life. But this study confirms that social support does not have a direct impact on life satisfaction, as has been shown in other studies in Chile (Barros et al. 2006; Herrera and Kornfeld 2008; Silva et al. 2003).

Future studies must include the interaction of social support with other variables, looking at the reciprocity of support and the need for aid. First, it may be hypothesized that receiving social support is of higher value when the old person can reciprocate it (Antonucci 1990), no matter whether it is of a different kind (for example, one can receive services and give emotional support). However, it should be noted that some authors have found a negative association between support and well-being even after controlling for reciprocity (Lee et al. 1995). Second, we can understand that the social support is very important when people are in need of help such as personal care, services, or economic aid. Thus it would be necessary to include a term of interaction between social support and the degree of dependency. In the survey of this study we did not measure this variable exhaustively.

We have also found that older people were more satisfied than people from 60 to 74 years old, even when it was statistically significant only for the year 2007. There are different interpretations for this result. On the one hand, it could be painful to admit that life has not been very satisfying; on the other hand, the loss of roles leads people to seek compensatory roles and activities that provide meaning and integration, for example, the importance of religion and/or forgiveness increases (Brown et al. 2004).

Another of the most notable outcomes of the study was to show the importance of self-efficacy—especially its effects on life satisfaction. Self-efficacy is an individual characteristic that is accumulated throughout life, which is very much related to the educational level of individuals. It is important to understand that education not only provides possibilities to obtain increased income; in addition it offers a series of psycho-social skills that allow individuals to face old age better, whether through better adaptation to new scenarios due to greater self-efficacy, or due to a greater predisposition for the development of selective activities. Moreover, education is a resource that can be accumulated through time with a cumulative advantage, affecting in various ways the different components of the quality of life and its predictors.

This conclusion is very important for Latin Americans, where there are great differences in educational opportunities. More educated people have advantages in every sense, and as these advantages accumulate throughout the life course, the developmental pathways as people get old in Latin America are very unequal.

Finally, some of the limitations of this study should be noted. The principal limitation has to do with problems of the direction of causality of the associations. We have calculated regression models that have as dependent variables functional

capacity and satisfaction. However, the associations may be reciprocal, in that the levels of living conditions and well-being of individuals also affect many of the supposed predictor variables. For example, individuals with greater well-being keep more active, go outside the home more often, read more, relate more and better with their families, can work and generate additional income, have a greater functional capacity, and have more self-efficacy. Only through longitudinal studies would it be possible to detect with more clarity the direction of these relations.

Another aspect for further research is to compare the results of this study with other measures of well-being, for example, with the affective one. The other dimension consists of a balance between positive and negative affects; it refers to the emotional response of adapting to the environment (Bradburn 1969; Mc Dowell and Newell 1996). In reviewing the existing literature it shows that both dimensions of well-being are closely related but not exactly the same. Satisfaction with life is basically an overall assessment of life as a whole, while emotional balance depends more on specific reactions to specific events that occur in the lifetime (Durán 2010). In other words, the well-being would consist of a cognitive component—which would be life satisfaction, either globally or domain-specific—and an affective component—referred to affects affections (Gómez et al. 2007; Moyano and Ramos 2007).

Undoubtedly, all of these findings tend to reaffirm a series of aspects already shown through previous evidence, even when we can see that progress requires that much be done. We recognize the need to enter into more in-depth studies that aid in confirming and in complementing the model with which we have worked. To this end, it would be pertinent to use more advanced multivariate analysis techniques such as, for example, path analysis or structural equations, given the fact that through regressions, it is not possible to examine more than one causal relation simultaneously. In addition, as noted in the article, as there are doubts about the direction of causality of some relationships, longitudinal studies (panel) are needed to allow further clarify these associations.

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