Purpose in life and performance of advanced activities of daily living among the oldest old

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Abstract

Objective: To verify the association between purpose in life (PL) and the performance in advanced (AADL) and instrumental (IADL) activities of daily living. *Methods:* Cross-sectional community-based study which analyzed data from the follow-up assessment of the FIBRA Study (Frailty in Elderly Brazilians) in the cities of Campinas and Ermelino Matarazzo (SP), Brazil, in 2016 and 2017. Participants were 187 community dwelling persons aged 80 years and older. The protocol included the application of a cognitive deficit screening test suggestive of dementia, an inventory assessing AADL, the Lawton and Brody scale (IADL), the Geriatric Depression Scale and the Ryff and Keyes' (1995) Purpose in Life Scale. *Results:* Participants had an average of 83.81 (±3.60) years, 4.38 (± 3.76) years of schooling, 3.49 minimum wages (±2.61) of income, 125 (66.8%) being women. Hierarchical linear regression analyzes showed that PV and depressive symptoms were significantly associated with a higher number of AADL (p=0.003) and no significant association with IADL scores (0.580), in a model adjusted for sociodemographic variables, self-rated health, cognitive performance and depression. *Conclusions:* The results suggest that older adults with higher PL and lower number of depression symptoms are more likely to perform a higher number of AADL. This association was not observed for IADL, which were associated with age, sex, depression and cognitive performance. PL may have an impact on complex levels of functional status in the elderly, thus contributing to healthy aging.

Keywords: Longevity. Aging. Personal satisfaction. Activities of Daily Living.

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INTRODUCTION

Functional capacity can be defined as the ability to perform activities that enable the person to take care of themselves and live independently. It can be evaluated by questionnaires that investigate the ability to perform basic (BADL), instrumental (IADL) and advanced activities of daily living (AADL)[1]. BADL are activities related to self-care and survival, including bathing, and eating, while IADL are activities of practical life, more complex in terms of cognitive requirements than BADL, and include handling medication, controlling finances, and using means of transport, which can be influenced by social, motivational, and contextual factors[2]. AADL refer to activities commonly performed outside the home, associated to community and social participation, including paid and voluntary work, attending to church services, and taking courses[3].

An increasing number of studies suggest that psychological factors like eudaimonic or psychological well-being may moderate the impact of age on functional status[4]. According to Ryff and Keyes[5], there are six dimensions of psychological or eudaimonic well-being: autonomy (independence and capacity for self-determination); mastery of the environment (the ability to manage the world around you); personal growth (being open to new experiences); positive relationships with others; self-acceptance (a positive attitude towards yourself); and purpose in life (PIL). PIL refers to the sense that life has meaning and direction, and guides behavior in pursuit of goals and objectives. PIL is related to a positive outlook on life, including feeling motivated to live life to the fullest[6]. It is described by Ryff et al.[4] as one of the main domains of psychological well-being, associated with a greater probability of engaging in healthy behaviors and favorable outcomes in aging. PIL is a construct increasingly explored in contemporary research due to its potential to stimulate resilience in the face of adversity and stressors[4]. It acts as a buffer for the effects of risk factors on physical and mental health and can be the focus of interventions aimed at improving these conditions[7]. It is of great importance in advanced age, when the potential for loss of physical and cognitive abilities and the occurrence of uncontrollable events increase. The management of these events is benefited by a positive outlook on life and the motivation to live life.

Higher scores in PIL are related to the use of preventive health services[8]; higher frequency of physical activity[9,10]; improved sleep quality[11]; less cognitive impairment[12]; lower risk of hospitalization[13]; lower risk of Alzheimer's disease[14]; and lower mortality rates[15]. Boyle et al.[6] demonstrated that a higher PIL score was associated with a lower risk of developing disabilities in BADL and IADL and with fewer mobility limitations after 4 years, controlling for sociodemographic variables, frailty, cardiovascular risk, vascular diseases, depression, neuroticism, and social network size. In a follow-up study[16]hey observed that a higher PIL score was a protective factor against the development of disabilities in IADL, even after adjusting for sociodemographic, physical, and psychiatric risk factors. Possible explanations for these findings could be related to the fact that people with a high level of PIL tend to be more proactive in terms of self-care in health and involvement in healthy activities, with improved global functionality[17].

Given the increase in life expectancy around the world, there is a growing need to identify factors that can prolong the period of independence in advanced age[18]. The objective of this research was to determine the association between PIL and performance in AADL and IADL, sociodemographic variables, subjective health assessment, cognitive performance, and depressive symptoms, in Brazilian adults aged 80 years old and over. This research made use of follow-up data from the FIBRA study (Frailty in Elderly Brazilians).

We chose to investigate the relationship between PIL and AADL in persons aged 80 years or older because functional limitations are more frequent in advanced age and PIL could moderate the effect of such limitations on the adaptation of advanced age adults. The underlying hypothesis is that advanced age adults with higher PIL scores perform better in AADL and IADL than those with lower scores. We conjectured that higher PIL likely provides greater motivation to perform activities and greater engagement in healthy behaviors.

METHODS

This is a cross-sectional study, with a sample of 187 older adults recruited from family homes, members of a cohort of adults born from January 1, 1911 onwards (persons aged 80 years or over) who participated in the follow-up FIBRA Study (Frailty in Elderly Brazilians) conducted in Campinas and Ermelino Matarazzo, São Paulo, Brazil, in 2016 and 2017, in which a PIL scale was included.

The baseline records of the FIBRA Study (2008-2009; N=1,284) supported the identification of older adults who were then invited to participate in the follow-up study. Recruitment and data collection were performed by trained students at the participants' homes and lasted approximately 90 minutes. The inclusion criteria were: being aged 80 years or over; participation in the baseline FIBRA study Campinas; permanent residence at home; understanding the instructions; and agreeing to participate. The exclusion criteria were: presence of cognitive deficits suggestive of dementia; permanent or temporary inability to walk, even using a cane or walker; localized loss of strength and aphasia resulting from stroke; severe impairment of motor and speech skills associated with Parkinson's disease; severe sensory deficits; and being in the terminal stage[19].

Participants initially selected to the baseline survey totaled 1,284 individuals, 900 from Campinas and 384 from Ermelino Matarazzo. Of these, in the follow-up 543 were considered losses due to non-location, refusal, exclusion, and dropout. A further 192 older adults were deceased, thus only 549 were interviewed again. Among these, 419 scored above the cutoff on the cognitive screening test. In this group, 234 were 80 years old or over, from which 47 were excluded because they did not fully respond to all the items of interest to this study. Thus, the sample consisted of 187 persons aged 80 years old and over, without cognitive impairment suggestive of dementia, and who responded to the PIL, IADL, AADL, subjective health, cognitive performance, depressive symptoms, and sociodemographic instruments in the follow-up of the study FIBRA Campinas and Ermelino Matarazzo (2016 and 2017).

PIL was assessed using the 10-item version of the Ryff and Keyes scale[5], translated and validated for use in Brazil[20]. Participants were asked to rate their degree of agreement with each statement on a five-point Likert scale: *não concordo de jeito nenhum* [I do not agree at all] (1); *concordo pouco* [I agree a little] (2), *concordância moderada* [I somewhat agree] (3); *concordo muito* [I agree a lot] (4); and *concordo muitíssimo* [I very much agree] (5). Item scores 2, 3, 5, 6, and 10 were inverted for analysis. The final score is the result of the average of the answers to the 10 questions (sum/10), ranging from 1 to 5. Higher scores reflect higher levels of PIL[14]. Examples of two scale questions: "I live life one day at a time and don't really think about the future" and "I have a sense of direction and purpose in life".

Cognitive performance was measured by the Mini Mental State Examination (MMSE). For each participant, the total score varies from 0 to 30 points, corresponding to the sum of the scores of the right responses. To determine inclusion in this analysis, the following cut-off scores were considered, based on averages determined by Brucki et al.[21] for each range of education level minus one standard deviation: 17 for illiterate older adults; 22 for older adults with one to four years of education; 24 for older adults with five to eight years of education; and 26 for older adults with nine or more years of education.

AADL were assessed using a questionnaire containing 17 self-report items: visiting other people's homes; receiving guests; going to church; going to social meetings and cultural events; driving a car; making short and/or long trips; doing paid and/or voluntary work; keeping in touch with friends and family by phone, letter, email or social media; using the internet to obtain information, making purchases or operating a bank account; taking courses and attending groups for older adults. For each of the items, there were three alternative responses: *nunca fiz* [I've never done it], *parei de fazer* [I stopped doing it] and *ainda faço* [I still do it]. The number of responses indicating "*ainda faço*" was computed, ranging from 0 to 17 points[19].

IADL were assessed using the Lawton and Brody Scale[22], with seven items: ability to use the

telephone, use of transportation, ability to shop, prepare meals, household chores, use medication and manage money; and three possible responses: fully independent (3 points), in need of some help (2 points), and in need of full help (1 point). In the analyses, the sum of activities carried out with full independence was used.

Participants answered a question about general health assessment, with scores ranging from 1 (very bad) to 5 (very good). In the analyses, the general health assessment scores were divided into four categories (poor/very poor, fair, good and very good). Depressive symptoms were assessed using the Geriatric Depression Scale (GDS), with 15 items[23,24].

The project was approved by the Research Ethics Committee of the State University of Campinas on Nov. 23, 2015, report no. 1,332,651, and registered on the Brazilian Ministry of Health Platform under the C.A.A.E. 49987615.30000.5404 and report 2,847,829, of Aug. 27, 2018, CAAE 92684517.5.1001.5404. All participants signed a term of free and informed consent before data was collected.

Descriptive analyzes were performed for the variables that characterize the sample. Data are presented for the total sample, and men and women separately. The study of the relationship between PIL and the AADL and IADL variables was performed using simple and multiple linear regression analysis, with a hierarchical method in three models. The first model analyzed the association between PIL and AADL. The second model included the variables sex, age, and education, while in the third model, the MMSE, EDG and subjective health assessment scores were inserted. In the regression analyzes (simple and hierarchical), the numerical variables were transformed into ranks due to the absence of normal distribution.

RESULTS

The sample consisted of 187 adults of advanced age, 125 (66.8%) of whom were women. Participant age ranged between 80 and 98 years old, with a mean of 83.8 (±3.6). The mean number of years of education was 4.4 (±3.8), ranging from 0 to 9 years; 13.9% of the sample had no formal education. The average income was 3.5 MW (minimum wages) (±2.6), and 47.5% had an income of 1 to 3 MW. The mean for the MMSE was 25.0 (±2.8). For the GDS, the mean was 3.5 (±2.8) ranging from 0 to 12 points. Table 1 presents the sociodemographic and clinical characterization and the PIL scores in the total sample and in the sample subdivided according to sex. A statistically significant difference was observed between the number of IADL performed independently by men, who were more independent than women.

Table 2 shows there were significant associations between higher AADL scores and more years of education, higher MMSE scores, lower number of depressive symptoms, higher PIL scores and health perceived as good and very good.

In the hierarchical linear regression analysis (Table 3), model 2 indicated a positive association between AADL and PIL and years of education. In model 3, the association between AADL and PIL remained significant even in the presence of subjective health assessment, MMSE and depressive symptoms, which was negatively associated with AADL.

Table 4 presents the results of simple linear regression analyzes between the number of IADL performed independently and the independent variables. There was a significant positive association between independence in IADL and being male, years of education, MMSE score, PIL, subjective health assessment and a negative association with GDS scores.

The hierarchical linear regression analysis for IADL with independence (Table 5) indicates that PIL showed a significant association with IADL in models 1 and 2, both alone and in the presence of sociodemographic variables. However, in the most complete model, which included the variables subjective health assessment, MMSE and GDS, PIL was not associated with IADL; however, it maintained a significant association with sex, age, MMSE and GDS.

Table 1. Sociodemographic and clinical characteristics and PIL scores for the total sample and for women and men, considering performance in IADL and AADL and subjective health assessment. FIBRA 80+ Study, Campinas, SP, 2016-2017.

Variable	Full sample (N=187)	Women (n=125)	Men (n=62)	*p* value*
Age	83.8 (3.6)	83.6 (3.76)	84.1 (3.2)	0.139
Education	4.3 (3.7)	4.4 (3.71)	4.3 (3.9)	0.775
Family income	3.5 (2.6)	3.5 (2.78)	3.4 (2.2)	0.342
MMSE	25.0 (2.8)	24.8 (3.01)	25.3 (2.5)	0.438
GDS	3.5 (2.8)	3.7 (2.90)	3.7 (2.9)	0.214
Number of IADL performed independently	5.6 (1.8)	5.3 (1.87)	6.0 (1.6)	**0.003***
Number of AADL still performing	6.9 (2.6)	6.9 (2.74)	6.8 (2.5)	0.515
Purpose in Life score (PIL)	3.5 (0.6)	3.5 (0.68)	3.5 (0.6)	0.781
Subjective health assessment				
Very good	28 (14.9)	22 (17.6)	6 (9.7)	0.084**
Good	70 (37.4)	40 (32.0)	30 (48.4)	
Regular	76 (40.6)	51 (40.8)	25 (40.3)	
Poor	10 (5.3)	9 (7.20)	1 (1.6)	

Family income in minimum wages; MMSE, Mini Mental State Examination; GDS, Geriatric Depression Scale; IADL, instrumental activities of daily living; AADL, advanced activities of daily living; *p-value in Mann-Whitney test, ** Fisher's exact test.

Table 2. Simple linear regression analysis of the associations between the number of AADL performed, sociodemographic variables, MMSE, GDS, PIL and subjective health assessment scores (N=187). FIBRA 80+ Study, Campinas, SP, 2016-2017.

Variable	Beta (EP)	*p* value	R^2
Sex			
Female (ref.)	---		
Male	-5.43 (8.36)	0.517	0.0023
Age (years)	-0.09 (0.07)	0.217	0.0082
Education (years)	0.30 (0.08)	**<0.001**	0.0771
MMSE	0.28 (0.07)	**<0.001**	0.0785
GDS	-0.36 (0.07)	**<0.001**	0.1285
Purpose in Life (PIL)	0.30 (0.07)	**<0.001**	0.0896
Subjective health assessment			0.0778
Very poor/Poor (ref)	---		
Regular	6.92 (15.61)	0.658	
Good	31.90 (15.71)	**0.044**	
Very good	42.24 (17.46)	**0.017**	

Beta refers to the value of the estimate or angular coefficient (slope) on the regression line; EP, beta standard error. R^2, coefficient of determination (% variability of the response variable explained by the independent variable); $p \leq 0.001$.

Table 3. Hierarchical linear regression analysis between higher AADL and PIL scores, sociodemographic variables, MMSE and GDS scores, and subjective health assessment (N=187). FIBRA 80+ Study, Campinas, SP, 2016-2017.

Variable	Model 1		Model 2		Model 3	
	Beta (*p* value)	Partial R^2	Beta (*p* value)	Partial R^2	Beta (*p* value)	Partial R^2
Purpose in Life (PIL)	0.33 **(<0.001)**	0.113	0.31 **(<0.001)**	0.113	0.23 **(0.003)**	0.113
Sex			-4.59 (0.562)	0.002	-9.90 (0.215)	0.002
Age (years)			-0.01 (0.838)	< 0.001	0.03 (0.671)	< 0.001
Education (years)			0.26 (**<0.001**)	< 0.061	0.15 (0.092)	< 0.061
MMSE					0.12 (0.172)	< 0.017
GDS					-0.20 **(0.011)**	< 0.044
Subjective health assessment						< 0.011
Very poor/Poor (ref)					-----	
Regular					3.29 (0.823)	
Good					16.24 (0.298)	
Very good					7.90 (0.648)	

Beta refers to the value of the estimate or angular coefficient (slope) on the regression line; EP, beta standard error. R^2, coefficient of determination (% variability of the response variable explained by the independent variable); Model 3: Total R^2= 0.2476. Intercept (EP): 59.94 (22.45); p=0.008. Variables without normal distribution were transformed into ranks.

Table 4. Simple linear regression analysis for greater independence in IADL (N=187). FIBRA 80+ Study, Campinas, SP, 2016-2017.

Variable	Beta (EP)	*p* value	R^2
Sex			
Female (ref.)	---		
Male	23.54 (7.76)	0.003	0.0473
Age (years)	-0.19 (0.07)	0.006	0.0396
Education (years)	0.18 (0.07)	0.015	0.0328
MMSE	0.29 (0.07)	<0.001	0.0956
GDS	-0.34 (0.07)	<0.001	0.1241
Purpose in Life (PIL)	0.20 (0.07)	0.003	0.0461
Subjective health assessment			
Very poor/Poor (ref)	---		0.0278
Regular	18.05 (15.24)	0.238	
Good	27.39 (15.33)	0.076	
Very good	34.07 (17.04)	0.047	

Beta refers to the value of the estimate or angular coefficient (slope) on the regression line; EP, beta standard error. R^2, coefficient of determination (% variability of the response variable explained by the independent variable); $p \leq 0.001$.

Table 5. Hierarchical linear regression analysis between the highest number of IADL performed independently and the PIL, MMSE and GDS scores, sociodemographic variables and subjective health assessment (N=187). FIBRA 80+ Study, Campinas, SP, 2016-2017.

Variable	Model 1		Model 2		Model 3	
	Beta (*p* value)	Partial R^2	Beta (*p* value)	Partial R^2	Beta (*p* value)	Partial R^2
Purpose in Life (PIL)	0.21 **(0.003)**	R^2= 0.050	0.15 **(0.026)**	R^2=0.050	0.04 (0.580)	R^2 =0.050
Sex			24.12 (**0.002**)	R^2=0.038	21.68 **(0.005)**	R^2 =0.038
Age (years)			- 0.18 **(0.010)**	R^2 < 0.032	-0.15 **(0.030)**	R^2 =0.032
Education (years)			0.17 **(0.017)**	R^2 < 0.028	0.06 (0.503)	R^2 =0.028
MMSE					0.17 **(0.041)**	R^2 =0.030
GDS					-0.24 **(0.002)**	R^2 =0.047
Subjective health assessment						R^2=0.002
Very poor/Poor (ref)					----	
Regular					2.55 (0.858)	
Good					-2.29 (0.879)	
Very good					3.70 (0.825)	

Beta refers to the value of the estimate or angular coefficient (slope) on the regression line; EP, beta standard error. R^2, coefficient of determination (% variability of the response variable explained by the independent variable); Model 3: Total R^2= 0.2291. Intercept (EP): 98.94 (21.67); p=0.008. Variables without normal distribution were transformed into ranks.

DISCUSSION

This research aimed to verify the association between PIL and the performance of AADL and IADL, depressive symptoms, self-rated health, and sociodemographic variables, in adults aged 80 years and over. The results indicated that the number of AADL performed showed a significant positive association with PIL and a negative association with depressive symptoms. However, independence in IADL was negatively associated with age, depressive symptoms, and positively associated with sex and cognitive performance, but not with PIL. In this study, men were better at performing IADL independently compared with women. This is because they presented a greater number of chronic and limiting diseases that cause pain and difficulties in carrying out daily activities, thus compromising functionality[25].

The results of this study emphasize the importance of high PIL for performing AADL, more complex activities, which require greater daily competence and motivation[17,26]. People with high PIL seem more likely to engage in more elaborate activities that require multiple skills and different environmental demands. The presence of high PIL may constitute motivation for active involvement in the execution of these activities, which are usually carried out in the community[27,28]. To our knowledge, there are no prior studies that examine the relationship between PIL and AADL performance.

The results showed the important influence of education on PIL and AADL. According to Ryff et al.[4], psychological well-being and education are strongly linked, especially by the domains of personal growth and PIL. According to the authors, opportunities for self-actualization are not evenly distributed, they occur mainly for those who make the most of their talents and abilities. It is assumed, therefore, that more educated individuals are more likely to put their skills into practice, engage in more complex activities, such as AADL, increasing self-realization, psychological well-being, reflecting favorably on PIL scores[20]. However, further analysis using more complex models that included the variables MMSE, GDS and subjective health assessment, indicated that education was not associated with AADL or IADL.

The findings regarding IADL showed that these activities were not associated with PIL in the most complete model. Divergent results were reported by Tomioka et al.[17], who investigated the relationship between the maintenance of hobbies and PIL with

mortality and decline in independence. In the 3-year follow-up period, 248 older adults died, 119 showed declined in BADL and 178 in IADL. Having no pleasurable hobbies and lower PIL were associated with increased risk of mortality odds ratio (OR= 2.08; 95%CI, 1.47-2.94), decline in BADL (OR= 2.74; 95%CI, 1.44-5.21) and decline in IADL (OR=1.89; 95%CI, 1.01-3.55). The study by Tomioka et al.[17] was based on longitudinal data that involved a younger sample than this study, therefore, more in-depth comparisons are limited by methodological differences.

Boyle et al.[6] and Mota et al.[16] also demonstrated that a higher PIL score was associated with a lower risk of developing disabilities in IADL in longitudinal studies over 4.7 and 2 years, respectively. High PIL is associated with healthier behaviors and may represent a protective factor against diseases. Thus, it is plausible to assume that this variable, when high, can contribute to the functional capacity of older adults[7,29]. In our analysis, PIL was significantly associated in models 1 and 2, in the presence of sociodemographic variables. Its significance was lost when additional variables were considered. This finding may indicate that, among the advanced age adults, IADL are more influenced by cognitive performance, mood, and health status than by psychological well-being. In contrast, performance in AADL can be driven by a sense of purpose.

The results obtained here showed that depressive symptoms were associated with IADL and AADL in the most complete regression model, indicating that psychosocial factors, particularly depression, seem to be associated with the risk of physical and functional disability in daily activities by persons of advanced age[30]. This is not fully in agreement with other studies that suggest depression is the result of increased functional disability, and not a predictor variable of changes in functional status[31]. This association can be explained by the fact that depression is a condition related to low levels of activity and reduced motivational status, leading to a deficit in mobility, physical performance and active lifestyle[31]. The findings on depressive symptoms and PIL are in agreement with other cross-sectional studies. Hedberg et al.[32], for example, included 189 participants (120 women and 69 men) aged 85 to 103 years, living in northern Sweden. They observed that 40 participants (21.2%) were depressed and that these were the individuals with the lowest PIL scores.

The findings of this study suggest that a higher PIL may be associated with greater involvement with complex activities carried out in the community. Additionally, studies have shown that PIL can be increased through psychosocial interventions.

A school protocol designed to teach children and adolescents about the importance of well-being showed an increase in psychological well-being in a non-clinical sample[33]. In this investigation, a combination of cognitive behavioral therapy techniques was followed by specific strategies to adapt the dimensions of psychological well-being. Based on this school intervention, Friedman et al.[34] created the Lighten UP! Program to promote psychological well-being in community-dwelling older adults. The program lasted eight weeks and was aimed to teach participants (103 men and women aged 60 and over) to identify positive experiences in various domains of psychological well-being. After the intervention, participants reported significant increases in psychological well-being (including PIL), life satisfaction, social well-being, and lower levels of depression. This pilot investigation suggests that these interventions can increase psychological well-being and enable positive changes for older adults.

This study presents limitations. First, the research was cross-sectional, which hinders us from establishing cause and effect relationships between PIL and functional status. Additionally, possible sample selection bias in longitudinal studies should be considered, when the most vulnerable participants are excluded. Thus, it is possible that people with lower PIL and greater dependence in the activities of daily life have been screened from the sample in greater proportion, either due to death or because they need to live with their children or long-term institutions for older adults[35].

CONCLUSIONS

The results suggest that there is a significant relationship between purpose in life and maintaining AADL among adults aged 80 years old and over. Regarding independence in IADL, there was

a negative association with age, sex, depressive symptoms, and a positive association with cognitive performance, but not with PIL.

Dissemination of the study data in academic, lay and professional circles is important, in order to encourage the involvement of society in actions to improve the motivation for life among older adults and to provide favorable outcomes in aging.

This work highlights the need for further research to investigate the effectiveness of interventions that can raise levels of purpose in life and facilitate engagement in meaningful social activities. Such initiatives constitute important new directions for research in the field of gerontology, specifically on the theme of purpose in life.

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