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Attitudes to ageing: A systematic review of attitudes to ageing and mental health, and a cross-sectional analysis of attitudes to ageing and quality of life in older adults

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Doctorate in Clinical Psychology

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2013

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Acknowledgements

Thank you to Professor Mick Power and Kenneth Laidlaw PhD for your expertise advice and guidance throughout my thesis journey. I really valued your enthusiasm and interest in my thesis topic. A huge thank you also to Nuno Ferreira PhD for your supervision and enthusiastic input towards the end result of my research project.

Thank you to Dr Angus Lorimer for your consistent support and guidance throughout my final year of training, and for reading and providing feedback on numerous drafts of my thesis. This was greatly appreciated.

A huge thank you to all my friends and family for providing all the fun times over the last three years. Hugs to Susan Walker for the numerous statistics "tutorials."

Finally, a special thank you to my mum, dad and big brother Stewart.

"From small beginnings come great things"

~Proverb~

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Thesis abstract

This thesis portfolio examines attitudes to ageing in older adults, and explores the impact that attitudes to ageing have on mental health status and quality of life. Attitudes to ageing are becoming more widely measured in older adults, particularly with the ageing population but also due the recent development of the Attitudes to Ageing Questionnaire. There is growing evidence to suggest a relationship between attitudes to ageing and mental health status in older adults. However, no study has explored the association between attitudes to ageing and quality of life in older adults, incorporating the Attitudes to Ageing Questionnaire and the World Health Organisation Quality of Life measures. Firstly a systematic search of studies exploring the relationship between attitudes to ageing and mental health in older adults (≥55 years) was undertaken. All potentially relevant studies were screened against inclusion and exclusion criteria. Variables related to attitudes to ageing, ageism, age stereotypes, depression and anxiety were considered in this review. Twelve papers met inclusion criteria for the systematic review. The setting, culture and measures incorporated varied across the studies. A negative attitude to ageing was associated with poorer mental health status in older adults across all 12 studies. The second part of this portfolio was an international cross-sectional analysis of attitudes to ageing and quality of life in older adults (≥57 years). Correlation and regression analyses explored the relationship between attitudes to ageing and QOL and investigated the impact of socio-demographic variables, depression and attitudes to ageing on two quality of life measures. The two constructs were positively related; a more positive attitude to ageing was associated with a better quality of life. Further, positive attitudes to ageing was a significant predictor of a better QOL. The sample was then divided into two age groups (57-79 years and 80+ years) and attitudes to ageing and quality of life ratings were compared. Results revealed more negative ratings in attitudes to ageing and quality of life in the over 80 year old age group. Correlation and regression analyses were then explored across both age groups. More positive attitudes to ageing was a significant predictor of better quality of life across both age groups. Overall, the two studies in this thesis portfolio highlight the need to better recognise and target older adults' negative attitudes to ageing. Appropriate psychological interventions could be provided to challenge negative attitudes and promote attitude change in an attempt to improve mental health difficulties and quality of life in older adults. Continued use of the Attitudes to Ageing Questionnaire and quality of life psychometric measures in clinical practice and research is encouraged.

CHAPTER 1: Overview

Thesis overview

This thesis portfolio begins with a systematic review (Chapter 2). The review aims were to identify research which looks at the relationship between attitudes to ageing and mental health status; specifically depression and/or anxiety in older adults (≥55 years). This review was presented in the format of the journal Clinical Psychology Review.

Chapter 3 presents an international cross-sectional analysis looking at the relationship between attitudes to ageing and quality of life in older adults (≥57 years). This article is presented in the format required by the journal Health and Quality of Life Outcomes.

Author guidelines for Clinical Psychology Review and Health and Quality of Life Outcomes are given in appendices F and G.

CHAPTER 2: Systematic review

The relationship between attitudes to ageing and mental health in older adults: A systematic review

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Word count: 5311

Abstract

Negative age stereotypes are prevalent among society and as one grows older these stereotypes can become internalised, resulting in negative attitudes towards ageing. Mental health difficulties are common in older adults, and in conjunction with negative attitudes to ageing, depression and anxiety can be seen as an inevitable part of ageing. A systematic search of studies exploring the relationship between attitudes to ageing and mental health in older adults was undertaken. All potentially relevant studies were screened against inclusion and exclusion criteria. Twelve studies met criteria for inclusion. These studies were cross-sectional, opportunistic samples and reported on the relationship between attitudes to ageing and mental health in older adults (≥55 years). Setting, culture and the measures incorporated varied across the 12 studies. Significant associations were found between the two constructs; a positive attitude to ageing was associated with better mental health status. Given the heterogeneous nature of studies this review provides preliminary evidence, prompting further investigation. Clinical and research implications are identified including the concurrent assessment of attitudes to ageing alongside mental health difficulties and targeting attitudes within a psychological framework. Further investigation of the psychometric properties of the attitudes to ageing questionnaire and longitudinal research is recommended.

Key words: attitudes to ageing, age stereotype, depression, anxiety, older adult.

Abstract word count: 199

Introduction

The older adult population is rapidly growing. Globally this population group is projected to increase from 810 million in 2012 to 2 billion in 2050. The fastest growing age group is those aged over 80 years; the 'oldest-old,' with numbers expected to increase almost eight-fold by 2100 (United Nations, 2012). These demographic changes present many challenges, one being the increased demand on health and clinical services (Laidlaw, 2010).

Old age is associated with significant losses in social, cognitive and physical domains (Urry & Gross, 2010) and older people are often perceived as weak, decrepit and a burden; leading to negative perceptions of ageing (Levy, 2003). Negative age stereotypes are prevalent world-wide, particularly in western societies, and are fed by the media (Martins, Williams & O'Neill, 2009), culture and individual experiences (Levy, 2003).

Levy (2003) proposed that negative age stereotypes are formed in early life, either implicitly or explicitly, are reinforced through adulthood and become internalised as one reaches old age; resulting in self-stereotypes. Ageing self-stereotypes give rise to negative expectations and attitudes towards being old and can have a significant impact on behaviours and physical and emotional health. Levy, Slade, Kunkel and Kasl (2002) revealed in a longitudinal study that those with positive age self-stereotypes reported better functional health 18 years later than those with negative age self-stereotypes, after controlling for various baseline measures. Similarly, Moser, Spagnoli and Santos-Eggimann (2011) found a strong association between negative perceptions of ageing and the emergence of difficulties in activities of daily living at 3 year follow up. Those with positive self-perceptions of ageing are also likely to live longer (Levy, Slade & Kasl, 2002) and engage in preventive health behaviours including exercising and eating a balanced diet (Levy & Myers, 2004; Quinn, Laidlaw & Murray, 2009). Loss in old age, physical or mental, is often explained or understood in biological terms, however, the above findings strongly suggest that psychological factors, such as ageing self-stereotypes, could be accountable for debilitation in old age (Levy, 2003).

Ageing is a process rather than a state and the experience of ageing is heterogeneous (Shenkin et al, 2012). Furthermore, with the increase in longevity the older adult population group is becoming even more diverse and varied (Laidlaw & Pachana, 2009). It is therefore crucial for society to develop a greater understanding of the ageing process in order to refute existing age

stereotypes which categorise and homogenise older adults. Until recently, measures of older adults' attitudes and perceptions of ageing in research and clinical practice were limited. Previous research tended to focus on attitudes across the whole age group or younger people's attitudes towards growing old (Abrams, Eilola & Swift, 2009; Yun & Lachman, (2006). Laidlaw, Power and Schmidt (2007) states it should be the older adult population group which are targeted when trying to obtain a richer understanding of the ageing process.

A 5-item subscale on 'attitudes towards own aging' within the Philadelphia Geriatric Center Morale Scale (PGCMS) (Lawton, 1975) is perhaps the most widely known measure of attitudes to ageing. This subscale, however, does not produce a comprehensive measure and is somewhat dated. Laidlaw et al (2007) developed an 'Attitudes to Ageing' questionnaire (AAQ) which assesses an individual's experience of growing old. The AAQ captures older adults' attitudes to ageing by focusing on three domains: *Psychological Growth; Psychosocial Loss*; and *Physical Change*. This questionnaire demonstrates strong reliability and validity and can be applied cross-culturally (Laidlaw et al, 2007). Older adults' attitudes to ageing are thus becoming more widely measured and employed in a growing body of research; in particular research looking at the link between attitudes to ageing and mental health.

Depression is a leading cause of emotional suffering and the most prevalent mental health condition in later life (Blazer, 2003). Mental health difficulties in older adults, particularly depression, are often tied up with themes of loss and therefore in conjunction with negative age stereotypes depression can be viewed as a normal part of the ageing process. These views can even be held by families and health professionals working with older adults (Burroughs et al, 2006; Law, Laidlaw & Peck, 2010). Blanchard (1992) described this as the "understandability phenomenon" (p.253). Law et al (2010) assessed the existence of this phenomenon in a small sample of both depressed and non-depressed older adults. The belief that depression is inevitable and a normal part of ageing was displayed across both groups of participants and was greater in the oldest-old (over 76 years) age group. Those who endorsed the phenomenon also displayed more negative attitudes to ageing and higher levels of internalised ageism.

Quinn et al (2009) explored this further looking at attitudes towards mental illness in the context of ageing and found that a negative attitude to mental illness was associated with

negative attitudes to ageing. As a result, older adults themselves may fail to seek treatment due to the stigma and lack of understanding of mental illness and their negative attitudes to ageing (Law et al, 2010). Or indeed, older adults are less likely to be offered the appropriate health services due to under recognition and the belief that mental health difficulties are just part of growing old.

Although depression and anxiety are major causes of emotional suffering in later life (Blazer, 2003), rates of depression are lower in older adults than those of working age (Blazer & Hybels, 2005). It is acknowledged that the prevalence of sub-clinical depression in older adults is more than double that of major depression (Blazer, 2003). Nevertheless, research has also shown that there are higher levels of resilience and emotion regulation among this age group (Urry & Gross, 2010) and older adults generally hold positive attitudes to ageing (Bryant et al, 2012; Laidlaw et al, 2007; Quinn et al, 2009). It is crucial to address the incongruity between society's assumptions and older adults' actual experiences.

Chachamovich, Fleck, Laidlaw and Power (2008) explored the impact of varying levels of depression on attitudes to ageing, using the AAQ, in a large international sample of older adults. Results revealed that with increasing levels of depression there was a progressive increase in negative attitudes to ageing; even minor levels of depression were associated with a pattern of negative attitudes. This study also investigated the link between depression and quality of life in older adults and found that an increase in depression levels resulted in a poorer quality of life. Given the large sample size and strong external validity of this study, these findings demonstrate the close interplay between ageing attitudes and depression. Bryant et al (2012) replicated these findings in a smaller sample of community-dwelling older adults, reporting that attitudes to ageing accounted for most of the variation in depression levels followed by demographics and physical health. In addition they revealed more positive attitudes to ageing were associated with lower levels of anxiety and better self-reported physical health; thus confirming the link not only between attitudes to ageing and depression, but to overall emotional and physical health.

The discovery that attitudes to ageing in older adults are associated with mental health status suggests that these attitudes are mood-state dependent (Chachamovich et al, 2008). Thus, the onset of depression in late life may trigger the development of negative attitudes to ageing or vice versa, demonstrating that attitudes are not global or rigid but can be manipulated

(Shenkin et al, 2012). Targeting ageing attitudes of individuals who access mental health services, in a therapeutic context, could be a means to improving and treating mental health difficulties.

Review aims

Given the increased interest in attitudes to ageing and its link to mental health status, the aim of this study is to review the research which looks at the relationship between attitudes to ageing and depression and/or anxiety in older adults. The two main aims are:

- To investigate the relationship between attitudes to ageing and depression.
- To investigate the relationship between attitudes to ageing and anxiety.

The author has no awareness of a systematic review undertaken in this area.

Method

This review was part written in accordance with Centre for Reviews and Dissemination.

Inclusion and exclusion criteria

Population

Studies which included participants aged 55 years and over (considered 'older adults').

Measures

Given the AAQ is a relatively new measure, this review included studies which gathered quantitative data on the following constructs: attitudes to ageing, ageism, age stereotypes or perceptions. Studies were restricted to those which incorporated well established and standardised measures of depression and anxiety. In studies which measured multiple outcomes (e.g. physical health, quality of life, cognitive functioning) only the outcome measures related to attitudes to ageing, age stereotypes or perceptions of ageing, and depression and anxiety were included in this review.

Study design

Studies which determined the relationship between attitudes to ageing and depression and/or anxiety were included. This may not be the main focus of the research, however if studies reported on the relationship between the two constructs they were included within this review. Discussion, narrative reviews or studies with no data collection and systematic reviews or meta-analysis were excluded from this review. Thus, studies which did not psychometrically measure the core constructs under investigation were excluded.

Literature search process

The overall search process was conducted between September and December 2012.

Electronic database

Database searches included CINAHL plus with full text, MEDLINE with full text (1940-2012), PsycINFO (1940-2012), Psychological and Behavioral Sciences Collection (1940-2012), eBOOK collection (1940-2012) using the key words **depress* OR anxiety AND**

(attitude* AND ageing OR aging) OR ageism OR age stereotyp*. This search yielded 1250 studies. The titles and abstracts were screened for suitability according to the inclusion and exclusion criteria, resulting in 45 studies to be accessed in full. Full access to three of these studies was not available (see Appendix A).

Additional searches

Psychology and Aging (2006-2012) was hand searched and all titles and abstracts were screened for relevance to reveal a further five potential studies, which were accessed in full. The Gerontologist (2006-2012) was electronically searched using the same process and a further two studies were deemed potentially relevant and accessed in full. None of the seven studies met inclusion criteria (see Appendix A). In order to reduce any effects of publication bias the authors of the included studies were contacted to increase access to unpublished studies which might meet inclusion criteria for this review. Twelve authors were approached of whom seven responded. Eleven studies were suggested and four met criteria for inclusion in the review. The remaining seven studies were excluded and are reported in Appendix A. The overall search process (see Table 1) was completed by a manual search of each reference list of included papers. The remaining **12** studies form the basis of this review. The flow of the search process is detailed in Fig. 1.

Quality criteria

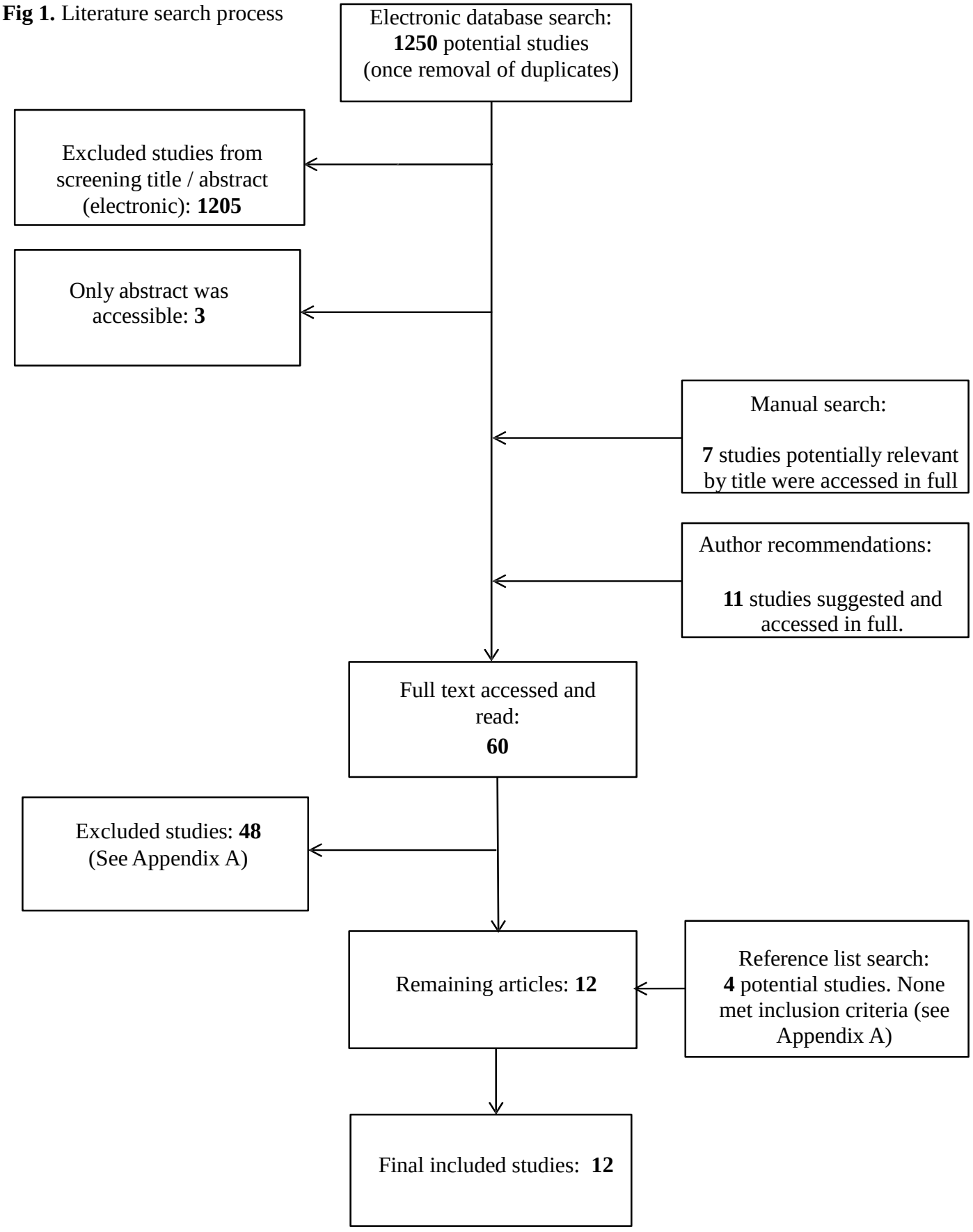
Five quality criteria were assessed: research question; study design; measurement issues; data and statistical analysis; and external validity (see Appendix B). These were rated in accordance with the following six outcome ratings: 'well covered/addressed' (2); 'adequately covered/addressed' (1); 'poorly addressed;' 'not addressed;' 'not reported;' (0) and 'not applicable' (N/A), based on the Scottish Intercollegiate Guidance Network methodology checklist (SIGN 50, Annex C). The criteria and related rating was developed by the author in accordance with SIGN 50 and was largely informed by STROBE guidelines for reporting observational epidemiological studies (www.strobe-statement.org) (see Appendix C).

Table 1. Summary of literature sources and resultant review articles.

Source of articles	Number of studies potentially relevant for initial screening	Number of articles read/accessed in full	No. of included studies	Review study number[a]
Electronic database search CINAHL, MEDLINE, PsycINFO, Psychological and Behavioral Sciences Collection (1940-2012)	1250	42	8	1, 2, 3, 5, 6, 7, 9, 12.
Manual journal search				
Psychology and Aging (2006-2012)	558	5	0	
The Gerontologist (2006-2012)	596	2	0	
Author recommendations	11	11	4	4, 8, 10, 11.
Scanning of reference lists of included searches		4	0	
Total		64	12	1-12

[a]Review study number as follows: 1. Bryant et al (2012), 2. Chachamovich et al (2008), 3. Jang et al (2006), 4. Kalfoss et al (2010), 5. Kleigel and Zimprich (2005), 6. Lai (2004), 7. Lai (2005), 8. Lai and Tong (2012), 9. Lu et al (20120), 10. Lucas-Carrasco et al (2013), 11, Shenkin et al (2012), 12. Sindi et al (2012).

Fig 1. Literature search process



Results

The 12 articles identified for this review were all cross-sectional studies. In five of the studies, the main or secondary aim was to investigate the relationship between attitudes to ageing and mental health in older adults. Of these five studies, three looked at attitudes to ageing and depression (Chachamovich et al, 2008; Lu, Kao and Hsieh, 2010; Sindi et al, 2012) and two explored attitudes to ageing and both depression and anxiety (Bryant et al, 2012; Shenkin et al, 2012). Three further studies looked at correlates or predictors of depressive symptoms, within which attitudes to ageing was a predictor (Jang, Bergman, Schonfeld & Molinari, 2006; Lai, 2004, 2005). The remaining four studies (Kalfoss, Low & Molzahn, 2010; Kliegel & Zimprich, 2005; Lai & Tong, 2012; Lucas-Carrasco, Laidlaw, Gomez-Benito & Power, 2013) addressed different research questions e.g. the effects of social exclusion on attitudes to ageing, or predictors of cognitive complaints in older adults, but within the statistical analysis section of the article the relationship between attitudes to ageing and mental health status was reported. Details on study characteristics and findings relevant to the current review are given in Table 2.

Quality of included studies

Table 3 reports the ratings on each of the 12 quality criteria. Given the heterogeneous nature of the 12 studies, the quality ratings give a guide to the methodological strength of the studies but do not allow a comparative measure. The results suggest that Bryant et al (2012) study provides the strongest methodological criteria, but overall all studies report relatively high quality criteria. Kliegel and Zimprich (2005) scored the poorest in terms of methodological quality. Fifty per cent of studies were rated by a second independent rater; producing exact agreement on 83% of the ratings. On four of the quality ratings (6%) there was a difference of two points (well-covered/addressed vs. poorly covered/not addressed) and in eight of the quality ratings (11%) there was a one point difference. Interestingly the study that revealed the most variation in ratings was Kliegel and Zimprich which reflected the poorest quality rating, where five out of 12 ratings were conflicting. All criteria with different ratings were reviewed and amended.

Table 2. Study characteristics and relevant findings

Author (year) *Country*	Participant characteristics *Age (% female)*	Study design Sample size	Attitudes to ageing, age stereotype, perceptions of ageing measures	Depression/ Anxiety measures	Findings relevant to current review
Bryant et al (2012) *Australia*	Community-dwelling older adults *60+ years (61.5)*	Cross-sectional postal survey n = 421	AAQ	CES-D GAI SF-12 mental	Positive scores on all three domains of the AAQ were significantly associated with better outcomes on SF-12 mental ($p<.01$ for *Psychosocial Loss* and *Physical Change*; $p<.05$ for *Psychological Growth*). Positive *Psychosocial Loss* and *Psychological Growth* were significantly associated with lower levels of depression ($p<.01$ and $p<.05$ respectively). Positive *Psychosocial Loss* was associated with lower levels of anxiety ($p<.01$). Attitudes to ageing accounted for an additional 15%, 16% and 18% of the variance in depression, anxiety and SF-12 respectively, beyond that accounted for by demographics and physical health.
Chachamovich et al (2008) *International*	Older adults *60+ years (approx. 59)*	Cross-sectional n = 4316	AAQ	GDS-15	Scores for attitudes to ageing were significantly lower in the clinically depressed group than the sub-clinical group ($p<.001$) when controlling for demographics. Hierarchical multiple regression analysis revealed that depression accounts for most of the variance (36.7%) in attitudes to ageing in comparison to age, gender, marital status and educational level. Hierarchical multiple regression analysis looking at the sample of

					subclinical depressed individuals revealed the same pattern (20.4%).
Jang et al (2006) *USA*	Older adults living in ALFs *60+ years (77)*	Cross-sectional survey n = 150	PGCMS	GDS-15	Significant negative correlation between attitudes to ageing and depressive symptoms (r = -.47, p<.001). More positive attitudes to ageing were associated with less depressive symptoms.
Kalfoss et al (2010) *Canada and Norway*	Older adults *60+years* *(54: Canada)* *58: Norway)*[a]	Cross-sectional n = 202 (Canada) n = 490 (Norway)	AAQ	GDS-15	Significant negative correlations between GDS scores on all three AAQ domains in both countries, ranging from r =-.305 to -.620, all p<.001. More positive attitudes to ageing were significantly associated with lower levels of depression.
Kliegel & Zimprich (2005) *Switzerland*	'Young' older adults *59-65 years (48)*	Cross-sectional (data forms part of a longitudinal study) n = 607	Negative age stereotypes (6 items from ILSE self-assessment questionnaire)	SDS	Relatively high correlations between age stereotypes and depressive symptoms (r =.371, p<.05) indicating more negative age stereotypes were related to more depressive symptoms.
Lai (2004) *Canada*	Chinese Immigrants *55+ years (53.8)*	Cross-sectional n = 444	6-item 'attitude to ageing' measure (developed by researchers)	GDS-15	Less positive attitude towards ageing were associated with more depressive symptoms (rs=-.30, p<.001). Stepwise multiple regression analysis revealed attitudes to ageing explained 6% of the variance in GDS scores, the second highest predictor after chronic illness.
Lai (2005) *Canada*	Taiwanese Immigrants *55+ years (43)*	Cross-sectional n = 98	6-item 'attitude to ageing' measure (developed by researchers)	GDS-15	Less positive attitudes towards ageing were associated with more depressive symptoms (rs=-.42, p<.001). Stepwise multiple

					regression analysis revealed attitudes to ageing explained 19.5% of the variance in GDS scores (the largest predictor).
Lai & Tong (2012) *China*	Shanghai residents who live alone *60+ years (73)*	Cross-sectional n = 228	6-item 'attitudes towards ageing' measure (developed by the researchers)	GDS-15	More depressive symptoms were significantly associated with less positive attitudes to ageing (β=-.242, p<.01). Depression revealed the strongest influence on attitudes to ageing, compared to demographics, social exclusion and physical health.
Lu et al (2009) *Taiwan, China*	Community-residing older adults *60+ years (47)*	Cross-sectional n = 316	OPS	CES-D	Attitudes to ageing significantly correlated with depression (r=-.40, p<.001). Hierarchical regression analyses revealed attitudes to ageing were significantly negatively related to depression (R^2=.04, p<.05).
Lucas-Carrasco et al (2013) *Spain*	Older adults *60+ years (60)*	Cross-sectional n = 242	AAQ	GDS-30	Moderate correlations between *Physical Change* and *Psychosocial Loss* AAQ domains and overall GDS scores (r=-.347, p<.001; r = .448, p<.001 respectively). Participants with lower depressive scores (GDS-30 ≥ 11) scored significantly higher on *Physical Change* domains (t = 4.732, p<.001) and significantly lower on the *Psychosocial Loss* domain (t = -5.583, p<.001) than those with higher depressive symptoms. No significant correlation was found between *Psychological Growth* and GDS.
Shenkin et al (2012) *Scotland, Lothian*	Community-dwelling older adults *Approx. 75 years (51)*	Data form part of a longitudinal study n = 792	AAQ	HADS	Higher scores on *Psychosocial Loss* were associated with higher depressive (r=.478, p<.001) and

						anxiety scores (r=.292, p<.01). Higher scores on the *Physical Change* domain were associated with lower depression and anxiety scores (r=-.337, p<.001) and r = .169, p<.001) respectively. Higher scores on *Psychological Growth* were also associated with lower levels of depression (r=-.211, p<.001) but no significant relationship with anxiety. Multiple regression analysis revealed depression and anxiety predicted *Psychosocial Loss* (p<.01) but not he *Psychological Growth* or *Physical Change*. Personality variables and affect (depression/anxiety) together were the most substantial predictors of attitudes to ageing.
Sindi et al (2012) *Canada*	Older adults *58-85 years (45)*	Data forms part of a longitudinal study n = 40	Ageing perceptions questionnaire (developed by researchers). Two sections; general perceptions of ageing and self-perceptions of ageing.	GDS-30	Increased total negative self-perception of ageing significantly predicted increased depressive symptoms (r^2=.447, p<.001). Total general perceptions of ageing was removed due to lack of explanatory weight in the model. Total self-perceptions of ageing explained almost 50% of the variance for geriatric depression.

AAQ: Attitudes to Ageing Questionnaire, ALF: Assisted Living Facilities, CES-D: Center for Epidemiologic Studies Depression Scale, GAI: Geriatric Anxiety Inventory, GDS-15: 15-item Geriatric Depression Scale, GDS-30: 30 item Geriatric Depression Scale; HADS: Hospital Anxiety and Depression Scale, ILSE: Interdisciplinary Study on Adult Development; OPS: Older People's Scale, PGCMS: Philadelphia Geriatric Center Morale Scale, SF-12: Medical Outcomes Study 12-item Short Form, SDS: 20-item Self-rating Depression Scale. [a]Missing data on gender for Norway.

Table 3. Ratings of study quality for included studies

Quality Criteria	1. Research question	2. Setting/ location & dates	3. Criterion sampling & selection	4. Measure: Attitudes to ageing	5. Measure: Depression/ Anxiety	6. No. of individuals at each stage	7. Characteristics of study participants	8. Missing data	9. Confound-ing factors	10. Statistical analyses	11. Generalis-ability	12. Biases/ limitations	**Total Rating**
Study													
Bryant et al (2012)	2	2	2	2	2	2	2	2	2	2	1	2	23/24
Chacha movich et al (2008)	2	2	1	2	2	2	2	0	2	2	2	2	21/24
Jang et al (2006)	2	2	2	2	2	2	2	1	1	2	1	2	21/24
Kalfoss et al (2010)	2	2	2	2	2	2	2	2	N/A	1	1	2	20/22
Kliegel & Zimprich (2005)	2	1	0	1	2	2	2	N/A[a]	2	2	0	2	16/22
Lai (2004)	2	2	2	1	2	2	2	N/A[a]	1	2	1	0	17/22
Lai (2005)	2	2	2	1	2	2	2	N/A[a]	1	2	1	2	19/22

Lai & Tong (2012)	2	2	2	1	2	2	2	N/A[a]	2	2	1	1	19/22
Lu et al (2010)	2	2	2	2	2	2	2	N/A[a]	2	2	1	1	20/22
Lucas-Carrasco et al (2013)	2	2	2	2	2	2	2	1	N/A	2	1	2	20/22
Shenkin et al (2012)	2	2	2	2	2	2	1	1	2	2	1	2	21/24
Sindi et al (2012)	2	2	2	1	2	2	2	0	2	2	1	2	20/24

[a] Oral interviews were carried out therefore no opportunity for missing data.

Sampling and methodology

The majority of the studies looked at community-dwelling older adults (both male and female) who were randomly selected using electoral/telephone registers, or recruited opportunistically. Four studies, however, looked at specific population groups including: older adults residing in assisted living facilities (Jang et al, 2006); older adults who live alone (Lai & Tong, 2012); or Chinese immigrants in Canada (Lai, 2004, 2005). The 12 studies were carried out across different countries. Chachamovich et al (2008) recruited an international sample across 20 countries, whereas the remaining 11 studies were carried out across one or two countries.

Measures

Attitudes to ageing, age stereotypes or perceptions of ageing in older adults were measured using various instruments across the 12 studies. Five studies (Bryant et al, 2012; Chachamovich et al, 2008; Kalfoss et al, 2010; Lucas-Carrasco et al, 2013; Shenkin et al, 2012) incorporated the AAQ which, as described earlier, demonstrates good psychometric properties (Laidlaw et al, 2007). Jang et al (2006) used the 5-item 'attitudes towards own aging' subscale of the PGCMS. Lu et al (2009) incorporated the OPS which is a standardised scale developed specifically for the Chinese population. The authors note that the OPS is more of a measure of attitudes *towards* older people which can be implemented across the whole age group, however, they suggest that older adults will draw information from their own experience of ageing and thus reflects a measure of their own attitudes towards ageing (Lu et al, 2009). Three studies (Lai, 2004, 2005; Lai & Tong, 2012) used the 'attitudes towards ageing' measure, a 6-item questionnaire developed Lai and colleagues, which is designed to relate to the Chinese cultural context and values of how Chinese older people view themselves. Limited information on the psychometric properties of this measure across each study is reported. Lai (2004), (2005) and Lai and Tong (2012) only provided Cronbach's α values which were .55, .54 and .67 respectively. The final two studies measured variations on attitudes to ageing: Kliegel and Zimprich (2005) measured 'negative age stereotypes' and Sindi et al (2012) looked at 'age perceptions' which similarly provided limited information on psychometric properties, reporting only Cronbach's α values (.71 and .76 respectively).

Depression and anxiety was also assessed using different measures across the 12 studies.

Although not all studies reported on the psychometric properties, all measures used were reliable and valid; this was part of the inclusion criteria. The GDS was the most commonly used measure incorporated in eight studies (Chachamovich et al, 2008; Jang et al, 2006; Kalfoss et al, 2010; Lai, 2004, 2005; Lai & Tong, 2012; Lucas-Carrasco et al, 2013; Sindi et al, 2012) and is a questionnaire designed specifically to measure depression in older adults (Yesavage et al, 1986).

Key findings relevant to review

All 12 studies reported significant relationships between attitudes to ageing, age stereotypes or self-perceptions of ageing, and depression and anxiety. Multiple regression analyses were carried out in eight studies (Bryant et al, 2012; Chachamovich et al, 2008; Lai, 2004, 2005; Lai & Tong, 2012; Lu et al, 2009; Shenkin et al, 2012; Sindi et al, 2012), five of which attitudes to ageing was the predictor variable with depression and anxiety as the outcome variables. Attitudes to ageing was either the strongest predictor of depression or anxiety (Bryant et al, 2012; Lai, 2005; Sindi et al, 2012) or the second highest predictor after community participation (Lu et al, 2009) and chronic illness (Lai, 2004). Chachamovich et al (2008) and Lai and Tong (2012) incorporated depression, and Shenkin et al (2012) both depression and anxiety, as predictor variables and attitudes to ageing as an outcome measure. In all three studies increased depression and anxiety scores were the highest predictor of negative attitudes to ageing. It is worth noting that Shenkin et al combined depression and anxiety with personality variables.

Bryant et al (2012), Kalfoss et al (2010), Lucas-Carrasco et al (2013) and Shenkin et al (2012) carried out more detailed analysis looking at the relationship between the three individual domains of the AAQ and depression and anxiety. *Psychosocial Loss* was the only domain demonstrating significant relationships with depression and anxiety across all three studies; mixed results were found for the relationship between *Psychological Growth* and *Physical Change*, and depression and anxiety (see Table 2).

Discussion

The relationship between attitudes to ageing and mental health status in older adults is evident. A more negative attitude to ageing is associated with increased depression or anxiety levels. Despite the variability between population group, culture, setting and measures used, the relationship between the two constructs appears robust.

When considering the individual domains of the AAQ and the link to depression and anxiety, Lucas-Carrasco et al (2013) attributed the non-significant relationship between the *Psychological Growth* domain and GDS to the heterogeneous nature of the sample, which included caregivers as well as non-caregivers. The authors note that their findings are difficult to explain given Laidlaw et al (2007) larger international study reported good psychometric properties on all three domains. These inconsistent findings with regards to the individual domains of the AAQ suggest the need for continued research into the psychometric properties of the AAQ across different samples.

This review highlighted, however, that there are few studies where the main aim is to investigate the relationship between attitudes to ageing and mental health status in older adults. In addition there were only two studies retrieved which incorporated anxiety as an outcome measure. Reviewing the research investigating the specific relationship between attitudes to ageing and anxiety was limited due to a paucity of studies currently. Nevertheless the results of the two studies reveal promising preliminary findings which will prompt further exploration.

Strengths of the review

This review sought unpublished studies by contacting authors of the key papers thereby reducing the potential for publication bias. Additionally, subjective bias of quality analysis was minimised by employing a second independent person who rated 50% of the studies.

Limitations of review

There are methodological limitations to the studies included in this review. The convenience sampling and self-selected methods used in most of the studies does not ensure

generalisability to the general population of older adults due to potential characteristic differences in respondents and non-respondents. Additionally, the cross-sectional nature of all the studies limits the results to a single time point preventing consideration of causality, i.e. negative attitudes to ageing cause mental health difficulties or vice versa. Longitudinal studies are required to address this question.

The various measures used for both attitudes to ageing and mental health increased the heterogeneity of this review which meant it was difficult to synthesize and directly compare the 12 studies. As the AAQ continues to develop world-wide recognition and become validated across various cultures, further studies looking explicitly at this relationship using the AAQ will emerge over time allowing for a more integrated, cohesive review. Finally, this review was restricted to studies written in English, and the inevitable limitations of the search strategy may have restricted the number of relevant articles for inclusion.

Implications for research and clinical practice

The results of this review highlight several implications for research and clinical practice. As described earlier, attitudes towards ageing are generally positive in the older adult population group (Bryant et al, 2012; Laidlaw et al 2007; Quinn et al, 2009) and more contemporary views on ageing are beginning to emerge. For example, older adults contributing to society in terms of informal work and voluntary activities, or caring for younger family members (WHO, 2002). Although these modern visions of old age challenge current negative age stereotypes, they still exist in society. Laidlaw and Pachana (2009) acknowledge the importance of correcting these negative assumptions surrounding old age, which can be achieved through continued research into older adults' attitudes to ageing.

The relationship between attitudes to ageing and mental health status highlights the importance of geriatric mental health professionals and clinicians considering 'attitudes to ageing' when working with the older adult population. Incorporating the AAQ as an assessment or outcome measure within clinical and therapeutic contexts could help clinicians acknowledge attitudes, and explore the interplay between attitudes to ageing and mental health. Indeed the theory that attitudes are mood-state dependent would encourage the concurrent assessment of both mood and attitudes in older adults who present with mental health difficulties. This could help

establish whether a person's low mood or anxiety is wrongly tied up with negative attitudes to growing old, and whether these attitudes need to be challenged. Targeting attitudes within a psychological framework could be a helpful way of directly targeting depression and other mental health difficulties. Indeed, Laidlaw and Pachana (2009) suggest that negative attitudes to ageing could be challenged within a cognitive behavioural therapeutic context, examining evidence for and against their negative beliefs.

In terms of future research, Shenkin et al (2012) recognise that there is no data on cut-off scores for the AAQ and suggest this could improve the overall scoring of the questionnaire. The AAQ cut-off scores could then be mapped onto GDS scores or other mental health outcome measures to further establish a relationship between attitudes to ageing and mental health.

Conclusion

With the AAQ gaining wider recognition and usage among clinicians and researchers working with the general older adult population, older adults' attitudes towards ageing will become more widely understood; slowly eradicating existing negative age stereotypes. The current evidence linking attitudes to ageing and mental health status in older adults highlights the need to assess and target negative to attitudes to ageing as a means to improving mental health difficulties. Further research into the psychometric properties and cut-off scores to the AAQ is warranted, and longitudinal studies investigating the relationship between attitudes to ageing and mental health in older adults should be considered to allow for inference of causality.

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CHAPTER 3: Cross-sectional analysis

Exploring the relationship between attitudes to ageing and quality of life in older adults: An international cross-sectional analysis

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Abstract word count: 345

Overall word count: 6995

Abstract

Background

Quality of life and attitudes to ageing have been explored in the context of mental and physical health problems in older adults. The interplay between quality of life and attitudes to ageing has received little attention. The purpose of this study is to explore the relationship between attitudes to ageing and quality of life in an international sample of older adults (≥57 years). A comparison of attitudes to ageing and quality of life ratings between those aged 57 and 79 years old (youngest-old) and those over 80 years old (oldest-old) is considered. The relationship between attitudes to ageing and quality of life is also explored in both age groups.

Methods

An international cross-sectional study consisting of 5566 participants was carried out. Opportunistic samples were recruited from 20 different countries across the world. Socio-demographic variables including age, gender, marital status and depression, along with attitudes to ageing, were considered in relation to quality of life. The Attitudes to Ageing Questionnaire and the World Health Organisation Quality of Life assessment for older adults was used, alongside the brief version of the WHOQOL measure. Statistical analyses involved correlation and multiple regression analyses and comparison of means.

Results

The findings revealed more positive attitudes to ageing were associated with a better quality of life in older adults. Further a more positive attitude to ageing was a significant predictor of better quality of life. Those over 80 years old demonstrated significantly more negative attitudes to ageing and a poorer quality of life. Positive attitudes to ageing was a significant predictor of better quality of life in both the youngest-old and oldest-old age groups.

Conclusions

Attitudes to ageing and QOL are positively related. Clinicians and researchers would benefit from the combined use of psychometric measures to investigate attitudes to ageing and quality of life in older adults. The findings highlight the importance of better recognition of negative ageing attitudes and the promotion of attitude change in an attempt to improve quality of life in older adults. Longitudinal studies are required to address the temporal relationship between the two constructs.

Background

The population of those aged 60 years and older is rapidly growing. Across the world this age group is estimated to increase from 810 million in 2012 to 2 billion in 2050 (United Nations, 2012). The fastest growing age group is those over 80 years old with numbers expected to quadruple to 395 million between 2000 and 2050 (World Health Organisation, 2012). This rapid growth in our ageing population presents many challenges including the increased demand for geriatric health care. There is a need to better understand the ageing process in order to provide more effective care for this population group.

The process of ageing is heterogeneous (Shenkin et al, 2012) and with increased life expectancy the needs and experiences of older adults are becoming even more diverse (Laidlaw & Pachana, 2009). Two, possibly even three, generations may exist within the over 60 age group, affirming the varying needs of this population group. As we grow older, the likelihood of living with a chronic physical or mental illness increases. The medical model of gerontological health care focuses on 'curing' people of disease or illness. The World Health Organisation (WHO) recognised the importance of considering a holistic approach to health care and views quality of life (QOL) as a key construct to consider in the older adult population group (WHOQOL Group, 1998a). An important objective in gerontological care is the improvement or maintenance of QOL rather than focusing solely on the prolongation of life, or eradication of illness and disease (Chan, Chien, Thompson, Chiu & Lam, 2006; WHOQOL Group, 1998a). QOL has predominantly been explored in the context of health, and research indicates that chronic physical illness can impact negatively on an individual's QOL (Dowdy et al, 2005; Mols, Vingerhoets, Coebergh, van de Poll-Franse, 2005; Thrall, Lane, Carroll & Lip, 2006). Consideration of QOL in older adults is therefore valuable given the probable existence of chronic illness within this age group.

Quality of life

QOL is a multi-dimensional concept encompassing a range of physical, environmental, psychological, social and spiritual aspects. WHO's definition of QOL is perhaps the most renowned and defines QOL as "an individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQOL Group, 1995, p.1405).

Research has revealed that older adults rate their overall QOL positively (The WHOQOL Group, 1998) even in the presence of physical health difficulties (Bowling, Seetai, Morris & Ebrahim, 2007). Brown and Roose (2011) explored various aspects of QOL across the adult and older adult population (age 30-98 years) and found that environmental QOL increased with age; social and psychological QOL remained stable; and physical health QOL decreased with age. Farquhar (1995) looked at age differences in perceptions of QOL within an older adult sample. Their results revealed that 25% of the 'very elderly' sample (85+ years) rated their QOL as 'very negatively' compared to only 6% in the 'younger elderly' sample (65-85 years). The majority of respondents attributed their negative QOL to disability, ill health, or being unhappy or miserable. Nevertheless, almost two-thirds of the overall sample rated QOL positively (Farquhar, 1995). These findings suggest that growing older may impact negatively on perceptions of QOL, but perhaps only certain aspects of QOL and not until one reaches the very late stages of life. Depression has been found to be the most influential predictor of QOL across the general adult population and there is growing research illustrating this association in older adults (Chachamovich, Fleck, Laidlaw & Power, 2008; Chan et al, 2006; Martinez-Martin et al, 2012; Naumann & Byrne, 2004; Trentini et al, 2011). Consideration of QOL in the context of mental health in older adults is therefore important.

WHO recognised the importance of developing a measure of QOL (WHOQOL Group, 1995) and constructed the WHOQOL-100 questionnaire. This process was undertaken simultaneously across different cultures using an extensive, iterative process resulting in a cross-culturally reliable and valid measure (WHOQOL Group, 1998b). The WHOQOL-100 is a subjective, holistic measure incorporating cultural, social and environmental aspects which identifies an individual's perceived QOL (WHOQOL Group, 1998a). An abbreviated version was subsequently developed, known as the WHOQOL-BREF, which can also be applied cross-culturally (WHOQOL Group, 1998c). Following this the WHOQOL-Old, an add-on module, was developed specifically for use in the older adult population (Power, Quinn, Schmidt, & the WHOQOL Group, 2005). The WHOQOL measures provide a framework for assessing the impact of psychological and physical difficulties on QOL, and have been identified as useful outcome indicators to monitor progress in treatment and evaluate service delivery (Naumann & Byrne, 2004).

Attitudes to ageing

Negative age stereotypes and attitudes towards old age are common, particularly among western cultures (Levy, 2003; Gething et al, 2002). These stereotypes depict old age as a time of loss, loneliness and negativity (Shenkin et al, 2012). Young people's attitudes towards growing old and attitudes across the whole age group, including geriatric health care workers, have been explored and generally reflect a negative stance towards the ageing process (Abrams, Eilola & Swift, 2009; Gething et al, 2002; Seefeldt, Jantz, Galper & Serock, 1977; Yun & Lachman, 2006).

Levy (2003) proposed that these negative age stereotypes are developed in early childhood and maintained or reinforced throughout adulthood. When one reaches old age these stereotypes are internalised resulting in self-stereotypes. Self-stereotypes lead to negative expectations and attitudes towards growing old. Levy (2003) suggested that debilitation in old age might be partly due to negative aging self-stereotypes, rather than an inevitable biological process. Korthase and Trenholme (1983) also proposed that early perceptions of ageing form an attitudinal framework which determines, to some extent, how we adapt to and cope with the process of growing old, therefore impacting on "the quality of our later years" (Korthase & Trenholme, 1983, p.893).

A series of experimental and longitudinal studies across the lifespan looked at the effect age stereotypes and self-perceptions of ageing have on various psychosocial factors including behaviours, and physical and cognitive functioning. These age stereotypes or perceptions were measured experimentally using subliminal techniques, or explicitly using self-report questionnaires. Results revealed that those who reported or were primed with positive ageing stereotypes revealed better functional health 18 years later (Levy, Slade & Kasl, 2002); were more likely to live longer and engage in positive health behaviours (Levy & Myers, 2004; Levy, Slade, Kunkel & Kasl, 2002) and performed better on memory tests (Levy, 1996). These results confirm the suggestion that negative ageing stereotypes formed in childhood, play a role in the physical or mental debilitation in old age (Levy, 2003).

Gaining a deeper understanding of the ageing process can only be elicited from older adults (Laidlaw, Power and Schmidt, 2007). Laidlaw et al thus developed an 'attitudes to ageing' questionnaire (AAQ) specifically for use in the older adult population group. This

questionnaire measures older adults' attitudes and perceptions of this life stage. Prior to this, measures of older adults' attitudes to ageing were limited. The AAQ has been incorporated in a growing body of research exploring the impact these attitudes have on behaviours, emotional and physical functioning. Results revealed that older adults who held more negative attitudes to ageing reported significantly poorer physical health (Bryant et al, 2012), were more depressed (Chachamovich et al, 2008), and were less likely to seek treatment for mental health problems, perceiving their difficulties as an inevitable consequence of ageing (Quinn, Laidlaw & Murray, 2009).

The significant impact that ageing self-stereotypes and attitudes to ageing have on various psychosocial outcomes, including mental and physical health, in older adults is evident. Given that these psychosocial variables, particularly depression, are also important to QOL it is surprising that the relationship between attitudes to ageing and QOL has received little attention. It is possible that older adults' attitudes to ageing may impact on their QOL. One study examined 'perceptions of ageing' and 'individually defined QOL,' among other socio-demographic and health variables including depression, in a substantial sample (n=1815) of Irish community-dwelling older adults. Results revealed that positive perceptions of ageing were associated with better QOL, with ageing perceptions contributing to four per cent of the variance in QOL, a relatively modest influence (Hickey et al, 2010). This study provides preliminary evidence of an association between the two paradigms, and indicates the need for further investigation into the interplay of these two related yet distinct psychological constructs.

Research hypotheses

To our knowledge no study has looked at the relationship between attitudes to ageing and QOL in older adults using the AAQ and WHOQOL measures: this is the first aim of this study.

First research hypothesis:

- A more positive attitude to ageing is associated with a better QOL in older adults.

The second aim seeks to determine the extent to which attitudes to ageing contributes to the variance in QOL. Given depression has already been identified as a strong predictor of

QOL in older adults (Chachamovich, Fleck, Laidlaw & Power, 2008; Chan et al, 2006; Hickey et al, 2010; Martinez-Martin et al, 2012; Naumann & Byrne, 2004; Trentini et al, 2011) this is included as a predictor in the current model alongside other socio-demographic variables.

Second research hypothesis:

- A more positive attitude to ageing will be a significant predictor of better QOL in older adults.

The fastest growing age group is those over 80 years old and it has been identified that aspects of QOL are negatively affected as one reaches this later stage in life (Brown & Roose, 2011; Farquhar, 1995). A third aim is therefore to investigate the difference in attitudes to ageing and QOL ratings between 'younger' older adults (57-79 years old) and adults aged 80+ years. These two age groups are defined as 'youngest-old' and 'oldest-old.'

Third research hypothesis:

- Quality of life and attitudes to ageing will be more negatively rated in the oldest-old age group.

The extent to which attitudes to ageing contributes to the variance in QOL is explored across both age groups.

Fourth research hypothesis:

- A more positive attitude to ageing will be a significant predictor of better QOL in both the youngest-old and oldest-old age groups.

Method

Participants

The World Health Organisation group carried out a large international cross-sectional study on QOL in older adults (Power et al, 2005). Data were collected from 20 different centres world-wide across Europe, North America, South America, Asia and Africa. The sample size recruited in each centre varied between n=116 (Edinburgh) and n=455 (Umea). Opportunistic samples were recruited from university hospitals, nursing homes and community groups. Initial criteria included those over 60 years old; however two participants aged less than 60 years (57 and 59 years) were included. This study looked at data from 5566 participants, aged over 57 years, who completed the WHOQOL BREF (WHOQOL Group, 1998c), WHOQOL- Old module (Power et al, 2005), Attitudes to Ageing Questionnaire (AAQ) (Laidlaw et al, 2007), the Geriatric Depression Scale (GDS) (Yesavage et al, 1983) and socio-demographic information.

Measures

WHOQOL-BREF is a 26-item generic instrument measuring QOL and forms a shorter version of the WHOQOL-100 questionnaire (WHOQOL Group, 1998b). It assesses four domains: *Physical Health*, *Psychological*, *Social Relationships* and *Environment* (WHOQOL Group, 1998c). Each domain contains a number of sub-categories, known as 'facets', which include a number of items that relate to a similar theme. For example, the *Physical Health* domain includes facets such as activities of daily living; energy and fatigue; mobility etc. *Psychological* includes facets such as bodily and physical appearance; positive and negative feelings; self-esteem etc. *Social Relationships* focuses on personal relationships; social support and sexual activity and finally *Environment* considers financial resources; transport; home and physical environment; accessibility and quality of health and social care; participation in leisure activities etc. In order to maintain the level of comprehensiveness, one item from each of the 24 facets in the WHOQOL-100 was incorporated in the WHOQOL-BREF questionnaire, as well as two items from the overall QOL and the general health facet. The method of selection of the original items for the WHOQOL-100 and the selection of appropriate items for the WHOQOL-BREF is detailed in WHOQOL Group 1998b and 1998c papers. High correlations between WHOQOL-100 and WHOQOL-BREF domain scores

were shown to range from .89 to .95, and the WHOQOL-BREF revealed good internal consistency, content validity, discriminant validity and test-retest reliability (WHOQOL Group, 1998c). Individual overall scores can range from 26 to 130, with higher scores indicating better QOL.

WHOQOL-Old measure is a 24 item add-on module which can be used in conjunction with WHOQOL-BREF or WHOQOL-100. It was designed specifically for use in the older adult population. It was developed using the same methodological procedures as the WHOQOL-BREF and WHOQOL-100 instruments and demonstrates good psychometric properties. It comprises of six domains: *Sensory Abilities; Autonomy; Death and Dying; Past, Present and Future Activities; Social Participation and Intimacy* (Power et al, 2005). *Sensory Abilities* includes facets assessing sensory functioning and the impact of loss of sensory abilities on QOL. *Autonomy* considers independence, living autonomously and taking own decisions. D*eath and Dying* explores fears and worries about death and dying. *Past, Present, and Future Activities* considers satisfaction about ones achievements in life and at things they are looking forward to. *Social Participation* includes facets such as participation in activities of daily living, particularly in the community and finally *Intimacy* explores being able to have personal and intimate relationships. Individual overall scores range from 24 to 120 with higher scores again signifying better QOL.

The AAQ is a 24-item questionnaire measuring subjective perception of ageing, and focuses on *Psychological Growth*, *Psychosocial Loss* and *Physical Change* (Laidlaw et al, 2007). *Psychological Growth* explores wisdom and acceptance in old age; *Psychosocial Loss* considers the deterioration or loss of social and psychological factors; and *Physical Change* looks at changes in health and physical well-being. This was developed using the same methodological procedure as the WHOQOL instruments and demonstrates strong reliability and validity and can be applied cross-culturally. Individual scores range from 24 to 120 and higher scores indicate more positive attitudes to ageing.

The GDS is a reliable and valid self-rating depression scale designed specifically for use in older adults (Yesavage et al, 1983). It consists of 30 items with a simple 'yes/no' response format, allowing for ease of administration and provides one overall score ranging from 0 to 30, with higher scores indicating more depressive symptoms. Given the increased co-

morbidity of physical health problems in older adults this measure focuses more on non-somatic symptomology including the emotional and cognitive elements of depression. The GDS-15 is a shorter version of the original GDS (Yesavage & Sheikh, 1986) and demonstrates satisfactory sensitivity and specificity across various population groups including the oldest-old (de Craen, Heeren & Gussekloo, 2003), geriatric inpatients (Shah, Phongsathorn, Bielawska & Katona, 1996), primary care patients (D'Ath, Katona, Mullan, Evans & Katona, 1994; Mitchell, Bird, Rizzo & Meader, 2010) and functionally impaired, cognitively intact individuals (Friedman, Heisel & Delavan, 2005). The GDS-15 was incorporated in this study.

Statistical analyses

The minimum sample size for multiple regression is 100 + n, where n is the number of predictor variables in the equation (Tabachnick & Fidell, 1996), therefore there are no concerns regarding the statistical power in the present study.

Statistical analysis was run using Statistics Package for the Social Sciences (SPSS) 19.0 software. Prior to carrying out analyses to test the study's hypotheses a series of diagnostic investigations of the dataset were conducted. Firstly, missing value analyses were conducted. Missing values were relatively low for the WHOQOL-BREF and WHOQOL-Old (ranging from 0.9 to 4.5%) with the exception of two items. The item *"How satisfied are you with your sex life?"* within the WHOQOL-BREF and the WHOQOL-Old item *"How much do you fear being in pain before you die?"* revealed 14.2% and 7.1% missing values respectively. Exploring missing data further revealed that single or widowed females were most likely to miss out the item considering sex life. There was no distinct pattern across the socio-demographic information to explain the missing data for item *"How much do you fear being in pain?"* A high number of missing values was found in the GDS-15. All items revealed missing values ranging from 9.2% and 17%. *"Do you feel full of energy"* and *"Do you prefer to stay at home, rather than going out and doing new things"* received the highest percentage of missing values; both 17%. Little's Missing Completely at Random test (MCAR; Little and Rubin, 1987) was significant *(x^2 =61214.690; df = 50956; p<.000)* revealing that data were not missing at random within the dataset. This is one of the considerations for usual procedures for replacement of missing values (RMV).

Missing values were imputed using two different methods; median imputation method and regression estimation method (Clark-Carter, 2010). Median imputation is a basic approach to RMV and imputes the median value for the scores which are available for that variable (Clark-Carter, 2010). The regression imputation method, a more sophisticated approach, uses a regression model to predict values for missing data from complete data (Clark-Carter, 2010). Mean and standard deviations for the main predictor and outcome variables were almost identical when descriptive statistics for imputed and non-imputed data were compared indicating that imputing missing values did not bias the dataset.

The total sample was analysed through descriptive statistics initially. Correlation analysis was run to explore the relationship between attitudes to ageing and quality of life in the overall sample. Multiple regression analyses was then applied in each domain of the WHOQOL-BREF and the WHOQOL-Old to detect the impact of attitudes to ageing on QOL. Age, gender, educational level, marital status and depression were used as independent variables, along with attitudes to ageing. Next, the sample was divided into 'youngest-old' (57-79 years) and 'oldest old' (80+ years) and descriptive statistics were run to investigate the differences between attitudes to ageing and QOL in both samples. Correlation and multiple regression analyses was then applied to both samples to explore the relationship between attitudes to ageing and QOL and detect if attitudes to ageing is a significant predictor of QOL in both the youngest-old and oldest-old age groups.

Results

Descriptive statistics

The full dataset consisted of 5566 respondents. Only 4875 completed the AAQ, but due to missing socio-demographic data the sample was reduced to 4616; this sample was included in the correlation and regression analysis.

Table 1. Total sample characteristics [a]

Characteristic	n (%) or M (SD)
Age: M (SD)	72.5 (8.0)
Gender	
Male	2298 (41.5)
Female	3235 (58.5)
Education level	
Illiterate	141
School/trade	3627
College or higher	1536
Other	115
Marital status	
Single	295 (5.6)
Married/partnered	3124 (58.9)
Separated	420 (4.9)
Widowed	1462 (27.6)
GDS-15	3.5 (3.1)
WHOQOL-Old: M (SD)	87.0 (12.9)
WHOQOL BREF: M (SD)	95.6 (14.6)
AAQ: M (SD)	82.7 (12.3)

[a] Missing data for age, gender, marital status and education level.

Inferential statistics

Potential multicollinearity was tested through the variance inflation factor in each regression model. Variance inflation values ranged from 1.09 to 1.73 indicating that there are no strong linear relationships among the predictors (Field, 2005). Bivariate correlations between predictor values were all below .6 further confirming the absence of collinearity (Table 2). The data distribution by means of the Kolmogorov-Smirnov test showed a normal distribution of all dependent variables (WHOQOL-BREF, WHOQOL-Old) and examination of residual plot revealed that the assumptions of linearity, homoscedasticity and normality were met. Cronbach's alpha for each of the domains within the WHOQOL-BREF, WHOQOL-Old and

AAQ were acceptable ranging from .6 to .9 (Clark-Carter, 2010).

First research hypothesis:

- A more positive attitude to ageing is associated with a better QOL in older adults.

Table 2 presents Pearson's correlation co-efficients for all predictor and outcome variables. All three AAQ domains; *Psychosocial Loss*, *Psychological Growth*, and *Physical Change* were positively related to the WHOQOL-Old (r=.617, r=.382 and r=.543 respectively at p<.01 level) and the WHOQOL-BREF (r=.628 r=.354 and r=.601 at p<.01 level).

Table 2. Pearson's correlation co-efficient for all predictor and outcome variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 Age	1																			
2 Gender	-.006	1																		
3 Education level	.113*	-.083*	1																	
4 Marital status	.274*	.261*	-.070*	1																
5 Depression	.101*	.064*	-.060*	.162*	1															
6 Psychosocial loss	-.189*	-.024	-.091*	.175*	-.582*	1														
7 Psychological growth	-.049*	.001	-.026	-.039*	-.285*	.216*	1													
8 Physical change	-.113*	-.008	.045*	-.119*	-.474*	.475*	.374*	1												
9 Sensory abilities	.254*	.044*	.065*	-.144*	-.424*	.451*	.142*	.344*	1											
10 Autonomy	-.098*	.006	.107*	-.035	-.476*	.435*	.274*	.436*	.355*	1										
11 PPF	-.037	-.033	.069*	-.096*	-.562*	.488*	.394*	.467*	.344*	.624*	1									
12 Social participation	-.126*	.015	.063*	.099*	-.544*	.492*	.339*	.528*	.391*	.545*	.655*	1								
13 Death and dying	.007*	-.103*	-.011	-.020	-.271*	.317*	.131*	.171*	.206*	.137*	.198*	.200*	1							
14 Intimacy	-.092*	-.120*	.065*	-.292*	-.369*	.317*	.288*	.297*	.195*	.363*	.494*	.388*	.038	1						
15 WHOQOL-Old overall	-.129*	-.057*	.085*	-.181*	-.650*	.617*	.382*	.543*	.623*	.718*	.798*	.766*	.485*	.633*	1					
16 Physical health	-.208*	-.060*	.199*	-.164*	-.592*	.522*	.248*	.615*	.501*	.513*	.512*	.599*	.224*	.302*	.647*	1				
17 Psychological	-.084*	-.082*	.061*	-.138*	-.667*	.567*	.407*	.540*	.421*	.574*	.673*	.617*	.257*	.464*	.736*	.653*	1			
18 Social relationships	-.036	.034	.007	-.134*	-.459*	.421*	.304*	.379*	.304*	.409*	.529*	.489*	.185*	.509*	.601*	.449*	.571*	1		
19 Environment	.023	-.066*	.068*	-.109*	-.556*	.446*	.256*	.462*	.377*	.575*	.611*	.532*	.225*	.388*	.659*	.582*	.650*	.512*	1	
20 WHOQOL-BREF overall	-.100*	-.063*	.089*	-.162*	-.698*	.628*	.354*	.601*	.506*	.636*	.698*	.684*	.273*	.466*	.797*	.865*	.861*	.671*	.851*	1

PPF = Past, present and future activities, *denotes significance at p<.01

Second research hypothesis:

- A more positive attitude to ageing will be a significant predictor of better QOL in older adults.

Predictor variables (gender, age, marital status, educational level and depression) were selected to constitute the regression model, together with attitudes to ageing. Twelve multiple regression analyses were run in order to establish the variables which would best predict overall QOL and the separate domains, for both the WHOQOL-BREF and the WHOQOL-Old. Standardised beta coefficients and R^2 values (cumulative and individual variance) were examined to compare the impact of the predictor variables on QOL (Table 3).

Table 3. Multiple regression analyses predicting WHOQOL scores from AAQ scores.

Dependent variable	Predictor variables	ΔR^2 cumulative contribution	R^2 change	β *final*
WHOQOL-Old				
Sensory abilities	*Step 1:*			
	Age	.064***	.064***	-.165***
	Education level	.069***	.005***	-.030**
	Marital status	.074***	.005***	-.002
	Gender	.078***	.004***	.066***
	Step 2:			
	Depression	.231***	.153***	-.201***
	Step 3:			
	Psychosocial loss	.278***	.047***	.253***
	Physical change	.291***	.013***	.159***
	Psychological growth	.293***	.002***	-.053***
Autonomy	*Step 1:*			
	Educational level	.012***	.012***	-.055***
	Age	.019***	.007***	-.015
	Marital Status	.020*	.001*	.063***
	Step 2:			
	Depression	.234***	.214***	-.243***
	Step 3:			
	Physical change	.289***	.055***	.271***
	Psychosocial loss	.315***	.026***	.202***
	Psychological growth	.318***	.003***	.063***
Past, present, future activities	*Step 1:*			
	Marital status	.018***	.018***	.003
	Education level	.024***	.006***	-.031**
	Step 2:			
	Depression	.318***	.294***	-.317***
	Step 3:			
	Psychological growth	.378***	.060***	.190***
	Psychosocial loss	.410***	.032***	.204***
	Physical change	.424***	.106***	.148***
Social participation	*Step 1:*			
	Marital status	.016***	.016***	.005
	Age	.025***	.009***	-.020
	Education level	.031***	.006***	-.036**
	Gender	.033**	.002**	.040***
	Step 2:			
	Depression	.316***	.283***	-.280***
	Step 3:			
	Physical change	.402***	.086***	.275***
	Psychosocial loss	.428***	.026***	.202***
	Psychological growth	.434***	.006***	.085***
Death and dying	*Step 1:*			
	Gender	.010***	.010***	-.088***
	Age	.016***	.006***	.141***
	Education level	.017**	.001**	-.011

	Step 2:			
	Depression	.091***	.074***	-.110***
	Step 3:			
	Psychosocial loss	.137***	.046***	.266***
	Psychological growth	.139**	.002**	.049**
Intimacy	*Step 1:*			
	Marital status	.167***	.176***	-.337***
	Education level	.168*	.001*	-.009
	Step 2:			
	Depression	.255***	.087***	-.178***
	Step 3:			
	Psychological growth	.288***	.033***	.164***
	Psychosocial loss	.293***	.005***	.085***
	Physical change	.296***	.003***	.060***
Overall	*Step 1:*			
	Marital status	.052***	.052***	-.070***
	Education level	.063***	.011***	-.045***
	Age	.067***	.004***	.015
	Step 2:			
	Depression	.439***	.372***	-.321***
	Step 3:			
	Psychosocial loss	.516***	.077***	.311***
	Physical change	.567***	.051***	.207***
	Psychological growth	.578***	.011***	.121***
WHOQOL-BREF				
Physical health	*Step 1:*			
	Age	.043***	.043***	-.092***
	Education level	.058***	.015***	-.053***
	Marital status	.069***	.011***	.004
	Step 2:			
	Depression	.379***	.310***	-.288***
	Step 3:			
	Physical change	.514***	.135***	.434***
	Psychosocial loss	.535***	.021***	.187***
	Psychological growth	.541***	.006***	-.083***
Psychological	*Step 1:*			
	Marital status	.029***	.029***	-.008
	Education level	.034***	.005***	-.016
	Age	.035*	.001*	.034**
	Gender	.036*	.001*	-.046***
	Step 2:			
	Depression	.448***	.412***	-.392***
	Step 3:			
	Physical change	.512***	.064***	.195***
	Psychosocial loss	.547***	.035***	.235***
	Psychological growth	.565***	.018***	.153***
Social relationships	*Step 1:*			
	Marital status	.027***	.027***	-.075***
	Gender	.033***	.006***	.075***
	Education level	.034*	.001*	.006

	Step 2:			
	Depression	.224***	.190***	-.244***
	Step 3:			
	Physical change	.255***	.031***	.122***
	Psychosocial loss	.279***	.024***	.193***
	Psychological growth	.292***	.013	.128***
Environment	*Step 1:*			
	Marital status	.019***	.019***	-.034**
	Education level	.026***	.007***	-.046***
	Age	.031***	.005***	.136***
	Step 2:			
	Depression	.321***	.290***	-.330***
	Step 3:			
	Physical change	.374***	.053***	.239***
	Psychosocial loss	.398***	.024***	.198***
Overall	*Step 1:*			
	Marital status	.034***	.034***	-.024**
	Education level	.046***	.012***	-.043***
	Age	.048**	.002**	.037***
	Step 2:			
	Depression	.493***	.445***	-.382***
	Step 3:			
	Physical change	.604***	.111***	.339***
	Psychosocial loss	.641***	.037***	.242***
	Psychological growth	.642**	.001**	.032**

Socio-demographic variables (age, gender, marital status, education level) and AAQ domains were tested for entry as a block using stepwise method and retained based on statistical criteria (p-values lower than .10 were removed from the model). Depression was entered at the second step. ΔR^2 highlights the cumulative contribution of each step of the regression model to the explained variance. R^2 change highlights the individual contribution of each variable. B_{final} is the co-efficient of the regression equation. *p<.05, **p<.01, ***p<.001. Marital status and educational level were re-coded into binary variables (Marital status: 0-single, separated and widowed; 1-married or partnered; Education level: 0-illiterate, school, trade; 1-college or higher).

Attitudes to ageing added a significant contribution to the model explaining 13.9% and 14.9% of the variance in the WHOQOL-Old and WHOQOL-BREF respectively. All three AAQ domains *(Physical Change*, *Psychosocial Loss* and *Psychological Growth)* contributed significantly to the overall WHOQOL-Old and WHOQOL-BREF. *Psychosocial Loss* contributed most to the overall WHOQOL-Old score, explaining 7.7% of the variance, followed by *Physical Change* (5.1%) and then *Psychological Growth* (1.1%). *Physical Change* contributed most to the overall WHOQOL-BREF, accounting for 11.1% of the variance, followed by *Psychosocial Loss* (3.7%) and then *Psychological Growth* (0.1%).

Physical Change, *Psychosocial Loss* and *Psychological Growth* contributed significantly to most of the individual QOL domains, with the exception of *Physical Change* which did not contribute to *Death and Dying* (WHOQOL-Old), and *Psychological Growth* did not contribute

to *Environment* (WHOQOL-BREF). *Psychological Growth* was negatively related to *Physical Health* (WHOQOL-BREF) and *Sensory Abilities* (WHOQOL-Old); the rest of the AAQ and WHOQOL domains were positively related. The strongest association was between *Physical Change* (AAQ) and *Social Participation* (WHOQOL-Old), and *Physical Change* (AAQ) and *Physical Health* (WHOQOL-BREF).

With regard to the socio-demographic variables; marital status, educational level and age contributed significantly to the WHOQOL-Old overall score (6.7%); however, gender did not. The same pattern was found for the WHOQOL-BREF overall score, with marital status, education level and age accounting for 4.8% in the variance. Depression contributed the most variance, out of all the predictor variables, to both QOL measures (37.2% in the WHOQOL-Old overall score and 44.5% in the WHOQOL-BREF overall score) and was negatively associated with QOL. The overall model explained 57.8% of the variance in QOL when considering the WHOQOL-Old and 64.2 % of the variance in the WHOQOL-BREF.

Third research hypothesis:

- Quality of life and attitudes to ageing will be more negatively rated in the oldest-old age group.

The total sample was then split into youngest-old (57-79 years) and oldest-old (80-100 years) age categories. Firstly, descriptive statistics were run on the youngest-old and oldest-old samples (Table 4) and then summary scores for both age groups were compared (Table 5).

Table 4. Characteristics of youngest-old and oldest-old samples

Characteristics	57-79 years[a] n (%) or M (SD)	80-100 years[b] n (%) or M (SD)
Age: M (SD)	69.2 (5.4)	84.1 (3.7)
Gender		
Male	1760 (42)	504 (41.9)
Female	2428 (58)	698 (58.1)
Marital status		
Single	225 (5.5)	66 (5.6)
Married/Partnered	2610 (64.1)	480 (41.1)
Separated	356 (8.7)	60 (5.1)
Widowed	883 (21.7)	563 (48.2)
Education level		
Illiterate	113 (2.8)	28 (2.4)
School/Trade	2644 (64.4)	869 (74.0)
College/University	1273 (31)	239 (20.3)
Other	74 (1.8)	39 (3.3)
GDS-15	3.4 (3.1)	3.9 (3.04)

[a]Missing data for gender, marital status and education level. [b]Missing data for marital status and education level.

Table 5. Comparison of means between age groups

Domains	57-79 years[a] M (SD)	80-100 years[b] M (SD)	*p*
WHOQOL-OldSensory abilities	15.9 (3.3)	14.3 (3.6)	.000***
Autonomy	14.7 (2.8)	14.2 (2.8)	.000***
Past, present and future activities	14.3 (2.8)	14.1 (2.7)	.012*
Social participation	14.7 (2.9)	14.0 (3.1)	.000***
Death and dying	13.9 (3.9)	14.7 (3.8)	.000***
Intimacy	14.0 (3.8)	13.3 (3.8)	.000***
Overall	87.6 (12.9)	84.6 (12.6)	.000***
WHOQOL-BREF			
Physical health	26.0 (5.1)	24.1 (5.4)	.000***
Psychological	22.0 (3.7)	21.6 (3.7)	.000***
Social relationships	10.8 (2.0)	10.7 (1.9)	.469
Environment	29.9 (5.1)	30.2 (4.9)	.041*
Overall	96.0 (14.7)	93.7 (14.6)	.000***
AAQ			
Psychological growth	27.6 (4.6)	27.1 (4.9)	.004**
Psychosocial loss	28.9 (6.0)	27.2 (5.8)	.000***
Physical change	26.7 (5.6)	25.6 (5.8)	.000**
Overall	83.2 (12.2)	79.9 (12.4)	.000***

[a] n = 4199 for WHOQOL-Old and WHOQOL BREF; n = 3765 for AAQ. [b] n = 1202 for WHOQOL- Old and WHOQOLBREF; n = 982 for AAQ. *p<.05, **p<.01, ***p<.001.

Significant differences between the two age groups were demonstrated across the overall and all domain scores of the WHOQOL-Old, WHOQOL-BREF and AAQ; with the exception of the *Social Relationship* domain within the WHOQOL-BREF. Attitudes to ageing and QOL overall scores were consistently lower in the oldest-old sample. At domain level, *Death and Dying* and *Environment* were the only two QOL domains rated more positively in the oldest-old; the remaining domains were scored more negatively.

The extent to which attitudes to ageing contributes to the variance in QOL was then explored across both age groups. The oldest-old sample comprised of 1202 respondents. The AAQ was completed by 982 respondents, but due to missing socio-demographic data the sample was reduced to 963 which were included in the correlation and regression analysis. The youngest-old sample comprised of 4199 respondents. The AAQ was completed by 3765 respondents, but due to missing socio-demographic data the sample was reduced to 3653 which was included in the correlations and regression analysis.

Fourth research hypothesis:

- Attitudes to ageing will be a significant predictor of QOL in both youngest-old and oldest-old age groups.

Correlation analysis was first applied to both the oldest-old and youngest-old samples. In the youngest-old sample *Psychosocial Loss*, *Psychological Growth*, and *Physical Change* were positively related to the WHOQOL-Old (r=.618 , r=.378, r=534 respectively at p<.01 level) and the WHOQOL-BREF (r=.599, r=.349, r=.619 respectively at p<.01 level). In the oldest-old sample *Psychosocial Loss*, *Psychological Growth*, and *Physical Change* were also positively related to the WHOQOL-Old (r=.584 , r=.405, r=.558 respectively at p<.01 level) and the WHOQOL-BREF (r=.584, r=.375, r=.652 respectively at p<.01 level). Pearson's correlation co-efficients for all predictor and outcome variables in the youngest-old and oldest-old samples are presented in appendices D and E respectively. Twelve multiple regression analyses were then run across both samples to identify the variables which would best predict overall QOL and the separate domains for both the WHOQOL-BREF and the WHOQOL- Old. Standardised beta coefficients and R^2 values (cumulative and individual variance) were examined to compare the impact of the independent variables on QOL; Table 6 and 7 present the results.

Table 6. Multiple regression analyses predicting WHOQOL scores from AAQ scores in the oldest-old sample.

Dependent variable	Predictor variables	ΔR^2 cumulative contribution	R^2 Change	β *final*
WHOQOL-Old				
Sensory abilities	*Step 1:*			
	Age	.023***	.023***	-.101***
	Step 2:			
	Depression	.189***	.166***	-.222***
	Step 3:			
	Psychosocial loss	.226***	.077***	.226***
	Physical change	.239***	.013***	.168***
	Psychological growth	.242*	.003*	-.066*
Autonomy	*Step 1:*			
	Age	.010**	.010**	-.039
	Education level	.016**	.006**	-.049
	Step 2:			
	Depression	.236***	.220***	-.247***
	Step 3:			
	Physical change	.287***	.051***	.250***
	Psychosocial loss	.310***	.023***	.183***
Past, present, future activities	*Step 1:*			
	Education level	.012***	.012***	-.076**
	Age	.016*	.004*	-.004
	Step 2:			
	Depression	.307***	.291***	-.285***
	Step 3:			
	Psychological growth	.390***	.083***	.227***
	Psychosocial loss	.416***	.026***	.191***
	Physical change	.433***	.017***	.167***
Social participation	*Step 1:*			
	Age	.016***	.016***	-.046*
	Step 2:			
	Depression	.333***	.317***	-.270***
	Step 3:			
	Physical change	.430***	.097***	.301***
	Psychosocial loss	.462***	.032***	.212***
	Psychological growth	.468**	.006**	.094**
Death and dying	*Step 1:*			
	Gender	.006**	.006**	-.101**
	Marital status	.010*	.004*	.123***
	Step 2:			
	Depression	.102***	.092***	-.181***
	Step 3:			
	Psychosocial loss	.138***	.026***	.231***
Intimacy	*Step 1:*			
	Marital status	.131***	.131***	-.321***

	Education level	.137**	.006**	-.073**
	Step 2:			
	Depression	.198***	.061***	-.139***
	Step 3:			
	Psychological growth	.251***	.053***	.205***
	Physical change	.256**	.005**	.093**
Overall	*Step 1:*			
	Age	.016	.016	-.040
	Marital status	.027	.011	-.020
	Education level	.031	.004	-.033
	Step 2:			
	Depression	.441***	.410***	-.344***
	Step 3:			
	Psychosocial loss	.508***	.067***	.286***
	Physical change	.565***	.057***	.224***
	Psychological growth	.576***	.011***	.120***
WHOQOL-BREF				
Physical health	*Step 1:*			
	Age	.016***	.016***	-.036
	Marital status	.029***	.013***	-.059**
	Education level	.033***	.004***	-.026
	Step 2:			
	Depression	.369***	.336***	-.249***
	Step 3:			
	Physical change	.517***	.148***	.479***
	Psychosocial loss	.553***	.036***	.234***
	Psychological growth	.561***	.008***	-.104***
Psychological	*Step 1:*			
	No variables retained			
	Step 2:			
	Depression	.187***	.187***	-.226***
	Step 3:			
	Psychosocial loss	.217***	.003***	.191***
	Physical change	.242***	.025***	.132***
	Psychological growth	.252***	.010***	.117***
Social relationships	*Step 1:*			
	No variables retained			
	Step 2:			
	Depression	.187***	.187***	-.226***
	Step 3:			
	Psychosocial loss	.217***	.030***	.191***
	Physical change	.242***	.025***	.132***
	Psychological growth	.252***	.010***	.117***
Environment	*Step 1:*			
	Education level	.015***	.015***	-.076**
	Gender	.025**	.010**	-.058*
	Step 2:			
	Depression	.308***	.283***	-.305***
	Step 3:			
	Physical change	.363***	.055***	.258***

	Psychosocial loss	.385***	.022***	.182***
Overall	*Step 1:*			
	Gender	.014***	.014***	-.047*
	Education level	.022**	.008**	-.050**
	Age	.026*	.004*	.019
	Step 2:			
	Depression	.489***	.463***	-.315***
	Step 3:			
	Physical change	.612***	.123***	.388***
	Psychosocial loss	.658***	.046***	.259***

Socio-demographic variables (age, gender, marital status, education level) and AAQ domains were tested for entry as a block using stepwise method and retained based on statistical criteria (p-values lower than .10 were removed from the model). Depression was entered at the second step. ΔR^2 highlights the cumulative contribution of each step of the regression model to the explained variance. R^2 change highlights the individual contribution of each variable. B_{final} is the co-efficient of the regression equation. *p<.05, **p<.01, ***p<.001. Marital status and educational level were re-coded into binary variables (Marital status: 0-single, separated and widowed; 1-married or partnered; Education level: 0-illiterate, school, trade; 1-college or higher).

In the oldest-old sample, attitudes to ageing added a significant contribution to the model explaining 13.5% and 16.9% of the variance in the WHOQOL-Old and WHOQOL-BREF respectively. All three AAQ domains (*Physical Change, Psychosocial Loss* and *Psychological Growth)* contributed significantly to overall WHOQOL-Old and were positively related. *Psychosocial Loss* explained the most variance (6.7%), followed by *Physical Change* (5.7%) and then *Psychological Growth* (1.1%). *Physical Change* and *Psychosocial Loss* contributed significantly and were positively related to overall WHOQOL-BREF; explaining 12.3% and 4.6% of the variance respectively. *Psychological Growth* revealed no contribution to the variance in overall WHOQOL-BREF.

Physical Change, Psychosocial Loss and *Psychological Growth* contributed significantly to some of the individual QOL domains. *Physical Change* did not contribute to *Death and Dying* (WHOQOL-Old), *Psychosocial Loss* did not contribute to *Intimacy* (WHOQOL-Old), and *Psychological Growth* did not contribute to *Autonomy, Death and Dying* (WHOQOL-Old) or *Environment* (WHOQOL-BREF). *Psychological Growth* was negatively related to *Physical Health* (WHOQOL-BREF) and *Sensory Abilities* (WHOQOL-Old); the rest of the WHOQOL and AAQ domains were positively related. The strongest association was between *Physical Change* (AAQ) and *Social Participation* (WHOQOL-Old), and *Physical Change* (AAQ) and *Physical Health* (WHOQOL-BREF).

With regard to the socio-demographic variables; age, marital status and educational level

contributed significantly to the WHOQOL-Old overall score (explaining 3.1% of the variance), however gender revealed no contribution. Gender, education level and age contributed significantly to the WHOQOL-BREF overall score (explaining 2.6% of the variance), however marital status did not. Depression contributed the most variance, out of all the predictor variables, in both QOL measures (41% for the WHOQOL-Old overall score and 46.3% for the WHOQOL-BREF overall score) and was negatively associated with all domains of QOL. The overall model explained 57.6% of the variance in QOL when considering the WHOQOL-Old and 65.8% of the variance in the WHOQOL-BREF.

Table 7. Multiple regression analyses predicting WHOQOL scores from AAQ scores in the youngest-old sample

Dependent variable	Predictor variables	ΔR^2 cumulative contribution	R^2 change	β *final*
WHOQOL-Old				
Sensory abilities	*Step 1:*			
	Age	.028***	.028***	-.085***
	Education level	.038***	.010***	-.053***
	Marital status	.045***	.007***	-.008
	Gender	.050***	.005***	.067***
	Step 2:			
	Depression	.206***	.156***	-.197***
	Step 3:			
	Psychosocial loss	.257***	.051***	.266***
	Physical change	.271***	.014***	.157***
	Psychological growth	.273**	.002**	-.050**
Autonomy	*Step 1:*			
	Education level	.012***	.012***	-.056***
	Marital status	.015***	.003***	.055***
	Age	.016**	.001**	.007
	Step 2:			
	Depression	.228***	.212***	-.240***
	Step 3:			
	Physical change	.284***	.056***	.214***
	Psychosocial loss	.310***	.026***	.206***
	Psychological growth	.313***	.003***	.067***
Past, present, future activities	*Step 1:*			
	Marital status	.024***	.024***	-.018
	Education level	.029***	.005***	-.024
	Step 2:			
	Depression	.322***	.293***	-.319***
	Step 3:			
	Psychological growth	.378***	.056***	.181***
	Psychosocial loss	.411***	.033***	.209***
	Physical change	.425***	.014***	.146***
Social participation	*Step 1:*			
	Marital status	.017***	.017***	-.009
	Education level	.027***	.010***	-.048***
	Gender	.032***	.005***	.055***
	Age	.033*	.001*	.014
	Step 2:			
	Depression	.308***	.275***	-.283***
	Step 3:			
	Physical change	.391***	.083***	.266***
	Psychosocial loss	.416***	.025***	.200***
	Psychological growth	.420***	.004***	.081***
Death and dying	*Step 1:*			
	Gender	.011***	.011***	-.099***

	Education level	.013**	.002**	-.011
	Step 2:			
	Depression	.082***	.069***	-.092***
	Step 3:			
	Psychosocial loss	.128***	.046***	.201***
	Psychological growth	.132***	.004***	.071***
Intimacy	*Step 1:*			
	Marital status	.176***	.176***	-.343***
	Step 2:			
	Depression	.271***	.095***	-.190***
	Step 3:			
	Psychological growth	.300***	.029***	.154***
	Psychosocial loss	.307***	.007***	.101***
	Physical change	.309**	.002**	.055**
Overall	*Step 1:*			
	Marital status	.058***	.058***	-.081***
	Education level	.070***	.012***	-.048***
	Age	.072**	.002**	.020
	Step 2:			
	Depression	.434***	.362***	-.315***
	Step 3:			
	Psychosocial loss	.515**	.081**	.316***
	Physical change	.564***	.049***	.201***
	Psychological growth	.576***	.012***	.122***
WHOQOL-BREF				
Physical health	*Step 1:*			
	Age	.026***	.026***	-.007
	Marital status	.045***	.019***	-.059***
	Education level	.058***	.013***	-.061***
	Step 2:			
	Depression	.366***	.308***	-.300***
	Step 3:			
	Physical change	.500***	.134***	.426***
	Psychosocial loss	.519***	.019***	.175***
	Psychological growth	.524***	.005***	-.080***
Psychological	*Step 1:*			
	Marital status	.036***	.036***	-.033**
	Education level	.040***	.004***	-.011
	Age	.041*	.001*	.021*
	Step 2:			
	Depression	.445***	.404***	-.396***
	Step 3:			
	Physical change	.506***	.061***	.183***
	Psychosocial loss	.540***	.034***	.231***
	Psychological growth	.558***	.018***	.154***
Social relationships	*Step 1:*			
	Marital status	.038***	.038***	-.100***
	Gender	.044***	.006***	.073***
	Education level	.045*	.001*	.003
	Step 2:			

	Depression	.236***	.191***	-.242***
	Step 3:			
	Psychosocial loss	.268***	.032***	.198***
	Psychological growth	.297***	.029***	.133***
	Physical change	.306***	.009***	.123***
Environment	*Step 1:*			
	Marital status	.026***	.026***	-.038**
	Education level	.033***	.007***	-.037**
	Age	.034*	.001*	.088***
	Step 2:			
	Depression	.325***	.291***	-.336***
	Step 3:			
	Physical change	.376***	.051***	.232***
	Psychosocial loss	.401***	.025***	.199***
Overall	*Step 1:*			
	Marital status	.041***	.041***	-.036***
	Education level	.053***	.012***	-.039***
	Age	.055**	.002**	.020*
	Step 2:			
	Depression	.493***	.438***	-.389***
	Step 3:			
	Physical change	.602***	.109***	.328***
	Psychosocial loss	.636***	.034***	.235***
	Psychological growth	.637**	.001**	.035**

Socio-demographic variables (age, gender, marital status, education level) and AAQ domains were tested for entry as a block using stepwise method and retained based on statistical criteria (p-values lower than .10 were removed from the model). Depression was entered at the second step. ΔR^2 highlights the cumulative contribution of each step of the regression model to the explained variance. R^2 change highlights the individual contribution of each variable. B_{final} is the co-efficient of the regression equation. *p<.05, **p<.01, ***p<.001. Marital status and educational level were re-coded in binary variables (Marital status: 0-single, separated and widowed; 1-married or partnered; Education level: 0-illiterate, school, trade; 1-college or higher).

In the youngest-old sample, attitudes to ageing added a significant contribution to the model explaining 14.2% and 14.4% of the variance in the WHOQOL-Old and WHOQOL-BREF respectively. All three AAQ domains (*Physical Change*, *Psychosocial Loss* and *Psychological Growth)* contributed significantly to overall WHOQOL-Old and WHOQOL-BREF were positively related. *Psychosocial Loss* explained the most variance (8.1%) in overall WHOQOL-Old, followed by *Physical Change* (4.9%) and then *Psychological Growth* (1.2%). *Physical Change* contributed the most variance to overall WHOQOL-BREF (10.9%) followed by *Psychosocial Loss* (3.4%) and *Psychological Growth* (0.1%).

Physical Change, Psychosocial Loss and *Psychological Growth* contributed significantly to most of the individual QOL domains, with the exception of *Physical Change* which did not contribute to *Death and Dying* (WHOQOL-Old), and *Psychological Growth* did not contribute to *Environment* (WHOQOL-BREF). *Psychological Growth* (AAQ) was negatively related to

Physical Health (WHOQOL-BREF) and *Sensory Abilities* (WHOQOL-Old); the rest of the AAQ and WHOQOL domains were positively related. The strongest association was between *Physical Change* (AAQ) and *Social Participation* (WHOQOL-Old), and *Physical Change* (AAQ) and *Physical Health* (WHOQOL-BREF).

With regard to the socio-demographic variables; marital status, educational level and age contributed significantly to the WHOQOL-Old overall score (explaining 7.2% of the variance), however gender revealed no contribution. Marital status, education level and age also contributed significantly to the WHOQOL-BREF overall score (explaining 5.5% of the variance) with gender revealing no contribution. Depression contributed the most variance, out of all the predictor variables, in both QOL measures (36.2% for the WHOQOL-Old overall score and 43.8% for the WHOQOL-BREF overall score) and was negatively associated with all domains of QOL. The overall model explained 57.6% of the variance in QOL when considering the WHOQOL-Old and 63.7% of the variance in the WHOQOL-BREF.

Discussion

This study explored the relationship between attitudes to ageing and QOL in an international sample of older adults. Results revealed that there was a significant relationship between the two constructs: attitudes to ageing and QOL were positively related. This confirms our first research hypothesis which stated that a more positive attitude to ageing is associated with better QOL in older adults. In addition, all three AAQ domains; *Physical Change, Psychosocial Loss* and *Psychological Growth* contributed significantly to the variance in QOL supporting our second research hypothesis; a more positive attitude to ageing will be a significant predictor of better QOL in older adults.

Psychosocial Loss contributed the most to the overall WHOQOL-Old score. Old age is associated with loss in social, physical and cognitive domains (Urry & Gross, 2010) and 'loss' is also incorporated within the WHOQOL-Old with regards to exploring loss in sensory functioning and independence. It is, therefore, not surprising that *Psychosocial Loss* has the strongest association with the WHOQOL-Old overall score. The WHOQOL-BREF has less of a focus on 'loss' since this was developed for the general adult population group, and *Physical Change* contributed the most to the overall WHOQOL-BREF. Previous research indicates that poor physical health can have a negative impact on QOL (Dowdy et al, 2005; Mols et al, 2005; Thrall et al, 2006) therefore it is expected that negative attitudes towards physical changes experienced in old age will impact negatively on QOL perceptions. The *Psychological Growth* domain yielded the least contribution to both WHOQOL measures.

On exploration of the individual items in the *Psychological Growth* domain, they appear to focus on abstract concepts including the qualities one can develop when growing older such as 'wisdom' and 'acceptance.' These concepts may not be as relevant or dependent on more concrete aspects of life such as the environment one lives in which is considered in QOL. Indeed the *Psychological Growth* domain did not contribute to the variance in the *Environment* domain. Nevertheless, one might expect psychological acceptance to be important in contributing to overall QOL, as suggested by the negative association found between *Psychological Growth* and the *Sensory Abilities* and *Physical Health* domains in QOL. This relationship suggests that as sensory abilities or physical health deteriorate in old age, wisdom and acceptance continue to grow. Thus reduced hearing or impairments in physical functioning may almost be anticipated when reaching old age and therefore embraced and

accepted as part of growing old. The lack of association between *Psychological Growth* and other variables might also be related to the problems in reliability of this domain as previously highlighted by Lucas-Carrasco et al (2013) and Chachamovich et al (2008).

Comparison of youngest-old and oldest-old

The third aim of this study was to determine if attitudes to ageing and QOL differed between the youngest-old and oldest-old age groups. Firstly, it is evident across the overall sample that older adults on average hold positive attitudes to ageing and rate their QOL highly. This is in line with previous research (Bryant et al, 2012; Hickey et al, 2010; Laidlaw et al, 2007; Power et al, 2005; Quinn et al, 2010) and refutes stereotypes of ageing.

Attitudes to ageing and QOL ratings between the youngest-old and oldest-old were significantly different across all overall and domain scores, with the exception of the *Social Relationships* domain of the WHOQOL-BREF, which remained stable. *Social Relationships domain* focuses on satisfaction with personal relationships and support from friends. It is possible that when one reaches the age of 60 and older, a solid social network has been established from earlier adult years and is unlikely to change. Negative age stereotypes would consider social interactions to decline as one grows older, either due to physical health restrictions or limited availability of social activities, thus impacting negatively on social QOL. However, retirement opportunities may allow more time to focus on important social relations, such as family and friends. Indeed socio-emotional selective theory states that as we grow older, we become increasingly selective in our choice of social partners, opting for emotional intimacy as opposed to seeking novel, interesting acquaintances; the preferred choice amongst younger adults (Carstensen, 1991). Further, Lang and Carstensen (1994) discovered that the size of social network in older adults over 85 years old is significantly smaller than those 70 to 85 years old but the amount of close confidents remained the same; reductions in social interactions were among peripheral, less meaningful acquaintances (Lang & Carstensen, 1994). Thus, the size of our social circle may decrease in late life, but satisfaction with the existing relationships remains stable. Our findings are also in line with Brown and Roose (2011) who also discovered that age did not impact on social QOL.

The oldest-old, on average, rated their QOL and attitudes to ageing more negatively across

each overall score and most domain scores; providing support for our third research hypothesis which stated that quality of life and attitudes to ageing will be more negatively rated in the oldest-old age group. This finding does not seem surprising given that the older we live the more likely we are to experience adverse life events such as co-morbid health problems, bereavement, poorer physical functioning etc., all potentially having a negative impact on attitudes to ageing and perceived QOL. This result also corroborates Farquhar's (1995) findings which revealed that as one approaches the very late stages of life, QOL deteriorated. Only two domains, within the WHOQOL measures; *Death and Dying* and *Environment*, were rated more positively in the oldest-old. This may be understood in terms of an acknowledgement that as one grows older, reaching 80 years and onwards, dying is more foreseeable and therefore this concept is more accepted, or less feared. Similarly, in relation to *Environment*, at this age one may have settled into surroundings which are comfortable and suitable for them, or more likely to have lived in a particular environment for a long period of time. This finding is in line with Brown and Roose (2011) who found environmental QOL to increase with age, even in the presence of anxiety and depressive symptoms. They suggest with age comes an improved ability to select an environment that maximizes one's quality of life or that there may be an inherent pride from years spent creating environmental satisfaction (Brown & Roose, 2011).

The actual difference in mean scores between the youngest-old and oldest-old is relatively small and it is worth noting that, although the differences reach statistical significance, this does not necessarily reflect a clinically meaningful difference. The largest mean difference was 3.3 for the overall mean AAQ scores. When considering the possible range of scoring on the AAQ (24-120) a difference of 3.3 may not necessarily reflect an important difference in real life, despite achieving statistical significance. The large sample size used in this study is likely to explain why relatively small differences are reaching clinical significance. It is crucial to recognise that the oldest-old group, on average, still rate their attitudes to ageing and QOL positively, again contradicting typical ageing stereotypes.

Our final aim was to explore the extent to which attitudes to ageing contributes to the variance in QOL across both the youngest-old and oldest-old samples. It was hypothesised that attitudes to ageing will be a significant predictor of QOL in both youngest-old and oldest-old age groups. The results confirmed this hypothesis. The findings across both age groups mirror that which was found in the overall sample and are therefore discussed earlier. These results corroborate the

strength of the relationship between attitudes to ageing and QOL, but also indicates that the relationship between attitudes to ageing and QOL does not seem to be affected by age.

Methodological considerations

The measures incorporated have good psychometric performance in this population group (with the exception of the *Psychological Growth* domain in the AAQ) which supports the reliability of the results. While the AAQ is a relatively new measure, it is being incorporated in a growing volume of research. Similarly the WHOQOL measures have world-wide recognition. The large sample size also indicates strong external validity.

Limitations

It is acknowledged that the opportunistic sampling method used in this study may have limitations. This approach does not confirm generalisability to the general population of older adults, as there may be potential differences in the characteristics of respondents and non-respondents. Whilst a cross-sectional methodology allows for exploration of associations, it precludes conclusions being drawn about causality and therefore the direction of this relationship. Longitudinal studies would be beneficial to assess the temporal relationship between attitudes to ageing and QOL. Finally, the model of analysis in this present study only explained, at most, 66% of the variance in QOL. Other factors not considered in this study could account for the unexplained variance in QOL; for example, physical health status, emotional support, socio-economic status, cognitive or functional impairment etc. With the expanding age range of older adults and this age group therefore becoming more heterogeneous, QOL is likely to be explained by a vast range of factors (Hickey et al, 2010).

Clinical and research implications

These results highlight important research and clinical implications. It is worth recognising that in this study depression is the strongest predictor for both WHOQOL measures. Depression is negatively associated with all domains of QOL, in both the overall, oldest-old and youngest-old populations. These findings contribute to the existing evidence base which identifies depression as an influential predictor of QOL in older adults (Chachamovich et al,

2008; Chan et al, 2006; Martinez-Martin et al, 2012; Naumann & Byrne, 2004; Trentini et al, 2011). However, this current research also reveals that older adults' attitudes to ageing explain a significant amount of the variance in QOL, beyond that which depression explains. Given, the close relationship among depression, attitudes to ageing and QOL, it would be appropriate to explore the interplay between these three related yet distinct constructs; i.e. the extent to which depression mediates the relationship between attitudes to ageing and QOL. Longitudinal studies, as mentioned previously, would be beneficial to assess the temporal relationship and establish whether negative attitudes to ageing result as a consequence of poor QOL, or if indeed negative attitudes to ageing lead to poorer perceptions of QOL.

In terms of future research, the exploration of cultural differences would be of interest. The unique cross-cultural development of the WHOQOL measures and the AAQ allows for cultural comparisons to be made (Power et al, 2005). Negative ageing stereotypes are considered a western phenomenon and with eastern cultures more heavily invested in themes such as filial piety (care for one's parents) attitudes to ageing may differ globally (Laidlaw, Wang, Coelho & Power, 2010). Cross-cultural differences in attitudes to ageing have been explored (Laidlaw et al, 2010; Yun & Lachman, 2006), however, cultural variations in the relationship between the two constructs have not yet been considered. Cross-cultural studies would also allow for continued investigation into the psychometric properties of the AAQ across difference population groups. This international dataset would certainly allow for further comparative studies.

Previous research highlighted the need for geriatric health care professionals to assess and target attitudes to ageing within a psychological framework in order to improve mental health status and promote successful ageing (Bryant et al, 2012; Hickey et al, 2010; Laidlaw & Pachana, 2009). These current findings further accentuate the importance of better recognising negative attitudes to ageing within the older adult population. Appropriate psychological interventions could be provided to challenge maladaptive attitudes and promote attitude change in an attempt to improve older adults QOL. Laidlaw et al (2007) proposes that the WHOQOL-Old and AAQ could be used in conjunction to assess psychological functioning and subsequent interventions. The current findings would certainly support this suggestion, and encourage the use of these measures in clinical practice, research and service evaluation.

Promotion of attitude change should not only occur at an individual level in older adults, but at a societal level (Hickey et al, 2010), and more importantly involve professional and non-professional healthcare staff working directly with older adults. Attitudes from health care workers will impact on how older people view themselves but will also affect the treatment and quality of service offered to older adults (Gething et al, 2002). Research has revealed that older adults are less likely to be offered the appropriate health services due to under recognition and the belief from health professionals that mental and physical health difficulties are just part of growing old (Gething et al, 2002; Law et al, 2010). The misconception that mental health problems in older adults is almost inevitable must be addressed. Further, influencing ageing attitudes of younger people could prevent negative attitudes becoming self-fulfilling in old age and impacting negatively on well-being and quality of life.

Changing negative ageing attitudes, and correcting misconceptions about growing old is crucial and could be attempted through the media, government policies in old age, or via educational and training packages with healthcare staff. These strategies to promote positive perceptions of ageing and educate society on the positive experiences and views of older adults, will aid in the removal of negative attitudes to ageing. This will allow for a more flexible and richer understanding of the ageing process, promoting successful ageing and improving the health and social care of older adults.

Conclusion

Attitudes to ageing and QOL are important, distinct constructs in geriatric mental and physical health, and this study reveals the significant interaction between the two concepts. Negative ageing stereotypes would attribute poor QOL in older adults as merely a consequence of growing older. However, the results from this study contest against existing ageist beliefs, revealing that older adults generally rate their QOL highly and hold positive attitudes to ageing. The significant impact of attitudes to ageing on QOL suggests the need for better recognition of negative attitudes to ageing in older adults and the subsequent promotion of attitude change. This could be implemented through appropriate psychological interventions challenging maladaptive attitudes in an attempt to improve QOL in older adults. Attitudes to ageing among the wider society should also be targeted, and promotion of the positive experiences of ageing in order to encourage more successful ageing. The overall results encourage the combined use of AAQ and WHOQOL measures in clinical practice and gerontological research. These measures can be incorporated as assessment tools and for monitoring the effectiveness of a particular intervention or service, in order to contribute to the continued development and improvement of health care provision in older adults.

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Appendix A. Excluded studies and reasons for exclusion

Discussion/narrative review articles

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Sorrell, J. M. (2009). Aging toward happiness. *Journal of Psychosocial Nursing & Mental Health Services*, 47, 23-26.

No quantitative data collected on attitudes to ageing, ageism or age stereotypes

Cheng, S.-T., Fung, H. H., & Chan, A. C. M. (2009). Self-perception and psychological well-being: the benefits of foreseeing a worse future. *Psychology and Aging*, 24, 623-33.

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Dong, X., Chang, E. S., Wong, E., and Simon, M. (2012). The perceptions, social determinants, and negative health outcomes associated with depressive symptoms among U.S. Chinese older adults. *The Gerontologist*, 52, 650-63.

[a]Helmes, E., & Campbell, A. (2010). Differential sensitivity to administration format of measures of attitudes toward older adults. *The Gerontologist*, 50, 60-65.

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[a]Neikrug, S. M. (1998). The value of gerontological knowledge for elders: A study of the relationship between knowledge on aging and worry about the future. *Educational Gerontology*, 24, 287-296.

Pitkälä, K., Kähönen-Väre, M., Valvanne, J., Strandberg, T. E., Tilvis, R. S. (2003). Long-term changes in mood of an aged population: repeated Zung-tests during a 10-year follow-up. *Archives of Gerontology and Geriatrics*. 36, 185-195.

Does not incorporate a standardised measure of anxiety or depression

[a] Allan, L. J. & Johnson. J. A. (2009). Undergraduate Attitudes Toward the Elderly: The Role of Knowledge, Contact and Aging Anxiety. *Educational Gerontology*. 35, 1-14.

Depaola, S. J., Griffin, M., Young, J. R. & Neimeyer, R. A. (2003). Death anxiety and attitudes toward the elderly among adults: The role of gender and ethnicity. *Death Studies*. 27, 335-354.

[a]Harrison, T., Blozis, S., & Stuifbergen, A. (2008). Longitudinal predictors of attitudes toward aging among women with multiple sclerosis. *Psychology and Aging*, *23*, 823-32.

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Lu, L. (2011). Attitudes towards aging and older people's intentions to continue working: a Taiwanese study. *Career Development International*, 17, 83-98.

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Salter, C. A., & deLerma-Salter, C. (1976). Attitudes toward aging and behaviors toward the elderly among young people as a function of death anxiety. *The Gerontologist*, *16*, 232-236.

Sargent-Cox, K. A., Anstey, K. J., Luszcz, M. A. (2012). Change in Health and Self-Perceptions of Aging Over 16 Years: The Role of Psychological Resources. *Health Psychology*. 31, 423-432.

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. *International Psychogeriatrics*, 24, 1085-93.

Does not determine the relationship between attitudes to ageing or ageism, and depression or anxiety

[a]David, S., & Knight, B. G. (2008). Stress and coping among gay men: age and ethnic differences. *Psychology and Aging*, 23, 62-69.

Ghosh, P., & Dey, A. (2008). Views on aging and dying among the middle-class Bengali Hindu elderly residents of Kolkata. In S. C. Chatterjee, P. Patnaik, & V. Chariar (Eds.), *Discourses on Aging and Dying.* (pp. 186-202). New Delhi India: Sage Publications India.

Gibson, C. J., Bromberger, J. T., Weiss, G. E., Thurston, R. C., Sowers, M., & Matthews, K. A. (2011). Negative attitudes and affect do not predict elective hysterectomy: a prospective analysis from the Study of Women's Health Across the Nation. *Menopause,* 18, 499-507.

Hernandez, C. R., & Gonzalez, M. Z. (2008). Effects of intergenerational interaction on aging. *Educational Gerontology, 34,* 292-305.

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Moor, C., Zimprich, D., Schmitt, M. and Kliegel, M. (2006). Personality, aging self-perceptions and subjective health: a mediation model. *International Journal of Aging*

and Human Development, 63, *241-257.*

Paúl, C., Fonseca, A. M., Martín, I., Amado, J. (2003). Psychosocial profile of rural and urban elders in Portugal. *European Psychologist*. 8, 160-167.

Sargent-Cox, K. A, Anstey, K. J., & Luszcz, M. A. (2012). The relationship between change in self-perceptions of aging and physical functioning in older adults. *Psychology and Aging*, *27*, 750-60.

Vahia, I. V, Thompson, W. K., Depp, C. A., Allison, M., & Jeste, D. V. (2012). Developing a dimensional model for successful cognitive and emotional aging. *International Psychogeriatrics*, 24, 515-523.

Qualitative studies: no quantitative data collection or evaluation

Cheng Y, Rosenberg M. W., Wang, W., Yang, L., Li, H. (2011). Aging, health and place in residential care facilities in Beijing, China. *Social Science and Medicine*. 72, 365-372.

Silveira, E., Allebeck, P. (2001). Migration, ageing and mental health: An ethnographic study on perceptions of life satisfaction, anxiety and depression in older Somali men in east London. *International Journal of Social Welfare*. 10, 309-320.

Does not include the relevant population group (older adults)

[a] Allan, L. J. & Johnson. J. A. (2009). Undergraduate Attitudes Toward the Elderly: The Role of Knowledge, Contact and Aging Anxiety. *Educational Gerontology*. 35, 1-14.

Choi, H., Lee, D., Lee, K., Kim, H., & Ham, E. (2004). A structural model of menopausal depression in Korean women. *Archives of Psychiatric Nursing*, *18*, 235-242.

[a]David, S., & Knight, B. G. (2008). Stress and coping among gay men: age and ethnic differences. *Psychology and Aging*, 23, 62-69.

[a]Harrison, T., Blozis, S., & Stuifbergen, A. (2008). Longitudinal predictors of attitudes toward aging among women with multiple sclerosis. *Psychology and Aging*, 23, 823-32.

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[a]Neikrug, S. M. (1998). The value of gerontological knowledge for elders: A study of the relationship between knowledge on aging and worry about the future. *Educational Gerontology*, 24, 287-296.

Woods, N. F., & Mitchell, E. S. (1997). Pathways to depressed mood for midlife women: observations from the Seattle midlife women's health study. *Research in Nursing & Health*, 20, 119-129.

Full text not available

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Full text not written in English (abstract written in English)

Mayoral-Babiano, P., Macías-Núñez, J. F., Peinado-Manzanoa, M. A., Santiago-Sandoval, J. M., & López-Novoa, J. M. (2005). Relación entre el estrés oxidativo y los procesos psicológicos y sociales en personas mayores. *Revista Española de Geriatría y Gerontología*, 40, 285-290.

Schelling, H. R., Martin, M. (2008). Attitudes toward one's own aging: a question of age or a question of resources? *Zeitschrift Für Gerontologie Und Geriatrie*. 41, 38-50.

[a] Falls under more than one category for exclusion.

Appendix B. Quality criteria checklist

Criteria were developed by the author and are based on the Scottish Intercollegiate Guidelines Network methodology checklist (SIGN 50, Annex C, 2011) and largely informed by STROBE guidelines for reporting observational epidemiological studies (www.strobe-statement.org).

Well covered/addressed = 2
Adequately covered/addressed = 1
Poorly addressed, not addressed, not reported = 0
Not Applicable = N/A.

Research question

1. The study addresses an appropriate and clearly focused research question.

The research question and any secondary research questions are clearly defined (2).
The research question and any secondary research questions are adequately defined (1).
The research question and any secondary research questions are poorly defined (0).

Study design

2. The setting/location and relevant dates, including periods of recruitment and follow-up were specified.

The setting/location and dates are clearly described (2)
The setting/location and dates are adequately described (1)
The setting/location and dates are not specified or are not clear (0).

3. The inclusion and exclusion criterion for sampling and the sources and methods of selection of participants was clearly outlined.

Inclusion/exclusion criteria and sources and methods of selection are well defined (2).
Inclusion/exclusion criteria and sources and methods of selection are adequately defined (1).
Inclusion/exclusion criterion is not specified and it is unclear what criteria researchers used to obtain participants (0).

Measurement issues

4. Measures for attitudes to ageing or age stereotypes are reliable and valid.

Attitudes to ageing or age stereotype measures demonstrate high reliability and validity (2).
Attitudes to ageing or age stereotype measures demonstrate adequate reliability and validity (1).
Attitudes to ageing or age stereotypes measures demonstrate low reliability and validity OR non-standardised measures with no established psychometric properties are used (0).

5. The measures used for depression and/or anxiety were reliable, valid and standardised.

Depression and/or anxiety measures were reliable, valid and standardised (2).
Depression and/or anxiety measures demonstrate adequate reliability and validity (1).
Depression and/or anxiety measures demonstrate low reliability and validity OR non-standardised measures with no established psychometric properties are used (0).

Data and statistical analysis

6. The numbers of individuals at each stage of the study is reported (e.g. numbers potentially eligible, examined for eligibility, included in the study, completing follow-up and analysed).

The number of individuals at each stage is clearly reported (2).
The number of individuals at each stage is adequately described (1).
The number of individuals at each stage is not reported (0).

7. Characteristics of study participants e.g. demographics, health, social and other relevant characteristics is provided.

Characteristics (e.g. demographics, health, social etc.) of study participants are clearly reported (2).
Characteristics (e.g. demographics, health, social etc.) of study participants are adequately reported (1).
No detailed description of data was provided in the form of tables or summary statistics (0).

8. The study reports any missing data for each variable of interest and how this was addressed.

Missing data is clearly reported and well addressed (2).
Missing data is adequately reported and addressed (1).
Missing data is not reported or addressed (0).

9. Statistical methods to control for potential confounding factors are reported.

Statistical methods controlling for potential confounding factors are clearly reported (2)

Statistical methods controlling for potential confounding factors are adequately reported (1).

There is no evidence of controlling for potential confounding factors (0).

10. All statistical analyses are appropriate for the study design and results clearly reported (correlation co-efficient, R^2, β and p-values reported where appropriate).

The statistical analyses are appropriate for the study design and the results are clearly reported (2).

The statistical analyses are appropriate and the results are adequately reported (1).

The statistical analyses are inappropriate or the analyses carried out were not clearly reported (0).

External validity

11. The results can be generalised beyond the study to other populations, places and time periods.

Generalizability is robust and clearly reported (2).

Generalizability is adequate and discussed (1).

Generalizability is limited or not discussed (0).

12. There is recognition of biases or limitations in the study and these are discussed.

Biases or study limitations are well addressed and discussed (2).

Biases or study limitations are adequately addressed and discussed (1).

Biases or study limitations are not addressed or discussed (0).

Appendix C. STROBE guidelines

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest

Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Appendix D. Pearson's correlation co-efficient matrix for the youngest-old sample.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1																			
2	-.028	1																		
3	-.110*	-.062	1																	
4	.171*	.243*	-.055*	1																
5	.081*	.058*	-.063*	.157*	1															
6	-.162*	-.010	.104*	-.165*	-.584*	1														
7	-.019	.017	-.047*	-.035	-.276*	.210*	1													
8	-.083*	.009	.035	-.118*	-.461*	.372*	.470*	1												
9	-.157*	-.051*	.072*	-.119*	-.405*	.444*	.140*	.338*	1											
10	-.057*	.008	.099*	-.033	-.466*	.437*	.272*	.429*	.360*	1										
11	-.017	-.024	.059*	-.099*	-.560*	.495*	.384*	.458*	.351*	.638	1									
12	-.068*	.030	.066*	-.088*	-.535*	.486*	.330*	.514*	.378*	.541	.660*	1								
13	.019	-.114*	.014	-.055*	-.264*	.327*	.147*	.190*	.239*	.153	.204*	.213*	1							
14	-.074*	-.106*	.049*	-.302	-.391*	.337*	.283*	.294*	.192*	.370	.494*	.395*	.061*	1						
15	-.087*	-.050*	.086*	-.185*	-.640*	.618*	.378*	.534*	.621*	.724	.799*	.760*	.506*	.640*	1					
16	-.153*	-.039*	.104*	-.148*	-.578*	.511*	.242*	.603*	.493*	.504	.500*	.581*	.250*	.305*	.638*	1				
17	-.068*	-.071*	.058*	-.150*	-.651*	.568*	.404*	.531*	.425*	.578	.676*	.610*	.271*	.483*	.741*	.649*	1			
18	.051*	.032*	.017*	-.155*	-.459*	.430*	.310*	.382*	.319*	.423	.536*	.507*	.201*	.531*	.620*	.459*	.582*	1		
19	.003	-062*	.066*	-.132*	-.556*	.476*	.251*	.462*	.402*	.586	.623*	.532*	.227*	.397*	.669*	.588*	.653*	.518*	1	
20	-.083*	-.051*	.083*	-.170*	-.686*	.599*	.349*	.619*	.513*	.639	.699*	.676*	.289*	.480*	.801*	.862*	.860*	.681*	.857*	1

1=Age, 2=Gender, 3=Education level, 4=Martial status, 5=Depression, 6=Psychosocial loss, 7=Psychological growth, 8=Physical change, 9=Sensory abilities, 10=Autonomy, 11=Past, present & future activities, 12=Social participation, 13=Death and dying, 14=Intimacy, 15=WHOQOL-Old overall, 16=Physical health, 17=Psychological, 18=Social relationships, 19=Environment, 20=WHOQOL-BREF overall. *denotes significance at p<.01.

Appendix E. Pearson's correlation co-efficient matrix for the oldest-old sample.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1																			
2	.073	1																		
3	-.029	-.164*	1																	
4	.150*	-.375*	-.065	1																
5	.055	.055	-.059	.094*	1															
6	-.104*	-.063	.017	-.111*	-.547*	1														
7	-.041	-.026	.019	-.016	-.306*	.220*	1													
8	-.091*	-.060	.048	-.059	-.500*	.323*	.504*	1												
9	-.149*	.032	-.037	-.055	-.401*	.401*	.142*	.329*	1											
10	-.096*	-.021	.149*	.048	-.469*	.411*	.282*	.442*	.294*	1										
11	-.053	-.045	.095*	-.039	-.546*	.458*	.446*	.497*	.305*	.572*	1									
12	-.124	-.030	.034	-.024	-.574*	.487*	.377*	.558*	.375*	.543*	.667*	1								
13	.044	-.083*	-.070	-.010	-.273*	.316*	.073	.119*	.205*	.116*	.186*	.196*	1							
14	-.067	-.147*	.111*	.252*	-.305*	.225*	.316*	.298*	.135*	.302*	.472*	.336*	-.014	1						
15	-.113*	-.082*	.064	-.098*	-.649*	.584*	.405*	.558*	.611*	.687*	.789*	.776*	.466*	.586*	1					
16	-.126*	-.122*	.079*	-.084*	-.590*	.516*	.268*	.636*	.470*	.520*	.543*	.637*	.238*	.231*	.661*	1				
17	-.042	-.091*	.099*	-.051	-.654*	.549*	.432*	.573*	.406*	.556*	.660*	.631*	.247*	.381*	.722*	.644*	1			
18	-.019	.046	.002	-.047	-.425*	.386*	.296*	.360*	.261*	.358*	.488*	.436*	.168*	.404*	.536*	.417*	.540*	1		
19	.017	-.102*	.123*	-.045	-.532*	.443*	.279*	.480*	.348*	.559*	.575*	.559*	.236*	.351*	.659*	.602*	.654*	.487*	1	
20	-.071*	-.104*	.110*	-.076*	-.684*	.584*	.375*	.652*	.473*	.619*	.686*	.708*	.274*	.382*	.788*	.877*	.864*	.634*	.849*	1

1=Age, 2=Gender, 3=Education level, 4=Martial status, 5=Depression, 6=Psychosocial loss, 7=Psychological growth, 8=Physical change, 9=Sensory abilities, 10=Autonomy, 11=Past, present & future activities, 12=Social participation, 13=Death and dying, 14=Intimacy, 15=WHOQOL-Old overall, 16=Physical health, 17=Psychological, 18=Social relationships, 19=Environment, 20=WHOQOL-BREF overall. *denotes significance at p<.01.

Appendix F. Clinical Psychology Review author guidelines

CLINICAL PSYCHOLOGY REVIEW

AUTHOR INFORMATION PACK

DESCRIPTION

Clinical Psychology Review publishes substantive reviews of topics germane to **clinical psychology.** Papers cover diverse issues including: psychopathology, psychotherapy, behavior therapy, cognition and cognitive therapies, behavioral medicine, community mental health, assessment, and child development. Papers should be cutting edge and advance the science and/or practice of clinical psychology.

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Appendix G. Health and Quality of Life Outcomes author guidelines

Instructions for authors

Research Articles

Presubmission enquiries | Submission process | Preparing main manuscript text | Preparing illustrations and figures | Preparing tables | Preparing additional files | Style and language

See 'About this journal' for descriptions of different article types and information about policies and the refereeing process.

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Manuscripts for Research Articles submitted to *Health and Quality of Life Outcomes* should be divided into the following sections (in this order):

- Title page
- Abstract
- Additional non-English language abstract
- Keywords
- Background
- Methods
- Results and discussion
- Conclusions
- List of abbreviations used (if any)
- Competing interests
- Authors' contributions

- Authors' information
- Acknowledgements
- Endnotes
- References
- Illustrations and figures (if any)
- Tables and captions
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- indicate the corresponding author

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Whole issue of journal
Ponder B, Johnston S, Chodosh L (Eds): **Innovative oncology.** In *Breast Cancer Res* 1998, **10:**1-72.

Whole conference proceedings
Smith Y (Ed): *Proceedings of the First National Conference on Porous Sieves: 27-30 June 1996; Baltimore.* Stoneham: Butterworth-Heinemann; 1996.

Complete book
Margulis L: *Origin of Eukaryotic Cells.* New Haven: Yale University Press; 1970.

Monograph or book in a series
Hunninghake GW, Gadek JE: **The alveolar macrophage.** In *Cultured Human Cells and Tissues.* Edited by Harris TJR. New York: Academic Press; 1995:54-56. [Stoner G (Series Editor): *Methods and Perspectives in Cell Biology,* vol 1.]

Book with institutional author
Advisory Committee on Genetic Modification: *Annual Report.* London; 1999.

PhD thesis
Kohavi R: **Wrappers for performance enhancement and oblivious decision graphs.** *PhD thesis.* Stanford University, Computer Science Department; 1995.

Link / URL
The Mouse Tumor Biology Database [http://tumor.informatics.jax.org/mtbwi/index.do]

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Tabular data provided as additional files can be uploaded as an Excel spreadsheet (.xls) or comma separated values (.csv). As with all files, please use the standard file extensions.

Preparing additional files

Although *Health and Quality of Life Outcomes* does not restrict the length and quantity of data included in an article, we encourage authors to provide datasets, tables, movies, or other information as additional files.

Please note: All Additional files **will be published** along with the article. Do not include files such as patient consent forms, certificates of language editing, or revised versions of the main manuscript document with tracked changes. Such files should be sent by email to hqlo@biomedcentral.com, quoting the Manuscript ID number.

Results that would otherwise be indicated as "data not shown" can and should be included as additional files. Since many weblinks and URLs rapidly become broken, *Health and Quality of Life Outcomes* requires that supporting data are included as additional files, or deposited in a recognized repository. Please do not link to data on a personal/departmental website. The maximum file size for additional files is 20 MB each, and files will be virus-scanned on submission.

Additional files can be in any format, and will be downloadable from the final published article as supplied by the author. We recommend CSV rather than PDF for tabular data.

Certain supported files formats are recognized and can be displayed to the user in the browser. These include most movie formats (for users with the Quicktime plugin), mini-websites prepared according to our guidelines, chemical structure files (MOL, PDB), geographic data files (KML).

If additional material is provided, please list the following information in a separate section of the manuscript text:

- File name (e.g. Additional file 1)
- File format including the correct file extension for example .pdf, .xls, .txt, .pptx (including name and a URL of an appropriate viewer if format is unusual)
- Title of data
- Description of data

Additional files should be named "Additional file 1" and so on and should be referenced explicitly by file name within the body of the article, e.g. 'An additional movie file shows this in more detail [see Additional file 1]'.

Additional file formats

Ideally, file formats for additional files should not be platform-specific, and should be viewable using free or widely available tools. The following are examples of suitable formats.

- Additional documentation
  - PDF (Adode Acrobat)
- Animations
  - SWF (Shockwave Flash)
- Movies
  - MP4 (MPEG 4)
  - MOV (Quicktime)
- Tabular data
  - XLS, XLSX (Excel Spreadsheet)
  - CSV (Comma separated values)

As with figure files, files should be given the standard file extensions.

Mini-websites

Small self-contained websites can be submitted as additional files, in such a way that they will be browsable from within the full text HTML version of the article. In order to do this, please follow these instructions:

1. Create a folder containing a starting file called index.html (or index.htm) in the root.
2. Put all files necessary for viewing the mini-website within the folder, or sub-folders.
3. Ensure that all links are relative (ie "images/picture.jpg" rather than "/images/picture.jpg" or "http://yourdomain.net/images/picture.jpg" or "C:\Documents

and Settings\username\My Documents\mini-website\images\picture.jpg") and no link is longer than 255 characters.
4. Access the index.html file and browse around the mini-website, to ensure that the most commonly used browsers (Internet Explorer and Firefox) are able to view all parts of the mini-website without problems, it is ideal to check this on a different machine.
5. Compress the folder into a ZIP, check the file size is under 20 MB, ensure that index.html is in the root of the ZIP, and that the file has .zip extension, then submit as an additional file with your article.

Style and language

General

Currently, *Health and Quality of Life Outcomes* can only accept manuscripts written in English. Spelling should be US English or British English, but not a mixture.

There is no explicit limit on the length of articles submitted, but authors are encouraged to be concise.

Health and Quality of Life Outcomes will not edit submitted manuscripts for style or language; reviewers may advise rejection of a manuscript if it is compromised by grammatical errors. Authors are advised to write clearly and simply, and to have their article checked by colleagues before submission. In-house copyediting will be minimal. Non-native speakers of English may choose to make use of a copyediting service.

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The abstract is one of the most important parts of a manuscript. For guidance, please visit our page on Writing titles and abstracts for scientific articles.

Tim Albert has produced for BioMed Central a list of tips for writing a scientific manuscript. American Scientist also provides a list of resources for science writing. For more detailed guidance on preparing a manuscript and writing in English, please visit the BioMed Central author academy.

Abbreviations

Abbreviations should be used as sparingly as possible. They should be defined when first used and a list of abbreviations can be provided following the main manuscript text.

Typography

- Please use double line spacing.
- Type the text unjustified, without hyphenating words at line breaks.
- Use hard returns only to end headings and paragraphs, not to rearrange lines.
- Capitalize only the first word, and proper nouns, in the title.
- All pages should be numbered.

- Use the *Health and Quality of Life Outcomes* reference format.
- Footnotes are not allowed, but endnotes are permitted.
- Please do not format the text in multiple columns.
- Greek and other special characters may be included. If you are unable to reproduce a particular special character, please type out the name of the symbol in full. **Please ensure that all special characters used are embedded in the text, otherwise they will be lost during conversion to PDF.**