



Systematic Review: Are third wave approaches efficacious in reducing anxiety and/or depressive symptoms in older adults?

Empirical Paper: Exploring the relationship between attitudes to ageing, subjective health status and health-related quality of life in an international sample of older adults.

Submitted by Eloise Charlotte Barbara Perry, to the University of Exeter
as a thesis for the degree of Doctor of Clinical Psychology, September 2021

This thesis is available for Library use on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature:

A handwritten signature in black ink, consisting of a series of loops and a trailing flourish.

Acknowledgements

I want to thank my supervisors, Professor Ken Laidlaw and Dr Nick Moberly, for their guidance, encouragement and suggestions throughout this project. My thanks are also extended to Dr Ian Frampton who filled in as secondary supervisor whilst Dr Nick Moberly was on shared parental leave.

I also want to thank those who have supported me throughout this process. My parents for their constant support; Mandy, for lending a compassionate ear and providing another set of eyes for my empirical paper; Lauren, for always being willing to talk through ideas and providing much validation; and Megan, for being my personal cheerleader.

A final thanks goes to my partner, Shaun, for his unwavering support, faith, and unbelievable grammatical knowledge. I couldn't have done it without you.

Contents

LITERATURE REVIEW	8
Abstract	9
1.0 Introduction	10
1.1 Background	10
1.2 Depression in Older Adults	11
1.3 Anxiety in Older Adults	12
1.4 Treatment of Anxiety and Depression in Older Adults	12
1.5 Third Wave Approaches	13
1.6 Aims of the Current Review	15
2.0 Method	15
2.1 Eligibility Criteria	15
2.2 Search Strategy	17
2.3 Quality Rating	18
3.0 Results	19
3.1 Participants	20
3.2 Clinical Status	27
3.3 Co-morbidities	27
4.0 Critical Summary	27
4.1 Mindfulness and MBCT	27
4.2 ACT	28
4.3 DBT	29
4.4 Acceptability	30
5. Discussion	31
5.1 Overview and Existing Literature	31
5.2 Strengths and Limitations of Studies	32
5.3 Strengths and Limitations of Review	34
5.4 Implications and Future Directions	36
5.5 Conclusions	37
References	38
Appendices	49
Appendix A: Specific Database Searches	49
Appendix B: RCT of Psychotherapy Quality Rating Scale (RCT-PQRS)	51
Appendix C: Dissemination Plan	55
Appendix D: Guidelines for submission in the International Journal of Geriatric Psychiatry	56
EMPIRICAL PAPER	60
Note to Examiners	61
Abstract	62
1. Introduction	63
1.1 Background	63
1.2 Normal Ageing	63
1.3 Ageism	65
1.4 Study of Attitudes to Ageing	65
1.5 Attitudes to Ageing and Health Outcomes	66
1.6 Quality of Life	67
1.7 The Relationship Between Attitudes to Ageing and QOL	68

1.8 Aims of Current Study	69
1.9 Hypotheses	69
2.0 Method	70
2.1 Overview of Study	70
2.2 Participants	70
2.3 Measures	71
2.3.1 Attitudes to Ageing Questionnaire (AAQ)	71
2.3.2 Geriatric Depression Scale 15 (GDS-15)	71
2.3.4 Short Form Health Survey version 1 (SF-12)	72
2.4 Data Cleaning	72
2.4.1 Outlier Exploration	73
2.5 Multiple Imputation	73
2.6 Data Analysis Plan	74
3.0 Results	75
3.1 Participant Characteristics	75
3.2 Hypothesis One	75
3.3 Hypothesis Two	78
3.3.1 Psychosocial Loss	79
3.3.2 Physical Change	79
3.3.3 Psychological Growth	80
3.3.4 Summary	80
3.4 Hypothesis Three	80
3.4.1 Psychosocial Loss	81
3.4.2 Physical Change	81
3.4.3 Psychological Growth	82
3.4.4 Summary	83
3.5 Hypothesis Four	83
3.5.1 Psychosocial Loss	84
3.5.2 Physical Change	85
3.5.3 Psychological Growth	87
3.5.4 Summary	88
4. Discussion	88
4.2 Strengths and Limitations	93
4.3 Future Research Directions	94
4.4 Impact of Covid-19 on Thesis	95
4.5 Conclusions	96
References	97
Appendices	109
Appendix A: Attitudes to Ageing Questionnaire	109
Appendix B: Geriatric Depression Scale 15	112
Appendix C: Short Form Health Survey (SF-12)	113
Appendix D: Missing Data Spreadsheets	115
Appendix E: Cleaning Steps	121
Appendix F: Univariate Outlier Exploration	122
Appendix G: Multivariate Outlier Exploration	140
Appendix H: Additional Demographic Data	142
Appendix I: Original Demographic Data	143
Appendix J: Repeated Checking Thesis Proposal	144

Appendix K: Ethics approval	166
Appendix L: Quality of Life Research – Instructions for Authors.....	168

List of Tables

Literature Review

Table 1. PICOS Inclusion and Exclusion Criteria of Systematic Review.....	15
Table 2. Search Terms for Systematic Review.....	17
Table 3. Summary Table of Included Studies.....	21
Table 4. Overall Findings, Strengths and Limitations and RCT-PQRS Omnibus Quality Rating.....	23

Empirical Paper

Table 1. Total Sample Characteristics of Participants Following Database Cleaning, Split by Centre and Key Variables.....	75
Table 2. Pearson's Correlations Between Key Variables.....	76
Table 3. Health Status (Healthy or Unhealthy) by Independent Variables: Logistical Regression.....	76
Table 4. Results of T-Tests Exploring Difference in AAQ Subscale Scores Between Subjective Health Status.....	77
Table 5. Mediation Analysis of Health Status and HRQOL Through Psychosocial Loss, Including Total Effect and Full Model including mediator.....	83
Table 6. Mediation Analysis of Health Status and HRQOL Through Physical Change, Including Total Effect.....	84
Table 7. Mediation Analysis of Health Status and HRQOL Through Psychological Growth, Including Total Effect.....	86

List of Figures

Literature Review

Figure 1. PRISMA Flow Diagram of Search.....	19
----------------------------------------------	----

Empirical Paper

Figure 1. Mediation through Psychosocial Loss between health status and HRQOL.....	79
Figure 2. Mediation through Physical Change between health status and HRQOL.....	80

Figure 3. Mediation through Psychological Growth between health status and HRQOL.....	81
Figure 4. Mediation through Psychosocial Loss between health status and HRQOL (model including covariates).....	82
Figure 5. Mediation through Physical Change between health status and HRQOL (model including covariates).....	84
Figure 6. Mediation through Psychological Growth between health status and HRQOL (model including covariates).....	85



SCHOOL OF PSYCHOLOGY
DOCTORATE IN CLINICAL PSYCHOLOGY

LITERATURE REVIEW

Are third wave approaches efficacious in reducing anxiety and/or depressive symptoms in older adults?

Trainee Name: **Eloise Charlotte Barbara Perry**

Primary Research Supervisor: **Professor Ken Laidlaw**

Professor of Clinical Psychology and DClinPsy
Programme Director, University of Exeter

Secondary Research Supervisor: **Dr Nick Moberly**

Senior Lecturer, University of Exeter

Target Journal: **International Journal of Geriatric Psychiatry**

Word Count: 6599 (excluding abstract, table of contents, list of figures and tables, tables, captions for tables and figures, footnotes, references, appendices)

**Submitted in partial fulfilment of requirements for the Doctorate Degree in
Clinical Psychology, University of Exeter**

Abstract

Objective: Due to the changing demographics within society, more people are getting older than ever before. The effectiveness of psychological interventions for older adults needs to be better understood. Depression and anxiety are two of the most common mental health difficulties that older adults experience. Although the evidence base indicates that Cognitive Behavioural Therapy (CBT) is effective for late-life depression/anxiety, it is important to explore other approaches to provide older adults with greater choice in their treatment. This review seeks to explore whether third-wave approaches are efficacious in reducing depression and/or anxiety symptoms in older adults.

Methods: Guided by PRISMA-P, a systematic review was completed, with relevant articles identified using PsycINFO, Medline, Ageline, Psychology and Behavioural Sciences Collection, and Scopus. Quality of included articles was assessed using the Randomised Control Trial of Psychotherapy Quality Rating Scale.

Results: A total of eight articles met criteria for inclusion, reporting on Acceptance and Commitment Therapy (ACT), mindfulness-based therapies, and Dialectical Behavioural Therapy (DBT). Overall, it appears that third-wave approaches are efficacious in reducing depression and/or anxiety symptoms in older adults, when compared to control conditions, in addition to two studies showing similar levels of symptom reduction when compared to CBT.

Conclusions: Third wave approaches appear to be acceptable approaches for later-life depression and anxiety. More research needs to substantiate these findings, comparing against active therapies, whilst further exploring how efficacious these approaches are in the oldest-old.

Keywords: Older adults, depression, anxiety, third wave intervention

1.0 Introduction

1.1 Background

The world is experiencing a profound and irrevocable demographic change (United Nations, 2019), with people living longer than previous generations (World Health Organization, 2015). By 2050, it is thought that there will be 2.1 billion people over the age of 60, and by 2030, these older adults will outnumber children under the age of 10 (United Nations, 2017). With this shifting demographic, it is crucial to better understand and support both the physiological and psychological needs of older adults, to promote positive ageing and wellbeing in the later years of their lives.

It should be noted that there is no unified consensus when defining older adults, and it seems that this concept differs depending on the frame of reference. For example, services in the NHS tend to use 65 years as a cut off for those who are older adults, which seems to link to the historic pension age that is now rising. Conversely, research into older adults can often conceptualise older adulthood as 60 years and above (Shenkin et al., 2017). The reasons for the lack of agreement may be because the concept of an older adult is a social construct, likely influenced by culture, life expectancies and individual experiences, rather than having a biological or psychological indicator, or being based solely on chronological age. Ageing is a process, rather than a category. Additionally, even if a unified age could be agreed, this would be likely to change due to the ever-changing demographics (United Nations, 2019).

There are strongly held societal stereotypes by the young that suggest that ageing is perceived as a negative experience and one that many do not look forward to, due to its association with decline (e.g., Awang et al., 2018). In addition, there are erroneous beliefs that low mood is an inevitable part of ageing, by both individuals and health care professionals (Burroughs et al., 2006). Contrary to this, evidence seems to suggest that ageing can be a positive experience. For example, the Office for National Statistics (2016) found that older adults tend to report higher levels of happiness and life satisfaction compared to working age adults. However, although the 12 month prevalence of developing a

mood or anxiety disorder generally decreases as people get older, these difficulties still remain common (Byers et al., 2010). As such, it is important to explore how best to support older adults who may experience mood or anxiety disorders.

1.2 Depression in Older Adults

There are a number of life changes associated with aging, such as retiring from work and related changes to financial status, social status and role, the development of long-term conditions, and having closer and more frequent experiences with loss and bereavement. All of these changes may be considered risk factors for developing depression (Rodda et al., 2011). Despite this, it seems that depression in older adulthood is less common than in young or middle adulthood (Haigh et al., 2018). The prevalence of major depressive disorder in older adults varies depending on the diagnostic tool or measure used, with prevalence for all severity grades being 4.2% when using the ICD-10, and 9.6% when using the DSM-IV-TR (Sjöberg et al., 2017). Subclinical depression has been found to be 2-3 times more prevalent than major depression (Meeks et al., 2011). It should be noted that the occurrence of depression in later life is nuanced and depends on the setting in which it is being studied. Generally, higher rates of depression are found in hospital and institutional care setting (Djernes, 2006).

Evidence suggests that depression is under-recognised in older adults, and they are less readily referred to psychological therapy services than younger adults (Pettit et al., 2017). It is thought that may be due to factors such as symptoms of depression being ascribed to one's physical health and older adults being less likely to ask for help (Pocklington, 2017). It seems that depression is not only poorly recognised in older adults by those experiencing it, but also by health professionals. For example, when compared to adults of working age, GPs are less successful in identifying depression in older adults (Mitchell et al., 2010). Additionally, it appears that psychological difficulties are often considered secondary to physical health (Frost et al., 2019). Depression may also be erroneously ascribed to the process of ageing, so practitioners feel that psychological interventions are unlikely to be helpful (Collins & Corna, 2018). However, findings from

Improving Access to Psychological Therapies (IAPT) have shown that, when compared to working age adults, older adults report better outcomes (Chaplin et al., 2015). However, evidence also shows that relapse rates appear to be higher for those over 65 years, which may be the product of previous episodes and co-morbidities (Mitchell & Subramaniam, 2005). This may indicate that treatment of depression should be tailored to consider these factors.

1.3 Anxiety in Older Adults

The current evidence seems to suggest that anxiety disorders are, in general, less common in older adults than in working age adults (Wolitzky-Taylor et al., 2010). When exploring prevalence rates in older adults, prevalence varies depending on the type of anxiety, and the 12-month prevalence seems to range from 0.53% for agoraphobia, to 4.24% for a specific phobia (Grenier et al., 2019). It also seems that females are more likely than males to experience anxiety disorders in later life (Vasiliadis et al., 2020), although this pattern appears to exist irrespective of age (McLean et al., 2011).

Anxiety shows a similar pattern to depression, as it seems that recognition of anxiety disorders is harder and more complicated in later life (Balsamo et al., 2018). A number of reasons for this have been suggested, including that older adults are less likely to disclose anxiety symptoms to professionals due to stigma and physical anxiety symptoms potentially being less easy to detect due to the reduction in automatic nervous system activity (Bryant et al., 2013). In addition, older adults may have lived with anxiety for so much of their life that they do not recognise it as a problem (Bryant et al., 2013). They may also be less likely to meet the criteria of functional impairment, due to the lower societal demands related to their age, and therefore avoidance behaviours associated with anxiety may be less obvious, but no less impactful, in older adults (Witlox et al., 2020).

1.4 Treatment of Anxiety and Depression in Older Adults

The treatment of anxiety and depression in older adults is generally approached in the same way as it is for working age adults; pharmacological interventions and/or psychotherapy (Kok & Reynolds, 2017). It appears the majority of older adults with

depression are treated with antidepressant medication; Walters et al. (2018) found that 87% of older adults are prescribed medication, whilst only 3.5% are referred for psychological interventions in England. CBT is a treatment approach recommended by the National Institute of Health and Care Excellence (NICE) for both anxiety and depressive disorders (e.g., NICE, 2009, 2011). When specifically looking at the evidence of CBT for older adults, meta-analyses have indicated that CBT is effective for later-life anxiety disorders, when compared to waitlist controls (e.g., Hall et al., 2016; Hendriks et al., 2008). Similar findings exist in respect of the effectiveness of CBT for depression in older adults (e.g., Jayasekara et al., 2015). When comparing CBT between working age adults and older adults, there were no statistical differences in outcomes, indicating that CBT is an effective approach with older adults. However, effect sizes were smaller in the older adult studies suggesting that there needs to be more refinement of CBT with this population (Kishita & Laidlaw, 2017). As previously mentioned, data from IAPT services indicates that older adults seem to have better outcomes from CBT compared to working age adults, in addition to lower attrition rates (Chaplin et al., 2015).

Treatment preference is an important factor when working with anyone who may be experiencing mental health difficulties, as it may be a contributing factor in treatment engagement, satisfaction, and outcomes (Lindhiem et al., 2014). A study by Mohlman (2012) found that, overall, older adults preferred psychotherapy (or a combined approach) to medication, and that the therapy preferences varied depending on the age of the sample. This highlights the nuance between cohorts that can often be lost in older adult research. As such, although evidence indicates that CBT is an effective therapy for older adults, there needs to be a range of options for an individual to choose from, and the effectiveness of alternative options needs to be investigated so services can offer interventions with the strongest evidence.

1.5 Third Wave Approaches

Since their development in the early 2000s, third wave approaches have become increasingly popular in the literature (Dimidjian et al., 2016). Third wave therapies, which

share a number of features with CBT, tend to emphasise an individual's relationship to their own emotions and thoughts, as opposed to focusing on the content of them, which is more common in CBT (Hayes & Hofmann, 2017). They aim to help build awareness and acceptance in a non-judgmental way (Churchill et al., 2013). Some common strategies employed in third wave approaches include mindfulness exercises, cognitive defusion, and acceptance of unwanted thoughts and feelings (Hunot et al., 2013). Examples of therapies that are generally considered to be third wave approaches include: Acceptance and Commitment Therapy (ACT), Mindfulness Based Cognitive Therapy (MBCT), Compassion Focused Therapy (CFT), Metacognitive Therapy (MCT), and Dialectical Behaviour Therapy (DBT). However, there are inconsistencies in the literature in terms of what therapies may fall under the umbrella of third wave; there does not seem to be one unified and definitive list of approaches. As an example, although MCT is commonly cited as a third wave approach, Wells, who developed the intervention, does not consider it to be third wave but merely an extension of CBT (Hofmann & Asmundson, 2008).

There is evidence indicating that third wave approaches are effective with older adults, such as mindfulness-based interventions (Kishita et al., 2017), CFT (Collins et al., 2018), and ACT (Scott et al., 2016). Third wave approaches may be particularly beneficial for older adults given some of the unique issues of ageing, such as bereavements and changing physical health status (Karlin et al., 2013), whereas challenging maladaptive, but not necessarily unrealistic, thoughts in CBT may be less helpful (Petkus & Wetherell, 2013). These data also appear to be consistent with the evidence for working age adults. For example, Arch et al. (2012) compared ACT and CBT for mixed anxiety disorders and found that ACT had similar outcomes to CBT, indicating it was a highly viable alternative approach for anxiety disorders. Equally, both MBCT and CFT were found to reduce anxiety and depression in a small scale study (Frostadottir & Dorjee, 2019). However, a meta-analysis by Hunot et al. (2013) found that, although third wave approaches were comparable to CBT, these studies tended to employ poor methodology, undermining the impact of this finding. Older adults are generally an under-researched population (Mody et al., 2008), despite the

rapid changes in demographics which will only continue as time passes. This means that the therapies offered to older adults are often done so with a smaller evidence base or using findings that have been extrapolated from an unrepresentative population. It is therefore important to critically examine the evidence looking at third wave approaches that have actually been conducted with older adults.

1.6 Aims of the Current Review

Thus, the aim of the current systematic review is to investigate the literature that seeks to understand whether third wave approaches are efficacious specifically for the older adult population in the treatment of depression and/or anxiety, two of the most common psychological difficulties in this population. As such, the current systematic review will attempt to answer the following question: Are third wave approaches efficacious in reducing anxiety and/or depressive symptoms in older adults?

2.0 Method

The current systematic review has followed the Preferred Reporting Items for Systematic reviews and Meta Analyses Protocol (PRISMA-P) checklist for each stage of the systematic review (Moher et al., 2015).

2.1 Eligibility Criteria

The current systematic review sought to explore third wave intervention studies with an older adult sample. Studies must adopt a randomised control design with comparison group/s and outcomes collected at a minimum of two time points. An inclusion age of 60 years and above was used for the current study, as most psychotherapy researchers adopt this age for pragmatic recruitment purposes. Given the scope of the question, clinical samples were sought, and studies with sub-clinical samples were excluded from the review. Table 1 details the specific inclusion and exclusion criteria using PICOS used in the current review.

TABLE 1

PICOS Inclusion and Exclusion Criteria of Systematic Review

	Inclusion	Exclusion
Population	<ul style="list-style-type: none"> • Studies with a mean population age of 60+ years • Participants who are experiencing symptoms of anxiety and/or depression at baseline above clinical cut off as measured by a structured psychometric assessment. If mean baseline outcome measure score is above clinical threshold, the study can also be included. • Physical health co-morbidity that has resulted in anxiety and/or depression defined as above. 	<ul style="list-style-type: none"> • Other mental health co-morbidities e.g., personality disorder, PTSD • Primary outcomes of the study are not depression/anxiety symptoms (e.g., primary outcome of study is sleep quality, secondary outcome is depression/anxiety). If there are multiple outcomes and the paper does not specify which are primary/secondary outcomes, then study may be included^a
Intervention	<ul style="list-style-type: none"> • Third-wave approach such as mindfulness-based approaches, mindfulness based cognitive therapy (MBCT), acceptance and commitment therapy (ACT), compassion focused therapy (CFT), dialectical behavioural therapy (DBT), metacognitive therapy (MCT) or schema therapy. 	<ul style="list-style-type: none"> • Papers where the focus is CBT • Third-wave approach in combination with another type of psychotherapeutic therapy (e.g., third-wave therapy and problem solving)
Comparison	<ul style="list-style-type: none"> • Comparison between control/waitlist/TAU, which includes active and passive control group 	<ul style="list-style-type: none"> • Study has no comparison group
Outcomes	<ul style="list-style-type: none"> • Study uses a validated outcome measure for anxiety or depression pre and post intervention. Examples of validated outcome measures 	<ul style="list-style-type: none"> • Studies that collect outcomes at one time point only

	include the PHQ-9, GAD7, HADS, Geriatric Depression Scale, and the Geriatric Anxiety Scale	
Study design	<ul style="list-style-type: none"> • Intervention study delivered in an individual or group-based format, including guided self-help • Papers written up in English • Quantitative method • Randomised design 	<ul style="list-style-type: none"> • Papers unavailable in English • Studies which explore interventions that are solely self-help approaches • Within-participant designs • Qualitative method • Book chapters, government reports, conference proceedings • Case reports • Studies where full text is unavailable

^a Papers will be included if the results seem to cover depression/anxiety in similar level of detail to other included outcomes

2.2 Search Strategy

Following scoping searches of various subject specific and multidisciplinary databases, five databases were chosen for the search of the current review. These were: PsycINFO, Medline, Ageline, Psychology and Behavioural Sciences Collection, and Scopus. Searches of each database were completed in October 2020.

Search terms were refined through the scoping searches, and specific search terms are detailed in Table 2. Each section of search terms was combined with the Boolean function 'AND'. Due to the subtle differences in the database interfaces, slightly differing truncation and wildcard were used depending on the database to fit with the specific rules of the database. In addition to search terms, databases that had the facility to search subject headings or MeSH headings were also searched using relevant headings relating to population, third wave approach, and clinical presentation, to attempt to capture all appropriate papers. Appendix A details the specific search for each database. Based on the

findings of the scoping searches, only titles and abstracts were searched. This was due to the large number of irrelevant hits when full texts were searched, which appeared to be primarily related to search terms that sought to capture the older adult population.

TABLE 2

Search Terms for Systematic Review

Section	Search terms
1	“older adult” OR “elder*” OR “old age” OR “late* life” OR “ag?ing” OR “geriatric” OR “older people”
2	“third wave” OR “CFT” OR “compassion focused therapy” OR “mindful*” OR “MBCT” OR “mindfulness based cognitive therapy” OR “ACT” OR “acceptance and commitment therapy” OR “MCT” OR “metacognitive therapy” OR “DBT” OR “dialectical behavior?r therapy” OR “schema therapy”
3	Anx* OR depress* OR dysph*

The grey literature was also sought, due to the balance it can bring to a systematic review (Paez, 2017). This was done by contacting multiple authors from papers identified as appropriate for the review, and searching the PsycEXTRA database, a grey literature database for psychology, using the same search terms. This yielded no additional papers.

Six papers were checked by the primary supervisor, who acted as a second rater at the full text screening stage, using the PICOS criteria. There was 100% agreement between the first author and second rater for inclusion/exclusion in the full text screening.

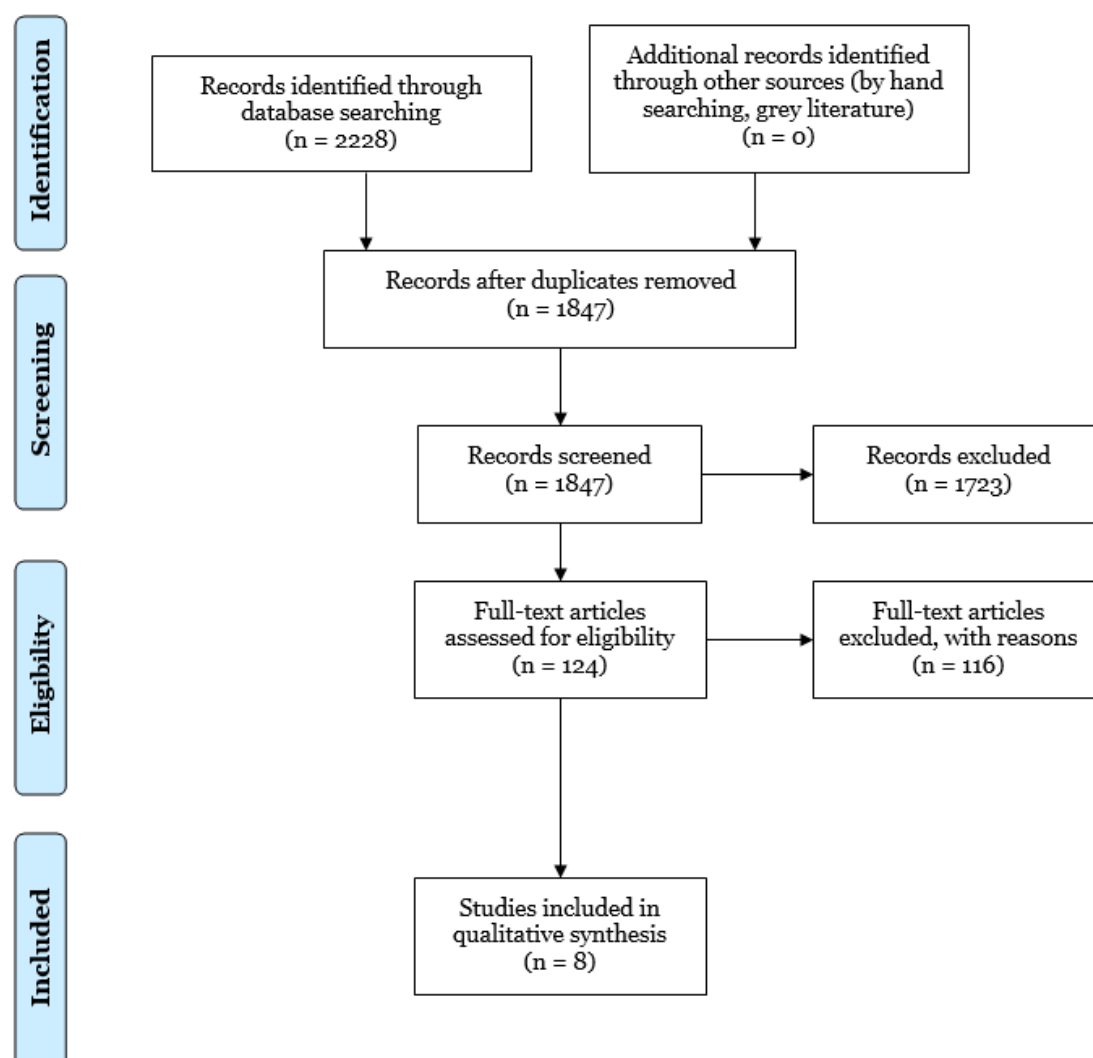
2.3 Quality Rating

To assess the quality of the papers included in the review, the Randomised Control Trial of Psychotherapy Quality Rating Scale (RCT-PQRS; Kocsis et al., 2010) was used. This tool was chosen as it provides a method of indexing the methodological quality of

psychotherapeutic intervention studies, which is the focus of the current review. The tool has been found to have good external validity, internal consistency, and inter-rater reliability (Kocsis et al., 2010). This was also found to be the case in the current review. The lead researcher and primary supervisor reviewed three of the included papers. Inter-rater reliability was calculated to be $\kappa=0.917$.

3.0 Results

A total of 2228 papers were found using the search terms above in the specified databases. No additional papers were added through grey literature channels. After deletion of duplications, 1847 titles and abstracts were screened for inclusion in the review. Following screening using PICOS criteria, 124 full texts were assessed for eligibility in the review. While many abstracts did not specify the age of the population, papers were included in full text review if they met all other criteria. Following the review of full texts, eight were identified to meet eligibility criteria and were evaluated using the RCT-PQRS. The main reason for excluding papers at full text stage was predominately due to studies having a mean population under the age of 60 years (87 studies), and thus not being a part of the target population for the review. Other reasons included anxiety/depression not being at clinical levels (27 studies), anxiety/depression not primary outcome (22 studies) no control/comparison group (21 studies) and a lack of randomised design (15 studies). Note that some studies have been included twice if they did not meet criteria for multiple reasons. Please see Figure 1 for flow diagram. Table 3 provides a summary of each study and Table 4 details each study's findings, quality rating, and some strengths and limitations of each study.

FIGURE 1*PRISMA Flow Diagram of Search***3.1 Participants**

The eight papers included a total of 473 participants. This is split between 327 females (71.4%) and 131 males (28.6%). Study 8 was excluded in determining the overall gender split, as it only reports gender split prior to a 12-week wait period, during which 6 people dropped out prior to intervention. Mean ages ranged from 61.82 years to 83 years in the eight papers. The overall mean age across studies was 69.15 years. Five of the eight

studies recruited participants living in the community, with only two studies recruiting from a retirement home or residential care setting (study 1 and study 4). Study 7 reported that 3 of 61 participants were living in either a long-term care facility or in a retirement residence, whilst the rest were living in the community, alone or with family.

TABLE 3*Summary Table of Included Studies*

Study	Author	Country of study	Mean age of participants (years)	Diagnosis	Intervention being studied	Comparison	Primary outcome/s	Number of participants (INT + COMP)	Length of follow up	Intent to treat analysis	RCT-PQRS total score
1	Ahmadpanah et al. (2017)	Iran	69.23	MMD	Detached mindfulness + SSRI	Twice weekly group leisure activities + SSRI	Depression (GDS + MADRS) Anxiety (BAI)	34 - 19 mindfulness - 17 group leisure activities	4 weeks	Yes	29
2	Franco et al. (2017)	Spain	71.82	Clinical GDS score	Mindfulness	Waitlist control	Anxiety (PSWQ, MW, WAQ) Depression (GDS)	87 - Mindfulness = 45 - WL = 42	None	No	16
3	Helmes and Ward (2017)	Australia	83	Clinical GAI score	MBCT	Standard activity programme	Anxiety (GAI + ASI) Quality of Life (WHOQOL-OLD)	52 - MCBT = 26 - standard activity programme = 26	1 month	No	29
4	Losada et al. (2015)	Spain	62.28 61.69 61.48 (overall average = 61.82)	Caregivers with clinical CES-D score	ACT	CBT	Depression (CES-D) Anxiety (Tension-Anxiety from POMS)	135 - ACT = 45 - CBT = 42 - CG = 48	6 months	No	30
5	Lynch et al. (2003)	USA	66	MDD	DBT (+ medication)	Medication and clinical management	Depression (Ham-D, BDI) Hopelessness (BHS)	34 - DBT = 17 - Medication management = 17	6 months	No	38
6	Majumdar and Morris (2019)	UK	62.7	Stroke (mean PHQ9 = clinical)	ACT	TAU	Depression (PHQ-9)	53 - ACT = 26 - TAU = 27	2 months	Yes	25
7	Torres-Platas et al. (2019)	Canada	67.8	Depression and/or anxiety (based on outcome measures)	MBCT	TAU	Depression (PHQ-9)	61 - MBCT = 32 - TAU = 29	None	No	25
8	Wetherell et al. (2011)	USA	70.8	GAD	ACT	CBT	Anxiety (HAMA, PSWQ)	15	6 months	No	33

Depression	
(BDI)	-ACT =7
QoL (Mental	-CBT =9
component of	
SF-36)	

Note. ACT – Acceptance and Commitment Therapy, ASI – Anxiety Sensitivity Index, BAI – Beck Anxiety Inventory, BDI – Beck Depression Inventory, BHS – Beck Hopelessness Scale, CAT – COPD Assessment Test, CES-D - Center for Epidemiological Studies- Depression, DBT – Dialectical Behaviour Therapy, GAD – Generalised Anxiety Disorder, GAI – Geriatric Anxiety Inventory, GDS - geriatric depression scale, HAMA – Hamilton Anxiety Rating Scale, Ham-D - Hamilton Depression Rating Scale, MADRS – Montgomery-Asberg Depression Rating Scale, MBCT – Mindfulness Based Cognitive Therapy, MMD - major mood disorder, MW – Metaworry subscale from Anxious Thoughts Inventory, PHQ-9 – Patient Health Questionnaire-9, POMS - Profile of Mood States, PSWQ – Penn State Worry Questionnaire, SF-36 – Short Form 36, TAU – Treatment as usual, WAQ – Worry and Anxiety Questionnaire, WHOQOL-OLD - World Health Organization Quality of Life Scale for Older People, WL – waitlist control

TABLE 4

Overall Findings, Strengths and Limitations and RCT-PQRS Omnibus Quality Rating

Study	Summary of findings	Strengths	Limitations	RCT-PQRS overall quality rating
1	Study found significant time x group interaction for GDS ($F = 52.05, p < .001$, large effect size) and MADRS ($F = 54.99, p < .001$, large effect size). This was also found for the BAI ($F = 41.67, p < .001$, large effect size).	Psychotropic medication controlled throughout study. Use of diagnostic interview to determine depression. Use of both self-report and clinician-reported outcome measures.	Female only sample, thus limits generalisability. Short follow up time of only 4 weeks. All participants recruited from same retirement home, potentially reducing generalisability.	Moderately good
2	Post-hoc tests indicated that the mindfulness condition was superior to the control condition, at both study completion and follow up. Statistically significant difference reported between intervention and control group following the completion of study in trait worry ($t = 4.58, p = .001$), depression ($t = 3.93, p < .005$), anxiety ($t = 3.49, p < .01$) and meta-worry ($t = 2.91, p < .05$). Repeated measures t-test indicated statistically different scores between T1 and T2 for intervention group, which was not found in control group.	Waitlist participants offered intervention following study completion. Fairly even gender split between conditions. Heterogenous education experience, thus potentially more generalisable sample.	Inferential statistics are unsophisticated, and not corrected for using Bonferroni, as an example. No follow up. Little information about what control/waitlist condition entailed. Flow meditation draws upon mindfulness and ACT.	Moderately poor
3	A 2 x 3 mixed MANOVA indicated there was a significant difference between intervention and control group. Follow up ANOVAs indicated a significant group x time interaction for GAI ($F = 31.6, p < .001$) and ASI ($F = 15.7, p < .001$). Repeated measure t-tests for the intervention group showed significant change between T1 and T2 for the GAI ($t = 13.15, p < .001, d = 3.69$), and between T1 and T3 ($t = 8.71, p < .001, d = 2.53$), but no difference was found between T2 and T3.	Participant flow is detailed, clearly citing reasons for exclusion and drop out. Inferential statistics are adjusted with Bonferroni corrections. Use of ITT analysis.	No information provided about any pharmacological treatment. Follow up period of only one month.	Moderately good

4	<p>When ACT and CBT were compared individually to the control, both were superior in terms of depressive symptom reduction (ACT vs control T1-T2 - $t = 4.40$, $p < .001$, $d = 1.17$, but not significant between T1 and T3; CBT vs control T1-T2 - $t = 3.57$, $p < .001$, $d = 0.98$; T1-T3 - $t = 2.35$, $p = .02$, $d = .74$).</p> <p>When comparing ACT and CBT, a significant difference favouring ACT was observed at T2, time by treatment effect = -3.73, $t = 2.01$, $p = .046$, $d = .50$. This was not found at T3.</p>	<p>Comparison between ACT, CBT and control group, which is advantageous given CBT is current treatment recommendation.</p> <p>Follow up time of 6 months.</p> <p>Largest sample of all of studies included in the review ($N = 135$).</p>	<p>No comparisons completed between all three conditions simultaneously.</p> <p>Sample was roughly 85% female, but likely representative of those who take on the role of caring.</p> <p>Control condition was only a one-off workshop, would be helpful to explore impact of same contact time to therapy.</p>	Moderately good
5	<p>ANOVAs indicated significant decreases in Ham-D and BDI scores for both DBT and control group from T1 to T2. DBT: Ham-D T1-T2, $F = 36.22$, $p < .006$; BDI T1-T2, $F = 14.78$, $p < .006$. Group x time interactions were not significant for T1 to T2, or T2 to T3.</p>	<p>Follow up time of 6 months.</p> <p>All participants were required to take psychotropic medication throughout, thus minimising this being an extraneous variable in the study.</p> <p>Diagnosed using a structured tool.</p> <p>Physical health comorbidities of participants noted.</p>	<p>Sample predominantly female (29 vs 5), potentially impacting the generalisability.</p> <p>Small sample, however was designed to be a pilot study.</p> <p>No intent to treat analysis.</p> <p>No measures investigating therapists' adherence to treatment.</p>	Very good
6	<p>A mixed ANOVA found significant time x group interaction for depression, favouring ACT over the control condition ($F = 3.87$, $p = .024$, partial $\eta^2 = .07$). This was significant from T1 to T2 ($F = 4.10$, $p = .048$, $\eta^2 = .07$) and T1 to T3 ($F = 5.90$, $p = .019$, $\eta^2 = .10$). No significant difference between T2 and T3 scores, indicating that gains remaining at follow up.</p>	<p>Use of intent to treat analysis.</p> <p>ACT intervention discussed in detail in paper, with further references provided.</p> <p>Sampling conducted in four different NHS sites.</p>	<p>Study explored stress in stroke survivors, potentially adding heterogeneity to review.</p> <p>No information about the degree in which control group access available options.</p> <p>Statistically significant difference between gender of two groups.</p>	Average
7	<p>Significant reduction in PHQ-9 scores at MBCT completion compared to control ($U = 179.5$, $p = .002$, $d = .86$). Secondary analysis of GAD7 scores, and a statistically significant reduction between groups ($U = -3.58$, $p = .001$, $d = .99$).</p>	<p>Clear information regarding the reasons participants were excluded.</p> <p>Information regarding the number of physical health conditions captured.</p>	<p>No follow up period.</p> <p>No information regarding reasons for dropouts.</p> <p>Study published as a letter, thus required supplementary information to gain full details of study.</p>	Average
8	<p>In ACT intervention, there was a significant difference between T1 and</p>	<p>Use of 12-week wait to control for spontaneous recovery.</p>	<p>Cannot statistically compare ACT to CBT due to sample size being too</p>	Moderately good

<p>T2 scores on the PSWQ ($z = -1.95, p = .05$) and BDI ($z = -2.13, p < .05$). There was not a significant difference on the HAMA. For CBT group, there was significant improvement on HAMA ($z = -2.02, p < .05$) and BDI ($z = -2.02, p < .05$), but not for PSWQ.</p> <p>No inferential statistics comparing groups available due to small sample size.</p>	<p>Follow up time of 6 months. Use of diagnostic interview to determine clinical status.</p>	<p>small, however was devised as a pilot study. No information detailing specific demographic information of the two samples that completed intervention.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------

3.2 Clinical Status

Three of the eight studies (studies 1, 5 and 8) reported their sample as meeting diagnostic criteria for major depressive disorder and/or anxiety disorders by using a standardised interview schedule. A further three studies (3, 4 and 7) used outcome measures above clinical cut off, such as the Geriatric Anxiety Inventory (GAI) or Patient Health Questionnaire (PHQ-9). Studies 2 and 6 were included as the average baseline outcome measures reported in the study identified that they were above a clinical cut off. Three studies had a sample with depression. Two studies had a sample with an anxiety disorder. The remaining three studies had a sample of both clinical anxiety and depression.

3.3 Co-morbidities

Two studies (5 and 7) explored a change in anxiety and/or depression symptoms within the context of another difficulty. Study 5 explored ACT (and CBT) in a sample of dementia caregivers and study 7 explored ACT in stroke survivors. The remaining studies discussed co-morbidities as part of exclusion criteria, for example, excluding other mental health conditions including psychosis, addiction, and personality difficulties. Only study 5 reported on physical health conditions present within their sample, and study 7 calculated the average number of medical problems for their sample. Long term health conditions (LTC) are common in older adults, with recent data by the Office for National Statistics (2020) indicated that 65.8% of adults over the age of 65 had at least one LTC. This may indicate that physical health co-morbidities may have been present which have not been fully captured or controlled for in the remaining studies.

4.0 Critical Summary

4.1 Mindfulness and MBCT

Four studies (1, 2, 3 and 7) looked at the impact of mindfulness-based approaches. Study 7 examined reduction in depression symptom scores (also exploring anxiety as a secondary outcome), study 3 looked at anxiety outcomes, and studies 1 and 2 considered

both depression and anxiety. Studies 3 and 7 reported on MBCT, and the remaining two studies adopted other forms of mindfulness intervention (study 2 explored flow meditation and study 7 explored detached mindfulness). All interventions were delivered in a group format.

All four studies (1, 2, 3 and 7) demonstrated that there was a statistically significant reduction in anxiety and/or depressive symptomology based on routine outcome measures over the course of the mindfulness intervention, when compared to the relevant control condition. This indicates that third-wave interventions using mindfulness techniques appear to be efficacious for symptom reduction for older adults. When looking at the effect sizes for the change between pre-intervention and post-intervention for the mindfulness-based intervention, studies 1, 2, and 7 all report large effect sizes and study 3 found very large effect sizes for the reduction of depression and anxiety scores between time 1 and time 3. This suggests that that mindfulness-based interventions are efficacious in reducing depression and anxiety symptoms in older adults.

Studies 1 and 3 explored the maintenance of gains in follow up periods of 4 weeks (study 1) and 1 month (study 3), and these findings seem to indicate that mindfulness-based interventions (detached mindfulness and MBCT) had a lasting effect on anxiety and depression symptoms, with symptom reduction being maintained at follow up. None of the studies compared the intervention against another active psychotherapy, meaning it is not possible to ascertain how a third-wave mindfulness intervention may compare against another therapy routinely offered to older adults, such as CBT. However, the evidence seems to indicate that mindfulness-based third wave approaches appear to be an effective option for older adults, resulting in a reduction in anxiety and depression symptoms compared to controls.

4.2 ACT

Three studies (4, 6 and 8) included in this review explored the impact of ACT upon symptom reduction. Study 4 explored the reduction in both anxiety and depression symptoms in dementia caregivers, study 6 explored the impact of ACT on depressive

symptoms in stroke survivors (with anxiety as a secondary outcome), and study 8 explored anxiety only. Study 6 compared ACT against TAU and study 8 compared ACT against CBT. No inferential between-group statistics were run in study 8 due to the sample size. Study 4 had three arms, comparing ACT against CBT and a non-psychotherapeutic control.

In study 4, both ACT and CBT were superior to the control condition in reducing depression symptoms, indicating that both approaches are likely to be effective for depression. When ACT and CBT were compared against one another, there were no statistically significant differences in outcome measure changes, other than ACT showed greater reductions in anxiety symptoms at intervention completion, though this was not maintained at follow up. Study 6 found that ACT resulted in a greater reduction of depression symptoms compared to TAU (usual community services such as GP or charity support). This study found that the changes were maintained between end of treatment and the two month follow up, as no statistically significant differences between these two time points were found, suggesting maintenance of gains. Study 8 did not conduct inferential statistics between groups, but found that there were significant declines in depressive symptoms in both ACT and CBT conditions independently when using Wilcoxon rank sum tests. When exploring anxiety reduction, there was a significant decline in the PSWQ in the ACT intervention, but not the HAMA. This was reversed for the CBT intervention, finding a reduction in the HAMA but not the PSWQ. All seven participants who started the trial completed ACT and five of the nine participants in the CBT arm completed the intervention.

Overall, it appears that ACT is efficacious in reducing both depression and anxiety symptoms in older adult populations, however one study explores this within stroke survivors and one in dementia caregivers, so findings should be held tentatively when considering ACT for older adults without a co-morbidity.

4.3 DBT

Only one study (5) explored whether DBT was efficacious in reducing depressive symptoms. This was tested against TAU, which was medication and clinical management. The participants in the DBT condition were all on psychotropic medication for the duration

of the study, meaning that the findings can be considered as a unique contribution of DBT, as opposed to medication being a confounding variable. When exploring the HAM-D scores, participants improved in both the DBT and medication management conditions. However, the DBT group also showed a significant decrease in self-reported depression scores, which the medication group did not. It should be noted that no significant group x time interaction was found. When looking at remission rates at follow up, a statistically significant difference was found, with more participants being in remission who were in the DBT arm compared to the medication only group. This study indicates that DBT could be an efficacious intervention for older adult with depression. However, caution needs to be taken as only one pilot study exploring DBT was included in the review and findings need to be confirmed with additional research. DBT is ordinarily a treatment approach used for those with a diagnosis of personality disorder (e.g., Stoffers-Winterling et al., 2012), which was an exclusion criteria in the current systematic review, potentially explaining the singular study included.

4.4 Acceptability

Although the review seeks to focus on whether third-wave approaches are efficacious at reducing anxiety and depression symptoms in older adults, it is important to consider whether these approaches are acceptable to this population. Two studies looked at acceptability of ACT to participants, study 4 and study 8.

Study 4 asked participants to rate satisfaction with treatment. There were no statistical differences found between ACT and CBT, indicating that third-wave approaches appear to be no less acceptable than more traditional psychological therapies used with older adults. However, those in the ACT condition rated the exercises as more difficult than participants in the CBT condition. Study 8 explored acceptability of the intervention, using attrition and the Client Satisfaction Questionnaire (CSQ). There were no dropouts in the ACT condition, whilst four participants withdrew from CBT, although there was no significant statistical difference in attrition rates. CSQ scores for both ACT and CBT were high (26.4 and 26.7 respectively), suggesting both are acceptable interventions for older adults.

5. Discussion

5.1 Overview and Existing Literature

The current systematic review sought to investigate whether third wave approaches are efficacious in reducing depression and/or anxiety symptoms at clinical levels in older adults. The review found that third wave approaches, specifically mindfulness-based approaches, ACT and DBT, overall show greater reductions in anxiety and depression symptom using validated outcome measures compared to treatment as usual or waitlist controls. In addition, two studies compared a third wave approach with CBT and found similar symptom reduction on outcomes measures. Overall, the findings seem to indicate that third wave approaches may be efficacious for older adults experiencing clinical depression or anxiety, and potentially an acceptable alternative to CBT.

These findings appear to be in line with the existing literature for third wave approaches, both with older adults and more broadly with working age adults. For example, a meta-analysis by Reangsing et al. (2020) found that mindfulness interventions reduced depression in older adults with a medium effect size. This seems to be consistent with the overall findings about mindfulness-based approaches in the current review. This is a similar finding to Kishita et al. (2017) who also looked at mindfulness based therapies on both depression and anxiety symptoms in older adults, finding moderate effect sizes, although this review included a range of study designs, such as those without a comparison group and many without an ITT analysis. There is less evidence exploring ACT in treating depression and anxiety in older adults, but a systematic review of ACT for anxiety disorders in adults indicated that ACT appears to be an effective for a range of anxiety presentations in both an individual and group format, although the author noted methodological flaws in a number of included studies, such as non-blinded treatment assignment and a lack of effect sizes reported (Swain et al., 2013). Similarly, there is little evidence exploring the role of DBT in treating depression/anxiety in older adults, as it is usually used with individuals who have a diagnosis of a personality disorder. However Lynch et al. (2007) completed a trial of DBT

with older adults: phase one was an 8-week medication trial and phase two was a RCT of DBT and medication versus medication management for those who had not responded to the medication in phase one. They found that DBT combined with medication resulted in higher remission rates from depression compared to medication management alone, suggesting that DBT can be beneficial for depression reduction, even alongside a co-morbid personality disorder.

The current findings indicate that third wave approaches, such as mindfulness and ACT are efficacious in symptoms reduction, and it might be that these approaches are particularly beneficial for an older adult population. For example, a key aspect of ACT which can be seen in the hexaflex model suggests focusing on ones values and 'committed action' towards their values. It may be that because older adults are aware of their decreasing time left (as per the socioemotional selectivity theory (Carstensen, Isaacowitz & Charles, 1999)), they are more orientated to living their life in a way that is consistent with their values (Roberts & Sedley, 2015). As such, third wave approaches like ACT may be a better therapeutic fit with older adults. Additionally, the process of ageing may mean that individuals experience a range of physical and mental co-morbidities, so third wave therapies which are transdiagnostic might be better able to support a range of presenting difficulties in this population (Roberts & Sedley, 2015). As individuals age, they will experience challenges of ageing as a process and a transition. For some, the transition will be more challenging, not just because of the presence of physical changes and potentially worsening physical health, but the psychological attributions towards ageing and negative ageing stereotypes. It is in this intersection of the psychology of ageing, physical state, and mental health status that third wave approaches may find enhanced acceptability, relevance and efficacy with older adults.

5.2 Strengths and Limitations of Studies

Generally, the majority of studies included in the current review were of a good standard, which may be partly a product of the PICOS criteria of the review, such as requiring them to have a randomized design, a comparison group, and validated outcome

measures for inclusion. This means that potential bias is reduced and findings can be trusted. However, it is important to acknowledge some of the limitations of the included studies in this review. The majority of included studies have mean sample ages of 60-70 years old, so caution needs to be taken in extrapolating these findings to all older adult cohorts. The studies focus on younger older adults as opposed to the oldest-old, who are often categorised as those over 80 years (Donisi et al., 2021; Rizzoli et al., 2014). Given the changing demographics within society, specifically that the oldest-old will be the fastest increasing section of the population (Office for National Statistics, 2018), these samples may not line up with the reality of the demographic shift happening. The oldest-old are likely to face more of the challenges of ageing (e.g., development of additional long-term conditions, bereavements, moving to care facilities) and it may be that third wave approaches could better meet the needs of this subsection of older adults, given their focus on acceptance. However, there is little evidence to confirm or deny this in the current review.

Another limitation is that there are several third wave approaches that have not been represented within the current review, such as MCT and CFT, limiting the ability to comment on how efficacious third wave approaches on reducing depression/anxiety symptomology generally. This might be the product of the lack of high-quality randomized control trials being conducted with this population, as evidence indicates that older adults are an under-researched population (e.g., Keum, 2018). As such, tentative conclusions need to be drawn when discussing third wave approaches overall in terms of how efficacious they are in reducing symptoms in older adults. The current studies all have small sample sizes, and therefore some caution must be taken when interpreting and extrapolating findings, as they may not be truly representative of the population as a whole. Further, the studies had a gender split of approximately 70% females to 30% males, meaning that there should be hesitation when extrapolating to those who identify as male. However, this may be understandable given that evidence indicated that there are more older adults who are female than male, with the Centre for Ageing Better (2019) indicating that the population split was 55% females to 45% males in over 65s. This imbalance may also be a product of

gender differences in help-seeking behaviours, as evidence has indicated that men like psychotherapy less than women, potentially due to the requirement of sharing emotions in therapy (Liddon et al., 2018). These findings were found in working-age adults, so it may be these views are more pronounced within older adults due to cohort beliefs.

As previously mentioned, the lack of information regarding participant co-morbidities is a weakness. It is not uncommon for older adults to experience long-term physical health conditions, as previously detailed by recent evidence from the Office for National Statistics (2020) indicating that approximately 65% of surveyed older adults had at least one condition. Experiencing a LTC may be a risk factor for the development of depression or anxiety (Colasanti et al., 2010; Wolitzky-Taylor et al., 2010), although this is not a certainty. As many studies have not captured this information, it is hard to understand if LTC influence how efficacious third wave interventions are. The majority of studies in the review also did not compare against an active psychological therapy, meaning that it is difficult to fully ascertain how third wave approaches compare to existing interventions, such as CBT, and thus only tentative conclusions can be drawn. As such, it would be important for further evidence to demonstrate how efficacious third-wave approaches are when compared to more traditional psychotherapeutic interventions.

5.3 Strengths and Limitations of Review

A strength of the current review is that a tool specifically seeking to review the quality of psychotherapy studies used in RCT was utilised to quantify methodological quality. As such, studies including the criteria are objectively measured for their methodological rigour. Furthermore, the majority of items in the RCT-PRQS were relevant when assessing study quality. Additionally, a range of databases were searched to capture different subsections of the research fields to maximise the studies for the review. However, there are some limitations to the search strategy and inclusion criteria used. One potential limitation is the way in which the inclusion criterion of age was determined. Inclusion criteria required the mean age of the sample to be above 60 years, but did not exclude studies that had younger participants, meaning that there are likely to be some individuals who would not be

categorized as an older adult included. This was to ensure that as many studies as possible that would likely capture the demographic and effectively answer the question were included, given that older adults are under-researched. Of the eight studies included, only two featured any participants who were under the age of 60, so they are a minority in the review.

The current study sought to have rigorous criteria regarding the participants being of a clinical status, however there was flexibility in terms of how clinical status was determined. The approach could have been to only include studies that used a diagnostic interview; however, this again would have severely limited the number of studies in the review. As such, a more flexible approach was decided upon, accepting studies where they were deemed to include participants with clinical levels of depression/anxiety as determined by an outcome measure or if a mean baseline outcome measure score was in a clinical range. There are limitations to this, as it may be that studies captured samples that may not have had clinical levels of depression and/or anxiety if using diagnostic criteria and these latter methods are likely to be less valid than the use of a tool such as the SCID. However, the use of outcome measures is reflective of how many mental health services are set up, using questionnaire scores as a way of determining if they meet the referral threshold, so may reflect those accessing clinical services.

It is important to note that most studies included in the review included participants from Western cultures which potentially limits the cross-cultural generalisability of the findings. The lack of studies in this review might be a product of differing views or stigma related to mental health difficulties and psychological therapy (e.g., Yang, 2007), or in conceptualising mental health (e.g., Martin, 2009). This may impact the amount of research exploring the efficaciousness of third wave approaches in non-Western locations being conducted. Given there is a limited amount of evidence from non-Western studies, caution should be taken when generalising the findings to minorities, until further research can substantiate the current findings.

Lastly, it is unfortunate that no grey literature was obtained for the review, as often this can reduce the potential impact of publication bias (Paez, 2017). Although the primary researcher sought this, searches and requests yielded no responses.

5.4 Implications and Future Directions

The current systematic review seems to suggest that third wave approaches, specifically ACT, mindfulness, and DBT, appear to be efficacious in reducing symptoms of depression/anxiety. However, given the above limitations, these findings should be held tentatively. Older adults are often underrepresented in mental health services (Horackova et al., 2019) and there needs to be improvement in the identification of depression and anxiety in older adults. However, also providing a range of efficacious treatments and giving an individual more choice may further enhance treatment engagement, even though older adults appear to be far less likely to drop out of therapy than working age adults (Chaplin et al., 2015). Third wave techniques such as acceptance and mindfulness have been argued to be more consistent with the emotion regulation strategies of older adults and approaches in line with strengths is thought to be more effective (Geiger et al., 2016), so these may be beneficial approaches for services to offer.

Future research in this field would benefit from focusing on a range of other third wave therapies to understand which of these approaches are efficacious, in addition to trials comparing third wave approaches against therapeutic comparators such as CBT to understand if any approach is superior. Studies exploring the mechanisms of treatment effects would also be important to understand. Equally, further exploring the acceptability of these approaches for older adults will likely be advantageous in determining which range of treatment approaches should be offered in mental health services for older adults. Given the ageing population, it is imperative that research studies seek to recruit the oldest-old and explore how efficacious these therapies are for this growing demographic in the population that is often unrepresented in research. Additionally, exploring third wave approaches with specialist populations, such as older adults with co-morbidities, for example dementia and stroke-survivors would also be advantageous. Future research should also seek to explore

efficaciousness of third wave approaches in a range of older adults from different cultural backgrounds, specifically non-Western cultures. Finally, it is important that, as time passes, RCTs are repeated, as the differing beliefs and experiences of separate cohorts of older adults might factor into how effective third wave treatment are, including perceived stigma and changing stereotypes and self-stereotypes of older adulthood.

5.5 Conclusions

To sum up, this is one of the few systematic reviews that seeks to explore how efficacious third wave approaches are in reducing depression and anxiety symptoms that reach a clinical threshold in older adults, reviewing the quality of papers using a tool appropriate for psychotherapeutic RCTs. The findings indicate that third wave approaches appear to be efficacious compared to waitlist controls and treatment as usual and appear to be acceptable approaches for older adults. When compared to CBT, third wave approaches seem to show similar reductions in depression/anxiety symptoms, although further evidence needs to confirm this as only two papers compared against CBT in the current review. Future research should seek to replicate the findings, given the small number of studies, with a focus on exploring other third wave approaches and against other psychological therapies, in addition to researching how efficacious these approaches are for the oldest old, in which there is a dearth of evidence.

References

- Ahmadpanah, M., Akbari, T., Akhondi, A., Haghighi, M., Jahangard, L., Sadeghi Bahmani, D., Bajoghli, H., Holsboer-Trachsler, E., & Brand, S. (2017). Detached mindfulness reduced both depression and anxiety in elderly women with major depressive disorders. *Psychiatry Research*, 257, 87–94. <https://doi.org/10.1016/j.psychres.2017.07.030>
- Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., & Craske, M. G. (2012). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology*, 80(5), 750–765. <https://doi.org/10.1037/a0028310>
- Awang, H., Mansor, N., Peng, T. N., & Osman, N. A. N. (2018). Understanding ageing: Fear of chronic diseases later in life. *Journal of International Medical Research*, 46(1), 175–184. <https://doi.org/10.1177/0300060517710857>
- Balsamo, M., Cataldi, F., Carlucci, L., & Fairfield, B. (2018). Assessment of anxiety in older adults: a review of self-report measures. *Clinical Interventions in Aging*, 13, 573–593. <https://doi.org/10.2147/CIA.S114100>
- Bryant, C., Mohlman, J., Gum, A., Stanley, M., Beekman, A. T. F., Wetherell, J. L., Thorp, S. R., Flint, A. J., & Lenze, E. J. (2013). Anxiety disorders in older adults: Looking to DSM5 and beyond. *American Journal of Geriatric Psychiatry*, 21(9), 872–876. <https://doi.org/10.1016/j.jagp.2013.01.011>
- Burroughs, H., Lovell, K., Morley, M., Baldwin, R., Burns, A., & Chew-Graham, C. (2006). “Justifiable depression”: How primary care professionals and patients view late-life depression? A qualitative study. *Family Practice*, 23(3), 369–377. <https://doi.org/10.1093/fampra/cmi115>
- Byers, A. L., Yaffe, K., Covinsky, K. E., Friedman, M. B., & Bruce, M. L. (2010). High occurrence of mood and anxiety disorders among older adults: The National Comorbidity Survey Replication. *Archives of General Psychiatry*, 67(5), 489–496. <https://doi.org/10.1001/archgenpsychiatry.2010.35>
- Centre for Ageing Better. (2019). *The State of Ageing in 2019: Adding life to our years*.

<https://www.ageing-better.org.uk/sites/default/files/2019-11/The-State-of-Ageing-2019-Adding-life-to-our-years.pdf>

Chaplin, R., Farquharson, L., Clapp, M., & Crawford, M. (2015). Comparison of access, outcomes and experiences of older adults and working age adults in psychological therapy. *International Journal of Geriatric Psychiatry*, 30(2), 178–184.

<https://doi.org/10.1002/gps.4122>

Churchill, R., Moore, T. H. M., Furukawa, T. A., Caldwell, D. M., Davies, P., Jones, H., Shinohara, K., Imai, H., Lewis, G., & Hunot, V. (2013). “Third wave” cognitive and behavioural therapies versus treatment as usual for depression. In *Cochrane Database of Systematic Reviews* (10). <https://doi.org/10.1002/14651858.CD008705.pub2>

Colasanti, V., Marianetti, M., Micacchi, F., Amabile, G. A., & Mina, C. (2010). Tests for the evaluation of depression in the elderly: A systematic review. *Archives of Gerontology and Geriatrics*, 50(2), 227–230. <https://doi.org/10.1016/j.archger.2009.04.001>

Collins, N., & Corna, L. (2018). General practitioner referral of older patients to Improving Access to Psychological Therapies (IAPT): an exploratory qualitative study. *BJPsych Bulletin*, 42(3), 115–118. <https://doi.org/10.1192/bjb.2018.10>

Collins, R. N., Gilligan, L. J., & Poz, R. (2018). The Evaluation of a Compassion-Focused Therapy Group for Couples Experiencing a Dementia Diagnosis. *Clinical Gerontologist*, 41(5), 474–486. <https://doi.org/10.1080/07317115.2017.1397830>

Dimidjian, S., Arch, J. J., Schneider, R. L., Desormeau, P., Felder, J. N., & Segal, Z. V. (2016). Considering Meta-Analysis, Meaning, and Metaphor: A Systematic Review and Critical Examination of “Third Wave” Cognitive and Behavioral Therapies. In *Behavior Therapy*, 47(6), 886–905. <https://doi.org/10.1016/j.beth.2016.07.002>

Djernes, J. K. (2006). Prevalence and predictors of depression in populations of elderly: a review. *Acta Psychiatrica Scandinavica*, 113(5), 372–387. <https://doi.org/10.1111/j.1600-0447.2006.00770.x>

Donisi, V., Tedeschi, F., Gonzalez-Caballero, J. L., Cresswell-Smith, J., Lara, E., Miret, M., Forsman, A. K., Wahlbeck, K., Amaddeo, F., & Kalseth, J. (2021). Is Mental Well-Being

- in the Oldest Old Different from That in Younger Age Groups? Exploring the Mental Well-Being of the Oldest-Old Population in Europe. *Journal of Happiness Studies*, 22(4), 1693–1717. <https://doi.org/10.1007/s10902-020-00292-y>
- Franco, C., Amutio, A., Mañas, I., Gázquez, J. J., & Pérez-Fuentes, M. D. C. (2017). Reducing anxiety, geriatric depression and worry in a sample of older adults through a mindfulness training program. *Terapia Psicológica*, 35(1), 71–79. <https://doi.org/10.4067/S0718-48082017000100007>
- Frost, R., Bhanu, C., Walters, K., Beattie, A., & Ben-Shlomo, Y. (2019). Management of depression and referral of older people to psychological therapies: A systematic review of qualitative studies. *British Journal of General Practice*, 69(680), E171–E181. <https://doi.org/10.3399/bjgp19X701297>
- Frostadottir, A. D., & Dorjee, D. (2019). Effects of Mindfulness Based Cognitive Therapy (MBCT) and Compassion Focused Therapy (CFT) on Symptom Change, Mindfulness, Self-Compassion, and Rumination in Clients With Depression, Anxiety, and Stress. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.01099>
- Geiger, P. J., Boggero, I. A., Brake, C. A., Caldera, C. A., Combs, H. L., Peters, J. R., & Baer, R. A. (2016). Mindfulness-Based Interventions for Older Adults: a Review of the Effects on Physical and Emotional Well-Being. *Mindfulness*, 7(2), 296–307. <https://doi.org/10.1007/s12671-015-0444-1>
- Grenier, S., Payette, M., Gunther, B., Askari, S., Desjardins, F. F., Raymond, B., & Berbiche, D. (2019). Association of age and gender with anxiety disorders in older adults: A systematic review and meta-analysis. *International Journal of Geriatric Psychiatry*, 34(3), 397–407. <https://doi.org/10.1002/gps.5035>
- Haigh, E. A. P., Bogucki, O. E., Sigmon, S. T., & Blazer, D. G. (2018). Depression Among Older Adults: A 20-Year Update on Five Common Myths and Misconceptions. *American Journal of Geriatric Psychiatry*, 26(1), 107–122. <https://doi.org/10.1016/j.jagp.2017.06.011>
- Hall, J., Kellett, S., Berrios, R., Bains, M. K., & Scott, S. (2016). Efficacy of Cognitive

- Behavioral Therapy for Generalized Anxiety Disorder in Older Adults: Systematic Review, Meta-Analysis, and Meta-Regression. *The American Journal of Geriatric Psychiatry*, 24(11), 1063–1073. <https://doi.org/10.1016/j.jagp.2016.06.006>
- Hayes, S. C., & Hofmann, S. G. (2017). The third wave of cognitive behavioral therapy and the rise of process-based care. *World Psychiatry*, 16(3), 245–246. <https://doi.org/10.1002/wps.20442>
- Helmes, E., & Ward, B. G. (2017). Mindfulness-based cognitive therapy for anxiety symptoms in older adults in residential care. *Aging & Mental Health*, 21(3), 272–278. <https://doi.org/10.1080/13607863.2015.1111862>
- Hendriks, G. J., Oude Voshaar, R. C., Keijsers, G. P. J., Hoogduin, C. A. L., & van Balkom, A. J. L. M. (2008). Cognitive-behavioural therapy for late-life anxiety disorders: a systematic review and meta-analysis. *Acta Psychiatrica Scandinavica*, 117(6), 403–411. <https://doi.org/10.1111/j.1600-0447.2008.01190.x>
- Hofmann, S. G., & Asmundson, G. J. G. (2008). Acceptance and mindfulness-based therapy: New wave or old hat? *Clinical Psychology Review*, 28(1), 1–16. <https://doi.org/10.1016/j.cpr.2007.09.003>
- Horackova, K., Kopecek, M., Machů, V., Kagstrom, A., Aarsland, D., Motlova, L. B., & Cermakova, P. (2019). Prevalence of late-life depression and gap in mental health service use across European regions. *European Psychiatry*, 57, 19–25. <https://doi.org/10.1016/j.eurpsy.2018.12.002>
- Hunot, V., Moore, T. H. M., Caldwell, D. M., Furukawa, T. A., Davies, P., Jones, H., Honyashiki, M., Chen, P., Lewis, G., & Churchill, R. (2013). “Third wave” cognitive and behavioural therapies versus other psychological therapies for depression. *Cochrane Database of Systematic Reviews*, (10). <https://doi.org/10.1002/14651858.CD008704.pub2>
- Jayasekara, R., Procter, N., Harrison, J., Skelton, K., Hampel, S., Draper, R., & Deuter, K. (2015). Cognitive behavioural therapy for older adults with depression: A review. *Journal of Mental Health*, 24(3), 168–171.

<https://doi.org/10.3109/09638237.2014.971143>

Karlin, B. E., Walser, R. D., Yesavage, J., Zhang, A., Trockel, M., & Taylor, C. B. (2013).

Effectiveness of acceptance and commitment therapy for depression: Comparison among older and younger veterans. *Aging and Mental Health*, 17(5), 555–563.

<https://doi.org/10.1080/13607863.2013.789002>

Keum, B. T. H. (2018). Older adult research in the Journal of Counseling Psychology, The Counseling Psychologist, and Counselling Psychology Quarterly: A 15-year review and implications for research. *Counselling Psychology Quarterly*, 31(4), 446–459.

<https://doi.org/10.1080/09515070.2017.1324762>

Kishita, N., & Laidlaw, K. (2017). Cognitive behaviour therapy for generalized anxiety disorder: Is CBT equally efficacious in adults of working age and older adults? *Clinical Psychology Review*, 52, 124–136. <https://doi.org/10.1016/j.cpr.2017.01.003>

Kishita, N., Takei, Y., & Stewart, I. (2017). A meta-analysis of third wave mindfulness-based cognitive behavioral therapies for older people. *International Journal of Geriatric Psychiatry*, 32(12), 1352–1361. <https://doi.org/10.1002/gps.4621>

Kocsis, J. H., Gerber, A. J., Milrod, B., Roose, S. P., Barber, J., Thase, M. E., Perkins, P., & Leon, A. C. (2010). A new scale for assessing the quality of randomized clinical trials of psychotherapy. *Comprehensive Psychiatry*, 51(3), 319–324.

<https://doi.org/10.1016/J.COMPPSYCH.2009.07.001>

Kok, R. M., & Reynolds, C. F. (2017). Management of depression in older adults: A review. In *JAMA - Journal of the American Medical Association* (Vol. 317, Issue 20, pp. 2114–2122). American Medical Association. <https://doi.org/10.1001/jama.2017.5706>

Liddon, L., Kinglerlee, R., & Barry, J. A. (2018). Gender differences in preferences for psychological treatment, coping strategies, and triggers to help-seeking. *British Journal of Clinical Psychology*, 57(1), 42–58. <https://doi.org/10.1111/bjc.12147>

Lindhiem, O., Bennett, C. B., Trentacosta, C. J., & McLearn, C. (2014). Client preferences affect treatment satisfaction, completion, and clinical outcome: A meta-analysis. *Clinical Psychology Review*, 34(6), 506–517.

<https://doi.org/10.1016/j.cpr.2014.06.002>

Losada, A., Márquez-González, M., Romero-Moreno, R., Mausbach, B. T., López, J., Fernández-Fernández, V., & Nogales-González, C. (2015). Cognitive-behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for dementia family caregivers with significant depressive symptoms: Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 83*(4), 760–772.

<https://doi.org/10.1037/ccp0000028>

Lynch, T. R., Cheavens, J. S., Cukrowicz, K. C., Thorp, S. R., Bronner, L., & Beyer, J. (2007). Treatment of older adults with co-morbid personality disorder and depression: A dialectical behavior therapy approach. *International Journal of Geriatric Psychiatry, 22*(2), 131–143. <https://doi.org/10.1002/gps.1703>

Lynch, T. R., Morse, J. Q., Mendelson, T., & Robins, C. J. (2003). Dialectical behavior therapy for depressed older adults: A randomized pilot study. *American Journal of Geriatric Psychiatry, 11*(1), 33–45. <https://doi.org/10.1097/00019442-200301000-00006>

Majumdar, S., & Morris, R. (2019). Brief group-based acceptance and commitment therapy for stroke survivors. *British Journal of Clinical Psychology, 58*(1), 70–90.

<https://doi.org/10.1111/bjc.12198>

Martin, S. S. (2009). Illness of the mind or illness of the spirit? Mental health-related conceptualization and practices of older Iranian immigrants. *Health & social work, 34*(2), 117-126. <https://doi.org/10.1093/hsw/34.2.117>

McLean, C. P., Asnaani, A., Litz, B. T., & Hofmann, S. G. (2011). Gender differences in anxiety disorders: Prevalence, course of illness, comorbidity and burden of illness. *Journal of Psychiatric Research, 45*(8), 1027–1035.

<https://doi.org/10.1016/j.jpsychires.2011.03.006>

Meeks, T. W., Vahia, I. V., Lavretsky, H., Kulkarni, G., & Jeste, D. V. (2011). A tune in “a minor” can “b major”: A review of epidemiology, illness course, and public health implications of subthreshold depression in older adults. *Journal of Affective Disorders,*

129(1–3), 126–142. <https://doi.org/10.1016/j.jad.2010.09.015>

Mitchell, A. J., Rao, S., & Vaze, A. (2010). Do Primary Care Physicians Have Particular Difficulty Identifying Late-Life Depression? A Meta-Analysis Stratified by Age.

Psychotherapy and Psychosomatics, 79(5), 285–294.

<https://doi.org/10.1159/000318295>

Mitchell, A. J., & Subramaniam, H. (2005). Prognosis of depression in old age compared to middle age: A systematic review of comparative studies. *American Journal of*

Psychiatry, 162(9), 1588–1601. <https://doi.org/10.1176/appi.ajp.162.9.1588>

Mody, L., Miller, D. K., McGloin, J. M., Freeman, M., Marcantonio, E. R., Magaziner, J., & Studenski, S. (2008). Recruitment and retention of older adults in aging research.

Journal of the American Geriatrics Society, 56(12), 2340–2348.

<https://doi.org/10.1111/j.1532-5415.2008.02015.x>

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P.,

Stewart, L. A., & PRISMA-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*,

4(1), 1–9. <https://doi.org/10.1186/2046-4053-4-1>

Mohlman, J. (2012). A community based survey of older adults' preferences for treatment of anxiety. *Psychology and Aging*, 27(4), 1182–1190. <https://doi.org/10.1037/a0023126>

NICE. (2009). *Depression in adults: recognition and Depression in adults: recognition and management management* [NICE Guidance No. CG90].

<https://www.nice.org.uk/guidance/cg90>

National Institute for Health and Care Excellence. (2011). *Generalised anxiety disorder and panic disorder in adults: management* [NICE Guideline No. CG113].

<https://www.nice.org.uk/guidance/cg113>

Office for National Statistics. (2016). *Measuring National Well-being: At what age is Personal Well-being the highest?*

<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/measuringnationalwellbeing/atwhatageispersonalwellbeingthehighest>

Office for National Statistics. (2018). *Living longer: how our population is changing and why it matters*.

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing/articles/livinglongerhowourpopulationischangingandwhyitmatters/2018-08-13>

Office for National Statistics. (2020). *People with long-term health conditions, UK: January to December 2019 - Office for National Statistics*.

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/adhocs/11478peoplewithlongtermhealthconditionsukjanuarytodecember2019>

Paez, A. (2017). Gray literature: An important resource in systematic reviews. *Journal of Evidence-Based Medicine*, 10(3), 233–240. <https://doi.org/10.1111/jebm.12266>

Petkus, A. J., & Wetherell, J. L. (2013). Acceptance and Commitment Therapy With Older Adults: Rationale and Considerations. *Cognitive and behavioural practice*, 20(1), 47–56. <https://doi.org/10.1016/j.cbpra.2011.07.004>

Pettit, S., Qureshi, A., Lee, W., Byng, R., Gibson, A., Stirzaker, A., & Henley, W. (2017). Variation in referral and access to new psychological therapy services by age: An empirical quantitative study. *British Journal of General Practice*, 67(660), e453–e459. <https://doi.org/10.3399/bjgp17X691361>

Pocklington, C. (2017). Depression in older adults. *British Journal of Medical Practitioners*, 10(1), a1007.

Reangsing, C., Rittiwong, T., & Schneider, J. K. (2020). Effects of mindfulness meditation interventions on depression in older adults: A meta-analysis. *Aging and Mental Health* 1–10. <https://doi.org/10.1080/13607863.2020.1793901>

Rizzoli, R., Branco, J., Brandi, M. L., Boonen, S., Bruyère, O., Cacoub, P., Cooper, C., Diez-Perez, A., Duder, J., Fielding, R. A., Harvey, N. C., Hilgsmann, M., Kanis, J. A., Petermans, J., Ringe, J. D., Tsouderos, Y., Weinman, J., & Reginster, J. Y. (2014). Management of osteoporosis of the oldest old. *Osteoporosis International*, 25(11), 2507–2529. <https://doi.org/10.1007/s00198-014-2755-9>

- Roberts, S. L., & Sedley, B. (2016). Acceptance and commitment therapy with older adults: Rationale and case study of an 89-year-old with depression and generalized anxiety disorder. *Clinical case studies*, 15(1), 53-67. <https://doi.org/10.1177/1534650115589754>
- Rodda, J., Walker, Z., & Carter, J. (2011). Depression in older adults. *BMJ*, 343(7825). <https://doi.org/10.1136/bmj.d5219>
- Shenkin, S. D., Harrison, J. K., Wilkinson, T., Dodds, R. M., & Ioannidis, J. P. (2017). Systematic reviews: guidance relevant for studies of older people. *Age and ageing*, 46(5), 722-728. <https://doi.org/10.1093/ageing/afx105>
- Scott, W., Daly, A., Yu, L., & McCracken, L. M. (2016). Treatment of Chronic Pain for Adults 65 and Over: Analyses of Outcomes and Changes in Psychological Flexibility Following Interdisciplinary Acceptance and Commitment Therapy (ACT). *Pain Medicine*, 18(2), 252-264. <https://doi.org/10.1093/pm/pnw073>
- Sjöberg, L., Karlsson, B., Atti, A. R., Skoog, I., Fratiglioni, L., & Wang, H. X. (2017). Prevalence of depression: Comparisons of different depression definitions in population-based samples of older adults. *Journal of Affective Disorders*, 221, 123–131. <https://doi.org/10.1016/j.jad.2017.06.011>
- Stoffers-Winterling, J. M., Völm, B. A., Rücker, G., Timmer, A., Huband, N., & Lieb, K. (2012). Psychological therapies for people with borderline personality disorder. *Cochrane Database of Systematic Reviews*, (8). <https://doi.org/10.1002/14651858.CD005652.pub2>
- Swain, J., Hancock, K., Hainsworth, C., & Bowman, J. (2013). Acceptance and Commitment Therapy in the treatment of anxiety: A systematic review. *Clinical Psychology Review*, 33(8), 965–978. <https://doi.org/10.1016/j.cpr.2013.07.002>
- Torres-Platas, S. G., Escobar, S., Belliveau, C., Wu, J., Sasi, N., Fotso, J., Potes, A., Thomas, Z., Goodman, A., Looper, K., Segal, M., Berlim, M., Vasudev, A., Moscovitz, N., & Rej, S. (2019). Mindfulness-Based Cognitive Therapy Intervention for the Treatment of Late-Life Depression and Anxiety Symptoms in Primary Care: A Randomized Controlled Trial. *Psychotherapy and Psychosomatics*, 88(4), 254–256.

<https://doi.org/10.1159/000501214>

United Nations. (2017). *World Population Ageing 2017: Highlights*.

https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf

United Nations (2019). *World Population Ageing 2019: Highlights*.

<https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf>

Vasiliadis, H. M., Desjardins, F., Roberge, P., & Grenier, S. (2020). Sex Differences in Anxiety Disorders in Older Adults. *Current Psychiatry Reports*, 22(12), 1–9.

<https://doi.org/10.1007/s11920-020-01203-x>

Walters, K., Falcaro, M., Freemantle, N., King, M., & Ben-Shlomo, Y. (2018).

Sociodemographic inequalities in the management of depression in adults aged 55 and over: An analysis of English primary care data. *Psychological Medicine*, 48(9), 1504–1513. <https://doi.org/10.1017/S0033291717003014>

Wetherell, J. L., Afari, N., Ayers, C. R., Stoddard, J. A., Ruberg, J., Sorrell, J. T., Liu, L.,

Petkus, A. J., Thorp, S. R., Kraft, A., & Patterson, T. L. (2011). Acceptance and Commitment Therapy for generalized anxiety disorder in older adults: a preliminary report. *Behavior Therapy*, 42(1), 127–134.

<https://doi.org/https://dx.doi.org/10.1016/j.beth.2010.07.002>

Witlox, M., Garnefski, N., Kraaij, V., Simou, M., Dusseldorp, E., Bohlmeijer, E., & Spinhoven,

P. (2020). Prevalence of anxiety disorders and subthreshold anxiety throughout later life: Systematic review and meta-analysis. *Psychology and Aging*.

<https://doi.org/10.1037/pag0000529>

Wolitzky-Taylor, K. B., Castriotta, N., Lenze, E. J., Stanley, M. A., & Craske, M. G. (2010).

Anxiety disorders in older adults: a comprehensive review. *Depression and Anxiety*, 27(2), 190–211. <https://doi.org/10.1002/da.20653>

World Health Organization. (2015). *World report on Ageing And Health*.

<https://www.who.int/ageing/events/world-report-2015-launch/en/>

Yang, L. H. (2007). Application of mental illness stigma theory to Chinese societies: synthesis and new direction. *Singapore medical journal*, 48(11), 977-985.

Appendices

Appendix A: Specific Database Searches

Ageline (via ebsco)– 01.10.2020 – 213 hits

Search terms (combined with AND):

1. ABSTRACT + TITLE ["older adult" OR elder* OR "old age" OR "late* life" OR ag#ing OR geriatric OR "older people"] AND
2. ABSTRACT + TITLE ["third wave" OR CFT OR "compassion focused therapy" OR mindful* OR MBCT OR "mindfulness based cognitive therapy" OR ACT OR "acceptance and commitment therapy" OR MCT OR "metacognitive therapy" OR DBT OR "dialectical behavior#r therapy" OR "schema therapy"] AND
3. ABSTRACT + TITLE [anx* OR depress* OR dysph*]

No subject headings searched – as ageline does not use subject headings

Medline (PubMed)– 01.10.20 – 1346 hits

Search terms:

1. ABSTRACT + TITLE ["older adult" OR elder* OR "old age" OR "late life" OR ag?ing OR geriatric OR "older people"] AND
2. ABSTRACT + TITLE ["third wave" OR CFT OR "compassion focused therapy" OR mindful* OR MBCT OR "mindfulness based cognitive therapy" OR ACT OR "acceptance commitment therapy" OR MCT OR "metacognitive therapy" OR DBT OR "dialectical behavior#r therapy" OR "schema therapy"] AND
3. ABSTRACT + TITLE [anxiety OR depress* OR dysph*]

MeSH headings (combined with relevant search terms using OR):

- "Dialectical Behavior Therapy" OR "Mindfulness" OR "Acceptance and Commitment Therapy" OR
- "Anxiety" OR "Depressive Disorder" OR "Depression" OR "Anxiety Disorders"
- "Aged" OR "Aged, 80 and over" OR "Geriatric Psychiatry" OR "Geriatrics"

PsycINFO (Ovid) – 01.10.20 – 416 hits

Search terms:

1. TEXT WORD (older ADJ adult) OR elder* OR (old ADJ age) OR (late* ADJ life) OR ag?ing OR geriatric OR (older ADJ people) AND
2. TEXT WORD (third ADJ wave) OR CFT OR (compassion ADJ focused) OR mindful* OR MBCT OR "mindfulness based cognitive therapy" OR ACT OR "acceptance and commitment therapy" OR MCT OR "metacognitive therapy" OR DBT OR "dialectical behavior#r therapy" OR "schema therapy"] AND
3. TEXT WORD [anx* OR depress* OR dysph*]

Text word = abstract + title

Subject headings used (combined with relevant search terms using OR):

1. Gerontology OR Geriatrics
2. Mindfulness-Based Interventions OR exp Mindfulness OR Dialectical Behavior Therapy OR Schema Therapy OR "Acceptance and Commitment Therapy"
3. "Depression (Emotion)" OR Major Depression OR Late Life Depression OR Anxiety Disorders OR Anxiety

Scopus – 02.10.20 – 155 hits

Search terms:

1. ARTICLE TITLE, ABSTRACT, KEYWORD {older adult} OR elder* OR {old age} OR {late life} OR ag\$ing OR geriatric OR {older people}
2. ARTICLE TITLE, ABSTRACT, KEYWORD {third wave} OR cft OR {compassion focused therapy} OR mindful* OR mbct OR {mindfulness based cognitive therapy} OR act OR {acceptance and commitment therapy} OR mct OR {metacognitive therapy} OR dbt OR {dialectical behavio\$r therapy}
3. ARTICLE TITLE, ABSTRACT, KEYWORD anx* OR depress* OR dysph*

Searches not limited by anything

Psychology and Behavioral Sciences Collection (ESBCO) – 02.10.20 – 98 hits

Search terms (combined with AND):

1. TITLE + ABSTRACT/AUTHOR-SUPPLIED ABSTRACT ["older adult" OR elder* OR "old age" OR "late* life" OR ag#ing OR geriatric OR "older people"] AND
2. TITLE + ABSTRACT/AUTHOR-SUPPLIED ABSTRACT ["third wave" OR CFT OR "compassion focused therapy" OR mindful* OR MBCT OR "mindfulness based cognitive therapy" OR ACT OR "acceptance and commitment therapy" OR MCT OR "metacognitive therapy" OR DBT OR "dialectical behavio#r therapy" OR "schema therapy"] AND
3. TITLE + ABSTRACT/AUTHOR-SUPPLIED ABSTRACT [anx* OR depress* OR dysph*]

Grey literature searches

PsycEXTRA (ovid) – 01.10.20 – 16 hits

1. TEXT WORD (older ADJ adult) OR elder* OR (old ADJ age) OR (late* ADJ life) OR ag?ing OR geriatric OR (older ADJ people) AND
2. TEXT WORD (third ADJ wave) OR CFT OR (compassion ADJ focused) OR mindful* OR MBCT OR "mindfulness based cognitive therapy" OR ACT OR "acceptance and commitment therapy" OR MCT OR "metacognitive therapy" OR DBT OR "dialectical behavio#r therapy" OR "schema therapy"] AND
3. TEXT WORD [anx* OR depress* OR dysph*]

Appendix B: RCT of Psychotherapy Quality Rating Scale (RCT-PQRS)

This scale is designed solely for the purpose of rating [randomized controlled trials](#) that aim to evaluate the effectiveness of [psychodynamic psychotherapy](#). Please rate all items on the basis of the 1 or more designated articles describing the study. Items 4, 5, 9, and 16 specifically rate the *description* of certain elements of the study. All other items are designed to capture both *description* and *quality* of the study's elements. For these items, when nonstandard elements are described, *adequate justification* of this measure or method is required to score a 2.

Description of subjects

Item 1. Diagnostic method and criteria for inclusion and exclusion

0 = poor description and inappropriate method/criteria

1 = full description *or* appropriate method/criteria

2 = full description *and* appropriate method/criteria

Item 2. Documentation or demonstration of reliability of diagnostic methodology

0 = poor or no reliability documentation

1 = brief reliability documentation (documentation in the literature is sufficient, even if it is not explicitly cited)

2 = full reliability documentation (documentation of within-study reliability necessary)

Item 3. Description of relevant comorbidities

0 = poor or no description of relevant comorbidities

1 = brief description of relevant comorbidities

2 = full description of relevant comorbidities

Item 4. Description of numbers of subjects screened, included, and excluded

0 = poor or no description of numbers screened, included, and excluded

1 = brief description of numbers screened, included, and excluded

2 = full description of numbers screened, included, and excluded

Definition and delivery of treatment

Item 5. Treatment(s) (including control/comparison groups) are sufficiently described or referenced to allow for replication

0 = poor or no treatment description or references

1 = brief treatment description or references (also if full description of one group and poor description of another)

2 = full treatment description or references (manual not required)

Item 6. Method to demonstrate that treatment being studied is treatment being delivered (only satisfied by supervision if transcripts or tapes are explicitly reviewed)

0 = poor or no adherence reporting

1 = brief adherence reporting with standardized measure *or* full adherence reporting with nonstandardized measure (eg, nonindependent rater)

2 = full adherence reporting with standardized measure (must be quantitative and completed by an independent rater)

Item 7. Therapist training and level of experience in the treatment(s) under investigation

0 = poor description and underqualified therapists

1 = full description *or* well-qualified therapists

2 = full description *and* well-qualified therapists

Item 8. Therapist supervision while treatment is being provided

0 = poor description and inadequate therapist supervision

1 = full description *or* adequate therapist supervision

2 = full description *and* adequate therapist supervision

Item 9. Description of concurrent treatments (eg, medication) allowed and administered during course of study (if patients on medication are included, a rating of 2 requires full reporting of what medications were used; if patients on medications are excluded, this alone is sufficient for a rating of 2).

0 = poor or no description of concurrent treatments

1 = brief description of concurrent treatments

2 = full description of concurrent treatments

Outcome measures

Item 10. Validated outcome measure(s) (either established or newly standardized)

0 = poor or no validation of outcome measure(s)

1 = brief validation of outcome measure(s) (shown or cited)

2 = full validation of outcome measure(s) (shown or cited)

Item 11. Primary outcome measure(s) specified in advance (although does not need to be stated explicitly for a rating of 2)

0 = poor or no specification of primary outcome measure(s) in advance

1 = brief specification of primary outcome measure(s) in advance

2 = full specification of primary outcome measure(s) in advance

Item 12. Outcome assessment by raters blinded to treatment group and with established reliability

0 = poor or no blinding of raters to treatment group (eg, rating by therapist, nonblind independent rater, or patient self-report) and reliability not reported

1 = blinding of independent raters to treatment group *or* established reliability

2 = blinding of independent raters to treatment group *and* established reliability

Item 13. Discussion of safety and adverse events during study treatment(s)

0 = poor or no discussion of safety and adverse events

1 = brief discussion of safety and adverse events

2 = full discussion of safety and adverse events

Item 14. Assessment of long-term posttermination outcome (should not be penalized for failure to follow comparison group if this is a wait-list or nontreatment group that is subsequently referred for active treatment)

0 = poor or no posttermination assessment of outcome

1 = medium-term assessment of posttermination outcome (2-12 months posttermination)

2 = long-term assessment of posttermination outcome (≥ 12 months posttermination)

Data analysis

Item 15. Intent-to-treat method for data analysis involving primary outcome measure

0 = no description or no intent-to-treat analysis with primary outcome measure

1 = partial intent-to-treat analysis with primary outcome measure

2 = full intent-to-treat analysis with primary outcome measure

Item 16. Description of dropouts and withdrawals

0 = poor or no description of dropouts and withdrawals

1 = brief description of dropouts and withdrawals

2 = full description of dropouts and withdrawals (must be explicitly stated and include reasons for dropouts and withdrawals)

Item 17. Appropriate statistical tests (eg, use of Bonferroni correction, longitudinal data analysis, adjustment only for a priori identified confounders)

0 = inappropriate statistics, extensive data dredging, or no information about appropriateness of statistics

1 = moderately appropriate, though unsophisticated, statistics and/or moderate data dredging

2 = fully appropriate statistics and minimal data dredging in primary findings

Item 18. Adequate sample size

0 = inadequate justification and inadequate sample size

1 = adequate justification *or* adequate sample size

2 = adequate justification *and* adequate sample size

Item 19. Appropriate consideration of therapist and site effects

0 = therapist and site effects not discussed or considered

1 = therapist and site effects discussed *or* considered statistically

2 = therapist and site effects discussed *and* considered statistically

Treatment assignment

Item 20. A priori relevant hypotheses that justify comparison group(s)

0 = poor or no justification of comparison group(s)

1 = brief or incomplete justification of comparison group(s)

2 = full justification of comparison group(s)
Item 21. Comparison group(s) from same population and time frame as experimental group
0 = comparison group(s) from significantly different population and/or time frame
1 = comparison group(s) from moderately different population and/or time frame
2 = comparison group(s) from same population and time frame
Item 22. Randomized assignment to treatment groups
0 = poor (eg, pseudo-randomization, sequential assignment) or no randomization
1 = adequate but poorly defined randomization procedure
2 = full and appropriate method of randomization performed after screening and baseline assessment
Overall quality of study
Item 23. Balance of allegiance to types of treatment by practitioners
0 = no information or poor balance of allegiance to treatments by study therapists (eg, therapy in experimental and control groups both administered by therapists with strong allegiance to therapy being tested in the experimental group)
1 = some balance of allegiance to treatments by study therapists
2 = full balance of allegiance to treatments (eg, therapies administered by therapists with allegiance to respective techniques)
Item 24. Conclusions of study justified by sample, measures, and data analysis, as presented (note: useful to look at conclusions as stated in study abstract)
0 = poor or no justification of conclusions from results as presented or insufficient information to evaluate (eg, sample or treatment insufficiently documented, data analysis does not support conclusions, or numbers of withdrawals or dropouts makes findings unsupportable)
1 = some conclusions of study justified or partial information presented to evaluate
2 = all conclusions of study justified and complete information presented to evaluate
Item 25. Omnibus rating: please provide an overall rating of the <i>quality of the study</i> , taking into account the adequacy of description, the quality of study design, data analysis, and justification of conclusions.
1 = exceptionally poor
2 = very poor
3 = moderately poor
4 = average
5 = moderately good
6 = very good
7 = exceptionally good

Appendix C: Dissemination Plan

The results of this systematic review will be submitted to the International Journal of Geriatric Psychiatry for dissemination to the wider academic community. Prior to this, the findings will be disseminated via a presentation to DClinPsy Trainees and Staff in June 2021.

Appendix D: Guidelines for submission in the International Journal of Geriatric Psychiatry

AIMS AND SCOPE

The rapidly increasing world population of aged people has led to a growing need to focus attention on the problems of mental disorder in late life. The aim of the International Journal of Geriatric Psychiatry is to communicate the results of original research in the causes, treatment and care of all forms of mental disorder which affect the elderly. The Journal is of interest to psychiatrists, psychologists, social scientists, nurses and others engaged in therapeutic professions, together with general neurobiological researchers.

The Journal provides an international perspective on the important issue of geriatric psychiatry, and contributions are published from countries throughout the world. Topics covered include epidemiology of mental disorders in old age, clinical aetiological research, post-mortem pathological and neurochemical studies, treatment trials and evaluation of geriatric psychiatry services.

Further information about the Journal, including links to the online sample copy and contents pages, can be found on the Journal homepage.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

All tables, figures, supporting information and bibliographic entries must have a reference in the text. Tables and figures should be numbered (Figure 1, Table 1, Supplementary Figure 1). The journal prefers tables to be included in the main document after the reference list, each on an individual page alongside their legend. The journal prefers figures to be uploaded as individual files rather than included in the main document. However authors should indicate clearly where figures/tables should be inserted in the main document. All figures and tables must be accompanied by a legend. Word limits below include the main text and exclude tables, figure/table legends and references.

i. Research Articles

Research articles are the journal's primary mode of scientific communication. Peer-review of these will be handled by the most appropriate Editor.

Manuscript structure: Abstract (250 words max); Introduction; Materials and Methods; Results; Discussion; Acknowledgements; References; Tables; List of figure captions; List of supporting information legends. Overall combined limit of 6 figures/tables. Word limit: 3500 words.

ii. Review Article

The review articles published by the journal are characterised by the following: (i) high quality methodology; (ii) novelty in terms of the scope and content compared with other published reviews; (iii) coverage of an area of particular clinical and/or scientific importance; (iv) there being sufficient papers in the literature to make the review informative; and (v) the ability to make well supported conclusions of clinical and/or scientific importance. All reviews are subject to the same process of editorial and peer review as research articles.

Manuscript structure: Abstract (250 words max); Introduction; Content-appropriate headings; Acknowledgements; References; Tables; List of figure captions; List of supporting information legends. Overall combined limit of 6 figures/tables and 150 references. Word limit: 4500 words.

iii. Letter to the Editor

Letters to the Editor may be in response to issues arising from recently published articles, or short, free-standing pieces expressing an opinion.

Manuscript structure: No abstract; one continuous section with content-specific headings if needed. Overall combined limit of 1 figure/table. Word limit: 700 words.

iv. Commentary

Manuscript structure: No abstract; one continuous section with content-specific headings if needed. Word limit: 4500 words.

v. Editorial

Manuscript structure: No abstract; one continuous section with content-specific headings if needed. Word limit: 3500 words.

File formats

Manuscripts can be uploaded either as a single document (containing the main text, tables and figures), or with figures and tables provided as separate files. Should your manuscript reach revision stage, figures and tables must be provided as separate files. The main manuscript file can be submitted in Microsoft Word (.doc or .docx) or LaTeX (.tex) format.

If submitting your manuscript file in LaTeX format via Research Exchange, select the file designation “Main Document – LaTeX .tex File” on upload. When submitting a LaTeX Main Document, you must also provide a PDF version of the manuscript for Peer Review. Please upload this file as “Main Document - LaTeX PDF.” All supporting files that are referred to in the LaTeX Main Document should be uploaded as a “LaTeX Supplementary File.”

Cover Letters and Conflict of Interest statements may be provided as separate files, included in the manuscript, or provided as free text in the submission system. A statement of funding (including grant numbers, if applicable) should be included in the “Acknowledgements” section of your manuscript.

4. PREPARING YOUR SUBMISSION**Cover Letters**

Cover letters are not mandatory; however, they may be supplied at the author's discretion.

Main Text Format

Recommended format for optimal review:

- i. A short informative title containing the major key words. The title should not contain abbreviations (see Wiley's [best practice SEO tips](#));
- ii. A short running title of less than 50 characters;
- iii. The full names of the authors;
- iv. The author's institutional affiliations where the work was conducted, with a footnote for the author's present address if different from where the work was conducted;
- v. The corresponding author details;
- vi. The word count of the body text;
- vii. Acknowledgments;
- viii. The name(s) of any sponsor(s) of the research contained in the paper, along with grant number(s);
- ix. Abstract, keywords and key-points;
- x. Main text;
- xi. References;
- xii. Tables (each table complete with title and footnotes);
- xiii. Figure legends;
- xiv. Appendices (if relevant).

Figures and supporting information should be supplied as separate files.

Authorship

Please refer to the journal's Authorship policy in the Editorial Policies and Ethical Considerations section for details on author listing eligibility. On initial submission, the submitting author will be prompted to provide the email address and country for all contributing authors.

Acknowledgments

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section. Financial and material support should also be mentioned. Thanks to anonymous reviewers are not appropriate.

Conflict of Interest Statement

Authors will be asked to provide a conflict of interest statement during the submission process. For details on what to include in this section, see the 'Conflict of Interest' section in the Editorial Policies and Ethical Considerations section below. Submitting authors should ensure they liaise with all co-authors to confirm agreement with the final statement.

Abstract

Abstracts are required for research and review articles. They must not exceed 250 words and should be divided into the following sections: 'Objectives', 'Methods'/'Design', 'Results', and 'Conclusions'.

Keywords

Please provide 3-10 keywords – the 'Keywords' section should be listed after the abstract in the main document and also entered into the submission system.

Key points

Please provide up to 4 key points – there should be listed after the keywords in the main document.

Main Text

Authors may submit using English UK or English US as spelling of accepted papers is converted during the production process, however this should be consistent throughout. See section 3 for information on manuscript types, word limits and other requirements. See Section 3: Manuscript categories and requirements for information on manuscript types, structure, word limit and other requirements.

References

All references should be numbered consecutively in order of appearance and should be as complete as possible. In text citations should cite references in consecutive order using Arabic superscript numerals.

For more information about this reference style, please see the AMA Manual of Style.

Reference examples follow:

Journal article

1. King VM, Armstrong DM, Apps R, Trott JR. Numerical aspects of pontine, lateral reticular, and inferior olivary projections to two paravermal cortical zones of the cat cerebellum. *J Comp Neurol* 1998;390:537-551.

Book

2. Voet D, Voet JG. *Biochemistry*. New York: John Wiley & Sons; 1990. 1223 p.

Please note that journal title abbreviations should conform to the practices of Chemical Abstracts.

Internet Document

1.

American Cancer Society. *Cancer Facts & Figures* 2003.

<http://www.cancer.org/downloads/STT/CAFF2003PWSecured.pdf>. Accessed March 3, 2003.

Tables

Tables should be self-contained and complement, not duplicate, information contained in the text. They should be supplied as editable files, not pasted as images. Legends should be concise but comprehensive – the table, legend, and footnotes must be understandable without reference to the text. All abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order) and *, **, *** should be reserved for P-values. Statistical measures such as SD or SEM should be identified in the headings.

Figure Legends

Legends should be concise but comprehensive – the figure and its legend must be understandable without reference to the text. Include definitions of any symbols used and define/explain all abbreviations and units of measurement.

Figures

Although authors are encouraged to send the highest-quality figures possible, for peer-review purposes, a wide variety of formats, sizes, and resolutions are accepted. [Click here](#) for the basic figure requirements for figures submitted with manuscripts for initial peer review, as well as the more detailed post-acceptance figure requirements.

Figures submitted as a colour original will appear in colour in the Journal's online edition free of charge. Colour figures will be printed in the Journal on the condition that authors contribute to the associated costs: £350 for the first page; £150 for each subsequent page thereafter. Corresponding authors will be invoiced post-publication.

Guidelines for Cover Submissions

If you would like to send suggestions for artwork related to your manuscript to be considered to appear on the cover of the journal, [please follow these general guidelines](#).

Additional Files

Appendices

Appendices will be published after the references. For submission they should be supplied as separate files but referred to in the text.

Supporting Information

Supporting information is information that is not essential to the article, but provides greater depth and background. It is hosted online and appears without editing or typesetting. It may include tables, figures, videos, datasets, etc.

[Click here](#) for Wiley's FAQs on supporting information.

Note: if data, scripts, or other artefacts used to generate the analyses presented in the paper are available via a publicly available data repository, authors should include a reference to the location of the material within their paper.

General Style Points

The following points provide general advice on formatting and style.

- **Abbreviations:** In general, terms should not be abbreviated unless they are used repeatedly and the abbreviation is helpful to the reader. Initially, use the word in full, followed by the abbreviation in parentheses. Thereafter use the abbreviation only.
- **Units of measurement:** Measurements should be given in SI or SI-derived units. Visit the [Bureau International des Poids et Mesures \(BIPM\) website](#) for more information about SI units.
- **Numbers:** numbers under 10 are spelt out, except for: measurements with a unit (8mmol/l); age (6 weeks old), or lists with other numbers (11 dogs, 9 cats, 4 gerbils).
- **Trade Names:** Chemical substances should be referred to by the generic name only. Trade names should not be used. Drugs should be referred to by their generic names. If proprietary drugs have been used in the study, refer to these by their generic name, mentioning the proprietary name and the name and location of the manufacturer in parentheses.

Article Preparation Support

[Wiley Editing Services](#) offers expert help with English Language Editing, as well as translation, manuscript formatting, figure illustration, figure formatting, and graphical abstract design – so you can submit your manuscript with confidence.

Also, check out our resources for [Preparing Your Article](#) for general guidance about writing and preparing your manuscript.



SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

EMPIRICAL PAPER

Exploring the relationship between attitudes to ageing, subjective health status and health-related quality of life in an international sample of older adults.

Trainee Name: Eloise Charlotte Barbara Perry

Primary Research Supervisor: Professor Ken Laidlaw

Professor of Clinical Psychology and DClinPsy
Programme Director, University of Exeter

Secondary Research Supervisor: Dr Nick Moberly

Senior Lecturer, University of Exeter

Target Journal: Quality of Life Research

Word Count: 8545 words (excluding abstract, table of contents, list of figures, headings, captions for tables and figures, digits within tables, footnotes, references, appendices)

**Submitted in partial fulfilment of requirements for the Doctorate Degree in
Clinical Psychology, University of Exeter**

Note to Examiners

Following exploring the DClinPsy handbook and on discussion with Professor Ken Laidlaw and then with Dr Cordet Smart, it seems that the handbook did not specify what would be classified as words within tables. We felt that digits (e.g., 78) are not technically words, but written out (e.g., seventy-eight) would be considered a word. As such, any words within the tables have been included within the word count, but digits have been excluded.

Abstract

Objectives: People are living longer than ever before, meaning the experiences and challenges of older adults need to be further explored. Older adults have a relationship to their own ageing experience which can influence their feelings, thoughts, and behaviours. Evidence indicates that negative attitudes towards ageing are associated with poor physical and psychological outcomes and that poorer health is associated with lower quality of life (QOL) and health-related quality of life (HRQOL). Thus, research should further investigate the relationship between ageing attitudes, health status, and HRQOL.

Methods: A secondary data analysis ($N=5144$) of a cross-sectional international database explored the relationship between the attitudes to ageing questionnaire (AAQ), subjective health status, and HRQOL, in addition to exploring the contribution of depression status to this. Missing data was managed using multiple imputation. Data was analysed using logistic regression, independent t-tests, and mediation analyses.

Results: Jointly, AAQ domains, HRQOL, and depression status correctly predict health status in 79% of cases. Those who consider themselves healthy have a statistically different AAQ profile (lower Psychosocial Loss scores, and higher Physical Change and Psychological Growth scores). Mediation analyses indicate statistically significant partial mediations between health status and HRQOL, with and without covariates including age, gender, depression, and recruitment centre. Effect sizes indicate very small magnitudes for the Psychological Growth domain, and when all covariates were included all domain effect sizes were small.

Conclusions: This study provides further support for the relationship between ageing attitudes, health status, and HRQOL, suggesting that positive attitudes are associated with better subjective health. Clinical implications are presented, both for clinicians working with older adults and on a broader societal level, alongside areas for future research.

Keywords: Older adults, attitudes to ageing, quality of life, health status

1. Introduction

1.1 Background

The world is currently experiencing an unprecedented and irreversible demographic transition (United Nations, 2019). People are living longer than previous generations, resulting in a profound increase in the oldest old compared to other sections of society. Projections indicate that there will be an additional 8.6 million adults over the age of 65 within the next 50 years (Office for National Statistics [ONS], 2018), and that the number of people aged 80 years and older will triple from 143 million to 426 million by 2050 (United Nations, 2019).

An ageing population is a triumph, highlighting positive societal improvements, including medical advancements, reducing childhood deaths in low- and middle-income countries, and declining deaths in older adults in higher-income countries (World Health Organization [WHO], 2015). Research has often focused on working age adults, rather than older adults. However, due to changing demographics, it is becoming increasingly important to understand the specific needs, strengths, and challenges of the oldest in society to aid strategies and interventions to promote positive ageing and wellbeing. This is important for clinicians, as more therapists will encounter older adults in their practice. Clinicians will need to develop competencies in the unique issues within this population and adaptations to therapy, whilst also understanding normal ageing (Karel et al., 2012; Laidlaw & Pachana, 2009).

1.2 Normal Ageing

To better appreciate the needs of older adults, normal ageing needs to be examined. Although physical health can decline with age, mental health seems to improve (Thomas et al., 2016), termed the ageing paradox. One explanation for this is that improvements in emotional regulation skills may buffer daily stresses related to changing physical functioning and health (J. Li et al., 2021). The socioemotional selectivity theory (SST; Carstensen, 2006; Carstensen et al., 1999), a lifespan theory of motivation, postulates that an individual's goals,

cognitive process, and preferences change as the individual's remaining time decreases. When time is perceived to be short, people focus on goals that optimise psychological wellbeing and from which they derive emotional meaning, rather than future focused goals and the pursuit of knowledge. This is indirectly supported by Carstensen et al. (2011), who found that as people age they become better at regulating emotions and that ageing is associated with greater emotional wellbeing. Additionally, research has indicated that older adults are more likely to recall positive information, termed the positivity effect (e.g., Carstensen & DeLiema, 2018; Carstensen & Mikels, 2005). Also, Isaacowitz and colleagues (2006) found that, compared to younger individuals, older adults showed an attentional preference towards happy faces and away from angry faces. The authors suggest that this demonstrates a motivated difference in attention that may be related to getting older, attempting to elevate wellbeing through focusing on positive stimuli.

Although SST provides some theoretical insight into the increase in wellbeing in older adults, the authors postulate that people reaching older adulthood may perceive that they have approximately 20 years left (Burnett-Wolle & Godbey, 2007). With more of the population living more than 80 years, those reaching older adulthood now may perceive themselves to have more than 20 years remaining. This could influence the U-shaped pattern of wellbeing. Moreover, an individual's awareness of their own ageing may influence the activation of this theory and changing motivations (Diehl et al., 2014).

Evidence also suggests that older adults are happier than their younger counterparts. The ONS (2016) found that life satisfaction and happiness decrease in middle age and increase again as individuals reach 60, refuting the idea that being old is a negative experience. Blanchflower (2021) has found this U-shaped pattern to exist in both developed and developing countries, when controlling for and excluding additional variables, including gender and education. However, there are some critiques to Blanchflower's research methods. Specifically, Jebb et al. (2020) have argued that Blanchflower only considers life satisfaction and neglects positive and negative affect, when all three are required to draw conclusions about wellbeing, whilst also arguing whether Blanchflower's findings would be

still meaningful when exploring effect sizes. Furthermore, this U-shaped pattern has not been consistent in the oldest-old (Bauer et al., 2017; J. Li et al., 2021), with wellbeing decreasing in certain regional sub-sections, indicating the need to further understand ageing in the oldest-old.

1.3 Ageism

For those who are young or of working age, getting old is often associated with negative experiences, despite gerontological evidence appearing to suggest otherwise. Such experiences may include developing memory problems (Dark-Freudeman et al., 2006), a reduction in competence (Abrams et al., 2015), and a time of decline and decrepitude, when individuals are seen as adding little value to society (World Economic Forum, 2012). Ageism appears to be pervasive, being the most prevalent form of discrimination in the UK (Abrams et al., 2011). Evidence has shown that there were more negative implicit attitudes towards the old than other regularly stigmatised groups (Nosek et al., 2002). This has been supported by Chopik and Giasson (2017), although they also found that experiencing counter-stereotypical examples could reduce prejudice, likely weakening the negative connotations associated with becoming old.

Levy (2003) proposed that negative ageing stereotypes start in the young, finding that children held views that older adults were helpless and unable to care for themselves and that being old would be awful. As children grow up, these stereotypes are strengthened through cognitive biases, such as recalling information that is congruent with their belief system. Consistent with stereotype embodiment theory (Levy, 2009), as someone reaches older adulthood, these held beliefs can become self-stereotypes, the unconscious assimilation of behaviours that conform to the stereotypes of one's own group.

1.4 Study of Attitudes to Ageing

Attitudes to ageing can be understood as the expectations, feelings, thoughts, and behaviours related to the process of ageing as a personal experience (Hess, 2006; Janečková et al., 2013). Until recently, measures exploring attitudes to ageing did not focus on the

experiences of older adults, instead taking a one size fits all approach or asking younger individuals about their views of ageing (Laidlaw et al., 2007). For example, one of the most popular scales which did explore older adults' views was the Philadelphia Geriatric Centre Morale Scale (PGCMS; Lawton, 1975). However, the PGCMS only contains five items about an individual's attitudes to their own ageing, so provides limited insight. To better understand ageing attitudes, Laidlaw et al. (2007) developed the Attitudes to Ageing Questionnaire (AAQ), a contemporary and comprehensive cross-cultural measure to understand the attitudes and experiences of ageing. The AAQ was developed cross-culturally, using a robust framework including the Delphi method and back-translation, as part of a larger project in collaboration with the WHO. This measure is widely used and has many citations compared to other ageing measures (Kishita et al., 2015; Klusmann et al., 2020). It has been translated into a range of languages and used in a variety of older adult populations, all demonstrating good reliability and validity (e.g., Chachamovich et al., 2008; Lucas-Carrasco et al., 2013; Marquet et al., 2016; Trigg et al., 2012).

1.5 Attitudes to Ageing and Health Outcomes

The importance of understanding attitudes to ageing is further highlighted when exploring their contribution to the physical and psychological health of older adults. Gale and Cooper (2018) found that older adults with more positive attitudes towards ageing were at a reduced risk of becoming frail. Additionally, more positive attitudes to ageing were associated with higher wellbeing and lower levels of anxiety and depression (Bryant et al., 2012). This emphasises the value of helping older adults build positive attitudes towards their own ageing.

Although evidence suggests that ageing can be positive, that does not mean that every older adult endorses this perspective. Given the negative stereotypes held by those of working age, older adults might be vulnerable to the activation of these negative stereotypes, impacting how they see their own ageing as per the stereotype embodiment theory (Levy, 2009). Negative attitudes to ageing have been associated with negative outcomes. Sargent-Cox et al. (2014) found that baseline negative perceptions of ageing, and declining

perceptions, seemed to increase the risk of mortality, even when controlling for physical health and cognitive functioning. Similarly, Levy et al. (2002) found that those with more positive attitudes had a lifespan 7.5 years longer than those with negative attitudes. Negative attitudes to ageing have been associated with difficulties in various activities of daily living (ADL) in older adults who were not disabled at study baseline (Moser et al., 2011). Negative attitudes are also related to poorer psychological outcomes. Freeman et al. (2016) found that more negative attitudes at an initial assessment were a significant predictor of both onset and persistence of depression at follow up. Thus, attitudes to ageing appear to have implications for how an individual experiences the later years of their life physically and psychologically, highlighting the need to further explore attitudes to ageing and health.

1.6 Quality of Life

Saxena and Orley (on behalf of the WHO; 1997) defined quality of life (QOL) as “individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the persons' physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment”. However, QOL is a concept without a unified definition; it is multidimensional and complex, differing depending on the scholarly lens through which it is examined (Sinha, 2019). QOL may be broken down into smaller subtypes, such as health-related QOL (HRQOL), which explores the effect of illness and treatment (Ferrans, 2004). Considering QOL specifically within older adults, van Leeuwen et al. (2019) found that QOL meant not being limited by physical condition, maintaining autonomy, having close relationships, and environmental and financial security. Farquhar (1995) found similar, with factors beyond physical health being important to the wellbeing of older adults, including social interactions, family relationships, and activities. They also found that QOL was defined differently depending on the age and location of those being interviewed, indicating the idiosyncratic nature of QOL.

Although QOL is a multidimensional concept, a more focal approach can be taken by exploring the relationship between health and QOL. Baernholdt et al. (2012) found that lower ADL function, memory problems, and higher levels of depression were associated with poorer QOL. Similarly, a meta-analysis by Kojima et al. (2016) found that those with higher levels of fragility had significantly lower QOL scores, both physically and mentally. Conversely, it seems that lower QOL has been associated with poorer prospective health outcomes. Bilotta et al. (2011) found in their prospective study that lower QOL and HRQOL were predictors of adverse health outcomes in older adults, including nursing home admissions and death. This highlights the value of promoting good QOL in older adults, as poorer QOL is associated with poorer health and a lack of health impacts upon QOL.

1.7 The Relationship Between Attitudes to Ageing and QOL

Given the relationship between attitudes to ageing and various health outcomes, alongside the relationship between health outcomes and QOL, there is a paucity of research exploring the relationship between attitudes to ageing and QOL. Low et al. (2013) have sought to understand this relationship, identifying whether attitudes to ageing mediated the effect of subjective health status on QOL using the WHOQOL-BREF, a short version QOL measure devised by the WHO. The study found that all three AAQ domains partly mediated the relationship between health status and different WHOQOL-BREF domains, including when controlling for age, gender, or recruitment centre.

There are limitations in the study by Low and colleagues. For example, they do not consider the impact of psychological health, such as depression. There is a significant association between depression severity and QOL in older adults (Sivertsen et al., 2015), so it is important to consider how this variable contributes to QOL alongside health status and attitudes to ageing. Additionally, the study employed listwise deletion to manage missing data, which can lead to biased results, especially in data that is not missing completely at random (Pepinsky, 2018).

Ageing will affect almost all the population and, given the increasing number of older adults, it is vital to understand how best to support them. Further insight into the

relationship between attitudes to ageing and QOL may help identify areas of specific intervention to promote positive ageing and wellbeing in older adults.

1.8 Aims of Current Study

Given the relationship between both attitudes to ageing and QOL with health, it is important to explore the relationship between these two concepts alongside subjective health status. As previous research suggests that prospective health is associated with AAQ domains and health is related to QOL, it may be useful to understand whether AAQ domains mediate the relationship between subjective health and QOL.

The current study, a secondary data analysis, aims to extend the work conducted by Low et al. (2013) by utilising a method of handling missing data that seeks to minimise bias, considering a validated measure of depression, and using an alternative QOL measure that is more focused on HRQOL (Castro et al., 2014).

The following research questions were investigated:

1. Do AAQ domains, quality of life (as measured by the SF-12), level of depression (as measured by the Geriatric Depression Scale) jointly predict subjective health status?
2. Is there a difference in attitudes to ageing between individuals who consider themselves to be 'healthy' versus 'unhealthy'?
3. Do attitudes to ageing mediate the relationship between health status and quality of life in older adults?
4. Do attitudes to ageing mediate the relationship between health status and quality of life in older adults, when also accounting for age, gender, country of origin and depression levels?

1.9 Hypotheses

1. It is hypothesised that AAQ subscales, GDS-15 and SF-12 subscales will be able to jointly predict those who consider themselves to be healthy or unhealthy.
2. It is anticipated that there will be a difference in AAQ subscale scores in those who consider themselves unhealthy and healthy. Specifically, those with lower scores on

the Psychosocial Loss domain and higher scores on the Physical Change and Psychological Growth domains are more likely to be healthy.

3. It is anticipated that all the AAQ subscales will at least partly mediate the relationship between health status and HRQOL.
4. It is hypothesised that the above relationship will exist even when age, gender, country of origin and depression levels are considered, although the proportion of the effect that is mediation is likely to be smaller.

2.0 Method

2.1 Overview of Study

The current study reports on secondary data taken from the AAQ (Laidlaw et al. 2007), a field-trial dataset of 5566 participants worldwide, recruited via opportunistic sampling. The AAQ measure was developed alongside the WHOQOL-OLD field study (Power et al., 2005), which sought to develop a new module of the WHOQOL to assess quality of life in older people. The WHOQOL group have published many research papers developing a robust, psychometrically stable, and culture-free measure of QOL. The AAQ was developed by the same research group, adopting the same methodology (see Power et al., 2005; WHOQOL Group, 1995, 1998). The current study used a subsection of the AAQ database to analyse the research questions.

2.2 Participants

As summarised in Laidlaw et al. (2007), participants were recruited from 18 international centres for the pilot trial ($N=1440$) and 20 countries for the field trial ($N=5566$), including centres in Europe, North America, Asia, South America and Australasia. Each centre sought to recruit a minimum of 300 participants, with a roughly equal split of gender and 'young-old' (60-80 years old) and 'old-old' (>80 years).

After cleaning the database, 5212 participants (3057 females) were included in the current study (please see data cleaning section for an explanation of this process).

2.3 Measures

2.3.1 *Attitudes to Ageing Questionnaire (AAQ; Laidlaw et al., 2007; Laidlaw et al., 2018; see Appendix A)*

The AAQ is a psychometrically sophisticated and robust 24-item measure designed for use with older adults. The AAQ seeks to measure ageing-related stereotypes and assesses losses and gains associated with ageing. The AAQ examines an individual's perspective on ageing from two different standpoints: (i) general attitudes (i.e., attitudes toward ageing that can be considered along nomothetic ranges) and (ii) a personal experiential component (i.e., attitudes toward an individual's own idiosyncratic experience of ageing). Items are scored on a 5-point Likert scale, from 1 (not at all true) to 5 (extremely true). The domains covered by the AAQ profile scores (psychosocial loss, physical change, and psychological growth) are consistent with research on older people's perceptions about ageing (Laidlaw et al., 2018). Each domain has good reliability (Cronbach alpha ranging from .68-.84) and the questionnaire overall has a Cronbach alpha of .86. As previously mentioned, it is a widely used tool (Kishita et al., 2015, see also Chachamovich et al., 2008; Janečková et al., 2013; Shenkin et al., 2014) and its validity and reliability has been demonstrated in many international studies with older adult populations.

2.3.2 *Geriatric Depression Scale 15 (GDS-15; Yesavage et al., 1982; Yesavage & Sheikh, 1986; see Appendix B)*

The GDS-15 is a 15-item measure that screens for depression in older people. Each item is answered using a simple yes/no answer format. The 15-item measure is a short form of the original 30-item measure (Yesavage & Sheikh, 1986). Items are summed to gain a single total score. A score above 5 suggests mild levels of depression. Multiple researchers have confirmed reliability and validity of the GDS-15 in a range of older adult samples across

different cultures (e.g., De Craen et al., 2003; Friedman et al., 2005; Nyunt et al., 2009). A review by Mitchell et al. (2010) found that the GDS-15 performs better than the original in primary care settings.

2.3.4 Short Form Health Survey version 1 (SF-12; Ware et al., 1996; see Appendix C)

The SF-12 is a 12-item measure of HRQOL, developed as a shorter alternative to the SF-36 (Ware & Sherbourne, 1992). Items are dichotomous or on a Likert scale, depending on the item. It contains two subscales, the Physical Component Summary (PCS) and the Mental Component Summary (MCS). Higher scores on the subscales represent better HRQOL. The Cronbach alpha for both subscales range from .76-.89 and the SF-12 has been found to be reliable for older adults (Cronbach alpha 0.72 to 0.89; Resnick & Nahm, 2001).

2.4 Data Cleaning

Prior to data analysis, the AAQ database was cleaned and prepared. The database was initially reduced to relevant variables that supported the research questions before further cleaning and analysis.

Exploratory descriptive statistics were run to ensure all participants were part of the target population, including screening participants to ensure they were over 60 years. Two participants were removed, due to being under 60 and not representative. Improbable values were removed from the database (e.g., categorical demographic with values not fitting predefined categories). The data was then split by centre and items, to ascertain overall missing data (see Appendix D for an example of this). The database had participants from 20 different sites, however two centres, Paris and Tokyo, were removed due to considerable amounts of missing data on key variables such as the GDS-15. Paris also had between 32%-43% missing data on 10 AAQ items. Whole centres were removed to prevent bias, rather than removing specific participants with high missingness. This left 5212 participants for analysis (see Appendix E for cleaning summary).

As is to be expected with real-world research, some missing data still remained, (1.3%-3.1% in AAQ items, 3.1%-11.4% in the GDS-15 and 33.5%-38.6% in the SF-12). Higher levels of missing data in the SF-12 were due to some centres in the original study not wishing to administer this measure. When exploring centres who completed the SF-12, missing data ranged from 2.0%-9.6%.

2.4.1 Outlier Exploration

Univariate and multivariate outliers were checked before and after multiple imputation (MI) was completed (see Appendices F and G for examples of outlier exploration). Before MI, outliers were identified by exploring z-scores and boxplots for questionnaire subscales. Outliers identified by z scores of ± 3.3 were low, totalling less than 0.5% per scale. However, this may be explained by z-scores not being calculated when data was missing. Similarly, 45 multivariate outliers were identified using Mahalanobis Distance, which was also limited by missing data, thus MI was run before removing any outliers.

When exploring the first of the five imputations, 68 multivariate outliers were identified using Mahalanobis Distance. These were removed from the original dataset. MI was then re-run without these participants, and multivariate outliers were checked again, resulting in 10-17 outliers per imputed database. As there were only a small number compared to the overall data, these seemed unlikely to influence the analyses significantly, and were not removed. Univariate outliers were reviewed again following the removal of multivariate outliers, using z-scores. The GDS-15 reported the highest number of outliers, from 30-33 per database (0.5-0.6% of the database), with all other variables having a lower proportion of univariate outliers. The questionnaires were reviewed for unusual scores (e.g., maximum scores in the AAQ), but none were removed as all appeared valid. This left 5144 participants in the database.

2.5 Multiple Imputation

Using guidance from Heymans and Eekhout (2019) and Tabachnick and Fidell (2014), a missing value analysis was conducted before imputing missing data. This was to identify if there were any specific patterns of missing data. None were identified. Missing data is classified into one of three categories, missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR; Rubin, 1976). Little's MCAR test (Little, 1988) was run on SPSS to determine patterns of missingness. As the test was statistically significant, the data was deemed to not be MCAR. It is important to acknowledge that the large power within this dataset may yield statistical significance, as sample sizes are closely related to p-values, even if the effect is unimportant (Field, 2018). Due to this, in addition to there being no clear reason to expect values of items to be related to missingness, the data were assumed to be MAR. MI was deemed the most appropriate way to manage missing data whilst attempting to minimise bias. This is because MI involves imputing values in a way that maintains the natural variability of values (Kang, 2013). Also, MI is thought to be the best method when data is being analysed outside of the agency that collected the data (Tabachnick & Fidell, 2014).

All questionnaire items (AAQ, GDS-15 and SF-12) were used as predictors, and missing values for questionnaire items were imputed. Demographic information (gender, age, marital status, education level, financial status, health conditions, medication use, alcohol and cigarette use, and relationship satisfaction) were used as predictors only and missing data was not imputed. It was considered inappropriate to impute these, as demographics are fixed characteristics rather than responses. SPSS version 26 was used to complete MI, which was run using five imputations and 10 iterations. A fully conditional specification was used. This is considered to be a more flexible method for imputation (Lee & Carlin, 2010), which imputes missing data on a variable-by-variable basis. Following MI, subscale scores for all questionnaires were recomputed with imputed data.

2.6 Data Analysis Plan

For research question one, as health status (outcome variable) is dichotomous, a multiple linear regression would be inappropriate (Field, 2018). Thus, a logistic regression was used to explore this question. For research question two, three separate t-tests were used, with Bonferroni corrections used to reduce the chance of type I errors. Mediation analyses were used to explore research questions three and four to conceptually understand if AAQ domains explain the association between health status and HRQOL. Each AAQ domain was included as a mediator. Sobel tests were used for mediation analyses. Bootstrapping is often suggested when conducting mediation analyses due to critiques of the Sobel test, in particular that it is conservative and requires an assumption of normality (Hayes, 2017). However, given the sample size of the database and the associated level of power, a conservative test is likely to be beneficial rather than a drawback. Furthermore, with a large sample, generally the sampling distribution of parameters deviates to normal. Although bootstrapping is cited as superior, Koopman et al. (2014) argue that the Sobel test should be used over bootstrapping when studies have sufficient power. The number of participants used in each analysis will be stated in each question, if demographic data is missing. When using MI, Rubin's rules (Rubin, 1987) are required when pooling data across imputations.

3.0 Results

3.1 Participant Characteristics

The current study used a total of 5144 participants. The mean age of the sample was 72.53 years (SD=7.90, range=60-100 years) and 58.7% of the sample were female. Tables 1 outlines descriptive statistics of demographics and Table 2 outlines correlations between variables. Appendices H and I contain additional demographic information and descriptive statistics of the original dataset.

3.2 Hypothesis One

To understand whether the AAQ domains, SF-12 subscales, and GDS-15 scores correctly predict subjective health status (healthy vs unhealthy), a logistic regression was performed. When including all questionnaires, the model was able to correctly classify between 79.5%-79.8% of cases (depending on imputation). A pseudo R^2 (Nagelkerke) indicated that the model explained approximately 39% of the variance. It is important to note that Nagelkerke R^2 is different to adjusted R^2 in multiple regression, so some caution should be taken when interpreting.

Table 3 shows the coefficients in the model. The odds ratios (OR) indicate that higher scores on SF-12, AAQ Physical Change, and GDS-15 meant someone was more likely to consider themselves healthy. In addition, higher scores on AAQ Psychosocial Loss and Psychosocial Growth meant someone was more likely to class themselves as unhealthy.

3.2.1 Summary

The results from the logistic regression indicate that hypothesis 1 is supported. Although the addition of the questionnaire subscales improves prediction of health status, the OR and beta coefficients for all variables are small, which may indicate that these are not strong predictors in determining subjective health in older adults. Equally, the OR for GDS-15 and Psychological Growth were unexpected and in the opposite direction to what previous research has indicated.

Table 1*Total Sample Characteristics of Participants Following Database Cleaning, Split by Centre and Key Variables*

Centre	N	Gender Female (%)	Age Mean (SD)	Health status <i>Healthy</i> (%)	AAQ – PL Mean (SD)	AAQ – PC Mean (SD)	AAQ – PG Mean (SD)	SF-12 PCS Mean (SD)	SF-12 MCS Mean (SD)	GDS-15 Mean (SD)
Edinburgh	116	78 (67.2)	77.60 (10.43)	92 (79.3)	17.53 (4.97)	25.30 (5.16)	26.30 (4.93)	40.88 (11.01)	55.00 (8.27)	8.74 (1.47)
Bath	143	89 (62.2)	69.77 (7.00)	129 (90.2)	16.16 (4.80)	27.70 (5.39)	25.87 (5.012)	42.73 (6.28)	51.14 (6.34)	9.05 (1.51)
Leipzig	350	163 (46.6)	72.84 (8.62)	216 (61.7)	19.08 (5.44)	27.81 (5.15)	25.32 (4.09)	41.93 (10.88)	51.06 (9.17)	9.42 (1.35)
Barcelona	267	157 (58.8)	72.09 (7.40)	179 (67.0)	21.18 (5.07)	26.55 (4.78)	27.47 (4.41)	41.22 (10.77)	49.38 (10.02)	7.93 (1.65)
Copenhagen	384	189 (49.2)	72.34 (8.12)	308 (80.2)	18.47 (5.31)	28.27 (5.69)	27.62 (4.91)	44.62 (6.75)	48.25 (5.91)	8.92 (1.26)
Prague	321	192 (59.8)	71.36 (7.71)	194 (60.4)	22.38 (5.81)	23.90 (5.49)	26.25 (4.05)	42.92 (6.58)	50.86 (6.17)	8.68 (1.65)
Budapest	329	227 (69.0)	73.76 (8.72)	141 (42.9)	21.86 (5.98)	24.38 (5.09)	26.54 (4.31)	43.10 (6.36)	50.91 (6.32)	7.92 (1.82)
Oslo	324	168 (51.9)	75.15 (7.94)	269 (83.0)	18.40 (4.80)	27.01 (5.58)	28.23 (4.76)	43.48 (10.62)	52.64 (8.68)	8.71 (1.35)
Victoria	202	109 (54.0)	72.93 (8.43)	168 (83.2)	16.01 (5.02)	28.20 (5.69)	29.00 (4.23)	45.37 (9.30)	52.45 (6.50)	9.07 (1.18)
Melbourne	368	211 (57.3)	75.63 (6.85)	305 (82.9)	17.62 (5.45)	26.47 (5.22)	28.27 (4.07)	42.53 (11.67)	53.67 (8.45)	8.72 (1.45)
Seattle	288	169 (58.7)	71.85 (8.20)	218 (75.7)	16.22 (5.41)	27.41 (5.52)	29.70 (3.66)	42.81 (6.41)	50.88 (6.260)	8.78 (1.49)
Beer-Sheva	246	159 (64.6)	70.37 (7.43)	193 (78.5)	18.60 (6.02)	27.76 (5.40)	28.19 (4.97)	45.75 (9.42)	51.09 (8.96)	9.14 (1.64)
Umea	448	239 (53.3)	72.66 (8.20)	334 (74.6)	18.51 (5.24)	26.63 (5.56)	28.10 (4.52)	44.06 (10.90)	52.37 (9.64)	8.94 (1.44)
Brazil	324	217 (67.0)	71.79 (7.75)	267 (82.4)	18.00 (5.75)	28.31 (4.56)	30.50 (3.57)	44.32 (10.12)	51.40 (8.76)	8.35 (1.54)
Uruguay	246	179 (72.8)	73.42 (5.73)	190 (77.2)	21.21 (6.30)	29.54 (4.49)	30.03 (4.05)	42.69 (6.41)	51.16 (6.46)	7.81 (1.70)
Turkey	315	163 (51.7)	70.96 (5.26)	145 (46.0)	23.92 (5.87)	22.54 (5.91)	27.03 (4.05)	42.93 (6.69)	51.09 (6.42)	7.43 (2.00)
Switzerland	137	76 (55.5)	74.42 (7.28)	115 (83.9)	17.09 (5.50)	26.95 (3.73)	24.33 (5.20)	45.35 (9.80)	49.89 (8.23)	9.05 (1.48)
Lithuania	336	234 (69.6)	68.64 (6.62)	193 (57.4)	22.21 (5.55)	25.89 (5.28)	27.25 (3.95)	44.25 (9.85)	48.39 (11.01)	8.51 (1.90)
Total	5144	3019 (58.7)	72.53 (7.90)	3656 (71.1)	19.39 (5.94)	26.64 (5.56)	27.70 (4.57)	43.41 (9.22)	51.10 (8.26)	8.60 (1.65)

Note. Gender - $n = 5115$; health status - $n = 5054$.

Table 2*Pearson's Correlations Between Key Variables*

	Gender	Age	Health Status	Psychological Growth	Psychosocial Loss	Physical Change	SF-12 PCS	SF-12 MCS	GDS-15
Gender	1	-.009	.019	.015	.021	-.003	-.056**	-.046**	-.059**
Age	-.009	1	.076**	-.037**	.187**	-.104**	-.204**	-.007	-.033*
Health Status	.016	.076**	1	-.154**	.364**	-.405**	-.370**	-.248**	-.185**
Psychological Growth	.015	-.037**	-.154**	1	.473**	.473**	.101**	.169**	-.022
Psychosocial Loss	.021	.187**	.364**	-.221**	1	-.375**	-.273**	-.305**	-.285**
Physical Change	-.003	-.104**	-.405**	.473**	-.375**	1	.345**	.230**	.090**
SF-12 PCS	-.056**	-.204**	-.370**	.101**	-.273**	.345**	1	.086**	.094**
SF-12 MCS	-.046**	-.007	-.248**	.169**	-.305**	.230**	.086**	1	.144**
GDS-15	-.059**	-.033*	-.185**	-.022	-.285**	.090**	.094**	.144**	1

Note. *p<.05 **p<.001

Table 3*Health Status (Healthy or Unhealthy) by Independent Variables: Logistical Regression*

	B	SE(B)	Odds Ratio	95% CI	
				Lower	Upper
Constant	6.124**	.550			
AAQ – Psychological Growth	.028*	.010	1.028	1.009	1.047
AAQ – Psychosocial Loss	.085**	.008	1.089	1.073	1.105
AAQ – Physical Change	-.145**	.009	.865	.850	.880
SF-12 – Physical Composite Scale	-.071**	.005	.931	.923	.940
SF-12 – Mental Composite Scale	-.040**	.006	.961	.951	.972
Geriatric Depression Scale	-.105**	.023	.900	.861	.941

Note. Pseudo R² (across the five imputations) = .389-.396 (Nagelkerke), .269-.274 (Cox-Snell). Model

$\chi^2(6) = 1585.865-1619.729$ (min and max across the five imputations, $p < .001$).

*p<.05 **p<.001. N = 5054 (due to missing data for health status). Mean age=72.47, range=60-100.

3.3 Hypothesis Two

Hypothesis two examined whether there are statistical differences between those who consider themselves healthy or unhealthy on the three AAQ domains. It was hypothesised that those who rated themselves as healthy would record higher scores for Physical Change and Psychological Growth domains and lower scores for Psychosocial Loss domain. A Bonferroni correction was applied for the following analyses. Taking account of three comparisons, the p value would need to be below .017 for a significant finding in following t -tests. Table 4 provides a summary of the t -tests run.

Table 4

Results of T-Tests Exploring Difference in AAQ Subscale Scores Between Subjective Health Status

	<i>M (SD)</i>		SE		<i>t</i>	<i>p</i>	<i>d</i>
	H	U	H	U			
Psychosocial Loss	18.03 (5.53)	22.87 (5.56)	.09	.15	27.60	<.001	.87
Physical Change	28.06 (5.08)	23.02 (5.13)	.08	.14	31.16	<.001	.78
Psychological Growth	28.14 (4.51)	26.56 (4.53)	.09	.12	11.06	<.001	.35

H = Healthy, U = Unhealthy. Overall mean age=72.47, range=60-100. Healthy $n = 3656$.

Unhealthy $n = 1398$.

3.3.1 Psychosocial Loss

Those who rated themselves as healthy reported lower scores on the Psychosocial Loss subscale than those who rated themselves as unhealthy. This was a statistically significant difference, $M=4.73$, 95% CI [5.18,4.50], $t(42842.22)=27.60$, $p<.001$, with a large effect size ($d_s=0.87$) based on Cohen's (1988) benchmarks. Hypothesis two is confirmed and the null hypothesis is rejected.

3.3.2 Physical Change

Participants who rated themselves as subjectively healthy reported higher scores on Physical Change on the AAQ compared to those who rated themselves as unhealthy. This difference was significant, $M=5.04$, 95% CI [4.72,5.36], $t(40862.86)=31.16$, $p<.001$, with a medium to large effect size ($d_s= 0.78$). Hypothesis two is confirmed and the null hypothesis is rejected.

3.3.3 Psychological Growth

In support of hypothesis two, participants who rated themselves as healthy had higher scores on the Psychological Growth subscale than those who rated themselves as unhealthy. This difference was significant, $M=1.58$, 95% CI [1.30,1.86], $t(145358.97) =11.06$, $p<.001$, and had a small effect size ($d_s= 0.35$). The null hypothesis is rejected.

3.3.4 Summary

Consistent with hypothesis two, the data suggest those who considered themselves healthy report higher scores on the Physical Change and Psychological Growth subscales and lower scores on the Psychosocial Loss domains of the AAQ. All domains of the AAQ performed as expected in terms of the hypotheses, which were statistically significant. The magnitude of the difference was strongest when looking at Psychosocial Loss, followed by Physical Change, indicating that these are particularly meaningful domains.

3.4 Hypothesis Three

Hypothesis three investigated the relationship between subjective health status and HRQOL (measured by the Physical Component Scale of the SF-12) and whether this was mediated by AAQ domains. It was predicted that all three AAQ domains would mediate the relationship between health status (IV) and HRQOL (DV). As such, three separate mediation analyses were completed, with each AAQ domain as a mediator. The sample size of these analyses is 5054 (mean age=72.47, range=60-100), due to missing data for health status. Effect sizes are unstandardized, calculated by working out the variance of the total effect size from a Pearson point-biserial correlation and using the ratio of the indirect to total effect

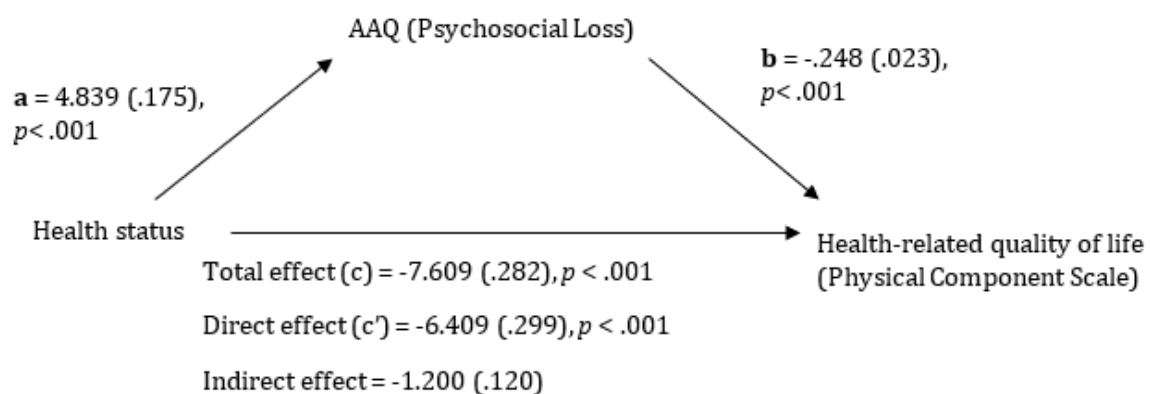
divided by the total variance to determine the effect size. In figures, regression coefficients are unstandardized.

3.4.1 Psychosocial Loss

Using a Sobel test ($z=-10.046$, $p<.001$), there was a statistically significant partial mediation between health status and HRQOL through AAQ Psychosocial Loss, $b=-1.200$ (see Figure 1). When exploring the ratio of the indirect effect to the total effect, it was found that 15.8% of the total effect was mediated through Psychosocial Loss. The effect size for indirect effect was .022, suggesting a small but significant partial mediation. This indicates that Psychosocial Loss may mediate the relationship between health status and HRQOL, supporting the hypothesis.

Figure 1

Mediation through Psychosocial Loss between health status and HRQOL



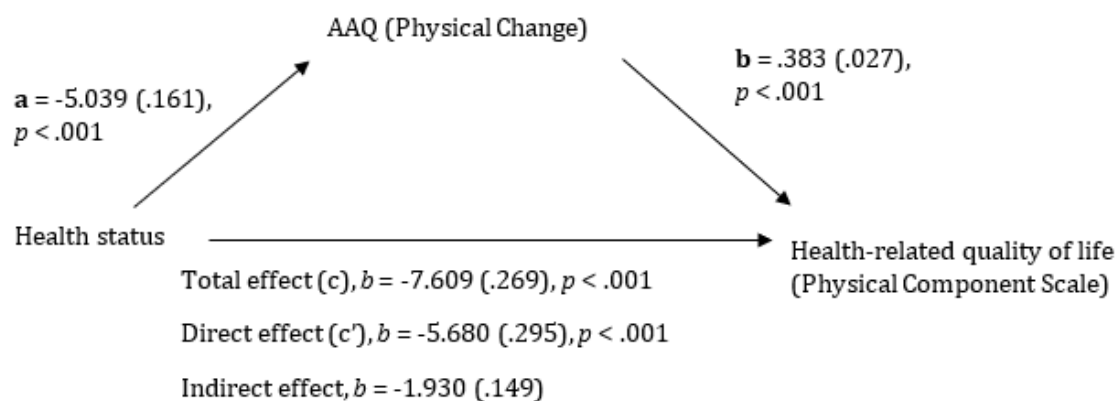
3.4.2 Physical Change

A Sobel test ($z=-12.920$, $p<.001$) indicated that there was a statistically significant partial mediation between health status and HRQOL through Physical Change, $b=-1.930$ (see Figure 2), supporting the alternative hypothesis. When exploring the ratio of the indirect

effect to the total effect, 25.4% of the total effect was explained by Physical Change. The effect size for indirect effect was .034, suggesting that, although significant, this was a small partial mediation through Physical Change.

Figure 2

Mediation through Physical Change between health status and HRQOL

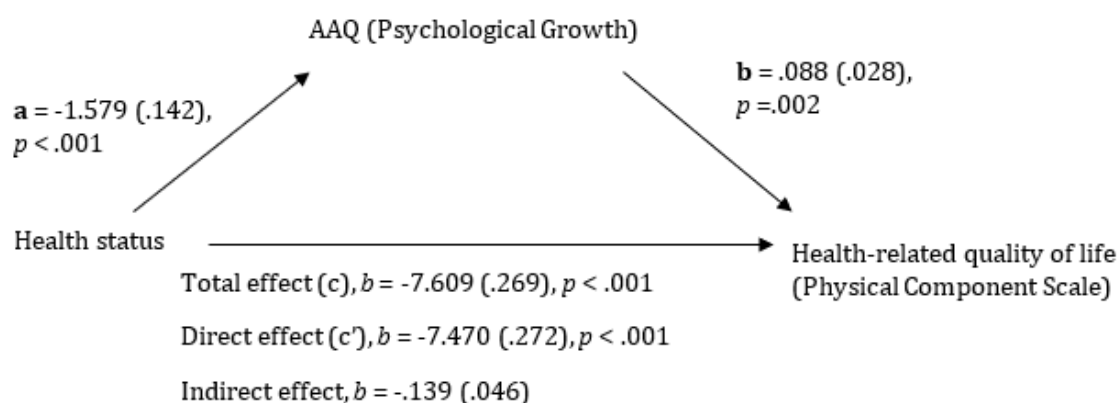


3.4.3 Psychological Growth

A Sobel test ($z = -3.024, p = 0.002$) indicated that there was a statistically significant partial mediation through Psychological Growth, $b = -.139$ (see Figure 3), between health status and HRQOL, meaning the null hypothesis could be rejected. The ratio of the indirect effect to the total effect indicated that 1.8% of the total effect mediated through Psychological Growth. The effect size for indirect effect was 0.002, highlighting a negligible indirect effect of Psychological Growth.

Figure 3

Mediation through Psychological Growth between health status and HRQOL



3.4.4 Summary

In support of hypothesis three, mediation analyses indicate that all three domains partially mediate the relationship between health status and HRQOL. This was statistically significant for all domains, so the null hypothesis can be rejected. The strongest mediation was found for the Physical Change subscale, with 25.4% of the effect explained. However, effect sizes for all subscales were small, particularly Psychological Growth at 0.002, suggesting that, although statistically significant, the strength of the effect is negligible.

3.5 Hypothesis Four

Hypothesis four sought to further explore whether each AAQ domain mediated the relationship between subjective health status and HRQOL when adding age, gender, recruitment centre, and GDS-15 scores into the regression as covariates. It was hypothesised that AAQ would mediate the relationship between health status and HRQOL, but that the strength would be reduced when including the covariates in the model. As before, the sample size for the below analyses is 5054, and uses the same participants as detailed in hypothesis three.

3.5.1 Psychosocial Loss

With age, gender, centre and GDS-15 as covariates, a Sobel test ($z=-8.784$, $p<.001$) indicated that there was still a statistically significant partial mediation through Psychosocial Loss between health status (IV) and HRQOL (DV), supporting the alternative hypothesis. See Figure 4 for diagrammatic model and Table 5. The ratio of the indirect effect to the total effect indicated that 12.2% of the total effect was mediated through Psychosocial Loss. The effect size for indirect effect = .017.

Figure 4

*Mediation through Psychosocial Loss between health status and HRQOL
(model including covariates)*

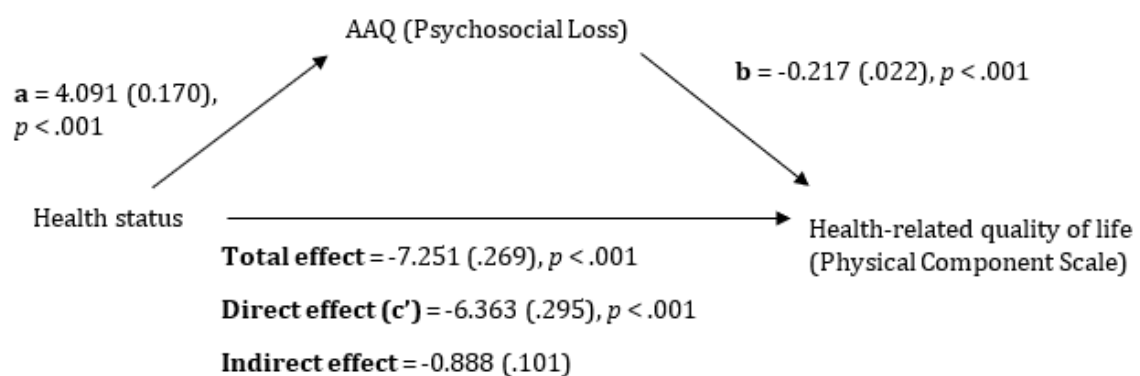


Table 5

Mediation Analysis of Health Status and HRQOL Through Psychosocial Loss, Including Total Effect and Full Model including mediator

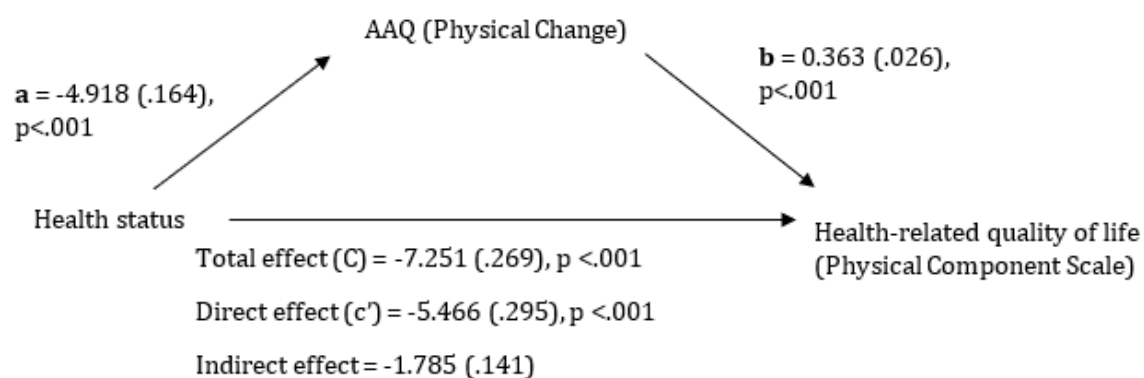
Variable	<i>B</i>	<i>t</i>	<i>p</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Total Effect					
Health status	-7.251	-26.012	< .001	-7.798	-6.704
Age	-0.195	-11.186	< .001	-0.230	-0.160
Gender	-1.001	-4.076	< .001	-1.482	-0.519
Centre	0.085	4.012	< .001	0.042	0.127
GDS-15 Score	0.165	2.160	0.031	0.015	0.315
Full Model					
Health status	-6.363	-21.550	< .001	-6.943	-5.783
Psychosocial Loss	-0.217	-9.326	< .001	-0.263	-0.171
Age	-0.169	-9.686	< .001	-0.203	-0.171
Gender	-0.998	-4.101	< .001	-1.475	-0.521
Centre	0.100	4.747	< .001	0.058	0.142
GDS-15 Score	-0.004	-0.048	0.962	-0.156	0.149
X > M Model					
Health status	4.091	24.005	< .001	3.757	4.425
Age	0.123	12.964	< .001	0.105	0.142
Gender	0.014	0.093	0.926	-0.285	0.313
Centre	0.069	6.121	< .001	0.047	0.092
GDS-15 Score	-0.777	-16.601	< .001	-0.868	-0.685

3.5.2 Physical Change

When including covariates, a Sobel test ($z=-12.657$, $p<.001$) indicated that there was a significant partial mediation through Physical Change between health status and HRQOL, supporting the alternative hypothesis. The ratio of the indirect effect to the total effect indicated that 24.6% of the total effect was mediated through Physical Change. The effect size for the indirect effect was 0.034. Please see Figure 5 and Table 6.

Figure 5

Mediation through Physical Change between health status and HRQOL (model including covariates)

**Table 6**

Mediation Analysis of Health Status and HRQOL Through Physical Change, Including Total Effect

Variables	<i>B</i>	<i>t</i>	<i>p</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Total Effect					
Health status	-7.251	-26.012	< .001	-7.798	-6.704
Age	-0.195	-11.186	< .001	-0.230	-0.160
Gender	-1.001	-4.076	< .001	-1.482	-0.519
Centre	0.085	4.012	< .001	0.042	0.127
GDS-15 Score	0.165	2.160	0.031	0.015	0.315
Full Model					
Health status	-5.466	-19.165	< .001	-6.025	-4.907
Physical Change	0.363	16.003	< .001	0.318	0.407
Age	-0.176	-11.959	< .001	-0.205	-0.147
Gender	-1.028	-4.380	< .001	-1.489	-0.568
Centre	0.091	5.231	< .001	0.057	0.125
GDS-15 Score	0.148	2.073	0.044	0.008	0.289
X > M Model					
Health status	-4.918	-30.116	< .001	-5.238	-4.598
Age	-0.054	0.009	< .001	-0.071	-0.036
Gender	0.076	0.519	0.604	-0.211	0.362
Centre	-0.018	-1.649	0.100	-0.039	0.003
GDS-15 Score	0.045	1.008	0.320	-0.042	0.132

3.5.3 Psychological Growth

When including covariates, a Sobel test ($z=-2.444$, $p=0.015$) demonstrated that there was a significant partial mediation through Psychological Growth between health status and HRQOL, meaning the null hypothesis can be rejected. See Figure 6 for model and Table 7. The ratio of the indirect effect to the total effect indicated that 1.6% of the total effect was mediated through Psychological Growth. Effect size for indirect effect was 0.002. This indicates that although there is a significant finding, it is likely to be a trivial mediated effect.

Figure 6

*Mediation through Psychological Growth between health status and HRQOL
(model including covariates)*

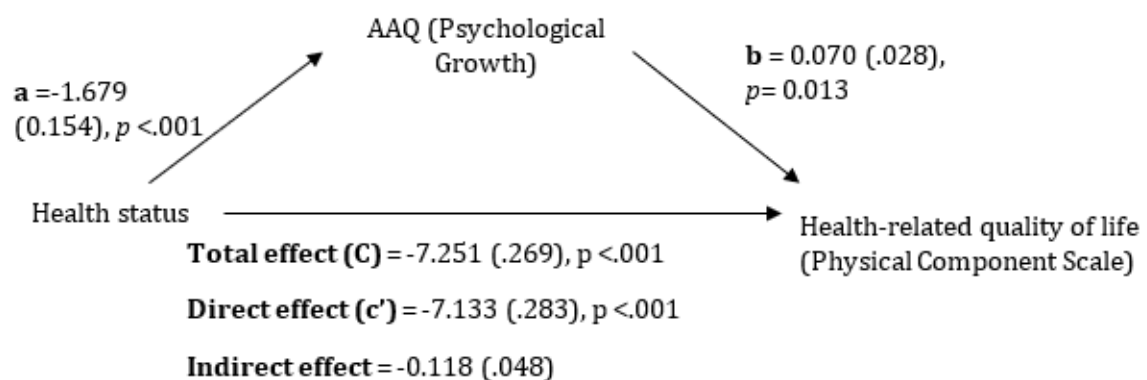


Table 7

Mediation Analysis of Health Status and HRQOL Through Psychological Growth, Including Total Effect

Variable	<i>B</i>	<i>t</i>	<i>p</i>	95% CI	
				<i>LL</i>	<i>UL</i>
Total Effect					
Health status	-7.251	-26.012	< .001	-7.798	-6.704
Age	-0.195	-11.186	< .001	-0.230	-0.160
Gender	-1.001	-4.076	< .001	-1.482	-0.519
Centre	0.085	4.012	< .001	0.042	0.127
GDS-15 Score	0.165	2.160	0.031	0.015	0.315
Full Model					
Health status	-7.133	-25.174	< .001	-7.690	-6.577
Psychological Growth	0.070	2.504	0.013	0.015	0.125
Age	-0.195	-11.184	< .001	-0.229	-0.160
Gender	-1.005	-4.097	< .001	-1.487	-0.524
Centre	0.079	3.689	0.001	0.036	0.122
GDS-15 Score	0.172	2.247	0.025	0.022	0.322
X > M Model					
Health status	-1.679	-11.630	< .001	-1.962	-1.396
Age	-0.010	-1.169	0.242	-0.026	0.006
Gender	0.065	0.502	0.616	-0.189	0.319
Centre	0.083	8.712	< .001	0.065	0.102
GDS-15 Score	-0.102	-2.541	0.011	-0.181	-0.023

3.5.4 Summary

AAQ domains appear to mediate the relationship between health status and HRQOL when including age, gender, recruitment centre, and GDS-15, thus the null hypothesis can be rejected. The strength of the mediation is reduced when covariates are added into the model, which was anticipated. When exploring effect sizes, the strength of mediations through the AAQ domains between health status and HRQOL are very weak, ranging from 0.002-0.034. Psychological Growth had the smallest effect size. This suggests that although the hypothesis is fully supported, indirect effect sizes are small, indicating that the effect is trivial.

4. Discussion

The current study utilises secondary data from a large international database to further explore the relationship between attitudes to ageing, subjective health status, and HRQOL using a thoughtful approach to missing data not previously applied. The current findings found that, together, attitudes to ageing, depression, and HRQOL correctly

predicted subjective health status in 79% of cases. Furthermore, participants who consider themselves to be healthy report statistically more positive attitudes to ageing, indicated by lower Psychosocial Loss scores and higher Physical Change and Psychological Growth scores, when compared to those who report being subjectively unhealthy. All AAQ domains were statistically significant in mediating the relationship between health status and HRQOL. The Physical Change domain demonstrated the largest mediation. The weakest mediation was found for the Psychological Growth domain. The unstandardized effect size suggests that, although statistically significant, the mediation is of very small magnitude. When covariates (age, gender, recruitment centre, and depression) were included in the model, all AAQ domains were still statistically significant in mediating the relationship between health status and HRQOL, but effect sizes were smaller. Effect sizes for all AAQ domains were of very small magnitude, suggesting AAQ domains were not meaningful mediators.

Results indicated that AAQ domains, depression, and HRQOL subscales could predict subjective health status. This finding supports previous literature, such as Janečková et al. (2013) who found that poor attitudes were associated with lower perceived health. There are also several studies that demonstrate positive attitudes to ageing are related to better specific health outcomes, including Gale and Cooper (2018) finding that more positive attitudes were associated with a lower risk of becoming frail. A systematic review also indicated that poorer attitudes were associated with greater disability and poorer physical performance (Warmoth et al., 2016). However, the GDS-15 in the current study did not correlate as expected, as odds ratios suggested that higher depression scores were associated with being subjectively healthy. This is inconsistent with existing literature exploring the relationship between depression and health, for instance Padayachey et al. (2017) found that those with a poorer health rating were almost 21 times more likely to have depression. The current finding is difficult to reconcile. The data has been checked and no errors in coding or in the MI have been identified. Health is a complex construct, and one theoretical explanation for this finding may be a result of the paradox of ageing, which postulates that despite changes in physical health as someone ages, life satisfaction and happiness increases.

This might influence an individual's subjective appraisal of their health, even if objectively their health might be worse. This finding may also be related to the positivity bias (Mather, 2012), meaning that even those who might be struggling with low mood may still look towards the positives and thus rate their subjective health as good. Further analysis beyond the scope of the thesis may be required to understand this.

Additionally, the current study indicated that those who rated themselves as healthy had more positive attitudes to ageing than those who felt they were unhealthy. These findings are consistent with previous literature; Shenkin et al. (2014) found a similar profile of AAQ domain scores in their sample of relatively healthy older adults.

Finally, mediation analyses confirmed that AAQ domains mediate the relationship between health status and HRQOL. The strength of the mediations reduced when adding in covariates (age, gender, recruitment centre and depression). The pattern found in the mediation is similar to the findings of Low et al. (2013), despite differing approaches in methodology and analysis. They found, using structural equation modelling, similar mediation patterns as those in the current study, with the strongest partial mediation through Physical Change and the weakest mediation through the Psychological Growth domain. This appears comparable with the current study. Physical Change being the strongest mediator between health status and HRQOL makes sense, given this domain captures physical functioning related to health and ageing. The Psychological Growth domain was found to have a trivial effect size, which may be due to items having little crossover with physical health, instead focusing on wisdom and gains associated with ageing. As such, the items may not tap into health status or HRQOL, thus not mediating this relationship. Another study also found that Psychological Growth was not related to physical and functional health (Shenkin et al., 2014), further supporting the current findings.

Additionally, Long et al. (2020) report AAQ domains to be significant predictors of QOL using the WHOQOL-OLD module. Although using different analyses, the current study demonstrated similar patterns to Long, specifically that AAQ domains were significant predictors of HRQOL in the regressions completed for mediation analyses. They found

depression was the biggest predictor of QOL in their study, more so than AAQ domains. When tentatively comparing to the current study, beta coefficients are much larger in Long and colleagues research, which may indicate depression was less important in the present study, although there are some differing covariates in the models. Both studies used the AAQ dataset, but due to differences in how missing data was handled a smaller group of participants were used in the study by Long and colleagues. These differences between the samples may potentially account for the discrepancies in how the GDS-15 functions, as those not included in that study may have had higher depression scores or errors may have occurred in the database coding in either study. Again, it is difficult to know why exactly the GDS-15 correlates unexpectedly in the current study.

Bryant et al. (2012) have also explored the relationship between AAQ and QOL, finding positive attitudes towards ageing were associated with higher scores on the SF-12, indicating better HRQOL. Korkmaz-Aslan et al. (2019) also explored this relationship in individuals in Turkey, finding that AAQ domains were significant predictors of QOL. This was in a sample of participants who were independent of the AAQ dataset used in the current study and several previously discussed studies. On the whole, it seems the current findings are generally consistent with the existing literature.

4.1 Implications of Findings

Changing demographics are a global phenomenon (United Nations, 2019) as more people are living longer than previous generations. Thus, efforts focusing on promoting positive ageing in older adults are likely to be important. The current study confirms the relationship between perceived health status, attitudes towards ageing, and HRQOL, which may suggest that modifying attitudes towards ageing could have a positive influence on HRQOL and subjective health. The AAQ potentially provides clinicians working with older adults an additional tool which they can use to augment psychological treatment outcomes. Clinicians may incorrectly assume that negative attitudes towards ageing are a static construct. However, evidence seems to indicate that attitudes are not fixed, especially when the attitude is not as strongly held (Maio & Haddock, 2010). Attitudes towards ageing appear

to be malleable, with Chachamovich et al. (2008) reporting that, as depression scores increased, AAQ scores decreased between individuals. This suggests an inverse relationship between depression and ageing attitudes, signifying that attitudes may be context-dependent and influenced by mood-state, although this remains to be validated through longitudinal research. As such, clinicians may use the AAQ with older adults as a tool to identify existing attitudes and challenge these in sessions. This may indirectly improve QOL.

More broadly, clinical psychologists should be advocating for public health interventions to focus on helping individuals age well or disseminating messages that dispute negative ageing stereotypes. This may be beneficial for both older adults and working age adults, because of stereotype embodiment theory, which postulates the lifelong development of ageing stereotypes. Meta-analytic evidence by Burnes et al. (2019) indicated that both education, intergenerational contact and a combination of these were all effective in reducing ageism, thus highlighting the role of more broader interventions. Additionally, Levy and Myers (2004) found positive attitudes to ageing were associated with preventative health behaviours (including exercise, diet, and medication compliance), which may have positive economic benefits when society needs to provide healthcare to more older adults. Clinical psychologists also have a broader role in ensuring that clinical psychology training courses provide in-depth teaching around ageing and working specially with older adults, in addition to contributing to evidence base for older adults, especially under-served older adult populations, so the workforce can better respond to the psychological needs of these populations.

It is important to note that attitudes to ageing can be considered through several theoretical lenses, in addition to the theories mentioned in the introduction. One additional model is age identity, which is rooted in sociology and social identity theory (Schafer & Shippee, 2010). This postulates that one's views of their age are viewed in relation to their social experiences and identification with a particular age group. This means that greater thought might need to go into understanding the wider systemic network around an individual, as this might shape their attitudes towards their own ageing. As such, it may be

that measures like the AAQ seek to capture the system around a person, whilst discussions about systemic factors should be happening within clinical work.

4.2 Strengths and Limitations

The strengths and limitations of the current study should be examined. One strength is that utilising secondary data analysis is highly ethical, meaning the time participants gave for the initial study is being used widely in several projects. Additionally, the study contains a large sample of older adults from a range of international locations and cohorts, which may better capture the heterogeneity of the population than smaller studies. A key strength is that the current study attempted to take a thoughtful approach to data cleaning and missing data by using MI, expanding upon the perceived limitations of the study by Low and colleagues (2013).

A main limitation of the study is that it is cross-sectional, meaning that causation cannot be inferred from the findings and the temporal precedence of variables cannot be determined. Mediation analysis was used, and the underlying theoretical model of mediation assumes causal relationships, which cannot be confirmed within the current data. It could have been possible to explore other variables as mediators or outcome variables or to have reversed the mediation, exploring whether AAQ domains mediate the relationship between HRQOL and health status. As such, alternative research questions and mediations may have changed the conclusions drawn.

Another consideration is that there are numerous ways to manage missing data, though none are free from consequences. The best way of handling missing data is to prospectively prevent it (T. Li et al., 2014), which was impossible in a secondary data analysis. MI was considered the best option for the study to mimic natural variability and to minimise bias, even when missingness is large (Madley-Dowd et al., 2019). Although MI was used, two centres were initially removed from the dataset, as opposed to imputing this data. This was due to greater missing data on key study variables for these centres compared to the remaining centres. Moreover, at the time of cleaning, it was hoped that further variables, in particular additional health data, would also be used in the analysis, for which the removed

centres also had lots of missing data. On reflection, this may have been done differently if repeated.

A further limitation is that the original study used opportunistic sampling, so it is difficult to know if those who volunteered differ from those who did not. Additionally, the SF-12 is normed on an American sample, though Gandek et al. (1998) indicated there was little difference in norms when compared to European countries. They suggested using the original scoring, but it is unknown whether norms are appropriate for all recruitment centres (e.g., Brazil and Israel).

It is important to critically evaluate the AAQ. Although it is positive that this measure was developed cross-culturally, one drawback of this might be that items are more generic. This means it might be harder to identify nuances in attitudes to ageing in individual cultures. Given the demographics of the population are changing rapidly, it should be considered whether this measure that was published 14 years ago can still effectively capture the attitudes around ageing today.

Logistic regression was used in the study due to the dichotomous independent variable. This was so the question could be effectively answered, but the process of logistic regression requires transforming data. This can make the data more complex to make sense of, reducing the accessibility of the findings, especially when the intended audience are clinicians. Additionally, log transformations may unintentionally make data more variable and skewed, and the transformed data shares little in common with the original data (Feng et al., 2014). These points should be acknowledged when considering the findings.

4.3 Future Research Directions

Due to the cross-sectional data, exploring the prospective longitudinal relationship between ageing attitudes and HRQOL in older adults would be advantageous, encompassing a broader range of measures of psychological health, including anxiety. This is because generalised anxiety disorder has been related to lower QOL in older adults (Canuto et al., 2018; Porensky et al., 2009). Moreover, negative ageing perceptions have been able to predict both anxiety and depression at follow up, and persistence of these (Freeman et al.,

2016). As such, this evidence highlights that this might be important to explore in future research. Additionally, investigation into demographic variables that may influence attitudes to ageing, such as education, may be beneficial to understand if there is a subsection of older adults who may be at greater risk of developing negative attitudes towards ageing, increasing the chance of negative health and QOL outcomes. This would be advantageous for clinicians by allowing earlier intervention.

The recent pandemic has significantly impacted the world, and it may be important to consider how this has influenced ageing attitudes in older adults. The narrative surrounding older adults during covid-19 has been largely negative, which may have later adverse consequences for attitudes. For example, a discourse analysis found that one in ten tweets implied that older adult lives were less valuable than other lives or that the severity of the pandemic was over emphasised because it only has consequences for older adults (Xiang et al., 2021), suggesting that older adults are being devalued within society. Furthermore, the messaging of the pandemic has suggested that older adults are vulnerable, to encourage them to keep safe by shielding. Conversely, this may have negative consequences for one's own view of their ageing through the stereotype embodiment theory. This could also exacerbate negative stereotypes held by younger individuals (Swift & Chasteen, 2021). The impact of this may be disproportionate in subsections of older adults, for instance those with health conditions. Future research should attempt to understand whether ageing attitudes have changed due to the pandemic, the prospective trajectory of these views, and if any particular groups will be more greatly impacted by this.

4.4 Impact of Covid-19 on Thesis

Halfway through clinical psychology training, the first lockdown happened due to covid-19. Then, an entirely different project was being worked on, looking to explore the impact of repeated checking on memory confidence in older adults with dementia (see Appendix J for proposal). The project was ready to be submitted for review by NHS ethics when covid-19 interrupted usual research recruitment. Given the unpredictable circumstances, it felt prudent to consider a different project, given the limited time available

to complete the thesis and the ethical issues of recruiting individuals who were more at risk of serious consequences. Although a difficult and sad decision, it was probably the right choice, given the pandemic is still present at the time of writing.

4.5 Conclusions

With an ageing population, it is imperative to understand the challenges of older adults to support positive ageing. The current project sought to explore the relationship between health status, health-related quality of life, and attitudes to ageing in a secondary data analysis of an international sample of older adults. The findings indicate that there are differences in attitudes to ageing in those who consider themselves to be healthy and unhealthy, and that one's attitudes towards ageing may partly explain the relationship between subjective health and health-related quality of life. Attitudes to ageing, depression, and health-related quality of life were also able to correctly predict subjective health in 79% of cases. The current study seeks to add to the existing literature using a more robust management of missing data. This relationship may suggest that recognising negative attitudes is advantageous, both on an individual basis in therapy and a wider societal level. Future research should examine the longitudinal impact of negative attitudes on health status and the impact of covid-19 on ageing attitudes.

References

- Abrams, D., Russell, P. S., Vauclair, C.-M., & Swift, H. (2011). *Ageism in Europe: Findings from the European Social Survey*.
[https://kar.kent.ac.uk/29733/1/ID10704%20AgeUKAgeism%20Across%20Europe2011%20prepubReport\[1\].pdf](https://kar.kent.ac.uk/29733/1/ID10704%20AgeUKAgeism%20Across%20Europe2011%20prepubReport[1].pdf)
- Abrams, D., Swift, H. J., Lamont, R. A., & Drury, L. (2015). The barriers to and enablers of positive attitudes to ageing and older people, at the societal and individual level.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454735/gs-15-15-future-ageing-attitudes-barriers-enablers-er06.pdf
- Baernholdt, M., Hinton, I., Yan, G., Rose, K., & Mattos, M. (2012). Factors associated with quality of life in older adults in the United States. *Quality of Life Research*, 21(3), 527–534. <https://doi.org/10.1007/s11136-011-9954-z>
- Bauer, J. M., Levin, V., Boudet, A. M. M., Nie, P., & Sousa-Poza, A. (2017). Subjective Well-being Across the Lifespan in Europe and Central Asia. *Journal of Population Ageing*, 10(2), 125–158. <https://doi.org/10.1007/s12062-016-9148-0>
- Bilotta, C., Bowling, A., Nicolini, P., Casè, A., Pina, G., Rossi, S. V., & Vergani, C. (2011). Older People's Quality of Life (OPQOL) scores and adverse health outcomes at a one-year follow-up. A prospective cohort study on older outpatients living in the community in Italy. *Health and Quality of Life Outcomes*, 9(1), 1–10. <https://doi.org/10.1186/1477-7525-9-72>
- Blanchflower, D. G. (2021). Is happiness U-shaped everywhere? Age and subjective well-being in 145 countries. *Journal of Population Economics*, 34(2), 575–624.
<https://doi.org/10.1007/s00148-020-00797-z>
- Bryant, C., Bei, B., Gilson, K., Komiti, A., Jackson, H., & Judd, F. (2012). The relationship between attitudes to aging and physical and mental health in older adults. *International Psychogeriatrics*, 24(10), 1674–1683. <https://doi.org/10.1017/S1041610212000774>
- Burnes, D., Sheppard, C., Henderson, C. R., Wassel, M., Cope, R., Barber, C., & Pillemer, K. (2019). Interventions to reduce ageism against older adults: A systematic review and

- meta-analysis. *American Journal of Public Health*, 109(8), E1–E9.
<https://doi.org/10.2105/AJPH.2019.305123>
- Burnett-Wolle, S., & Godbey, G. (2007). Refining Research on Older Adults' Leisure: Implications of Selection, Optimization, and Compensation and Socioemotional Selectivity Theories. *Journal of Leisure Research Copyright*, 39(3), 498–513.
<https://doi.org/10.1080/00222216.2007.11950119>
- Canuto, A., Weber, K., Baertschi, M., Andreas, S., Volkert, J., Dehoust, M. C., Sehner, S., Math, D., Suling, A., Wegscheider, K., Ausín, B., Crawford, M. J., Ronch, D., Grassi, L., HersHKovitz, Y., Muñoz, M., Quirk, A., Rotenstein, O., Santos-Olmo, A. B., ... Härter, M. (2018). Anxiety Disorders in Old Age: Psychiatric Comorbidities, Quality of Life, and Prevalence According to Age, Gender, and Country. *The American Journal of Geriatric Psychiatry*, 26(2), 174–185. <https://doi.org/10.1016/j.jagp.2017.08.015>
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science*, 312(5782), 1913–1915. <https://doi.org/10.1126/science.1127488>
- Carstensen, L. L., & DeLiema, M. (2018). The positivity effect: a negativity bias in youth fades with age. *Current Opinion in Behavioral Sciences*, 19, 7–12.
<https://doi.org/10.1016/j.cobeha.2017.07.009>
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54(3), 165–181.
<https://doi.org/10.1037/0003-066X.54.3.165>
- Carstensen, L. L., & Mikels, J. A. (2005). At the Intersection of Emotion and Cognition. *Current Directions in Psychological Science*, 14(3), 117–121.
<https://doi.org/10.1111/j.0963-7214.2005.00348.x>
- Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershfield, H., Samanez-Larkin, G. R., Brooks, K. P., & Nesselroade, J. R. (2011). Emotional Experience Improves With Age: Evidence Based on Over 10 Years of Experience Sampling. *Psychology and Aging*, 26(1), 21–33. <https://doi.org/10.1037/a0021285>
- Castro, P. C., Driusso, P., & Oishi, J. (2014). Convergent validity between SF-36 and

- WHOQOL-BREF in older adults. *Revista de Saúde Pública*, 48(1), 63–67.
<https://doi.org/10.1590/S0034-8910.2014048004783>
- Chachamovich, E., Fleck, M., Laidlaw, K., & Power, M. (2008). Impact of Major Depression and Subsyndromal Symptoms on Quality of Life and Attitudes Toward Aging in an International Sample of Older Adults. *The Gerontologist*, 48(5), 593–602.
<https://doi.org/10.1093/geront/48.5.593>
- Chachamovich, E., Fleck, M. P., Trentini, C. M., Laidlaw, K., & Power, M. J. (2008). Development and validation of the Brazilian version of the Attitudes to Aging Questionnaire (AAQ): an example of merging classical psychometric theory and the Rasch measurement model. *Health and Quality of Life Outcomes*, 6(1), 1–10.
<https://doi.org/10.1186/1477-7525-6-5>
- Chopik, W. J., & Giasson, H. L. (2017). Age Differences in Explicit and Implicit Age Attitudes Across the Life Span. *The Gerontologist*, 57(suppl_2), S169–S177.
<https://doi.org/10.1093/geront/gnx058>
- Dark-Freudeman, A., West, R. L., & Viverito, K. M. (2006). Future selves and aging: Older adults' memory fears. *Educational Gerontology*, 32(2), 85–109.
<https://doi.org/10.1080/03601270500388125>
- De Craen, A. J. M., Heeren, T. J., & Gussekloo, J. (2003). Accuracy of the 15-item geriatric depression scale (GDS-15) in a community sample of the oldest old. *International Journal of Geriatric Psychiatry*, 18(1), 63–66. <https://doi.org/10.1002/gps.773>
- Diehl, M., Wahl, H. W., Barrett, A. E., Brothers, A. F., Miche, M., Montepare, J. M., Westerhof, G. J., & Wurm, S. (2014). Awareness of aging: Theoretical considerations on an emerging concept. *Developmental Review*, 34(2), 93–113.
<https://doi.org/10.1016/j.dr.2014.01.001>
- Farquhar, M. (1995). Elderly people's definitions of quality of life. *Social Science and Medicine*, 41(10), 1439–1446. [https://doi.org/10.1016/0277-9536\(95\)00117-P](https://doi.org/10.1016/0277-9536(95)00117-P)
- Feng, C., Wang, H., Lu, N., Chen, T., He, H., Lu, Y., & Tu, X. M. (2014). Log-transformation and its implications for data analysis. *Shanghai Archives of Psychiatry*, 26(2), 105–109.

<https://doi.org/10.3969/j.issn.1002-0829.2014.02>

Ferrans, C. E. (2004). Definitions and conceptual models of quality of life. In J. Lipscomb, C.

C. Gotay, & C. Snyder (Eds.), *Outcomes assessment in cancer* (pp. 14–30). Cambridge University Press.

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics: 5th edition*. Sage Publications.

Freeman, A. T., Santini, Z. I., Tyrovolas, S., Rummel-Kluge, C., Haro, J. M., & Koyanagi, A.

(2016). Negative perceptions of ageing predict the onset and persistence of depression and anxiety: Findings from a prospective analysis of the Irish Longitudinal Study on Ageing (TILDA). *Journal of Affective Disorders*, 199, 132–138.

<https://doi.org/10.1016/j.jad.2016.03.042>

Friedman, B., Heisel, M. J., & Delavan, R. L. (2005). Psychometric properties of the 15-item

geriatric depression scale in functionally impaired, cognitively intact, community-dwelling elderly primary care patients. *Journal of the American Geriatrics Society*, 53(9), 1570–1576. <https://doi.org/10.1111/j.1532-5415.2005.53461.x>

Gale, C. R., & Cooper, C. (2018). Attitudes to Ageing and Change in Frailty Status: The English Longitudinal Study of Ageing. *Gerontology*, 64(1), 58–66.

<https://doi.org/10.1159/000477169>

Gandek, B., Ware, J. E., Aaronson, N. K., Apolone, G., Bjorner, J. B., Brazier, J. E., Bullinger,

M., Kaasa, S., Leplege, A., Prieto, L., & Sullivan, M. (1998). Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: Results from the IQOLA Project. *Journal of Clinical Epidemiology*, 51(11), 1171–1178.

[https://doi.org/10.1016/S0895-4356\(98\)00109-7](https://doi.org/10.1016/S0895-4356(98)00109-7)

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. The Guildford Press.

Hess, T. M. (2006). Attitudes toward Aging and Their Effects in Behavior. In J. E. Birren &

K. W. Schaie (Eds.), *Handbook of the psychology of aging* (6th ed., pp. 379–406).

Academic Press.

- Heymans, M. W., & Eekhout, I. (2019). *Applied missing data analysis with SPSS and (R)Studio*. <https://bookdown.org/mwheymans/bookmi/>
- Isaacowitz, D. M., Wadlinger, H. A., Goren, D., & Wilson, H. R. (2006). Selective preference in visual fixation away from negative images in old age? An eye-tracking study. *Psychology and Aging, 21*(1), 40–48. <https://doi.org/10.1037/0882-7974.21.1.40>
- Janečková, H., Dragomirecká, E., Holmerová, I., & Vaňková, H. (2013). The Attitudes of Older Adults Living in Institutions and Their Caregivers to Ageing. *Central European Journal of Public Health, 21*(2), 63–71. <https://doi.org/10.21101/cejph.a3774>
- Jebb, A. T., Morrison, M., Tay, L., & Diener, E. (2020). Subjective Well-Being Around the World: Trends and Predictors Across the Life Span. *Psychological Science, 31*(3), 293–305. <https://doi.org/10.1177/0956797619898826>
- Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology, 64*(5), 402–406. <https://doi.org/10.4097/kjae.2013.64.5.402>
- Karel, M. J., Gatz, M., & Smyer, M. A. (2012). Aging and mental health in the decade ahead: What psychologists need to know. *American Psychologist, 67*(3), 184–198. <https://doi.org/10.1037/a0025393>
- Kishita, N., Fisher, P., & Laidlaw, K. (2015). *What are the attitudes of different age groups towards contributing and benefitting from the wider society and how are these experienced by individuals in those age groups? Looking forward to 2025 and 2040, how might these evolve?* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/454795/gs-15-16-future-ageing-attitudes-psychological-er07.pdf
- Klusmann, V., Notthoff, N., Beyer, A. K., Blawert, A., & Gabrian, M. (2020). The assessment of views on ageing: a review of self-report measures and innovative extensions. *European Journal of Ageing, 17*(4), 403–433. <https://doi.org/10.1007/s10433-020-00556-9>
- Kojima, G., Iliffe, S., Jivraj, S., & Walters, K. (2016). Association between frailty and quality of life among community-dwelling older people: a systematic review and meta-analysis.

- J Epidemiol Community Health*, 70(7), 716–721. <https://doi.org/10.1136/jech>
- Koopman, J., Howe, M., & Hollenbeck, J. R. (2014). Pulling the sobel test up by its bootstraps. In *More Statistical and Methodological Myths and Urban Legends* (pp. 224–243). Routledge/Taylor & Francis Group.
- Korkmaz Aslan, G., Kulakçı Altıntaş, H., Özen Çınar, İ., & Veren, F. (2019). Attitudes to ageing and their relationship with quality of life in older adults in Turkey. *Psychogeriatrics*, 19(2), 157–164. <https://doi.org/10.1111/psyg.12378>
- Laidlaw, K., Kishita, N., Shenkin, S. D., & Power, M. J. (2018). Development of a short form of the Attitudes to Ageing Questionnaire (AAQ). *International Journal of Geriatric Psychiatry*, 33(1), 113–121. <https://doi.org/10.1002/gps.4687>
- Laidlaw, K., & Pachana, N. A. (2009). Aging, Mental Health, and Demographic Change: Challenges for Psychotherapists. *Professional Psychology: Research and Practice*, 40(6), 601–608. <https://doi.org/10.1037/a0017215>
- Laidlaw, K., Power, M. J., Schmidt, S., Quinn, K., Toner, H., Lucas, R., Skevington, S., McCrate, F., Amir, M., Ben Ya'acov, Y., Narkiss-Guez, T., Kullman, L., Bech-Anderson, G., Martigny, K., Fang, J. Q., Hao, Y., Angermeyer, M. C., Winkler, I., Hawthorne, G., ... Killian, R. (2007). The attitudes to ageing questionnaire (AAQ): Development and psychometric properties. *International Journal of Geriatric Psychiatry*, 22(4), 367–379. <https://doi.org/10.1002/gps.1683>
- Lawton, M. P. (1975). The Philadelphia Geriatric Center Morale Scale: A Revision 1. *Journal of Gerontology*, 30(1), 85–89. <https://academic.oup.com/geronj/article/30/1/85/596888>
- Lee, K. J., & Carlin, J. B. (2010). Multiple Imputation for Missing Data: Fully Conditional Specification Versus Multivariate Normal Imputation. *American Journal of Epidemiology*, 171(5), 624–632. <https://doi.org/10.1093/aje/kwp425>
- Levy, B. R. (2003). Mind matters: Cognitive and physical effects of aging self-stereotypes. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 58(4), P203–P211. <https://doi.org/10.1093/geronb/58.4.P203>

- Levy, B. R. (2009). Stereotype embodiment: A psychosocial approach to aging. *Current Directions in Psychological Science*, 18(6), 332–336. <https://doi.org/10.1111/j.1467-8721.2009.01662.x>
- Levy, B. R., & Myers, L. M. (2004). Preventive health behaviors influenced by self-perceptions of aging. *Preventive Medicine*, 39(3), 625–629. <https://doi.org/10.1016/j.ypmed.2004.02.029>
- Levy, B. R., Slade, M., Kunkel, S. R., & Kasl, S. V. (2002). Longevity Increased by Positive Self-Perceptions of Aging. *Journal of Personality and Social Psychology*, 83(2), 261–270. <https://doi.org/10.1037/0022-3514.83.2.261>
- Li, J., Lai, D. W. L., & Chappell, N. L. (2021). The Older, the Happier?: A Cross-Sectional Study on the “Paradox of Aging” in China. *Research on Aging*, Article 016402752199422. <https://doi.org/10.1177/0164027521994225>
- Li, T., Hutfless, S., Scharfstein, D. O., Daniels, M. J., Hogan, J. W., Little, R. J. A., Roy, J. A., Law, A. H., & Dickersin, K. (2014). Standards should be applied in the prevention and handling of missing data for patient-centered outcomes research: A systematic review and expert consensus. *Journal of Clinical Epidemiology*, 67(1), 15–32. <https://doi.org/10.1016/j.jclinepi.2013.08.013>
- Little, R. J. A. (1988). A Test of Missing Completely at Random for Multivariate Data with Missing Values. *Journal of the American Statistical Association*, 83(404), 1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>
- Long, S., Laidlaw, K., Lorimer, A., & Ferreira, N. (2020). Attitudes to ageing and quality of life in young and old older adults: an international cross-sectional analysis. *Working with Older People*, 25(1), 39–57. <https://doi.org/10.1108/WWOP-06-2020-0032>
- Low, G., Molzahn, A. E., & Schopflocher, D. (2013). Attitudes to aging mediate the relationship between older peoples’ subjective health and quality of life in 20 countries. *Health and Quality of Life Outcomes*, 11(146), 1–10. <https://doi.org/10.1186/1477-7525-11-146>
- Lucas-Carrasco, R., Laidlaw, K., Gomez-Benito, J., & Power, M. (2013). The suitability of the

- Attitudes Ageing (AAQ) for Spanish older adults. *International Psychogeriatrics*, 25(3), 490–499. <https://doi.org/10.1017/S1041610212001809>
- Madley-Dowd, P., Hughes, R., Tilling, K., & Heron, J. (2019). The proportion of missing data should not be used to guide decisions on multiple imputation. *Journal of Clinical Epidemiology*, 110, 63–73. <https://doi.org/10.1016/j.jclinepi.2019.02.016>
- Maio, G. R., & Haddock, G. (2010). *The Psychology of Attitudes and Attitude Change*. SAGE Publications Ltd.
- Marquet, M., Missotten, P., Schroyen, S., Van Sambeek, I., Van Den Akker, M., Van Den Broeke, C., Buntinx, F., & Adam, S. (2016). A validation of the French version of the attitudes to aging questionnaire (AAQ): factor structure, reliability and validity. *Psychologica Belgica*, 56(2), 80–100. <https://doi.org/10.5334/pb.301>
- Mather, M. (2012). The emotion paradox in the aging brain. *Annals of the New York Academy of Sciences*, 1251(1), 33–49. <https://doi.org/10.1111/j.1749-6632.2012.06471.x>
- Mitchell, A. J., Bird, V., Rizzo, M., & Meader, N. (2010). Diagnostic validity and added value of the geriatric depression scale for depression in primary care: A meta analysis of GDS30 and GDS 15. *Journal of Affective Disorders*, 125(1–3), 10–17. <https://doi.org/10.1016/j.jad.2009.08.019>
- Moser, C., Spagnoli, J., & Santos-Eggimann, B. (2011). Self-Perception of Aging and Vulnerability to Adverse Outcomes at the Age of 65–70 Years. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 66B(6), 675–680. <https://doi.org/10.1093/geronb/gbr052>
- Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Harvesting Implicit Group Attitudes and Beliefs From a Demonstration Web Site. *Group Dynamics: Theory, Research, and Practice*, 6(1), 101–115. <https://doi.org/10.1037/1089-2699.6.1.101>
- Nyunt, M. S. Z., Fones, C., Niti, M., & Ng, T.-P. (2009). Criterion-based validity and reliability of the Geriatric Depression Screening Scale (GDS-15) in a large validation sample of community-living Asian older adults. *Aging & Mental Health*, 13(3), 376–382. <https://doi.org/10.1080/13607860902861027>

Office for National Statistics. (2016). *Measuring National Well-being: At what age is Personal Well-being the highest?*

<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/measuringnationalwellbeing/atwhatageispersonalwellbeingthehighest>

Office for National Statistics. (2018). *Living longer - how our population is changing and why it matters.*

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/ageing/articles/livinglongerhowourpopulationischangingandwhyitmatters/2018-08-13>

Padayachey, U., Ramlall, S., & Chipps, J. (2017). Depression in older adults: prevalence and risk factors in a primary health care sample. *South African Family Practice*, 59(2), 61–66. <https://doi.org/10.1080/20786190.2016.1272250>

Pepinsky, T. B. (2018). A Note on Listwise Deletion versus Multiple Imputation. *Political Analysis*, 26, 480–488. <https://doi.org/10.1017/pan.2018.18>

Porensky, E. K., Dew, M. A., Karp, J. F., Skidmore, E., Rollman, B. L., Shear, M. K., & Lenze, E. J. (2009). The burden of late-life generalized anxiety disorder: Effects on disability, health-related quality of life, and healthcare utilization. *American Journal of Geriatric Psychiatry*, 17(6), 473–482. <https://doi.org/10.1097/JGP.0b013e31819b87b2>

Power, M., Quinn, K., & Schmidt, S. (2005). Development of the WHOQOL-Old module. *Quality of Life Research*, 14(10), 2197–2214. <https://doi.org/10.1007/s11136-005-7380-9>

Resnick, B., & Nahm, E. S. (2001). Reliability and validity testing of the revised 12-item short-form health survey in older adults. *Journal of Nursing Measurement*, 9(2), 151–161. <https://doi.org/10.1891/1061-3749.9.2.151>

Rubin, D. B. (1976). Inference and missing data. *Biometrika*, 63(3), 581–592. <https://doi.org/10.1093/biomet/63.3.581>

Rubin, D. B. (1987). *Multiple Imputation for Nonresponse in Surveys*. John Wiley & Sons,

Sargent-Cox, K. A., Anstey, K. J., & Luszcz, M. A. (2014). Longitudinal change of self-perceptions of aging and mortality. *Journals of Gerontology, Series B: Psychological*

- Sciences and Social Sciences*, 69(2), 168–173. <https://doi.org/10.1093/geronb/gbt005>
- Saxena, S., & Orley, J. (1997). Quality of life assessment: The World Health Organization perspective. *European Psychiatry*, 12(SUPPL. 3), 263s-266s.
[https://doi.org/10.1016/S0924-9338\(97\)89095-5](https://doi.org/10.1016/S0924-9338(97)89095-5)
- Schafer, M. H., & Shippee, T. P. (2010). Age identity, gender, and perceptions of decline: does feeling older lead to pessimistic dispositions about cognitive aging?. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 65(1), 91-96.
<https://doi.org/10.1093/geronb/gbp046>
- Shenkin, S. D., Laidlaw, K., Allerhand, M., Mead, G. E., Starr, J. M., & Deary, I. J. (2014). Life course influences of physical and cognitive function and personality on attitudes to aging in the Lothian Birth Cohort 1936. *International Psychogeriatrics*, 26(9), 1417–1430. <https://doi.org/10.1017/S1041610214000301>
- Shenkin, S. D., Watson, R., Laidlaw, K., Starr, J. M., & Deary, I. J. (2014). The Attitudes to Ageing Questionnaire: Mokken Scaling Analysis. *PLoS ONE*, 9(6), e99100.
<https://doi.org/10.1371/journal.pone.0099100>
- Sinha, B. R. K. (2019). Introduction: An Overview of the Concept of Quality of Life. *Multidimensional Approach to Quality of Life Issues*, 3–23.
https://doi.org/10.1007/978-981-13-6958-2_1
- Sivertsen, H., Bjørkløf, G. H., Engedal, K., Selbæk, G., & Helvik, A. S. (2015). Depression and quality of life in older persons: A review. *Dementia and Geriatric Cognitive Disorders*, 40(5–6), 311–339. <https://doi.org/10.1159/000437299>
- Swift, H. J., & Chasteen, A. L. (2021). Ageism in the time of COVID-19. *Group Processes & Intergroup Relations*, 24(2), 246–252. <https://doi.org/10.1177/1368430220983452>
- Tabachnick, B. G., & Fidell, L. S. (2014). *Using Multivariate Statistics*. Pearsons Education Limited.
- Thomas, M. L., Kaufmann, C. N., Palmer, B. W., Depp, C. A., Martin, A. S., Glorioso, D. K., Thompson, W. K., & Jeste, D. V. (2016). Paradoxical trend for improvement in mental health with aging: A Community-Based study of 1,546 adults aged 21-100 years.

Journal of Clinical Psychiatry, 77(8), e1019–e1025.

<https://doi.org/10.4088/JCP.16m10671>

Top, M., & Dikmetaş, E. (2015). Quality of life and attitudes to ageing in Turkish older adults at old people's homes. *Health Expectations*, 18(2), 288–300.

<https://doi.org/10.1111/hex.12032>

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(7), 1085–1093. <https://doi.org/10.1017/S1041610212000038>

United Nations, D. of E. and S. A. (2019). *World Population Ageing 2019: Highlights*.

<https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf>

van Leeuwen, K. M., van Loon, M. S., van Nes, F. A., Bosmans, J. E., de Vet, H. C. W., Ket, J.

C. F., Widdershoven, G. A. M., & Ostelo, R. W. J. G. (2019). What does quality of life mean to older adults? A thematic synthesis. *PLOS ONE*, 14(3), e0213263.

<https://doi.org/10.1371/journal.pone.0213263>

Ware, J. E., Kosinski, M., & Keller, S. D. (1996). A 12-Item Short-Form Health Survey:

Construction of Scales and Preliminary Tests of Reliability and Validity. *Medical Care*, 34(3), 220–233. <https://doi.org/10.1097/00005650-199603000-00003>

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. *Medical Care*, 30(6), 473–483.

Warmoth, K., Tarrant, M., Abraham, C., & Lang, I. A. (2016). Older adults' perceptions of ageing and their health and functioning: a systematic review of observational studies.

Health & Medicine, 21(5), 531–550. <https://doi.org/10.1080/13548506.2015.1096946>

WHOQoL Group. (1995). The World Health Organization quality of life assessment

(WHOQOL): Position paper from the World Health Organization. *Social Science and Medicine*, 41(10), 1403–1409. [https://doi.org/10.1016/0277-9536\(95\)00112-K](https://doi.org/10.1016/0277-9536(95)00112-K)

WHOQOL Group. (1998). Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment. *Psychological Medicine*, 28, 551–558.

<https://doi.org/10.1017/S0033291798006667>

World Economic Forum. (2012). *Global Population Ageing : Peril or Promise?*

[https://demographic-](https://demographic-challenge.com/files/downloads/6c59e8722eec82f7ffa0f1158dof4e59/ageingbook_010612.pdf)

[challenge.com/files/downloads/6c59e8722eec82f7ffa0f1158dof4e59/ageingbook_010612.pdf](https://demographic-challenge.com/files/downloads/6c59e8722eec82f7ffa0f1158dof4e59/ageingbook_010612.pdf)

World Health Organization. (2015). *World report on Ageing And Health.*

http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811_eng.pdf?sequence=1

Xiang, X., Lu, X., Halavanau, A., Xue, J., Sun, Y., Lai, P. H. L., & Wu, Z. (2021). Modern

Senicide in the Face of a Pandemic: An Examination of Public Discourse and Sentiment About Older Adults and COVID-19 Using Machine Learning. *The Journals of Gerontology: Series B*, 76(4), e190–e200. <https://doi.org/10.1093/geronb/gbaa128>

Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1982).

Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research*, 17(1), 37–49. [https://doi.org/10.1016/0022-3956\(82\)90033-4](https://doi.org/10.1016/0022-3956(82)90033-4)

Yesavage, J. A., & Sheikh, J. I. (1986). Geriatric Depression Scale (GDS): Recent Evidence and Development of a Shorter Version. *Clinical Gerontologist*, 5(1/2), 165–173.

https://doi.org/10.1300/J018v05n01_09

Appendices

Appendix A: Attitudes to Ageing Questionnaire

The following questions ask **how much you agree** with the following statements. If you agree with the statements an extreme amount circle the number next to “strongly agree”. If you do not agree with the statements at all, circle the number next to “Strongly disagree”. You should circle one of the numbers in between if you wish to indicate your answer lies somewhere between “Strongly disagree” and “Strongly agree”.

1. As people get older they are better able to cope with life. (F3)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

2. It is a privilege to grow old. (F3)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

3. Old age is a time of loneliness. (F1)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

4. Wisdom comes with age. (F3)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

5. There are many pleasant things about growing older. (F3)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

6. Old age is a depressing time of life. (F1)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

7. It is important to take exercise at any age. (F2)

Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	2	3	4	5

8. Growing older has been easier than I thought. (F2)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

9. I find it more difficult to talk about my feelings as I get older. (F1)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

10. I am more accepting of myself as I have grown older. (F3)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

11. I don't feel old. (F2)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

12. I see old age mainly as a time of loss. (F1)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

13. My identity is not defined by my age. (F2)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

14. I have more energy now than I expected for my age. (F2)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

15. I am losing my physical independence as I get older. (F1)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

16. Problems with my physical health do not hold me back from doing what I want to. (F2)

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

17. As I get older, I find it more difficult to make new friends. **(F1)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

18. It is very important to pass on the benefits of my experiences to younger people. **(F3)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

19. I believe my life has made a difference. **(F3)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

20. I don't feel involved in society now that I am older. **(F1)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

21. I want to give a good example to younger people. **(F3)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

22. I feel excluded from things because of my age. **(F1)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

23. My health is better than I expected for my age. **(F2)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

24. I keep myself as fit and active as possible by exercising. **(F2)**

Not at all true	Slightly true	Moderately true	Very true	Extremely true
1	2	3	4	5

Appendix B: Geriatric Depression Scale 15**GERIATRIC DEPRESSION SCALE (GDS)****NAME:****DATE:**

1	Are you basically satisfied with your life?	No	Yes
2	Have you dropped many of your activities or interests?	Yes	No
3	Do you feel that your life is empty?	Yes	No
4	Do you often feel bored?	Yes	No
5	Are you in good spirits most of the time?	No	Yes
6	Are you afraid that something bad is going to happen to you?	Yes	No
7	Do you feel happy most of the time?	No	Yes
8	Do you often feel helpless?	Yes	No
9	Do you prefer to stay at home, rather than going out and doing new things?	Yes	No
10	Do you feel you have more problems with your memory than most?	Yes	No
11	Do you think it is wonderful to be alive?	No	Yes
12	Do you feel pretty worthless the way you are now	Yes	No
13	Do you feel full of energy?	No	Yes
14	Do you feel that your situation is hopeless?	Yes	No
15	Do you think that most people are better off than you are?	Yes	No
> 5 problems (answers in BOLD) indicates probable depression TOTAL:			

Appendix C: Short Form Health Survey (SF-12)*SF-12 Health Survey**D. Standard and Acute Forms*  *p. 85***SF-12 HEALTH SURVEY (STANDARD)**

INSTRUCTIONS: This questionnaire asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.

Please answer every question by marking one box. If you are unsure about how to answer, please give the best answer you can.

1. In general, would you say your health is:


☐**Excellent**☐**Very good**☐**Good**☐**Fair**☐**Poor**

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

- | | Yes,
Limited
A Lot | Yes,
Limited
A Little | No, Not
Limited
At All |
|------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------|---------------------------------------|
| 2. Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Climbing several flights of stairs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

- | | YES | NO |
|----------------------------------------------------------------|--------------------------|--------------------------|
| 4. Accomplished less than you would like | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Were limited in the kind of work or other activities | <input type="checkbox"/> | <input type="checkbox"/> |

p. 86  D. Standard and Acute Forms

SF-12 Health Survey

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

- | | YES | NO |
|--------------------------------------------------------------------|--------------------------|--------------------------|
| 6. Accomplished less than you would like | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Didn't do work or other activities as carefully as usual | <input type="checkbox"/> | <input type="checkbox"/> |
8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?
- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Not at all | A little bit | Moderately | Quite a bit | Extremely |

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks -

- | | All of the Time | Most of the Time | A Good Bit of the Time | Some of the Time | A Little of the Time | None of the Time |
|-----------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 9. Have you felt calm and peaceful? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Did you have a lot of energy? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Have you felt downhearted and blue? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

12. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All of the time | Most of the time | Some of the time | A little of the time | None of the time |

Appendix D: Missing Data Spreadsheets

Subsections of excel spreadsheet of missing data split by centre and item

Indicates 10%+ missing		Edinburgh			Bath			Leipzig			Barcelona			Copenhagen			Paris			Prague			Budapest			Oslo			Victoria			Melbourne			
		Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			
Variable Label		Var Name	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%			
Demographics	Gender	sd1	116	0	0	144	0	0	353	1	0.3	271	0	0	380	4	1	164	0	0	325	0	0	333	0	0	319	5	1.5	202	0	0	366	10	2.7
	Age	sd2	116	0	0	144	0	0	354	0	0	271	0	0	384	0	0	164	0	0	325	0	0	333	0	0	324	0	0	202	0	0	376	0	0
	Marital Status	sd3	116	0	0	143	1	0.7	347	7	2	271	0	0	381	3	0.8	80	84	51.2	325	0	0	333	0	0	313	11	3.4	202	0	0	374	2	0.5
	Education Level	sd4	116	0	0	142	2	1.4	351	3	0.8	269	2	0.7	376	8	2.1	77	87	53	325	0	0	332	1	0.3	316	8	2.5	202	0	0	372	4	1.1
	Living Arrangements	sd5	116	0	0	142	2	1.4	350	4	1.1	271	0	0	379	5	1.3	80	84	51.2	325	0	0	333	0	0	317	7	2.2	198	4	2	372	4	1.1
	Previous occupation	sd6	110	6	5.2	134	10	6.9	349	5	1.4	263	8	3	245	139	36.2	68	96	58.5	312	13	4	325	8	2.4	288	36	11.1	199	3	1.5	369	7	1.9
	Employment status	sd7	114	2	1.7	83	61	42.4	302	52	14.7	269	2	0.7	370	14	3.6	70	94	57.3	260	65	20	329	4	1.2	317	7	2.2	198	4	2	364	12	3.2
	Financial situation	sd9	112	4	3.4	143	1	0.7	351	3	0.8	269	2	0.7	379	5	1.3	75	89	54.3	325	0	0	317	16	4.8	285	39	12	201	1	0.5	371	5	1.3
	R/ship w/ partner	sd10	112	4	3.4	141	3	2.1	342	12	3.4	261	10	3.7	360	24	6.3	59	105	64	0	325	100	290	43	12.9	293	31	9.6	199	3	1.5	365	11	2.9
	Sat r/ship w/ children	sd12	113	3	2.6	118	26	18.1	352	2	0.6	249	22	8.1	380	4	1	72	92	56.1	323	2	0.6	325	8	2.4	277	47	14.5	200	2	1	356	20	5.3
	Sat r/ship w/ g'kids	sd14	112	4	3.4	87	57	39.6	350	4	1.1	239	32	11.8	382	2	0.5	66	98	59.8	323	2	0.6	320	13	3.9	261	63	19.4	202	0	0	345	31	8.2
	MC: Cardiovascular	sd16_1	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	14	150	91.5	325	0	0	333	0	0	38	286	88.3	202	0	0	376	0	0
	MC: Hypertension/Hypotension	sd16_2	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	15	309	95.4	202	0	0	376	0	0
	MC: Musculoskeletal	sd16_3	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	13	151	92.1	325	0	0	333	0	0	86	238	73.5	202	0	0	376	0	0
	MC: Diseases of the foot	sd16_4	113	3	2.6	144	0	0	354	0	0	271	0	0	382	2	0.5	0	164	100	325	0	0	333	0	0	0	324	100	202	0	0	376	0	0
	MC: Neurologic diseases	sd16_5	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	22	142	86.6	325	0	0	333	0	0	12	312	96.3	202	0	0	376	0	0
	MC: Infectious disease	sd16_6	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	1	323	99.7	202	0	0	376	0	0
	MC: Respiratory disease	sd16_7	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	14	310	95.7	202	0	0	376	0	0
	MC: Oral disease	sd16_8	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	0	324	100	202	0	0	376	0	0
	MC: Gastrointestinal disease	sd16_9	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	1	163	99.4	325	0	0	333	0	0	11	313	96.6	202	0	0	376	0	0
	MC: Endocrine and Metabolic disorders	sd16_10	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	90	74	45.1	325	0	0	333	0	0	16	308	95.1	202	0	0	376	0	0
	MC: Gynecologic diseases	sd16_11	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	0	324	100	202	0	0	376	0	0
	MC: Disorders of sexual function	sd16_12	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	0	324	100	202	0	0	376	0	0
	MC: Hematologic diseases	sd16_13	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	3	321	99.1	202	0	0	376	0	0
	MC: Oncology	sd16_14	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	1	163	99.4	325	0	0	333	0	0	8	316	97.5	202	0	0	376	0	0
	MC: Renal and urinary disease	sd16_15	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	3	321	99.1	202	0	0	376	0	0
	MC: Prostate disease	sd16_16	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	7	317	97.8	202	0	0	376	0	0
	MC: Dermatologic disease	sd16_17	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	0	164	100	325	0	0	333	0	0	0	324	100	202	0	0	376	0	0
	MC: Psychiatric disorders	sd16_18	113	3	2.6	144	0	0	354	0	0	271	0	0	383	1	0.3	5	159	97	325	0	0	333	0	0	6	318	98.1	202	0	0	376	0	0
	Use of medication	sd17a	113	3	2.6	112	32	22.2	343	11	3.1	265	6	2.2	371	13	3.4	72	92	56.1	323	2	0.6	327	6	1.8	311	13	4	201	1	0.5	368	8	2.1
	Use of complimentary medicines	sd18a	108	8	6.9	142	2	1.4	340	14	4	251	20	7.4	372	12	3.1	70	94	57.3	324	1	0.3	329	4	1.2	309	15	4.6	200	2	1	365	11	2.9
	Do you smoke	sd19	112	4	3.4	144	0	0	347	7	2	268	3	1.1	368	16	4.2	158	6	3.7	321	4	1.2	331	2	0.6	313	11	3.4	199	3	1.5	155	221	58.8
	How often drink alcohol	sd20	112	4	3.4	142	2	1.4	346	8	2.3	261	10	3.7	377	7	1.8	72	92	56.1	321	4	1.2	330	3	0.9	312	12	3.7	198	4	2	369	7	1.9
	Basically satisfied with your life	gds1	115	1	0.9	143	1	0.7	346	8	2.3	260	11	4.1	367	17	4.4	0	164	100	323	2	0.6	333	0	0	313	11	3.4	197	5	2.5	374	2	0.5
	Dropped many activities and interests	gds2	112	4	3.4	142	2	1.4	340	14	4	262	9	3.3	363	21	5.5	0	164	100	324	1	0.3	331	2	0.6	310	14	4.3	198	4	2	0	376	100

Indicates 10%+ missing					Victoria			Melbourne			Seattle			Beer-Sheva			Tokyo			Umea			Brazil			Uruguay			Turkey			Switzerland			Lithuania			TOTAL		
			ing		Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing		
	Variable Label	Var Name	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	
Demographics	Gender	sd1	1.5	202	0	0	366	10	2.7	295	0	0	241	8	3.2	185	3	1.6	455	0	0	328	0	0	248	0	0	327	0	0	138	1	0.7	342	0	0	5532	32	0.58%	
	Age	sd2	0	202	0	0	376	0	0	295	0	0	249	0	0	188	0	0	455	0	0	328	0	0	248	0	0	327	0	0	139	0	0	342	0	0	5564	0	0.00%	
	Marital Status	sd3	3.4	202	0	0	374	2	0.5	293	2	0.7	241	8	3.2	184	4	2.1	455	0	0	328	0	0	112	136	54.8	327	0	0	137	2	1.4	342	0	0	5304	260	4.67%	
	Education Level	sd4	2.5	202	0	0	372	4	1.1	293	2	0.7	239	10	4	183	5	2.7	448	7	1.5	328	0	0	240	8	3.2	327	0	0	139	0	0	342	0	0	5417	147	2.64%	
	Living Arrangements	sd5	2.2	198	4	2	372	4	1.1	291	4	1.4	240	9	3.6	181	7	3.7	455	0	0	328	0	0	247	1	0.4	327	0	0	138	1	0.7	339	3	0.9	5429	135	2.43%	
	Previous occupation	sd6	11.1	199	3	1.5	369	7	1.9	285	10	3.4	226	23	9.2	175	13	6.9	394	61	13.4	323	5	1.5	0	248	100	0	327	100	139	0	0	334	8	2.3	4538	1026	18.44%	
	Employment status	sd7	2.2	198	4	2	364	12	3.2	175	120	40.7	242	7	2.8	161	27	14.4	451	4	0.9	328	0	0	200	48	19.4	327	0	0	134	5	3.6	335	7	2	5029	535	9.62%	
	Financial situation	sd9	12	201	1	0.5	371	5	1.3	291	4	1.4	238	11	4.4	177	11	5.9	438	17	3.7	325	3	0.9	0	248	100	327	0	0	136	3	2.2	337	5	1.5	5097	467	8.39%	
	R/ship w/ partner	sd10	9.6	199	3	1.5	365	11	2.9	289	6	2	237	12	4.8	175	13	6.9	436	19	4.2	323	5	1.5	0	248	100	0	327	100	133	6	4.3	294	48	14	4309	1255	22.56%	
	Sat r/ship w/ children	sd12	14.5	200	2	1	356	20	5.3	293	2	0.7	244	5	2	169	19	10.1	449	6	1.3	327	1	0.3	0	248	100	0	327	100	134	5	3.6	329	13	3.8	4710	854	15.35%	
	Sat r/ship w/ g'kids	sd14	19.4	202	0	0	345	31	8.2	292	3	1	236	13	5.2	153	35	18.6	446	9	2	325	3	0.9	0	248	100	0	327	100	134	5	3.6	319	23	6.7	4592	972	17.47%	
	MC: Cardiovascular	sd16_1	88.3	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4780	784	14.09%	
	MC: Hypertension/Hypotension	sd16_2	95.4	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4743	821	14.76%	
	MC: Musculoskeletal	sd16_3	73.5	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4827	737	13.25%	
	MC: Diseases of the foot	sd16_4	100	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4727	837	15.04%	
	MC: Neurologic diseases	sd16_5	96.3	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4762	802	14.41%	
	MC: Infectious disease	sd16_6	99.7	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4729	835	15.01%	
	MC: Respiratory disease	sd16_7	95.7	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4742	822	14.77%	
	MC: Oral disease	sd16_8	100	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4728	836	15.03%	
	MC: Gastrointestinal disease	sd16_9	96.6	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4740	824	14.81%	
	MC: Endocrine and Metabolic disorders	sd16_10	95.1	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4834	730	13.12%	
	MC: Gynecologic diseases	sd16_11	100	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4728	836	15.03%	
	MC: Disorders of sexual function	sd16_12	100	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4728	836	15.03%	
	MC: Hematologic diseases	sd16_13	99.1	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4731	833	14.97%	
	MC: Oncology	sd16_14	97.5	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4737	827	14.86%	
	MC: Renal and urinary disease	sd16_15	99.1	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	135	4	2.9	342	0	0	4730	834	14.99%	
	MC: Prostate disease	sd16_16	97.8	202	0	0	376	0	0	295	0	0	242	7	2.8	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4734	830	14.92%	
	MC: Dermatologic disease	sd16_17	100	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	135	4	2.9	342	0	0	4727	837	15.04%	
MC: Psychiatric disorders	sd16_18	98.1	202	0	0	376	0	0	295	0	0	243	6	2.4	183	5	2.7	452	3	0.7	328	0	0	248	0	0	0	327	100	136	3	2.2	342	0	0	4739	825	14.83%		
Use of medication	sd17a	4	201	1	0.5	368	8	2.1	281	14	4.7	235	14	5.6	165	23	12.2	435	20	4.4	325	3	0.9	246	2	0.8	327	0	0	132	7	5	339	3	0.9	5291	273	4.91%		
Use of complimentary medicines	sd18a	4.6	200	2	1	365	11	2.9	283	12	4.1	236	13	5.2	174	14	7.4	431	24	5.3	326	2	0.6	247	1	0.4	327	0	0	125	14	10.1	333	9	2.6	5292	272	4.89%		
Do you smoke	sd19	3.4	199	3	1.5	155	221	58.8	290	5	1.7	242	7	2.8	173	15	8	443	12	2.6	328	0	0	0	248	100	0	327	100	133	6	4.3	333	9	2.6	4658	906	16.28%		
How often drink alcohol	sd20	3.7	198	4	2	369	7	1.9	294	1	0.3	242	7	2.8	167	21	11.2	439	16	3.5	328	0	0	0	248	100	0	327	100	132	7	5	331	11	3.2	4773	791	14.22%		
Basically satisfied with your life	gds1	3.4	197	5	2.5	374	2	0.5	293	2	0.7	237	12	4.8	0	188	100	449	6	1.3	270	58	17.7	245	3	1.2	327	0	0	135	4	2.9	325	17	5	5052	512	9.20%		
Dropped many activities and interests	gds2	4.3	198	4	2	0	376	100	292	3	1	243	6	2.4	0	188	100	443	12	2.6	270	58	17.7	242	6	2.4	327	0	0	134	5	3.6	323	19	5.6	4656	908	16.32%		

Indicates 10%+ missing						Edinburgh			Bath			Leipzig			Barcelona			Copenhagen			Paris			Prague			Budapest			Oslo			Victoria			Melbourne		
			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing			Missing		
Variable Label			Var Name			N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%			
GDS15	Often get bored	gds4	115	1	0.9	144	0	0	341	13	3.7	260	11	4.1	364	20	5.2	0	164	100	325	0	0	332	1	0.3	311	13	4	197	5	2.5	0	376	100			
	In good spirits most of the time	gds5	114	2	1.7	143	1	0.7	340	14	4	261	10	3.7	362	22	5.7	0	164	100	325	0	0	330	3	0.9	313	11	3.4	197	5	2.5	0	376	100			
	Afraid something bad is going to happen to you	gds6	113	3	2.6	142	2	1.4	341	13	3.7	259	12	4.4	363	21	5.5	0	164	100	325	0	0	332	1	0.3	310	14	4.3	196	6	3	371	5	1.3			
	Feel happy most of the time	gds7	114	2	1.7	142	2	1.4	336	18	5.1	257	14	5.2	361	23	6	0	164	100	321	4	1.2	331	2	0.6	310	14	4.3	196	6	3	370	6	1.6			
	Often feel helpless	gds8	113	3	2.6	142	2	1.4	342	12	3.4	259	12	4.4	364	20	5.2	0	164	100	320	5	1.5	332	1	0.3	312	12	3.7	197	5	2.5	0	376	100			
	Prefer staying at home than going out and doing things	gds9	112	4	3.4	141	3	2.1	340	14	4	260	11	4.1	359	25	6.5	0	164	100	325	0	0	331	2	0.6	311	13	4	191	11	5.4	0	376	100			
	Have more problems with memory than most	gds10	115	1	0.9	141	3	2.1	342	12	3.4	263	8	3	365	19	4.9	0	164	100	325	0	0	333	0	0	311	13	4	197	5	2.5	0	376	100			
	Think it is wonderful to be alive now	gds11	113	3	2.6	144	0	0	336	18	5.1	260	11	4.1	365	19	4.9	0	164	100	323	2	0.6	332	1	0.3	313	11	3.4	194	8	4	0	376	100			
	Feel pretty worthless the way you are now	gds12	115	1	0.9	144	0	0	344	10	2.8	263	8	3	364	20	5.2	0	164	100	325	0	0	332	1	0.3	312	12	3.7	198	4	2	0	376	100			
	Feel full of energy	gds13	112	4	3.4	137	7	4.9	332	22	6.2	257	14	5.2	357	27	7	0	164	100	325	0	0	331	2	0.6	313	11	3.4	193	9	4.5	0	376	100			
Feel your situation is hopeless	gds14	115	1	0.9	144	0	0	342	12	3.4	256	15	5.5	364	20	5.2	0	164	100	324	1	0.3	333	0	0	312	12	3.7	198	4	2	0	376	100				
Think that most people are better off than you are	gds15	115	1	0.9	141	3	2.1	340	14	4	259	12	4.4	366	18	4.7	0	164	100	325	0	0	332	1	0.3	309	15	4.6	196	6	3	0	376	100				
AAQ	As people get older they are better able to cope	AAQ1_G	114	2	1.7	134	10	6.9	351	3	0.8	270	1	0.4	360	24	6.3	154	10	6.1	325	0	0	328	5	1.5	316	8	2.5	198	4	2	370	6	1.6			
	It is a privilege to grow old	AAQ2_G	115	1	0.9	133	11	7.6	350	4	1.1	267	4	1.5	363	21	5.5	154	10	6.1	325	0	0	329	4	1.2	311	13	4	200	2	1	374	2	0.5			
	Old age is a time of loneliness	AAQ3_PL	114	2	1.7	133	11	7.6	348	6	1.7	267	4	1.5	370	14	3.6	159	5	3	324	1	0.3	331	2	0.6	316	8	2.5	200	2	1	368	8	2.1			
	Wisdom comes with age	AAQ4_G	114	2	1.7	132	12	8.3	347	7	2	267	4	1.5	361	23	6	159	5	3	324	1	0.3	331	2	0.6	318	6	1.9	201	1	0.5	368	8	2.1			
	There are many pleasant things about growing old	AAQ5_G	115	1	0.9	134	10	6.9	348	6	1.7	262	9	3.3	371	13	3.4	154	10	6.1	325	0	0	325	8	2.4	317	7	2.2	201	1	0.5	372	4	1.1			
	Old age is depressing time of life	AAQ6_PL	114	2	1.7	133	11	7.6	348	6	1.7	265	6	2.2	372	12	3.1	155	9	5.5	323	2	0.6	328	5	1.5	318	6	1.9	200	2	1	372	4	1.1			
	It is important to take exercise at any age	AAQ7_PC	114	2	1.7	134	10	6.9	348	6	1.7	267	4	1.5	375	9	2.3	159	5	3	325	0	0	326	7	2.1	321	3	0.9	201	1	0.5	374	2	0.5			
	Growing older has been easier than I thought	AAQ8_PC	113	3	2.6	133	11	7.6	347	7	2	264	7	2.6	375	9	2.3	131	33	20.1	325	0	0	332	1	0.3	310	14	4.3	202	0	0	374	2	0.5			
	More difficult to talk about feelings	AAQ9_PL	113	3	2.6	134	10	6.9	349	5	1.4	263	8	3	372	12	3.1	127	37	22.6	323	2	0.6	331	2	0.6	305	19	5.9	200	2	1	373	3	0.8			
	I am more accepting of myself as I have grown old	AAQ10_G	113	3	2.6	132	12	8.3	348	6	1.7	266	5	1.8	369	15	3.9	128	36	22	324	1	0.3	329	4	1.2	310	14	4.3	201	1	0.5	374	2	0.5			
	I don't feel old	AAQ11_PC	115	1	0.9	133	11	7.6	350	4	1.1	267	4	1.5	374	10	2.6	130	34	20.7	324	1	0.3	329	4	1.2	314	10	3.1	201	1	0.5	371	5	1.3			
	I see old age mainly as a time of loss	AAQ12_PL	114	2	1.7	133	11	7.6	349	5	1.4	265	6	2.2	368	16	4.2	129	35	21.3	325	0	0	328	5	1.5	306	18	5.6	201	1	0.5	366	10	2.7			
	My identity is not defined by my age	AAQ13_PC	108	8	6.9	133	11	7.6	347	7	2	255	16	5.9	360	24	6.3	121	43	26.2	323	2	0.6	326	7	2.1	303	21	6.5	199	3	1.5	370	6	1.6			
	I have more energy than I expected for my age	AAQ14_PC	111	5	4.3	134	10	6.9	347	7	2	267	4	1.5	374	10	2.6	128	36	22	322	3	0.9	331	2	0.6	309	15	4.6	198	4	2	371	5	1.3			
	I am losing my physical independence as I get old	AAQ15_PL	112	4	3.4	133	11	7.6	346	8	2.3	269	2	0.7	367	17	4.4	129	35	21.3	324	1	0.3	330	3	0.9	304	20	6.2	201	1	0.5	370	6	1.6			
	Problems with my physical health do not hold me back	AAQ16_PC	112	4	3.4	134	10	6.9	348	6	1.7	266	5	1.8	370	14	3.6	132	32	19.5	324	1	0.3	331	2	0.6	307	17	5.2	199	3	1.5	372	4	1.1			
	As I get older I find it more difficult to make new friends	AAQ17_PL	111	5	4.3	134	10	6.9	346	8	2.3	264	7	2.6	374	10	2.6	131	33	20.1	325	0	0	332	1	0.3	310	14	4.3	200	2	1	368	8	2.1			
	It is very important to pass on the benefits of my life to younger people	AAQ18_G	112	4	3.4	134	10	6.9	348	6	1.7	267	4	1.5	372	12	3.1	154	10	6.1	323	2	0.6	330	3	0.9	308	16	4.9	199	3	1.5	371	5	1.3			
	I believe my life has made a difference	AAQ19_G	109	7	6	132	12	8.3	337	17	4.8	264	7	2.6	369	15	3.9	155	9	5.5	324	1	0.3	332	1	0.3	311	13	4	198	4	2	366	10	2.7			
	I don't feel involved in society now that I am older	AAQ20_PL	112	4	3.4	134	10	6.9	346	8	2.3	263	8	3	373	11	2.9	155	9	5.5	324	1	0.3	327	6	1.8	305	19	5.9	200	2	1	372	4	1.1			
	I want to give a good example to younger people	AAQ21_G	112	4	3.4	133	11	7.6	345	9	2.5	262	9	3.3	367	17	4.4	155	9	5.5	324	1	0.3	332	1	0.3	309	15	4.6	198	4	2	371	5	1.3			
	I feel excluded from things because of my age	AAQ22_PL	111	5	4.3	134	10	6.9	345	9	2.5	266	5	1.8	370	14	3.6	155	9	5.5	323	2	0.6	332	1	0.3	304	20	6.2	199	3	1.5	372	4	1.1			
	My health is better than expected for my age	AAQ23_PC	111	5	4.3	134	10	6.9	346	8	2.3	265	6	2.2	374	10	2.6	157	7	4.3	323	2	0.6	332	1	0.3	310	14	4.3	198	4	2	371	5	1.3			

Indicates 10%+ missing							Victoria		Melbourne		Seattle		Beer-Sheva		Tokyo		Umea		Brazil		Uruguay				Turkey		Switzerland		Lithuania		TOTAL									
			ing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing									
Variable Label			Var Name		N		Count		%		N		Count		%		N		Count		%		N		Count		%		N		Count		%		N		Count		%	
GDS15	Often get bored	gds4	4	197	5	2.5	0	376	100	291	4	1.4	241	8	3.2	0	188	100	446	9	2	270	58	17.7	241	7	2.8	327	0	0	133	6	4.3	325	17	5	4663	901	16.19%	
	In good spirits most of the time	gds5	3.4	197	5	2.5	0	376	100	293	2	0.7	237	12	4.8	0	188	100	446	9	2	270	58	17.7	243	5	2	327	0	0	135	4	2.9	321	21	6.1	4657	907	16.30%	
	Afraid something bad is going to happen to you	gds6	4.3	196	6	3	371	5	1.3	293	2	0.7	238	11	4.4	0	188	100	448	7	1.5	270	58	17.7	242	6	2.4	327	0	0	136	3	2.2	322	20	5.8	5028	536	9.63%	
	Feel happy most of the time	gds7	4.3	196	6	3	370	6	1.6	293	2	0.7	236	13	5.2	0	188	100	444	11	2.4	270	58	17.7	244	4	1.6	327	0	0	133	6	4.3	319	23	6.7	5004	560	10.06%	
	Often feel helpless	gds8	3.7	197	5	2.5	0	376	100	292	3	1	235	14	5.6	0	188	100	445	10	2.2	270	58	17.7	242	6	2.4	327	0	0	137	2	1.4	323	19	5.6	4652	912	16.39%	
	Prefer staying at home than going out and doing	gds9	4	191	11	5.4	0	376	100	292	3	1	233	16	6.4	0	188	100	439	16	3.5	270	58	17.7	238	10	4	327	0	0	132	7	5	319	23	6.7	4620	944	16.97%	
	Have more problems with memory than most	gds10	4	197	5	2.5	0	376	100	292	3	1	240	9	3.6	0	188	100	447	8	1.8	270	58	17.7	240	8	3.2	327	0	0	136	3	2.2	324	18	5.3	4668	896	16.10%	
	Think it is wonderful to be alive now	gds11	3.4	194	8	4	0	376	100	290	5	1.7	231	18	7.2	0	188	100	447	8	1.8	270	58	17.7	244	4	1.6	327	0	0	134	5	3.6	322	20	5.8	4645	919	16.52%	
	Feel pretty worthless the way you are now	gds12	3.7	198	4	2	0	376	100	293	2	0.7	239	10	4	0	188	100	444	11	2.4	270	58	17.7	236	12	4.8	327	0	0	136	3	2.2	323	19	5.6	4665	899	16.16%	
	Feel full of energy	gds13	3.4	193	9	4.5	0	376	100	289	6	2	234	15	6	0	188	100	447	8	1.8	270	58	17.7	240	8	3.2	327	0	0	132	7	5	322	20	5.8	4618	946	17.00%	
	Feel your situation is hopeless	gds14	3.7	198	4	2	0	376	100	292	3	1	241	8	3.2	0	188	100	447	8	1.8	270	58	17.7	243	5	2	327	0	0	137	2	1.4	323	19	5.6	4668	896	16.10%	
	Think that most people are better off than you are	gds15	4.6	196	6	3	0	376	100	293	2	0.7	236	13	5.2	0	188	100	448	7	1.5	270	58	17.7	237	11	4.4	327	0	0	136	3	2.2	322	20	5.8	4652	912	16.39%	
AAQ	As people get older they are better able to cope	AAQ1_G	2.5	198	4	2	370	6	1.6	294	1	0.3	245	4	1.6	182	6	3.2	446	9	2	328	0	0	240	8	3.2	327	0	0	139	0	0	340	2	0.6	5461	103	1.85%	
	It is a privilege to grow old	AAQ2_G	4	200	2	1	374	2	0.5	294	1	0.3	243	6	2.4	183	5	2.7	447	8	1.8	328	0	0	241	7	2.8	327	0	0	138	1	0.7	332	10	2.9	5454	110	1.98%	
	Old age is a time of loneliness	AAQ3_PL	2.5	200	2	1	368	8	2.1	293	2	0.7	244	5	2	183	5	2.7	448	7	1.5	328	0	0	239	9	3.6	327	0	0	139	0	0	337	5	1.5	5468	96	1.73%	
	Wisdom comes with age	AAQ4_G	1.9	201	1	0.5	368	8	2.1	292	3	1	243	6	2.4	183	5	2.7	447	8	1.8	328	0	0	239	9	3.6	327	0	0	138	1	0.7	338	4	1.2	5457	107	1.92%	
	There are many pleasant things about growing old	AAQ5_G	2.2	201	1	0.5	372	4	1.1	292	3	1	243	6	2.4	183	5	2.7	449	6	1.3	328	0	0	242	6	2.4	327	0	0	137	2	1.4	337	5	1.5	5462	102	1.83%	
	Old age is depressing time of life	AAQ6_PL	1.9	200	2	1	372	4	1.1	293	2	0.7	244	5	2	184	4	2.1	449	6	1.3	328	0	0	240	8	3.2	327	0	0	137	2	1.4	337	5	1.5	5467	97	1.74%	
	It is important to take exercise at any age	AAQ7_PC	0.9	201	1	0.5	374	2	0.5	292	3	1	246	3	1.2	184	4	2.1	448	7	1.5	328	0	0	242	6	2.4	327	0	0	136	3	2.2	338	4	1.2	5485	79	1.42%	
	Growing older has been easier than I thought	AAQ8_PC	4.3	202	0	0	374	2	0.5	292	3	1	239	10	4	184	4	2.1	446	9	2	328	0	0	238	10	4	327	0	0	136	3	2.2	334	8	2.3	5430	134	2.41%	
	More difficult to talk about feelings	AAQ9_PL	5.9	200	2	1	373	3	0.8	293	2	0.7	244	5	2	183	5	2.7	447	8	1.8	328	0	0	236	12	4.8	327	0	0	136	3	2.2	329	13	3.8	5413	151	2.71%	
	I am more accepting of myself as I have grown old	AAQ10_G	4.3	201	1	0.5	374	2	0.5	292	3	1	241	8	3.2	184	4	2.1	448	7	1.5	328	0	0	239	9	3.6	327	0	0	136	3	2.2	337	5	1.5	5426	138	2.48%	
	I don't feel old	AAQ11_PC	3.1	201	1	0.5	371	5	1.3	293	2	0.7	245	4	1.6	184	4	2.1	448	7	1.5	328	0	0	242	6	2.4	327	0	0	136	3	2.2	340	2	0.6	5451	113	2.03%	
	I see old age mainly as a time of loss	AAQ12_PL	5.6	201	1	0.5	366	10	2.7	293	2	0.7	244	5	2	184	4	2.1	445	10	2.2	328	0	0	240	8	3.2	327	0	0	136	3	2.2	332	10	2.9	5413	151	2.71%	
	My identity is not defined by my age	AAQ13_PC	6.5	199	3	1.5	370	6	1.6	293	2	0.7	238	11	4.4	184	4	2.1	437	18	4	327	1	0.3	230	18	7.3	327	0	0	138	1	0.7	334	8	2.3	5353	211	3.79%	
	I have more energy than I expected for my age	AAQ14_PC	4.6	198	4	2	371	5	1.3	294	1	0.3	243	6	2.4	184	4	2.1	447	8	1.8	327	1	0.3	242	6	2.4	327	0	0	139	0	0	336	6	1.8	5431	133	2.39%	
	I am losing my physical independence as I get old	AAQ15_PL	6.2	201	1	0.5	370	6	1.6	294	1	0.3	244	5	2	184	4	2.1	424	31	6.8	327	1	0.3	241	7	2.8	327	0	0	139	0	0	337	5	1.5	5402	162	2.91%	
	Problems with my physical health do not hold me back	AAQ16_PC	5.2	199	3	1.5	372	4	1.1	291	4	1.4	238	11	4.4	184	4	2.1	443	12	2.6	327	1	0.3	238	10	4	327	0	0	138	1	0.7	337	5	1.5	5418	146	2.62%	
	As I get older I find it more difficult to make new friends	AAQ17_PL	4.3	200	2	1	368	8	2.1	293	2	0.7	242	7	2.8	184	4	2.1	448	7	1.5	327	1	0.3	242	6	2.4	327	0	0	137	2	1.4	339	3	0.9	5434	130	2.34%	
	It is very important to pass on the benefits of my life	AAQ18_G	4.9	199	3	1.5	371	5	1.3	292	3	1	241	8	3.2	184	4	2.1	446	9	2	326	2	0.6	240	8	3.2	327	0	0	139	0	0	337	5	1.5	5450	114	2.05%	
	I believe my life has made a difference	AAQ19_G	4	198	4	2	366	10	2.7	291	4	1.4	244	5	2	183	5	2.7	447	8	1.8	327	1	0.3	241	7	2.8	327	0	0	135	4	2.9	338	4	1.2	5430	134	2.41%	
	I don't feel involved in society now that I am older	AAQ20_PL	5.9	200	2	1	372	4	1.1	290	5	1.7	244	5	2	184	4	2.1	448	7	1.5	326	2	0.6	235	13	5.2	327	0	0	134	5	3.6	340	2	0.6	5439	125	2.25%	
	I want to give a good example to younger people	AAQ21_G	4.6	198	4	2	371	5	1.3	294	1	0.3	244	5	2	184	4	2.1	442	13	2.9	327	1	0.3	239	9	3.6	327	0	0	135	4	2.9	339	3	0.9	5439	125	2.25%	
	I feel excluded from things because of my age	AAQ22_PL	6.2	199	3	1.5	372	4	1.1	294	1	0.3	244	5	2	182	6	3.2	446	9	2	327	1	0.3	236	12	4.8	327	0	0	135	4	2.9	340	2	0.6	5442	122	2.19%	
	My health is better than expected for my age	AAQ23_PC	4.3	198	4	2	371	5	1.3	294	1	0.3	243	6	2.4	184	4	2.1	446	9	2	327	1	0.3	240	8	3.2	327	0	0	135	4	2.9	342	0	0	5459	105	1.89%	

Indicates 10%+ missing				Edinburgh			Bath			Leipzig			Barcelona			Copenhagen			Paris			Prague			Budapest			Oslo			Victoria			Melbourne		
Variable Label		Var Name	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%	N	Count	%				
AAQ	I am more accepting of myself as I have grown old	AAQ10_G	113	3	2.6	132	12	8.3	348	6	1.7	266	5	1.8	369	15	3.9	128	36	22	324	1	0.3	329	4	1.2	310	14	4.3	201	1	0.5	374	2	0.5	
	I don't feel old	AAQ11_PC	115	1	0.9	133	11	7.6	350	4	1.1	267	4	1.5	374	10	2.6	130	34	20.7	324	1	0.3	329	4	1.2	314	10	3.1	201	1	0.5	371	5	1.3	
	I see old age mainly as a time of loss	AAQ12_PL	114	2	1.7	133	11	7.6	349	5	1.4	265	6	2.2	368	16	4.2	129	35	21.3	325	0	0	328	5	1.5	306	18	5.6	201	1	0.5	366	10	2.7	
	My identity is not defined by my age	AAQ13_PC	108	8	6.9	133	11	7.6	347	7	2	255	16	5.9	360	24	6.3	121	43	26.2	323	2	0.6	326	7	2.1	303	21	6.5	199	3	1.5	370	6	1.6	
	I have more energy than I expected for my age	AAQ14_PC	111	5	4.3	134	10	6.9	347	7	2	267	4	1.5	374	10	2.6	128	36	22	322	3	0.9	331	2	0.6	309	15	4.6	198	4	2	371	5	1.3	
	I am losing my physical independence as I get old	AAQ15_PL	112	4	3.4	133	11	7.6	346	8	2.3	269	2	0.7	367	17	4.4	129	35	21.3	324	1	0.3	330	3	0.9	304	20	6.2	201	1	0.5	370	6	1.6	
	Problems with my physical health do not hold me back	AAQ16_PC	112	4	3.4	134	10	6.9	348	6	1.7	266	5	1.8	370	14	3.6	132	32	19.5	324	1	0.3	331	2	0.6	307	17	5.2	199	3	1.5	372	4	1.1	
	As I get older I find it more difficult to make new friends	AAQ17_PL	111	5	4.3	134	10	6.9	346	8	2.3	264	7	2.6	374	10	2.6	131	33	20.1	325	0	0	332	1	0.3	310	14	4.3	200	2	1	368	8	2.1	
	It is very important to pass on the benefits of my life to younger people	AAQ18_G	112	4	3.4	134	10	6.9	348	6	1.7	267	4	1.5	372	12	3.1	154	10	6.1	323	2	0.6	330	3	0.9	308	16	4.9	199	3	1.5	371	5	1.3	
	I believe my life has made a difference	AAQ19_G	109	7	6	132	12	8.3	337	17	4.8	264	7	2.6	369	15	3.9	155	9	5.5	324	1	0.3	332	1	0.3	311	13	4	198	4	2	366	10	2.7	
	I don't feel involved in society now that I am older	AAQ20_PL	112	4	3.4	134	10	6.9	346	8	2.3	263	8	3	373	11	2.9	155	9	5.5	324	1	0.3	327	6	1.8	305	19	5.9	200	2	1	372	4	1.1	
	I want to give a good example to younger people	AAQ21_G	112	4	3.4	133	11	7.6	345	9	2.5	262	9	3.3	367	17	4.4	155	9	5.5	324	1	0.3	332	1	0.3	309	15	4.6	198	4	2	371	5	1.3	
I feel excluded from things because of my age	AAQ22_PL	111	5	4.3	134	10	6.9	345	9	2.5	266	5	1.8	370	14	3.6	155	9	5.5	323	2	0.6	332	1	0.3	304	20	6.2	199	3	1.5	372	4	1.1		
My health is better than expected for my age	AAQ23_PC	111	5	4.3	134	10	6.9	346	8	2.3	265	6	2.2	374	10	2.6	157	7	4.3	323	2	0.6	332	1	0.3	310	14	4.3	198	4	2	371	5	1.3		
I keep as fit and active as possible by exercising	AAQ24_PC	112	4	3.4	134	10	6.9	347	7	2	267	4	1.5	371	13	3.4	152	12	7.3	325	0	0	329	4	1.2	309	15	4.6	200	2	1	373	3	0.8		
SF-12	General health	sf1	111	5	4.3	0	144	100	349	5	1.4	269	2	0.7	355	29	7.6	83	81	49.4	0	325	100	0	333	100	314	10	3.1	199	3	1.5	372	4	1.1	
	Moderate activities	sf2	111	5	4.3	0	144	100	350	4	1.1	268	3	1.1	359	25	6.5	82	82	50	0	325	100	0	333	100	318	6	1.9	197	5	2.5	372	4	1.1	
	Climbing several flights of stairs	sf3	111	5	4.3	0	144	100	347	7	2	261	10	3.7	359	25	6.5	82	82	50	0	325	100	0	333	100	309	15	4.6	196	6	3	366	10	2.7	
	Accomplished less than would like due to physical health	sf4	112	4	3.4	0	144	100	349	5	1.4	265	6	2.2	354	30	7.8	82	82	50	0	325	100	0	333	100	315	9	2.8	0	202	100	366	10	2.7	
	Limited in regular activities due to physical health	sf5	112	4	3.4	0	144	100	340	14	4	265	6	2.2	347	37	9.6	74	90	54.9	0	325	100	0	333	100	309	15	4.6	0	202	100	355	21	5.6	
	Accomplished less due to emotional problems	sf6	112	4	3.4	0	144	100	348	6	1.7	264	7	2.6	353	31	8.1	77	87	53	0	325	100	0	333	100	314	10	3.1	0	202	100	366	10	2.7	
	Limited in regular activities due to emotional problems	sf7	112	4	3.4	0	144	100	339	15	4.2	260	11	4.1	347	37	9.6	78	86	52.4	0	325	100	0	333	100	311	13	4	0	202	100	350	26	6.9	
	Pain interfere with normal work/activities	sf8	111	5	4.3	0	144	100	352	2	0.6	266	5	1.8	352	32	8.3	79	85	51.8	0	325	100	0	333	100	315	9	2.8	194	8	4	373	3	0.8	
	Felt calm and peaceful	sf9	111	5	4.3	0	144	100	347	7	2	265	6	2.2	356	28	7.3	78	86	52.4	0	325	100	0	333	100	312	12	3.7	194	8	4	371	5	1.3	
	Have a lot of energy	sf10	108	8	6.9	0	144	100	344	10	2.8	263	8	3	355	29	7.6	79	85	51.8	0	325	100	0	333	100	309	15	4.6	195	7	3.5	372	4	1.1	
	Felt down	sf11	108	8	6.9	0	144	100	344	10	2.8	264	7	2.6	355	29	7.6	81	83	50.6	0	325	100	0	333	100	312	12	3.7	195	7	3.5	372	4	1.1	
	Physical health or emotional problems interfere with your life	sf12	108	8	6.9	0	144	100	347	7	2	264	7	2.6	356	28	7.3	80	84	51.2	0	325	100	0	333	100	313	11	3.4	195	7	3.5	374	2	0.5	
BREF	Rate quality of life	BREF_q1	113	3	2.6	144	0	0	351	3	0.8	268	3	1.1	362	22	5.7	154	10	6.1	325	0	0	330	3	0.9	313	11	3.4	200	2	1	373	3	0.8	
	Satisfied with health	BREF_q2	113	3	2.6	144	0	0	352	2	0.6	269	2	0.7	371	13	3.4	155	9	5.5	325	0	0	331	2	0.6	313	11	3.4	199	3	1.5	371	5	1.3	
	Pain prevents from doing what need to do	BREF_q3	113	3	2.6	143	1	0.7	352	2	0.6	265	6	2.2	361	23	6	148	16	9.8	325	0	0	327	6	1.8	313	11	3.4	202	0	0	374	2	0.5	
	Need any medical treatment	BREF_q4	113	3	2.6	144	0	0	352	2	0.6	264	7	2.6	370	14	3.6	151	13	7.9	324	1	0.3	328	5	1.5	312	12	3.7	197	5	2.5	371	5	1.3	
	How much do you enjoy life	BREF_q5	113	3	2.6	143	1	0.7	351	3	0.8	267	4	1.5	369	15	3.9	153	11	6.7	324	1	0.3	323	10	3	310	14	4.3	201	1	0.5	372	4	1.1	
	Feel life to be meaningful	BREF_q6	112	4	3.4	143	1	0.7	342	12	3.4	256	15	5.5	363	21	5.5	150	14	8.5	325	0	0	321	12	3.6	311	13	4	201	1	0.5	373	3	0.8	
	Able to concentrate	BREF_q7	113	3	2.6	144	0	0	350	4	1.1	269	2	0.7	372	12	3.1	150	14	8.5	325	0	0	331	2	0.6	312	12	3.7	201	1	0.5	371	5	1.3	
	Feel safe in your daily life	BREF_q8	113	3	2.6	144	0	0	350	4	1.1	266	5	1.8	375	9	2.3	153	11	6.7	325	0	0	328	5	1.5	312	12	3.7	199	3	1.5	373	3	0.8	

120

Indicates 10%+ missing				Victoria		Melbourne		Seattle		Beer-Sheva		Tokyo		Umea		Brazil		Uruguay		Turkey		Switzerland		Lithuania		TOTAL													
		ing %	Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing		Missing												
	Variable Label	Var Name	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %	N	Count %											
AAQ	I am more accepting of myself as I have grown old	AAQ10_G	4.3	201	1	0.5	374	2	0.5	292	3	1	241	8	3.2	184	4	2.1	448	7	1.5	328	0	0	239	9	3.6	327	0	0	136	3	2.2	337	5	1.5	5426	138	2.48%
	I don't feel old	AAQ11_PC	3.1	201	1	0.5	371	5	1.3	293	2	0.7	245	4	1.6	184	4	2.1	448	7	1.5	328	0	0	242	6	2.4	327	0	0	136	3	2.2	340	2	0.6	5451	113	2.03%
	I see old age mainly as a time of loss	AAQ12_PL	5.6	201	1	0.5	366	10	2.7	293	2	0.7	244	5	2	184	4	2.1	445	10	2.2	328	0	0	240	8	3.2	327	0	0	136	3	2.2	332	10	2.9	5413	151	2.71%
	My identity is not defined by my age	AAQ13_PC	6.5	199	3	1.5	370	6	1.6	293	2	0.7	238	11	4.4	184	4	2.1	437	18	4	327	1	0.3	230	18	7.3	327	0	0	138	1	0.7	334	8	2.3	5353	211	3.79%
	I have more energy than I expected for my age	AAQ14_PC	4.6	198	4	2	371	5	1.3	294	1	0.3	243	6	2.4	184	4	2.1	447	8	1.8	327	1	0.3	242	6	2.4	327	0	0	139	0	0	336	6	1.8	5431	133	2.39%
	I am losing my physical independence as I get old	AAQ15_PL	6.2	201	1	0.5	370	6	1.6	294	1	0.3	244	5	2	184	4	2.1	424	31	6.8	327	1	0.3	241	7	2.8	327	0	0	139	0	0	337	5	1.5	5402	162	2.91%
	Problems with my physical health do not hold me back	AAQ16_PC	5.2	199	3	1.5	372	4	1.1	291	4	1.4	238	11	4.4	184	4	2.1	443	12	2.6	327	1	0.3	238	10	4	327	0	0	138	1	0.7	337	5	1.5	5418	146	2.62%
	As I get older I find it more difficult to make new	AAQ17_PL	4.3	200	2	1	368	8	2.1	293	2	0.7	242	7	2.8	184	4	2.1	448	7	1.5	327	1	0.3	242	6	2.4	327	0	0	137	2	1.4	339	3	0.9	5434	130	2.34%
	It is very important to pass on the benefits of my	AAQ18_G	4.9	199	3	1.5	371	5	1.3	292	3	1	241	8	3.2	184	4	2.1	446	9	2	326	2	0.6	240	8	3.2	327	0	0	139	0	0	337	5	1.5	5450	114	2.05%
	I believe my life has made a difference	AAQ19_G	4	198	4	2	366	10	2.7	291	4	1.4	244	5	2	183	5	2.7	447	8	1.8	327	1	0.3	241	7	2.8	327	0	0	135	4	2.9	338	4	1.2	5430	134	2.41%
	I don't feel involved in society now that I am older	AAQ20_PL	5.9	200	2	1	372	4	1.1	290	5	1.7	244	5	2	184	4	2.1	448	7	1.5	326	2	0.6	235	13	5.2	327	0	0	134	5	3.6	340	2	0.6	5439	125	2.25%
	I want to give a good example to younger people	AAQ21_G	4.6	198	4	2	371	5	1.3	294	1	0.3	244	5	2	184	4	2.1	442	13	2.9	327	1	0.3	239	9	3.6	327	0	0	135	4	2.9	339	3	0.9	5439	125	2.25%
I feel excluded from things because of my age	AAQ22_PL	6.2	199	3	1.5	372	4	1.1	294	1	0.3	244	5	2	182	6	3.2	446	9	2	327	1	0.3	236	12	4.8	327	0	0	135	4	2.9	340	2	0.6	5442	122	2.19%	
My health is better than expected for my age	AAQ23_PC	4.3	198	4	2	371	5	1.3	294	1	0.3	243	6	2.4	184	4	2.1	446	9	2	327	1	0.3	240	8	3.2	327	0	0	135	4	2.9	342	0	0	5459	105	1.89%	
I keep as fit and active as possible by exercising	AAQ24_PC	4.6	200	2	1	373	3	0.8	294	1	0.3	245	4	1.6	183	5	2.7	447	8	1.8	326	2	0.6	239	9	3.6	327	0	0	134	5	3.6	337	5	1.5	5451	113	2.03%	
SF-12	General health	sf1	3.1	199	3	1.5	372	4	1.1	0	295	100	238	11	4.4	145	43	22.9	451	4	0.9	326	2	0.6	0	248	100	0	327	100	130	9	6.5	341	1	0.3	3683	1881	33.81%
	Moderate activities	sf2	1.9	197	5	2.5	372	4	1.1	0	295	100	242	7	2.8	0	188	100	447	8	1.8	325	3	0.9	0	248	100	0	327	100	138	1	0.7	341	1	0.3	3550	2014	36.20%
	Climbing several flights of stairs	sf3	4.6	196	6	3	366	10	2.7	0	295	100	242	7	2.8	143	45	23.9	449	6	1.3	319	9	2.7	0	248	100	0	327	100	139	0	0	342	0	0	3665	1899	34.13%
	Accomplished less than would like due to physical	sf4	2.8	0	202	100	366	10	2.7	0	295	100	244	5	2	143	45	23.9	448	7	1.5	327	1	0.3	0	248	100	0	327	100	137	2	1.4	342	0	0	3484	2080	37.38%
	Limited in regular activities due to physical health	sf5	4.6	0	202	100	355	21	5.6	0	295	100	242	7	2.8	97	91	48.4	447	8	1.8	325	3	0.9	0	248	100	0	327	100	136	3	2.2	341	1	0.3	3390	2174	39.07%
	Accomplished less due to emotional problems	sf6	3.1	0	202	100	366	10	2.7	0	295	100	245	4	1.6	77	111	59	445	10	2.2	327	1	0.3	0	248	100	0	327	100	139	0	0	341	1	0.3	3408	2156	38.75%
	Limited in regular activities due to emotional problems	sf7	4	0	202	100	350	26	6.9	0	295	100	234	15	6	0	188	100	442	13	2.9	325	3	0.9	0	248	100	0	327	100	138	1	0.7	341	1	0.3	3277	2287	41.10%
	Pain interfere with normal work/activities	sf8	2.8	194	8	4	373	3	0.8	0	295	100	240	9	3.6	146	42	22.3	449	6	1.3	326	2	0.6	0	248	100	0	327	100	137	2	1.4	340	2	0.6	3680	1884	33.86%
	Felt calm and peaceful	sf9	3.7	194	8	4	371	5	1.3	0	295	100	242	7	2.8	141	47	25	447	8	1.8	327	1	0.3	0	248	100	0	327	100	139	0	0	342	0	0	3672	1892	34.00%
	Have a lot of energy	sf10	4.6	195	7	3.5	372	4	1.1	0	295	100	233	16	6.4	141	47	25	448	7	1.5	327	1	0.3	0	248	100	0	327	100	137	2	1.4	342	0	0	3653	1911	34.35%
	Felt down	sf11	3.7	195	7	3.5	372	4	1.1	0	295	100	233	16	6.4	140	48	25.5	447	8	1.8	327	1	0.3	0	248	100	0	327	100	138	1	0.7	342	0	0	3658	1906	34.26%
	Physical health or emotional problems interfere	sf12	3.4	195	7	3.5	374	2	0.5	0	295	100	236	13	5.2	142	46	24.5	450	5	1.1	327	1	0.3	0	248	100	0	327	100	138	1	0.7	341	1	0.3	3671	1893	34.02%
BREF	Rate quality of life	BREF_q1	3.4	200	2	1	373	3	0.8	294	1	0.3	241	8	3.2	157	31	16.5	451	4	0.9	327	1	0.3	244	4	1.6	327	0	0	137	2	1.4	340	2	0.6	5451	113	2.03%
	Satisfied with health	BREF_q2	3.4	199	3	1.5	371	5	1.3	295	0	0	239	10	4	156	32	17	451	4	0.9	327	1	0.3	246	2	0.8	327	0	0	138	1	0.7	341	1	0.3	5463	101	1.82%
	Pain prevents from doing what need to do	BREF_q3	3.4	202	0	0	374	2	0.5	294	1	0.3	239	10	4	157	31	16.5	448	7	1.5	326	2	0.6	246	2	0.8	327	0	0	137	2	1.4	339	3	0.9	5436	128	2.30%
	Need any medical treatment	BREF_q4	3.7	197	5	2.5	371	5	1.3	292	3	1	240	9	3.6	157	31	16.5	451	4	0.9	327	1	0.3	243	5	2	327	0	0	137	2	1.4	341	1	0.3	5441	123	2.21%
	How much do you enjoy life	BREF_q5	4.3	201	1	0.5	372	4	1.1	293	2	0.7	236	13	5.2	157	31	16.5	451	4	0.9	327	1	0.3	244	4	1.6	327	0	0	134	5	3.6	342	0	0	5437	127	2.28%
	Feel life to be meaningful	BREF_q6	4	201	1	0.5	373	3	0.8	291	4	1.4	238	11	4.4	156	32	17	451	4	0.9	326	2	0.6	241	7	2.8	327	0	0	135	4	2.9	338	4	1.2	5400	164	2.95%
	Able to concentrate	BREF_q7	3.7	201	1	0.5	371	5	1.3	289	6	2	239	10	4	157	31	16.5	450	5	1.1	327	1	0.3	241	7	2.8	327	0	0	136	3	2.2	340	2	0.6	5444	120	2.16%
	Feel safe in your daily life	BREF_q8	3.7	199	3	1.5	373	3	0.8	285	10	3.4	240	9	3.6	156	32	17	450	5	1.1	326	2	0.6	245	3	1.2	327	0	0	137	2	1.4	341	1	0.3	5445	119	2.14%

Appendix E: Cleaning Steps

1. Removed questionnaire items not relevant (e.g. EAAQ variables, WHOQOL-OLD, GDS30 variables)
2. Removed demographic variables that were deemed not relevant to current study (e.g. Beer-Sheva – when immigrated)
3. Recoded variables that were incorrect (e.g. one item on GDS incorrectly to count yes=0 when it should have been yes=1, SF-12 item 8 had 6 options although 5 option question, only typographical error as no one had selected option 6)
4. Removed those outside of desired population (2 people under 60 years thus removed)
5. Looked at frequency of missing data per item and by centre (see – Missing data split by centre - C:\Users\owner\Google Drive\DClinPsy\10 - Assignments\Major Research Project\AAQ\4. Database\Missing data)
 - a. Agreed to remove Paris and Tokyo due to high levels of missing data on key variables
6. Reviewed univariate (z-scores, and box plots) and multivariate outliers (Mahalanobis Distance). Noted some issues re not all being completed due to missing data.
7. Deleted impossible values from database, namely demographic info, all questionnaires were okay (see Outlier info – 07.09.20 - C:\Users\owner\Google Drive\DClinPsy\10 - Assignments\Major Research Project\AAQ\4. Database\Outliers)
8. Ran MI
9. Reviewed outliers again following MI, looked at per database – 68 multivariate outliers identified and removed from original data to ensure that sample is slightly more generalisable (although appreciate that 68 is a small proportion of sample thus wouldn't have a huge influence on the data)
10. MI ran again, FCS with 5 imputations and 10 iterations
11. Multivariate outliers remaining (imp 1 = 15, imp 2 = 16, imp 3 = 14, imp 4 = 10, imp 5 = 17). Agreed with supervisors that okay to leave these, as unlikely to have much influence on power (and that some outliers are to be expected within a large sample)

(N.B. each time MI was run, subscale scores needed to be recomputed, thus after each MI step, questionnaire subscale scores were recomputed)

Appendix F: Univariate Outlier Exploration

Demographics

		Gender	Age	Marital Status	Education level	Living arrangements	Previous occupation	Employment status	Current occupation	Financial situation	Relationship with partner	Satisfaction with relationship with children	Satisfaction with relationship with grandchildren
N	Valid	5183	5212	5040	5157	5168	4295	4798	1412	4845	4075	4469	4373
	Missing	29	0	172	55	44	917	414	3800	367	1137	743	839
Mean		1.59	72.52	3.02	2.80	2.41	3.30	49991.88	.	2.87	3.07	10.66	18.28
Mode		2	70	2	1	3	1	6	7	3	1	1	1
Std. Deviation		.492	7.904	1.705	1.628	1.500	10.163	3388365.430	.000	.918	1.768	28.352	36.766
Skewness		-.365	.406	7.019	.560	1.405	33.805	69.245		.131	-.127	2.793	1.740
Std. Error of Skewness		.034	.034	.034	.034	.034	.037	.035	.065	.035	.038	.037	.037
Kurtosis		-1.867	-.498	141.620	-.704	2.880	1301.687	4795.865		.191	-1.771	5.815	1.030
Std. Error of Kurtosis		.068	.068	.069	.068	.068	.075	.071	.130	.070	.077	.073	.074
Minimum		1	60	1	1	1	1	1	8	1	1	1	1
Maximum		2	100	45	7	8	453	234678910	789	5	5	99	99

Outliers in – Marital status (IDs – 12634, 6170, 12556, 6175, 6187) , previous occupation (IDs – 6073, 6182, 6007, 6054, 6176, 6173, 6072, 6047), employment status (too many for IDs, 284 outliers!), current occupation (IDs – 4189, 4291, 4177, 4237, 4204, 4038, 4308, 4298, 4018)

Health & Conditions

		Current health status	Medical condition: Cardiovascular	Medical condition: Hypertension/ Hypotension	Medical condition: Musculoskeletal	Medical condition: Diseases of the foot	Medical condition: Neurologic diseases	Medical condition: Infectious disease	Medical condition: Respiratory disease	Medical condition: Oral disease	Medical condition: Gastrointestinal disease
N	Valid	5119	4583	4560	4631	4544	4557	4546	4559	4545	4556
	Missing	93	629	652	581	668	655	666	653	667	656
Mean		1.28	.17	.18	.28	.02	.06	.00	.06	.00	.06
Mode		1	0	0	0	0	0	0	0	0	0
Std. Deviation		.449	.373	.382	.451	.126	.234	.057	.232	.055	.239
Skewness		.976	1.785	1.685	.956	7.701	3.769	17.328	3.813	17.940	3.677
Std. Error of Skewness		.034	.036	.036	.036	.036	.036	.036	.036	.036	.036
Kurtosis		-1.047	1.186	.841	-1.086	57.327	12.208	298.399	12.543	319.999	11.526
Std. Error of Kurtosis		.068	.072	.073	.072	.073	.073	.073	.073	.073	.073
Minimum		1	0	0	0	0	0	0	0	0	0
Maximum		2	1	1	1	1	1	1	1	1	1

[illegible]

No outliers identified using minimum or maximum values

Alcohol & Smoking

		Do you smoke	No of cigarettes per week	How long since quit	How often drink alcohol	How many drinks
N	Valid	4327	403	1497	4534	4133
	Missing	885	4809	3715	678	1079
Mean		2.46	.	.	4.08	33.11
Mode		3	20	360	6	1
Std. Deviation		.674	.000	.000	2.255	45.825
Skewness		-.863			16.234	.743
Std. Error of Skewness		.037	.122	.063	.036	.038
Kurtosis		-.429			691.114	-1.449
Std. Error of Kurtosis		.074	.243	.126	.073	.076
Minimum		1	3	1	1	1
Maximum		3	504	792	99	99

- Potential outliers in no of cigarettes per week (e.g. 504 would mean 72 a day, is this unrealistic?). Top numbers are 504, 468, 450, 360, 350, 250 (IDs – 7142, 7099, 5455, 4574, 2190, 1597, 597). Possibly likely statistically, as a few of thousands?
- Unsure whether quit scale is in months or years?? Assuming months based on data. 792 would equate to 66 years (and this case is 82, thus meaning he quit at 16, valid or invalid – likely valid)
 - (5324 is coming up in highest descending, despite being missing – gender is also missing)
- Alcohol – 1 has 99 (data isn't coded as missing, but could assume a 99 value means missing)

GDS15

		Basically satisfied with your life	Dropped many activities and interests	Feel life is empty	Often get bored	In good spirits most of the time	Afraid something bad is going to happen to you	Feel happy most of the time	Often feel helpless	RECODED - prefer to stay at home	Have more problems with memory than most	Think it is wonderful to be alive now	Feel pretty worthless the way you are now	Feel full of energy	Feel your situation is hopeless	Think that most people are better off than you are
N	Valid	5052	4656	5038	4663	4657	5028	5004	4652	4620	4668	4645	4665	4618	4668	4652
	Missing	160	556	174	549	555	184	208	560	592	544	567	547	594	544	560
Mean		.11	.65	.85	.81	.16	.71	.19	.78	.4487	.75	.19	.85	.43	.87	.79
Mode		0	1	1	1	0	1	0	1	.00	1	0	1	0	1	1
Std. Deviation		.312	.478	.355	.394	.371	.455	.395	.415	.49742	.432	.395	.361	.495	.332	.409
Skewness		2.512	-.619	-1.982	-1.563	1.809	-.913	1.558	-1.348	.206	-1.163	1.555	-1.921	.286	-2.252	-1.402
Std. Error of Skewness		.034	.036	.034	.036	.036	.035	.035	.036	.036	.036	.036	.036	.036	.036	.036
Kurtosis		4.313	-1.618	1.930	.444	1.272	-1.166	.426	-.182	-1.958	-.648	.419	1.691	-1.919	3.074	-.034
Std. Error of Kurtosis		.069	.072	.069	.072	.072	.069	.069	.072	.072	.072	.072	.072	.072	.072	.072
Minimum		0	0	0	0	0	0	0	0	.00	0	0	0	0	0	0
Maximum		1	1	1	1	1	1	1	1	1.00	1	1	1	1	1	1

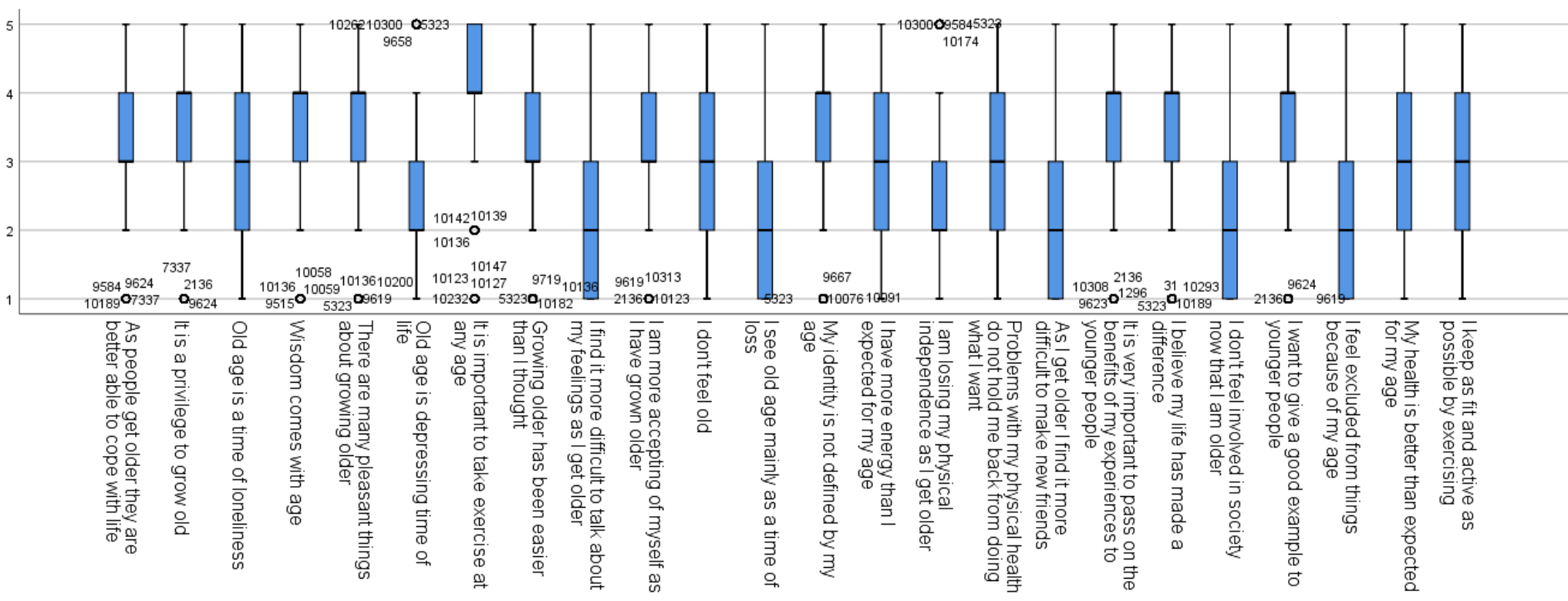
No issues based on looking at min/max re outliers

AAQ

		As people get older they are better able to cope with life	It is a privilege to grow old	Old age is a time of loneliness	Wisdom comes with age	There are many pleasant things about growing older	Old age is depressing time of life	It is important to take exercise at any age	Growing older has been easier than I thought	I find it more difficult to talk about my feelings as I get older	I am more accepting of myself as I have grown older	I don't feel old	I see old age mainly as a time of loss
N	Valid	5125	5117	5126	5115	5125	5128	5142	5115	5103	5114	5137	5100
	Missing	87	95	86	97	87	84	70	97	109	98	75	112
Mean		3.27	3.46	2.74	3.59	3.54	2.48	4.28	3.24	2.41	3.18	3.25	2.39
Mode		4	4	2	4	4	2	4	4	1	4	4	1
Std. Deviation		.964	1.084	1.101	.921	.915	1.042	.720	1.071	1.176	1.075	1.199	1.183
Skewness		-.404	-.555	.167	-.667	-.760	.382	-1.253	-.464	.299	-.404	-.319	.385
Std. Error of Skewness		.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
Kurtosis		-.370	-.443	-.899	.152	.260	-.687	3.041	-.377	-1.009	-.500	-.786	-.934
Std. Error of Kurtosis		.068	.068	.068	.068	.068	.068	.068	.068	.069	.068	.068	.069
Minimum		1	1	1	1	1	1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5	5	5	5	5	5

		My identity is not defined by my age	I have more energy than I expected for my age	I am losing my physical independence as I get older	Problems with my physical health do not hold me back from doing what I want	As I get older I find it more difficult to make new friends	It is very important to pass on the benefits of my experiences to younger people	I believe my life has made a difference	I don't feel involved in society now that I am older	I want to give a good example to younger people	I feel excluded from things because of my age	My health is better than expected for my age	I keep as fit and active as possible by exercising
N	Valid	5048	5119	5089	5102	5119	5112	5092	5100	5100	5105	5118	5116
	Missing	164	93	123	110	93	100	120	112	112	107	94	96
Mean		3.34	3.07	2.49	3.09	2.32	3.51	3.44	2.33	3.72	2.27	3.12	3.24
Mode		4	4	2	4	1	4	4	1	4	1	4	4
Std. Deviation		1.217	1.217	1.148	1.257	1.253	1.074	1.084	1.189	1.024	1.162	1.210	1.249
Skewness		-.494	-.271	.312	-.234	.514	-.556	-.539	.475	-.850	.543	-.301	-.310
Std. Error of Skewness		.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
Kurtosis		-.681	-.911	-.859	-1.015	-.938	-.313	-.295	-.813	.366	-.737	-.882	-.912
Std. Error of Kurtosis		.069	.068	.069	.069	.068	.068	.069	.069	.069	.069	.068	.068
Minimum		1	1	1	1	1	1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5	5	5	5	5	5

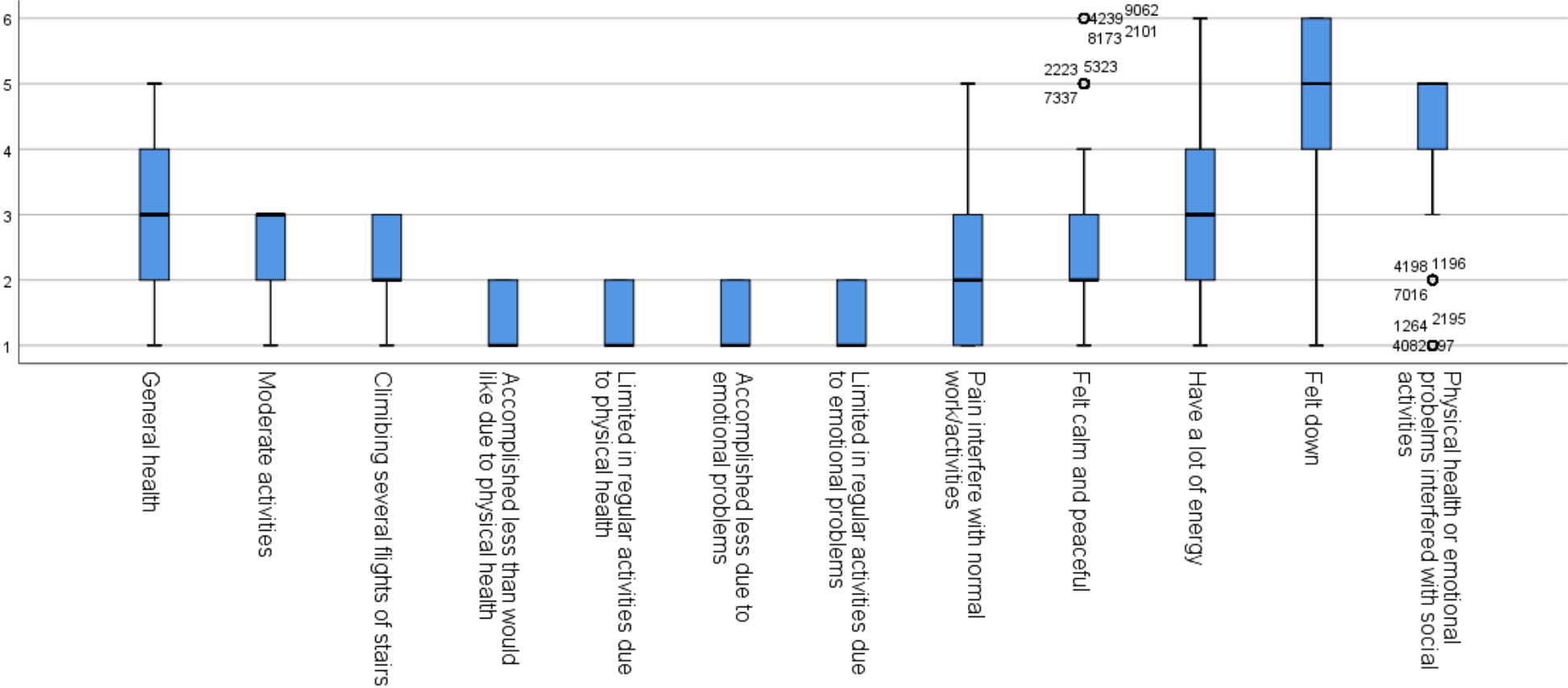
No outliers based on min/max or looking at box plots



SF-12

		General health	Moderate activities	Climbing several flights of stairs	Accomplished less than would like due to physical health	Limited in regular activities due to physical health	Accomplished less due to emotional problems	Limited in regular activities due to emotional problems	Pain interfere with normal work/activities	Felt calm and peaceful	Have a lot of energy	Felt down	Physical health or emotional problems interfered with social activities
N	Valid	3455	3468	3440	3259	3219	3254	3199	3455	3453	3433	3437	3449
	Missing	1757	1744	1772	1953	1993	1958	2013	1757	1759	1779	1775	1763
Mean		3.00	2.41	2.30	1.43	1.40	1.32	1.30	2.07	2.44	3.06	4.92	4.21
Mode		3	3	3	1	1	1	1	1	2	2	6	5
Std. Deviation		.949	.708	.751	.495	.491	.466	.456	1.137	1.130	1.332	1.123	1.069
Skewness		-.113	-.782	-.551	.286	.393	.777	.899	.824	.800	.391	-1.118	-1.215
Std. Error of Skewness		.042	.042	.042	.043	.043	.043	.043	.042	.042	.042	.042	.042
Kurtosis		-.197	-.655	-1.046	-1.919	-1.846	-1.397	-1.193	-.276	.183	-.660	1.082	.601
Std. Error of Kurtosis		.083	.083	.083	.086	.086	.086	.087	.083	.083	.084	.084	.083
Minimum		1	1	1	1	1	1	1	1	1	1	1	1
Maximum		5	3	3	2	2	2	2	5	6	6	6	5

(issue noticed in qu 8 in database re coding of options, but min/max values indicate this is purely a typographical issue)



Z-scores prior to removing outliers (frequencies of those outside of acceptable z-scores, 1 indicates that z-score is outside ± 3.3)

zAAQgrowth_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	5159	99.0	99.6	99.6
	1.00	23	.4	.4	100.0
	Total	5182	99.4	100.0	
Missing	System	30	.6		
Total		5212	100.0		

zAAQloss_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	5176	99.3	99.9	99.9
	1.00	5	.1	.1	100.0
	Total	5181	99.4	100.0	
Missing	System	31	.6		
Total		5212	100.0		

zAAQchange_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	5168	99.2	99.7	99.7
	1.00	13	.2	.3	100.0
	Total	5181	99.4	100.0	
Missing	System	31	.6		
Total		5212	100.0		

zPCS_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	3491	67.0	100.0	100.0
Missing	System	1721	33.0		
Total		5212	100.0		

zMCS_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	3472	66.6	99.5	99.5
	1.00	18	.3	.5	100.0
	Total	3490	67.0	100.0	
Missing	System	1722	33.0		
Total		5212	100.0		

zGDS_outside

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	5075	97.4	99.8	99.8
	1.00	11	.2	.2	100.0
	Total	5086	97.6	100.0	
Missing	System	126	2.4		
Total		5212	100.0		

z-scores after MI (prior to multivariate outliers removed)

zAAQ_growth_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5148	98.8	99.3	99.3
		1.00	34	.7	.7	100.0
		Total	5182	99.4	100.0	
	Missing	System	30	.6		
	Total		5212	100.0		
1	Valid	.00	5205	99.9	99.9	99.9
		1.00	7	.1	.1	100.0
		Total	5212	100.0	100.0	
2	Valid	.00	5205	99.9	99.9	99.9
		1.00	7	.1	.1	100.0
		Total	5212	100.0	100.0	
3	Valid	.00	5206	99.9	99.9	99.9
		1.00	6	.1	.1	100.0
		Total	5212	100.0	100.0	

4	Valid	.00	5205	99.9	99.9	99.9
		1.00	7	.1	.1	100.0
		Total	5212	100.0	100.0	
5	Valid	.00	5205	99.9	99.9	99.9
		1.00	7	.1	.1	100.0
		Total	5212	100.0	100.0	
Pooled	Valid	.00	5205.2			
		1.00	6.8			
		Total	5212			
	Missing	System				
	Total					

zAAQ_loss_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5176	99.3	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5181	99.4	100.0	
	Missing	System	31	.6		
	Total		5212	100.0		
1	Valid	.00	5207	99.9	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5212	100.0	100.0	
2	Valid	.00	5207	99.9	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5212	100.0	100.0	
3	Valid	.00	5207	99.9	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5212	100.0	100.0	
4	Valid	.00	5207	99.9	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5212	100.0	100.0	
5	Valid	.00	5207	99.9	99.9	99.9
		1.00	5	.1	.1	100.0
		Total	5212	100.0	100.0	
Pooled	Valid	.00	5207			
		1.00	5			
		Total	5212			
	Missing	System				
	Total					

zAAQ_change_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5168	99.2	99.7	99.7
		1.00	13	.2	.3	100.0
		Total	5181	99.4	100.0	
	Missing	System	31	.6		
	Total		5212	100.0		
1	Valid	.00	5212	100.0	100.0	100.0
2	Valid	.00	5212	100.0	100.0	100.0
3	Valid	.00	5212	100.0	100.0	100.0
4	Valid	.00	5212	100.0	100.0	100.0
5	Valid	.00	5212	100.0	100.0	100.0
Pooled	Valid	.00	5212			
		1.00				
		Total				
	Missing	System				
	Total					

zPCS_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5212	100.0	100.0	
1	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5212	100.0	100.0	
2	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5212	100.0	100.0	
3	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5212	100.0	100.0	
4	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5212	100.0	100.0	
5	Valid	.00	5211	100.0	100.0	100.0
		1.00	1	.0	.0	100.0

		Total	5212	100.0	100.0
Pooled	Valid	.00	5211		
		1.00	1		
		Total	5212		

zMCS_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5184	99.5	99.5	99.5
		1.00	28	.5	.5	100.0
		Total	5212	100.0	100.0	
1	Valid	.00	5183	99.4	99.4	99.4
		1.00	29	.6	.6	100.0
		Total	5212	100.0	100.0	
2	Valid	.00	5183	99.4	99.4	99.4
		1.00	29	.6	.6	100.0
		Total	5212	100.0	100.0	
3	Valid	.00	5183	99.4	99.4	99.4
		1.00	29	.6	.6	100.0
		Total	5212	100.0	100.0	
4	Valid	.00	5183	99.4	99.4	99.4
		1.00	29	.6	.6	100.0
		Total	5212	100.0	100.0	
5	Valid	.00	5182	99.4	99.4	99.4
		1.00	30	.6	.6	100.0
		Total	5212	100.0	100.0	
Pooled	Valid	.00	5182.8			
		1.00	29.2			
		Total	5212			

zGDS_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	4701	90.2	92.4	92.4
		1.00	385	7.4	7.6	100.0
		Total	5086	97.6	100.0	
	Missing	System	126	2.4		
	Total		5212	100.0		
1	Valid	.00	5196	99.7	99.7	99.7
		1.00	16	.3	.3	100.0

		Total	5212	100.0	100.0	
2	Valid	.00	5196	99.7	99.7	99.7
		1.00	16	.3	.3	100.0
		Total	5212	100.0	100.0	
3	Valid	.00	5196	99.7	99.7	99.7
		1.00	16	.3	.3	100.0
		Total	5212	100.0	100.0	
4	Valid	.00	5196	99.7	99.7	99.7
		1.00	16	.3	.3	100.0
		Total	5212	100.0	100.0	
5	Valid	.00	5196	99.7	99.7	99.7
		1.00	16	.3	.3	100.0
		Total	5212	100.0	100.0	
Pooled	Valid	.00	5196			
		1.00	16			
		Total	5212			
	Missing	System				
	Total					

z-scores after multivariate outliers removed and MI run again

		zAAQloss_outside			
Imputation Number		Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5110	99.3	99.9
		1.00	3	.1	100.0
		Total	5113	99.4	100.0
	Missing	System	31	.6	
	Total		5144	100.0	
1	Valid	.00	5142	100.0	100.0
		1.00	2	.0	100.0
		Total	5144	100.0	100.0
2	Valid	.00	5141	99.9	99.9
		1.00	3	.1	100.0
		Total	5144	100.0	100.0
3	Valid	.00	5142	100.0	100.0
		1.00	2	.0	100.0
		Total	5144	100.0	100.0

4	Valid	.00	5141	99.9	99.9	99.9
		1.00	3	.1	.1	100.0
		Total	5144	100.0	100.0	
5	Valid	.00	5141	99.9	99.9	99.9
		1.00	3	.1	.1	100.0
		Total	5144	100.0	100.0	
Pooled	Valid	.00	5141.4			
		1.00	2.6			
		Total	5144			
	Missing	System				
	Total					

zAAQgrowth_outside

Imputation Number		Frequency		Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5091	99.0	99.6	99.6
		1.00	23	.4	.4	100.0
		Total	5114	99.4	100.0	
	Missing	System	30	.6		
	Total		5144	100.0		
1	Valid	.00	5138	99.9	99.9	99.9
		1.00	6	.1	.1	100.0
		Total	5144	100.0	100.0	
2	Valid	.00	5137	99.9	99.9	99.9
		1.00	7	.1	.1	100.0
		Total	5144	100.0	100.0	
3	Valid	.00	5138	99.9	99.9	99.9
		1.00	6	.1	.1	100.0
		Total	5144	100.0	100.0	
4	Valid	.00	5138	99.9	99.9	99.9
		1.00	6	.1	.1	100.0
		Total	5144	100.0	100.0	
5	Valid	.00	5138	99.9	99.9	99.9
		1.00	6	.1	.1	100.0
		Total	5144	100.0	100.0	
Pooled	Valid	.00	5137.8			
		1.00	6.2			
		Total	5144			
	Missing	System				

Total						
zAAQchange_outside						
Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5100	99.1	99.7	99.7
		1.00	13	.3	.3	100.0
		Total	5113	99.4	100.0	
	Missing	System	31	.6		
		Total	5144	100.0		
1	Valid	.00	5144	100.0	100.0	100.0
2	Valid	.00	5144	100.0	100.0	100.0
3	Valid	.00	5144	100.0	100.0	100.0
4	Valid	.00	5144	100.0	100.0	100.0
5	Valid	.00	5144	100.0	100.0	100.0
Pooled	Valid	.00	5144			
		1.00				
		Total				
	Missing	System				
		Total				

zGDS_outside						
Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5011	97.4	99.8	99.8
		1.00	11	.2	.2	100.0
		Total	5022	97.6	100.0	
	Missing	System	122	2.4		
		Total	5144	100.0		
1	Valid	.00	5111	99.4	99.4	99.4
		1.00	33	.6	.6	100.0
		Total	5144	100.0	100.0	
2	Valid	.00	5112	99.4	99.4	99.4
		1.00	32	.6	.6	100.0
		Total	5144	100.0	100.0	
3	Valid	.00	5113	99.4	99.4	99.4
		1.00	31	.6	.6	100.0
		Total	5144	100.0	100.0	

4	Valid	.00	5111	99.4	99.4	99.4
		1.00	33	.6	.6	100.0
		Total	5144	100.0	100.0	
5	Valid	.00	5114	99.4	99.4	99.4
		1.00	30	.6	.6	100.0
		Total	5144	100.0	100.0	
Pooled	Valid	.00	5112.2			
		1.00	31.8			
		Total	5144			
	Missing	System				
	Total					

zPCS_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5140	99.9	99.9	99.9
		1.00	4	.1	.1	100.0
		Total	5144	100.0	100.0	
1	Valid	.00	5143	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5144	100.0	100.0	
2	Valid	.00	5143	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5144	100.0	100.0	
3	Valid	.00	5143	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5144	100.0	100.0	
4	Valid	.00	5143	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5144	100.0	100.0	
5	Valid	.00	5143	100.0	100.0	100.0
		1.00	1	.0	.0	100.0
		Total	5144	100.0	100.0	
Pooled	Valid	.00	5143			
		1.00	1			
		Total	5144			

zMCS_outside

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	.00	5105	99.2	99.2	99.2
		1.00	39	.8	.8	100.0
		Total	5144	100.0	100.0	
1	Valid	.00	5119	99.5	99.5	99.5
		1.00	25	.5	.5	100.0
		Total	5144	100.0	100.0	
2	Valid	.00	5120	99.5	99.5	99.5
		1.00	24	.5	.5	100.0
		Total	5144	100.0	100.0	
3	Valid	.00	5120	99.5	99.5	99.5
		1.00	24	.5	.5	100.0
		Total	5144	100.0	100.0	
4	Valid	.00	5119	99.5	99.5	99.5
		1.00	25	.5	.5	100.0
		Total	5144	100.0	100.0	
5	Valid	.00	5120	99.5	99.5	99.5
		1.00	24	.5	.5	100.0
		Total	5144	100.0	100.0	
Pooled	Valid	.00	5119.6			
		1.00	24.4			
		Total	5144			

Appendix G: Multivariate Outlier Exploration

Multivariate outlier exploration examples (critical value used was 29.59)

Explored on database imputation 1 (used 50/10 SUM function scoring)				Original dataset, using MD prior to MI (NB almost 2000 not completed due to missing data)		
ID	Centre	Mal dist	Delete	ID	Centre	Mal dist
553	Bath	29.79542	x	7060	Umea	50.81889
1011	Leipzig	34.91562	x	8113	Lithuania	49.30808
1073	Leipzig	31.30661	x	2222	Copenhagen	44.99099
1219	Leipzig	31.69849	x	8316	Lithuania	44.63446
1336	Leipzig	37.79493	x	2177	Copenhagen	42.15828
1719	Barcelona	38.45273	x	4047	Oslo	39.4246
1726	Barcelona	30.31673	x	1719	Barcelona	39.14159
1746	Barcelona	41.72228	x	1758	Barcelona	39.0716
1758	Barcelona	40.761	x	2264	Copenhagen	38.84184
3196	Prague	38.06733	x	8266	Lithuania	38.16212
3204	Prague	30.03795	x	1746	Barcelona	38.11684
3265	Prague	29.65294	x	7116	Umea	37.27711
3382	Prague	35.7982	x	5027	Melbourne	37.06117
3595	Budapest	29.67726	x	2098	Copenhagen	36.75306
3687	Budapest	34.84599	x	5489	Melbourne	36.58696
3762	Budapest	29.90445	x	8102	Lithuania	35.64977
3800	Budapest	38.5077	x	5126	Melbourne	35.35736
5027	Melbourne	30.81012	x	5427	Melbourne	34.63258
5050	Melbourne	31.76583	x	7266	Umea	33.86833
5064	Melbourne	32.56661	x	1229	Leipzig	33.65343
5126	Melbourne	37.76381	x	6214	Beer-Sheva	33.11281
5137	Melbourne	35.97108	x	1336	Leipzig	33.05902
5198	Melbourne	41.88944	x	2001	Copenhagen	32.66633
5486	Melbourne	36.24192	x	5137	Melbourne	32.47249
5489	Melbourne	32.7074	x	4223	Oslo	32.24998
5504	Seattle	29.85134	x	4153	Oslo	32.15536
5633	Seattle	34.82829	x	5050	Melbourne	32.09859
5690	Seattle	33.26363	x	1073	Leipzig	31.75542
5724	Seattle	40.33646	x	5167	Melbourne	31.58459
5731	Seattle	35.69807	x	2029	Copenhagen	31.53522
5749	Seattle	41.99282	x	8262	Lithuania	31.53332
5768	Seattle	34.91979	x	1236	Leipzig	31.28371
6122	Beer-Sheva	29.77757	x	5064	Melbourne	31.12421
6214	Beer-Sheva	31.45628	x	1219	Leipzig	31.11796

			Higher score indicates more positive attitude	Higher score indicates a more negative attitude	Higher score indicates more positive			Score higher than 5 indicates depression	Higher score denotes higher QoL	Higher score denotes higher QoL	Higher score denotes higher QoL	Higher score denotes higher QoL					
ID	Centre	Mah dist	AAQ - growth	AAQ - loss	AAQ - change	SF-12 - PCS	SF-12 MCS	GDS	BREF D1 (physical)	BREF D2 (psychological)	BREF D3 (social)	BREF D4 (environment)	Notes	MI	MD above critical in all imputations	Column1	
8316	Lithuania		47.51	24	32	24	57.09921	27.19988	5	19	7	11	17	Very low MCS score, although potentially similar to BREF D2, but GDS isn't high. No MI required at all	N	Y	
7060	Umea		45.26	40	40	40	37.9416	36.33758	8	13	18	15	19	Scored 5 for all items of AAQ, should this be removed and re-imputed?	Y - BREF (1 item), GDS (4 items),	Y	AAQ not valid?
7266	Umea		43.07	40	40	40	52.59974	55.54509	11	14	13	12	12	Scored 5 for all items of AAQ, should this be removed and re-imputed? High GDS score	Y - AAQ (1 item)	Y	AAQ not valid ?
9157	Brazil		42.96	18	8	12	56.57535	46.04446	7	18	19	20	14	GDS already MI	Y - GDS (all)	Y	
5749	Seattle		41.99	31	27	19	37.772	53.58734	4	5	9	17	16	SF-12 already MI, scores look low for BREF when AAQ is high	Y	Y	
5198	Melbourne		41.89	30	27	16	20.10324	32.89152	13	5	5	11	12	SF-12 quite low compared to 'average', GDS = high but MI, but equally potentially fits with BREF scores for D1 + D2	Y - GDS (over half)	Y	
1746	Barcelona		41.72	40	31	37	51.4972	46.00167	6	14	11	7	6	AAQ growth - max	Y - AAQ (3 items), SF12 (4 items)	Y	
1758	Barcelona		40.76	32	20	25	21.00988	29.77776	7	8	5	7	12	Low SF-12 scores, but not dissimilar to BREF (although alternative pattern)	N	Y	
5724	Seattle		40.34	29	28	16	55.42422	39.39408	7	7	15	15	19	D2 perhaps doesn't fit with GDS score, MCS = low but obviously used MI	Y - BREF (1 item), all of SF-12	N (not 2 + 4)	
10300	Turkey		40.09	40	36	40	32.2012	45.75945	6	18	16	20	20	Low SF-12 but MI, maxing out on AAQ growth and change?	Y - all of SF-12	Y	

Appendix H: Additional Demographic Data

	<i>N</i>	%
Age category		
60-74 years	3242	63.0
75+	1902	37.0
Marital status		
Single (never married)	279	5.4
Married	2643	51.4
Partnered (other than married)	254	4.9
Separated	398	7.7
Widowed	1393	27.1
Missing	177	3.4
Education level		
Primary school	1484	28.8
Secondary school	1048	20.4
Trade or technical certificate	914	17.8
College diploma or degree	605	11.8
University degree	803	15.6
Unable to read or write	134	2.6
Other	101	2.0
Missing	55	1.1
Financial status		
Well above average	327	6.4
Slightly above average	1143	22.2
Average	2399	46.6
Slightly below average	677	13.2
Well below average	236	4.6
Missing	362	7.0
Living arrangements		
Living at home (supported by family)	2049	39.8
Living with family but not in own home	235	4.6
Living at home (unsupported by family)	2294	44.6
Living in residential care	214	4.2
Living in sheltered housing/community care	68	1.3
Living in Nursing home	48	0.9
Living in long-stay patient ward (hospital)	106	2.1
Missing	43	0.8
Health conditions		
None	1862	35.7
1-3	2662	51.1
4+	161	3.1
Missing	527	10.1

Appendix I: Original Demographic Data

	N	Gender <i>Female (%)</i>	Age Mean (SD)	Health status <i>Healthy</i> (%)	AAQ – PL Mean (SD)	AAQ – PC Mean (SD)	AAQ – PG Mean (SD)	SF-12 PCS Mean (SD)	SF-12 MCS Mean (SD)	GDS Mean (SD)
Edinburgh	116	78 (67.2)	77.60 (10.4)	92 (79.3)	17.10 (5.2)	24.72 (5.8)	25.9 (5.2)	41.80 (11.0)	55.39 (8.4)	8.67 (1.5)
Bath	145	91 (62.8)	69.66 (7.0)	131 (90.3)	15.68 (4.7)	27.89 (5.4)	25.75 (5.2)	-	-	8.92 (1.5)
Leipzig	354	165 (46.6)	72.73 (8.6)	218 (61.6)	18.88 (5.5)	27.54 (5.5)	24.89 (4.5)	42.19 (10.8)	51.22 (9.4)	9.19 (1.5)
Barcelona	271	161 (59.4)	71.96 (8.1)	182 (67.2)	20.79 (5.1)	26.12 (4.9)	27.09 (4.7)	41.54 (10.8)	49.62 (10.3)	7.79 (1.7)
Copenhagen	384	189 (49.2)	72.34 (7.7)	308 (80.2)	17.83 (5.5)	27.60 (6.5)	26.61 (5.9)	45.77 (6.7)	49.42 (6.3)	8.83 (1.4)
Paris	164	77 (47.0)	76.65 (8.7)	48 (29.3) ^a	19.56 (7.8)	17.97 (7.3)	21.34 (5.8)	46.91 (10.8) ^b	52.40 (10.0) ^b	-
Prague	325	194 (59.7)	71.36 (7.7)	196 (60.3)	22.32 (5.8)	23.80 (5.6)	26.14 (4.1)	-	-	8.66 (1.7)
Budapest	333	230 (69.1)	73.80 (8.7)	143 (42.9)	21.60 (6.0)	24.05 (5.3)	26.26 (4.5)	-	-	7.88 (1.8)
Oslo	324	168 (51.9)	75.15 (7.9)	269 (83.0)	17.58 (5.2)	26.28 (6.5)	27.63 (5.4)	44.00 (10.5)	53.13 (8.5)	8.60 (1.5)
Victoria	202	109 (54.0)	72.93 (8.4)	168 (83.2)	15.85 (5.1)	27.90 (5.8)	28.66 (4.4)	48.17 (8.6)	55.23 (4.8)	9.02 (1.2)
Melbourne	376	213 (56.6)	75.64 (6.8)	307 (81.6)	17.42 (5.7)	26.17 (5.5)	27.95 (4.6)	42.58 (11.7)	53.58 (8.7)	1.96 (0.4) ^c
Seattle	295	171 (58.0)	72.00 (8.4)	218 (73.9)	16.30 (5.7)	26.97 (5.9)	29.41 (4.0)	-	-	8.72 (1.5)
Beer-Sheva	250	160 (64.0)	70.32 (7.4)	195 (78.0)	18.35 (6.2)	27.16 (5.7)	27.51 (5.6)	46.25 (9.3)	51.87 (8.6)	8.87 (1.7)
Tokyo	188	99 (52.7)	69.39 (5.3)	111 (59.0)	20.08 (5.4)	27.95 (5.2)	25.26 (4.1)	47.51 (6.4)	54.05 (9.1)	-
Umea	455	243 (53.4)	72.74 (8.2)	337 (74.1)	18.45 (5.6)	26.55 (5.8)	28.06 (4.8)	44.12 (11.0)	52.44 (9.8)	8.86 (1.6)
Brazil	328	221 (67.4)	71.78 (7.7)	270 (82.3)	17.96 (5.8)	28.19 (4.7)	30.42 (3.7)	44.51 (10.2)	51.14 (9.1)	8.32 (1.6)
Uruguay	248	180 (72.6)	73.44 (5.7)	191 (77.0)	20.80 (6.4)	29.03 (5.0)	29.50 (4.7)	-	-	7.63 (1.7)
Turkey	327	171 (52.3)	70.97 (5.3)	148 (45.3)	23.78 (6.0)	22.39 (6.1)	26.84 (4.3)	-	-	7.36 (2.0)
Switzerland	139	77 (55.4)	74.34 (7.3)	116 (83.5)	16.81 (5.5)	26.47 (4.2)	23.88 (5.3)	45.65 (9.8)	50.06 (8.1)	8.96 (1.6)
Lithuania	342	238 (69.6)	68.66 (6.7)	195 (57.0)	21.93 (5.8)	25.50 (5.5)	26.86 (4.2)	44.21 (10.0)	48.21 (11.2)	8.25 (2.1)
Total	5566	3235 (58.1)	72.53 (7.9)	3843 (69.0)	19.19 (6.1)	26.09 (6.1)	27.09 (5.1)	48.08 (10.2)	54.43 (8.7)	8.00 (2.4)

^a n=73; ^b n=74-83 on individual SF-12 items; ^c scores computed based only on four items completed

Appendix J: Repeated Checking Thesis Proposal

Introduction

As with other countries in the developed and developing world, the UK is experiencing a profound demographic transition. Current projections indicate that there will be an additional 8.6 million adults over the age of 65 within the next 50 years', with those who are 85 and over being the fastest growing population group (Office for National Statistics, 2018). As such, it is important to understand the unique challenges to quality of life and psychology of ageing to support the needs of older people and promote wellbeing. The current study seeks to explore the utility of research examining checking behaviours on memory confidence in people with Obsessive Compulsive Disorder (OCD) when applied to entirely different clinical population (older people with memory deficits). As such, the current study elaborates upon research pioneered in OCD populations by adapting the principles of these research protocols to older people with dementia to understand the individual impact of memory decline.

In many Western societies and developed countries, there appears to be strongly held negative stereotypes about ageing, viewing older adulthood as a period of decline and decrepitude where individuals are appraised as holding little value to society (e.g., Milner, Van Norman, & Milner, 2012). There also appears to be elevated concerns around the decline of memory or cognitive functioning in older age (e.g., Dark-Freudeman, West, & Viverito, 2006). Dementia worry, a term coined by Kessler, Bowen, Baer, Froelich and Wahl (2012), is the fear that an individual may develop dementia. Dementia is an umbrella term for a set of symptoms that include difficulties with thinking, problem-solving, language and memory loss affecting daily living (Alzheimer's Society, 2017). Worry about developing dementia is something that affects not just older people but may be prevalent across people with a range of ages (Anderson, Day, Beard, Reed, & Wu, 2009), highlighting that this may be present as

a concern for a wide range of the population, especially as decline is a common stereotype of ageing (Molden & Maxfield, 2017). A proposed explanation for this increase in worry about cognitive functioning or the development of dementia is due to increased exposure and awareness of dementia, either through media consumption or personal contact with dementia (Kessler et al., 2012), which may be a by-product of the societal demographic transition. This fear is important to recognise for its implicit acceptance and negative impact on individual and societal views of ageing. While dementia is not an outcome of ageing, nevertheless, the greatest risk of developing dementia is age, doubling in prevalence every 5 years after the age of 60 (Hofman et al., 1991). As dementia may become something that more individuals face, relatively, as our population ages, it is important to consider interventions to enhance psychological wellbeing and promote successful ageing in these individuals.

One of the main overt and impactful consequences of developing a dementia is impaired memory functioning. Concern with memory is something that has already been explored within specific clinical groups, with increasing literature considering the role of memory in individuals with OCD. OCD can be characterised as the experience of obsessions, which are intrusive and unwanted recurrent thoughts, and compulsions, which are repetitive behaviours (such as checking, ordering or hand washing) that an individual feels driven to complete as a way of reducing anxiety or preventing harm (American Psychiatric Association, 2013). Often, those individuals with OCD repeatedly perform compulsions, repeatedly checking something until they are satisfied, or have alleviated their distress somewhat. Research has indicated that checking compulsions are commonly observed in individuals with OCD (e.g. Rasmussen & Tsuang, 1986). It was initially believed that those with OCD may also have an memory impairment, with compulsive checking being a compensatory behaviour for this deficit (Sher, Frost, Kushner, Crews, & Alexander, 1989). However, research has been unable to find consistent evidence to support this idea, however,

it seems there is strong evidence for low memory confidence (Muller & Roberts, 2005). This intriguing finding has been explored by researchers (e.g. van den Hout & Kindt, 2003), which will be discussed in detail later on.

Metamemory, an individual's knowledge, monitoring of, and control of memory process and learning (Dunlosky & Bjork, 2013), is something that has been increasingly explored in the OCD population. Boschen and Vuksanovic (2007) found that relevant repeated checking reduced memory confidence, vividness and detail (which together can be termed as metamemory) in a sample of 15 individuals with OCD, with this effect being amplified when perceived responsibility was increased. Radomsky, Dugas, Alcolado and Lavoie (2014) found similar: repeated checking had a negative impact on metamemory, but only in a relevant checking condition (the repeated checking involving the same object checked as the test check) and not in an irrelevant checking condition (the repeated checking being a different stimulus to the test check).

Rachman (2002) proposed a cognitive model to explain repeated checking within OCD. He suggested that if someone feels an elevated responsibility to prevent harm and are unsure if they have effectively reduced the risk of harm happening, they may repeatedly check for safety. Rachman (2002) argued that repeated checking can become a self-perpetuating mechanism, paradoxically decreasing confidence whilst increasing fear. This occurs due to four factors. Firstly, people seek out, but ultimately fail, in their pursuit for certainty of reducing harm, and as such, feel the need to make further checks. Secondly, repeated checking appears to diminish an individual's memory of checking, so reduces confidence in that check. Thirdly, there is a cognitive bias that suggests that individuals feel the probability of harm is increased when they are responsible (Lopatka & Rachman, 1995). Finally, following a check for safety, individuals tend to feel an increase in responsibility, with this negative cognitive bias feeding into this self-perpetuating mechanism.

Although the research protocols supporting this model focus on repeated checking within OCD, several researchers have found repeated checking to reduce memory confidence is present in non-clinical populations. As such this suggests that this mechanism extends beyond OCD and may have wider applications. This is the reasoning of applying this research paradigm with older people with memory deficits to be explored in the current study.

For example, van den Hout and Kindt (2003) found in a healthy student population that repeated checking was associated with reduced confidence in memory when they had to repeatedly check a virtual stove top. This was not demonstrated in the control group, who had to complete irrelevant checks on virtual light bulbs instead. Equally, Radomsky, Gilchrist and Dussault (2006) found similar findings relating to a reduction in memory confidence, vividness and detail after checking a physical stove top. These findings may indicate that repeated checking has an adverse effect in general on metamemory. Van den Hout and Kindt (2003) propose that this reduction in confidence may be a product of familiarity, which inhibits processing of perceptual features, impacting the vividness and detail of the memory as a result. The link between repeated checking and reduced confidence in one's memory (e.g. Radomsky et al., 2006) which appears to be present in OCD populations (e.g. Radomsky et al., 2014), offers an intriguing range of possible scientific explorations when applied to populations who have identified deficits in memory functioning, such as people with dementia. Presently there is a developing literature on this, but this idea remains relatively unexplored.

Research with non-clinical samples has demonstrated that reduced confidence in both retrospective memory (remembering information relating to the past), and prospective memory (remembering to perform a planned event or intention at a future time point) increases the urge to check. Alcolado and Radomsky (2011) found this when manipulating

confidence in a retrospective memory task, whilst Cuttler, Sirois-Delisle, Alcolado, Radomsky and Taylor (2013) found individuals whose confidence had been reduced by receiving negative feedback about prospective memory performance experienced greater urges to check. Considering this finding in relation to older adults, who may already be preoccupied and hypervigilant to their own memory performance given their concerns about developing dementia, they may see repeated checking as a useful strategy to engage in, which may inadvertently and paradoxically reduces confidence in memory. As Rachman (2002) asserts the more one checks the less one has confidence in memory of checking. Checking has one main outcome in this case and that is to increase doubt. For older people with identified memory deficits, checking could be damaging to confidence in memory functioning. This remains as yet under-explored. Lattimer (2016) piloted the use of a repeated checking paradigm from the OCD research domain with older adults diagnosed with mild cognitive impairment (MCI). Lattimer (2016) demonstrated that participants in control and MCI samples reported reduced confidence in a relevant checking condition, establishing the potential utility of repeated checking paradigms outside the original research domain. The current study seeks to elaborate on Lattimer (2016), which was underpowered and did not test the paradigm with an appropriate population, i.e., people with dementia. MCI does not constitute a valid test for the paradigm as there remains much heterogeneity around diagnosis and recognition (Petersen et al., 2014).

As such, given the pre-existing concerns about memory function and dementia in older adults (e.g., Kessler et al., 2012), the aim of the current research study is to gather a better understanding of repeated checking in a sample of older adults with a diagnosis of dementia in comparison to a control sample of older adults. It seems reasonable that older adults may engage in repeated checking as a way of managing concerns about memory, and the paradoxical impact this may have on metamemory and subsequent wellbeing. As research

(e.g., Radomsky et al., 2014) demonstrates checking may paradoxically increase doubt, older people who report fears about memory loss may misattribute reasons for memory failings (if they repeatedly check memory) and this may impact referrals to memory clinics. For those with dementia, repeated checking may add excess disability, further compromising wellbeing. As our population is ageing, it is important to appreciate pertinent concerns and effectively support these. Given there has been little exploration of repeated checking in subsequent memory confidence within older adults, this study seeks to gather a better understanding of this, with the hope it will have both clinical and theoretical implication. Repeated checking will be investigated through the use of an adapted experimental procedure developed by Radomsky et al. (2006), which employs relevant and irrelevant checking conditions. Relevant checking will involve participants checking the same stimulus throughout the study, whilst those in the irrelevant checking condition will check a different stimulus between pre and post metamemory checks. Novelty of the study comes from the investigation of repeated checking in those with a dementia diagnosis which has yet to be explored.

Research Questions

1. Does repeated checking reduce confidence, vividness and detail of memory, as measured by a Likert scale, in older adults when compared to an irrelevant checking condition?
2. Does relevant repeated checking reduce memory confidence in individuals diagnosed with dementia in comparison to community-dwelling older adults without an identified cognitive impairment?
3. Are higher levels of dementia fear more strongly associated with a reduction in memory confidence following a relevant checking condition?

4. Does repeated checking in a relevant domain decrease accuracy of memory, when compared to an irrelevant checking condition in older adults with and without a diagnosis of dementia?
5. Is reduced confidence following repeated checking associated with low mood and high levels of anxiety?

Hypotheses

- It is hypothesised that both controls and those with dementia who complete a relevant repeated checking task will experience a greater reduction in metamemory (confidence, vividness and detail of memory) than those who engage in an irrelevant checking condition.
- Relevant repeated checking will have a greater impact upon memory confidence in those who have a diagnosis of dementia compared to controls.
- Participants reporting high levels of fear of dementia will report significantly lower levels of memory confidence in comparison to participants with low levels of fear of dementia following a relevant checking condition.
- Memory accuracy will be significantly lower in older adults who engage in relevant checking compared to older people in an irrelevant checking condition.
- Participants who report elevated levels of anxiety and depression will report significantly low levels of confidence in memory following a relevant repeated checking condition.

Literature Review

Psychological treatment approaches for anxiety disorders in older adults were rarely considered prior to the 1990s (Kishita & Laidlaw, 2017), and in the main early research trials were characterised by methodological flaws not in keeping with modern gold standards for RCTs (Laidlaw, 2019). As such, there remains a small but developing evidence base for

psychological interventions for late life anxiety disorders. Research in this domain has not been subjected to substantial review and many reviews have focused specifically on Cognitive Behavioural Therapy (e.g., Kishita & Laidlaw, 2017). Therefore, the aim of this review seeks to add a specific contribution to the existing evidence base, by identifying the effectiveness of a range of psychological and psychosocial interventions in the treatment of later life anxiety, whilst evaluating the methodological strength of the study.

Literature review question

Is psychological psychotherapy efficacious in reducing anxiety symptoms and disorder in older people?

Search strategy

PRISMA guidelines will be followed when completing the systematic review. Searches will be conducted across the following databases: PsycINFO, PsycARTICLES and Ageline. No restrictions will be made on the date of publication. Searching will also involve contacting authors in the field, such as Viviana Wuthrich and Melinda Stanley for requests of grey literature due to their extensive research contributions to the treatment of later life anxiety (e.g. Stanley et al., 2018; Wuthrich, Rapee, Kangas, & Perini, 2016).

Search terms

The search strategy will use key words which have been selected by looking at terms used in related papers such as Hendriks, Voshaar, Keijsers, Hoogduin, and van Balkom (2008) in addition to medical subject heading (MESH) terms. Titles and abstracts will be searched for the following terms (* indicates truncated search term):

1. (“therapy” OR “psychotherapy” OR “treatment” OR “psychological treatment” OR “psycho*”) AND
2. (“anxiety” OR “anxiety disorder” OR “panic disorder” OR “generalised anxiety” OR “generalized anxiety” OR “social anxiety” OR “social phobia”) AND

3. (“old* adult” OR “elder*” OR “late* life” OR “old age” OR “aged” OR “over 65”)

Inclusion and Exclusion Criteria

Previous systematic reviews in the field, such as Hendriks et al. (2008) have helped define current inclusion and exclusion criteria. The current systematic review aims to explore the efficacy of psychological psychotherapy for late life anxiety disorders. While CBT has been somewhat explored the narrowness of previous reviews leaves open the question about efficacy of psychotherapy overall as a treatment for anxiety disorders. Table 1 outlines inclusion and exclusion criteria.

Table 1

Inclusion and exclusion criteria for the current systematic review, arranged by PICOS criteria

	Inclusion criteria	Exclusion criteria
Population	<ul style="list-style-type: none"> • Average age of participants is over 65 • A diagnosis of generalised anxiety disorder (GAD), panic disorder, social phobia or agoraphobia as determined by a diagnostic manual such as the DSM5 or ICD-10, confirmed by clinical interview 	<ul style="list-style-type: none"> • Participants under the age of 65
Intervention	<ul style="list-style-type: none"> • A psychotherapeutic intervention for anxiety such as CBT, systemic therapy, schema therapy, problem solving therapy, etc.). 	
Comparison	<ul style="list-style-type: none"> • Comparison between a control group, such as waitlist or placebo 	

Outcome	<ul style="list-style-type: none"> • Use of valid outcome measure, such as self-report questionnaire or clinical interview^a 	
Study type	<ul style="list-style-type: none"> • Use of randomised research control design • Use of within-study design 	<ul style="list-style-type: none"> • Papers not written or translated to English, due to the researcher being English speaking

^a Ideally specific outcome measures would be identified and form part of inclusion and exclusion criteria, however there is no agreed outcome measure that is used within the field.

Screening Procedures

Initially, papers will be screened by titles and abstracts to determine whether they are suitable for inclusion. If the paper appears appropriate to include in the systematic review based on title and abstract screening, the full text will then be examined to determine inclusion or not in the review, as advised by the Centre for Reviews and Disseminations (2009).

Planned Evaluation Criteria

The quality of included papers will be assessed using the Randomised Control Trial of Psychotherapy Quality Rating Scale (RCT-PQRS; (Kocsis et al., 2010), a validated instrument that assesses the quality of a psychotherapeutic intervention. This tool has been chosen because it is more relevant to the current systematic review and it provides a means of indexing the methodological quality of studies included in the review. The review process will be validated by the primary supervisor, who will review at least six studies at the full-text screening stage for inclusion in the review, and will assess the quality of at least three studies that are included in the review. In the event of poor inter-rater reliability, a third researcher will be consulted to review any disagreements.

Empirical Paper

Design

The study will be a 2x2 mixed experimental design, with two independent between-participant variables: checking condition (relevant/irrelevant checking; in which participants will be randomly allocated) and dementia status (there will be a clinical sample of older people diagnosed with a dementia of mild severity and a control sample of community dwelling older people). The primary dependant variables of memory vividness, confidence, detail and accuracy will be measured before and after participants are exposed to the experimental manipulation of checking. These are within-participant variables.

Sample

The clinical sample will be recruited via NHS memory clinics within the region, the Bristol Brain Centre and Join Dementia Research (JDR), all who will have received a dementia diagnosis from a medical professional. The control sample will be recruited only through social groups for older adults in the local area, in addition to JDR and Bristol Brain Centre. Please see Table 2 and 3 for inclusion and exclusion criteria for samples.

Table 2

Inclusion and exclusion criteria for control group

Inclusion criteria	Exclusion criteria
Over 65 years of age	Diagnosis of a dementia
Living independently in the community	A diagnosed anxiety or mood disorder
Fluent in English	A current/past diagnosis of psychosis
Ability to give informed consent	A history of drug abuse

A history of alcohol abuse

Unable to give informed consent

Table 3

Inclusion and exclusion criteria for dementia sample

Inclusion criteria	Exclusion criteria
Over 65 years of age	A current/past diagnosis of psychosis
Living independently in the community	A history of drug abuse
Fluent in English	A history of alcohol abuse
A diagnosis of mild dementia (of any kind) for experimental sample as assessed by the Clinical Dementia Rating Scale (CDR) or self-reported dementia status	A diagnosis of dementia that is deemed greater than mild severity as assessed by the Clinical Dementia Rating Scale (CDR) or self-reported dementia status
Ability to give informed consent	Unable to give informed consent

Power Analysis

Sample size would be ideally estimated by using the effect sizes reported in Lattimer (2016) study, as the current study is an elaboration of that. However, this study did not reach the required sample size to complete the proposed analysis, such as a MANOVA, so effect sizes do not relate to the current analysis strategy. To achieve a more realistic estimation of power, relevant empirical studies from the scientific literature have been used. G*Power (version 3.1) has been used to calculate estimations of power.

For the first hypothesis which will explore metamemory, G*Power with power set at .8 and α set at .05, determined a sample size of 32 older adults would be required to detect a time x condition interaction with an effect size of .24 (η^2) for a two-way MANOVA (see Appendix A). This effect size has been taken from research reported by Radomsky, Dugas, Alcolado and Lavoie (2014). This study was chosen as it was also a primary source used by Lattimer (2016) to determine power calculations and because of the similarity of methodological approach adopted in the current study. The second hypothesis will also be explored using this MANOVA.

To explore the third hypothesis exploring the relationship between fear of dementia and memory confidence using a multiple regression, G*Power estimates a total sample size of 55 to detect a medium effect size ($f^2 = .15$) with one outcome and two predictors (detailed in data analysis section), when power is set at .8 and $\alpha = .05$ (see Appendix B).

For hypothesis 4 exploring memory accuracy following relevant or irrelevant checking using an ANOVA, with power set as .8 and α at .05, a total sample size of 151 would be required to detect an effect size of .23 (η^2 ; see Appendix C). This effect size has also been taken from Radomsky et al. (2014).

For the final hypothesis, a sample size of 55 would be required to complete a multiple regression with one outcome and three predictors to detect a medium effect size ($f^2 = .15$), with power set at .8 and α set at .05 (see Appendix D).

Given the number of participants required for sufficient power, and the time frame to recruit a clinical population, it is likely that parts of the current study will be underpowered. However, given this is the first study to investigate the role of repeated checking in a sample diagnosed with dementia, the current study may be a beneficial pilot study. As Lattimer (2016) reported statistically significant data in their initial explorative study of 34 older people, this may strengthen confidence that data will make a notable incremental contribution

to the scientific understanding of the phenomena of memory confidence in people with dementia who exhibit checking behaviours.

Method of Data Collection

Experimental measures (see Appendix E).

Memory confidence. Memory confidence will be assessed at pre- and post-test using a Likert scale from 0-100. It will require all participants to check three of six hobs on a non-functioning replica stove top and then rate their confidence for this check. This is replicating the Radomsky, Gilchrist and Dussault (2006) study. A score of 0 represents “not at all confident” and a score of 100 represents “extremely confident”.

Vividness and detail. Participants will be asked to rate vividness and detail following a check of three hobs on a non-functioning replica stove top, assessed pre- and post-test. They will be asked to rate these on a Likert scale from 0 to 100. Vividness will be defined to participants as the clarity and intensity of their recollection, whilst detail will be defined as their ability to remember particular visual features of the last trial. Zero represents “not at all” and 100 represents “extremely”.

Memory accuracy. Accuracy will also be assessed at pre- and post-test by providing participants with a diagram of the stove and knobs labelled and asking them to mark with an X which three stoves they had been asked to check. Participants can obtain a score between 0-3.

Secondary measures.

Clinical Dementia Rating Scale (CDR; Hughes, Berg, Danziger, Coben, & Martin, 1982; see Appendix F). The CDR is a measure that can be used by clinicians to classify the severity of dementia across domains such as memory, orientation and personal care. A summary is provided for each rating of no dementia, questionable, mild, moderate and severe

dementia which an individual is graded against to come up with an overall rating of severity. Although it is a subjective measure, inter-rater reliability is acceptable ($K = .62$; Rockwood, Strang, MacKnight, Downer, & Morris, 2000) and it has been recommended for use in clinical trials (Coley et al., 2011). This will be used with clinicians in the memory service to identify eligible participants to approach for the study. Individuals who are rated as mild (classified by a score of 1) will be approached for the study. This is not an experimental measure.

Demographics and self-reported dementia status (see Appendix G). Basic demographic details will be collected, including age, gender and ethnicity. Participants will also be asked if they have received a diagnosis of dementia from a medical professional, in addition to how long they have lived with dementia. Current medications will also be requested.

One item from the Fear of Developing Alzheimer's Disease scale (FADS; French, Floyd, Wilkins, & Osato, 2012; see Appendix H). The FADS is a scale to explore apprehension about developing Alzheimer's disease. Consistent with Lattimer (2016), one item from the FADS will be used to index fear. This will be administered to both groups.

Five-item Geriatric Depression Scale (GDS; Hoyle et al., 1999; see Appendix I). The GDS is a 5-item self-report measure to screen depression within older adults that can be completed in approximately one minute. A score of 2 or higher may indicate that depression is present. It has been found to have good test-retest reliability ($\kappa = .84$) and interrater reliability ($\kappa = .88$; Rinaldi et al., 2003).

Geriatric Anxiety Scale – 10 item version (GAS-10; Mueller et al., 2015; see Appendix J). The GAS-10 is an adapted scale from the 30-item Geriatric Anxiety Scale, specifically for use with older adults. It requires participants to rate symptoms on a 4-point

Likert scale over the space of a week. It has been found to have good internal consistency (Cronbach's $\alpha = .89$).

Six-item Cognitive Impairment Test (6-CIT; Brooke & Bullock, 1999; see Appendix K). The 6-CIT is a brief cognitive assessment that can be used as a screen for dementia. It has been found to correlate highly with the Mini-Mental States Examination (MMSE), and has good sensitivity and specificity (Upadhyaya, Rajagopal, & Gale, 2010). This test has been selected as it is quick to administer yet provides meaningful data.

Prospective and Retrospective Memory Questionnaire (PRMQ; Smith, Della Sala, Logie, & Maylor, 2000; see Appendix L). The PRMQ seeks to measure prospective and retrospective memory slips in everyday life on a 5-point Likert scale. It has strong internal consistency, construct and concurrent validity (Crawford, Smith, Maylor, Della Sala, & Logie, 2003).

Procedure

There will be multiple avenues of recruitment, as discussed above, to obtain the required number of participants as determined by the power analysis following ethical approval from the Research Ethics Service (RES) and Trust Research and Development (R&D) departments. Identified individuals who meet the inclusion criteria will be approached initially via telephone to introduce the study to them. If they are interested, a participant information sheet (see Appendix M) will be sent via post or over email, with a follow up telephone call booked to discuss the study. At this call, if the person wishes to participate, a time to complete the study will be booked in a convenient location (e.g. NHS clinic or participant's home).

When meeting participants, a consent form will be completed (see Appendix N), highlighting the participant's right to withdraw and confidentiality. Given the clinical population involved in this study, their GP will also be informed about participant

involvement in the study and this will be subject to consent (see Appendix O). Once consent has been given, the individual will be randomly allocated to receive either the relevant or irrelevant checking condition, using block randomisation. Relevant checking will require participants to check a non-functioning replica stove top, whilst the irrelevant checking condition will involve checking a 7x4 dosette box. The random allocation will also be counterbalanced during the training phase, so half of the participants will be trained on the stove first, and the other half on the dosette box first. Following the training phase, participants will complete the pre-test trial, where they will be asked to rate confidence, vividness and detail of memory, in addition to stating what three hobs they checked. Participants who are randomly allocated to the relevant checking condition will complete an additional 15 trials on the stove top, whilst those allocated to the irrelevant checking condition will complete 15 trials checking the dosette box. The amount of trials has been based on the methodology reported by Lattimer (2016). Following the trials, a post-test will be completed, with all participants having to check the stove top and once again rating confidence, vividness and detail of memory and identify which three hobs they checked.

Following the experimental task, participants will be asked to complete a batch of questionnaires including demographic information, anxiety and depression measures, a prospective memory questionnaire, a fear of Alzheimer's scale and a measure of cognition. It is anticipated that the testing session will last approximately one hour in total.

Once completed, participants will be verbally debriefed and given the opportunity to ask any questions they may have. They will also be provided with a debriefing sheet (see Appendix P), highlighting support avenues to contact if they feel any distress. Distress will be monitored at debrief by the researcher and discussed with the research supervisor if required. Should consent be granted, a letter will be sent to their GP explaining their involvement in the study.

Proposed Data Analysis Strategy

A mixed repeated measures MANOVA will be used to explore the first hypothesis considering metamemory, the between-participant independent variables being checking conditions (relevant vs. irrelevant) and group (clinical vs. control), the within-participant independent variable being time (pre- vs. post- checking condition), and the dependant variables being memory confidence, vividness and detail. Interaction effects in the MANOVA will be examined to explore hypothesis two.

To explore the relationship between fear of dementia and memory confidence, a multiple regression will be used. The dependent variable will be post-checking confidence, with pre-checking confidence and fear of dementia as predictor variables.

A mixed repeated measures ANOVA will be used to explore the fourth hypothesis, with between-participant independent variables being checking condition (relevant vs. irrelevant) and group (clinical vs. control), the within-participant independent variable being time (pre- vs. post- checking condition), and the dependant variable being memory accuracy. Separate analyses are being conducted so as to replicate the approach adopted by Radomsky et al. (2014).

A multiple regression and correlation will be used to explore the final hypothesis. An anxiety and depression composite score, pre-checking confidence and PRMQ scores will be used as predictor variables to predict the outcome variable which is post-checking confidence.

User Consultation

It is anticipated that the project will be discussed with a local Age UK group. Discussions have already been held with one of the professionals working in the NHS service that will be used for recruitment about the materials and ethical considerations of the study.

Ethical Approval and Considerations

Given the sensitive nature of the research and the population being recruited, there has been much thought put into the ethical considerations and how to manage these. Due to recruiting a clinical population through an NHS service, ethical approval will be sought from the Research Ethics Service (RES). As half of the sample will be those who have a diagnosis of dementia, to ensure they are able to give informed consent, only those individuals who would be classed as having mild dementia will be recruited into this trial. Prior to entry into this research all participants will be given at least 24 hours to read through the participant information sheet, allowing them enough time to process the information and consent to the research. They will have multiple opportunities to ask any questions, including at the point of organising the participation date, and prior to the start of the study. Both the information sheet and consent form will state the voluntary nature of the study and their right to withdraw at any time without it affecting their care, in addition to explaining issues around confidentiality and data protection.

As the focus of the study is memory, it is possible this may elevate some levels of distress for certain individuals. This will be ameliorated by providing all participants with an information sheet and debriefing sheet, highlighting avenues of support, such as their GP, Alzheimer's Society, or discussing with the researcher or primary supervisor. If any distress is shown during the study, participants will be reminded that their participation is voluntary and that they are able to withdraw at any time. If elevated distress is shown once the study has been completed or terminated, this would be explored within the session and signposting options will be discussed so they can access additional support. It is anticipated that the likelihood of this occurring is low, as no episodes of distress were reported by Lattimer (2016).

Data will be stored in accordance to GDPR guidelines, consent forms and measures being stored separately from one another to maintain participant confidentiality. Each participant will be allocated a unique identification number so that study data is anonymised. All data will be stored on a password protected university network that only the researcher will have access to. Data will be stored securely until the project has been completed, so it is anticipated that all study data will be destroyed by December 2021. See appendix Q for risk matrix.

Timeline

A proposed timeline of completion of tasks related to both the literature review and empirical study are outlined in Table 4.

Table 4

Estimated project timeline

Task	Proposed completion date
Submitting ethics application to HRA	December 2019
Anticipated receipt of ethical approval from HRA	May 2020
Data collection	June 2020-October 2020
First draft of literature review	September 2020
Data analysis	November 2020
First draft of empirical paper	March 2021
Submission of thesis	4 th May 2021

Feasibility

Given the length of time NHS ethics can take, it is planned to submit for ethical approval in a timely fashion, ideally by the beginning of December 2019. This should allow sufficient time for multiple ethical considerations and approval, whilst allowing a decent time frame for data collection. When waiting for approval, the time will be used constructively by working on the linked literature review as part of the thesis.

The main feasibility issue is likely to be recruiting a sufficient number of participants. Optimisation of recruitment will occur by using multiple sources, including a NHS service that forms part of a clinical placement, and achieving approval for access to two research databases for individuals with a diagnosis of dementia, JDR and Bristol Brain Centre. The NHS service where approval for ethics has been sought has memory services across the county, so there should be multiple locations to recruit from. If by the end of August 2020 and enough participants are yet to be obtained, contingency plans to apply for approval in another NHS service in the South West will be put in place, with a pre-existing link through the primary supervisor of this study. There is a backup plan of recruiting solely via JDR, which will only require university ethics.

Contribution to Knowledge

The current study aims to investigate repeated checking in a population that is yet to be studied, which may have both clinical and theoretical contributions. The current study may provide some additional insight into the costs and benefits of compensatory strategies used by those with a diagnosis of dementia, potentially highlighting a need for education around this to support wellbeing and minimise additional reductions in confidence and increased doubt.

The study may also be an initial starting point in understanding another factor for those who present to memory services who are ‘worried well’, those who believe they may have dementia but would not meet diagnostic criteria.

It is likely that this study, in combination with future research, may provide the opportunity to refine Rachman’s (2002) cognitive model of repeated checking to be relevant to older adults or those with a diagnosis of dementia.

The literature review and empirical study will be disseminated in journals such as *The Journals of Gerontology* or *Psychological Medicine*.

Appendix K: Ethics approval

CLES – Psychology
Psychology
College of Life and Environmental Sciences
University of Exeter
Washington Singer Building
Perry Road
Exeter
EX4 4QG
Web: www.exeter.ac.uk

CLES – Psychology Ethics Committee

Dear Ellie Perry

Ethics application - eCLESPsy001447

Exploring the Relationship between Attitudes to Ageing, Health Status and Quality of Life in Older Adults

Your project has been reviewed by the CLES – Psychology Ethics Committee and has received a Favourable opinion.

The Committee has made the following comments about your application:

- Please view your application at <https://eethics.exeter.ac.uk/CLESPsy/> to see comments in full.

If you have received a Favourable with conditions, Provisional or unfavourable outcome you are required to re-submit for full review and/or confirm that committee comments have been addressed before you begin your research.

If you have any further queries, please contact your Ethics Officer.

Yours sincerely

Date: 30/09/2020

CLES – Psychology Ethics Committee

Appendix L: Dissemination Plan

The results of the empirical paper are hoped to be submitted to the journal of Quality of Life Research for dissemination to the wider academic community. Prior to this, the findings will be disseminated via a presentation to DClinPsy Trainees and Staff in June 2021.

Appendix L: Quality of Life Research – Instructions for Authors

Instructions for authors

Article types

Quality of Life Research welcomes scientific articles in the following categories:

- Original Articles

Original articles are a maximum of 4,000 words, exclusive of a 250-word structured abstract, figures, tables, and references. We encourage submissions of shorter length if the empirical study can be presented concisely. We also make authors aware of the option to publish additional detail as online appendices. We are particularly interested in studies that utilize patient-reported outcomes, focusing on clinical and policy applications of (health-related) quality-of-life research; showcasing quantitative and qualitative methodological advances; and/or describing instrument development.

Original articles describe work that is not already published elsewhere or directly uses statements from previously published materials without appropriate acknowledgement or referencing. For example, if the submitted work forms part of a thesis dissertation or the abstract was published as part of conference proceedings, these should be acknowledged. If taking direct statements from published sources, these should be appropriately referenced.

Language

We appreciate any efforts that you make to ensure that the language usage is corrected before submission using standard United States or United Kingdom English. This will greatly improve the legibility of your paper if English is not your first language.

[Back to top](#)

Title page

Title Page

Please make sure your title page contains the following information.

Title

The title should be concise and informative.

Author information

The name(s) of the author(s)

The affiliation(s) of the author(s), i.e. institution, (department), city, (state), country

A clear indication and an active e-mail address of the corresponding author

If available, the 16-digit ORCID of the author(s)

If address information is provided with the affiliation(s) it will also be published.

For authors that are (temporarily) unaffiliated we will only capture their city and country of residence, not their e-mail address unless specifically requested.

Abstract

Please provide a structured abstract of 150 to 250 words which should be divided into the following sections:

Purpose (stating the main purposes and research question)

Methods

Results

Conclusion

For life science journals only (when applicable)

Trial registration number and date of registration

Trial registration number, date of registration followed by "retrospectively registered"

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

Declarations

All manuscripts must contain the following sections under the heading 'Declarations'.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

To be used for all articles, including articles with biological applications

Funding (information that explains whether and by whom the research was supported)

Conflicts of interest/Competing interests (include appropriate disclosures)

Availability of data and material (data transparency)

Code availability (software application or custom code)

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory)

Additional declarations for articles in life science journals that report the results of studies involving humans and/or animals

Ethics approval (include appropriate approvals or waivers)

Consent to participate (include appropriate statements)

Consent for publication (include appropriate statements)

Please see the relevant sections in the submission guidelines for further information as well as various examples of wording. Please revise/customize the sample statements according to your own needs.

Please note:

The Title Page should also state the word count for the manuscript (exclusive of abstract, figures, tables, and references).

[Back to top](#)

Text

Text Formatting

Manuscripts should be submitted in Word.

Use a normal, plain font (e.g., 10-point Times Roman) for text.

Use italics for emphasis.

Use the automatic page numbering function to number the pages.

Do not use field functions.

Use tab stops or other commands for indents, not the space bar.

Use the table function, not spreadsheets, to make tables.

Use the equation editor or MathType for equations.

Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX.

[LaTeX macro package \(Download zip, 188 kB\)](#)

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

[Back to top](#)

Scientific style

Please always use internationally accepted signs and symbols for units (SI units).

Generic names of drugs and pesticides are preferred; if trade names are used, the generic name should be given at first mention.

[Back to top](#)

References

Citation

Reference citations in the text should be identified by numbers in square brackets. Some examples:

1. Negotiation research spans many disciplines [3].
2. This result was later contradicted by Becker and Seligman [5].
3. This effect has been widely studied [1-3, 7].

Authors are encouraged to follow official APA version 7 guidelines on the number of authors included in reference list entries (i.e., include all authors up to 20; for larger groups, give the first 19 names followed by an ellipsis and the final author's name). However, if authors shorten the author group by using et al., this will be retained.

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text.

The entries in the list should be numbered consecutively.

Journal names and book titles should be *italicized*.

If available, please always include DOIs as full DOI links in your reference list (e.g. "<https://doi.org/abc>").

Journal article

Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture*, 8(3), 207–217. <https://doi.org/10.1037/ppm0000185>

Article by DOI

Hong, I., Knox, S., Pryor, L., Mroz, T. M., Graham, J., Shields, M. F., & Reistetter, T. A. (2020). Is referral to home health rehabilitation following inpatient rehabilitation facility associated with 90-day hospital readmission for adult patients with stroke? *American Journal of Physical Medicine & Rehabilitation*. Advance online publication. <https://doi.org/10.1097/PHM.0000000000001435>

Book

Sapolsky, R. M. (2017). *Behave: The biology of humans at our best and worst*. Penguin Books.

Book chapter

Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115–129). Routledge.

Online document

Fagan, J. (2019, March 25). *Nursing clinical brain*. OER Commons. Retrieved January 7, 2020, from <https://www.oercommons.org/authoring/53029-nursing-clinical-brain/view>

[Back to top](#)

Tables

All tables are to be numbered using Arabic numerals.

Tables should always be cited in text in consecutive numerical order.

For each table, please supply a table caption (title) explaining the components of the table.

Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.

Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

[Back to top](#)

Artwork and Illustrations Guidelines

Electronic Figure Submission

Supply all figures electronically.

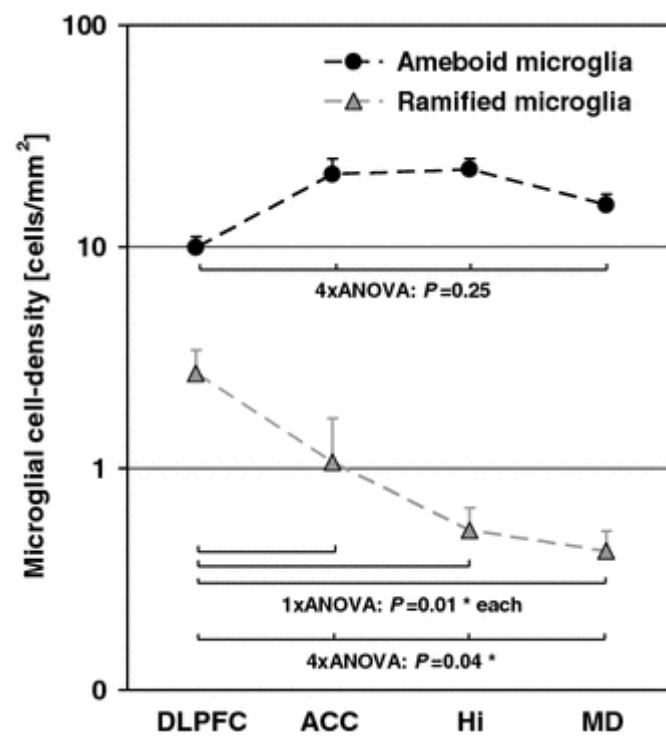
Indicate what graphics program was used to create the artwork.

For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.

Vector graphics containing fonts must have the fonts embedded in the files.

Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art



Definition: Black and white graphic with no shading.

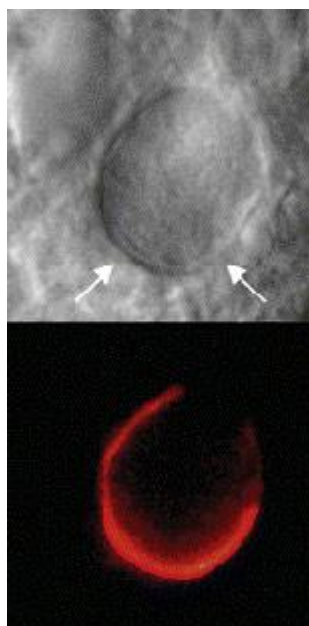
Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.

All lines should be at least 0.1 mm (0.3 pt) wide.

Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.

Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art

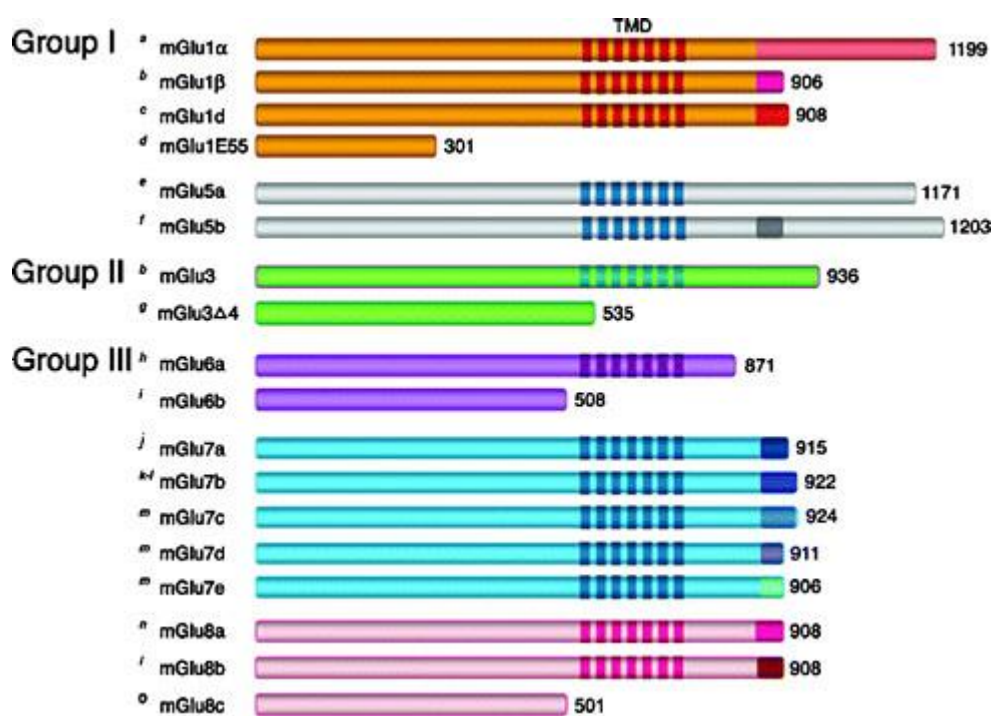


Definition: Photographs, drawings, or paintings with fine shading, etc.

If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.

Halftones should have a minimum resolution of 300 dpi.

Combination Art



Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.

Combination artwork should have a minimum resolution of 600 dpi.

Color Art

Color art is free of charge for online publication.

If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.

If the figures will be printed in black and white, do not refer to color in the captions.

Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering

To add lettering, it is best to use Helvetica or Arial (sans serif fonts).

Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).

Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.

Avoid effects such as shading, outline letters, etc.

Do not include titles or captions within your illustrations.

Figure Numbering

All figures are to be numbered using Arabic numerals.

Figures should always be cited in text in consecutive numerical order.

Figure parts should be denoted by lowercase letters (a, b, c, etc.).

If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text.

Do not number the appendix figures, "A1, A2, A3, etc." Figures in online appendices [Supplementary Information (SI)] should, however, be numbered separately.

Figure Captions

Each figure should have a concise caption describing accurately what the figure depicts. Include the captions in the text file of the manuscript, not in the figure file.

Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.

No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.

Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.

Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

Figure Placement and Size

Figures should be submitted separately from the text, if possible.

When preparing your figures, size figures to fit in the column width.

For large-sized journals the figures should be 84 mm (for double-column text areas), or 174 mm (for single-column text areas) wide and not higher than 234 mm.

For small-sized journals, the figures should be 119 mm wide and not higher than 195 mm.

Permissions

If you include figures that have already been published elsewhere, you must obtain permission from the copyright owner(s) for both the print and online format. Please be aware that some publishers do not grant electronic rights for free and that Springer will not be able to refund any costs that may have occurred to receive these permissions. In such cases, material from other sources should be used.

Accessibility

In order to give people of all abilities and disabilities access to the content of your figures, please make sure that

All figures have descriptive captions (blind users could then use a text-to-speech software or a text-to-Braille hardware)

Patterns are used instead of or in addition to colors for conveying information (colorblind users would then be able to distinguish the visual elements)

Any figure lettering has a contrast ratio of at least 4.5:1

[Back to top](#)

Supplementary Information (SI)

Springer accepts electronic multimedia files (animations, movies, audio, etc.) and other supplementary files to be published online along with an article or a book chapter. This feature can add dimension to the author's article, as certain information cannot be printed or is more convenient in electronic form.

Before submitting research datasets as Supplementary Information, authors should read the journal's Research data policy. We encourage research data to be archived in data repositories wherever possible.

Submission

Supply all supplementary material in standard file formats.

Please include in each file the following information: article title, journal name, author names; affiliation and e-mail address of the corresponding author.

To accommodate user downloads, please keep in mind that larger-sized files may require very long download times and that some users may experience other problems during downloading.

Audio, Video, and Animations

Aspect ratio: 16:9 or 4:3

Maximum file size: 25 GB

Minimum video duration: 1 sec

Supported file formats: avi, wmv, mp4, mov, m2p, mp2, mpg, mpeg, flv, mxf, mts, m4v, 3gp

Text and Presentations

Submit your material in PDF format; .doc or .ppt files are not suitable for long-term viability.

A collection of figures may also be combined in a PDF file.

Spreadsheets

Spreadsheets should be submitted as .csv or .xlsx files (MS Excel).

Specialized Formats

Specialized format such as .pdb (chemical), .wrl (VRML), .nb (Mathematica notebook), and .tex can also be supplied.

Collecting Multiple Files

It is possible to collect multiple files in a .zip or .gz file.

Numbering

If supplying any supplementary material, the text must make specific mention of the material as a citation, similar to that of figures and tables.

Refer to the supplementary files as "Online Resource", e.g., "... as shown in the animation (Online Resource 3)", "... additional data are given in Online Resource 4".

Name the files consecutively, e.g. "ESM_3.mpg", "ESM_4.pdf".

Captions

For each supplementary material, please supply a concise caption describing the content of the file.

Processing of supplementary files

Supplementary Information (SI) will be published as received from the author without any conversion, editing, or reformatting.

Accessibility

In order to give people of all abilities and disabilities access to the content of your supplementary files, please make sure that

The manuscript contains a descriptive caption for each supplementary material

Video files do not contain anything that flashes more than three times per second (so that users prone to seizures caused by such effects are not put at risk)

[Back to top](#)

English Language Editing

For editors and reviewers to accurately assess the work presented in your manuscript you need to ensure the English language is of sufficient quality to be understood. If you need help with writing in English you should consider:

Asking a colleague who is a native English speaker to review your manuscript for clarity.

Visiting the English language tutorial which covers the common mistakes when writing in English.

Using a professional language editing service where editors will improve the English to ensure that your meaning is clear and identify problems that require your review. Two such services are provided by our affiliates Nature Research Editing Service and American Journal Experts. Springer authors are entitled to a 10% discount on their first submission to either of these services, simply follow the links below.

[English language tutorial](#)

[Nature Research Editing Service](#)