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Development of a Short Form of the Attitudes to Ageing Questionnaire (AAQ)

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Key points:

- The paper reports on the robust creation of a new short form of the Attitudes to Ageing Questionnaire (AAQ-SF).
- Exploratory and Confirmatory Factor Analyses confirm the same overall factor structure for the AAQ and AAQ-SF suggesting adequate coverage of attitudes to ageing is possible in a short format.
- The 12-item AAQ-SF demonstrated adequate internal consistency for each subscale and acceptable rates of validity.
- Results showed that the AAQ-SF demonstrates construct-level measurement invariance across respondents scoring above 'cut-off' on anxiety and depression measures.

Abstract

Objectives: The original 24-item Attitudes to Ageing Questionnaire (AAQ) is well-established as a measure of attitudes to aging, comprising domains of Psychosocial Loss (PL), Physical Change (PC), and Psychological Growth (PG). This paper presents a new 12-item short form Attitudes to Ageing Questionnaire (AAQ-SF).

Methods: The original field trial data used to develop the AAQ-24 were used to compare 6-, 9- and 12-item versions of AAQ-SF (Sample 1, $n = 2,487$) and to test the discriminative validity of the selected 12-item AAQ-SF (Sample 2, $n = 2,488$). Data from a separate study reporting on the AAQ-24 (sample 3, $n = 792$) verified analyses.

Results: The 12-item AAQ-SF reported adequate internal consistency in both Sample 1 (PL $\alpha = .72$, PC $\alpha = .72$, and PG $\alpha = .62$) and Sample 3 (PL $\alpha = .68$, PC $\alpha = .73$, and PG $\alpha = .61$).

The AAQ-SF functioned consistently with the profile of the AAQ-24 in that subscales in both formats of this measure discriminate between respondents on key parameters such as depression, subjective health status, and overall quality of life in Sample 2. Sample 3 also demonstrated the AAQ-SF can detect the differences in attitudes toward aging between individuals experiencing anxiety and depression and those without psychological symptoms. Confirmatory Factor Analysis confirmed the structure of the AAQ-SF mirrors that of the original 24-item AAQ.

Conclusions: The AAQ-SF is a robust measure of attitudes toward aging, which can reduce respondent burden when used within longer questionnaire batteries or longitudinal research.

(249/250 words)

Introduction

We are living in a time of extraordinary demographic change with relatively larger numbers of older people achieving previously unheard levels of longevity (United Nations, 2013). We are, as yet, under-equipped to understand the individual and collective experience of aging (Abrams *et al.*, 2015).

Generally, older people report more positive attitudes about aging than younger people (Kishita *et al.*, 2015). However, beliefs about aging may become more negative in the presence of age-associated challenges (e.g., Chachamovich *et al.*, 2008; Janecková *et al.*, 2013; Kavirajan *et al.*, 2011; Law *et al.*, 2010; Trigg *et al.*, 2012).

The Attitudes to Ageing Questionnaire (AAQ: Laidlaw *et al.*, 2007) is a psychometrically robust 24-item measure specifically designed for use with older adults. The AAQ provides a means to measure aging-related stereotypes and usefully, assesses losses *and* gains associated with aging. The original aim was to examine both subjective experience and attitudes towards personal aging. The AAQ examines an individual's perspective on aging from two different standpoints: (i) General attitudes (i.e. attitudes toward aging that can be considered along nomothetic ranges); and (ii) a more personal experiential component (i.e. attitudes toward an individual's own idiosyncratic experience of aging from a subjective point of view). The domains covered by the AAQ profile scores (psychosocial loss, physical change, and psychological growth) are consistent with research on older people's perceptions about aging (Laditka *et al.*, 2009).

There are well-established theoretical models characterizing how one's attitude to aging is formed and influenced across the lifespan such as stereotype embodiment theory (SET: Levy, 2009) and socio-emotional selectivity theory (SST: Scheibe & Carstensen, 2010). SET suggests negative attitudes to aging impact on an individual in multiple ways influencing psychological, behavioral, and physiological functioning of an individual.

Depending upon the individual experience of aging, negative views may be attributed to aging. As such a self-fulfilling prophecy may engender negative consequences for individuals where age-related decline is perceived as inevitable and irreversible (Laidlaw & Kishita, 2015; Levy & Leifheit-Limson, 2009).

There remain a dearth of theories that explain how people attribute and explain their own phenomenological experience of aging (Diehl & Werner-Wahl, 2010) and how this influences attitudes in either negative or virtuous cycles. In SST individuals apprehend finite-time horizons when recognizing one has less years remaining to live than one has lived. This results in a change in values. While not necessarily a model of attitude to aging, SST nonetheless describes the individual experience of aging as a process rather than a state and suggests attitudes about one's experience of aging are dynamic, idiosyncratic, and malleable.

Previous research demonstrated AAQ scores are associated with a wide range of mental health outcomes. For example, positive attitudes on the psychosocial loss, physical change, and psychological growth subscales are associated with lower levels of depression (Chachamovich *et al.*, 2008; Janecková *et al.*, 2013; Shenkin *et al.*, 2014) and better quality of life (Janecková *et al.*, 2013; Top *et al.*, 2012). Importantly, the AAQ does not just correlate with quality of life indices. Low *et al.*, (2013) demonstrated all three subscales partly mediate the impact of health satisfaction on quality of life. This suggests individuals who are dissatisfied with their current health status are likely to endorse more negative attitudes toward their own aging. Unchecked, this may lead to a reduction in quality of life.

Previous studies have also demonstrated positive attitudes on the psychosocial loss and physical change subscales are associated with lower levels of anxiety (Bryant *et al.*, 2012; Shenkin *et al.*, 2014) and less physical disabilities (Bryant *et al.*, 2012; Shenkin *et al.*, 2014). Moreover, evidence suggests individuals with medical conditions such as dementia

(Trigg *et al.*, 2012) and musculoskeletal pain (Rashid *et al.*, 2012) report negative attitudes on the psychosocial loss subscale.

The AAQ is also associated with behavioral indices. Positive attitudes on all three subscales predict greater social participation (Top *et al.*, 2012). Furthermore, positive attitudes on the physical change and psychological growth subscales are associated with better preventative health behaviors such as undertaking regular aerobic exercise and having regular medical check-ups (Quinn *et al.*, 2009).

In managed health care environments, many consultations with health professionals are characterized as time-pressured and thus the temptation to find ways to measure constructs more quickly is as strong today as it ever was (Smith *et al.*, 2000). A short form of the AAQ (AAQ-SF) is advantageous because an optimal balance of brevity is achieved without significant loss in coverage of key concepts and without compromising psychometric quality.

The AAQ-SF may reduce respondent burden and increase the likelihood of the AAQ-SF being included in research studies employing a large battery of tests and questionnaires. The purpose of the current study is to develop a short-form of the AAQ with acceptable reliability and validity for use in settings where time constraints preclude the use of the full-form. This study aims to develop the AAQ-SF that a) covers the three distinct domains of aging identified in the original field trial study, b) demonstrates a high degree of performance in discriminating between clinically-relevant groups known to differ (e.g., depression), and c) could be completed in less than 5 minutes.

Methods

Participants and procedure

Sample 1 and 2 comprised data from the original large cross-sectional study used to develop the 24-item AAQ (Laidlaw *et al.*, 2007) that recruited 5,566 adults aged 60 years and older in 20 centers worldwide. Data with one or more items missing on the 24-item AAQ were excluded in the current study with 4,975 participants split into two groups by restricted randomization taking account of research centers and gender. Sample 1 was used to identify which of the 24 items would be included in the shortened version of the questionnaire. (see Table 1 for sample characteristics).

Sample 3 (LBC dataset) comprised AAQ data from a large longitudinal study of cognitive aging, the Lothian Birth Cohort 1936 (Deary *et al.*, 2011). This dataset (Shenkin *et al.*, 2014) was used to confirm the psychometric properties of the AAQ-SF. Respondents were 792 community dwelling older adults, who originally participated in the Scottish Mental Survey of 1947 (Deary *et al.*, 2011) and now participate in longitudinal follow-up. Samples 2 and 3 were used for the CFA and to test the validity of the AAQ-SF.

Measures for Sample 1 and 2

Attitudes to Ageing Questionnaire. Development of the AAQ followed a coherent, logical and empirical process (see Laidlaw *et al.*, 2007). Factor analysis and structural equation modelling were used in determining three distinct subscales for the AAQ: (1) Psychosocial Loss (PL), (2) Physical Change (PC), and (3) Psychological Growth (PG). Each domain includes eight items. The PL subscale measures the perceived negative experiences of aging and functions as a proxy for negative attitudes toward aging where old age is seen as a negative experience involving psychological and social losses. PC focuses on items primarily related to health and the experience of aging itself, therefore a subjective individualized psychological perspective on health is assessed. PG is explicitly positive and could be summarized as ‘Personal Wisdom’ as it recognizes a lifespan development

perspective on aging. The three domains of the AAQ therefore reflect positive and negative aspects of aging.

The 24 items of the AAQ scale are scored on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Each factor has eight questions with domains returning minimum scores of eight and maximum of 40.

Geriatric Depression Scale. The Geriatric Depression Scale (GDS; Yesavage *et al.*, 1983) is a standardized self-report questionnaire using a simple yes/no format measuring depressive symptoms in older people. The items which comprise the 15-item GDS (Sheikh and Yesavage, 1986) were used for calculating GDS total score (higher scores corresponds to higher levels of depressive symptoms). A conservative cut-off score of 6 to distinguish individuals with and without depression is adopted here (Wancata *et al.*, 2006).

Current Health Status was measured by asking participants to subjectively characterize health status as either healthy or unhealthy.

Quality of Life. Quality of life was measured using the WHOQOL-BREF (WHO Quality of Life Group, 1998) item “how would you rate your quality of life?” with five response categories ranging from ‘very poor’ to ‘very good’. We only included respondents who identified their quality of life as ‘very poor’ or ‘very good’ in the analysis stage to compare attitudes toward aging between two distinct groups of older adults.

Measures for Sample 3

Attitudes to Ageing Questionnaire. The 24-item AAQ (Laidlaw *et al.*, 2007) was used to assess the subjective perceptions of aging.

Hospital Anxiety and Depression Scale. The Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983) is a standardized self-report questionnaire consisting of 14 items, comprised of two seven-item subscales assessing anxiety (HADS-A) and depression (HADS-D). A recent meta-analysis of diagnostic test accuracy reported a score of

eight or above as optimal for sensitivity and specificity in the detection of anxiety or depression (Brennan *et al.*, 2010).

A measure of current health status and quality of life were not available in Sample 3.

Analysis Strategy

All data was analyzed using IBM SPSS Statistics 22 for Windows. Item selection procedure was conducted through the analysis of item-total correlation and internal consistency, and exploratory factor analysis using Sample 1. First, the items of each subscale were ranked in order of magnitude of their item-total correlations (see Table 2). In order to preserve high consistency with the 24-item AAQ (AAQ-24), items with higher item-total correlations were selected for each subscale and equal numbers of items from each subscale were used to form 6-, 9- and 12-item short forms of the AAQ. For example, the 12-item AAQ-SF included the top *four* items from each subscale. Internal consistency of the different forms were examined by Cronbach's alpha selecting the most optimal format of AAQ-SF. Values greater or equal to .70 are recommended for purposes of comparing groups (Nunnally *et al.*, 1994).

The original AAQ-24 study reported an optimal a 3-factor solution (Laidlaw *et al.*, 2007). Therefore, for the 12-item AAQ-SF we determined the number of factors as 3 and carried out exploratory factor analysis using on sample 1. Maximum likelihood analysis with Promax (oblique) rotation ensured best fit for the data.

To evaluate discriminative validity, independent t-tests compared attitudes toward aging according to predictors such as health status and depression scores reported in previous research (Chachamovich *et al.*, 2008; Bryant *et al.*, 2012).

Confirmatory factor analysis (CFA) using samples 2 and 3, 'confirmed' the outcome from the EFA performed on sample 1. Using 'rules of thumb' proposed by researchers making sense of CFA data (Hu & Bentler, 1998; Jackson *et al.*, 2009; Iacobucci 2009)

combination approaches to evaluate model fit for CFA are adopted here. While there is no universal agreement on what is reported in CFA (Jackson et al., 2009), the following combination data are used to evaluate ‘goodness of fit’; chi-square statistic, comparative fit index (CFI), root mean square error of approximation (RMSEA), and Tucker-Lewis index (TLI). Making sense of the data is achieved by a combination of the following; non-significant chi-square values, values higher than .90 on the CFI are considered adequate, RMSEA values up to .08 are considered by Hu and Bentler (1998) as a ‘fair fit’ (p.446) and TLI values of .95 (Hu & Bentler, 1999). In Structural Equation Modelling (SEM), data are not always perfect for example, chi-square are invariably large and significant and, in fact, may increase with sample size.

Results

Item Selection with Sample 1

The 12-item AAQ-SF was selected as the short form of AAQ (AAQ-SF) and analyses report on the validity of the scale (See Table 1 for means and standard deviations). Table 2, reports item-total Correlations for each of the Subscales of the AAQ. Table 3 reports Cronbach’s alpha for each subscale of the different forms of AAQ. Alpha coefficients for the PL and PC subscales of 12-item AAQ-SF were above .70 maintaining high consistency with the AAQ thus this format is adopted for the AAQ-SF. The PG subscale of AAQ-SF demonstrated a lower alpha coefficient ($\alpha = .62$). This could be due to the multidimensional constructs of psychological growth assessed by the PG subscale. The PG subscale measures two aspects of positive psychological gains, positive gains in relation to self (e.g., “there are many pleasant things about growing older”) and others (e.g., “I want to give a good example to younger people”). The PG subscale of the AAQ-SF includes an equal number of items related to these two dimensions. When a scale consists of two or more constructs Cronbach’s

α could be substantial only if the scale has enough items and thus the converse of a high value of α implying a high degree of internal consistency may not apply in all situations (Streiner, 2003). Although it is recommended that the value of α should not fall below .60 in any cases (Loewenthal, 2001).

Exploratory Factor analyses. The selected 12 items support a 3-factor solution with eigenvalues greater than 1 explaining 40% of the variance. Two items (item 2, and item 5,) demonstrated low factor loadings with relative factor cross-loadings suggesting that they did not discriminate well between the Factor 1 (PC) and Factor 3 (PG) (See Table 4). However, analysis of item-total correlations showed that both item 2 and 5 contributed significantly to the overall coherence of the PG subscale. The PG subscale, appears to capture two qualitatively distinct aspects of attitudes and experiences related towards aging. However, deletion of items 2 and 5 would narrow the diversity of items and thus limit aspects of the construct being measured.

Confirmatory factor analysis of the AAQ-SF in samples 2 and 3.

The data support a three-factor structure identical to that of the original AAQ, providing an adequate fit for the data. However, analyses do not support the idea of an overall scale (summative AAQ Scaled) as the hierarchical model ("3+1") does not provide a better fit than the three factor model. (see Table 5).

Test of Validity with the 12-item AAQ-SF in Sample 2

Individuals with depression demonstrated negative attitudes to aging on all three domains assessed by the AAQ-SF (see table 6). Consistent with the findings from the AAQ, the effect size for group difference was large for the PL ($d = 1.28$) and PC ($d = 1.13$). Similar patterns of results were found for current health status and QOL scores. Individuals defining their current health status as unhealthy demonstrated a significantly higher level of negative attitudes toward aging compared to those who identified themselves as healthy. Individuals

defining their current QOL as very poor reported statistically significant negative attitudes compared to those who identified their QOL as very good.

Replication of the Findings with the AAQ-SF in Sample 3

We used an independent validation cohort (LBC dataset) to test the structure and performance of the AAQ-SF. The internal consistency of each subscale was similar to those found in Sample 1 (PL $\alpha = .68$, PC $\alpha = .73$, and PG $\alpha = .61$).

Exploratory Factor analysis. Factor analysis for the selected 12 items AAQ-SF supported a 3-factor solution with eigenvalues greater than 1, explaining 40% of the variance. Consistent with findings from Sample 1, items 2 and 5 had relative factor loadings between the Factor 1 (PC) and Factor 3 (PG).

Test of Validity. To examine subscale scores between individuals with and without psychological difficulties, scores of 8 and above were used for the HADS-D and HADS-A to create subgroups of participants. Individuals with depressive symptoms reported statistically significant negative attitudes on all three subscales of the AAQ-SF (PL $t = 6.78$, $df = 787$, $p < 0.01$, $d = 1.24$; PC $t = 3.47$, $df = 787$, $p < 0.01$, $d = 0.63$; PG $t = 2.11$, $df = 787$, $p < 0.05$, $d = 0.39$). Similar patterns of results were found for individuals with and without anxiety symptoms as measured by the HADS-A (PL $t = 5.27$, $df = 789$, $p < 0.01$, $d = 0.48$; PC $t = 2.28$, $df = 789$, $p < 0.05$, $d = 0.21$; PG $t = 0.57$, $df = 789$, $n.s.$).

Discussion

The AAQ-SF comprises 12-items derived using a split-half of the original development sample (Sample 1) providing an appropriate balance of brevity and internal consistency. An examination of the internal consistency and the breadth of content coverage demonstrated high reliability for the 12 item AAQ-SF in comparison to 6- and 9-item alternatives. Results suggest an identical 3-factor structure for the AAQ-SF to that of the

original AAQ, demonstrating adequate internal consistency for each subscale. Similar findings were obtained with an independent sample (LBC dataset, Sample 3, Shenkin *et al.*, 2014) further confirming the construct validity of the AAQ-SF.

CFA demonstrated an adequate fit for the AAQ-SF retaining the three factor structure of the original AAQ. This finding suggests data generated by AAQ-SF will be easily translatable to previous research published for the AAQ. While the CFA data are adequate, the combination of different indices suggests the data is a good enough fit and provides a good solution for the creation of the AAQ-SF. Data are not perfect, therefore in CFA multiple indices are used to conclude regarding adequacy of fit to the data.

The finding that a unitary factor AAQ-SF is not a good fit for understanding attitudes to aging is an excellent result as the scale was constructed to provide profile scores on attitudes to aging. The single factor confuses more than it clarifies as it summates qualitatively different items.

Finally, the AAQ-SF demonstrated construct-level measurement invariance across respondents scoring above 'cut-off', or caseness scores, on the GDS in Sample 2 and the HADS in Sample 3. Overall, the AAQ-SF functioned consistently with the profile reported using the original 24-item AAQ for depression, anxiety, current health status, and QoL (e.g., Bryant *et al.*, 2012; Chachamovich *et al.*, 2008; Janecková *et al.*, 2013). This suggests the AAQ-SF remains useful to clinicians as a measure of symptom change.

Smith *et al.*, (2000) emphasize when reducing questionnaire items, researchers engage in a thorough content analysis along with a statistical examination in order to demonstrate the target content domain is being adequately represented. When examining the items selected for the AAQ-SF, selection was based on items reporting highest item-total correlations. The data suggests the AAQ-SF functions very well in comparison to the original 24 item AAQ to

provide sufficient coverage of the constructs. Gains in brevity of the scale compensate for anything that is lost.

Future developments

Despite evidence that people are living healthier in later life, aging is more negatively appraised by younger adults (Kishita *et al.*, 2015). Evidence suggests strategies to reduce negative evaluations of older adults through positive intergenerational contact may foster empathy and reduce aging anxiety (Jarrot and Savla, 2015). A version of the AAQ that can measure attitudes to aging in both young and older people will therefore be important.

Limitations

There are factor cross-loadings, with item 2 and item 5 from the psychological growth factor demonstrating overlap with the physical change factor. The psychometric properties of these items are nevertheless adequate as the overall structure and comparability of the AAQ-SF with the larger scale justifies their retention. Moreover, two items in this subscale appear to have overlap and could be argued to be indices of generativity, a legacy concern expressed from one generation to the next that transmits values and experiences to prevent the repetition of errors. Evidently, psychological growth is a nuanced construct comprising many different elements thus no scale can aim to provide comprehensive coverage of this.

The original AAQ adopts a different response format (i.e., where individuals are asked to consider general and specific items about aging) and as such may produce overlapping responses especially as older people may be relative in the social comparisons they make about how well they perceive their aging (George, 2010). Just as aging is a process and not a state, there is no absolute index of ‘aging well’ as it is formed from comparisons on a number of criteria. Therefore, development of cut-off scores for the AAQ-SF and AAQ indicating optimal and non-optimal attitudes toward aging in both clinical and non-clinical populations are planned.

Finally, items for the AAQ-SF were derived from a large international field trial dataset from across 20 countries. However, our third sample included only a UK population. In the interests of robust replication, future research should be conducted using the AAQ-SF with an international sample, ideally from at least one other country drawn from the original field trial (see Laidlaw *et al.*, 2007).

Conclusion

The paper reports development of a new 12 item short form of the AAQ, The AAQ-SF, derived from the original AAQ-24 field-trial dataset. Validated with a separate dataset recruited by researchers independent from the WHOQOL group, the AAQ-SF provides a brief but nevertheless sufficiently comprehensive assessment of attitudes to aging. Given that attitudes to aging are poorly understood and often inadequately assessed in research and clinical settings the AAQ-SF is a significant step forward in addressing this unmet need.

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References

- Abrams D, Swift HJ, Lamont RA., Drury L. 2015. *The barriers to and enablers of positive attitudes to ageing and older people, at the societal and individual level*. The UK Government Office for Science: London.
- Brennan C, Worrall-Davies A, McMillan D, Gilbody S, House A. 2010. The Hospital Anxiety and Depression Scale: a diagnostic meta-analysis of case-finding ability. *J Psychosom Res* 69 : 371–378. doi:10.1016/j.jpsychores.2010.04.006
- Bryant C, Bei B, Gilson K, Komiti A, Jackson H, Judd F. 2012. The relationship between attitudes to aging and physical and mental health in older adults. *Int Psychogeriatr* 24 : 1674–1683. <http://dx.doi.org/10.1017/S10416102120007>
- Chachamovich E, Fleck M, Laidlaw K, Power M. 2008. Impact of major depression and subsyndromal symptoms on quality of life and attitudes toward aging in an international sample of older adults. *Gerontologist* 48 : 593–602. <http://dx.doi.org/10.1093/geront/48.5.593>
- Deary IJ, Gow AJ, Pattie A, Starr JM. 2011. Cohort profile: The Lothian Birth Cohorts of 1921 and 1936. *Int J Epidemiol*. Advance online publication. doi: 10.1093/ije/dyr197
- Hu LT, Bentler PM. 1998. Fit indices in covariance structure modelling: Sensitivity of underparameterized model misspecification. *Psychological Methods*, 3 : 424-435.
- Hu LT, Bentler PM. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modelling*, 6 : 1-55.
- Iacobucci D. 2009. Everything you always wanted to know about SEM (structural equations modeling) but were afraid to ask. *Journal of Consumer Psychology*, 19 : 673-680.
- Jackson DL, Gillaspay JA, Purc-Stephenson R. 2009. Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods*, 14 : 6-23.

Janecková H, Dragomirecká E, Holmerová I, Vaňková H. 2013. The attitudes of older adults living in institutions and their caregivers to ageing. *Cent Eur J Public Health* 21 : 63–71.

Jarrott SE, Savla J. 2015. Intergenerational contact and mediators impact ambivalence towards future selves. *Int J Behav Dev*. Advance online publication. doi: 10.1177/0165025415581913

Kavirajan H, Vahia IV, Thompson WK, Depp C, Allison M, Jeste DV. 2011. Attitude toward own aging and mental health in post-menopausal women. *Asian J Psychiatr* 4 : 26–30. <http://dx.doi.org/10.1016/j.ajp.2011.01.006>

Kishita N, Fisher P, Laidlaw K. 2015. *What are the attitudes of different age groups towards contributing and benefiting from the wider society and how are these experienced by individuals in those age groups? Looking forward to 2025 and 2040, how might these evolve?* The UK Government Office for Science: London.

Laditka SB, Corwin SJ, Laditka JN, Liu R, Tseng W, Wu B, Beard RL, Sharkey JR, Ivey SL. 2009. Attitudes about aging well among a diverse group of older Americans: implications for promoting cognitive health. *Gerontologist* 49 : S30–S39. doi:10.1093/geront/gnp084

Laidlaw K. 2015. *Cognitive behavior therapy for older people: An introduction*. Sage: London.

Laidlaw K, Kishita N. 2015. Age appropriate augmented CBT to enhance treatment outcome for late life depression and anxiety disorders. *GeroPsych (Bern)* 28 : 57–66. <http://dx.doi.org/10.1024/1662-9647/a000128>

Laidlaw K, Power MJ, Schmidt S, WHOQOL-OLD Group. 2007. The Attitudes to Ageing Questionnaire (AAQ): Development and psychometric properties. *Int J Geriatr Psychiatry* 22 : 367–379. <http://dx.doi.org/10.1002/gps.1683>

- Law J, Laidlaw K, Peck D. 2010. Is depression viewed as an inevitable consequence of age? The “understandability phenomenon” in older people. *Clin Gerontol* 33 : 194–209.
DOI: 10.1080/07317111003773627
- Levy R. 2009. Stereotype embodiment: A psychosocial approach to aging. *Curr Dir Psychol Sci* 18 : 332–336. doi:10.1111/j.1467-8721.2009.01662.x
- Levy R, Leifheit-Limson E. 2009. The stereotype-matching effect: Greater influence on functioning when age stereotypes correspond to outcomes. *Psychol Aging* 24 : 230–233. <http://dx.doi.org/10.1037/a0014563>
- Loewenthal KM. 2001. *An introduction to psychological tests and scales, 2 ed.* Psychology Press: Hove.
- Low G, Molzahn AE, Schopflocher D. 2013. Attitudes to aging mediate the relationship between older peoples’ subjective health and quality of life in 20 countries. *Health Qual Life Outcomes* 11 : 146. Retrived from <http://dx.doi.org/10.1186/1477-7525-11-146>
- Nunnaly JC, Bernstein IH. 1994. *Psychometric Theory, 3rd ed.* McGraw-Hill: New York.
- Quinn KM, Laidlaw K, Murray LK. 2009. Older peoples’ attitudes to mental illness. *Clin Psychol Psychother* 16 : 33–45. DOI: 10.1002/cpp.598
- Rashid A, Ong EK, Wong ESY. 2012. The attitude towards ageing among residents of an elderly care institution in Penang Malaysia. *Int J collab Res Internal Med Public Health* 4 : 1069–1083.
- Scheibe S, Carstensen LL. 2010. Emotional aging: Recent findings and future frends. *J Gerontol B Psychol Sci Soc Sci* 65B2: 135–44. doi: 10.1371/journal.pone.0072559
- Sheikh JI, Yesavage JA. 1986. Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. *Clin Gerontol* 5 : 165–173.
DOI:10.1300/J018v05n01_09

- Shenkin SD, Laidlaw K, Allerhand M, Mead GE, Starr JM, Deary IJ. 2014. Life course influences of physical and cognitive function and personality on attitudes to aging in the Lothian Birth Cohort 1936. *Int Psychogeriatr* 26 : 1417–1430.
<http://dx.doi.org/10.1017/S1041610214000301>
- Smith GT, McCarthy DM, Anderson KG. 2000. On the sins of short-form development. *Psychol Assessment* 12 : 102–111. <http://dx.doi.org/10.1037/1040-3590.12.1.102>
- Streiner DL. 2003. Starting at the beginning: An introduction to coefficient alpha and internal consistency. *J Pers Assess*, 80(1) : 99–103. doi: 10.1207/S15327752JPA8001_18
- Top M, Eris H, Kabalcioglu F. 2012. Quality of life (QOL) and attitudes toward aging in older adults in Sanliurfa, Turkey. *Res Aging* 35 : 533–562.
<http://dx.doi.org/10.1177/0164027512447822>
- Trigg R, Watts S, Jones R, Tod A, Elliman R. 2012. Self-reported quality of life ratings of people with dementia: The role of attitudes to aging. *Int Psychogeriatr* 24 : 1085–1093.
<http://dx.doi.org/10.1017/S1041610212000038>
- United Nations, Department of Economic and Social Affairs, Population Division. 2013. *World Population Ageing 2013*. ST/ESA/SER.A/348.
- Wancata J, Alexandrowicz R, Marquart B, Weiss M, Friedrich F. 2006. The criterion validity of the Geriatric Depression Scale: a systematic review. *Acta Psychiatr Scand* 114 : 398–410. <http://dx.doi.org/10.1111/j.1600-0447.2006.00888.x>
- World Health Organization Quality of Life Group. 1998. *The World Health Organization Quality of Life Assessment (WHOQOL): Development and general psychometric properties*. *Soc Sci Med* 46 : 1566–1585.
- Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey MB, Leirer VO. 1983. Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res* 17 : 37–49. [http://dx.doi.org/10.1016/0022-3956\(82\)90033-4](http://dx.doi.org/10.1016/0022-3956(82)90033-4)

Zigmond AS, Snaith RP. 1983. The hospital anxiety and depression scale. *Acta Psychiatr*

Scand 67 : 361–370. <http://dx.doi.org/10.1111/j.1600-0447.1983.tb09716.x>

Table 1

Demographic and Descriptive Statistics.

	Sample 1*	Sample 2*	Sample 3
<i>n</i>	2,487	2,488	792
Age range	60-97 ¹⁾	60-99 ¹⁾	73-74
Mean age	72.3 ¹⁾ (8.0)	72.2 ¹⁾ (8.1)	74.0 (0.3)
Gender (<i>n</i>)			
Female	1,426	1,427	385
Male	1,050	1,050	407
Not specified	11	11	-
12-item AAQ (<i>mean</i>)			
Psychosocial loss	9.43 (3.40)	9.54 (3.43)	7.54 (2.54)
Physical change	12.77 (3.60)	12.48 (3.67)	13.44 (3.23)
Psychological growth	14.15 (2.83)	14.17 (2.67)	14.54 (2.42)

* Samples 1 and 2 are derived from the original AAQ field trial dataset (*Laidlaw et al., 2007).

Note. AAQ = Attitudes to Ageing Questionnaire; Numbers in brackets are standard deviations; ¹⁾ this excludes 130 participants who did not report age.

Table 2

Item-total Correlations for the Subscales of 24-item AAQ (Sample 1)

Item	Content	<i>r</i>
Psychosocial loss		
22	I feel excluded from things because of my age.	.580
6	Old age is a depressing time of life.	.572
12	I see old age mainly as a time of loss.	.551
17	As I get older, I find it more difficult to make new friends.	.536
3	Old age is a time of loneliness.	.489
20	I don't feel involved in society now that I am older.	.482
15	I am losing my physical independence as I get older.	.467
9	I find it more difficult to talk about my feelings as I get older.	.465
Physical change		
14	I have more energy now than I expected for my age.	.625
23	My health is better than I expected for my age.	.539
24	I keep myself as fit and active as possible by exercising.	.486
11	I don't feel old.	.484
8	Growing older has been easier than I thought.	.438
16	Problems with my physical health do not hold me back from doing what I want to.	.398
7	It is important to take exercise at any age.	.352
13	My identity is not defined by my age.	.344
Psychological growth		
5	There are many pleasant things about growing older.	.476
21	I want to give a good example to younger people.	.468
2	It is a privilege to grow old.	.424
18	It is very important to pass on the benefits of my experiences to younger people.	.414
4	Wisdom comes with age.	.398
10	I am more accepting of myself as I have grown older.	.380
1	As people get older they are better able to cope with life.	.358
19	I believe my life has made a difference.	.298

Note. AAQ = Attitudes to Ageing Questionnaire; the items are arranged in decreasing order of correlation coefficient.

Table 3

Alpha Coefficients for the Subscales of 24-item, 12-item, 9-item, and 6-item AAQ (Sample 1)

	24-item AAQ	12-item AAQ	9-item AAQ	6-item AAQ
Psychosocial loss	.81	.72	.67	.55
Physical change	.76	.72	.72	.73
Psychological growth	.71	.62	.54	.37

Note. AAQ = Attitudes to Ageing Questionnaire.

Table 4

Exploratory Factor Analysis of AAQ Items for 12-item Versions of the Scale (Sample 1)

AAQ items	Factor 1	Factor 2	Factor 3
Physical Change			
14. More energy than I expected	.855	.089	-.029
23. Health is better than expected	.721	.063	.021
24. Keep myself as fit and active by exercising	.510	-.077	-.019
11. I don't feel old	.448	-.100	-.026
Psychosocial Loss			
12. Old age mainly as a time of loss	.063	.693	.035
17. More difficult to make new friends	.087	.643	-.003
6. Old age depressing time of life	-.082	.627	-.003
22. Feel excluded from things because of my age	-.075	.565	.079
Psychological Growth			
18. Pass on benefits of experience	-.006	.100	.712
21. Want to give a good example	-.039	-.022	.765
2. Privilege to grow old	.152	-.141	.227
5. Pleasant things about growing older	.182	-.341	.191
Factor correlation with Factor 1	-	-.477	.402
Factor correlation with Factor 2	-	-	-.213

Note. AAQ = Attitudes to Ageing Questionnaire.

Table 5

Fit indices for the Confirmatory Factor Analysis using Samples 2 and 3.

Model	X2	df	p	CFI	RMSEA	TLI
Sample 2 AAQ original sample (Laidlaw et al., 2007)						
3 factor model	807.4	51	.001	.88	.08	.84
3 + 1 factor model	807.4	51	.001	.88	.08	.84
1 factor model	2053.6	54	.001	.67	.12	.60
Sample 3 LBC Dataset (Shenkin et al, 2014)						
3 factor model	314.2	51	.001	.87	.08	.83
3 + 1 factor model	316.0	51	.001	.87	.08	.83
1 factor model	697.0	54	.001	.69	.12	.62

Note. X2 = Chi-Square, CFI = comparative fit index, RMSEA = root mean square error of approximation, TLI = Tucker-Lewis Index.

Table 6

Comparison of Means of 12-item and 24-item AAQ between Subsamples (Sample 2)

Depression								
	12-item AAQ				24-item AAQ			
	GDS 0-5 (N=1518)	GDS 6-15 (N=491)	<i>p</i>	<i>d</i>	GDS 0-5 (N=1518)	GDS 6-15 (N=491)	<i>p</i>	<i>d</i>
Psychosocial	8.60 (2.99)	12.46 (3.13)	<.001	1.28	17.80 (5.28)	24.99 (5.30)	<.001	1.36
Physical	13.35 (3.28)	9.61 (3.44)	<.001	1.13	27.65 (5.15)	21.98 (5.35)	<.001	1.09
Psychological	14.52 (2.57)	13.37 (2.76)	<.001	0.44	28.33 (4.38)	25.80 (4.65)	<.001	0.57
Current Health Status								
	12-item AAQ				24-item AAQ			
	Healthy (N=1653)	Unhealthy (N=758)	<i>p</i>	<i>d</i>	Healthy (N=1653)	Unhealthy (N=758)	<i>p</i>	<i>d</i>
Psychosocial	8.71 (3.14)	11.31 (3.37)	<.001	0.81	18.00 (5.61)	22.92 (5.76)	<.001	0.87
Physical	13.72 (3.13)	9.96 (3.35)	<.001	1.17	28.09 (5.06)	22.73 (5.29)	<.001	1.05
Psychological	14.44 (2.61)	13.73 (2.68)	<.001	0.27	28.11 (4.46)	26.54 (4.50)	<.001	0.35
QoL								
	12-item AAQ				24-item AAQ			
	Very good (N=397)	Very poor (N=48)	<i>p</i>	<i>d</i>	Very good (N=397)	Very poor (N=48)	<i>p</i>	<i>d</i>
Psychosocial	7.24 (2.99)	12.46 (3.80)	<.001	1.69	15.17 (5.41)	25.04 (7.27)	<.001	1.75
Physical	14.99 (3.04)	7.15 (3.42)	<.001	2.54	30.28 (5.08)	18.81 (5.09)	<.001	2.26
Psychological	15.33 (2.50)	12.48 (2.54)	<.001	1.14	29.96 (4.25)	23.92 (4.93)	<.001	1.40

Note. AAQ = Attitudes to Ageing Questionnaire; GDS = Geriatric Depression Scale;

Numbers in brackets are standard deviations.