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Full-Length Research Report

Promoting Active Aging Through University Programs for Older Adults

An Evaluation Study

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Abstract. Throughout history, formal education has been "age-based," in the sense that primary, secondary, further, and higher education have been planned and implemented with the main objective of preparing citizens for working life. However, gerontological research on cognitive plasticity in the latter half of the 20th century provided evidence of learning potential throughout the lifespan and into old age. The II International Plan of Action on Aging recognizes the importance of older adults in contributing to social and economic development, remaining active and having the right to benefit from lifelong learning (LLL) policies. Consequently, universities have been opened up to older adults, and university programs for older adults have been developed. Our general hypothesis is that those older adults who follow a university program will improve the core of active aging, which involves cognitive, emotional, and social factors. The quasiexperimental group was 82 older adults who followed the University Program for Older Adults at the Autonomous University of Madrid from 2007 to 2010. These were then compared with a control group ($N = 76$) over the same period. Pre/post comparisons show that participants obtain significant benefits, attributable to the program, in that they maintain their cognitive performance evaluated through the Digit-Symbol Test, their health (assessed through the number of illnesses reported), and their level of activity (information-seeking and social activities), increase their level of positive affect. At the end of the Program, significantly more of those who enrolled on it were classified as "active agers," compared to the control group.

Keywords: university programs for older adults, active aging, cognitive plasticity

Introduction

Active aging can be defined as an adaptation process over the lifespan for maintaining optimal physical (including health) and psychological (motor, cognition and emotion-motivation) functioning, as well as high levels of social participation (Fernández-Ballesteros, 2002; Rowe & Khan, 1987; WHO, 2002). Among the determinants of active aging, the pursuit of education is one of the most important factors, not only because education is key to one's occupation – and hence one's socioeconomic status – but also because schooling and lifelong education influence health and all behavioral repertoires across the lifespan (Bandura, 1987; Staats, 1975), as shown empirically in cross-sectional, longitudinal and cohort studies (e.g., Baltes & Meyer**[or MAYER???]**, 1999; Schaie, 2005a,b).

Compulsory education has been behind the increase in life expectancy and other indicators of human development, having been first introduced in the late 19th century as a basic tool for individual, social, and national development (United Nations, 2000**[in refs 2002]**). Throughout the 20th century, formal education was "age-based," so that at all levels (from primary to university) it was designed with the primary objective of preparing individuals for working life.

The final third of the 20th century saw the opening up of educational opportunities for adults along two lines: universities of the third age (U3A) and lifelong learning (LLL) courses (see ACE, 2007; Fisher & Wolf, 2000).

U3As began as university courses for older adults in a local context, at a specific university. In 1973, the University of the Third Age was founded by Prof. Pierre Vellas at the Faculty of Social Sciences in Toulouse (France). Since then, universities of the third age have appeared in many countries worldwide. Typical courses include art, classical studies, computing, crafts, debating, drama, history, languages, literature, music, sciences, social sciences, and philosophy. Courses have traditionally been in the areas of humanities and social sciences, though today there are also opportunities in natural sciences and technology (see Formosa, 2010; Swindell & Thompson, 1995).

The goal of lifelong learning (LLL) policies, first introduced in the 1990s, is to promote learning and educational

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opportunities throughout adulthood and into old age (Field, 2006; Kim & Merriam, 2004).

It is, of course, important to distinguish U3As from LLL programs for older adults. Jütte, Nicoll, and Olesen (2011), in their Editorial Statement of the RELA (*European Journal for Research on the Education and Learning of Adults*), point out that between them they account for a broad range of learning program types: High school activities for older persons, evening classes, and liberal adult education, education organized by trade unions and civic organizations, basic education for adults, professional continuing education and training, human resources development, and so on. Nevertheless, with the support of LLL policies, most of the U3As have introduced university programs for older adults (Programas Universitarios para Mayores, PUMAs), which have appeared worldwide as innovative LLL tools for promoting personal development and active aging.

Furthermore, according to the II International Plan of Action on Aging (MIPAA; UN, 2002), Priority Direction I (Aging and Development), education is a crucial basis for an active and fulfilling life, so that continuing education and training are essential for extending development into old age and ensuring the productivity of both individuals and nations.

Along a similar line, in the seminal booklet "Active Ageing. A Policy Framework," the WHO (2002) proposed the promotion of educational programs at all levels as a policy aimed at extending and establishing healthy aging, not only from the biomedical and physical health perspectives, but also in terms of quality of life and wellbeing. Finally, among determinants of active aging, the WHO refers explicitly to schooling, education and lifelong learning.

The term "active aging" has become iconic, a kind of mantra not only for gerontological science, but also, and especially, for decision-makers responsible for social and health policies and programs for older adult populations. However, active aging is just expression among many others which set out to describe basically the same concept, including healthy, successful, positive, optimal, or productive aging, or indeed aging well or vital aging (for a review, see Fernández-Ballesteros, 2008; Fernández-Ballesteros et al., 2012). In this study, active aging is defined from a psychological perspective as embracing behavioral health and physical fitness, cognitive functioning, affect, and social participation and engagement. But to what extent have the effects of LLL university programs on individuals been evaluated?

The National Association of University Programs for Older Adults (AEPUM, Asociación Estatal de Programas Universitarios para Mayores) carried out a formative evaluation study on most of the university programs for older adults in Spain (see Bru, 2007). The general objectives of most of these courses are as follows: to promote knowledge and new technologies, to increase social integration and participation and intergenerational relationships, and to promote personal development and wellbeing. Clearly, there is considerably overlap between these goals and the components of active aging. Typically, these programs would involve 3-year courses (this applies to 75% of PUMAs), with academic years from October to June, a total of some 45 credits, and 450 teaching hours over the 3 years. As far as content is concerned, most are humanities, social, and natural sciences as well as ICT (information and communications technology) courses, with some elective components (depending on the university). There are also complementary activities, such as visits to museum, galleries, exhibition centers, and so on. Unfortunately, this very broad formative evaluation study did not provide evidence about the effects of these programs on students.

There is a broad-based and scientifically sound body of knowledge about the effect of an enriched environment on cognitive development (for a review, see Hertzog, Kramer, Wilson, & Lindenberg, 2009). The research on learning potential and cognitive plasticity supports the modifiability of cognitive decline through cognitive training and/or stimulating environments (e.g., Fernández-Ballesteros, 2008, Chap. 4; Fernández-Ballesteros et al., 2012; Schaie, 2005a, 2005b). It can be hypothesized that a university program for older adults would be a stimulating environment that can determine positive change in cognition. Nevertheless, and although the European Commission supports several programs for LLL networking and actions, apart from formative evaluation (number of people involved, type, and content of courses) and other qualitative and subjective information (such as reported satisfaction with the course and/or formative data), there is generally very little evidence about the effects these programs can have on participants (Price, Handley, Millar, & O'Donovan, 2010).

Recently, from an international perspective and using a quasiexperimental design, we examined the effects of university courses for older adults, taught throughout one academic year (with similar credit values but a varied range of content) at four institutions in Spain and Latin America (Autónoma University of Madrid, Autónoma University of Mexico, La Habana University in Cuba, and the Universidad Católica in Chile; Fernández-Ballesteros et al., 2012). Comparisons between preexperimental and postexperimental and control groups showed that the experimental group improved their group stereotypes and self-perception of aging, as well as increasing their positive affect and improving their hedonic balance.

Previously, Ordonez, Tavares, and Cachioni (2011) had found that after one academic semester of a third age university program in Brazil, older adults improved their depressive mood. Thus, there is evidence to suggest that university programs for older adults yield positive results in the fields of personal and social perception and positive affect.

However, despite such promising findings, much more evidence is required as to the extent to which university courses for older adults produce positive changes.

In sum, although U3A and LLL courses have common bases (extending the process of teaching/learning across old age), their goals and content can vary, as can their format (credits, sessions, tutorials, etc.). And finally, over and above the results in academic achievement, more data are needed on the effects they have on those older adults who attend them.

Our general hypothesis is that those older adults who follow a university program improve the cognitive, physical, emotional, and social factors that constitute the core of active aging. Thus, the primary goal of the present evaluation study was to measure the extent to which a university program for older adults lasting for 3 academic years has positive effects in these areas.

Method

Design

A pre/post quasiexperimental with quasicontrol group design was used (Millsap & Maydeu-Olivares, 2009; Montero & León, 2007). Thus, two groups were assessed and compared using the same measures over the same period of time.

Participants

The experimental group was made up of students on the University Program for Older Adults (PUMA) from 2007 to 2011, who were assessed before and after the program. The control group was made up of a subsample of the Longitudinal Study of Active Aging (ELEA, see Fernández-Ballesteros et al., 2011), who were assessed at baseline and in the first follow-up, with a similar time interval to that of the experimental group. None of the control individuals in the follow-up had enrolled on any educational programs in the intervening period.

Quasiexperimental Group

Individuals were recruited on the standard basis (after an exam) and registered on a 3-year PUMA program at the Autónoma University of Madrid in October 2007. The sample consisted of 82 individuals, 54% of them women, with an age range of 55 to 70 (mean age = 61.06, *SD* = 4.19), assessed in the year 2007 and in May 2010 at post-assessment. After 3 academic years, 67 individuals had completed the program, and 56 of them agreed to participate in the posttest evaluation (68%) in 2011 (50% women; mean age = 63.39; *SD* = 4.40).

Quasicontrol Group

Control group individuals were recruited from the Longitudinal Study of Active Aging-ELEA (Estudio Longitudinal sobre Envejecimiento Activo), beginning in 2006. As pretest values we used the baseline measures of one of the ELEA subsamples. Participants were 76 volunteers taken from a representative probabilistic sample of the population of Madrid, 50% of them women, with an age range of 55–70 (mean age = 62.09; *SD* = 4.17) (for a description of the sample, see Fernández-Ballesteros et al., 2011). As

Table 1. Sociodemographic characteristics of Experimental-PUMA and Control-ELEA final sample

		Experimental-PUMA		Control-ELEA		T_{93}		*p*
N		56		39				
Mean age* (*SD*)		60.89 (4.33)		61.76 (3.90)		1.007		0.317
		N	%	*N*	%	χ^2	(*df*)	*p*
Sex	Men	28	50	25	64	1.235	(1)	0.226
	Women	28	50	14	36			
Education	No formal schooling	0	0	3	8	9.335	(4)	0.053
	Primary	8	14	11	28			
	Secondary	14	25	6	15			
	High	18	32	7	18			
	University	16	29	11	28			
	Missing	0	0	1	3			
Profession	Housewife	2	4	2	5	3.072	(7)	0.878
	Professional	6	11	6	15			
	Freelance	1	2	1	3			
	Official	11	19	7	18			
	Manager	6	11	6	15			
	Qualified employee	24	42	13	34			
	Other	6	11	2	5			
	Missing	0	0	2	5			

Notes. *Mean age at pretest.

Table 2. Subjects of Control-ELEA and Experimental-PUMA who were evaluated and dropped out

	Experimental-PUMA[2]		Control-ELEA[1]	
	N	%	*N*	%
Assessed (final sample)	56	68	39	51
Not assessed	26	32	37	49
Refused to participate	6	7	17	23
Change of residence[1]/Dropped out[2]	17	21	1	1
Not localized[1]/Not identified[2]	3	4	14	18
Ill	–	–	5	7
Total (initial sample)	82		76	

Notes. **[please explain [1] and [2]]**

Table 3. Subjects and credits of PUMA

First term		Second term		Third term	
Subjects	Credits	Subjects	Credits	Subjects	Credits
Spanish language: use and norms	3	Major events into the Spanish history	3	Literature across texts	3
History of science	3	Art history	3	Mainstream thinking	3
Life course psychology	2	Evolutionary biology and dialog of nature	3	The future of science	3
Introduction to computer and Internet	3	Physical activity and quality of life	2	Psychology in daily life	3
Lifestyle and health	3	Demography and economy today	3	Environmental education	2
Political geography	2	Astronomy	2	The history through movies	2
Creative reading and writing	2	Knowing your Madrid region	2	Music history	2
Psychology of personality	2	Mythology	2	Diversity of languages, diversity of worlds	2

posttest values we used those from the first follow-up 3 years after baseline. Unfortunately, attrition was very high, with only 39 individuals agreeing to participate (36% women, mean age = 65.89; *SD* = 3.78). A detailed description of the sociodemographic characteristics of each group is shown in Table 1; attrition is described in Table 2. There were no significant differences in the sociodemographic variables between groups.

There were no significant differences among the variables of interest between people finishing the program and those who dropped out; nor were any significant differences found in the quasicontrol group between baseline and follow-up.

The University Program for Older Adults (PUMA)

The PUMA program is of three academic years' duration with a total of 450 teaching hours (Table 3 shows the subjects and credits). Attendance at lectures is mandatory, and they are taught by lecturers at the university. At the end of each course students have an achievement evaluation.

The goals of the PUMA program are as follows: (1) to promote knowledge and competences (measured by tests and exams), (2) to promote personal development, and (3) to increase social participation. Moreover, the objective of this study is also to test to what extent PUMA participants increase their proportion of active agers after follow-up over 3 years.

Assessment Measures

Participants from the ELEA project were assessed by means of the PELEA (ELEA Protocol, developed from the ESAP Protocol, see Fernández-Ballesteros et al., 2004); the description as well as data on the reliability and construct validity of both protocols have been reported elsewhere (Fernandez Ballesteros et al., 2011).

Experimental (PUMA) participants were assessed in accordance with the objectives of the program, through selected measures of the ELEA protocol: memory and learning, affect (positive, negative, and emotional balance), health (number of illnesses and subjective health), activity and productivity, and social relationships.

Table 4 shows the goals of the PUMA and the measures used to operationalize them. These measures were already included in the ELEA protocol, so that we assessed the same variables for the two samples.

– *To promote personal development.* This includes cognitive functioning, assessed with the Digit-Symbol Test (memory and learning) from the WAIS (Wechsler,

Table 4. PUMA objectives and measures used

PUMA objectives	Domains of the protocol	Measures used
To promote personal development	Cognitive functioning	Digit symbol (Wechsler, 1981)
	Physical functioning	Subjective health (global and compared with others) and objective health (number of illness reported)
	Affect	PANAS (Watson, Clark, & Tellegen, 1988): positive and negative affect and balance.
	Social relationships	Social (friends, neighbors, acquaintances) network (from Lubben, 1988)
To increase social participation	Activities	*"Information-seeking."* Read books, newspapers, hearing the radio.
		"Social." Go to a show, make excursions, make physical exercise and go to the church.
		"Productive." Adult and child caregiving, shopping purchasing, household administrative management and messages, household work, handwork and DIY.

Note. **[please explain use of *italics*]**

1981); physical health functioning, based on objective health (number of illnesses reported) and subjective health (general self-perception of health and self-perception of health compared to others); and affect, assessed with the PANAS (Watson & Clark, 1994**[not in refs]**), from which we obtained three measures: positive and negative affect and emotional balance, and social relationships assessed via one's social network (friends, neighbors, acquaintances, etc.) (Lubben, 1988).

– *To increase social participation.* This includes the following activities: information-seeking (reading books, reading newspapers, listening to the radio); social activities (going to shows, going on excursions, doing physical exercise, and going to church); and productive activities (adult and child caregiving, shopping, household management, household work, DIY and handicrafts, etc.). For each activity the question asked was: "How often do you do these activities: Yearly, monthly, weekly, daily, or never?"

– *To test in what extent the proportion of active agers increase after PUMA.* A nominal measure of active aging was calculated combining health (illnesses reported ≤ 1 and subjective health "good" or "very good"), cognitive functioning (Digit-Symbol ≥ = 33), positive affect ≥ 1.56), and activity (information-seeking and social activities ≥ 1.47; values are equal or higher than the mean). This definition – as well as others both simple and combined – measured were already tested (Fernández-Ballesteros et al., 2011) and are also used and reported by other authors (see Hank, 2011**[not in refs]**).

Data Analysis

We carried out two types of analysis to measure the attainment of our objectives. First, *t*-test tests were applied to determine the extent to which there were significant differences between the two samples (experimental-PUMA vs control-ELEA) in the variables of interest at baseline. Second, to examine whether there were differences between the groups attributable to the PUMA, we carried out a repeated-measures ANOVA and ANCOVA (with age and education as covariant) for each dependent variable under study.

Procedure

Quasiexperimental Group

To access PUMA, applicants must be aged 55 or more and pass an academic exam. At the first session of the course, the PUMA students were informed of the purpose of the evaluation, and those who agreed to participate filled out the evaluation protocol.

Quasicontrol Group

To participate in the ELEA study, individuals must be aged 55 years or more. Those appearing on a list of a representative sample of Madrid residents aged over 55 were contacted by telephone. Those who agreed to participate in the study were interviewed in their own homes and filled out the PELEA protocol after providing informed consent.

Results

Table 5 shows the *t*-test for comparing the variables under study between the experimental-PUMA and control-ELEA groups in the pretest. There were no significant differences between the control-ELEA and experimental-PUMA samples in the following variables: cognitive functioning, objective health and subjective health (both global and compared to others), affect (positive), and social network (though experimental-PUMA participants' networks were larger). However, there were significant differences in negative affect ($t = 3.254$; $p = .002$), affect balance ($t = -2.371$; $p = .020$), information-seeking activities ($t = -3.493$; $p =$

Table 5. Means of both groups at pretest and posttest and contrast of Experimental-PUMA group with Control-ELEA group at pretest

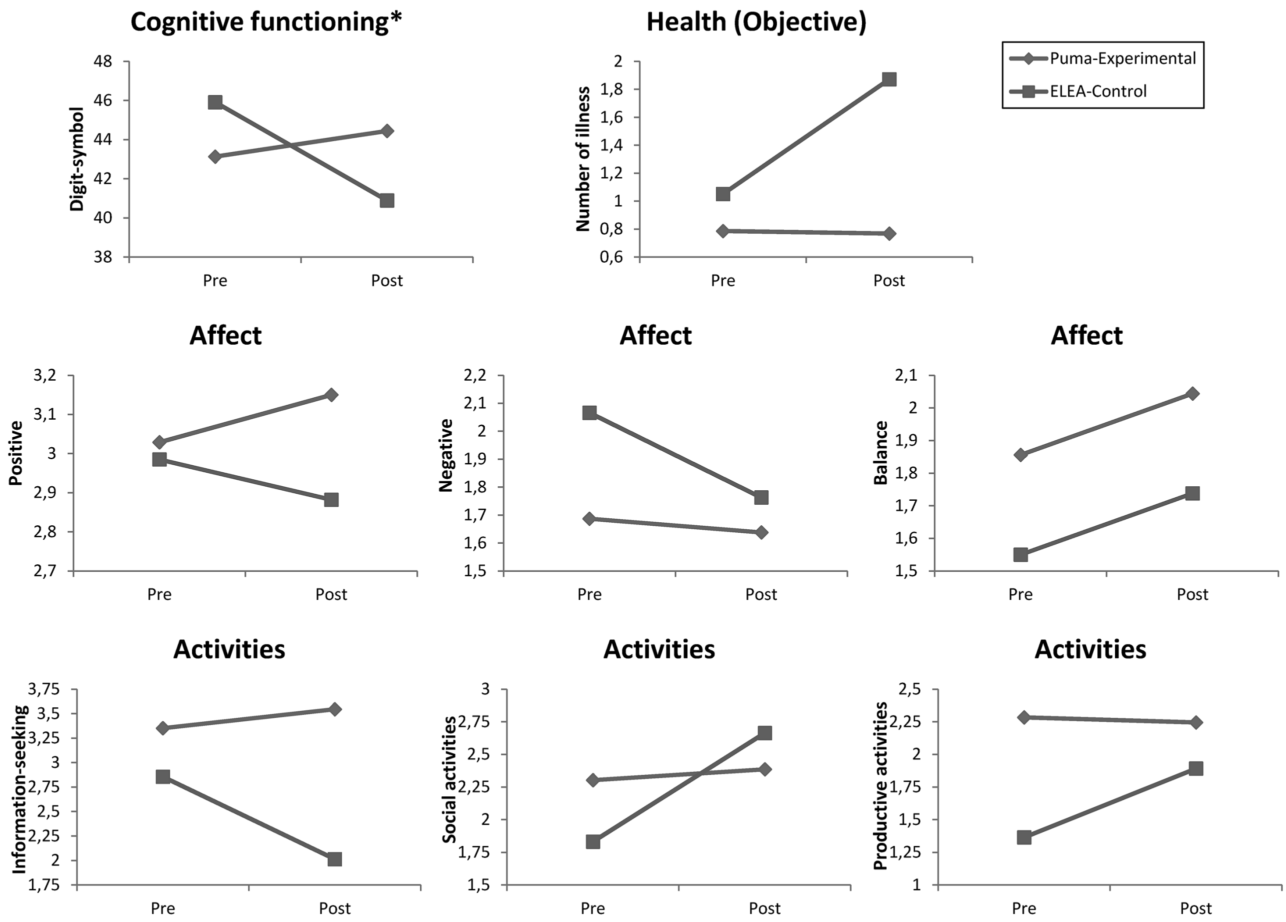
			Experimental-PUMA			Control-ELEA						
			N	Mean	*SD*	*N*	Mean	*SD*	Mean dif.	*t*	*df*	*p*(.95)
Cognitive functioning	Digit-symbol	Pre	56	44.36	11.81	39	43.21	14.21	–1.15	–0.430	93	.668
		Post	56	45.54	11.18	38	39.24	13.61				
Health (objective)	Illness reported	Pre	56	0.79	0.91	39	1.05	1.00	0.27	1.345	93	.182
		Post	56	0.77	1.06	39	1.87	1.45				
Health (subjective)	General	Pre	56	3.05	0.52	39	2.90	0.79	–0.16	–1.165	93	.247
		Post	54	3.06	0.53	39	2.82	0.79				
	Compared with others	Pre	56	3.61	0.80	39	3.72	0.86	0.11	0.644	93	.521
		Post	55	3.64	0.80	39	3.72	1.00				
Affect	Positive affect	Pre	50	3.01	0.42	39	2.98	0.57	–0.03	–0.243	87	.809
		Post	52	3.15	0.44	39	2.88	0.50				
	Negative affect	Pre	40	1.71	0.41	38	2.07	0.55	0.36	3.254	76	**.002**
		Post	39	1.65	0.41	39	1.79	0.46				
	Balance	Pre	38	1.84	0.52	38	1.55	0.56	–0.29	–2.371	74	**.020**
		Post	39	2.07	0.63	39	1.73	0.55				
Social relationships	Social networks	Pre	50	7.84	6.54	38	7.22	5.02	–0.62	–0.482	86	.631
		Post	48	7.85	5.05	39	12.15	24.63				
Activities	Information-seeking	Pre	56	3.34	0.60	39	2.85	0.76	–0.49	–3.493	93	**.001**
		Post	55	3.54	0.46	39	2.01	0.95				
	Social	Pre	56	2.29	0.49	39	1.85	0.54	–0.44	–4.147	93	**< .005**
		Post	55	2.39	0.46	37	2.66	0.68				
	Productive	Pre	53	2.28	0.97	39	1.36	0.55	–0.92	–5.315	90	**< .005**
		Post	55	2.24	0.61	39	1.89	0.59				

Note. **[please explain use of *bold*]**

Table 6. Comparisons pre/post Experimental-PUMA and Control-ELEA. ANOVA repeated measures

			Time			Sample			Interac-tion		
		df	*F*	*p* (.95)	η^2	*F*	*p* (.95)	η^2	*F*	*p* (.95)	η^2
Cognitive functioning	Digit-symbol*	*1.89*	0.042	.838	< .001	0.034	.854	< .001	8.022	**.006**	0.083
Health (objective)	Illness reported	*1.93*	12.44	**.001**	0.118	11.773	**.001**	0.112	13.572	**< .005**	0.127
Health (subjective)	General	*1.91*	0.525	.471	0.006	3.011	.086	0.032	0.197	.659	.002
	Compared with others	*1.92*	0.000	1.000	0.000	0.293	.589	0.003	0.000	1.000	< .001
Affect	Positive affect	*1.85*	0.030	.863	< .001	2.586	.112	0.030	7.267	**.008**	0.079
	Negative affect	*1.68*	8.666	**.004**	0.113	7.299	**.009**	0.097	4.448	**.039**	0.061
	Balance	*1.67*	7.939	**.006**	0.106	6.564	**.013**	0.089	< .001	.995	< .001
Social relationships	Social networks	*1.81*	1.657	.202	0.020	0.779	.380	0.010	2.343	.130	0.028
Activities	Information-seeking	*1.92*	16.496	**< .005**	0.152	70.755	**< .005**	0.435	42.158	**< .005**	0.314
	Social	*1.90*	55.147	**< .005**	0.380	1.015	.316	0.011	36.917	**< .005**	0.291
	Productive	*1.90*	8.498	**.004**	0.086	24.955	**< .005**	0.217	11.428	**.001**	0.113

Notes. *ANCOVA with education and age as covariant. **[please explain use of bold and italics]**



* Adjusted means for covariant education=2.5 and age=61.3

Figure 1. Changes representation of those variables with significant effects in the Experimental (PUMA) and Control (ELEA) groups.

.001), social activities ($t = -4.147$; $p < .005$) and productive activities ($t = -5.315$; $p < .005$).

Results from repeated-measures ANOVA and ANCOVA analyses with the continuous variables are shown in Table 6. There were effects of education and age as covariants only for Digit-Symbol, so we stated the result of the ANCOVA only for cognitive functioning. For the other variables ANOVA results are showed. For Digit-Symbol, number of illness reported, positive and negative affect, and the three types of activities, there were significant effects of the interaction between sample and time, with medium or even large effect sizes according to the Cohen criteria (Pardo & San Martin, 2010). The experimental-PUMA sample remained stable in number of illnesses, negative affect, and activities, while the control-ELEA sample scores increased significantly for objective health and social and productive activities, and decreased for negative affect and information-seeking. As regards Digit-Symbol and positive affect, the experimental-PUMA participants increased, while the control-ELEA group decreased. Over time, affect balance increased in both samples, but the experimental-PUMA group's balance score was significantly higher than that of the control-ELEA group. Finally, there were no significant effects in subjective health or social network.

In summary, as shown in Figure 1, after 3 years on a PUMA program, pre/post comparisons show that participants obtain benefits insofar as they maintain their negative affect, their health (assessed through number of illnesses) and their level of activity and increase their cognitive performance (evaluated through the Digit-Symbol Test) and their positive affect, while the control group show a significant decrease in cognitive functioning, reductions in affect and information-seeking activities and an increase in number of illnesses reported, but also an increase in social and productive activities.

Discussion

The first point to make is that, after 3 years on a university course, our experimental-PUMA group improved their *memory and learning* performance as assessed by the Digit-Symbol Test (Wechsler, 1981), while cognitive functioning in the control (ELEA) group declined significantly. This level of decline is quite similar to that reported for Digit-Symbol performance in longitudinal studies by Schaie (2005a) and in cross-sectional studies by Fernández-Ballesteros et al., 2004), from research on age differences. Schaie (2005**[a or b???]**) reported stability and change over 3 years for a neuropsychological battery that included the Digit-Symbol Test. Mean decline for normal individuals was 5.73, for suspected dementia 7.64, and for dementia 12.21, with proportions of decline of 57%, 73%, and 90.6%, respectively. In sum, by attending the PUMA Course, participants appear to have avoided 3 years of potential decline (estimated at 57% of their memory and learning capacities). In contrast, the control (ELEA) group taken from a representative sample showed a decline in their performance similar to that of healthy individuals in general.

As regards *health*, although no differences were found between the two groups in subjective health in any of the comparisons, our experimental (PUMA) participants maintained their objective health, as assessed through number of illness reported, while the control (ELEA) individuals showed a significant increase in the number of illnesses reported at the 3-year follow-up. It should be taken into account, however, that in the pretest assessment the experimental (PUMA) group already had better health than the control (ELEA) group (albeit not significantly), but the gap between the health of the two groups was even larger at the follow-up. We cannot speculate in the present study what the determinants of these results might be. As shown in Table 3, most of the content of the PUMA courses can be considered as humanities. Only three subjects are related to health: "Lifestyle and Health," "Life Course Psychology," and "Physical Exercise and Quality of Life." Obviously, there is no explanatory mechanism to be found there, but is an initial posthoc explanatory hypothesis that refers to *health literacy*. Thus, Nutbeam (2000) pointed out that improving people's access to health information as well as more personal forms of communication and community-based educational outreach can provide equip people better for overcoming structural barriers to health. Second, it may be that the results in health were mediated by positive affect, the increase in which seems to be attributable to the PUMA program. Finally, from an empirical point of view, there are several evaluation studies showing how increasing one's *level of activity* (recreation, travel, leisure, etc.) has indirect repercussions for health (e.g., IMSERSO, 2006).

As predicted, the experimental (PUMA) group significantly increased their *positive affect* and *affect balance*; in other words, after the program, participants had significantly increased their positive feelings: Indeed, they reported twice as many positive as negative emotions. Over time, negative affect decrease in control-ELEA group (as reported in the general literature, Carstensen, 1995), but still control individuals reported more negative affect than the experimental-PUMA group. These emotional results showed that our experimental individuals increase their emotional development since, as stressed by several authors, positive affect triggers adaptive behaviors. Thus, Fredrikson and Losada (2005) formulated a theoretical model for a better understanding of the role of positive emotions, which are assumed to broaden people's momentary thought-action repertoires and build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources. After taking a 3-year university course, experimental (PUMA) participants show significantly more positive affect, which is posited to play a protective role for psychopathology and mental health, in accordance with Ordonez et al. (2011), who found that after one academic semester on a "third age university program" in Brazil older adults had improved their depressive mood. Such improvement of positive affect is supported by the findings of another study (Fernández-Ballesteros et al., 2012) that explored the effects of university programs for older adults in four countries. Using a quasiexperimental design, these authors found that a broad range of university programs for older adults developed in Spain, Cuba, Mexico, and Chile produced a significant improvement in affect. All of these empirical findings are supported by positive psychology (Steptoe & Wardle, 2005). Furthermore, positive affect appears to have an indirect effect on lower morbidity, decrease in symptoms and pain, and higher longevity (Cohen & Pressman, 2006; Pressman & Cohen, 2005; for a review, see Fernández-Ballesteros, 2008, Chap. 4)

After the university program, our experimental participants maintained their level of activity and productivity. However, although the experimental group (PUMA) showed significantly higher levels of information-seeking and productive type of activities than the control group (ELEA), their social activities increased significantly more than in the experimental group.**[OK now??]**

These results are in accordance with two well-known gerontological theories: activity and SOC theories. As in previous findings already reported, experimental-PUMA participants seem to have *compensated* for the decline due to age and shown by the control-ELEA participants. As is well known, the developmental process mechanisms in the theory of successful aging proposed by Baltes and Baltes (1990) are selection, optimization and compensation (SOC theory). Thus, along the same line as the findings of other studies on cognitive functioning and health described earlier, it seems that the problematic issue is related to the control group, which showed a significant reduction in information-seeking, as well as in cognitive functioning and in health. Those older adults who do not follow such programs – thus lacking the corresponding enrichment of their environment – reduce their activities to stay informed. Our results, then, are in accordance with the hypothesis of activity theory (Havighurst, 1963), namely, that decline is due not to age, but to a withdrawal of stimulation, which leads to a disuse of functioning (Schaie, 2005a, 2005b).

In line with the PUMA goals, and with definitions of active aging, we would expect the program to bring about an increase in participants' social network and social and productive activities in general. Nevertheless, the social networks of those individuals enrolled on the PUMA program (experimental group) did not change significantly, and those in the control (ELEA) group actually increased their social activities more than the experimental participants, even if they did reduce their cognitive activities. This is congruent with Carstensen's socioemotional selectivity theory (SST; Carstensen, 1995), which conceptualizes life-span changes in social networks as consequences of loss of cognitive and instrumental control.

In this study, several components of active aging (health, cognitive functioning, and affect) improved after the program, but one question remains: To what extent did the experimental-PUMA group, compared to those in the control-ELEA, increase their proportion of active aging? We have been working in a four-domain model of aging well (active, successful, optimal, productive . . .) through several methodological strategies (from lay definitions to experimental manipulations; for a review, see Fernández-Ballesteros, 2008; Fernández-Ballesteros, Molina, Schettini, & Santacreu, in press). This four-domain model was recently tested through structural equation modeling with cross-cultural lay definitions of aging well and with our database from the ELEA study (Fernández-Ballesteros, Schettini, Molina, Santacreu, 2012**[or submitted??]**). In previous studies (Fernández-Ballesteros et al., 2011) we descriptively developed four combined definitions of successful aging ("physical health," "subjective health," "active aging," and "productive aging"), which yielded proportions of successful aging of 41.4% (subjective health), 27.9% (physical health), 19.5% (active aging) and 15.5% (productive aging) for the overall ELEA sample. With a view to answering the above question, in this study we classified our participants according to a nominal active aging definition combining the following measure: good health, high cognitive functioning, positive affect, and high activity level. Therefore, we calculated in both groups, and at both pretest and posttest, the following formula for active aging: health (illnesses reported ≤ 1 & subjective health "good" or "very good"), cognitive functioning (Digit-Symbol ≥ 33), positive affect (≥ 1.56) and activity (information-seeking and social activities ≥ 1.47). Figure 2 shows the percentages of individuals aging successfully in the experimental-PUMA and control-ELEA groups at pretest and posttest. In the pretest there are no differences between the experimental and control groups. But while the proportion of active agers is quite unchanged at the posttest in the control group (12.8% to 15.4%), after the program the experimental group shows a significant increase in the number of active aging individuals, from 19.6% at the pretest to 33.9% at the posttest (χ^2 = 11.619; p = .001), with significant differences between the experimental and control groups (χ^2 = 6.48; p = .011).

In conclusion, the complexity of our results must be analyzed in terms of more than one theory. First of all, they are in line with the most general theory of active aging, the *activity theory*. Experimental-PUMA participants (in contrast to controls) maintain their levels of health and activities and improve their affect and cognitive functioning. These results

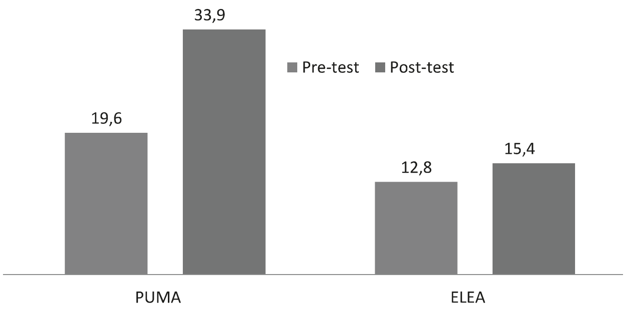


Figure 2. Percentage of active aging individuals in pretest and posttest.

in turn fit the compensation mechanism posited by the *SOC theory*, inasmuch as these university programs appear to provide an important means of compensating for the decline associated, perhaps not only with age, but with disuse.

All of these results and conclusions are limited by the design used: A quasiexperimental, quasicontrol design is a very poor tool from the point of view of threats to internal validity, and it also restricts the potential for generalization of the results. A randomized controlled trial (RCT) would be highly advantageous with a view to obtaining results on which to support the promotion of active aging. Bearing in mind the large numbers of university programs for older adults in existence worldwide, initiatives for their evaluation can be considered extremely worthwhile.

Declaration of Conflicts of Interest

The authors declare that no conflicts of interest exist.

References

ACE. (2007). *Older adults and higher education.* Washington DC: American Council of Education.

Baltes P. B., & Baltes, M. M. (Eds.). (1990). *Successful aging: Perspectives from the behavioral sciences.* Cambridge, UK: Cambridge University Press.

Baltes, P. B., & Mayer, K. U. (1999). *The Berlin aging study.* New York: Cambridge University Press.

Bandura, A. (1987). *Pensamiento y acción: Fundamentos sociales***[translation please]**. Barcelona, España: Martínez Roca.

Bru, C. (2007). Older adults University programs in Spain. **Editor??,** *Proceedings of the International Conference on Learning in Later Life*. Glasgow: University of Strathclyde.

Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science, 4,* 151–156.

[not in text]Cohen, G. (2005). *The mature mind: The positive power of the aging brain*. New York: Basic Books.

Cohen, S., & Pressman, S. (2006). Positive affect and health. *Current Directions in Psychological Science, 15,* 122–125.

[not in text]Commission of the European Communities. (2000). *A* *memorandum on lifelong learning.* Retrieved from http://www.bologna-berlin2003.de/pdf/MemorandumEng.pdf

[not in text]Cross, K. P. (1979). Adult learners: Characteristics, needs, and interests. In R. E. Peterson (Ed.)., *Lifelong learning in America* **[PAGE NOS??]**. San Francisco: Jossey-Bass.

Fernández-Ballesteros, R. (2002). Cap. 1. Envejecer bien**[translation please]**. In R. Fernández-Ballesteros (dir.)**[Ed.??]**, *Vivir con vitalidad* (Vol. I). Madrid: Pirámide.

Fernández-Ballesteros, R. (2008). *Active aging. The contribution of psychology.* Göttingen: Hogrefe & Huber.

[not in text]Fernández-Ballesteros, R. (2011). Positive aging. Objective, subjective, and combined outcomes. *E-Journal of Applied Psychology, 7*(1), 22–30.

[not in text]Fernández-Ballesteros, R., Caprara, G., Schettini, R., Bustillos, Mendoza-Nuñez, V., Orosa, R., . . . Zamarrón, M. D. (in press). Effects of university programs for older adults. Changes in cultural and group stereotypes, self-perception of aging, and emotional balance. *Educational Gerontology*.

Fernández-Ballesteros, R., Molina, M. A., Schettini, R., & Santacreu, M. (in press). The semantic network of aging well. In J.-M. Robine, C. Jagger, & E. M. Crimmins (Eds.), *Healthy longevity. Annual Review of Gerontology and Geriatrics* (Vol. 33, 2013). **City??: Publisher??**

Fernández-Ballesteros, R., Schettini, R., Molina, M. A., & Santacreu, M. (submitted). *Testing a four domains model of aging well*.

Fernández-Ballesteros, R., Zamarrón, M. D., Molina, M. A., Cabras, E., Tárraga, L., Schettini, R., . . . Tárraga, L. (2012). Cognitive plasticity in normal and pathological aging. *Clinical Intervention on Aging, 7*, 15–25.

Fernández-Ballesteros, R., Zamarrón, M. D., Montero, P., Díez-Nicolás, J., López Bravo, M. D., Molina, M. A., & Schettini, R. (2011). Successful aging: Criteria and predictors. *Psychology in Spain, 15*, 94–101.

Fernández-Ballesteros, R., Zamarron, M. D., Rudinger, G., Schroots, H. J. J., Heikkinen, E., Charzeska, L., . . . Rosenmayr, L. (2004) Assessing competence: The European Survey on Aging Protocol (ESAP). *Gerontology*, *50*, 330–347.

Field, J. (2006). *Lifelong learning and the new educational order*. London: Trentham Books.

Fisher, J. C., & Wolf, M. A. (2000). Older adult learning. In A. L. Wilson & E. Hayes (Eds.), *Handbook of adult and continuing education***[PAGE NOS??]**. San Francisco: Jossey-Bass.

Formosa, M. (2010). Lifelong learning in later life: The universities of the Third Age. *Lifelong Learning Institute Review, 5,* 1–12.

Fredrikson B. L., & Losada, M. F. (2005). Positive affect and the complex dynamics of human flourishing. *American Psychologist, 60,* 678–686.

Havighurst, R. J. (1963). Activity theory of aging. In R. H. Williams, C. Tibbits, & W. Donahue, W. (Eds.), *Process of aging* (Vol. 1, **[PAGE NOS??]**). New York: Atherton.

Hertzog, C., Kramer, A. F., Wilson, R. S., & Lindenberger, U. (2009). Enrichment effects on adult cognitive development. Can the functional capacity of older adults be preserved and enhanced. *Psychological Science, 9,* 1–65.

IMSERSO. (2006). *Evaluación de los programas de vacaciones***[translation please]**. Madrid: Instituto de Mayores y Servicios Sociales.

Jütte, W., Nicoll, K., & Olesen, H. S. (2011). Professionalization – The struggle within (Editorial). *European Journal for Research on the Education and Learning of Adults, 2*, 7–20.

Kim, A., & Merriam, S. (2004). Motivations for learning among older adults in a learning-in-retirement institute. *Educational Gerontology, 30*, 441–455.

Lubben, N. (1988). Assessing networks among the elderly population. *Family Community Health, 11,* 42–52.

Millsap, R. E., & Maydeu-Olivares, A. (2009). *The sage handbook of quantitative methods in psychology*. Thousand Oaks, CA: Sage.

Montero, I., & León, O. (2007). A guide for naming research studies in Psychology. *International Journal Clinical and Health Psychology, 7*, 847–862.

Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promot. Int.***[full name please]***, 15*, 259–267.

Ordonez, T. N., Tavares, S. S., & Cachioni, M. (2011). Síntomas depresivos en adultos mayores participantes de una universidad abierta de la tercera edad**[translation please]**. *Revista Española de Geriatría y Gerontología, 46*, 250–255.

Pardo, A., & San Martín, R. (2010). *Análisis de datos en ciencias sociales y de la salud II***[translation please]**. Madrid: Síntesis.

Pressman, S. D., & Cohen, S. (2005). Does positive affect influence health. *Psychological Bulletin, 131*, 925–971.

Price, M., Handley, K., Millar, J., & O'Donovan, B. (2010). Feedback: All the effort, but what is the effect? *Assessment and Evaluation in Higher Education, 35*, 277–289.

Rowe, J. W., & Khan, R. L. (1987). Human aging: Usual and successful. *Science, 237*, 143–149.

Schaie, K. W. (2005a). *Developmental influences on adult intelligence: The Seattle Longitudinal Study.* New York: Oxford University Press.

Schaie, K. W. (2005b). What can we learn from longitudinal studies of adult development? *Research on Human Development, 2,* 133–158.

Staats, A. W. (1975). *Sociobehaviorism.* Homewood, II: Dorsey.

Steptoe, A., & Wardle, J. (2005). Positive affect and biological function in everyday life. *Neurobiology of Aging, 26S*, S108–S112.

Swindell, R., & Thompson, J. (1995). An international perspective of the university of the third age. *Educational Gerontology*, *21*, 429–447.

United Nations. (2002). *Madrid-II international plan of action on aging (MIPAA)*. New York: United Nations.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070.**[not in text]**

Wechsler, D. (1981). *WAIS-R. Wechsler Adult Intelligence Scale – Revised.* Orlando: Psychological Corporation.

WHO. (2002). *The world health report 2002: Reducing risks, promoting healthy life.* Retrieved from http://www.who.int/whr/2002/en/index.html

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