

PURPOSE IN LIFE AND PHYSICAL ACTIVITIES IN COMMUNITY-DWELLING OLDER ADULTS: A CROSS-SECTIONAL STUDY

Propósito de vida e atividade física em idosos da comunidade: estudo transversal

Daniel Vicentini de Oliveira^a , Matheus Amarante do Nascimento^b , Géssica Aline Caruzo^c ,
Cristina Cristóvão Ribeiro^d , José Roberto Andrade do Nascimento Júnior^e ,
Sônia Maria Marques Gomes Bertolini^a 

ABSTRACT

OBJECTIVE: This study aimed to investigate purpose in life among community-dwelling older adults and its possible associations with physical activity. **METHODS:** Cross-sectional study conducted with 654 older adult users of primary health care in a city in Southern Brazil. The International Physical Activity Questionnaire and the Purpose in Life Scale were administered to participants. Data analysis was conducted using the Kolmogorov-Smirnov, Kruskal-Wallis, and Mann-Whitney tests, and Spearman's correlation coefficients were calculated. Significance was accepted at $p < 0.05$. **RESULTS:** The results showed a significant difference in purpose in life according to age ($p = 0.003$), monthly income ($p = 0.001$), health perception ($p = 0.020$), and medication ($p = 0.008$). There was a very weak correlation between purpose in life and minutes walked per day ($r = -0.13$). **CONCLUSION:** We conclude that sociodemographic variables and health conditions (such as health perception and medications used, respectively) can be considered intervening factors in purpose in life among older adults. Engagement in physical activity was not associated with purpose in life.

KEYWORDS: aged; aging; epidemiology; health services; public health; physical activity.

RESUMO

OBJETIVO: Este estudo teve como objetivo investigar o propósito de vida de idosos de uma cidade do sul do Brasil e suas possíveis associações com a prática de atividade física. **MÉTODOS:** Estudo transversal realizado com 654 idosos usuários de atenção primária à saúde em uma cidade do sul do Brasil. Os instrumentos utilizados foram o Questionário Internacional de Atividade Física e a Escala Objetivo na Vida. A análise dos dados foi realizada pelos testes de Kolmogorov-Smirnov, Kruskal-Wallis, Mann-Whitney e coeficiente de correlação de Spearman ($p < 0,05$). **RESULTADOS:** Os resultados mostraram uma diferença significativa no propósito de vida de acordo com a idade ($p = 0,003$), a renda mensal ($p = 0,001$), a percepção de saúde ($p = 0,020$) e a medicação ($p = 0,008$). Houve uma correlação muito fraca entre o propósito de vida e os minutos de caminhada por dia ($r = -0,13$). **CONCLUSÃO:** Concluímos que variáveis sociodemográficas e condições de saúde, como percepção de saúde e medicamentos utilizados, respectivamente, podem ser considerados fatores intervenientes no propósito de vida dos idosos. Os resultados revelaram que a prática de atividade física não está associada ao propósito na vida.

PALAVRAS-CHAVE: idosos; envelhecimento; epidemiologia; serviços de saúde; saúde pública; atividade física.

^aCentro Universitário de Maringá – Maringá (PR), Brazil.

^bUniversidade do Estado do Paraná – Paranavaí (PR), Brazil.

^cCentro Universitário Metropolitano de Maringá – Maringá (PR), Brazil.

^dCentro Universitário de Foz do Iguaçu – Foz do Iguaçu (PR), Brazil.

^eUniversidade Federal do Vale do São Francisco – Petrolina (PE), Brazil.

Corresponding data

Daniel Vicentini de Oliveira – Centro Universitário de Maringá – Avenida Guedner, 1.610 – Jardim Aclimação – CEP: 87050-900 – Maringá (PR), Brazil – E-mail: d.vicentini@hotmail.com

Received on: 09/26/2019. Accepted on: 10/23/2019

DOI: 10.5327/Z2447-211520191900069

INTRODUCTION

The aging process entails several physical, social, and psychological changes that can interfere with older adults' health and quality of life.¹ These alterations may lead to the development of different chronic diseases, which, in turn, are associated with financial, social, and personal burdens.² Regarding psychological changes, previous studies have shown that mental conditions such as depression and anxiety have a negative impact on some health outcomes, including stroke, coronary heart disease, and myocardial infarction.³⁻⁵ Other researchers have found an important role of positive psychiatry in diminishing mental disorders and supporting healthy aging.^{6,7}

The roles of subjective and psychological well-being have also been analyzed in recent years, usually as a construct composed of six domains: autonomy, environment, personal growth, positive relations with others, self-acceptance, and purpose in life.⁸⁻¹¹ Within this context, "purpose in life" refers to intention, some aim to meet or achieve, and sense that life has meaning and direction.⁸ Research has shown that higher purpose-in-life scores are associated with reduced risk of incident disability,^{12,13} stroke,² myocardial infarction,¹⁴ mild cognitive impairment, and Alzheimer's disease¹⁵ in older adults. Higher purpose-in-life score might also help people manage their stress response to various situations; when people feel well and happy with their own lives, they usually exhibit better judgement during stressful moments and experience better recovery from stressful events.¹⁶⁻¹⁸ Conversely, low scores of purpose in life have been related to depressed mood and depression.¹¹

On the other hand, there is growing research on issues related to the psychological health of older adults as a function of their engagement in physical activity.¹⁹⁻²² Being less aware of one's purpose in life may partially explain why some individuals do not regularly engage in healthy behaviors, including physical activity.¹⁷

Indeed, the majority of investigations involving older adults usually focus on several health outcomes but not physical activity, which, in turn, leads to a gap in the literature regarding the impact of subjective and psychological variables that could help mitigate alterations associated with the aging process. In this sense, there is a need for further studies, especially in Brazil, that focus on this type of variable in order to better elucidate its role in the health of older persons. The limited research conducted in this age group to date was largely composed of U.S. military veterans,¹² U.S. citizens,¹³ and men and women from Northern Sweden.¹⁰ In addition, it has been found that purpose in life usually decreases with age,²³ and past research has shown that older women tend to lose their purpose in life due to depression after some years.¹¹ These findings highlight the need for further research into this important construct. Within this context, the

present study was designed to investigate purpose in life among community-dwelling older adults in Southern Brazil and possible associations with engagement in physical activity.

METHODS

Participants

This study was conducted in Maringá, a mid-sized city (population ca. 420,000) in the state of Paraná, Brazil. According to data obtained from the Municipal Department of Health, the target population comprised 42,258 older adults as of 2016. The initial sample size was calculated as 595. After adding 10% to account for possible losses, the final sample consisted of 654 older adults, considering a 95% confidence level and a 4% margin of error. Sample size was calculated in StatDisk version 8.4.

Participants were enrolled at Basic Health Units (BHUs) across the city, which was subdivided for recruitment purposes into four regions: east region (seven BHUs), comprising 21.8% of the population; north region (eight BHUs), with 34.5% of the population; west region (eight BHUs), with 23.2% of the population; and south region (eight BHUs), which accounted for 20.4% of the total population. Then, three BHUs from each region were selected randomly for evaluation.

After defining sample size in each region and selecting the BHUs, to maintain the proportion of older adults in the sample, the calculations to obtain the final sample by BHUs according to sex were made proportional to the population. The inclusion criteria were age 60 years or older and speech and hearing ability (as assessed by the researcher) sufficient to allow questionnaire administration.

The Mini-Mental State Examination (MMSE) was used to exclude older adults with significant cognitive deficits. The MMSE consists of questions grouped into seven categories: orientation to time, orientation to place, registration of three words, attention and calculation, recall of three words, language, and visual construction.²⁴ The cutoff scores used for exclusion by the MMSE were: 17 for illiterate participants, 22 for those with 1 to 4 years of formal schooling, 24 for those with 5 to 8 years of schooling, and 26 for those with 9 or more years of schooling.²⁵ Overall, 31 potential participants were excluded after application of the MMSE.

Instruments

To characterize participants' sociodemographic and health profile, a semi-structured questionnaire was used to collect information on age (60 to 69 years, 70 to 79 years, 80 years or older), sex (male, female), marital status (married or cohabitating, single, married or divorced, widowed), health perception (good,

fair, poor), medication (none, 1 to 2, more than 2), falls in the last 6 months (yes, no), and near falls in the last 6 months (yes, no).

The Purpose in Life scale is a 10-item self-report measure scored on a Likert-type scale, anchored by the expressions:

- I strongly disagree;
- I agree a little;
- Moderate agreement;
- I agree a lot;
- I strongly agree.

To calculate the final score, the scores for negatively worded items (2, 3, 5, 6, 10) were reversed.¹¹ The final score is given by the average of the answers to the 10 items (sum/10), which can range from 1 to 5.¹

The participants' level of physical activity was evaluated using the short version of the International Physical Activity Questionnaire (IPAQ). This instrument is composed of seven open-ended questions, which allow estimation of the time spent per week in different dimensions of physical activity (moderate and vigorous walking and physical exertion) and physical inactivity (sitting position). The level of physical activity was classified as sedentary, insufficiently active, active, or very active. The average sitting time on weekdays and weekend days was used as a surrogate of sedentary behavior, as described elsewhere.²⁶ The short-form version of the IPAQ was used because it is more easily and quickly administered than its long version.

Procedures

This was a descriptive, cross-sectional epidemiological study. The research protocol was approved by the University Center of Maringá (UNICESUMAR) Ethics Committee in opinion 1,626,966/2016, and authorization was obtained from the Evaluation Committee of the Maringá Municipal Department of Health (CECAPS).

Data were collected in 12 of the 33 BHUs in all four regions of Maringá (north, south, east, and west). Participants were approached by the principal investigator or by the research team and informed of the rationale, objectives, and procedures of the study, in accordance with Brazilian guidelines for human subjects research (National Health Council Resolution 196/96). Those who agreed to participate in the study signed an informed consent form. As potential difficulties with reading, eyesight, and comprehension were anticipated, the questionnaires were administered by direct interview.

Statistical analysis

Data analysis was performed using a descriptive and inferential statistics approach. Frequencies and percentages were used as descriptive measures for the categorical variables. For the

numerical variables, the normality of distribution was initially checked with the Kolmogorov–Smirnov test. As the data did not follow a normal distribution, the median (Md) and interquartile range (IQR) were used to characterize the results. For comparison of purpose in life scores according to the level of physical activity, the Kruskal–Wallis test followed by the Mann–Whitney *U* test were used for pairs of groups. Spearman's coefficient was used to test for correlation between purpose in life and physical activity level. Significance was accepted at $p < 0.05$ was considered. All data analysis was performed in SPSS 22.0 software.

RESULTS

The study sample was predominantly female (56.0%), Caucasian (81.0%), married (61.3%), aged 60–69 years (59.2%), and retired (75.0%), with a monthly income of one to two times the current minimum wage at the time of enrollment (70.0%). Most participants had an incomplete primary education (43.0%).

Regarding health status (Table 1), most participants reported good health perception (48.5%), were taking one or two medications (43.9%), had no history of falls (83.7%) or near falls (79.7%) in the preceding 6 months, and were active or very active (60.7%).

Analysis of physical activity (Table 2) showed that the participants did not engage in vigorous exercise, and few

Table 1 Health profile of older adults in Maringá, Paraná, Brazil.

Variables	n	%
Health perception ^a		
Good	316	48.5
Fair	262	40.2
Poor	74	11.3
Medication ^a		
None	96	14.8
1 to 2	285	43.9
More than 2	268	41.3
Falls in the last 6 months ^a		
Yes	106	16.3
No	546	83.7
Near falls in the last 6 months ^a		
Yes	132	20.3
No	519	79.7
Level of physical activity		
Active/Very active	397	60.7
Insufficiently active	180	27.5
Sedentary	77	11.8

^aVariables with missing cases.

Table 2 Physical activity level and purpose in life of older adults in Maringá, Paraná, Brazil.

Variables	Md	Q1–Q3
Physical activity		
Days walked	3.0	2.0–6.0
Minutes walked per day	40.0	20.0–90.0
Minutes walked per week	140.0	60.0–420.0
Days of moderate physical activity	1.0	0.0–3.0
Minutes of moderate physical activity per day	20.0	0.0–60.0
Minutes of moderate physical activity per week	30.0	0.0–180.0
Days of vigorous physical activity	0.0	0.0–0.0
Minutes of vigorous physical activity per day	0.0	0.0–0.0
Minutes of vigorous physical activity per week	0.0	0.0–0.0
Purpose in life	3.3	3.0–3.7

did moderate activities during the week. However, regarding walking, the participants presented a median value of 3.0 walking days, and a median of 40.0 and 140.0 walking minutes per day and week, respectively. The median purpose-in-life score was 3.3.

Comparison of the participants' purpose in life as a function of sociodemographic variables (Table 3) revealed significant differences for age groups ($P = 0.003$) and monthly income ($P = 0.001$). Participants in the 60-to-69 age group had better purpose-in-life scores than participants in the other age groups, and older adults with a monthly income between one to two times the minimum wage had worse purpose-in-life scores than older adults with a higher monthly income.

When comparing purpose in life of our older adult participants according to their health and physical activity (Table 4), significant differences were found only for health perception ($P = 0.020$) and medication ($P = 0.008$). This indicates that older adults who perceive themselves as having good health felt a greater sense of purpose in life, while those who regularly take more than three medications had a lesser sense of purpose in life compared to those taking one to two medications.

Table 3 Comparison of purpose in life of older adults in Maringá, Paraná, Brazil, according to sociodemographic variables.

Variables		Purpose in life	p
		Md (IQR)	
Sex ^a	Male	3.4 (3.0; 3.7)	0.403
	Female	3.3 (3.0; 3.7)	
Age ^b	60 to 69 years	3.4 (3.1; 3.8)†	0.003*
	70 to 79 years	3.3 (2.9; 3.6)	
	80 years or older	3.2 (3.0; 3.6)	
Marital status ^b	Married	3.4 (3.0; 3.7)	0.555
	Single	3.3 (3.0; 3.6)	
	Divorced	3.3 (3.1; 3.7)	
	Widowed	3.3 (3.0; 3.6)	
Education ^b	Illiterate	3.4 (3.0; 3.6)	0.280
	Incomplete primary	3.3 (3.0; 3.7)	
	Complete primary	3.3 (2.9; 3.6)	
	Complete secondary	3.4 (3.0; 3.8)	
	Any higher	3.3 (3.0; 3.9)	
Monthly income ^b	1–2× minimum wage	3.3 (3.0; 3.6)†	0.001*
	2–3× minimum wage	3.4 (3.1; 3.8)	
	>3× minimum wage	3.6 (3.1; 3.9)	
Retired ^a	Yes	3.3 (3.0; 3.7)	0.940
	No	3.3 (3.0; 3.7)	

* $p < 0.05$ (Mann–Whitney U test^a, Kruskal–Wallis test^b: †60 to 69 years vs. 70 to 79 years and 80 years or older; †One to two times minimum wage vs. Two to three times minimum wage and more than three times minimum wage.

When analyzing the correlation between physical activity variables and purpose in life (Table 5), there was a significant though modest correlation between purpose in life and minutes walked per day ($r = -0.13$).

These findings reinforce the hypothesis that level of physical activity does not seem to be an intervening element in purpose in life in this older adult population.

DISCUSSION

Our study aimed to investigate purpose in life among older adults in a city in Southern Brazil and its possible associations with engagement in physical activity. The main findings suggest that there was no gender difference in purpose in life among older adults, corroborating the findings of several other investigations.^{1,13,14,27} On the other hand, one

Table 4 Comparison of purpose in life of older adults in Maringá, Paraná, Brazil, according to health status.

Variables		Purpose in life	p
		Md (IQR)	
Health perception ^b	Good	3.4 (3.1; 3.8)†	0.020*
	Fair	3.3 (3.0; 3.6)	
	Poor	3.2 (2.8; 3.6)	
	None	3.4 (3.0; 3.7)	
Medication ^b	1 to 2	3.4 (3.1; 3.8)†	0.008*
	More than 2	3.3 (3.0; 3.6)	
Level of physical activity ^b	Active/Very active	3.3 (3.0; 3.7)	0.503
	Insufficiently active	3.4 (3.0; 3.7)	
	Sedentary	3.4 (3.1; 3.6)	
Falls in the last 6 months ^a	Yes	3.3 (3.0; 3.6)	0.059
	No	3.4 (3.0; 3.7)	
Near falls in the last 6 months ^a	Yes	3.3 (3.0; 3.7)	0.815
	No	3.3 (3.0; 3.7)	

* $p < 0.05$ (Mann–Whitney U test^a and Kruskal–Wallis test^b); †good vs. fair and poor; ‡more than 2 vs. none; †1 to 2 vs. more than 2.

Table 5 Correlation between level of physical activity and purpose in life of older adults. Maringá, Paraná, Brazil.

Variable	Physical activity									Life purpose
	1	2	3	4	5	6	7	8	9	10
1. Days walked		0.56*	0.77*	0.23*	0.14*	0.18*	-0.06	-0.08	-0.07	0.04
2. Minutes walked per day			0.89*	0.26*	0.31*	0.28*	0.02	0.01	0.01	-0.13*
3. Minutes walked per week				0.26*	0.26*	0.30*	0.02	0.01	0.01	-0.06
4. Days moderate activity					0.86*	0.93*	0.47*	0.47*	0.47*	-0.01
5. Minutes moderate activity per day						0.94*	0.50*	0.53*	0.53*	-0.10
6. Minutes moderate activity per week							0.51*	0.53*	0.53*	-0.04
7. Days vigorous activity								0.98*	0.98*	-0.03
8. Minutes vigorous physical activity per day									0.99*	-0.05
9. Minutes vigorous physical activity per week										-0.05
10. Purpose in life										

*Significant correlation — $p < 0.05$; 1: days walked; 2: minutes walked per day; 3: minutes walked per week; 4: days of moderate activity; 5: minutes of moderate activity per day; 6: minutes of moderate activity per week; 7: days of vigorous activity; 8: minutes of vigorous physical activity per day; 9: minutes of vigorous physical activity per week; 10: purpose in life.

previous investigation found that women had lower scores of purpose in life compared to men, and that, after 5 years, older women (but not older men) had experienced a significant decline in scores.¹¹

In our sample, the oldest participants (age ≥ 80 years) presented lower purpose-in-life scores, which is in line with previous investigations. One possible explanation for this finding might be related to a reduction in positive feelings, coping strategies, or even the lack of a social support network as people get older, which, in turn, may lead to older adults becoming more isolated.^{1,28} Another important aspect is that, as people get older, they tend to feel their time is running short, preventing them from making big plans for the future, which might reduce their purpose-in-life scores.¹

Among our participants, purpose in life was higher for those with higher income (more than three times the current minimum wage), which is in line with a recent investigation conducted with Brazilian older adults.¹ This may be related to the fact that people in a better financial situation may set more ambitious goals. Conversely, some authors believe that people with higher purpose in life are usually more focused on achieving professional goals, which could increase their income.²⁹

Purpose in life has received attention in recent years for different reasons. This concept refers to the feeling that one's life has direction and one's goals are achievable.²⁹ It is associated with better perception of personal growth, happiness, satisfaction, and greater motivation to engage in the activities of daily living.²⁹ Several investigations have shown that greater purpose in life is related to various important health outcomes, such as a lower waist-hip ratio, lower salivary cortisol levels, and higher levels of high-density lipoprotein (HDL).³⁰⁻³²

We did not find a strong correlation between level of physical activity and purpose in life in our sample. This contradicts the findings of some previous investigators, who pointed out that

higher scores of purpose in life are associated with increased physical activity.¹⁷ However, a study by Hedberg et al.¹¹ involving very old women showed no relationship between reduction in activities of daily living (evaluated by the Barthel Index) and purpose in life over a 5-year period. Thus, it is important to note that a strong purpose in life does not necessarily protect older adults from developing depression.

Our study has some limitations. We did not recruit a nationally representative sample; thus, our findings should be interpreted with caution. The observational, cross-sectional design precludes any causal inferences. Despite the probabilistic sampling strategy, some biases may occur, such as the number of older adults with comorbidities, nutritional status, and depression, among other factors that may impact life purpose and engagement in physical activity.

Additional longitudinal investigations are necessary to assess the interrelationship among the variables utilized in this study and provide stronger evidence of causal relationships with purpose in life. An important confounding factor for perception of life purpose is mood state; however, this variable was not investigated in the present study, which constitutes another limitation. Thus, future research into life purpose should take mood into account.

CONCLUSION

Sociodemographic variables, such as age and monthly income, and health conditions, such as health perception and medication use, can be considered intervening factors in the life purpose of older adults. Conversely, engagement in physical activity is not strongly associated with purpose in life. From a practical standpoint, this highlights the importance of public policies to support living, working, and health conditions during the aging process, since these factors can interfere with purpose in life in the older population.

REFERENCES

1. Ribeiro CC, Neri AL, Yassuda MS. Semantic-cultural validation and internal consistency analysis of the Purpose in Life Scale for Brazilian older adults. *Dement Neuropsychol*. 2018;12(3):244-9. <http://dx.doi.org/10.1590/1980-57642018dn12-030004>
2. Kim ES, Sun JK, Park N, Peterson C. Purpose in life and reduced incidence of stroke in older adults: "The Health and Retirement Study". *J Psychosom Res*. 2013;74(5):427-32. <https://doi.org/10.1016/j.jpsychores.2013.01.013>
3. Wu Q, Kling JM. Depression and the Risk of Myocardial Infarction and Coronary Death: A Meta-Analysis of Prospective Cohort Studies. *Medicine (Baltimore)*. 2016;95(6):e2815. <https://doi.org/10.1097/MD.0000000000002815>
4. Pan A, Sun Q, Okereke OI, Rexrode KM, Hu FB. Depression and risk of stroke morbidity and mortality: a meta-analysis and systematic review. *JAMA*. 2011;306(11):1241-9. <https://doi.org/10.1001/jama.2011.1282>
5. Kubzansky LD, Kawachi I. Going to the heart of the matter: do negative emotions cause coronary heart disease? *J Psychosom Res*. 2000;48(4-5):323-37. [https://doi.org/10.1016/S0022-3999\(99\)00091-4](https://doi.org/10.1016/S0022-3999(99)00091-4)
6. Jeste DV, Palmer BW. A call for a new positive psychiatry of ageing. *Br J Psychiatry*. 2013;202:81-3. <https://doi.org/10.1192/bjp.bp.112.110643>
7. Jeste DV, Palmer BW, Rettew DC, Boardman S. Positive psychiatry: Its time has come. *J Clin Psychiatry*. 2015;76(6):675-83. <https://doi.org/10.4088/JCP.14nr09599>

8. Ryff CD, Keyes CL. The structure of psychological well-being revisited. *J Pers Soc Psychol.* 1995;69(4):719-27. <https://doi.org/10.1037//0022-3514.69.4.719>
9. Boyle PA, Barnes LL, Buchman AS, Bennett DA. Purpose in life is associated with mortality among community-dwelling older persons. *Psychosom Med.* 2009;71(5):574-9. <https://doi.org/10.1097/PSY.0b013e3181a5a7c0>
10. Hedberg P, Gustafson Y, Brulin C. Purpose in life among men and women aged 85 years and older. *Int J Aging Hum Dev.* 2010;70(3):213-29. <https://doi.org/10.2190/AG.70.3.c>
11. Hedberg P, Brulin C, Aléx L, Gustafson Y. Purpose in life over a five-year period: a longitudinal study in a very old population. *Int Psychogeriatrics.* 2011;23(5):806-13. <https://doi.org/10.1017/S1041610210002279>
12. Mota NP, Tsai J, Kirwin PD, Sareen J, Southwick SM, Pietrzak RH. Purpose in Life is Associated with a Reduced Risk of Incident Physical Disability in Aging U.S. Military Veterans. *Am J Geriatr Psychiatry.* 2016;24(9):706-14. <https://doi.org/10.1016/j.jagp.2016.03.004>
13. Boyle PA, Buchman AS, Bennett DA. Purpose in Life Is Associated With a Reduced Risk of Incident Disability Among Community-Dwelling Older Persons. *Am J Geriatr Psychiatry.* 2010;18(12):1093-102. <https://dx.doi.org/10.1097%2FJGP.0b013e3181d6c259>
14. Kim ES, Sun JK, Park N, Kubzansky LD, Peterson C. Purpose in life and reduced risk of myocardial infarction among older U.S. adults with coronary heart disease: A two-year follow-up. *J Behav Med.* 2013;36(2):124-33. <https://doi.org/10.1007/s10865-012-9406-4>
15. Boyle PA, Buchman AS, Barnes LL, Bennett DA. Effect of a purpose in life on risk of incident Alzheimer disease and mild cognitive impairment in community dwelling older persons. *Arch Gen Psychiatry.* 2010;67(3):304-10. <https://doi.org/10.1001/archgenpsychiatry.2009.208>
16. Van Reekum CM, Urry HL, Johnstone T, Thurow ME, Frye CJ, Jackson CA, et al. Individual differences in amygdala and ventromedial prefrontal cortex activity are associated with evaluation speed and psychological well-being. *J Cogn Neurosci.* 2007;19(2):237-48. <https://doi.org/10.1162/jocn.2007.19.2.237>
17. Hooker SA, Masters KS. Purpose in life is associated with physical activity measured by accelerometer. *J Health Psychol.* 2016;21(6):962-71. <https://doi.org/10.1177/1359105314542822>
18. Ishida R, Okada M. Effects of a firm purpose in life on anxiety and sympathetic nervous activity caused by emotional stress: Assessment by psycho-physiological method. *Stress Heal.* 2006;22(4):275-81. <http://dx.doi.org/10.1002/smi.1095>
19. Joia LC, Ruiz T, Donalisio MR. Conditions associated with satisfaction with quality of life in an elderly population. *Rev Saúde Pública.* 2007;41(1):131-8. <http://dx.doi.org/10.1590/S0034-89102007000100018>
20. Vieira DCR, Aquino TAV. Subjective Vitality, Sense in Life and Religiosity in the Elderly: A Correlational Study. *Temas Psicol.* 2016;24(2):483-94. <http://dx.doi.org/9788/TP2016.2-05PT>
21. Vieira DCR. Old age in an existential dimension: perspectives between sense of life, religiosity, vitality and temporality [dissertation]. Universidade Federal da Paraíba: João Pessoa; 2014.
22. Silva ANC, Castanho GKF, Chimizzo JGC, Barreira J, Fernandes PT. Motivational factors related to the practice of physical activities in the elderly. *Psicol Estudo.* 2016;21(4):677-85.
23. Pinquart M. Creating and maintaining purpose in life in old age: A meta analysis. *Ageing Int.* 2002;27(2):90-114. <https://doi.org/10.1007/s12126-002-1004-2>
24. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário Internacional De Atividade Física (Ipaq): Estupo De Validade E Reprodutibilidade No Brasil. *Rev Bras Atividade Física Saúde.* 2012;6(2):5-18. <https://doi.org/10.12820/rbafs.v.6n2p5-18>
25. Kim ES, Sun JK, Park N, Peterson C. Purpose in life and reduced incidence of stroke in older adults: "The Health and Retirement Study." *J Psychosom Res.* 2013;74(5):427-32. <https://doi.org/10.1016/j.jpsychores.2013.01.013>
26. Ryff CD, Heller AS, Schaefer SM, van Reekum C, Davidson RJ. Purposeful {Engagement}, {Healthy} {Aging}, and the {Brain}. *Curr Behav Neurosci Rep.* 2016;3(4):318-27. <https://doi.org/10.1007/s40473-016-0096-z>
27. Hill PL, Turiano NA, Mroczek DK, Burrow AL. The value of a purposeful life: Sense of purpose predicts greater income and net worth. *J Res Pers.* 2016;65:38-42. <https://doi.org/10.1016/j.jrp.2016.07.003>
28. Ryff CD. Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *J Pers Soc Psychol.* 1989;57(6):1069-81. <https://doi.org/10.1037/0022-3514.57.6.1069>
29. Ryff CD, Singer BH, Love GD. Positive health: Connecting well-being with biology. *Philos Trans R Soc B Biol Sci.* 2004;359(1449):1383-94. <https://dx.doi.org/10.1098%2Frstb.2004.1521>
30. Bower JE, Kemeny ME, Taylor SE, Fahey JL. Finding positive meaning and its association with natural killer cell cytotoxicity among participants in a bereavement related disclosure intervention. *Ann Behav Med.* 2003;25(2):146-55. https://doi.org/10.1207/S15324796ABM2502_11
31. Lindfors P, Lundberg U. Is low cortisol release an indicator of positive health? *Stress Heal.* 2002;18(4):153-60. <https://doi.org/10.1002/smi.942>
32. Jacobs TL, Epel ES, Lin J, Blackburn EH, Wolkowitz OM, Bridwell DA, et al. Intensive meditation training, immune cell telomerase activity, and psychological mediators. *Psychoneuroendocrinology.* 2011;36(5):664-81. <https://doi.org/10.1016/j.psyneuen.2010.09.010>

