Normative data and longitudinal invariance of the Life Engagement Test (LET) in a community sample of older adults.

Elissa L. Pearson¹, Tim D. Windsor¹, Dimity A. Crisp², Peter Butterworth², Pamela D. Pilkington³, & Kaarin J. Anstey²

1. Centre for Ageing Studies, Flinders University, Adelaide, South Australia, Australia.

2. Centre for Research on Ageing, Health and Wellbeing, the Australian National University, Canberra, Australian Capital Territory, Australia.

3. Orygen Youth Health Research Centre, Centre for Youth Mental Health, University of Melbourne, Melbourne, Victoria, Australia.

Corresponding author:

Elissa Pearson

Now at the School of Psychology, Social Work & Social Policy

University of South Australia

GPO Box 2471 Adelaide SA, 5001, Australia.

Email: Elissa.Pearson@UniSA.edu.au

Phone: +61 08 8302 4843

Fax: +61 08 8302 2956

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Abstract

Purpose: Interest in evaluating purpose in life as an important component of ageing well is growing; however, investigation into the appropriate measurement of this construct is required. The purpose of this paper was to examine the measurement properties of the Life Engagement Test (LET) and to provide normative data for a non-clinical sample of community-dwelling older adults. *Methods:* A random sample of 545 adults, aged 55-94 years, completed the LET twice over a 12 month period as part of a larger survey on relocation in later life. *Results:* Consistent with previous research, participants typically reported high levels of purpose in life. Scores were also observed to vary over the 12-month duration, with, on average, an increase in purpose in life at Time 2. However, tests of longitudinal invariance were inconclusive. *Conclusions:* Future research is needed to further examine the content validity of the LET, and its factorial invariance over longer measurement intervals, and across different populations including non-residential/aged care settings.

Keywords: measurement invariance; purpose in life; LET; ageing; quality of life

List of abbreviations

CFI Comparative Fit Index

LET Life Engagement Test

SEM Structural Equation Modeling

RMSEA Root Mean Square Error of Approximation

WLSMV Weighted Least Squares Mean and Variance adjusted

Introduction

Recent theoretical [1] and empirical [2] perspectives on successful adaptation have identified a sense of purpose in life as a key unifying cognitive process that underlies motivation and guides the allocation of resources in responding to changing life contexts. Maintaining a coherent sense of purpose in the face of changing social roles (e.g., retirement, widowhood) and increasing functional decline is likely to be of particular significance to quality of life for older adults [3]. As interest grows regarding aspects of ageing well [4-5], it is clear a need exists for future studies into how purpose in life is developed and maintained, and its implications for psychological and physical health [1, 6-7]. At present this is problematic due to a lack of consensus regarding measurement. Although the Purpose in Life Test [8] and the Purpose in Life sub-scale of the Psychological Wellbeing Scale [9] have been widely used [3], each of these contain retrospective scale items which can confound an individual's sense of present purpose with their perception of how well historical goals were attained [cf. 10-11].

A more recently developed measure, the Life Engagement Test (LET), may advance the measurement of purpose in life through its temporal focus on the present. Scheier et al. [12] developed the LET to provide "an index of purpose in life by assessing the extent to which a person considers his or her activities to be valuable and important" (p. 292). Although initial psychometric testing supported the reliability and validity of the LET across diverse samples [12], we are not aware of studies that have assessed the measurement properties in non-clinical samples of male and female older adults. The purpose of the present research was to provide normative data on the LET from community-dwelling older adults and to determine whether the LET demonstrates longitudinal factorial invariance over a twelve month measurement interval. Longitudinal studies are fundamental to research on human development [e.g., 13], and tests of invariance provide a formal means of determining

whether measurement properties are consistent over time. The present study provides initial data regarding the appropriateness of the LET as a means of assessing longitudinal changes in current purpose in life among older adults.

Methods

Study sample

The study sample comprised 545 community-dwelling older adults from the Australian Capital Territory (ACT), recruited as part of a larger study examining relocation from the community into a residential retirement facility. Sampling began by randomly selecting 2000 individuals aged 55 and over from the Australian electoral roll. After excluding individuals living in retirement communities (N=27), the remaining 1973 individuals were mailed a questionnaire and a letter inviting them to participate in the research. A total of 561 participants returned the questionnaire, with 545 valid responses to the Life Engagement Test (27.6% response rate). Sample characteristics of age, gender, and partner status (see Table 1) were compared with those of the ACT population [14] using Z tests. The sample did not differ significantly from the population in age (in 5-year bands) or gender, although there was a marginally higher proportion of individuals in the sample who were partnered relative to the ACT population (68.7%) [15].

TABLE 1 ABOUT HERE

Materials and procedure

Participants completed the Life Engagement Test at two separate points in time, approximately twelve months apart (represented as T1 and T2), as part of a larger questionnaire regarding psychosocial aspects of ageing well. The LET consists of six Likert type items, shown in Table 2. Possible scores range from 6-30, with higher scores indicating

a greater sense of purpose in life. Ethics approval was obtained from the Australian National University Committee for Ethics in Human Research (Protocol # 2009/041).

Data analysis

Longitudinal invariance of the LET over the twelve month measurement interval was assessed using confirmatory factor analysis. On account of high negative skewness characterising the LET items, it was not appropriate to apply a standard SEM estimator (e.g., Maximum Likelihood) that assumes multivariate normality. Consequently, we conducted the analysis using a weighted-least square estimator with a mean and variance adjusted chi-square statistic (WLSMV) in Mplus with the delta parameterization. Scale factors for the latent response variables of the categorical indicators at T2 were free to be estimated, which equates to the latent response variables not being required to have equal variances over time [16]. WLSMV estimation is appropriate for the analysis of ordered categorical variables [17] and provides a good balance between Type I and Type II error rates in the assessment of factorial invariance with censored ordinal variables [18]. Under WLSMV estimation (with no covariates) treatment of missing data is analogous to pairwise present analysis [16].

To test invariance, we specified a baseline model that included equality constraints over time for factor loadings and item thresholds. This approach was consistent with other studies that have examined the invariance of factors with ordered categorical indicators [19] and is analogous to establishing strong factorial invariance (equivalence of factor loadings and item intercepts), which is typically regarded as a minimum condition for longitudinal modelling using latent factors with continuous indicators in an SEM framework [20]. Modification indices were used to examine possible sources of poor fit in the baseline model [e.g., 21]. Variances for the latent factors were freely estimated, and the factors were allowed to correlate over time. Residuals for all corresponding observed indicator variables (e.g., item

1 at T1 with item 1 at T2) were allowed to correlate. Model fit was assessed with multiple fit indices, including the χ^2 , RMSEA, and CFI. Due to the high sensitivity of the χ^2 to minor violations of the model, the combined goodness of fit was considered across all three indicators.

Results

Normative data, reliability, and stability across time

The initial questionnaire was completed by 545 participants, with 423 returning the follow-up questionnaire (417 valid responses to the LET). Mean scores by item and item-total correlations (at T1) are provided in Table 2. Each item demonstrated a correlation of at least 0.7 with the composite scale score.

TABLE 2 ABOUT HERE

The scale demonstrated sound internal consistency (Cronbach's α 0.84 and 0.82 at T1 and T2 respectively) and stability over time, with scores at T1 accounting for 50.4% of the variance at T2 ($r = 0.71$). The distribution of scores at both time intervals were negatively skewed, reflecting a ceiling effect, such that a majority of older adults in this sample scored toward the upper limit of the scale (T1: skew -1.01, SE 0.11; T2: skew -0.75, SE 0.12). Normative data for this sample at the scale level (by age group, gender, and education level; and across time) are provided in Table 3. At both time points, most participants reported a high level of purpose in life, with scores showing a small (around 0.1 of a standard deviation) increase from T1 to T2. Tobit regression analyses (due to the ceiling effects in the data) using R version 2.14.0 [22] with the VGAM package [23] were conducted to determine whether age group, gender, or education level were associated with LET scores at T1. Findings revealed no significant associations of LET scores with age group or gender ($p > .05$), however there

was a significant association between education level and LET scores ($p < .001$) with the predicted value of scores on the LET 1.46 higher for those with 5 or more years of secondary education, compared to those with less than five years.

TABLE 3 ABOUT HERE

Factor structure and invariance

Preliminary analysis of the data (available from the authors upon request) replicated the one-factor structure of the LET obtained by Scheier et al. (2006). Confirmatory factor analysis (described above) was used to test invariance of factor loadings and item thresholds. For the initial baseline model, fit statistics were mixed, with χ^2 suggesting poor fit, whereas RMSEA and CFI indicated a reasonably well fitting model ($\chi^2 (69) = 194.86, p < .001$; CFI = .99; RMSEA = .06). Modification indices showed that fit could be improved by allowing correlations of residuals for item 2 with item 4, and item 3 with item 5 (see Table 2) within each time point. Making these changes to the model resulted in a significant improvement to fit ($\chi^2 (65) = 103.64, p < .001$; CFI = 1.00; RMSEA = .03; $\chi^2 \Delta (4) = 113.88, p < .001$). While CFI and RMSEA suggested very good fit, the significant value for χ^2 remained indicative of unacceptable fit [24-25]. Standardized regression weights for each item in the final model ranged from .71 to .85.

Discussion

To date there has been a paucity of research examining age-appropriate motivating factors among older adults, with much research in the field developed using younger samples. There has also been a lack of well validated measures of constructs associated with psychological wellbeing such as sense of purpose and engagement in life, despite the increasing recognition by researchers and policy makers that these factors are integral to ensuring individual and

social health in ageing societies [1, 12, 26-27]. The present study provides the first longitudinal evaluation of the measurement properties of the LET. Our results pertaining to longitudinal invariance of the LET were inconclusive. On the one hand, alternative fit indices supported the tenability of the model that specified equivalence of factor loadings and item thresholds over the study interval. On the other, the significance of χ^2 in the context of our moderate sample size implied poor model fit [28]. Further studies incorporating large sample sizes, and multiple repeated assessments, are needed to better establish the measurement properties of the LET in older samples.

Descriptive analyses indicated that mean LET scores for this sample were generally high, consistent with the findings of Scheier et al. [6], who reported a mean score of 24.9 (SD = 3.4) in a community sample of women aged 60-69. Thus the data provide support for the retention of a strong sense of purpose in life for community-dwelling older populations. The scale may ultimately prove useful for evaluating hypotheses about the effects of significant life events on sense of purpose, such as spousal bereavement, the development of physical impairment or disability, or the transition into retirement [3; 29]. Nonetheless, in addition to the need for further assessment of measurement invariance, researchers should be mindful of ceiling effects on this scale, and the possible need to use appropriate statistical techniques such as Tobit (censored) regression or hierarchical Tobit models for longitudinal or nested data [see 30].

The present study was limited by the low response rate and generally high level of wellbeing in the sample. Future studies may benefit from sampling more diverse and disadvantaged groups including clinical populations, and those living in aged care settings. Future research is also required to investigate the scale properties over longer intervals, and

190 to further evaluate how the construct measured by the LET relates to other psychosocial and
191 health outcomes and biological markers of stress and wellbeing over time [12].

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286 **Table 1** Sample characteristics

<i>N</i>		537 - 545 ^a
Age	Age Range	55-94
	Age, M (SD)	65.19 (8.17)
Gender	Female	52.1%
Ethnicity	Caucasian	73.0%
	Asian	2.0%
	African-American	1.1%
	Not specified/Other	23.9%
Marital status	Married/Defacto	73.5%
	Separated/Divorced	14.4%
	Widowed	8.3%
	Never married	3.9%
Employment	Working full-time	27.7%
	Fully retired	52.7%
Education	<5 years secondary school	37.2%
	5+ years secondary school	62.7%
Home Ownership	Own residence	90.0%

287 ^aNs varied across analyses on account of different proportions of missing data

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290 **Table 2** Descriptive statistics for the Life Engagement Test items

Life Engagement Test Items	Mean (SD)	Min	Max	Item-Total Correlation
1. *There is not enough purpose in my life*	3.99 (1.11)	1	5	.77
2. To me, the things I do are all worthwhile	3.94 (0.90)	1	5	.72
3. *Most of what I do seems trivial and unimportant to me*	4.11 (0.98)	1	5	.74
4. I value my activities a lot	4.13 (0.79)	1	5	.78
5. *I don't care very much about the things I do*	4.28 (0.94)	1	5	.77
6. I have lots of reasons for living	4.43 (0.86)	1	5	.70

291 Note: The questionnaire read 'Please answer the following questions about yourself indicating the extent to which you agree
 292 or disagree with each statement. Response categories were (1) strongly disagree; (2) disagree; (3) neither agree or disagree;
 293 (4) agree; and (5) strongly agree. As items 1, 3, and 5 (marked with an asterisk) were negatively worded these were reverse
 294 scored to calculate the composite LET score and to facilitate comparison of mean scores across items. Thus for all items a
 295 higher mean score indicates a higher sense of purpose in life.

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297 **Table 3** Descriptive statistics across time, by age, gender and education level

		T1	T2	
	<i>N</i>	LET Mean (<i>SD</i>)	LET Mean (<i>SD</i>)	<i>N</i>
Sample	545	24.86 (4.16)	25.43 (3.79)	417
<i>Age</i>				
55-64	300	24.89 (4.21)	25.45 (3.81)	229
65-74	167	25.10 (4.20)	25.74 (3.78)	136
75+	74	24.30 (3.85)	24.44 (3.68)	50
<i>Gender</i>				
Male	261	24.64 (4.20)	25.34 (3.66)	203
Female	284	25.07 (4.12)	25.50 (3.93)	214
<i>Education</i>				
<5 years secondary	202	24.02 (4.52)	25.01 (3.99)	144
5+ years secondary	340	25.38 (3.85)	25.65 (3.66)	271

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