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Reliability and Validity of the Attitudes to Ageing Questionnaire for Canadian and Norwegian Older Adults

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Abstract

The aim of this study was to examine the reliability and validity of the Attitudes to Ageing Questionnaire (AAQ), a new scale designed for cross–cultural comparisons of older adults. Very similar Canadian (n=202) and Norwegian (n=490) data were used to cross-validate these findings. Score distributions showed higher negatively skewed mean scores for the psychosocial loss subscale in the Canadian data and lower negatively skewed mean scores for the physical change and psychosocial growth subscales in the Norwegian data. In both study samples, a series of correlation analyses indicated that item scores correlated most strongly with their parent subscales; however, equally appreciable correlations were observed among the psychosocial loss, physical change and physical growth items (r=.42 to .79; p< .01). Acceptable internal consistency was shown with Cronbach's alpha coefficients of .70 or greater for all subscales. In a confirmatory factor analyses (CFA), all 24 items in the AAQ were retained (p<.001); the observed lack of goodness of fit and residual covariance patterns provided empirical support, in part, for the construct validity of the AAQ. Patterns of correlations (p< .01) of the AAQ subscales with WHOQOL-OLD facets, WHOQOL–BREF domains, a global QoL item and GDS scores provided evidence of convergent and divergent validity. Non-significant correlations were found between psychological growth and two facets of the WHOQOL–OLD in the Canadian sample. Subscale scores also significantly discriminated between healthy and unhealthy groups, but psychosocial growth did not significantly discriminate for presence of morbidity. Further exploration of the scale's construct validity, particularly among older people, across countries, is recommended.

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Key words: measurement; reliability; validity; Attitudes to Ageing Questionnaire; cross-cultural; ageing

INTRODUCTION

According to the United Nations (UN) World Assembly on Ageing, the proportion of people over 60 years of age is expected to rise from 10% to 15% worldwide between 1998 – 2025. By 2050, the UN projects that one of every five persons will be 60 or older, and that by 2150, one of every three persons will be 60 or more years of age.[1] As the population of older adults continues to increase, successful ageing has risen to the top of the health policy agenda. Although the idea of successful ageing can be traced back to Cicero, in 44 BC, who wrote an essay on the nature of good aging[2], there remains no standard way of measuring attitudes to successful ageing[3]. Further, there is a lack of information about older adults' own attitudes to ageing[4,5]. The Attitudes to Ageing Questionnaire (AAQ) was developed as part of a larger 3-year international project on quality of life (QoL) of older adults funded by the European Commission 5th Framework Competition in collaboration with WHO. The study involved a partnership of 23 centres representing a wide range of cultures. The main aims of the project were to develop a measure to assess QoL in older adults and to test this measure in an innovative cross-cultural study of healthy aging[6,7,8]. Attitudes to aging were considered to be important to ageing and QoL, hence the concurrent development of the AAQ as part of the larger project. In taking a lifespan development approach, the experience of older age was conceptualized as multidimensional and one wherein older adults experience both losses and gains[9]. The aim of this paper is to describe the construct validity of the final version of the AAQ based on Canadian and Norwegian Field Trial data. The analysis of very similar data from two independent samples of older people in two countries provided the foundation for our cross-validation analysis.

Procedure for Instrument Development

The development of the AAQ followed WHO methodology which emphasizes a simultaneous cross-cultural approach to instrument development[7,8]. First, a literature review

on relevant attitudes to ageing and preliminary focus groups with older adults were conducted by the Edinburgh Centre. A set of items were then generated and fed into focus group work of a number of centres worldwide. For these groups, attempts were made to obtain equal numbers in the 60 – 80 and 80 plus age groups, equal numbers of males and females, and equal numbers of well and ill repondents. One focus group was conducted with lay caregivers of older adults and one with health professionals. As a result of the multicenter focus groups and additional literature reviews, a preliminary set of items was generated in English and circulated to 15 centres who provided feedback through Delphi exercises. This process resulted in a 44 item pilot version of the AAQ. Centres then took part in the pilot testing of this version (*n*=1,356 older adults) including Canada (*n*=90 older adults) and Norway *(n*=138 older adults). These data were then analyzed using a combination of classical and modern psychometric methods. Based on these analyses, a reduced set of items was tested in a field trial in which 20 centres participated (*n*=5,566 older adults). To our knowledge, there exist only two published studies regarding the AAQ[9,10].

METHODS

Procedure and Subjects

Inclusion criteria were: 60 or more years of age, English or Norwegian speaking, resident of British Columbia, Canada or Norway, and no illness likely to cause death within the next six months or significant cognitive impairment. In Canada, a sample stratified by age (60-70, 71-80, and 81+) was sought. Letters were sent to eligible randomly selected people from the databases of the British Columbia Ministry of Health Client Registry. Older adults who responded to a letter of invitation to participate were sent questionnaires by mail. The response rate to the letters was 42%, and the return of study packages by people who responded positively was 80.4% (*n*=202).

The Norwegian study sample consisted of two cohorts, one of randomly selected stratified older adults from 20 geographically dispersed communities drawn by allocated proportional design by Statistics Norway. Of the 802 elders who were sent invitations to participate, 401 consented and were sent questionnaires by mail. Another randomized sample of 89 older adults receiving formalized health care services was drawn to increase participation of frailer older adults. These adults were personally interviewed. A total of 490 respondents from Norway participated, yielding a response rate of 53.1%.

Measures

The measures used in the larger study were selected to facilitate the assessment of the reliability and validity of both the AAQ and the WHOQOL-OLD. For the purposes of this study, the WHOQOL-BREF, WHOQOL-OLD, GDS, and self-reported health and morbidity were used in examination of the psychometric properties of the AAQ. The rationale for selection of these instruments included availability of the instruments in all languages of participating countries and previously demonstrated relationships with QoL.*Attitude to Ageing Questionnaire (AAQ)*

During the developmental process of the AAQ, the translation method recommended by WHO was followed[11,12]. This includes an interative process of forward and backward translation, complemented by a review with monolingual and bilingual groups to ensure conceptual, semantic and technical equivalence. The English version was translated into Norwegian by a native Norwegian. An expert group composed of a researcher, physician, researcher in geriatric medicine, professor in nursing science, and a statistician agreed upon a common translation. A native-speaking English speaker then back-translated the questionnaire. The back-translated version was then submitted to the international project team.

Further details regarding the development of the AAQ are described elsewhere[9]. The final scale consists of 24 items consisting of a three factor model encompassing psychosocial loss, physical change and psychological growth. The first subscale (psychosocial loss) includes items related to psychological and social losses relevant to ageing as a negative experience. The second subscale (physical change) focuses on physical function with items related to health, exercise and the experience of ageing itself. The third subscale (psychosocial growth) relates to wisdom and growth, reflecting positive gains in relation to self and to others. The three subscale scores are intended to provide a profile of attitudes. All items are based on self-report with ratings ranging from 1 to 5, where 1 reflects strongly disagree or not at all true, and 5 reflects strongly agree or extremely true. The time period for the assessment is the present. Both classical and modern psychometric methods were used to establish the reliability and validity of the recommended instrument[9]. The internal consistency reliability of the AAQ based on the international data set was .86.

WHOQOL-BREF

The WHOQOL-BREF is a short version of the WHOQOL-100 designed to measure generic QOL across cultures[7,8,13]. It has been translated into 50 languages. The scale contains four domains: physical (7 items), psychological (6 items), social relationships (3 items) and environmental (8 items). Two global questions address overall QoL and health satisfaction. Each item is scored on a 5-point Likert scale in relation to the last two weeks. Higher scores indicate higher QoL, with the exception of three negatively worded items which are recoded. Use of domain level profiles is recommended (WHOQOL Group 1996). Cronbach's alpha coefficient values for the physical, psychological, social relationships, and environmental domains in the Canadian sample were 0.89, 0.81, 0.67, and 0.86, respectively. For the Norwegian sample, these values were 0.87, 0.81, 0.54, and 0.80 respectively. Total scale values were α=0.93 (Canada) and α=0.92 (Norway).

WHOQOL–OLD Module

The WHOQOL–OLD Module is a 24-item 6-facet generic module intended to be used in conjunction with the WHOQOL–BREF or WHOQOL–100[6]. Module facets include sensory abilities, autonomy, past present and future activities, death and dying, and intimacy, with each facet containing 4 items. Items are scored on a 5-point Likert scale with higher scores representing greater QoL. The internal consistency reliability in this study was Cronbach α=0.90 for Canada and α=0.89 for Norway.

Depression

In Canada, depression was assessed with the 30-item Geriatric Depression Scale (GDS)[14]. The shorter GDS-15 was used in Norway[15,16]. For consistency, items from the GDS–15 were used from the Canadian data. Each item is scored dichotomously (No/Yes). To obtain a depression score, the number of depressive symptoms or 'Yes' responses is totalled. The value range is 0 to 15, with higher values indicating more depressive symptoms. The time frame is the present. The consistency reliability in the current study was α = 0.88 for Canada and α = 0.80 for Norway.

Self–Reported Health and Morbidity

Self–reported health was assessed with the question 'do you consider yourself to be healthy or sick?' Response categories included yes/no. Morbidity was assessed with an open ended question asking participants to list any conditions that influenced their QoL, with response categories ranging from 0 (none) to 5 (5 or more). Given the small numbers of participants reporting 4 and 5 or more illnesses (Canada=3%; Norway=2%), frequency counts were collapsed and reported for those with 0, 1, 2, and 3 or more chronic conditions.

Data Analysis

According to WHOQOL guidelines[17], use of data is not recommended for research purposes when more than 20% of the items are missing. There were few missing responses

and no subscale-specific gaps. For the Canadian sample, the most missing responses (n=4; 2%) were observed for items from the physical change subscale, these being 'more energy than expected' and 'health better than expected'. This was also the case for psychosocial growth items 'better able to cope', 'life has made a difference', and 'give a good example'.

In the Norwegian sample, missing responses ranged from 5 – 6.1% in each AAQ subscale. From the physical change subscale, 'identity not being defined by age' (n=30; 6.1%), and for psychosocial growth, 'give a good example' (n=25; 5.1%). Other items from the psychosocial loss subscale were 'lose physical independence' (n=30; 6%), 'old age as a time of loss' (n=25; 5.1%), 'more difficult to discuss feelings' (n=27; 5.5%), and 'don't feel involved in society' (n=25; 5.1%).

The Little MCAR test revealed the data were missing completely at random for Canada (X^2=358.099, df=402, p=.943) and Norway (X^2=1156.732, df=1101, p=.119). Missing values were estimated using a full information maximum likelihood procedure. Maximum likelihood allows for unbiased estimates of population parameters, particularly when values are missing completely at random, and estimates of missing values are made based on all existing variables across all cases[18].

The psychometric evaluation of the AAQ was performed using recommended criteria for instrument evaluation[19, 20,21,22,23]. Criteria for scaling qualities include score distributions for ceiling and floor effects, with >20% as the criterion[24,25] and more than 5% considered missing data[20]. Internal consistency reliability was assessed using Cronbach's alpha coefficient. The criterion for acceptability was .70-.90[26].

Convergent validity was assessed through the presence of positive and significant correlations among the global QoL item and WHOQOL-BREF domains and WHOQOL-OLD facets. Divergent validity was assessed through the presence of significant negative correlations with participants' GDS scores. To further examine construct validity using a

multi-trait multi-method matrix, Pearson Product Moment Correlation Coefficients between subscales, items and subscales, and items within subscales were examined.

Goodness of fit of the hypothesized measurement structure of the AAQ was assessed using confirmatory factor analysis (CFA). Criteria for goodness of fit of the implied measurement model (GFI) was set at .90 and the Root Mean Square Error of Approximation or average lack of fit per degree of freedom for testing this model (RMSEA) cut-off criterion was .05[27,28]. A model χ^2 and its associated p-value are also reported; statistical significance is considered indicative of ill fit.[27,29] Examination of patterns of residual covariances provided diagnostic information with respect to sources of poor fit.[29] Data were analyzed using maximum likelihood estimation with AMOS 6.0. Lastly, student t-tests were used to assess the significance of differences between healthy and unhealthy adults, and those with and without morbidities (self-reported conditions).

Ethical Considerations

The study was approved by the Norwegian Data Inspectorate and the Regional Ethical Committee and the University of Victoria Human Research Ethics Committee.

RESULTS

Demographics

The mean age of Canadian older adults was slightly younger than their Norwegian counterparts at 72.3 years (*SD*=7.9; range 60-95); 54% were female and 46% male. Approximately 66% were married or partnered; 34% were never married, separated, divorced or widowed; 55% had post–secondary education. Approximately 43% reported living at home unsupported and 1% resided in nursing homes and residential care facilities. Norwegian older adults were slightly older (*M*=77.6; *SD*=7.2; range of 60-91 years). Fifty-eight percent were female and 41% male. Most were married or partnered (86%); approximately 12% were never married, separated, widowed or divorced. Just over one-third had post-secondary education.

Approximately 66% lived at home unsupported and 3.3% lived in nursing homes and residential care settings.

Scaling Qualities

As shown in Table 1, a non-normal distribution was observed for the psychosocial loss subscale in the Canadian and Norwegian samples with a tendency toward higher scale scores; among Norwegians, the physical change and psychosocial growth subscales were skewed to lower scale scores. For both samples, highest mean scores were found for psychosocial loss (Canada *M* =35.5, *SD*=5.6; Norway *M*=29.6, *SD*=5.0).

Scores ranged from 1 to 5 on all the items for both countries. In relation to floor effects, for all three facets of the AAQ, less than 20% of participants selected the lowest response category. For example, for the energy item in the physical change facet, 89 Norwegian (19%) and 29 Canadian (14.9%) participants selected the lowest response category. From the psychological growth facet, the lowest response category was selected by 30 Norwegians (6.3%) and 3 Canadians (1.5%) on the 'better able to cope with life' item. Another example from the psychosocial loss facet was the item, 'old age is a time of illness', for which 39 Norwegians (8.2%) and 4 Canadians (2%) selected the lowest response category.

In relation to ceiling effects, for ten items in the Canadian and 14 items in the Norwegian data set, greater than 20% of participants selected the highest response category for a number of items. In both samples, such response patterns were noted for: 'old age is depressing' (n=110 or 23.1% of Norwegians; n=48; 23.8% of Canadians) , 'more difficult to discuss feelings' (n=131 or 28.4% for Norwegians; n=90 or 45%) , 'a time of loss' (n=178 or 38.2% for Norwegians; 98 or 49% for Canadians) , 'feel excluded from activities' (n=254 or 54.9% for Norwegians; n=46 or 23.2% for Canadians), 'important to exercise' (n=328 or 68.2% for Norwegians; n=102 or 51% for Canadians), 'don't feel old' (n=122 or 25.9% for

Norwegians; n=44 or 21.8% for Canadians), 'identity not defined by age' (n=118 or 25.7% for Norwegians; n=41 or 20.8% for Canadians), 'keep fit by exercising' (n=106 or 22.7% of Norwegians; n=42 or 20.8% of Canadians), and 'want to give a good example' (n=112 or 24.1% of Norwegians; 45 or 22.8% for Canadians).

Internal Consistency

The internal consistency of the AAQ subscales as indicated by Cronbach's alpha coefficient values for psychological loss, physical change and psychological growth in Canada were 0.77, 0.79, and 0.70, respectively. For Norway, these were 0.73, 0.75, and 0.73, respectively. For the scale as a whole, Cronbach's alpha values for Canadian and Norwegian samples were α=.86 and α=.82, respectively.

Multi-Trait Multi-Method Matrix

As shown in Table 2, among the Canadian sample, subscale correlations ranged from r=0.36 to r =0.53 (p<.001). The lowest correlation was between psychosocial loss and psychosocial growth, and the highest was between physical change and psychosocial loss. In the Norwegian sample, correlations ranged from r=0.13 to r=0.56 (p<.001). The lowest correlation was between psychosocial loss and psychosocial growth, and the highest, physical change and psychosocial growth.

An item-to-subscale correlation analysis for both countries showed that all AAQ items correlated significantly higher with their parent subscales than with non-parent subscales (p <.01; see Table 3 a,b,c). For Canada, correlation coefficient values ranged from r=0.51 to r=0.68 for psychosocial loss, r=0.42 to r=0.79 for physical change, and r=0.44 to r=0.68 for psychosocial growth. For Norway, correlation coefficients were similar, ranging from r=0.55 to r=0.65 for the psychosocial loss subscale, from r=0.43 to r=0.71 for the physical change subscale, and r=0.53 to r=0.62 for the psychosocial growth subscale.

Convergent and Divergent Validity

Convergent validity of the AAQ subscales was explored by examining correlations with QoL assessments, namely the WHOQOL–OLD and WHOQOL–BREF. It was assumed that all AAQ subscales would positively and significantly correlate with the WHOQOL-OLD facets and BREF domains. For the Canadian sample, these kinds of associations were observed for most of the WHOQOL-OLD facets ($p<.01$), the exception being between psychosocial growth and the WHOQOL-OLD sensory ability ($r=0.13$) and death and dying ($r=0.10$) facets. Correlations between psychosocial loss and the WHOQOL-OLD sensory ability and social participation facets were $r=0.38$ and $r=0.58$ respectively. Physical change correlations ranged from $r=0.29$ for death and dying to $r=0.65$ for social participation. Psychosocial growth correlations ranged from $r=0.32$ for intimacy to $r=0.52$ for past, present and future.

For the Norwegian sample, positive correlations were found between all AAQ subscales and WHOQOL–OLD facets ($p<0.01$), with psychosocial loss correlations being r=0.25 for death and dying and r=0.47 for past present and future. Physical change correlations ranged from $r=0.18$ for death and dying to $r=0.57$ for social participation. Psychosocial growth correlations with sensory ability were $r=0.18$ and for past, present and future activities, $r=0.42$.

All AAQ subscales also correlated positively and significantly with all WHOQOL – BREF domains in both countries ($p<.01$). For Canada, correlations for psychosocial loss ranged from $r=0.43$ to $r=0.60$ for the social and psychological domains, respectively. Physical change correlations ranged from $r=0.39$ for the social domain to $r=0.63$ for the physical domain. Psychosocial growth correlations ranged from $r=0$ .27 to $r=0.45$ for the social to the psychological domains. For Norway, correlations for psychosocial loss ranged from $r=.38$ to $r=.42$ for the physical and psychological domains, respectively. Physical change correlations

ranged from r=.36 to r=.61 for the social and physical domains, respectively. Psychosocial growth correlations ranged from r=.23 for the physical to r=.47, for the psychological.

As shown on Table 4, convergent validity was also assessed by exploring whether significant positive correlations would be observed between AAQ subscales and overall health satisfaction, and overall QoL. In both samples, results supported these assumptions with physical changes being most strongly associated with health satisfaction (Canada, r=.617, p<.001; Norway, r=.533, p<.001).

Divergent validity was expected with significant negative correlations with the GDS and this was the case for all AAQ subscales in both countries. Physical loss and psychosocial change correlated equally strongly with participant GDS scores for Canada (r=-.620, p <.001) and for Norway, physical change (r=-.473, p<.001) followed by psychosocial loss (r=-.510, p<.001).

Ability to Discriminate

The student t-tests shown in Tables 5 and 6 show that there were significant subscale score differences between healthy and unhealthy older people with respect to physical change and psychosocial loss. Among Norwegians, all subscales significantly discriminated by health status; for the Canadian sample, no significant differences by health status were observed for psychosocial growth. In both countries, significant subscale score differences between older people with and without morbidities were not observed for psychosocial growth.

Confirmatory Factor Analysis

The model was specified with eight indicators for each of the subscales (physical change, psychological growth and psychological loss). It was assumed that the subscales were correlated. The goodness of fit of the hypothesized measurement model for the AAQ was assessed in a confirmatory factor analysis (CFA) and was first tested against the Canadian data set (n=202) and then the Norwegian data set (n=490).

Though all 24 items in the AAQ were retained as each reached statistical significance ($p<.001$), goodness of fit between the hypothesized measurement model and the Canadian study sample data was not achieved (*GFI*=.803; *CFI*=.763; *RMSEA*=.084; χ^2=603.11; *df*=249; p=.000) (see Figure 1). Standardized residual covariances (range=2.844-3.876) and their patterns identified possible areas of AAQ subscale misspecification[29], the vast majority implicating psychosocial growth and loss. In particular, large residual values were observed among 'many pleasant things about growing older' from the psychosocial growth subscale and two items pertaining to psychosocial loss – 'old age is a time of illness' and 'old age is a depressing time'. A similar pattern was noted between 'being better able to cope with life' and 'not perceiving old age as a time of illness'. A cross-loading was also observed for the psychosocial growth item, 'many pleasant things about growing older', onto psychosocial loss (MI=16.002; par change=.362). Another not fully specified and thus underestimated relationship was noted between 'being more accepting of self' and one item from the physical change subscale, 'not feeling old'.

This same model, tested using the data from Norway, resulted in slightly better fit statistics (*GFI* =.854; *CFI* =.742; *RMSEA*=.072; χ^2=913.78; *df*=249; p =.000) (see Figure 2). All patterns of residual covariances (range=3.478-4.987) further implicated the psychosocial growth and loss subscales. The relationship between 'many pleasant things about growing older' and 'old age is a depressing time' was underestimated, further corroborated by its cross-loading onto psychosocial growth (*MI*=17.124; par change=.332). Unique to older Norwegians alone were the misspecified relationships between 'privilege to grow old' and 'old age is a depressing time"; 'don't feel involved in society ', 'more accepting of myself'and 'wisdom comes with age'. The psychosocial loss item, 'don't feel involved in society', also cross-loaded onto psychosocial growth (*MI*=11.206; par change=.366).

DISCUSSION

Information about measurement properties such as reliability, construct validity and features of score distributions is essential for instrument selection[19,20,22,23,31,32]. Our study is one of the first to examine these attributes for the AAQ among two independent samples of older people. Though all subscales of the AAQ were found to meet the critical threshold for consistency reliability, the psychosocial growth subscale did so marginally in Canada (α=.71). Examination of construct validity and features of score distributions suggest the need for further modification and testing of the scale among older people across countries.

It has been noted that QoL researchers often do not report the distributional properties of their data[33]. AAQ subscale scores can range from 8 to 40; each subscale contains 8 items measured on a 5-point Likert scale. Subscale distributions, with the exception of physical change in the Canadian sample, were non-normal. Psychosocial loss was skewed toward the higher end of the scale and psychosocial growth toward lower scale scores. In the Norwegian sample, all subscale distributions were skewed toward lower scores but this was marginally so with physical change.

Ceiling effects are well documented in QOL research[34,35] although others have noted that ceiling effects decrease with age[36,37]. At the item level, in both samples, ceiling effects were mainly found within the psychosocial loss and physical change subscales, these being 'old age is depressing', 'more difficult to discuss feelings', 'a time of loss', 'feel excluded from activities', 'important to exercise; 'don't feel old', 'identity not defined by age', and 'keep fit by exercising'. A similar pattern was observed for the psychosocial growth item 'want to give a good example'.

In the international field study, Laidlaw et al.[9] reported poor distributional properties for four items, namely 'it is important to exercise', 'personal beliefs', 'problems with physical health', and 'want to continue doing work'. However, in looking closer at Table 5 in this work, 11 additional items also qualify[38]. Significantly skewed items are at issue because these

exhibit poor discrimination, and may not detect changes and improvement over time, thereby reducing the sensitivity or responsiveness of the AAQ as a whole. Ceiling effects were predominant among AAQ items pertaining to exclusion, loss, and physical ability, and their parent psychosocial loss and physical change subscales were most strongly associated with health satisfaction, health status, and morbidity.

The internal consistency or inter-item reliability of the psychosocial growth subscale was marginally acceptable for Canada; for Norway, this subscale yielded the lowest Cronbach's alpha identical in value to psychosocial loss (α=.72). Although higher consistency reliability was found in the international study[9] for psychological loss (α=.84), the Cronbach's alpha coefficient for physical change was far lower (α=.68) than in the present study.

To compare attitudes toward ageing, researchers must ensure that the items of an attitudinal measure represent the same construct across countries. In both study samples, all items in the AAQ were most strongly associated with their parent subscales. Convergent validity was also supported by significant positive correlations with all WHOQOL-BREF domains, and the global QOL and health satisfaction items. Positive significant correlations were also found between all AAQ subscales and WHOQOL-OLD facets in the Norwegian study sample. However, in the Canadian sample, psychosocial growth did not correlate significantly with the WHOQOL-OLD sensory ability and death and dying facets. Typically, for both countries, the weakest pattern of correlations between AAQ and WHOQOL-OLD facets was observed for psychosocial growth. Divergent validity was also supported by significant negative correlations between all AAQ subscales and depression scores. Health status significantly differentiated all subscale scores in the Norwegian sample and for the Canadian sample, discriminated in all but psychological growth. The psychological growth subscale also did not discriminate between older people with and without morbidity.

While we were disappointed with the fit of the initial three correlated factor model in the CFA, the findings were not very different from those in an analysis of the international data set (n=5566)[9]. Our GFI of .85 in Norway was slightly higher than the .84 in the international study; however, the GFI for Canada was .80. The RMSEA of .056 in the international study was better than that of .084 in Canada and Norway (.072). Though the p-value for model X^2 is not reported, model X^2 relative to its degree of freedom or mean value using pooled data from 20 partnering countries in the international study (18.39) provided stronger evidence of greater ill-fit than did our country-specific analysis (Canada=2.42; Norway=3.67). In an abstract, Fleck et al.[39] report similar pre-modification fit indices of *CFI*=.835; *RMSEA*=.061 in testing the measurement model in an opportunistic sample of 424 Brazilian older adults. After Rasch analysis, they recommend deletion of two items (not specified) from the psychosocial growth subscale.

The fit indices in the present study indicate that the factor structure of the AAQ is not as clear as one might hope, with residual covariance patterns and item cross-loadings implicating its psychosocial growth and loss subscales. For both countries, we concluded that the physical change subscale was the most conceptually homogenous. Large residual covariances were consistently observed between items from the psychosocial growth and loss subscales. Considering the lifespan developmental approach, it was interesting to note that the distinctions between psychological loss and gains were not well demarcated as was the case with the physical change facet. Among Canadians, the attitude that there are many pleasant things about growing older was related to whether older age is viewed as a time of illness, a stage when one is better able to cope with life, and that growing older is depressing. For Norwegians, the attitude that growing older is a privilege appeared to be linked with viewing older age as a depressing time, and the perceived lack of involvement in society impacted upon their degree of self-acceptance and acquired wisdom in later life. These patterns of ill-

specified relationships speak to Erickson, Erickson, and Kivnick's[40] description of the developmental work in older age as reflecting on, learning from, and coming to terms with cumulative life experience; this helps preserve the sense of self or ego-integrity and brings wisdom with which to live out one's remaining life years. Others believe that positive cognitive developmental transitions in later life are marked by continual emotional and behavioral adjustment to illness-related changes, temporally integrating past, present and future life experience, and the pursuit of activities beneficial to self and others.[41] In keeping with these theoretical perspectives, it would be reasonable to infer that positive gains realized in relation to the self and others are intrinsically linked to psychological and social losses. The residual covariances are, in this respect, logical in that their patterns speak strongly to the need for a balanced focus on both the gains and losses realized in older age.[9] The underestimated relationships between psychosocial growth and loss reported in this study also acknowledge older peoples' abilities to overcome ill health and disability, and adapt their lives to pursue their goals.[42] For example, participants' views that growing old is pleasant and a privilege was further associated with believing that older age is equated with illness and depression.

Recommendations for Future Research

Laidlaw et al.[9] argue that attitudes to ageing are situated in the qualities older people value in their lives; such knowledge may help identify areas where the highest possible gains in QOL can be realized. Based on observations for both study samples in the CFA, we recommend further research, both qualitative and quantitative, to explore the meaning of psychosocial growth, particularly its relationship with loss among older people residing in different countries. Among older Canadians, the meaning of feeling physically old and its effect on opportunities for further growth in later life warrants further empirical attention. Refinement of the AAQ also requires theoretical rationale.[29] Erickson et al.'s[40] work on *Vital*

Involvement in Older Age and Glick and Tripp-Reimer's[41] theoretical perspectives on transitions in later life may help researchers further clarify and interpret findings pertaining to the meaning of psychosocial growth in older age. Further research to develop Norwegian and Canadian norms for the instrument is required.

While there is no theory of attitudes to ageing per se, these findings suggest that there are significant relationships among older peoples' attitudes to aging, and their health and QoL. Further theory generating research from a developmental perspective could clarify what constitutes loss and gain in later life, and the relationships between them.

Study Limitations

Several methodological limitations may be raised in connection with this study. Generalizability of findings cannot be assured because of possible differences between respondents and non-respondents to the surveys. Another limitation to this study is the absence of test-retest reliability data. Evidence yielded in the CFA was also not consistent with the hypothesized measurement structure of the AAQ. Comparing patterns of underestimated relationships among older Canadians and Norwegians provided additional evidence of overlap between psychosocial growth and loss. These shared and peculiar residual covariances serve as a reminder that older people alone possess intimate knowledge of adaptation to the ageing process.[9] On the other hand, the strengths of this study rest with its assessment of the construct validity of the AAQ using very similar data from two independent samples of older people in a stratified randomized design, and the relatively large number of respondents representing varying geographical districts, especially in Norway.

CONCLUSION

Evidence-based practice[30] necessitates reliable, valid and responsive instruments. Due to the non-normal distribution and ceiling effects among AAQ subscale scores, the conceptual overlap between psychosocial growth and loss rendering the subscales of the AAQ non-

homogenous, further testing and refinement of this instrument is recommended. Cross-validation studies among older people residing in different countries adults, including the publication of factor structures and randomized population norms, could help explain variations in findings by country.

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Author Contributions

All authors contributed to the conception and design of the paper. Data were collected by Mary Kalfoss in Norway and Anita Molzahn in Canada. Mary Kalfoss drafted the manuscript. Gail Low analyzed the data. All authors took part in critical revisions.

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Table 1.

Data distribution and Cronbach's alpha for AAQ facets.

Facets (number of items)		Mean (SD)	95% CI	Skewness	Test of normal distribution[a]	Cronbach's alpha
Psychosocial loss (8)	(C)	35.56 (5.58)	34.79 - 36.34	-.543	.085**	.771
	(N)	29.64 (5.02)	29.19 – 30.08	-.476	.066***	.727
Physical change (8)	(C)	28.21 (5.69)	27.42 – 29.00	-.201	.060[b]	.787
	(N)	26.42 (5.85)	25.90 – 26.95	.081	.049**	.749
Psychosocial growth (8)	(C)	20.02 (4.24)	28.44 – 29.62	-.081	.074**	.701
	(N)	29.02 (4.79)	28.13 – 28.97	.022	.066***	.727

Note. CI, confidence interval. C, Canada (n = 202). N, Norway (n = 490).

[a]Kolmogorov-Smirnov test with Lillefor's correction

[b]NS.

**p < .01. ***p < .001.

Table 2.

Intercorrelations among AAQ subscales.

Subscales		Psychosocial loss	Physical change	Psychosocial growth
Psychosocial loss	(C)	1.000		
	(N)	1.000		
Physical change	(C)	.527**	1.000	
	(N)	.238**	1.000	
Psychosocial growth	(C)	.363**	.479**	1.000
	(N)	.132**	.562**	1.000

Note. C, Canada (n = 202). N, Norway (n = 490).

**p < .01.

Table 3a.

Intercorrelations among AAQ subscales and items

Questions	Q7	Q10	Q14	Q17	Q21	Q24	Q32	Q34
AAQ Subscales								
Psychosocial loss								
(C)	**.63**	**.71**	**.51**	**.62**	**.59**	**.57**	**.59**	**.68**
(N)	**.58**	**.65**	**.54**	**.63**	**.56**	**.62**	**.55**	**.58**
Physical change								
(C)	.33	.43	.12[a]	.25	.46	.23	.37	.44
(N)	.18	.35	.02[a]	.19	.18	.01[a]	.09*	.13
Psychosocial growth								
(C)	.36	.29	.19*	.23	.17*	.13[a]	.31	.20
(N)	.14	.26	.01[a]	.12*	.02[a]	.05[a]	-.08[a]	.14

Note. Final 24 items in WHOQOL-OLD Group (2005) AAT confirmatory factor structure.

C, Canada (n = 202). N, Norway (n = 490).

Psychosocial loss (Q7, Q10, Q14, Q17, Q21, Q24, Q32, Q34).

Physical change (Q12, Q13, Q16, Q19, Q20, Q22, Q36, Q37).

Psychosocial growth (Q2, Q4, Q8, Q9, Q15, Q25, Q30, Q33).

[a]NS. * $p < .05$. All others $p < .01$.

Table 3b.

Intercorrelations between AAQ subscales and items

Questions	Q7	Q10	Q14	Q17	Q21	Q24	Q32	Q34
AAQ Subscales								
Psychosocial loss								
(C)	.22	.37	.38	.24	.39	.35	.36	.32
(N)	.08[a]	.21	.15	.06[a]	.14*	.11*	.17	.23
Physical change								
(C)	**.42**	**.63**	**.69**	**.56**	**.79**	**.58**	**.73**	**.62**
(N)	**.43**	**.65**	**.60**	**.48**	**.71**	**.60**	**.68**	**.66**
Psychosocial growth								
(C)	.23	.38	.35	.28	.32	.23	.29	.35
(N)	.35	.52	.39	.30	.43	.25	.29	.26

Note. Final 24 items in WHOQOL-OLD Group (2005) AAT confirmatory factor structure.

C, Canada (n = 202). N, Norway (n = 490).

Psychosocial loss (Q7, Q10, Q14, Q17, Q21, Q24, Q32, Q34).

Physical change (Q12, Q13, Q16, Q19, Q20, Q22, Q36, Q37).

Psychosocial growth (Q2, Q4, Q8, Q9, Q15, Q25, Q30, Q33).

[a]NS. * $p < .05$. All others $p < .01$.

Table 3c.

Intercorrelations between AAQ Subscales and Items

Questions	Q7	Q10	Q14	Q17	Q21	Q24	Q32	Q34
AAQ Subscales								
Psychosocial loss								
(C)	.33	.20	.11[a]	.45	.15*	.07[a]	.27	.14[a]
(N)	.13	.11*	-.05[a]	.19	.02[a]	.05[a]	.08 [a]	.10
Physical change								
(C)	.26	.33	.20	.29	.37	.23	.26	.25
(N)	.30	.32	.18	.36	.45	.36	.32	.33
Psychosocial growth								
(C)	**.54**	**.44**	**.64**	**.57**	**.52**	**.68**	**.59**	**.59**
(N)	**.53**	**.56**	**.60**	**.62**	**.57**	**.61**	**.59**	**.61**

Note. Final 24 items in WHOQOL-OLD Group (2005) AAT confirmatory factor structure.

C, Canada (n = 202). N, Norway (n = 490).

Psychosocial loss (Q7, Q10, Q14, Q17, Q21, Q24, Q32, Q34).

Physical change (Q12, Q13, Q16, Q19, Q20, Q22, Q36, Q37).

Psychosocial growth (Q2, Q4, Q8, Q9, Q15, Q25, Q30, Q33).

[a]NS. * $p < .05$. All others $p < .01$.

Table 4.

Correlations among AAQ subscales, health satisfaction, depression, and QOL

Subscales		Health satisfaction	GDS	QOL
Psychosocial loss	(C)	.475***	-.620***	.480***
	(N)	.305***	-.423***	.423***
Physical change	(C)	.617**	-.620***	.561***
	(N)	.533**	-.510***	.470***
Psychosocial growth	(C)	.310**	-.374***	.245***
	(N)	.226**	-.305***	.304***

Note. C, Canada (n = 202). N, Norway (n = 490). GDS, Geriatric Depression Scale.

***p < .001. **p <.01.

Table 5.

AAQ facet mean scores by health status.

Domains		Unhealthy Mean (SD)	Healthy Mean (SD)	95% CI Mean difference	p value[a]
Psychosocial loss	(C)	29.74 (5.55)	36.62 (4.90)	-9.03, -4.72	.000
	(N)	26.89 (5.18)	30.28 (4.78)	-4.55, -2.20	.000
Physical change	(C)	21.18 (4.51)	29.49 (4.90)	-10.10, -6.50	.000
	(N)	21.58 (5.25)	27.55 (5.40)	-7.17, -4.74	.000
Psychosocial growth	(C)	27.77 (3.79)	29.26 (4.29)	-3.00, .041	.056
	(N)	26.94 (4.70)	28.91 (4.70)	-3.11-.823	.001

Note. CI, confidence interval. C, Canada. N, Norway.

[a]Student's t-test.

Canada (N = 202); healthy (n = 171); unhealthy (n = 31).

Norway (N = 490); healthy (n = 399); unhealthy (n = 91).

Table 6.

AAQ facet and overall item mean scores for those with and without morbidities.

Facets		Without morbidity Mean (SD)	With morbidity Mean (SD)	95% CI Mean difference	p value[a]
Psychosocial loss	(C)	37.57 (4.87)	34.75 (5.65)	1.148, 4.484	.001
	(N)	30.54 (4.87)	28.70 (5.01)	.9611, 2.716	.000
Physical change	(C)	30.51 (4.08)	27.29 (5.99)	1.769, 4.663	.000
	(N)	28.15 (5.81)	24.64 (5.35)	2.519, 4.505	.000
Psychosocial growth	(C)	29.20 (4.32)	28.96 (4.23)	-1.069, 1.540	.722
	(N)	28.65 (4.79)	28.44 (4.80)	-.6440, 1.060	.631

Note. CI, confidence interval. C, Canada. N, Norway.

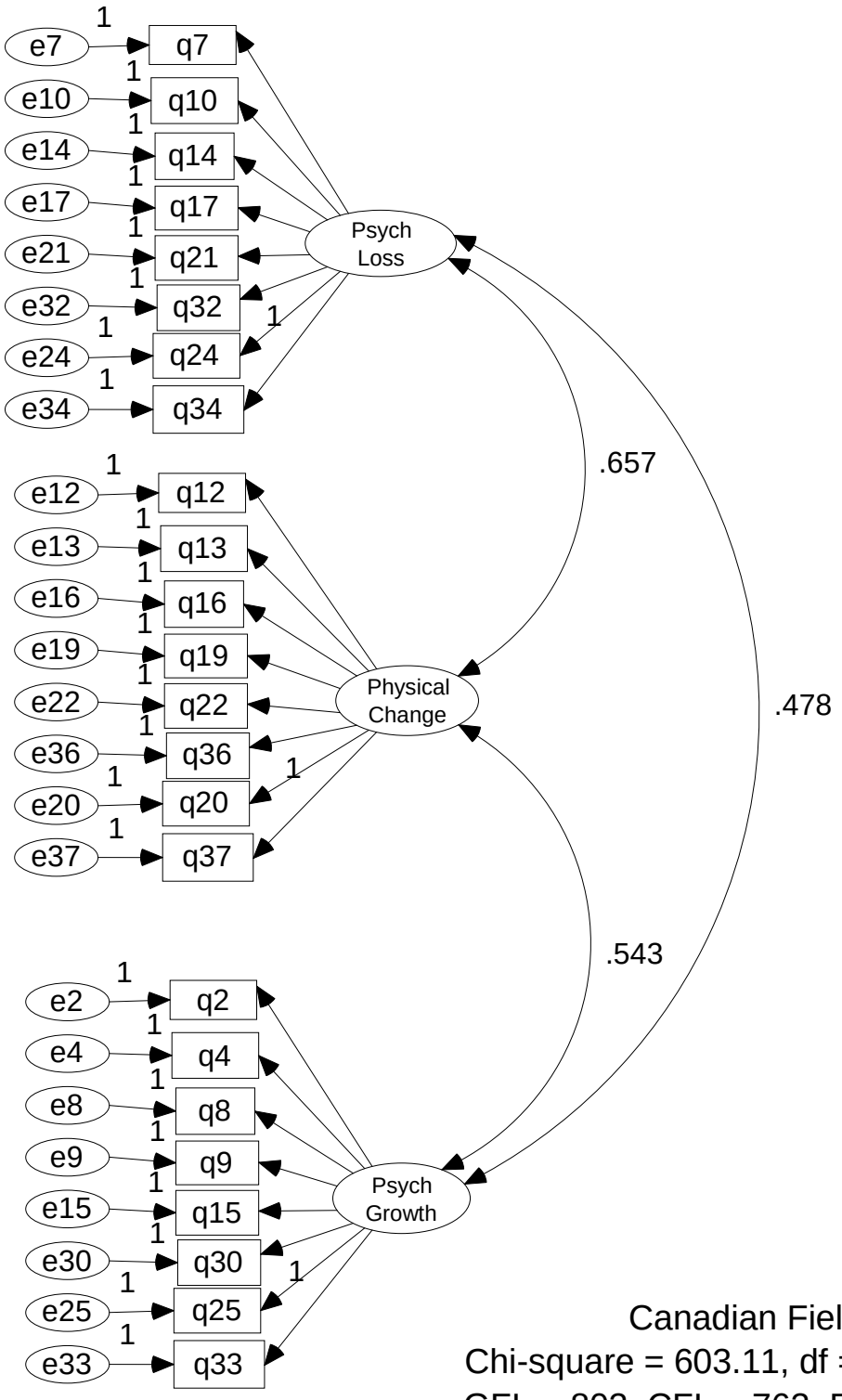
[a]Student's t-test.

Canada (N = 202); without comorbidity (n = 58); with comorbidity (n = 144).

Norway (N = 490); without comorbidity (n = 250); with comorbidity (n = 240).

Figure 1.

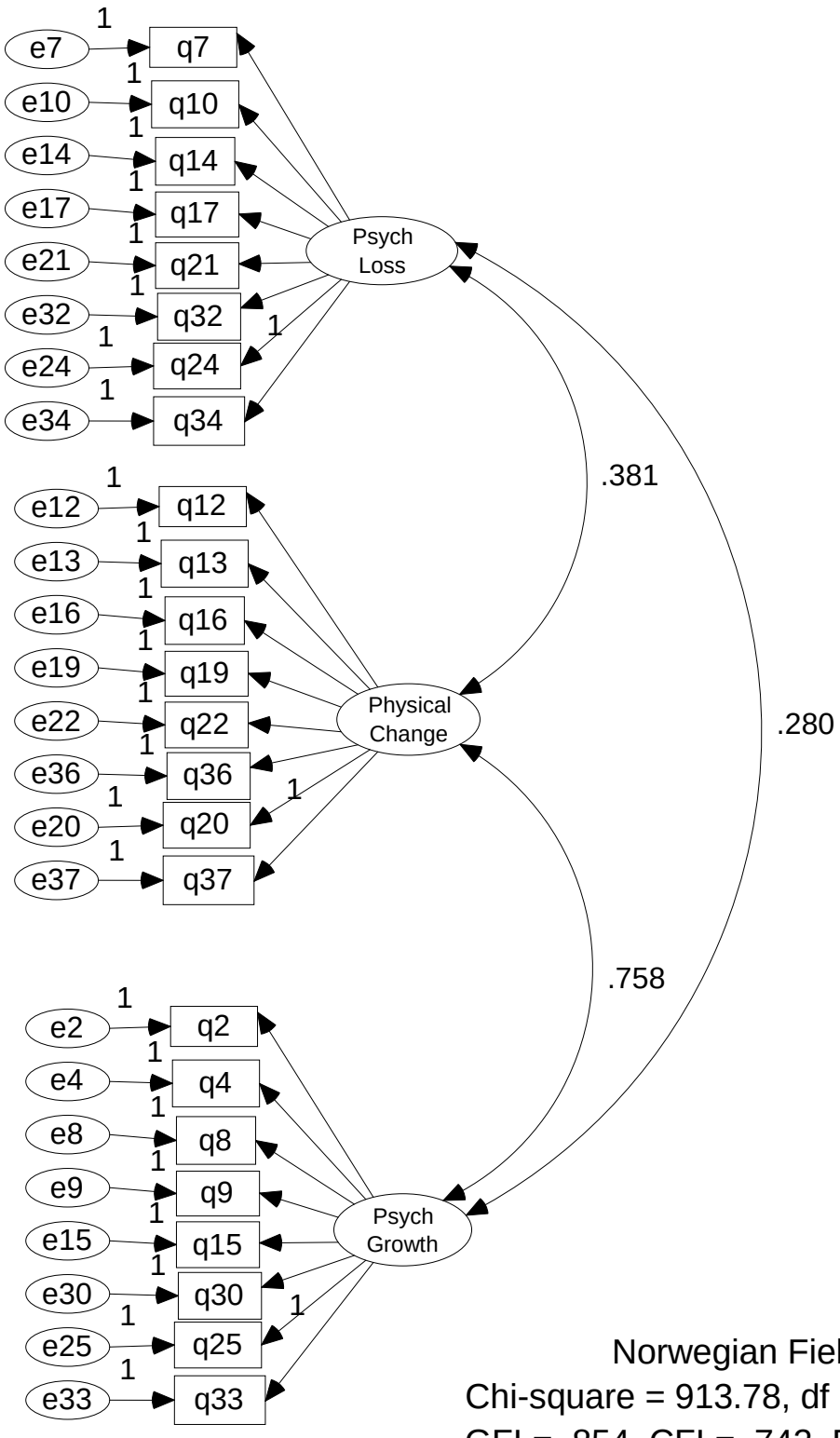
Confirmatory Factor Analysis with Canadian Field Trial Data



Canadian Field Trial (n=202)
Chi-square = 603.11, df = 249, p =.000
GFI = .803, CFI = .763, RMSEA = .084

Figure 2

Confirmatory Factor Analysis with Norwegian Field Trial Data



Norwegian Field Trial (n=490)
Chi-square = 913.78, df = 249, p = .000
GFI = .854, CFI = .742, RMSEA = .072