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*Corresponding author: Marina Prista Guerra, Faculty of Psychology and Educational Sciences, University of Porto, Rua Alfredo Allen, 4200-135 Porto, Portugal
E-mail: mguerra@fpce.up.pt

HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Meaning in life in medical settings: A new measure correlating with psychological variables in disease

Marina Prista Guerra[1]*, Leonor Lencastre[1], Eunice Silva[2] and Pedro M. Teixeira[1]

Abstract: Meaning in life or lack of it is frequently associated to the psychological adjustment to disease. This study aims at contributing to the clarification of the concept and developing a meaning in life scale which may be applied either in a clinical population or in the general population as well as presenting its psychometric evaluation. Four samples were used to perform the psychometric analyses, of which three of them represented different diseases. Sample one consists of 200 patients with colorectal cancer, where 51% are males, sample two consists of 150 females with breast cancer and sample three consists of 92 male patients mainly with prostatic cancer. Sample four consists of 88 healthy subjects of which 37.5% are males. Confirmatory Factorial Analysis was performed, and the maximum likelihood extraction method was applied. Findings suggested a unidimensional scale with a good model of fit across the four samples, acceptable reliability and appropriate convergent validity. There was a negative relationship with Anxiety and Depression and a positive relationship with Quality of Life, Life Satisfaction, Optimism and Social Support. No differences were found in the new scale concerning gender and cancer types. The meaning in life scale is a promising tool to be used in health settings.

Subjects: Behavioral Sciences; Health and Social Care; Medicine, Dentistry, Nursing & Allied Health

Keywords: meaning in life; assessment; cancer; life satisfaction; optimism; anxiety; depression; social support; quality of life

ABOUT THE AUTHOR

Marina Prista Guerra has a PhD in Health Psychology since 1994, being Associate Professor of Psychology at the University of Porto in Portugal, lecturing in the courses of "Health Psychology" and "Psychological Intervention in Groups" of the Master Program in Psychology. She also leads the "Health Psychology Clinic" at the Faculty of Psychology, as well as a research group line at the Centre of Psychology of the University of Porto in Portugal (CPUP), funded by the Portuguese Foundation of Science and Technology (FCT). This paper is part of CPUP ongoing research in the psychological adjustment to a variety of diseases (Aids/HIV, cancer, inflammatory bowel disease, multiple sclerosis, vertebra medullar lesions, cardiac diseases), reinforcing meaning in life as a good indicator of psychological adjustment, in relation with quality of life, life satisfaction, optimism, anxiety, and depression.

PUBLIC INTEREST STATEMENT

Every person strives to have meaning in life (ML). ML means having goals and a mission to follow, according to one's own potentials and values, reflecting a lifestyle with a sense for living and fulfilment.

The aim of this research is to present a new Portuguese ML scale developed to measure this concept through its features (e.g. behaviours and cognitions), without using the word "meaning in life" in the construction of each item, in order to obtain a more objective operationalization of ML. This is an important contribution of this assessment instrument, making it different from the ones that are more frequently used to assess ML. Through statistical analysis this ML scale proved to be an useful tool.

The main interest for evaluating ML, is because it is a good indicator of adjustment in disease, associated with quality of life, anxiety and depression.

1. Introduction

The concept of meaning in life (ML) was introduced into the literature during the development of the Humanistic Approach by Frankl (Auhagen, 2000; Bronk, 2014; Emmons, 2003; Sommerhalder, 2010), being at first analysed as an important key for mental health and when absent leading to depression and boredom, among other negative psychological indicators (Bronk, 2014). Frankl developed Logotherapy as a form of treatment to enhance meaning and thus, the will to live. Meaning or purpose in life were used interchangeably by Frankl and during the sixties Crumbaugh and Maholick developed the first instrument to assess meaning in life or purpose in life (PIL) (Bronk, 2014).

During the eighties and nineties a very few research was done on ML, but recently, and probably due to the rise of Positive Psychology, we have seen a boom in the related research, highlighting a relationship with either disease or health. Across the literature we emphasize the difficulty of a consensual definition for ML (e.g. Heintzelman & King, 2013; Leontiev, 2013), which influences the interpretation of the related research and results when it is associated with other variables. Although ML was part of the humanistic framework, it was not always emphasized as a single or independent construct. Rogers, Maslow and May vaguely suggested ML as part of a broader conceptualization entitled Self-actualization or Self-actualizing Tendency, which took into account other dimensions way beyond ML (Guerra, 1992).

Diverse terms, such as "Purpose in life", "Life meaning", "Meaning in life", "Existential meaning" and "Personal meaning" are all used as equivalent terms in specialized literature on the subject.

Some authors like George and Park (2013) point out differences in the definitions of the above-mentioned terms, arguing that "meaning" and "purpose" are distinct, although accepting a close relationship between them. However, we agree with many other authors cited by Heintzelman and King (2013) that assume that "meaning is a sense of purpose" (p. 477). More recently Heintzelman and King (2014) tried to expand the concept, highlighting three themes that are present in almost all the current definitions of ML. The first sustains that purpose is part of a meaningful life, the second, that purpose includes significance and the third that: "The meaningful life makes sense to the person living it, it is comprehensible and it is characterized by regularity, predictability or reliable connections" (Heintzelman & King, 2014, p. 562).

Another issue, regards the concepts of presence and search of ML. The presence and the search of meaning can have different expressions across life developmental stages, where the search for meaning is more prevalent in younger individuals (Steger, Kashdan, Sullivan, & Lorentz, 2008; Steger, Oishi, & Kashdan, 2009) and the presence of meaning is higher in older individuals (Park, Park, & Peterson, 2010). As a matter of fact, in adolescence and in the first stage of adulthood it is natural to strive to find goals, which is more in line with the search for ML. The associations observed between the presence and the search for meaning with other variables are also different, where well-being is related to the presence of meaning across the life span but not to the search (Park et al., 2010; Steger et al., 2009) which can suggest different features between the two (Damásio, Hauck-Filho, & Koller, 2016). Although we stress that the presence of meaning overcomes the search, the concept of presence of ML always includes a type of pursuit, as it is not a static concept but is always reshaping itself according to the circumstances that surround the individual. In other words, when one recognizes the presence of meaning, implying permanent adjustment overtime, this is reinforced by Martela and Steger (2016, p. 534) when they mention that "Thus, in the tradition of Frankl, purposes has nobility and breadth of impact that ideally is measured in terms of lifespan rather than a day".

The main difference between the search and the presence of ML is that, in one hand, one can spend their life searching for meaning and never find it. On the other hand, when one feels its presence, in accordance within their main values and philosophy of living, one is able, even when facing a crisis or disease, to maintain its presence and restructure it accordingly. Park et al. (2010, p. 8) also sustain the same idea stating that "When people have meaning, they have a foundation that allows the search for further meaning to be a process of modification and expansion. In contrast, when

people do not have meaning in their life, the search for meaning can be difficult and frustrating". Furthermore in their study Park et al. (2010) found that the presence of meaning is positively related to well-being and negatively related to depression. The search for meaning does not present the same results, except in cases where the individual also has high indicators of presence of meaning.

The humanistic approach/ framework stresses two main ideas: the human being is aware of his/ her own capacities, strengths and motivations, and is always striving in a process of becoming to reach fulfilment, as reinforced by Rogers when stating that "... the substratum of all motivation is the organismic tendency toward fulfillment" (Rogers, 1980, p. 123). We hereby would like to suggest the definition of ML to be*: The perception that one has goals in life, a mission to pursue and develop their potentials within a humanistic framework.*

1.1. Assessing meaning in life

Regarding ML assessment, the systematic review of Brandstätter, Baumann, Borasio, and Fegg (2012) is an example of the mix of instruments available in the literature on this subject. When carefully analysing the results of Brandstätter et al. (2012), one can notice that there are instruments that are unidimensional and others that are multidimensional and which englobe many features beyond the pure ML from broader conceptualizations (e.g. Self-actualization, Eudaimonia, Self-transcendence) or which include other dimensions (e.g. spirituality or sources for meaning).

The unidimensional tests on ML used the most in the English literature worldwide are the purpose in life test (PIL) (Crumbaugh & Maholick, 1969) and the life engagement test (LET) (Scheier et al., 2006). The meaning in life questionnaire (MLQ) is also very well known and despite comprising two dimensions, they can be scored separately: the presence and the search for meaning (Steger, Frazier, Oishi, & Kaler, 2006). These kinds of tests seem to be more suitable because they correspond to conceptualizations based primarily on Viktor Frankl's definition (Brandstätter et al., 2012).

It was based both on the assumptions mentioned above and on our own definition, that ML was considered and assessed in this study.

1.2. The importance of meaning in life for health psychology

Recently in Health Psychology there has been a particular interest in ML, addressing it as a potentially related variable to well-being and better health (Kleftaras & Psarra, 2012; Mascaro & Rosen, 2008; Park et al., 2010; Skrabski, Kopp, Rózsa, Réthelyi, & Rahe, 2005; Steger et al., 2009). Others studies stress the importance of ML either to a better adjustment in cancer (Fonseca, Lencastre, & Guerra, 2014; Jim & Andersen, 2007; Jim, Purnell, Richardson, Golden-Kreutz, & Andersen, 2006; Jim, Richardson, Golden-Kreutz, & Andersen, 2006; Vehling et al., 2011) or in spinal cord lesion (Ferreira & Guerra, 2014) as well as a mediator of adjustment in spinal cord lesions (Thompson, Coker, Krause, & Henry, 2003). Associations between ML and optimism have also been emphasized in the literature both in individuals with disease (Dezutter et al., 2013) as well as in healthy individuals (Ho, Cheung, & Cheung, 2010). In regards to healthy adult individuals the literature also sustains positive associations between the presence of ML and life satisfaction, and negative associations with depression (e.g. Park et al., 2010). Social support has also been associated with the presence of ML in adult immigrants (Dunn & O'Brien, 2009) and university students (Steger & Kashdan, 2013). This latter study regarding university students also reports the existence of positive associations between the presence of ML and other variables (e.g. life satisfaction, positive affect) and negative associations with depression.

This study therefore aims at contributing to the clarification of the ML concept through the development of a new measure—the Portuguese ML scale—that was one of the four dimensions of the self-actualization scale (Guerra, 1992). In recent studies the ML scale has proved to be very useful in health settings (Ferreira & Guerra, 2014; Fonseca et al., 2014) and despite being a small questionnaire, has good reliability scores. We expect, according to the literature, that when applied to

individuals with disease a correlation between ML and other positive psychological dimensions, like optimism and life satisfaction, will be observed, as well as a correlation with negative psychological dimensions like depression and anxiety. For healthy individuals the same type of associations are emphasized in the literature.

Another objective is to present the psychometric evaluation of this new scale, which is intended for both individuals with disease as well as the general population, by a Confirmatory Factor Analysis and convergent validity, correlating it with other psychological parameters (e.g. mood, quality of life, life satisfaction, optimism, social support).

Given these results and considering the recent revival of the ML construct in the literature, it will be presented next the psychometric properties of the developed ML scale.

2. Method

Three different samples of patients with different types of cancer from an oncology hospital and with spinal cord lesion from a physical rehabilitation hospital both in Portugal, were included for the study of the psychometric properties of the ML scale, and a fourth sample of healthy individuals composed of students, teachers, and employees from two educational institutions (Faculty of Engineering and College of Nursing) was also included.

2.1. Participants

2.1.1. Sample 1

Sample one of this study was composed of 200 patients with colorectal cancer of which 51% were males and 49% were females. Age range between 32 and 70 y.o., $M = 57$ (8.16). The education level was divided into three categories: elementary school(less than 5 years of schooling) made up 57.5% of the sample, middle and high school (between 5 and 12 years of schooling) made up 30% of the sample and higher education (more than 12 years of schooling) made up 12.5% of the sample

2.1.2. Sample 2

Sample two was composed of 150 females with breast cancer. Age range between 25 and 85 y.o., $M = 54.75$ (11.24). The education level was the following: elementary school made up 42.6% of the sample, middle and high school made up 41.3% of the sample and higher education made up 16.1% of the sample.

2.1.3. Sample 3

Sample three was composed of 92 male patients. Some had prostatic cancer ($n = 65$) and the others had spinal cord lesion ($n = 27$). Age range from 21 to 76 y.o., $M = 59.08$ (12.28). The education level was the following: elementary school made up 43.3% of the sample, middle and high school made up 43.4% of the sample and higher education made up 11.1% of the sample. Two missing cases were registered.

2.1.4. Sample 4

The last and fourth sample was composed of 88 healthy subjects of which 37.5% were males and 62.5% were females. Age range from 18 to 72 y.o., $M = 32.19$ (13.571). The education level was the following: elementary school made up 5.7% of the sample, middle and high school made up 23% of the sample and higher education made up 71.3% of the sample.

2.2. Measures

2.2.1. Main outcome measure

The ML scale was developed to measure the concept of meaning in life through its features, without using the word "meaning in life" in the construction of each item, in order to obtain a more objective operationalization of the concept. This is an important contribution of this assessment instrument,

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making it different from the ones that are more frequently used in the assessment of ML. The scale was also developed using some negatively formulated items with Likert scale options in order to eliminate socially desirable answers. According to the definition mentioned before, ML expresses the perception of having goals, and a mission to pursue them according to one's own potentials and values, in a way that reflects an autonomous humanistic lifestyle with a sense for living and fulfilment. The main objective of the ML scale is to reach towards the conceptualization of meaning in life through the perception of its presence in one's everyday life.

The scale was constructed having in mind those characteristics that fit well with Frankl's original work. This measure was developed to be used either in a population of individuals with disease or in the general population.

In the development of this ML scale we did not mention in any item, any type of limitation posed by their disease.

The item formulation is of "Likert type" with 5 levels of agreement: (1) I strongly agree; (2) I agree; (3) I am not sure; (4) I disagree; (5) I strongly disagree). The total score is obtained by the sum of the items, some of which are reversed (cf. Appendix 1).

2.2.2. Other measures

Other variables included in this study are: (1) Depression - assessed by the brief symptom inventory-BSI Portuguese version by Canavarro (1999) or by the sub-scale of depression from the Hospital Anxiety Depression Scale - HADS (Pais-Ribeiro et al., 2007); (2) Anxiety - evaluated either by the state-trait anxiety inventory (form Y) - STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) adapted to the Portuguese population (Silva & Spielberger, 2007) or by the sub-scale of anxiety from the HADS (Pais-Ribeiro et al., 2007); (3) Optimism - assessed by the life orientation test Portuguese version or by the optimism scale by Barros (2004); (4) Quality of life - assessed by the QLQ-C30 developed by the cancer study group on quality of live, European organization for research and treatment of cancer (EORTC); (5) Satisfaction with Life assessed by the Satisfaction with Life Scale - SWLS Portuguese version (Neto, 1993) and (6) Social support assessed by the Instrumental-expressive social support scale Portuguese version (Guerra, 1995).

All the instruments used revealed good psychometric qualities in the studies where they were adapted to the Portuguese population (respective references).

2.3. Procedure

2.3.1. Data collection

The data collection was obtained between 2009 and 2014 in the two hospitals mentioned above and procedures were similar in all three samples of clinical patients. After obtaining the approval by the ethical committees of the two hospitals involved and after obtaining the informed consent from each patient according to the Helsinki Declaration, the researchers asked the patients to answer the several questionnaires individually, at the same time, in the presence of the researcher, in the waiting room of the hospital whilst waiting for their follow-up consultation. If patients did not feel like filling in the questionnaires at that moment, they were asked if they were willing to participate at a more convenient time for them. In the cases of low educational levels and with problems comprehending the questionnaire, a researcher was always available to clarify any doubts experienced by the patients.

The average time spent filling in the ML scale was between 2 and 3 mins. The time of response was on average 30 min for all the instruments applied.

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Different measures to evaluate the same construct were used given some restrictions from the ethical committee or from the hospital services which the patients belonged to.

For healthy subjects, both instruments applied did not exceed 10 min to fill in.

In the data collection the instruments were applied at the same moment in time, in the institutions were the participants belonged to, and after giving their informed consent.

The following instruments were used:

Sample 1

Meaning in life – ML scale; Depression – BSI; Anxiety – STAI; Quality of life-QLQ C30.

Sample 2

Meaning in life – ML scale; Depression – HADS; Anxiety – HADS; Distress- HADS; Life Satisfaction – SWLS; Optimism – Portuguese scale (Barros, 2004).

Sample 3

Meaning in life – ML scale; Depression – HADS; Optimism – LOT.

Sample 4

Meaning in life – ML scale; Social Support – Instrumental-Expressive Social Support Scale – Portuguese version (Guerra, 1995).

2.3.2. Data analysis

A confirmatory factor analysis (CFA) was performed for the ML scale, considering the psychometric evaluation mentioned before for the self-actualizing scale (Guerra, 1992), and the maximum likelihood extraction method was applied in order to test the validity of the construct of the scale as just one dimension, as was suggested theoretically. All analyses were conducted in AMOS (v. 21, SPSS Inc, Chicago, IL). To assess model fit, we considered the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). The cut-off criteria used in this study followed generally accepted indices in recent literature, namely: RMSEA values <.05 indicate excellent fit and values ≥.08 indicate acceptable fit; and CFI values close to .95 indicate excellent fit and values >.90 indicate good fit (Bentler, 1990; Byrne, 2001). The reliability of the scale was analysed with the Alpha of Cronbach and with the estimation of the composite reliability measure (Fornell & Larcker, 1981). Values of composite reliability (CR) >.70 were considered to represent adequate measurement of factor reliability. Additionally, other analyses were made in order to observe convergent validity using the correlation method with other variables.

3. Results

3.1. Confirmatory factor analysis results in the four samples

CFA for the ML scale was performed in the three samples with disease. The initial solution was not fully satisfactory for sample 1 given the following adjustment indexes: Sample 1 CFI = .843; TLI = .780; RMSEA = .120; Sample 2 CFI = .919; TL I = .886; RMSEA = .090; Sample 3 CFI = .947; TLI = .926; RMSEA = .074.

Considering the estimates of the standardized regression, weights revealed that one item had the lowest factorial loading in the four samples. The item had the following formulation: "*É impossível viver a vida em termos daquilo que quero fazer*" which in an informal translation means "It is

impossible to live as I would like to". Consequently, this item was removed from the model and a new CFA was conducted in the four samples. The adjustment indexes obtained by this late model (i.e. 7 items) provided satisfactory results for all samples: Sample 1 CFI = .920; TLI = .879 C; RMSEA = .093; Sample 2 CFI = .915; TLI = .872; RMSEA = .104; Sample 3 CFI = .969; TLI = .954; RMSEA = .063; Sample 4 CFI = .954; TLI = .909; RMSEA = .062.

Additionally, in all the four samples the Cronbach Alpha's coefficient was acceptable ranging from .74 to .78 and the composite reliability index ranging from .84 to .86.

Table 1 presents the number of subjects, means, standard deviations, and two measures of reliability for the four samples with the final version of ML scale using 7 items (cf. Appendix 1).

Regarding the means of ML scale, the value obtained in sample 3 (involving just males) was the highest, with the lowest one observed in sample 1 (colorectal cancer patients). There were no significant differences in ML means across the four samples F (3,524) = .480, p = .696 (see Table 1), considering a .05 alpha level.

Differences in ML scale concerning gender were analysed in the sample of individuals with disease (Males n = 194, M = 28.186 (3.93) and Females n = 246, M = 27.703 (4.40), t = 1.211, p = .226) and no significant differences were found considering a .05 alpha level.

For the healthy adult participants regarding gender (Males, n = 33, M = 28.12 (4.32) and Females n = 55, M = 28.09 (3.71), t = .035, p = .972) there were no significant differences either considering a .05 alpha level.

Table 2 presents descriptive statistics just for the Type of cancer groups in ML and no significant differences were found F (2, 409) = 1.64, p = .194 considering a .05 alpha level.

3.2. Convergent validity across the four samples

The convergent validity was obtained by correlating the ML scale with other psychological measures: Depression, anxiety, distress, optimism, quality of life, SWLS and social support (c.f. Table 3).

Table 3 presents the correlations across the four samples examined, emphasizing the fact that not all the samples obtained all the measures, with some blank cells present. Depression presents a significant negative correlation with ML in all samples of individuals with disease, explaining 28.94 and 30.03% of results variations, respectively, in samples 1 and 2. It was also observed in these samples negative correlations between ML and Anxiety, explaining 48.58 and 23.23% of results

Table 1. Descriptive and reliability statistics of the meaning in life scale					
	N	*M*	SD	Cronbach' α	C.R.
Sample 1 (mixed)	200	27.67	3.88	0.76	0.85
Sample 2 (female)	150	28.09	4.44	0.78	0.86
Sample 3 (male)	92	28.16	4.50	0.74	0.84
Sample 4 (mixed healthy)	88	28.10	3.93	0.76	0.84

Table 2. Descriptive statistics of the meaning in life scale concerning type of cancer			
	N	*M*	SD
Colorectal cancer	200	27.67	3.88
Breast cancer	148	28.09	4.44
Prostatic cancer	65	28.77	4.11

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Table 3. Convergent validity							
	Depression	**Anxiety**	**Distress**	**Q.O.L.**	**SWLS**	**Optimism**	**Social support**
ML sample 1	−.538**	−.697**		.353**			
	n = 200	*n* = 200		*n* = 199			
ML sample 2	−.548**	−.482**	−.560**		.350*	.528**	
	n = 148	*n* = 148	*n* = 148		*n* = 65	*n* = 65	
ML sample 3	−.254*					.374**	
	n = 92					*n* = 65	
ML sample 4							.420**
							n = 88

*Significant at .05 level.
**Significant at .01 level.

variation, respectively, in samples 1 and 2, as well as Distress explaining 31.36% in sample 2 and positive correlations were present with Quality of Life, Life Satisfaction and Optimism. In sample 4 (the healthy sample) the correlation found was positive with social support.

4. Discussion

The main objective of this article was to deepen the definition of ML through the validation of a new meaning in life measure using CFA to be used either in individuals with disease or in healthy individuals.

Recognizing that within ML approach one can identify diverse themes of ML (Heintzelman & King, 2014) or according to Martela and Steger (2016) three different dimensions (coherence/cognition, purpose and significance), we still think that ML can be measure as a single construct, in which all the three underlying dimensions are necessary to reach a meaningful life.

It was found that across the four samples studied this scale was unidimensional. These samples presented acceptable reliability coefficients and across them we observed that the models were very similar, with acceptable values reproducing the one-dimensionality of the construct, independent of the clinical specifications (e.g. colorectal cancer; breast cancer; and spinal cord lesion and prostatic cancer) or healthy participants.

Regarding the means of the ML scale there were also no differences according to the types of cancers. This finding suggests that ML is similar in cancer patients when facing the threat of death, being a construct that is present in the global concept of cancer crises, independent of the cancer location.

The fact that we did not find differences between the group of individuals with disease and the healthy individuals regarding the means of the ML scale, as well as the fact of high means of ML, normally above the midpoint, are results that are consistent with the worldwide literature about this concept. Heintzelman and King (2014) did a review of various international studies about the evaluation of ML using different scales and concluded that, using the MLQ (presence) the means were similar in undergraduate students, adults or individuals facing life challenges (e.g. bereavement). In studies that used the PIL, no differences were found between the samples of undergraduate students, critically ill patients and adults. Groups related mainly to dependency (e.g. alcohol, drugs) had lower means of ML compared to the groups mentioned above. These results can be explained by the fact that a life without motivation and objectives, frequently associated with depression, seems to favour substance abuse. On the contrary individuals with a healthy life, which even so, presents itself with crises, and individuals with a disease, in general, fight to find meaning for their existence in order to freely pursue their goals.

Our data found no differences regarding gender. This result was also found in Scheier et al. (2006), using the life engagement test (LET), a six-item scale that assesses ML. In the same direction Thakur and Basu (2010), did not find any differences across gender using the (MLQ) which evaluates the presence of meaning or the search for meaning to assess ML. Steger et al. (2006), which psychometrically evaluates the MLQ, did not find differences concerning gender, when analysing a sample of college students. And in the Steger et al. (2009) study, no differences were found between gender using a large sample of individuals from the Internet.

The analysis of the association with other psychological constructs sustained the convergent validity of the ML scale, as it relates in a negative way with distress (Jim & Andersen, 2007), depression, and anxiety (Jim Purnell, Richardson et al., 2006; Scheier, Carver, & Bridges, 1994), and in a positive way with quality of life (Jim, Richardson, Golden-Kreutz et al., 2006), general health or well-being (Kleftaras & Psarra, 2012) and life satisfaction, using ML presence (Park et al., 2010; Steger et al., 2009).

The observed medium strength correlation between ML and optimism in this study, was also found by Dezutter et al. (2013) in a sample of chronically ill patients, and by Ho et al. (2010) in a sample comprising students which stressed out the association of ML and optimism.

Regarding the healthy adult participants, we observed a medium strength correlation between ML and social support that was also found by Steger and Kashdan (2013) in their study evaluating social support and ML in a sample of undergraduate students and also in a study by Dunn and O'Brien (2009) using a sample of latina/latino immigrant adults.

A limitation of this study is not having another measure of psychometrically evaluated ML available in Portuguese, as this would enhance the convergent validity through the performance of a correlation analysis.

Another limitation of this study is the difficulty to control the time since the diagnosis and the stage of cancer across the samples, knowing that these variables of time and cancer severity can interfere in the perception of ML.

5. Conclusion

One must be very careful when analysing and comparing results of studies of ML either in regards to their definitions or to their assessment. First of all, we concluded that in adult samples, the presence and search of meaning may have different results when related to other psychological variables (Damásio et al., 2016; Park et al., 2010; Steger et al., 2006, 2009), being the presence highlighted in the current study. Second, the presence of meaning requires a constant adaptation along time. Third, some instruments created to evaluate meaning in life/purpose in life include others dimensions, way beyond the strict sense of ML, such as spirituality or religion. The reason why spirituality and religiosity should not be considered in the assessment of ML is the fact that, although those dimensions may be associated with ML, in our opinion, are not an integral part of the concept in itself.

A unidimensional scale of strict ML assessment is presented herein.

Finally, there are also differences considering labels of ML that can be used interchangeably (e.g. purpose, meaning, global meaning), depending upon the theoretical conceptualizations underlying the concept (e.g. humanistic framework; meaning-making framework). Meaning in life is the selected name used in the present study and included in the Humanistic/existential approach. In this study, we emphasize the interest in ML specially in contexts of disease, as it can function as an indicator of adaptation to disease.

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According to Heintzelman and King (2014, p. 568) "All measures of meaning in life include items that refer specifically to 'meaning' in items like those used in the scales on which we have focused ...". In this citation, the instruments to which the authors referred to were those most used, which are the MLQ and the PIL, and added: "... As already noted, such measures rely on participants' intuitive sense of what meaning in life means".

One major contribution of this new ML scale, presented herein is that none of the items include the word "meaning" but rather the operationalization of the concept through the perception of its presence. Like so, we were able to theoretically deepen the concept of ML, analysing it in its pure form through a unidimensional scale without any other of its associated features (e.g. spirituality, search for meaning) and focusing on the perception of the present without referring to the word ML but instead looking for behaviours and cognitions that express what meaning in life truly is.

The results of this study, obtained through psychometric evaluation, sustain the validation of the presented ML scale as an effective tool for use either in the diseased or healthy population in Portuguese Population. The observed positive correlations between ML and quality of life, life satisfaction and optimism, as well as negative associations with anxiety, depression and distress, confirms ML as a good psychological indicator of adjustment in disease.

Competing Interests
The authors declare that they have no competing interests.

Author details
Marina Prista Guerra[1]
E-mail: mguerra@fpce.up.pt
ORCID ID: http://orcid.org/0000-0003-3863-8520
Leonor Lencastre[1]
E-mail: leonor@fpce.up.pt
Eunice Silva[2]
E-mail: eunicedrs@gmail.com
Pedro M. Teixeira[1]
E-mail: pteixeira@fpce.up.pt
[1] Faculty of Psychology and Educational Sciences, University of Porto, Rua Alfredo Allen, 4200-135 Porto, Portugal.
[2] Portuguese Institute of Oncology Francisco Gentil, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal.

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Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent
Informed consent was obtained from all individual participants included in the study.

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Appendix 1

Escala de Sentido de Vida-SV

Meaning in life scale-ML

(A free translation of the scale is presented)

O questionário seguinte pretende saber a sua opinião sobre um certo número de questões. Não existem alternativas certas ou erradas. Responda com a maior sinceridade, assinalando a alternativa que mais se aplica.

The following questionnaire aims to know your opinion about some issues. There are no right or wrong answers. Please answer with sincerity, signaling the alternative that better applies to you.

	Concordo Muito	Concordo	Não tenho a certeza	Discordo	Discordo Muito
	I strongly agree	*I agree*	*I am not sure*	*I disagree*	*I strongly disagree*
1. Tenho interesse pela vida e faço planos	1	2	3	4	5
I have interest in life and I make plans					
2. A minha vida é vivida em vão	1	2	3	4	5
My life is lived in vain					
3. Apesar das contingências procuro seguir um plano coerente de vida interior	1	2	3	4	5
In spite of the contingencies I try to pursue a coherent inner life plan					
4. Desenvolvo as potencialidades que tenho	1	2	3	4	5
I develop my own potentialities					
5. Sinto falta de uma missão na vida na qual me empenhe	1	2	3	4	5
I feel I need a mission in my life to engage in					
6. Sinto-me pouco realizado/a como pessoa	1	2	3	4	5
I feel slight fulfilled as a person					
7. Vivo de acordo com o que gosto e com os meus valores	1	2	3	4	5
I live accordingly with my preferences and my values					

Items 1, 3, 4 and 7 are reverse (1 = 5; 2 = 4; 3 = 3; 4 = 2; 5 = 1).

The score ranges from 7 to 35 so that the higher the score means the best, the presence of meaning in life.