

# Subjective longevity in Latin America: the cases of Chile and Mexico

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## *Abstract*

The body of research on subjective survival expectations in developing countries is scant and to the best of our knowledge in Latin America is virtually non-existent. The main objective of this study is to investigate and compare the determinants of subjective survival expectations as they are stated by individuals aged 65-74 in Chile and Mexico. Results show that the determinants of subjective survival expectations are consistent for both, Chile and Mexico, with those reported by the literature for the US and Europe. Both studies show that age is an important determinant of subjective probabilities of surviving to a given age. Health is also highly relevant in determining subjective survival. However, contrary to what was expected, smoking was not a significant determinant of subjective survival in neither study. The same is true for obesity despite the obesogenic profile of both countries.

*Key words:* Life expectancy, subjective survival probabilities, Chile, Mexico.

## *Resumen*

*Longevidad subjetiva en América Latina: los casos de Chile y México*

El cuerpo de investigación sobre las expectativas subjetivas de sobrevivencia en los países en desarrollo es escaso y en América Latina es prácticamente inexistente. El objetivo principal de este estudio es investigar y comparar los determinantes de las probabilidades subjetivas de sobrevivencia así como son expresadas por personas de 65-74 años en Chile y México. Los resultados muestran que los determinantes de las expectativas subjetivas de sobrevivencia son consistentes para ambos, Chile y México, con los reportados por la literatura para Estados Unidos y Europa. Ambos estudios muestran que la edad es un factor determinante de las probabilidades subjetivas de sobrevivir a una edad determinada. La salud también es altamente relevante en la determinación de la supervivencia subjetiva. Sin embargo, al contrario de lo que se esperaba, el tabaquismo no fue un determinante significativo en ninguno de los estudios. Lo mismo puede decirse para la obesidad a pesar del perfil propicio para la obesidad en ambos países.

*Palabras clave:* Esperanza de vida, probabilidades subjetivas de sobrevivencia, Chile, México.

## SUBJECTIVE EXPECTATIONS

Assessments on subjective expectations have been extensively used in the economic literature that, since the mid-fifties, has been mainly interested in predicting consumption, saving choices, and retirement planning (Benitez *et al.*, 2008; Biro, 2013; Dominitz and Manski, 1997; Gan *et al.* 2005; Griffin *et al.*, 2012). How to measure these subjective expectations has changed over time. Since the early 1990's economists have shown an increased interest in bringing out probabilistic expectations on relevant personal events directly from survey respondents instead of inferring subjective probability distributions from choice data (Manski, 2004). Studies on health outcomes have placed, by far, less importance on individual subjective expectations than research on the economic field has. Mortality expectations, as well as risk perception, associated with health-related behaviors have been studied for the most part regarding smoking behavior (Balia, 2014; Khwaja *et al.* 2007; Schoenbaum, 1997; Smith *et al.* 2001a). Recently, Delavande and Kohler (2009) introduced a new method for eliciting subjective expectations about HIV/AIDS-related behaviors and events, in an effort to gain insight on the determinants and consequences of HIV-risks in a low literacy and numeracy context.

Probabilistic expectations are attractive because of their potential for allowing inter- and intra-individual responses, for testing internal consistency and external accuracy, and for predicting future outcomes (Dominitz and Manski, 1999). Different studies underwent the task of determining whether subjective survival estimations predict mortality and how accurate subjective survival probabilities are as compared to observed survival (Jylhä, 2011): survival expectations proved to be consistent with observed survival patterns (Bissonnette *et al.*, 2014; Peracchi and Perotti, 2009; Smith *et al.*, 2001a). Several recent studies suggest that subjective forecasts are effective mortality predictors (Perozek, 2008), however there is some controversy on this regard (Elder, 2013). Subjective probabilities of survival have shown to behave and aggregate as population probabilities do and to covary with other variables like socioeconomic status (SES) and smoking as actual probabilities vary with the same variables (Hurd and McGarry, 1995; Rappange *et al.*, 2016a).

The body of research on subjective survival expectations in developing countries is scant and to the best of our knowledge in Latin America is

virtually non-existent. For this reason, the main objective of this study is to investigate and compare the determinants of subjective survival expectations as older adults in Chile and Mexico state them.

The organization of the paper is as follows: In section 2, we review selected empirical findings. In section 3, we describe the data and the measures used for the analysis and in section 4 the methodology we employed. In section 5, we show the results of the statistical analysis and in section 6, we discuss the results. Finally, section 7 contains some concluding remarks.

### **WHAT DOES THE LITERATURE SAY ON THE DETERMINANTS OF SUBJECTIVE SURVIVAL EXPECTATIONS?**

Tolor and Murphy stated that “the assessment of one’s own life duration is probably a composite, based on at least such factors as one’s estimate of normative (actuarial) data, defensiveness against death anxiety, experiences with death in family members or in close friends, the attitudes of family towards death and dying, age, and relative position in the family” (Tolor and Murphy, 1967: 21). Nelson and Honnold (1980), in accordance with Tolor and Murphy, hypothesized that subjective life expectancy would vary by type of death exposure (death among near relatives) and family size and structure; they also considered in their model the effect of desired longevity. Interestingly, neither Tolor and Murphy nor Nelson and Honnold mentioned the effect of health on subjective survival expectations, probably because they were working with young individuals. Different health conditions as well as perceived health seem to have a substantial impact on subjective life expectancy (Hurd and McGarry, 1995; Ross and Mirowsky, 2002). In general, the literature proposes four main elements as determinants of subjective survival: sociodemographic characteristics, healthy and unhealthy lifestyles, different facets of physical and mental health, and longevity of parents (Zick *et al.*, 2013). These elements can be grouped into four dimensions:

#### **Sociodemographic Dimension**

Individual’s chronological age was consistently found to be positively associated with the subjective probability of surviving to age 75 (Finkelstein *et al.*, 2008; Hurd and McGarry, 1995; Liu *et al.*, 2007) and with subjective life expectancy (Brouwer and van Exel, 2005; Mirowsky, 1997). Results regarding the influence of income, education, and marital status on subjective life expectancy or self-reported probabilities of surviving to a

given age are somehow less consistent than they are for chronological age (Mirowsky and Ross, 2000; Ross and Mirowsky, 2002). However, Popham and Michell (2007) found that subjective life expectancy is associated with life-course SES after adjusting for self-rated health and smoking status: those experiencing childhood disadvantages and poor educational attainment have the highest odds of being pessimistic regarding their own survival probabilities. Moreover, Delavande & Rohwedder (2011) suggest that subjective probabilities of survival are a reasonable alternative for estimating differential survival by wealth. Regarding differences in subjective survival expectations by gender, some studies found that men expect a longer life than women do, contrary to actuarial survival expectations (Griffin *et al.*, 2013).

### **Objective Health and Self-Assessed Health Dimension**

As mentioned earlier, health status, as well as different health conditions, has consistently shown to be predictors of self-reported probabilities of surviving to a target age (Bulanda and Zhang, 2009). For example, Hamermesh and Hamermesh (1983) found that having been diagnosed with a life-threatening illness significantly decreased expected longevity by around four to seven years. It was also observed that individuals revise downwards their perceived survival probabilities upon acquiring adverse health information (Benitez-Silva and Ni, 2008; Liu *et al.*, 2007; Smith *et al.*, 2001b). Popham and Michell stated that self-rated life expectancy “may capture something other than simply current health conditions” (Popham and Michell, 2007: 62). Siegel *et al.* (2003) suggested that self-predicted probability of survival and self-rated health may be conceptually related but they are not the same and they seem to have independent effects on mortality predictions.

### **Health-related Behaviors Dimension**

In addition, individuals seem to be aware of the relationship between their health-related behaviors and their future survival expectations. Smoking is consistently found to be negatively associated with subjective survival estimations (Hamermesh and Hamermesh, 1983; Ross and Mirowsky, 2002; Viscusi and Hakes, 2008). For alcohol drinking, Hurd and McGarry (1995) found that moderate drinking was associated with higher subjective probabilities of surviving to ages 75 and 85 than subjective survival probabilities for complete abstinence. The opposite was true for heavy drinking (five or more glasses per day) relative to complete abstinence. However, heavy

drinkers, like smokers, seem to be optimistic regarding their survival chances compared with observed mortality outcomes (Hurd, 2009; Rappange *et al.*, 2016b). However, regular physical activity does not show a clear relationship with subjective survival expectations (Hamermesh and Hamermesh, 1983; Hudomiet and Willis, 2013; Ross and Mirowsky, 2002).

### **Death Experience Dimension**

As Tolor and Murphy (1967) hypothesized, longevity of parents has shown to have an important influence on individuals' survival expectations. Hurd and McGarry (1995) stated that, as genetic factors help to determine subjective longevity, parental age and parental age at death are used as genetic predisposition markers. Ross and Mirowsky (2002) pointed out that when making longevity estimations people may look to their family history to determine their genetic stock mainly taking into account same-sex parent's survival history. However, Hamermesh (1985) suggested that individuals base their subjective life expectancies in an unreasonable manner on their relatives' longevity, especially longevity of their parents and grandparents. The study by Hudomiet and Willis (2012) show evidence that individuals place too much weight on their parent's age at death when forming their own longevity expectations.

## **DATA AND MEASURES**

### **Data**

Data for this project was drawn from the Chilean 2004 Social Protection Survey<sup>1</sup> (SPS) and the 2005 Mexican Family Life Survey<sup>2</sup> (MxFLS). The SPS is a nationally representative longitudinal survey. The 2004 SPS is the follow-up study of the original 2002 SPS study for individuals 15 years old and over who were affiliated to the Chilean pension system. The 2004 SPS only includes individuals aged 18 and over were they affiliated or not to the pension system. The 2004 SPS sample is composed of 17,000 individuals, 940 of whom were new participants, 2,860 unaffiliated and 13,200 affiliated to the national pension system.

The MxFLS is a longitudinal survey with national, urban, rural and regional representation of the Mexican population. The 2005 MxFLS is composed of 39,000 individuals based on the original 2002 MxFLS sam-

<sup>1</sup> Encuesta de Protección Social (EPS). For more information, see: [http://www.previsionsocial.gob.cl/subprev/?page\\_id=7185](http://www.previsionsocial.gob.cl/subprev/?page_id=7185)

<sup>2</sup> Encuesta Nacional sobre Niveles de Vida de los Hogares (ENNViH). For more information, see: <http://www.ennvih-mxfls.org/en/mxfls.php?seccion=1&subseccion=1&session=>

ple of 8,440 households with 35,000 individuals from 150 communities in Mexico.

## Measures

*Subjective Survival Expectations in the SPS and the MxFLS studies*

*Self-Reported Probability of Surviving to a Target Age*

In the 2004 SPS, the question on subjective survival probabilities changes the target age as follows: “Using a 0 to 100 scale where “0” means there is absolutely no chance, and “100” means that it is absolutely certain:

- What are your chances to live to age 65” (individuals aged 50-65).
- What are your chances to live to age 75” (individuals aged 65-74).
- What are your chances to live to age 85” (individuals aged 75-84).
- What are your chances to live to age 100” (individuals aged 85+).

The MxFLS asks the survival probability question only to individuals aged 50-74 and it takes the following form: “To make it easier, we will use a scale from 0 to 100, where 0 is ‘impossible’ and 100 is ‘completely sure’ that it can happen,

How probable is that you will live until 75 years of age?”

## Determinants of Subjective Survival Probabilities

In order to study the determinants of the subjective survival probability of reaching a given age, we considered the aforementioned four dimensions (Sociodemographic, Health Status, Health-related Behaviors, and Death Experience). The set of variables included in each dimension is described below:

*Sociodemographic dimension*

Sex is included in the analysis as the dichotomous variable Female. Marital Status takes into account four categories: Married/Cohabiting, Separated/Divorced, Widowed, and Single. Regarding education, four educational categories were considered: No Formal Education, Incomplete Primary School, Complete Primary School, and More than Primary Education. Age is defined as a continue variable.

### *Health dimension*

In order to assess the relationship between health status and subjective survival expectations the health dimension includes measures of subjective physical health status, diagnosed diseases, and physical functioning. Self-assessed physical health status was defined as a three-category variable: Excellent/Very Good/Good (or Very Good/Good),<sup>3</sup> Fair, and Poor/Very Poor. Besides self-assessed physical health, this dimension includes an Index of Self-Reported Chronic Conditions (diabetes, cancer, heart disease, and hypertension).<sup>4</sup> This dimension also includes an Index of Physical Functioning.<sup>5</sup> The Index of Physical Functioning is a dichotomous variable indicating whether or not the respondent can perform without difficulties at least 85 per cent of the functions described in each of the studies respectively.<sup>6</sup>

### *Health-related Behaviors Dimension*

The health-related behaviors included in this dimension are smoking and practicing physical activities. It also includes an indicator on body weight status.<sup>7</sup> Smoking and practicing physical activities are taken into account by means of two dichotomous variables indicating whether the respondent is currently a smoker and whether he or she practices physical activities on regular bases.<sup>8</sup>

<sup>3</sup> The Chilean study asks respondents to define their health as Excellent, Very Good, Good, Fair, Poor, or Very Poor while the Mexican study asks respondents to define their health as Very Good, Good, Fair, Poor, or Very Poor.

<sup>4</sup> This is a weighted index defined following Charlson *et al.* (1987).

<sup>5</sup> The instruments used to measure physical functioning differ between studies. The Chilean study asks respondents about difficulties walking long distances, climbing stairs, dressing, exercising, eating, bathing, and getting into and out bed. While the Mexican study asks respondents about difficulties walking long distances, climbing stairs, dressing, lifting heavy objects, bending, getting to the standing position if sitting on a chair, going to the toilet, and getting to a standing position while lifting an object from the floor. Therefore, we used different variable definitions for testing models that include the health dimension.

<sup>6</sup> The index was constructed rescaling the total amount of positive answers (no difficulties) from 0 to 100.

<sup>7</sup> Body weight status is defined according the WHO cut-off points for BMI (Body Mass Index = ): Underweight (BMI < 18.5), Normal Weight (18.5 ≤ BMI < 25), Overweight (25 ≤ BMI < 30), Obese Class I (30 ≤ BMI < 35), Obese Class II (35 ≤ BMI < 40), Obese Class II (BMI ≥ 40).

<sup>8</sup> Here again due to differences in the instruments used by the MxFLS and the SPS, we constructed dichotomous variables stating whether respondents practice any type of physical exercise on regular bases. The Chilean study asks respondents about the regularity he or she practices any sport or physical activity (Every day, 5-6 days a week, 3-4 days a week, 1-2 days a week, 1-3 days a month, Never or almost never), while the Mexican study asks 3 questions on exercising (Do you make any kind of physical exercise as a routine, from Monday through Friday? How many days from Monday through Friday, do you exercise?, and How much time per day, on average, do you spend doing physical exercise?)

*Death Experience Dimension*

Both studies provide parental mortality data. Respondents were asked whether their parents were still alive. Only MxFLS respondents were also asked about the current age of their parents, both father and mother's age, if they were still alive and, the age at death if they were not.

**METHODS**

The determinants of subjective survival probabilities are studied by means of linear regression analysis where the dependent variable is Self-Reported Probability of Surviving to a Target Age. Due to differences in the wording of the questions according to the age of respondents, we only consider individuals aged 65 to 74 in 2002 and 2005 for the Mexican and Chilean samples respectively. In this age range both studies share the same target age: 75 years.

Different models were evaluated in a nested fashion following the dimensions listed earlier, one model for each dimension. However, instead of the four expected models we only evaluated three models for both studies. This decision is due to the huge amount of missing data that the Chilean study has for the survival of the parents' question.<sup>9</sup>

We used Non Linear Square (NLS) methods to estimate subjective life tables fitting a range of mortality functions: Gompertz, Weibull, and logistic. Estimations of subjective survival were done using the answer to the survival question to age 75: the conditional probability of surviving to age 75 given the respondent survived to his or her current age at the time of the survey. In contrast with previous research (like the study by Perozek (2008)), we assume that individuals adopt the same age pattern of mortality to assess survival expectations but allow them to differ in terms of the mortality levels they express. That is to say that subjective expectations of individuals the same age help identify mortality levels, whereas the shape of the mortality curve is identified using individuals of different ages.<sup>10</sup>

**RESULTS**

Tables 1 and 2 describe the analytical sample composition for males and females in both surveys, the Chilean SPS and the Mexican MxFLS res-

<sup>9</sup> 87.9 per cent of cases for males and 70.3 per cent of cases for females in the age range 65-74 (87.5 per cent and 66.1 per cent for males and females respectively in the age range 50-64) were missing, which would have unnecessarily decremented the sample size from 972 to 172.

<sup>10</sup> For a detailed explanation of the methodology see, Novak and Palloni (2013).

pectively. In relation to the Health Dimension, differences between males and females in the Chilean sample are mainly regarding the prevalence of hypertension, difficulties walking long distances and dressing. These prevalence, that are higher for females than for males, are reflected in the Index of Chronic Conditions, where the prevalence of having zero chronic conditions is lower for females than for males. The Index of Physical Functioning shows that the percentage of individuals with less functioning limitations is lower for females than for males. Regarding the Mexican sample, the percentage of those who report not having hypertension, diabetes, and heart disease is lower for males than for females. Results for males compared to females with respect to the Index of Chronic Conditions, difficulties walking and climbing stairs, as well as for the Index of Physical Functioning are similar to those obtained for the Chilean sample.

Table 2 shows that for males and females the prevalence of self-reported hypertension and heart disease is higher in the Chilean sample than in the Mexican one. No statistical significant differences were found regarding diabetes. Consistently, for both males and females, the percentage of individuals with no chronic conditions is higher among individuals in the Mexican study. On the contrary, the percentage of males and females reporting difficulties walking long distances and climbing stairs is higher among those in the Mexican sample. Another important difference between samples is found in the Sociodemographic Dimension where the percentage of individuals with no formal education is higher among those in the Mexican sample.

Tables 3 and 4 show Models A, B, and C including the Sociodemographic, Health, and Health-Related Behaviors dimensions in a nested way for Chile and Mexico, respectively. In general, all variables included in each dimension have the expected sign. However, there are differences between samples. Age is highly significant in both cases, although its contribution explaining the dependent variable seems to be greater in the case of Chile. The coefficients related to education are also as expected, however only for the Mexican case having no formal education, compared with having complete primary school, significantly decreases subjective survival expectations. Regarding marital status, only among individuals in the Chilean sample the coefficients associated with being separated/divorced, widowed or single, as compared with being married/cohabiting, have the expected negative sign although not statistically significant.

Table 1. Chile: Social Protection Survey (SPS) 2004. Descriptive Statistics

	Males	N	Females	N	a		Males	N	Females	N	a
Age Group (%)						Index of Chronic Conditions (%)					
65-70	55.5	296	56.0	246		0	50.7	270	38.5	169	*
70-75	44.5	237	44.0	193		1	37.1	198	42.4	186	
Education (%)						2	9.9	53	15.5	68	
Primary Incomplete	45.8	244	48.0	211		3	2.3	12	3.6	16	
Primary Complete	24.2	129	20.3	89		Difficulties Walking (%)					
More than Primary	19.7	105	18.0	79		Yes	8.6	46	16.4	72	
No Formal Education	10.3	55	13.7	60		No	91.4	487	83.6	367	**
Marital Status (%)						Difficulties Climbing Stairs (%)					
Married/Cohabiting	73.7	393	43.5	191	***	Yes	6.4	34	13.0	57	
Separated/Divorced	6.0	32	6.6	29		No	93.6	449	87.0	382	
Widowed	11.8	63	33.3	146	*	Difficulties Dressing (%)					
Single	8.5	45	16.6	73		Yes	2.4	13	3.9	17	
Self/Rated Health (%)						No	97.6	520	96.1	422	**
Excellent/Very good/Good	41.5	221	31.2	137	†	Index of Physical Functioning (%)					
Regular	43.5	232	46.6	204		Yes	12.2	65	21.4	94	
Bad/Very bad	15.0	80	22.2	98		No	87.8	468	78.6	345	**
Diabetes (%)						Exercise (%)					
Yes	12.4	66	14.6	64		Yes	16.9	90	11.6	51	
No	87.6	467	85.4	375		No	83.1	443	88.4	388	*
Hypertension (%)						Body Mass Index (%)					
Yes	35.3	188	56.0	246	***	Normal	36.2	193	36.6	160	
No	64.7	345	44.0	193	***	Underweight	1.7	9	1.1	5	
Heart Disease (%)						Overweight	46.5	248	35.5	156	*
Yes	13.3	71	10.7	47		Obesity class I	11.5	61	17.0	75	
No	86.7	462	89.0	392		Obesity class II/III	4.1	22	9.8	43	
Cancer (%)						Current Smoker (%)					
Yes	2.8	15	3.0	13		Yes	14.3	76	5.9	26	
No	97.2	518	97.0	426		No	85.7	457	94.1	413	*

a: Difference in proportions between males and females. Statistical significance: †:  $p < 0.1$ ; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$

Table 2. Mexico: Mexican Family Life Survey (MxFLS) 2005. Descriptive Statistics

	Males	N	b	Females	N	a	b	Males	N	b	Females	N	a	b	
Age Group (%)								Index Chronic Conditions (%)							
65-70	56.7	276		59.2	322			0	73.3	357	***	57.2	311	***	**
70-75	43.3	211		40.8	222			1	21.4	104	*	32.2	175	†	*
Education (%)								2	4.5	22		7.9	43		
Primary Incomplete	48.5	236		43.0	234			3	0.8	4		2.8	15		
Primary Complete	10.1	49	*	13.2	72			Difficulties Walking (%)							
More than Primary	9.0	44		5.5	30	†		Yes	28.6	307	†	55.7	747	***	***
No Formal Education	32.4	158	*	38.3	208	*		No	71.4	766	***	44.3	595	***	***
Marital Status (%)								Difficulties Climbing Stairs (%)							
Married/Cohabiting	77.2	376	*	54.6	297	***	*	Yes	17.6	189		31.7	426	**	*
Separated/Divorced	5.5	27		5.9	32			No	82.4	884	***	68.3	916	***	***
Widowed	12.6	61	**	33.6	183	**		Difficulties Dressing (%)							
Single	4.7	23	†	5.9	32			Yes	6.8	73		8.8	118		
Self/Rated Health (%)								No	93.2	1000	*	91.2	1224	†	*
Very good/ Good	34.7	169		31.6	172			Index of Physical Functioning (%)							
Regular	56.3	274	**	58.6	319	*		Yes	22.3	239	†	48.2	647	***	***
Bad/Very bad	9.0	44		9.7	53	†		No	77.7	834	***	51.8	695	***	***
Diabetes (%)								Exercise (%)							
Yes	13.8	67		21.4	116			Yes	10.0	107		8.5	114		
No	86.2	420		78.6	427	**		No	90.0	966	**	91.5	1228		†
Hypertension (%)								Body Mass Index (%)							
Yes	14.5	69	**	25.4	138	†	***	Normal	27.4	294	*	20.6	277	†	**
No	85.5	418	***	74.6	406	**	***	Underweight	1.5	16		1.0	14		
Heart Disease (%)								Overweight	44.5	477		37.0	496	*	
Yes	4.5	22		7.9	43	*	*	Obesity class I	22.1	237	†	26.0	349		
No	95.5	465	***	92.1	501	**	***	Obesity class II/III	4.6	49		15.4	206	*	
Cancer (%)								Current Smoker (%)							
Yes	0.4	2		1.6	9			Yes	18.1	194		4.1	55		†
No	99.6	485	*	98.4	535	†		No	81.9	879		95.9	1287	***	

a: Difference in proportions between males and females. b: Difference in proportions between Chile and Mexico. Statistical significance: †: p < 0.1; \*: p < 0.05; \*\*: p < 0.01 \*\*\*: p < 0.001

Table 3. OLS Models: Chile. Determinants Subjective Survival to Age 75

	Model A		Model B		Model C		Model C Standardized			
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.			
Female (Ref. Male)	0.015	0.017	0.034	*	0.017	0.030	†	0.017	0.057	
Age (Years)	0.016	***	0.003	0.018	***	0.003	0.018	***	0.003	0.209
Education (Ref. Complete Primary)										
Primary Incomplete	-0.011	0.021	-0.014	0.020	-0.014	0.020	0.020	-0.023		
More than Primary	0.039	†	0.022	0.005	0.022	0.013	0.022	0.020		
No formal Education	-0.030	0.027	-0.021	0.026	-0.022	0.026	0.026	-0.028		
Marital Status (Ref. Married/Cohabiting)										
Divorced/Separated	-0.008	0.034	-0.011	0.033	-0.011	0.033	0.033	-0.010		
Widowed	-0.005	0.022	-0.015	0.021	-0.017	0.021	0.021	-0.027		
Single	-0.010	0.026	-0.015	0.025	-0.010	0.026	0.026	-0.012		
Self-Rated Health (Ref. Excellent/Very Good/Good)										
Regular			-0.082	***	0.018	-0.082	***	0.019	-0.158	
Bad/Very Bad			-0.193	***	0.025	-0.192	***	0.025	-0.287	
Index Chronic Conditions (Range 0-3)			-0.005	0.011	-0.008	0.011	0.011	-0.025		
Index Physical Functioning (Ref. More than 85%)			-0.008	0.023	-0.010	0.023	0.023	-0.015		
BMI (Ref. Normal Weight)										
Underweight					-0.004	0.067	0.067	-0.020		
Overweight					-0.003	0.018	0.018	0.006		
Obese					0.049	*	0.022	0.077		
Smoker (Ref. No)					0.017	0.027	0.027	0.020		
Exercises (Ref. No)					-0.021	0.023	0.023	-0.029		
Constant	-0.281	0.194	-0.368	†	0.190	-0.209	0.219	-		
N	972		972		972					
R <sup>2</sup>	0.0358		0.1055		0.1123					
Prob>F	0.0000		0.0000		0.0000					
AIC	107.838		42.908		45.472					
BIC	151.752		106.340		133.301					

\*\*\*: p &lt; 0.001; \*\*: p &lt; 0.01; \*: p &lt; 0.05; †: p &lt; 0.1

Table 4. OLS Models: Mexico. Determinants Subjective Survival to Age 75

	Model A		Model B		Model C		Model C	
	Coef.	SE	Coef.	SE	Coef.	SE	Standardized Coef.	
Female (Ref. Male)	-0.022	0.018	0.004	0.019	0.006	0.019	0.219	
Age (Years)	0.009 **	0.003	0.011 ***	0.003	0.011 ***	0.003	0.108	
Education (Ref. Complete Primary)								
Primary Incomplete	0.055 †	0.029	0.048 †	0.028	0.040	0.028	0.045	
More than Primary	0.057	0.035	0.036	0.035	0.028	0.035	0.025	
No formal Education	-0.048 *	0.020	-0.041 *	0.019	-0.038 †	0.020	-0.066	
Marital Status (Ref. Married/Cohabiting)								
Divorced/Separated	0.085 *	0.038	0.078 *	0.037	0.078 *	0.037	0.063	
Widowed	-0.025	0.022	-0.025	0.021	-0.027	0.021	-0.043	
Single	0.017	0.039	0.010	0.039	0.005	0.039	0.004	
Self-Rated Health (Ref. Excellent/Very Good/Good)								
Regular			-0.029	0.019	-0.029	0.019	-0.056	
Bad/Very Bad			-0.130 ***	0.033	-0.132 ***	0.033	-0.138	
Index Chronic Conditions (Range 0-3)			-0.021	0.013	-0.025 †	0.013	-0.061	
Index Physical Functioning (Ref. More than 85%)			-0.072 ***	0.019	-0.071 ***	0.019	-0.117	
BMI (Ref. Normal Weight)								
Underweight					0.084	0.059	0.044	
Overweight					0.007	0.021	0.015	
Obese					0.044 †	0.023	0.068	
Smoker (Ref. No)					-0.010	0.032	-0.012	
Exercises (Ref. No)					0.060	0.039	0.049	
Constant	-0.132	0.219	-0.224	0.217	-0.230	0.218	-	
N	1,031		1,031		1,031			
R <sup>2</sup>	0.0338		0.0717		0.0790			
Prob>F	0.0000		0.0000		0.0000			
AIC	301.151		267.493		269.239			
BIC	345.569		331.652		358.076			

\*\*\*: p < 0.001; \*\*: p < 0.01; \*: p < 0.05; †: p < 0.1

On the contrary, among individuals in the Mexican sample only the coefficient associated with being widowed, although not statistically significant, has the expected sign. More surprising is the coefficient associated with being separated/divorced: its sign is in the opposite expected direction and statistically significant at the five per cent level. This last result needs more insight.

Regarding the Health dimension, self-rated regular and bad/very bad health, compared with excellent/very good/good health, as expected, significantly decrease subjective survival probabilities among individuals in both samples. However, their contribution explaining the dependent variable seems to be greater for the Chilean sample. The coefficients associated with the indexes of Chronic Conditions and Physical Functioning have the expected sign for both samples. Nevertheless, only among individuals in the Mexican sample they are statistically significant (at the 10 per cent and 0.1 per cent level, respectively).

About the variables included in the Health-related Behaviors dimension, the coefficients associated with BMI are in the opposite direction in both cases. Moreover, for the Chilean sample it is statistically significant at the 5 per cent level and for the Mexican sample at the 10 per cent level. That is to say, being obese, as compared with having normal weight, increases subjective survival probabilities of reaching age 75. It is worthwhile remembering that the category obese encompasses the categories obese classes I, II, and III. The coefficients associated with being a current smoker and practicing physical exercises on regular bases, although not statistically significant, have the expected sign for the Mexican sample. Among individuals in the Chilean sample, although these coefficients also lack statistical significance, they are in the opposite direction. That is to say, the coefficient associated with being a current smoker is positive (increasing subjective survival expectations) and the one associated with practicing exercises is negative (decreasing subjective survival expectations).

We decided to test separately other aspect related to the Health dimension: mental health. Depressed individuals may manifest a greater pessimism than non-depressed ones. It was shown that depressed individuals are less likely than the others are to predict that their own future outcomes would be more positive than future outcomes of similar individuals (Alloy and Ahrens, 1987). The Chilean survey includes a question about having ever been diagnosed with depression; 8.0 per cent of the analytical sample reported a depression diagnosis. Instead, the Mexican survey includes an

instrument for measuring severity of depression symptoms.<sup>11</sup> The instrument was meant to discriminate between depression and anxiety: 14.9 per cent of the analytical sample was identified as having anxiety<sup>12</sup> and 3.0 per cent as having mild and severe depression.<sup>13</sup> We collapsed these two categories into one named just depression. The variables associated with depression are not comparable between countries. They are included in Models D. Tables 5 and 6 show Model D estimates for Chile and Mexico, respectively. Among individuals in the Chilean sample, the coefficient associated to having ever been diagnosed with depression is not statistically significant; moreover, it is in the opposite expected direction. On the contrary, among individuals in the Mexican sample, the sign of the coefficients associated with anxiety and depression are as expected, both negative. However, only the coefficient associated with anxiety is significant.

In the case of the Mexican sample, we also estimated a fifth model, Model E, incorporating to Model D the Death Experience dimension. This dimension includes a variable reporting whether the same-sex parent was dead. Table 6 also shows Model E estimates for Mexico.

In order to compare the performance of Models A, B, and C, we use the Akaike's information criterion (AIC) and the Bayesian information criterion (BIC). These two methods vary in the weight that they give to simplicity, the fewness of parameters, with the penalty term being larger in BIC than in AIC (Forster, 2000). Lower values on each of these two criteria indicate a better fit. Results of applying the AIC and BIC criteria were similar. They both favor Model B (Tables 3 and 4). In other words, Model B is the most parsimonious. For these samples, the Health-related Behavior dimension does not increase the explanatory power to the models.

Figure 1 shows predicted subjective survival probabilities for both Mexico and Chile. Predictions are based on Model B in both cases. Although conditional subjective survival probabilities for both males and females increase with age, subjective survival expectations for Chileans are much higher than for Mexicans.

<sup>11</sup> For an extensive description of the instrument, see Calderón (1997).

<sup>12</sup> Medina-Mora *et al.* (2003) using the National Survey of Psychiatric Epidemiology (Encuesta Nacional de Epidemiología Psiquiátrica) 2002-2003 found that anxiety prevalence in Mexico was 14.3 per cent, which is consistent with anxiety prevalence in the analytical sample.

<sup>13</sup> Using the National Performance Evaluation Survey (Encuesta Nacional de Evaluación del Desempeño) 2002-2003, Belló *et al.* (2005) found a 4.5 per cent prevalence of depression, which is also consistent with the three per cent depression prevalence in the analytical sample. Differences in magnitude between this figure and the prevalence of depression in the analytical sample may be due to the age range of respondents. In our case, individuals are 65-74 while in survey are 18 years and over.

Table 5. OLS Models: Chile- Determinants Subjective Survival to Age 75

	Model A			Model B			Model C			Model D		
	Coef.	SE	Standardized	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.
Female (Ref. Male)	0.015	0.017		0.034	0.017	0.030	0.017	0.028	0.017	0.054	0.017	0.054
Age (Years)	0.016	***		0.018	***	0.018	***	0.018	***	0.210	0.003	0.210
Education												
(Ref. Complete Primary)												
Primary Incomplete	-0.011	0.021		-0.014	0.020	-0.014	0.020	-0.014	0.020	-0.023	0.020	-0.023
More than Primary	0.039	†		0.005	0.022	0.013	0.022	0.014	0.022	0.021	0.022	0.021
No formal Education	-0.030	0.027		-0.021	0.026	-0.022	0.026	-0.023	0.026	-0.028	0.026	-0.028
Marital Status												
(Ref. Married/Cohabiting)												
Divorced/Separated	-0.008	0.034		-0.011	0.033	-0.011	0.033	-0.010	0.033	-0.010	0.033	-0.010
Widowed	-0.005	0.022		-0.015	0.021	-0.017	0.021	-0.017	0.021	-0.027	0.021	-0.027
Single	-0.010	0.026		-0.015	0.025	-0.010	0.026	-0.010	0.026	-0.013	0.026	-0.013
Self-Rated Health (Ref. Excellent/Very Good/Good)												
Regular				-0.082	***	-0.082	***	-0.083	***	-0.160	0.019	-0.160
Bad/Very Bad				-0.193	***	-0.192	***	-0.194	***	-0.291	0.026	-0.291
Index Chronic Conditions (Range 0-3)				-0.005	0.011	-0.008	0.011	-0.009	0.011	-0.027	0.011	-0.027
Index Physical Functioning (Ref. More than 85%)				-0.008	0.023	-0.010	0.023	-0.020	0.023	-0.014	0.023	-0.014
BMI (Ref. Normal Weight)												
Underweight				-0.004	0.067	-0.004	0.067	-0.041	0.067	-0.019	0.067	-0.019
Overweight				-0.003	0.018	0.003	0.018	0.003	0.018	0.006	0.018	0.006
Obese				0.049	*	0.049	*	0.049	*	0.077	0.022	0.077
Smoker (Ref. No)				0.017	0.027	0.016	0.027	0.016	0.027	0.019	0.027	0.019
Exercises (Ref. No)				-0.021	0.023	-0.021	0.023	-0.021	0.023	-0.029	0.023	-0.029
Depression (Ref. No)												
Constant	-0.281	0.194		-0.368	†	0.190	0.190	-0.418	0.020	0.021	0.030	0.021
N	972			972		972		972		972		972
R <sup>2</sup>	0.0358			0.1055		0.1123		0.1128		0.1128		0.1128
Prob>F	0.0000			0.0000		0.0000		0.0000		0.0000		0.0000
AIC	107.838			42.908		45.472		47.009		47.009		47.009
BIC	151.752			106.340		133.301		139.717		139.717		139.717

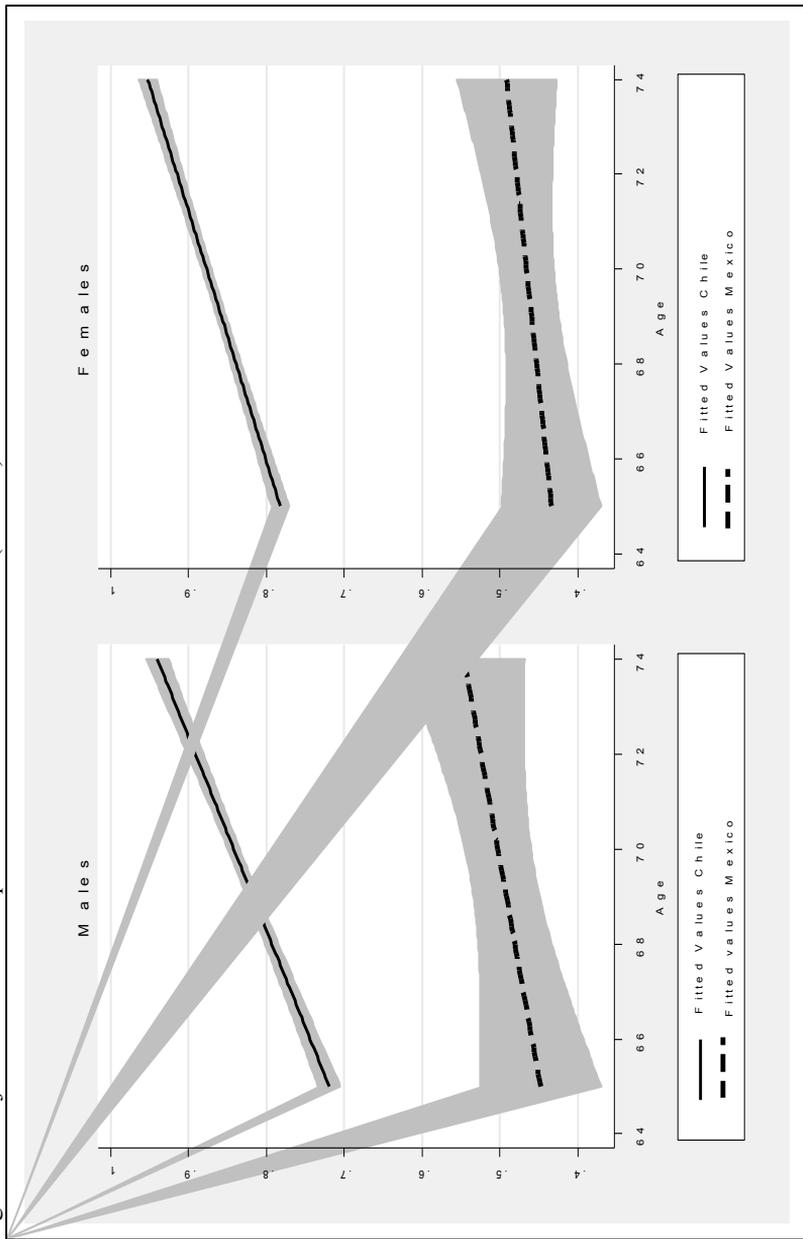
\*\*\*: p < 0.001; \*\*: p < 0.01; \*: p < 0.05; †: p < 0.1

Table 6. OLS Models: Mexico - Determinants Subjective Survival to Age 75

	Model A			Model B			Model C			Model D			Model D Standardized			Model E			Model E Standardized			
	Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		
Female (Ref. Male)	-0.022	0.018		0.004	0.019	0.006	0.019	0.004	0.019	0.007	0.019	0.007	0.003	0.019	0.003	0.003	0.019	0.003	0.003	0.019	0.003	0.005
Age (Years)	0.009	** 0.003	0.011	**	0.003	0.011	**	0.003	0.011	**	0.003	0.113	0.012	**	0.003	0.012	**	0.003	0.012	**	0.003	0.116
Education (Ref. Complete Primary)																						
Primary	0.055	† 0.029	0.048	†	0.028	0.040	0.028	0.039	0.028	0.044	0.028	0.044	0.039	0.028	0.044	0.039	0.028	0.044	0.039	0.028	0.044	0.044
Incomplete																						
More than Primary	0.057	0.035	0.036		0.035	0.028	0.035	0.025	0.035	0.023	0.035	0.023	0.025	0.035	0.023	0.025	0.035	0.023	0.025	0.035	0.023	0.022
No formal Education	-0.048	* 0.020	-0.041	*	0.019	-0.038	†	0.020	-0.036	†	0.020	-0.060	-0.036	†	0.020	-0.036	†	0.020	-0.036	†	0.020	-0.061
Marital status (Ref. Married/Cohabiting)																						
Divorced/Separated	0.085	* 0.038	0.078	*	0.037	0.078	*	0.037	0.082	*	0.037	0.067	0.081	*	0.037	0.081	*	0.037	0.081	*	0.037	0.067
Widowed	-0.025	0.022	-0.025		0.021	-0.027	0.021	-0.028	0.021	-0.042	0.021	-0.042	-0.029	0.021	-0.042	-0.029	0.021	-0.042	-0.029	0.021	-0.042	-0.044
Single	0.017	0.039	0.010		0.039	0.005	0.039	0.002	0.039	0.002	0.039	0.002	0.039	0.002	0.039	0.002	0.039	0.002	0.039	0.002	0.039	0.001
Self-Rated Health (Ref. Excellent/Very Good/Good)																						
Regular	-0.029	0.019	-0.029		0.019	-0.029	0.019	-0.025	0.019	-0.044	0.019	-0.044	-0.025	0.019	-0.044	-0.025	0.019	-0.044	-0.025	0.019	-0.044	-0.043
Bad/Very Bad	-0.130	**	0.033	-0.132	**	0.033	-0.114	**	0.033	-0.118	**	0.033	-0.115	**	0.033	-0.115	**	0.033	-0.115	**	0.033	-0.119
Index Chronic Conditions (Range 0-3)	-0.021	0.013	-0.025	†	0.013	-0.022	†	0.013	-0.022	†	0.013	-0.054	-0.022	†	0.013	-0.022	†	0.013	-0.022	†	0.013	-0.055
Index Physical Functioning (Ref. More than 85%)	-0.072	**	0.019	-0.071	**	0.019	-0.063	**	0.019	-0.108	**	0.019	-0.064	**	0.019	-0.064	**	0.019	-0.064	**	0.019	-0.109
BMI (Ref. Normal Weight)																						
Underweight	0.084	0.059	0.083		0.059	0.083	0.059	0.083	0.043	0.043	0.059	0.043	0.085	0.059	0.043	0.085	0.059	0.043	0.085	0.059	0.044	0.044
Overweight	0.007	0.021	0.005		0.021	0.005	0.021	0.005	0.021	0.009	0.021	0.009	0.006	0.021	0.009	0.006	0.021	0.009	0.006	0.021	0.009	0.101
Obese	0.044	†	0.023	0.043	†	0.023	0.043	†	0.023	0.068	0.023	0.068	0.044	†	0.023	0.044	†	0.023	0.044	†	0.023	0.070
Smoker (Ref. No)	-0.010	0.032	-0.008		0.032	-0.008	0.032	-0.008	0.032	-0.008	0.032	-0.008	-0.008	0.032	-0.008	-0.008	0.032	-0.008	-0.008	0.032	-0.008	-0.007
Exercises (Ref. No)	0.060	0.039	0.060		0.039	0.060	0.039	0.060	0.039	0.048	0.039	0.048	0.056	0.039	0.048	0.056	0.039	0.048	0.056	0.039	0.048	0.048
Depression (Ref. Normal person)																						
Anxiety																						
Depression																						
Same sex parental dead (Ref. No)																						
Constant	-0.132	0.219	-0.224		0.217	-0.230	0.218	-0.244	0.218	-	0.218	-	-0.070	**	0.025	-0.069	**	0.025	-0.069	**	0.025	-0.080
N	1,031	1,031	1,031		1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031
R2	0.0338	0.0717	0.0877		0.0790	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877	0.0877
Prob>F	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIC	301.151	267.493	269.239		269.239	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400	263.400
BIC	345.569	331.652	358.076		358.076	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169	357.169

\*\*\*: p < 0.001; \*\*: p < 0.01; \*: p < 0.05; †: p < 0.1

Figure 1. Subjective Survival Expectations – Linear Predictions (95% CI)



Source: SPS-2004 and MxFLS-2005.

Chilean females unlike Mexican females, report, as expected, subjective probabilities of surviving to age 75 that are significantly greater, although only at 10 per cent level, than those reported by males are.

We compared results obtained adjusting the aforementioned mortality functions to the subjective data with published life tables.<sup>14</sup> In the case of the Chilean study, we found that the logistic data offers a better fit than the Gompertz and Weibull functions. In the Mexican case the Gompertz and the logistic functions yielded similar results. Therefore, we estimated subjective life expectancy at birth by means of non-linear regression analysis fitting a logistic survival function for both samples. Results show that  $se_0 = 77.2$  and  $se_0 = 79.1$  for Chilean males and females respectively and  $se_0 = 74.9$  and  $se_0 = 75$  for Mexican males and females respectively. Subjective life expectancy at birth among females in the Chilean study is higher than subjective life expectancy at birth among males. On the contrary, subjective life expectancy among females in the Mexican study is similar than subjective life expectancy at birth among males.

## DISCUSSION

The main objective of this study is to investigate and compare the determinants of subjective survival expectations as are stated by adults aged 65 to 74 years in Chile and Mexico. Results show that the determinants of subjective survival expectations are consistent for both, Chile and Mexico, with those reported by the literature for the US and Europe. Both studies show that age is an important determinant of subjective probabilities of surviving to a given age. In the same way, the Health dimension is highly relevant in determining subjective survival. However, contrary to what was expected, smoking as a health-related behavior was not a significant determinant of subjective survival in neither study. In fact, adding the Health-related dimension to a model including sociodemographic and health variables did not add explanatory power to the model.

The unexpected opposite signs of the coefficients associated with smoking and exercising among individuals in the Chilean sample may be related to the age of respondents, particularly for being a current smoker. Including in our models a variable indicating number of cigarette packs smoked per month instead of status as current smoker does not change

<sup>14</sup> For Mexico, we used data from the Mexican Demographic Society (Sociedad Mexicana de Demografía): Conciliación Demográfica de México y Entidades Federativas 1990-2010. For Chile we used data published by the National Institute of Statistics (Instituto Nacional de Estadísticas): Proyecciones y Estimaciones de Población, Total País, 2004. Available at: [http://deis.minsal.cl/deis/ev/esperanza\\_de\\_vida/index.asp](http://deis.minsal.cl/deis/ev/esperanza_de_vida/index.asp)

results. It is possible that respondents who survived to age 65 and more and are current smokers think that they are already too old for them to be affected by smoking. Changing the age range to 50 to 64 years and testing the determinants of subjecting survival to age 65 among individuals in the Chilean study results were somehow different. Although still not significant, the coefficient related to being a current smoker is in the expected negative direction. Similar results were obtained when analyzing the Mexican sample. Interestingly enough, Balia (2014) identified two groups of smokers. One of them seemed to attribute less damaging effects of smoking on health and mortality, the group being composed of “hard-core smokers.” The second group, that was less frail and less addicted than the first one, on the contrary, seemed to be more rational assessing health status and survival probabilities regarding the consequences of smoking. The author concluded that the heavy smokers, who were in general older than the others, might have believed that they did not have time left for smoking to affect their mortality risk. This seemingly lack of awareness of the damaging effects of smoking on health and on the long run, on longevity, is in contrast to estimates obtained from mortality data. For example, Palloni *et al.* (2015) showed that differences in life expectancy at age 50 between observed mortality and its counterfactual, life expectancy at age 50 in case the fraction of deaths attributable to smoking would be eliminated, that is in the absence of smoking, are large: around four years for Chile and two years for Mexico. These differences in life expectancy between countries reflect the stages of the smoking epidemic that each country is undergoing, with Chile at an advance stage and Mexico at an early one.

Results regarding subjective survival and relative body weight status suggest a similar lack of awareness of the consequences of being obese. For both samples the coefficient associated with being obese as compared with having normal weight are positive and statistically significant. According to the Pan American Health Organization (2014), in Chile, Mexico, and United States of America the prevalence of obesity and overweight among individuals 20 years and older reaches 70 per cent. Particularly for Mexico, Palloni *et al.* (2015) estimated that under current conditions of overweight and obesity prevalence, diabetes incidence and related mortality, individuals are likely to experience losses in life expectancy at age 50 of between 1 to 2 years. These losses are somewhat less than those associated with smoking prevalence in some countries of the region. More research is needed particularly to understand the results regarding the body weight status being as both samples are from countries where the environ-

ment contributes to promote gaining weight, an obesogenic environment (Mackenbach *et al.* 2014). We should stress that health is not mediating the relationship between subjective survival and health-related behaviors. We evaluated a model with only this dimension adjusted for demographic characteristics and the coefficients associated with the variables included in the Health-related behavior dimension are not substantially different from the coefficients obtained in model C.

Some caveats are in order: to compare the determinants of subjective probabilities of surviving between both studies we redefine different variables. Among them the index of physical functioning, the index of chronic conditions, and the variable associated with mental health. To ensure that the definition used for the index of physical functioning does not affect the results for Chile, we run the models with different index definitions. There were no significant changes in the results. Moreover, we run the models not using an index but with a set of dummy variables, one for each of the questions asked in the study that were part of the index. Except for having difficulties walking and climbing stairs, none of the other dummy variables were statistically significant. However, the coefficients related with these variables were in opposite directions, positive the one associated with walking long distances and negative the one associated with climbing stairs (both significant at the five per cent level). These two results could be affecting the lack of significance of the coefficient related to the physical functioning index. Regarding the unexpected result for climbing stairs, it may be due to the wording of the questions.<sup>15</sup>

Regarding the index of chronic conditions, we tested separately the four conditions that comprise this index. In the case of the Chilean study we found that although the coefficients associated with each of them were in the expected direction (except for cancer, but this result may be due to the very small prevalence of the condition in the sample) none of them were statistically significant.

As mentioned earlier, the Mexican study includes an instrument meant to measure the severity of depression symptoms. The Mexican instrument discriminates between anxiety and depression. Even though only the coefficient associated with anxiety was significant, the coefficient associated with depression was in the expected direction. This result may reflect the low prevalence of individuals classified as having symptoms of depression, only three per cent among individuals in the analytical sample. Surpris-

<sup>15</sup> SPS: "Do you usually have difficulties or need help to climb stairs? (Yes/No)"; MxFLS: "If you had to climb up stairs without help, could you do it? (Easily, With difficulty, Not do it)."

gly enough, because depression is consistently found as decreasing survival expectations (Griffin *et al.*, 2013; Hudomiet and Willis, 2013), among individuals in the Chilean sample the coefficient associated to having ever been diagnosed with depression is not statistically significant and is in the opposite expected direction. One possible explanation of this result lies in the wording of the survey question and its interpretation. Having ever been diagnosed with depression may be understood as ever been diagnosed with a depression episode. As a depression disorder, these episodes should last at least for two weeks (Belló *et al.*, 2005). Despite the fact that the prevalence of depression in Chile is very high (Bossert and Leisewitz, 2016), because life expectancy in Chile is also relatively high we may speculate, as Hamermesh (1985) did, that people extrapolate improvements in longevity when estimating survival while being aware of the level and changes of current life tables, independently of their depression symptoms.

Results obtained for life expectancy at birth are accurate compared with 2000-2005 published estimates.<sup>16</sup> The UN World Population Prospective estimates of life expectancy at birth are  $e_0 = 74.6$  and  $e_0 = 81$  for Chilean males and females respectively ( $se_0 = 77.2$  and  $e_0 = 79.1$  for males and females). While  $e_0 = 72.4$  and  $e_0 = 77.4$  for Mexican males and females respectively ( $se_0 = 74.9$  and  $se_0 = 75$  for males and females). In both cases, males overestimate their future life expectancy (around two and three years Chilean and Mexican males respectively) while females underestimate it (around two years both Chilean and Mexican females).

There are several hypothesis trying to explain this “anomaly,” as Mirrowsky (1999) called it: First, as mortality rates are higher among men than among women, men may think there is more room for decreasing mortality rates among them than among women. Second, they may sense they have higher life expectancy than women do, because in general men show to be in better health than women are (Read and Gorman, 2005). In the same way, their higher SES may suggest them that they have a higher life expectancy than actuarial estimates indicate because of the inverse relationship between SES and mortality (Adler *et al.*, 1994; Elo, 2009; Lynch *et al.*, 2000; Marmot *et al.*, 1997).

An important property of self-reported probabilities of any kind is the high frequency of what Hurd and McGarry (1995) called “focal-point responses.” A focal-point response is found when the answer given to the question regarding the respondents’ beliefs on the probability of occurrence of any given future event corresponds to a probability of zero, one half,

<sup>16</sup> <http://data.un.org/Data.aspx?d=GenderStat&f=inID%3A37>

or one. Focal point responses are not rare; on the contrary, surveys usually show a fair amount of them in response to questions on subjective expectations that allow numerical scale answers.<sup>17</sup> One of the problems with the fifty percent chance responses is the difficulty, or impossibility, of distinguishing if they are the respondents' expression of the belief that their chances are fifty percent (Gärdenfors and Sahlin, 1982) or of the inability to express their beliefs in a probabilistic manner (Fischhoff and Bruine de Bruin, 1999). A fifty percent response may allow uncertain respondents to answer a question numerically instead of giving a "don't know" answer (Bruine de Bruin *et al.*, 2000). Balia (2014) states that, under the rationality assumption, an individual who is uncertain would consider his or her chances to live until a target age or die before it to be equal and therefore give the fifty percent answer. For testing the sensitivity of the results to focal-point answers, we run different models, particularly omitting answers that represented 0.5 probabilities of surviving to age 75. Results did not differ in any quantitative or qualitative way. Excluding focal-point answers when estimating subjective life expectancy do not yield significant different results either.

One of the limitations of the present study is related to differences in the subjective survival question between surveys. We only considered individuals aged 65 to 74 in 2002 and 2005 for the Mexican and Chilean samples respectively because in this age range both studies share the same target age: 75 years. We run our models for the Mexican sample using the whole available age range, 50-74 (the question was asked to individuals 50 years old and over). Results did not vary qualitatively although we gain statistical power. For the Chilean, sample because the question varies the target age according to the respondent's age at survey, in order to analyze the determinants of subjective survival, which in our case was age 75, we should have changed our research objective altogether asking for the determinants of surviving at least 10 years more from current age. This analysis remains to be done.

The other important limitation is that the analysis of the effect of parent's survival status on respondent's subjective survival expectations could not be done for the Chilean study because of the amount of missing values in the answer to this question (more than 70 per cent). We studied the likeli-

<sup>17</sup> Among individuals in the Chilean study, the distribution of focal-point responses is as follows: 0 per cent chance of surviving to age 75, 1.69 per cent and 1.34 per cent, 50 per cent chance, 16.49 per cent and 13.28 per cent, and 100 per cent chance, 51.17 per cent and 49.70 per cent, for males and females respectively. Among individuals in the Mexican study, the distribution is 0 per cent chance 5.08 per cent and 4.82 per cent, 50 per cent chance, 36.30 per cent and 33.49 per cent, and 100 per cent chance, 8.89 per cent and 8.97 per cent for males and females respectively.

hood of not answering the question on survival status of parents and found that the odds of not answering the question being female are four times the odds of not answering it being male. As expected, the odds of lacking information on parental mortality for individuals with complete primary education and for individuals with more than primary education are 60 per cent and 40 per cent, respectively, the odds of lacking this information for individuals with incomplete primary education. On the contrary, the odds of not answering this question for individuals with no formal education are more than two times the odds for individuals with incomplete primary education. This last result is consistent with findings by Kleinjans and van Soest (2014). One possible explanation is that individuals with less education and cognitive capacity may find it more difficult to express expectations as probabilities (Bago D'Uba *et al.*, 2015). Unfortunately, the Chilean survey does not provide information on cognitive ability of respondents.

Despite this limitations subjective survival estimations have the same properties shown in the fair amount of studies that analyzed data from the United States and Europe. Results obtained in the present study highlight the need of a better understanding of how individuals estimates their survival expectations.

## CONCLUSIONS

Survival expectations are responses to questions about probabilities of the surviving age that could be attained by respondents in the future. Work on survival expectations is relatively new and part of a larger literature on individual expectations (Manski, 2004). Much like self-rated health (Idler and Benyamini, 1997), subjective survival was also found to be a significant mortality predictor even controlling for sociodemographic factors and health-related conditions (Elder, 2014; Hurd *et al.*, 2001; Hurd and McGarry, 2002; Smith *et al.*, 2001). This line of research has seldom been addressed for Latin American countries.

The importance of subjective survival expectation has been growing rapidly as researchers uncover patterns, determinants and remarkable consistency with individual health status and changes thereof (Liu *et al.*, 2007), past and current health-related behaviors (Falba and Busch, 2005; Khwaja *et al.*, 2006, 2007, Scott-Sheldon *et al.*, 2010), experiences of health shocks and individual self-reported health (Smith *et al.*, 2001). There is still much to be done on this topic. For example, an important point that we did not address, and is worthwhile exploring, particularly for Mexico, is the influence of the violent environment on subjective survival expecta-

tions. We may hypothesized as individuals with experience of violence or crime (robbery, assault, aggression) feel more vulnerable and this may be reflected on their survival expectations. Finally, explaining, at least part, of the process by which individuals determine their future survival may help on determining differentials in health and mortality across societies and cultures.

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