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Life satisfaction in community-dwelling older adults and direct and indirect associations with physical activity, functionality and overall health: a pathway analysis

Satisfação com a vida em idosos da comunidade e associações diretas e indiretas com atividade física, funcionalidade e saúde global: uma análise de caminhos

Satisfacción con la vida en adultos mayores que viven en comunidades y asociaciones directas e indirectas con la actividad física, la funcionalidad y la salud global: un análisis de ruta

Daniel Vicentini de Oliveira (https://orcid.org/0000-0002-0272-9773) [1]
Yara Lucy Fidelix (https://orcid.org/0000-0003-2390-0565) [2]
Priscila Ester de Lima Cruz (https://orcid.org/0000-0003-2958-4786) [3]
José Roberto Andrade do Nascimento Júnior (https://orcid.org/0000-0003-3836-6967) [2]
Lenamar Fiorese (https://orcid.org/0000-0003-1610-7534) [4]

Abstract *This study aimed to analyze whether physical activity, functionality, health variables and psychological factors are associated with life satisfaction of 654 older adults users of basic health units in the city of Maringá, Brazil. The WHODAS 2.0, International Physical Activity Questionnaire, Geriatric Depression Scale, Life Satisfaction Scale, Geriatric Anxiety Inventory, Self-Esteem Scale, Life Purpose Scale, Perceived Stress Scale and Mini Nutritional Assessment were used. Path analysis was used. Self-esteem was the main factor related to satisfaction with life. Stress and depression indicators negatively influenced life satisfaction. Level of physical activity and life purpose were indirectly related to life satisfaction. Anxiety was the main factor linked to stress and indicative of depression, which in turn seems to negatively impact life satisfaction. It is concluded that satisfaction with life was directly related to self-esteem, nutritional status, stress and indicative of depression. Self-esteem was the main factor related to satisfaction with life.*
Key words *Aging, Psychological tests, Health*

Resumo *O estudo teve como objetivo analisar se a atividade física, a funcionalidade, variáveis de saúde e fatores psicológicos estão associados à satisfação com a vida de 654 idosos usuários de unidades básicas de saúde do município de Maringá, Brasil. Foram utilizados o WHODAS 2.0, Questionário Internacional de Atividade Física, Escala de Depressão Geriátrica, Escala de Satisfação com a Vida, Inventário de Ansiedade Geriátrica, Escala de Autoestima, Escala de Propósito de Vida, Escala de Estresse Percebido e Mini Avaliação Nutricional. Foi utilizada a análise de caminhos. A autoestima foi o principal fator relacionado à satisfação com a vida. O estresse e os indicadores de depressão influenciaram negativamente a satisfação com a vida. O nível de atividade física e o propósito de vida estiveram indiretamente relacionados à satisfação com a vida. A ansiedade foi o principal fator ligado ao estresse e indicativo de depressão, que por sua vez parece impactar negativamente a satisfação com a vida. Conclui-se que a satisfação com a vida esteve diretamente relacionada com autoestima, estado nutricional, estresse e indicativo de depressão. A autoestima foi o principal fator relacionado à satisfação com a vida.*
Palavras-chave *Envelhecimento, Testes psicológicos, Saúde*

Resumen *Este estudio tuvo como objetivo analizar si la actividad física, la funcionalidad, las variables de salud y los factores psicológicos están asociados con la satisfacción con la vida de 654 ancianos usuarios de unidades básicas de salud de la ciudad de Maringá, Brasil. Se utilizó el WHODAS 2.0, Cuestionario Internacional de Actividad Física, Escala de Depresión Geriátrica, Escala de Satisfacción con la Vida, Inventario de Ansiedad Geriátrica, Escala de Autoestima, Escala de Propósito de Vida, Escala de Estrés Percibido y Mini Evaluación Nutricional y el Análisis de Ruta. La autoestima fue el principal factor relacionado con la satisfacción con la vida. El estrés y los indicadores de depresión influyeron negativamente en la satisfacción con la vida. El nivel de actividad física y el propósito en la vida se relacionaron indirectamente con la satisfacción con la vida. La ansiedad fue el principal factor relacionado con el estrés e indicativo de depresión, lo que a su vez parece afectar negativamente la satisfacción con la vida. Se concluye que la satisfacción con la vida estuvo directamente relacionada con la autoestima, el estado nutricional, el estrés y es indicativo de depresión. La autoestima fue el principal factor relacionado con la satisfacción con la vida.*
Palabras clave *Envejecimiento, Pruebas psicológicas, Salud*

[1] Departamento de Pós-Graduação em Promoção da Saúde, Instituto Cesumar de Ciência, Tecnologia e Inovação, Universidade Cesumar. Av. Guedner 1610. 87050-900 Maringá PR Brasil. d.vicentini@hotmail.com
[2] Departamento de Pós-Graduação em Educação física, Universidade Federal do Vale do São Francisco. Petrolina PE Brasil.
[3] Departamento de Pós-Graduação em Promoção da Saúde, Universidade Cesumar. Maringá PR Brasil .
[4] Departamento de Pós-Graduação em Educação Física, Universidade Estadual de Maringá. Maringá PR Brasil.

Introduction

As people age, they are more likely to face complex health issues, job loss, bereavement and impaired cognitive functions, which can threaten their mental health and quality of life, affecting their satisfaction with life[1]. Some studies indicate that worse self-perceived health[2], more physical disabilities[3] and living alone or being single are associated with lower levels of satisfaction with life[4].

In contrast, the theory of socio-emotional selectivity posits that as people age, they accumulate emotional wisdom that leads to the selection of more emotionally satisfying events, friendships, and experiences. Thus, despite the negative factors mentioned above, loss of status associated with retirement, deterioration in health and reduction in income, older adults maintain and even increase subjective well-being by focusing on a more limited set of social aspects, contacts and experiences[5]. And for an adequate level of subjective well-being to be reported, it is necessary that the individuals recognize to maintain at a high level their satisfaction with life, high frequency of positive emotional experiences and low frequencies of negative emotional experiences[6].

Subjective well-being may even be a protective factor for health, reducing the risk of chronic diseases and promoting longevity. Therefore, it should be addressed in measures of health appreciation and be considered in the allocation of health resources[5], after all, it is an indicator of adaptation and successful aging[7].

The emotional composition of the concept of subjective well-being includes a balance between these two emotional dimensions: positive emotions and negative emotions. For the balance to represent a dimension of subjective well-being, it is necessary to result in a positive relationship between the emotions experienced, that is, the experience of more positive emotions than negative ones in the course of life[8] and in the present moment.

In order for older adults to maintain their life functionally and proceed to a peaceful end, it is important to identify the factors that affect their satisfaction with life[9]. Satisfaction with life is the judgment of an individual about the own life[8] and is considered a person's overall assessment derived from a comparison of what they have and what they expect. It is an individual's emotional reaction or attitude towards life at work, free time, and other time periods and is part of the subjective well-being construct[10]. In addition, some factors that are related to life satisfaction in the elderly include health status, income level, acceptance into their family, frank relationships in their family, professional role performance, self-confidence, being a woman, active religious life, recreation, level of education and physical aspects, level of social activity and fear of falling[9,11].

Studies show that there are divergences regarding aging and life satisfaction because it is a subjective analysis, permeated by social relationships, participation in pleasurable activities and personality, family and health characteristics, among other aspects, because it is a dynamic process[12,13]. Life satisfaction and its correlates have been widely studied among older adults, but there are few studies on how functionality and health measures relate specifically to life satisfaction[14]. Thus, it can be inferred that there are still gaps in the literature that need to be investigated regarding the relationship between life satisfaction and several other psychological variables (indicative of depression, life purpose, self-esteem, anxiety, stress) and health (use of medications, functionality, level of physical activity, nutritional status).

To date, few studies have specifically examined the network of factors that influence life satisfaction in older adults. Therefore, there is a need to consider this large number of factors when studying life satisfaction, in order to understand which are the main ones and which should be the focus of future practical interventions that seek to improve life satisfaction of older adults. Therefore, the study aimed to analysed whether physical activity, functionality, health variables and psychological factors are associated with satisfaction with life in older people.

Method

This is a quantitative, analytical, observational and cross-sectional population-based and cluster sample study, approved by the People Ethics Committee of the University Center of Maringá, through opinion 1,777,797/2016.

According to data from the Health Department of Maringá, Paraná, 42,258 older adults attended the Basic Health Units (BHU) of the municipality in 2016. Considering the population found, the initial sample to be considered was 595 older adults, totalling 10% of possible losses. The final sample consisted of 654 older adults of both sexes, considering a confidence

level of 95% and a margin of error of 4%. The software used to obtain the calculations was StatDisk version 8.4.

The BHU in which older adults were attended were subdivided into four regions of the municipality: East region (07 BHU covering 21.8% of the population), North region (08 BHU covering 34.5% of the population), West region (08 BHU covering 23.2% of the population) and South region (08 BHU covering 20.4% of the total older population of the municipality). By drawing lots, three BHU were selected from each region. After defining the sample size in each region and selecting the BHU, it was important to maintain the proportion of the older population in the sample, so that the calculations for obtaining the final sample by BHU according to sex were proportional to the population.

Participants were older adults of both sexes, aged 60 years or older, with preserved speech and hearing, which enabled the application of questionnaires. The Mini Mental State Examination (MMSE)[15] was used to exclude older adults with significant cognitive deficits. The MMSE consists of questions grouped into seven categories: temporal orientation, spatial orientation, three-word recording, attention and calculation, three-word memorization, language, and visual-constructive ability. The cutoff score used by the MMSE for exclusion was: 17 for illiterates; 22 for older people with schooling from one to four years; 24 for older adults with schooling between five and eight years; and 26 for older adults with nine years or more of schooling[16]. Older adults were excluded if classified below the cutoff point specific to their schooling.

A semi-structured questionnaire was used to characterize the sociodemographic profile of the older adults. The questionnaire covered the age (60 to 69 years, 70 to 79 years, 80 to 90 years), sex (male, female), marital status (married or resident with partner), single, divorced, widowed), color (black, white, other), occupational status (working or not working for own income), monthly income in minimum wages (MW) according to the 2016 Census of the Brazilian Institute of Geography and Statistics (IGBE) as a reference (1 to 2 MW, 2.1 to 3 MW, more than 3 MW), retirement (yes, no), schooling (non-schooled, incomplete elementary school, complete elementary school, complete high school, higher education).

Functionality was assessed using the WHO-DAS 2.0 instrument. This 12-item instrument covers six disability domains in 30 days (last month). These domains are: Understanding and Communication (UC), Mobility (MB), Self-Care (SC), Interpersonal Relations (IR), Activities of Daily Living (ADL) and Social Participation (SP). Items are answered on a 5-point Likert scale, ranging from no difficulty (0 points) to self-reported extreme difficulty (4 points)[17,18].

The level of physical activity of the older adults was assessed through the summary version of the International Physical Activity Questionnaire (IPAQ), composed of seven open questions with information that allow estimating the time spent per week in the different dimensions of physical activity (moderate and vigorous physical activity and walking efforts) and physical inactivity (sitting position). The answer is given in hours and minutes. The time of 150 min per week of physical activities was considered for the subject to be classified as physically active; for less than 10 min, the subject was considered sedentary and those who performed at least 10 min, but did not reach 150 min, were considered insufficiently active[19].

To verify the indications of depression, the Geriatric Depression Scale (GDS) was applied. The GDS, short version, is a test for the detection of depressive symptoms in older adults, with 15 negative/affirmative questions, in which the result of five or more points indicates depression, and the score equal to or greater than 11 characterizes indications of severe depression[20,21]. This scale does not diagnose depression, but rather depressive symptoms.

The Life Satisfaction Scale is an instrument proposed by Diener et al[22]. This measure consists of five items (for example, "In most respects, my life is close to my ideal"), with responses graded according to a Likert-type scale, ranging from 1 = strongly disagree to 7 = strongly agree. This scale aims to evaluate the judgment that people make about their own satisfaction with life, being themselves to choose, according to their values and interests, the aspects to be considered to express such satisfaction. From a possible total score of 35 points, the closer to it, the better the satisfaction with the life of older adults[23].

The Geriatric Anxiety Inventory is easy and fast to administer and evaluates the anxiety of the older population and has good validity converging with the other instruments that evaluate anxiety. It consists of 20 items, with the answer options "I agree" (one point) or "I disagree" (zero points), always referring to the last week. Scores above 10/11 indicate suspicion of anxiety disorder[24,25]. This scale does not diagnose anxiety, but anxiety symptoms.

Regarding the evaluation of Self-esteem, the Self-esteem Scale developed by Rosenberg[26] was used. This is a one-dimensional measure consisting of 10 statements related to a set of feelings of self-esteem and self-acceptance that assesses global self-esteem. The items are answered on a four-point Likert scale, ranging from totally I totally agree, I agree, I disagree, and I totally disagree. In this study, the version adapted to Portuguese by Hutz[27] was used, whose initial results already indicate the unidimensionality of the instrument and psychometric characteristics equivalent to those found in the original file. The score obtained with the scale can vary from 10 to 40, being calculated by adding the scores obtained through the answers given to the 10 sentences. Each sentence can receive a score of at least 1 and at most 4. Satisfactory self-esteem is defined as a score greater than or equal to 30 on the Rosenberg Scale and unsatisfactory with a score less than[27].

The purpose of life of older adults was assessed using an instrument with 10 questions derived from the original scale of Ryff and Keyes[28], validated by Ribeiro, Neri and Yassuda[29]. The life purpose instrument is a self-report measure, which contains ten questions, with answers indicated on a 6-point Likert scale, according to the level of agreement (I strongly agree, I agree, I partially agree, I partially disagree, I disagree, and I totally disagree).

The Brazilian version of the Perceived Stress Scale[30] was used to measure individuals' stress. This instrument consists of 14 questions answered on a 5-point Likert scale ranging from 0 = never to 4 = always. Questions with a positive connotation (4, 5, 6, 7, 9, 10 and 13) are scored inversely before adding the remaining questions. The total score can range from 0 to 56 and higher values indicate higher levels of stress.

For the assessment of nutritional status, the Mini Nutritional Assessment (MNA), developed by the Nestlé Nutrition Institute and validated for Brazilian older adults[31], was used, which is a tool that can identify nutritional risk or installed malnutrition. The detection of these risks in any degree is an important measure for the adequate nutritional guidance of these older adults. In addition to screening, it is divided into four parts: anthropometric assessment (BMI, arm circumference, calf circumference and weight loss); global assessment (questions related to lifestyle, medication, mobility and psychological problems); dietary assessment (questions related to the number of meals, food and liquid intake and autonomy in food); and self-assessment (self-perception of health and nutritional condition). For the total questionnaire of the MNA, the scores considered were: adequate nutritional status (normal): ≥ 24; risk of malnutrition: between 17 and 23.5; malnutrition: < 17.

After authorization from the Standing Committee on Training and Qualification of Health Workers (CECAPS), data were collected in 12 BHU, from the 33 BHU in Maringá. Before data collection began, a team of ten researchers was properly trained, and a pilot study was also carried out with 30 older adults. Volunteers were approached by the responsible researcher and/or the research team. Then, they were informed about the justification, objectives and procedures to be performed, according to guidelines for research with human beings contained in Resolution 466/2012 of the National Health Council. After these procedures, those who agreed to participate in the research signed the informed consent form. The collection was carried out on different days, shifts and times, according to the availability of the researchers, between the months of June and December 2016. In order to minimize difficulties with reading, visual and comprehension problems, the researchers read the questionnaires to older adults.

Data were analyzed with descriptive and inferential statistics. The software R v3.5.1 was used. Missing data were imputed through the MICE Package (Multiple Imputation Chained Equations). The normality of the data was verified by the Shapiro-Wilk test, presenting a non-parametric univariate distribution. Spearman's correlation was used to evaluate the relationship between the variables and Whitney's Mann-U test was used to compare the 50 best performances of the sample with others. Values were considered significant when $p < 0.05$.

In order to study the complex interaction between the study variables, a network analysis technique was applied. Using the qgraph package, a smaller absolute shrinkage and selection was obtained. The Operator network (LASSO) was produced, which calculates a network of partial correlations between all variables, promoting associations between peers while controlling for the influence of other variables. Next, the LASSO network trivially shrinks small correlations with zero, tracing a network with only the largest associations, removing potentially spurious correlations[32].

Networks are formed by "nodes" (circles) representing variables and "edges" connecting

variables. The colors indicate the direction of the relationship and the width of the edges represents the strength of the association. The positioning of nodes within the network also follows the calculation of associations[33]. In the current network, positive associations were represented by green edges, while red edges indicated an inverse relationship.

In addition to visual inspection of the network, centrality indices were used to identify the most influential nodes: strength of connections; proximity centrality, which measures the distance between nodes and indicates the ease with which information from a node travels through the network; and intermediation centrality, describing the number of times a node acts as a bridge in the shortest path between two nodes, which indicates the potential node to affect other variables within the network[34].

Results

To trace the sociodemographic and health profile of older adults

Of the 654 older adults evaluated, there was a higher prevalence of females (56.0%), married people (61.3%), aged between 60 and 69 years (59.2%), with incomplete elementary school (43.0%), good health perception (48.5%) and taking at least one medication (85.2%). The majority also had a level of active physical activity (51.5%). The following are the descriptive values of the study variables: Satisfaction with life (M = 26.06; SD = 4.43); Purpose of life (M = 33.22; SD = 5.73); Functionality (M = 5.45; SD = 5.50); Anxiety symptoms (M = 5.59; SD = 5.54); Stress (M = 22.42; SD = 7.53); Self-esteem (M = 31.47; SD = 4.81); Indicatives of depression (M = 3.74; SD = 3.16); and Nutritional assessment (M = 35.06; SD = 48.30).

Correlations between psychological and behavioral variables of the study

According to the results in Table 1, the following significant correlations were found ($p < 0.05$): perception of health with medication use (r = -0.34), life satisfaction (r = 0.08), self-esteem (0.12) and indicative of depression (r = -0.17); nutritional status with level of physical activity (r = 0.09), functionality (r = -0.34), life satisfaction (r = 0.32), anxiety symptoms (r = -0.21), stress (r = -0.17), purpose of life (r = 0.26), self-esteem (r = 0.19) and indicative of depression (r = -0.22); level of physical activity with life satisfaction (r = 0.08); functionality with life satisfaction (r = -0.28), anxiety symptoms (r = 0.25), stress (r = 0.21), purpose of life (r = -0.28), self-esteem (r = -0.16) and indicative of depression (r = 0.30); life satisfaction with anxiety (r = -0.26), stress (r = -0.43), purpose of life (r = 0.34), self-esteem (r = 0.50) and indicative of depression (r = -0.38); anxiety symptoms with stress (r = 0.50), purpose of life (r = -0.19), self-esteem (r = -0.26) and indicative of depression (r = 0.47); stress with life purpose (r = -0.31), self-esteem (r = -0.43) and indicative of depression (r = 0.42); life purpose with self-esteem (r = 0.32) and indicative of depression (r = -0.38); self-esteem with indicative of depression (r = -0.31) (Table 1).

Network analysis (Figure 1) seeks to graphically represent complex relationships, such as psychological, social, behavioral or health phenomenal. Due to its complexity, the network can be observed from several angles, and in order to meet the objective of the study, we brought satisfaction with life as the focus of the results. It was observed that life satisfaction was directly related to four variables: self-esteem (r = 0.31), nutritional status (r = 0.17), stress (r = -0.18) and indicative of depression (r = -0.13).

Since the spatial distribution of nodes in a network is based on the relationships between each of them, observing the general structure already brings us relevant information. It is worth noting that, directly or indirectly, all network variables are connected, even if by longer/distant paths. Still, it is important to emphasize that the analysis of correlations in a network is not evidence of cause and effect, so it is important to take into account that the interaction between each of the nodes can occur, and possibly does occur, mutually.

Six of the psychological variables measured (i.e., life satisfaction, self-esteem, stress, anxiety symptoms, indicative of depression and purpose in life) formed a kind of nucleus within the network, as confirmed by the centrality indicators (Figure 2). From this nucleus of psychological variables, the distal positioning of the other nodes is noted, which represent more behavioral or attitudinal characteristics, such as the level of physical activity, the use of medications and nutritional status.

Among the aspects investigated, self-esteem was the main factor related to life satisfaction; a better nutritional status was also positively associated; on the other hand, stress and indicative of depression had a negative influence on

Table 1. Interrelationships between the study variables. Maringá, Paraná, Brazil (2016).

Variables	1	2	3	4	5	6	7	8	9	10	11
1. P. Health	-	**-0.34***	0.00	0.01	-0.06	**0.08***	0.05	-0.05	-0.07	**0.12***	**-0.17***
2. Medications		-	0.07	0.03	-0.02	0.00	0.01	0.05	0.06	-0.04	0.03
3. Nutritional S.			-	**0.09***	**-0.34***	**0.32***	**-0.21***	**-0.17***	**0.26***	**0.19***	**-0.22***
4. Level of PA				-	0.07	**0.08***	-0.06	0.00	-0.06	0.15*	0.08*
5. Functionality					-	**-0.28***	**0.25***	**0.21***	**-0.28***	**-0.16***	**0.30***
6. S. Life						-	**-0.26***	**-0.43***	**0.34***	**0.50***	**-0.38***
7. Anxiety symptoms							-	**0.50***	**-0.19***	**-0.26***	**0.47***
8. Stress								-	**-0.31***	**-0.43***	**0.42***
9. P. Life									-	**0.32***	**-0.38***
10. Self-esteem										-	**-0.31***
11. I. Depression											-

1. Perception of health. 3. Nutritional status. 4. Level of Physical Activity 6. Satisfaction with Life. 9. Purpose of life 11. Indicative of depression.

Source: Authors.

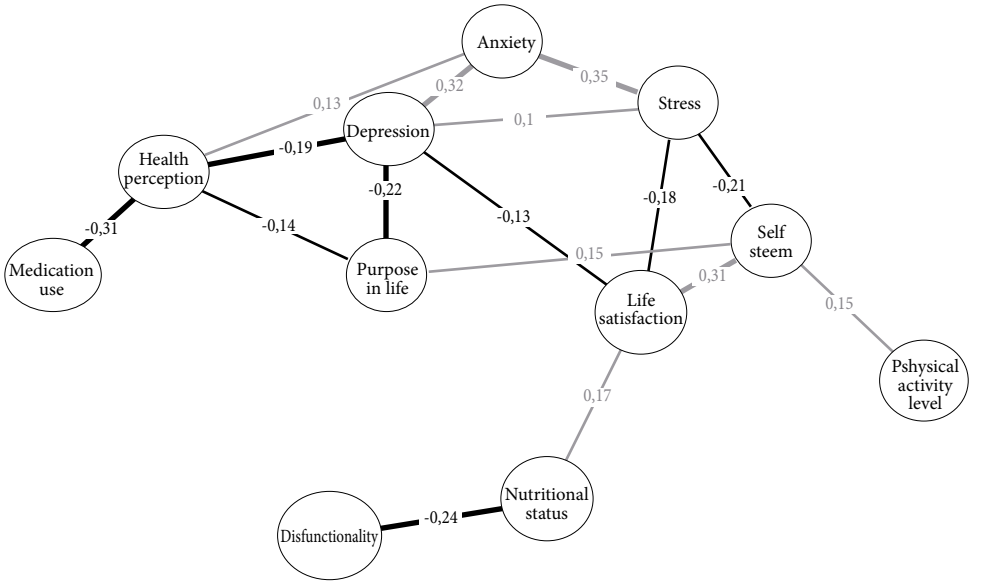

Figure 1. Correlation network of the selection operator and absolute minimum reduction for the psychological and health variables of older adults. Maringá, Paraná, Brazil (2016).

Source: Authors.

life satisfaction of older adults. It is important to note that stress had both a direct negative effect on life satisfaction and an indirect effect on self-esteem. The other psychological factors, such as anxiety symptoms, health perception and life purpose, were not directly connected with life satisfaction, although they may play indirect roles. Nutritional status was the only non-psychological factor directly related to life satisfaction.

By analyzing the indirect relationships present in the network, some observations can be made. Due to its positive and direct relationship with self-esteem, the level of physical activity and life purpose have the potential to indirectly benefit the life satisfaction of older adults, that is, having a life purpose and practicing physical activities can be beneficial to the self-esteem of older adults, improving their life satisfaction. Although not directly related to life satisfaction,

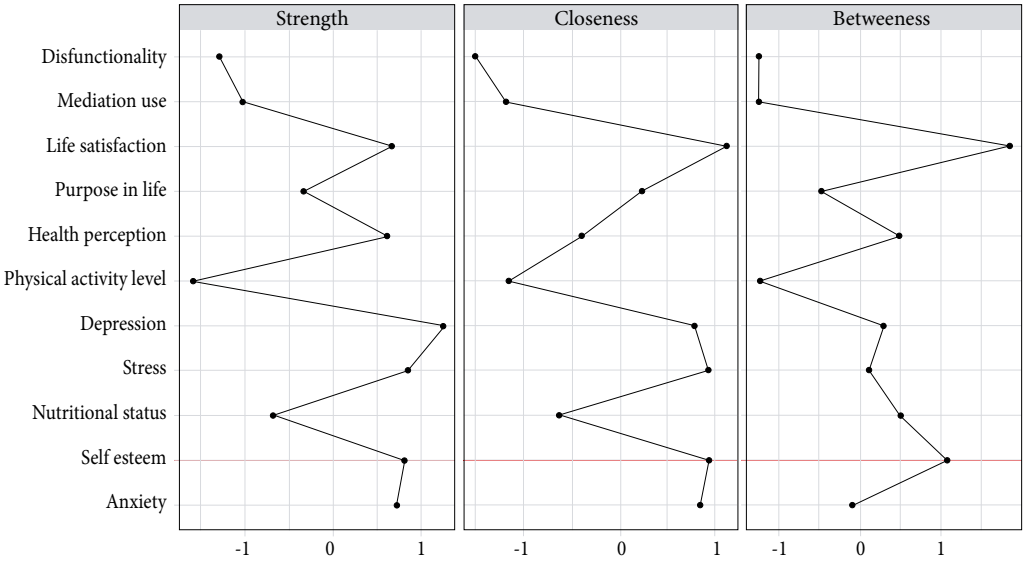

Figure 2. Strength, proximity and centrality of intermediation of network variables. Maringá, Paraná, Brazil (2016).

Source: Authors.

anxiety symptoms was the main factor linked to stress and indicative of depression, which in turn negatively impact life satisfaction.

Interestingly, the functionality of older adults and their perception of health were not directly related to how satisfied they were with their lives, and were the variables most distant from satisfaction with life, along with the use of medication.

When analyzing the indicators of centrality of the network (Figure 2), it can be noted that the indicator of depression was the factor with the greatest strength, that is, it had greater direct impacts on the other nodes of the network. Then, life satisfaction, stress and self-esteem presented the highest degree of proximity, and can be considered as the nucleus of the network, along with the indicative of depression and anxiety symptoms, which also presented high values of proximity.

Finally, it is noteworthy that life satisfaction was the variable with the highest degree of intermediation among all 11 aspects assessed, this means that life satisfaction acts as a bridge to connect the other nodes of the network and can be a common factor among all. Considering its high degree of proximity and intermediation, life satisfaction proved to be the main variable within the present network.

Discussion

The aim of this study was to analyze whether physical activity, functionality, health variables and psychological factors are associated with satisfaction with life in older people and the results showed that satisfaction with life was directly related to self-esteem, nutritional status, stress and indicative of depression in older people.

Life satisfaction is a general indicator of health risk and successful aging[35] and is affected by different cognitive, physical and social factors[36]. In the present study, life satisfaction was shown to be the main variable within the network and self-esteem was the main factor related to it.

Self-esteem, as a fundamental psychological construction, is influenced by several life parameters, such as physical and mental health, satisfaction with close relationships, social support and economic perspectives in adulthood[37]. In addition to these, it is suggested that personality factors are in multiple ways associated with self-esteem and its development throughout life[38]. Self-esteem is expected to be lower in adolescence but to gradually increase from early to late adulthood[39]. A longitudinal study showed that self-esteem peaks around age 50

and declines after that, especially after age 70. Declines were less pronounced in emotionally stable older adults and associations of self-esteem level with disability became weaker with advancing age[38].

Other studies have reported smaller declines in self-esteem in old age[37,40]. Such diversity of findings can be explained by intercultural differences[37,39], since studies reporting large declines in self-esteem were mostly conducted in the United States while small reductions were found in samples from other countries, such as Germany, Australia and Japan. In addition to cultural aspects, factors related to self-esteem in old age need to be investigated in more detail in future studies[38].

Indirect relationships in the network of the present study allowed us to verify that having a purpose in life and practicing physical activities can be beneficial to the self-esteem of older adults, improving their satisfaction with life. However, it is worth noting that causal relationships cannot be considered here.

There are positive relationships between physical activity and life satisfaction[40]. More physically active older adults, during leisure time, reported fewer depressive symptoms and better life satisfaction when compared to sedentary older adults[36]. Two potential mechanisms may explain the biopsychosocial effects of physical activity. The first involves improvements in physical health, such as strength, cardiorespiratory fitness, and functional capacity. The second is related to changes in psychological variables, such as increased self-efficacy, self-esteem and decreased anxiety and depressive symptoms. In addition, people with mental health problems may report greater life satisfaction when they regularly engage in physical activity[41].

Adequate nutritional status, the only non-psychological factor, was also positively associated with life satisfaction, corroborating another studie[42]. Life satisfaction and a diet that includes consumption of soybeans, fish, fruits, vegetables and tea has also been linked to more positive aging of older adults from Singapore[43].

Optimal nutrition can decrease the risk of morbidity and mortality from many diseases and can positively influence self-perception of health and life satisfaction[42]. It is worth mentioning that food intake, in addition to the physical characteristic of eating, involves sociological and cultural aspects of food[44]. Positive psychological and social aspects associated with mealtimes make the experience more enjoyable. Thus, it can be hypothesized that the improvement in life satisfaction is influenced more by positive experiences of meals and, to a lesser extent, by nutrition itself[42].

Older adults at nutritional risk may eat few fruits and vegetables, have greater dissatisfaction with life, low resilience and greater symptoms of depression when compared to older adults without risk[45]. In the present study, stress and indications of depression had a negative influence on life satisfaction of older adults. This finding is supported by other studies[11,35,46,47]. People with mental health problems report greater dissatisfaction with life than the general population. Adults who are dissatisfied with life are 41 times more likely to have depressive symptoms when compared to their satisfied peers 46. On the other hand, anxiety symptoms, stress, self-esteem and indicative of depression can predict 21% of the variability in life satisfaction of older adults[48,49].

Functionality, health perception and medication use were not directly related to life satisfaction among the older adults evaluated. Other studies have pointed out a positive association between perception of health status and life satisfaction[11,40,42]. A 10-year follow-up study of 1,485 older women found that self-reported health, mobility, and life satisfaction were closely intertwined. The strongest correlate of life satisfaction over the years was self-rated health. Older women with lower perceptions of health were more likely to be dissatisfied with their current and future lives[14].

The present study has some limitations that need to be emphasized. The sample consisted mostly of physically active older adults, which, in turn, makes it impossible to extrapolate the results to groups of institutionalized, frail or hospitalized older adults. In addition, as previously mentioned by other researchers, although the investigations carried out based on path analysis represent a configuration of possible causal relationships through the paths, it is still not possible to establish causal relationships between the variables analysed. It is also noteworthy that there may be other variables in the path related to life satisfaction that we could not consider in this study; so future studies should explore other potentially important mediators. As strengths, we highlight the methodological care so that there was representativeness of the regions that had BHU; the analysis used, since studies with this approach are still scarce; the representative sample of the municipality.

Conclusions

It is concluded that life satisfaction was directly related to self-esteem, nutritional status, stress and indicative of depression in older adults. Self-esteem was the main factor related to life satisfaction. Stress and indicative of depression had a negative influence on the satisfaction with life of older adults.

As practical implications, it is important that professionals from the various areas of knowledge pay more attention to psychological issues of older adults, such as satisfaction with life, because these may be directly related to several other biological and social variables.

Collaborations

DV Oliveira participated in the conception, design, analysis, and interpretation of the data, as well as the writing of the manuscript or its revision when it included important intellectual criticism of its content. YL Fidelix participated in the analysis and interpretation of the data and the writing of the manuscript. PEL Cruz participated in the analysis and interpretation of the data and the writing of the manuscript. JRA Nascimento Júnior participated in the analysis and interpretation of the data, the writing of the manuscript, and the final approval of the version to be published. L Fiorese participated in the final approval of the version to be published.

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