Literature Review:

A Systematic Review: Is There a Longitudinal Relationship Between Self-Perceptions of Ageing and Cognition? If so, what is the Direction of this Relationship?

Empirical Paper:

Are Age, Gender and the Interaction of Age and Gender Associated with Older People's Attitudes to Ageing?

Submitted by Alex Carol Brierley, to the University of Exeter as a thesis for the degree of Doctor of Clinical Psychology, March 2022

Signature: 

Author's Declaration

Thesis supervisor was allocated at the end of December 2019, with planning for the thesis commencing in early 2020, coinciding with, and subsequently impacted by, the beginning of the COVID pandemic. Alex Brierley completed the systematic literature review independently. In regards to the empirical paper, data collection was not conducted by Alex Brierley, with secondary data utilised from Laidlaw et al. (2007). The decision to use secondary data was made in recognition that the measures and method of data collection by Laidlaw et al. (2007) were consistent with that planned for the current empirical study, but would provide access to a larger sample size, contributing to a well-powered study and opportunity to include a larger number of relevant covariates, thus strengthening the study design. Additionally, the use of secondary data was considered an effective way to overcome potential pandemic-related barriers in recruitment of participants, given the impact of the pandemic on recruitment was relatively unknown at that point. Alex Brierley was solely responsible for all other components of the empirical paper from both an intellectual and practical perspective. For example, developing the rationale for the study, selection of appropriate covariates based on pre-existing theory and evidence base (though this was modified slightly once access to the database of secondary data was obtained, dependent on variables present in the database) hypothesis generation, data analysis and interpretation of the findings.

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SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

LITERATURE REVIEW

Is There a Longitudinal Relationship Between Self-Perceptions of Ageing and Cognition? If so, what is the Direction of this Relationship?

Trainee Name:	**Alex Carol Brierley**
Primary Research Supervisor:	**Professor Ken Laidlaw** Professor of Clinical Psychology, University of Exeter
Secondary Research Supervisor:	**Dr Nick Moberly** Senior Lecturer, School of Psychology, University of Exeter
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Abstract

Objective: With the increasing number and proportion of people growing into older adulthood, a rise in the prevalence of cognitive impairment in older people has been observed. This review seeks to investigate whether there is a longitudinal relationship between self-perceptions of ageing (SPA) and cognition, and if so, the direction of this relationship.

Method: A systematic review was conducted in accordance with the PRISMA-P checklist. The PsycINFO, Medline, Web of Science, Ageline and PsycEXTRA databases were utilised to identify articles. The quality of the articles was evaluated using the CASP Cohort Study Checklist.

Results: Ten articles met the criteria for inclusion in the review, with one article containing two independent studies, resulting in a total of 11 studies. The articles indicate statistically significant relationships between negative SPA and poorer functioning across multiple cognitive domains, as well as positive SPA and maintained or greater functioning across multiple cognitive domains. Generally, baseline SPA predicted later deterioration or improvement in cognition. However, the evidence indicates that baseline cognition may also be associated with improvements or deterioration in SPA measured at subsequent timepoints.

Conclusions: Despite variation in study length, cognitive functions assessed and inclusion of covariates, there is compelling high-quality evidence indicating longitudinal relationships between SPA and cognition. This could have important implications for identifying individuals at risk of cognitive decline and subsequently implementing preventative interventions aiming to improve SPA and cognition. Further research exploring the association between cognition at baseline and SPA at

subsequent timepoints would be beneficial, as would extending these findings to cross-cultural studies and better understanding the mechanisms underlying these relationships.

Keywords: Self-perceptions of ageing, attitudes to ageing, age-stereotypes, cognition, cognitive functioning, dementia, Alzheimer's disease

1.0 Introduction

1.1 Background

The number and relative proportion of older people in the population is growing globally and is anticipated to continue to increase, albeit at differing paces across the world (United Nations [UN], 2020). The UK's old-age-dependency ratio (the number of people of pensionable age per every 1000 people of working age) is projected to increase from 280 in mid-2020 to 341 in mid-2045 (Office for National Statistics, 2022). The increasing population of older people highlights the importance of better understanding ageing and supporting a healthy ageing process (Tully-Wilson et al., 2021).

Ageing is a dynamic, idiosyncratic process rather than a state (Shenkin et al., 2014), involving contextual and subjective elements. Despite the ageing process being heterogenous, age stereotypes are prominent in western cultures, though they can be positive, neutral or negative (Dionigi, 2015). Negative stereotypes of ageing suggest older age involves incompetence, poor health, dependency and poor physical and mental functioning (Cuddy & Fiske, 2002; Dionigi, 2015), with Barber (2017) highlighting the prevalence of stereotypes regarding cognitive decline in older age.

1.2 Cognition

Cognitive functioning is multi-faceted, comprising multiple cognitive domains (Tucker-Drob et al., 2022). Normal ageing can involve measurable changes in cognition, which can be accompanied by structural and functional brain changes (Murman, 2015). The extent of cognitive deterioration experienced by older people varies from minimal to no cognitive challenges, to the most severe being the

dementias (Luchsinger, 2012). Furthermore, there are multiple types of dementia, each with varying degrees and patterns of cognitive decline (Deary et al., 2009).

A systematic review (Pais et al., 2020) identified that the global prevalence of cognitive impairment (not including any types of dementia) within community-dwelling older adults was 5.1 - 41% with a median of 19%, and warned that the prevalence of cognitive impairment may rise as a result of the increasing older population. This is pertinent given that having a cognitive impairment has been associated with a reduced quality of life (Abrahamson et al., 2012; Bárrios et al., 2013) and increase in neuropsychiatric symptoms (Lyketsos et al., 2002). Additionally, economic costs related to cognitive impairment can be large (Geda, 2012), with Zissimopoulos et al. (2015) estimating that delaying the onset of Alzheimer's disease (AD) by five years could result in 40% lower healthcare costs of AD in 2050. However, this research was conducted in the USA so cost savings may differ within the UK.

Better understanding the role of psychological predictors, such as self-perceptions of ageing (SPA), of cognitive impairment in older age is crucial, to enable identification of individuals at greater risk of cognitive impairment and facilitate the development of interventions (Brown et al., 2021; Pais et al., 2020; Siebert et al., 2018)

1.3 Self-Perceptions of Ageing (SPA)

Attitudes to ageing have been used to conceptualise and measure aspects of ageing. A well adopted definition of attitudes to ageing proposed by Eagly and Chaiken (1993) is that an attitude is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p. 1). This

includes affective, behavioural and cognitive elements (Eagly & Chaiken, 2007). Attitudes to ageing are, therefore, individualised and idiosyncratic. Throughout the literature, SPA and attitudes to ageing operate around very similar bases of definition and may approximate to a description of similar, if not identical, psychological constructs around the phenomenology of ageing, with SPA defined as an evaluation of one's own ageing process, comprising thoughts, beliefs and expectations about the ageing experience (Boeder & Dwight, 2021; Robertson et al., 2016; Tully-Wilson et al., 2021). It is evident that the literature lacks a clear distinction between attitudes to ageing and SPA, suggesting that perhaps the two terms could be used interchangeably. It is noted that studies exploring SPA encompass a range of constructs and terms, including attitudes to ageing (Tully-Wilson et al., 2021; Warmoth et al., 2016; Yao et al., 2021), supporting the suggestion that these are two terms used to describe one construct. For the purpose of the current review, the term SPA will be adopted throughout. SPA can be influenced by the internalisation of attitudes and stereotypes regarding ageing held by society (Tully-Wilson et al., 2021). SPA may not necessarily correspond with a person's chronological age, with SPA and chronological age possibly predicting different outcomes.

Stereotype embodiment theory (SET; Levy, 2009) is a theory of stereotypical attitudes towards ageing and older people that can be useful in elucidating links between SPA and health-related outcomes and behaviour. SET is a dominant theory cited throughout the evidence base to attempt to explain these relationships, with a noticeable dearth of competing theories. Levy (2009) suggests that individuals are exposed to age stereotypes from an early age and that the content of age stereotypes become internalised into self-concepts as we age, resulting in individuals behaving in accordance with the stereotype.

Three potential pathways have been suggested (Levy, 2009). First, the physiological pathway, whereby negative age stereotypes contribute to a heightened physiological stress response (Levy et al., 2000), which over time could alter the structure and function of the brain (Bremner, 1999). Second, the behavioural pathway, whereby positive ageing attitudes can predict engagement in preventative health behaviours (Levy & Myers, 2004). Third, the psychological pathway, in which stereotypes become self-fulfilling prophecies. Whilst SET enables the role of stereotypes to be investigated from a lifetime developmental process (Sun, 2017), it has been criticised for lacking clarity regarding the processes involved (Fawsitt & Setti, 2017). Furthermore, the data used to support the existence of SET is difficult to falsify because of the extensive use of subliminal cues and primes and especially so as Levy (2009) suggests SET operates outside one's conscious awareness.

1.3.1 SPA and Health Related Outcomes

SPA are linked to a broad range of health-related outcomes. Based on a sample of 550 Turkish older people, Top et al. (2013) found that two of the three domains of the Attitudes to Ageing Questionnaire (AAQ; Laidlaw et al., 2007), physical change and psychological growth, were significantly correlated with quality of life. A study of 1170 American adults indicated that negative SPA predicted reduced life satisfaction over 10 years (Mock & Eibach, 2011), though a robust and standardised measure of SPA was not utilised. A study spanning five continents concluded that, as depression intensity increases, SPA (as measured by the AAQ) becomes more negative (Chachamovich et al., 2008). Inference of causality, however, could not be inferred given the cross-sectional design. Furthermore, the study did not control for variables such as physical health and life stressors, which could contribute to depression and SPA.

A 23-year longitudinal study of 660 people aged 50 years and older reported that, compared to those with negative SPA, those with positive SPA lived on average 7.5 years longer (Levy et al., 2002). Although this study included functional health as a covariate at baseline, it did not control for physical health difficulties developed during the study. Similarly, endorsing negative age stereotypes as an older person was associated with a 50% greater chance of hospitalisation (Levy et al., 2015). This study, however, did not control well for physical health related covariates. The studies discussed indicate an important role of SPA in health-related outcomes.

1.3.2 SPA and Cognition

An evidence base has emerged identifying associations between SPA and a specific health-related outcome: cognitive functioning (Tully-Wilson et al., 2021; Warmoth et al., 2016), which could possibly be explained by SET. Meta-analyses of a combined 24 studies reported that priming older people with positive age stereotypes improved memory performance, whilst priming of negative age stereotypes had an adverse effect on memory performance, with small to moderate overall effect sizes (Horton et al., 2008; Meisner, 2012). Although experimental manipulation of age stereotype was helpful in determining causal relationships, it is important to understand if this relationship is maintained for age stereotypes developed via natural mechanisms e.g., socialisation over the lifetime.

This was addressed by several cross-sectional studies that yielded similar results. Levy and Langer (1994) identified that more positive views on ageing were associated with better performance on a memory task. Furthermore, performance on the memory task was poorer if the older person had been culturally or socially exposed to negative age stereotypes than if they had not. Based on a sample of 94 healthy, community-dwelling older people aged 59 - 90, Brand (2002) concluded that

positive age beliefs significantly predicted improved recall memory. Brown et al. (2021) broadened the cognitive abilities investigated, determining that older people's endorsement of the negative SPA subscales of the Brief Ageing Perceptions Questionnaire (B-APQ; Sexton et al., 2014) did not contribute to cognitive performance, whereas endorsement of the positive B-APQ subscales was significantly associated with improved executive function, processing speed and short-term memory. This sample comprised highly educated older people, posing challenges generalising the results.

Furthermore, Kisvetrová et al. (2021) measured attitudes to ageing using the AAQ in 563 Czech community-dwelling older people with and without dementia, concluding that those without dementia reported significantly less negative attitudes to ageing than those with dementia, in terms of the psychosocial loss, physical changes and psychological growth domains of the AAQ. Kisvetrová et al. (2021), however, did not control for finances and health, despite recognising these can influence attitudes to ageing. Intriguingly, Trigg et al. (2021) found, based on a survey of 56 British older people using the AAQ, that dementia was not associated with negative attitudes relating to physical changes and psychological growth, but was associated with increased psychosocial loss, suggesting individuals may recognise a differential effect of cognition on SPA. Whilst the differing results of Kisvetrová et al. (2021) and Trigg et al. (2021) may reflect cross-cultural differences, the large difference in sample size will have influenced the studies' relative power to detect small effects.

In summary, there is compelling evidence for a cross-sectional relationship between SPA and cognition. However, it is important to understand whether these relationships are maintained over time.

1.4 Aims of the Review

This systematic review aims to answer the questions ‘what is the longitudinal relationship between SPA and cognition?’ and ‘what is the direction of this relationship?’ The current review builds on previous systematic reviews conducted by Tully-Wilson et al. (2021) and Warmoth et al. (2016) who explored the relationship between SPA and a range of health-related outcomes, with one health related outcome being cognition. Both concluded that, compared to negative SPA, positive SPA was associated with better cognitive functioning. Both studies’ conclusions were based upon a small number of studies (four and three) and were limited to exploration of unidirectional relationships (SPA as the independent/predictor variable and cognition as the dependent/outcome variable). Furthermore, Tully-Wilson et al. (2021) restricted the inclusion of articles to those that used one particular measure of SPA and Warmoth et al. (2016) only included cross-sectional designs, thus limiting the findings.

The current review intends to build on the previous systematic reviews by exploring a larger number of studies investigating both unidirectional and bidirectional relationships, with these longitudinal in design to enable inference of long-term relationships and prediction of change over time. Additionally, the inclusion of studies will not be restricted to one measure of SPA but a range of standardised SPA measures.

2.0 Method

The current systematic review was conducted in accordance with the Preferred Reporting Items for Systematic reviews and Meta Analyses Protocol (PRISMA-P) checklist (Page et al., 2021).

2.1 Eligibility Criteria

Studies were included in the review if they were longitudinal quantitative designs, using standardised measures to investigate the relationship between SPA and objectively assessed cognition (e.g., standardised, psychometric assessments, formal diagnoses, structural brain changes, etc.). Studies that solely included measures of subjective cognition were not included, as this was not able to be assessed using standardised measures. Additionally, studies that experimentally manipulated SPA or cognition were not included, as this study was interested in one's own SPA. Studies were excluded if SPA or cognition were included solely as a covariate, mediator or moderators of a relationship between SPA or cognition and a different variable. Table 1.1 outlines the PECOS criteria utilised in this review.

Table 1.1

PECOS Inclusion and Exclusion of Systematic Review

	Inclusion	Exclusion
Population	• Human participants with a mean sample age of 60 years or above at one or more assessment timepoint	
Exposure	• Used a standardised or psychometric measure to assess SPA	
Comparison	• Any or no comparison group	
Outcome	• Used a standardised or psychometric measure to assess objective cognition, mild cognitive impairment (MCI) or dementia *or* a formal diagnosis of MCI or dementia *or* identification of structural brain changes	• Subjective cognition assessed (i.e., subjective cognitive complaints) instead of objective cognition
Study Design	• Longitudinal • Quantitative analysis • Included either SPA as the predictor/exposure and cognition as the outcome or vice versa	• SPA or cognition were experimentally manipulated • SPA or cognition included solely as a covariate, mediator or moderator of a relationship between SPA or cognition and a different variable • Qualitative analysis • Full text article not published in English • Full text article not available • Empirical reviews not reporting original experimental data, single case designs, book chapters, governmental reports or conference proceedings

2.2 Information Sources

A computerised search of four subject specific and multidisciplinary databases was conducted in November 2021 to identify relevant articles: PsycINFO, Medline, Web of Science and Ageline. In acknowledgement that a bias may exist in published

literature (Quintana, 2015), grey literature was also sought via the PsycEXTRA database.

2.3 Search Strategy

The search terms (Table 1.2) were informed by scoping searches (see Appendix A for search term scoping searches). Concepts one and two were combined using the Boolean operator “AND”. Variations in truncations and wildcards were adopted to correspond with each database. The search strategy for each database can be found in Appendix B. For concept one, phrase searching rather than key word searching was utilised to improve the precision of the search.

Table 1.2

Search Terms for Systematic Review for Ovid Databases

Concept	Search Terms
1	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception*
2	Dementia OR alzheimer’s OR cognition OR cognitive

The titles and abstracts of all identified articles were screened by the researcher to check articles met the PECOS criteria of the review. The researcher then screened the relevant articles at the full text stage to confirm eligibility for inclusion.

2.4 Quality Appraisal Tool

The commonly used and recommended (Mamikutty et al., 2021) Critical Appraisal Skills Programme (CASP) Cohort Study Checklist (CASP, 2019) was utilised to assess the quality of all articles included in the systematic review. The items comprising the tool were considered more relevant to the longitudinal articles in question in comparison to other cohort evaluation tools that contained an extensive proportion of items on exposure.

The CASP was adapted in accordance with Cesario et al. (2006), Smith (2011) and Tak et al. (2017) to yield an overall quality rating (see Appendix C for adapted CASP). Each of the 14 items were rated and assigned the corresponding value of ‘not addressed’ (0), ‘partially addressed’ (1) or ‘well addressed’ (2), except for item 6b where response options were ‘<1 year’ (0), ‘1 – 6 years’ (1) or ‘>6 years’ (2). Studies that achieved 75 – 100% of the maximum total score were deemed to have a low risk of bias; 50 – 74% of the maximum total score was considered a moderate risk of bias; and 0 – 49% of the total maximum score was considered a high risk of bias.

2.5 Inter-Rater Reliability Checks

The researcher’s primary supervisor screened a random selection of six articles at the full text stage using the PECOS criteria. The researcher and primary supervisor had 100% agreement on the inclusion and exclusion decision of those six studies (see Appendix D for summary of inter-rater check).

The researcher and primary supervisor independently evaluated the methodological rigour and quality of three studies included in the review using the CASP cohort study checklist and inter-rater reliability was calculated (k = .63). The

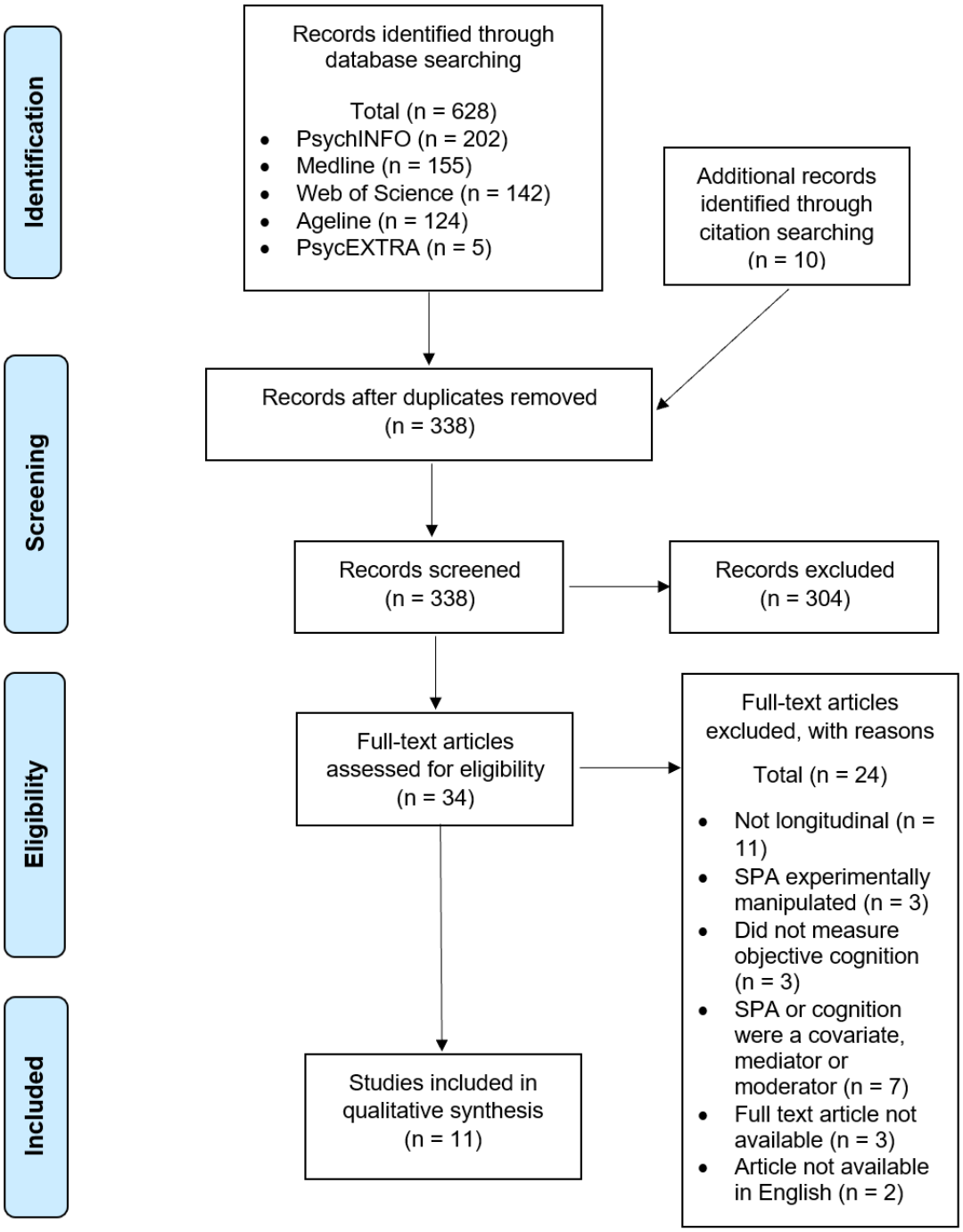
difference in scores were attributed to item 6a across all three articles and differences were resolved via discussion.

3.0 Results

A total of 638 articles were initially identified. Following deletion of duplications, 338 titles and abstracts were screened, with 34 of these proceeding to full text screening. A total of 11 studies (all prospective cohort longitudinal studies) met eligibility criteria for the current review, of which eight were identified via the literature search and three via citation searching. Please note that two independent studies were published within one article (Levy et al. 2016). Please see Figure 1.1 for the corresponding PRISMA flow diagram (Liberati et al., 2009). Table 2.1 provides a summary of each study included in the current review and their findings. Table 2.2 provides a description of included study strengths, limitations and methodological quality rating.

Figure 1.1

PRISMA Flow Diagram of Article Search



Note. Five articles did not meet multiple inclusion/exclusion criteria. The total number of studies included is 11, whilst the total number of articles included is 10, due to one article containing two independent studies.

Table 2.1

Summary Table for Included Studies

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
1 - Levy et al. (2011)	USA	To determine whether negative age stereotypes predict memory over time and whether this potential relationship is influenced by the self-relevance of negative age stereotypes	395 participants (28.61% female) from the 38-year BLSA cohort, aged 22-77(*M* = 45) years at baseline. A reduced sample of 87 participants (31.03% female) aged 40-74 (*M* = 53) at baseline was used to test study's second hypothesis	Total follow up = 38 years. Measurement points varied, see 'measures' column	16-item age stereotype subscale derived from negative items on the ATOP scale. Measure completed by participants on one occasion between 1968 and 1980	BVRT to measure visual perception and visual memory. Administered regularly over the 38 years study, every 6 years from 1968 to 1991 and then every 2 years for the remainder of the study	Individual growth models indicated participants with more negative age stereotypes reported poorer visual memory over time than those with less negative age stereotypes (t = 2.01, p = .04, d = 2.00)[a]. This disparity increased with age, with a 30.2% greater decline in memory for those aged 60 and above in the negative compared to positive age stereotypes group. Self-relevance of stereotype moderated the relationship between age stereotypes and memory over time, with memory decline greater for participants holding self-relevant stereotypes compared to not self-relevant (t = 3.70, p = .0002, d = 3.70)[a]
2 - Levy et al. (2016). Referred to as study 1 in Levy et al. (2016)	USA	To investigate whether endorsement of negative age stereotypes was associated with loss of hippocampal volume over time	52 participants from the BLSA cohort (31% female), *M* age of 68.54 at the time of the first MRI	Total follow up = 25.08 years; study 2, 28.49 years. Measurement points varied, see 'measures' column	16-item age stereotype subscale derived from negative items on the ATOP scale, administered from 1968	MRI to assess hippocampal volume. MRIs conducted annually for up to 10 years. On average, MRI scans occurred 25.08 years after ATOP administered	A linear mixed-effects regression model indicated that participants who held more negative age stereotypes had a significantly steeper decline in hippocampal volume over time (F = 6.24, p =.007, d =.29)[a], with the model adjusting for age, sex, education, self-rated health, well-being, number of chronic conditions and intracranial volume. The rate of hippocampal volume decline in the negative age stereotype group was three times that of the positive age stereotype group

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
3 - Levy et al. (2016). Referred to as study 2 in Levy et al. (2016)	USA	To investigate whether endorsement of negative age stereotypes was associated with composite Alzheimer's disease pathology scores	74 BLSA participants (26% female) who had joined the brain autopsy program. *M* final age of cohort was 88.75	Total follow up = 28.49 years. Measurement points varied, see 'measures' column	16-item age stereotype subscale derived from negative items on the ATOP scale, administered from 1968	Composite-Alzheimer's disease pathology score to quantify the combined effects of amyloid plaques and neurofibrillary tangles in relation to cognitive impairment	A generalised linear model indicated, compared to participants who held positive age stereotypes, those who held negative age stereotypes had significantly higher composite Alzheimer's-disease pathology scores (t=1.71, p=.046), with the model adjusting for age, sex, education, self-rated health, well-being, and number of chronic conditions
4 - Levy et al. (2018)	USA	Examined whether positive age beliefs protect against the development of dementia, including within APOE ε4 carriers	4765 participants from the HRS, average age 72 years	Total follow up = 4 years. T1 – 2008 or 2010 T2 – 2 years after T1 T3 – 4 years after T1	Five-item ATOA subscale of the PGCMS. Administered at T1	TICS to assess dementia, administered at T2 and T3	A prospective logistic regression model indicated that positive age beliefs at baseline protected participants from developing dementia for the duration of the study in the total sample (RR = .81, p = .03) and among participants who were APOE ε4 carriers (RR = .69, p = .018). Participants holding positive age beliefs at baseline had a 43.6% lower risk of developing dementia over 4 years, increasing to 49.8% for APOE ε4 carriers, compared to those holding negative age beliefs at baseline. A significant difference was not identified for dementia incidence between those who held positive age beliefs in the non APOE carrier group and those in the APOE ε4 carrier group ($\chi 2$ = .33, p = .57)
5 - Levy et al. (2020)	USA	To explore the effect of positive age beliefs, the APOE ε2 gene and the interaction of these on cognition	3895 participants (50.17% female) from the HRS aged 60-97 (*M* = 71.07) years at	Total follow up = 8 years. T1 – 2008 or 2010 Date of remaining timepoints not specified	Five-item ATOA subscale of the PGCMS, administered at T1	TICS-m administered every two years for a total of 8 years to assess dementia	Repeated measures ANOVA indicated positive age beliefs (F = 122.68, p < .001, η_p^2 = .007) [a] and APOE ε2 (F = 7.87, p = .005, η_p^2 = .0005) [a] significantly predicted better cognition, as did the interaction of positive age beliefs and APOE ε2 (F = 7.74, p = .005, η_p^2 = .0005) [a]. Contrasts

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
			baseline. Participants divided into APOE ε2 carriers and non APOE ε2 carriers				indicated the difference between the APOE ε2 carriers and non-APOE ε2 carriers was significantly greater for participants with positive age beliefs than participants with negative age beliefs (t = 2.78, p = .005). No significant advantage of APOE ε2 was identified among those with negative age beliefs (t = .04, p = .97), but a significant advantage of APOE ε2 was identified among those with positive age beliefs (t = 3.95, p < .001)
6 - Robertson et al. (2016)	Republic of Ireland	To investigate which elements of SPA (i.e., positive and negative) predict cognitive function over time	5896 participants (54.65% female) from the TILDA cohort. *M* age of the sample at baseline was 63.17 years	Total follow up = 1-3 years T1 - 2009-2011 T2 - 2012	B-APQ, administered at T1 and T2	Animal naming task to assess verbal fluency, 10-word list recall to assess immediate and delayed memory. Prospective memory assessed via asking participants to remember to write their initials when handed a pen and to remember to ask the examiner to record the time at the end of the session. Administered at T2, unclear if administered at T1	Linear regression analyses indicated the positive control subscale of the B-APQ at T1 was significantly associated with higher verbal fluency scores at T2 (η_p^2= .002, p <.01) [a]. The negative control and consequences subscale of the B-APQ at T1 was significantly associated with poorer verbal fluency scores at T2 (η_p^2= .005, p <.001)[a]. Linear regression analyses indicated an absence of statistically significant associations between B-APQ subscale scores and immediate and delayed memory. Analyses were not conducted to explore the longitudinal relationship between B-APQ subscale scores and prospective memory, as significant relationships were not identified cross-sectionally.
7 - Seidler & Wolff (2017)	Germany	To understand the direction and strength of effects between two domains of SPA (personal growth and physical losses) as	8198 participants (49.44% female) from the DEAS cohort *M* age of 62.56 years at T1.	Total follow up = 3 years T1 – 2008 T2 - 2011	AgeCog-Scales, administered at T1 and T2	Digit symbol substitution test to assess processing speed, administered at T1 and T2	Unconstrained path analyses indicated a significant effect of PS at T1 on personal growth at T2 (b (SE) = 0.03 (0.02), p = .09) and vice versa (b (SE) = 0.03 (0.02), p = .07). A significant effect of physical losses at T1 on PS at T2 was identified (b (SE) = –0.03 (.02), p = .05) but the effect of PS at T1 on

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
		assessed by the AgeCog-Scales on processing speed	51% participants reassessed at T2				physical losses at T2 was not significant (b (SE) = –0.02 (.02), p = .31). The cross-lagged paths of personal growth and physical losses on PS and vice versa could be set equal without a significant loss of model fit, suggesting significant bidirectional relationships
8 - Shenkin et al. (2014)	UK	To explore which life course factors predict differences in attitudes to ageing	792 participants from the LBC1936 cohort, who were also part of the original SMS1947 cohort	Total follow up = 62 years T1 – 11 years old T2 – approximately 70 years old T3 – approximately 73 years old	AAQ, administered within three years of completing T3	At T1 the MHT was administered. At T2 and T3 a battery of assessments was administered that included: six WAIS-III subtests (letter-number sequencing, digit span backwards, matrix reasoning, block design, digit symbol coding and symbol search), to assess general fluid-type cognitive ability; MMSE, to assess global cognitive function; MHT, to assess general intelligence; and NART, to assess peak prior cognitive ability.	Statistically significant univariate associations between lower *g* at age 70 and higher psychosocial loss (*r* = -.13, p <.001) [a] and negatively valenced attitudes related to the physical changes of ageing (*r* =.127, p<.001) [a]. Lower NART at age 70 was statistically significantly associated with higher psychological growth (*r* = -.175, p<.01) [a]. In the multivariable analyses, the only cognitive factor statistically contributing to attitudes to ageing is NART, with lower NART at age 70 predicting higher psychological growth
9 - Siebert et al. (2018a)	Germany	To investigate the relationship between ATOA and expert diagnoses of MCI and AD in older age. The study	260 participants from the ILSE cohort study born 1930-1932	Total follow up = 12 years T1 - 1993-1994 T2 - 1997-1998 T3 - 2005-2006	Five-item ATOA subscale of the PGCMS, administered at T1, T2 and T3	A neuropsychological test battery was conducted at T1, T2 and T3, comprising: tasks on memory, abstract thinking,	Logistic regression analyses indicated ATOA at T1 significantly predicted cognitive status at T3 (B = .209, p <.05; OR = 1.27), when controlling for gender, education, initial subjective and objective health, and APOE genotype.

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
		also investigated whether this relationship was medicated by leisure activity engagement and control beliefs (both internal and external)				spatial orientation, verbal fluency and attention	A 1 *SD* increase in ATOA at T1 was associated with a 31% higher risk of MCI–AD diagnosis at T3. Leisure activity and control beliefs were found not be to be significant mediators of this relationship. Change in ATOA over time did not significantly predict cognitive disorder. Significant mediation effects of leisure activity and control beliefs were not identified
10 - Siebert et al. (2018b)	Germany	To determine whether ATOA predict changes in crystallised and fluid abilities, plus investigate the potential moderating role of gender	352 participants from the ILSE cohort study born 1930-1932	Total follow up = 12 years T1 - 1993-1994 T2 - 1997-1998 T3 - 2005-2006	Five-item ATOA subscale of the PGCMS, administered at T1, T2 and T3	Digit symbol, block design and digit span subtests of the WAIS-R to assess fluid abilities. Information, similarities and picture completing subtests of the WAIS-R to assess crystallised abilities. Conducted at T1, T2 and T3	LCS modelling indicated that ATOA at T1 did not significantly predict crystallised ability at T3 ($\beta = .10$, $p = .47$). However, more positive ATOA at T1 were associated with significantly less decline in fluid abilities at T3 ($\beta = .29$, $p < .05$), though this relationship became insignificant when education and objective health were included as covariates ($\beta = .28$, $p = .08$). When the model was fitted separately by gender, the significant relationship between ATOA and fluid abilities held for males only ($\beta = .63$, $p < .001$). Statistically significant change scores between T1 and T2 were not identified (no statistics reported)
11 - Siebert et al. (2020)	Germany	To investigate the reciprocal relationship between ATOA and cognitive functioning in older people and middle-aged people	152 older people (*M* age at baseline = 62.5 [*SD* not reported]) from the ILSE cohort. An additional control sample of	Total follow up = 20 years T1 – 1993-1994 T2 - 1997-1998 T3 - 2005-2006 T4 – 2014-2016	Five-item ATOA subscale of the PGCMS, administered at T1, T3 and T4	Digit symbol and digit span tests to assess processing speed and working memory. Block design test to assess perceptual reasoning. Administered at T1, T2, T3 and T4	Multigroup latent growth curve modelling indicated that more negative ATOA at T1 was significantly associated with a steeper decline in cognitive ability at T4 for the older people sample ($\beta = .24$, $p = .04$) but not midlife sample ($\beta = .34$, $p = .08$). However, ATOA did not predict cognitive decline in the older people sample when depressive affect at T4 was controlled for ($\beta = .30$, $p = .183$). Objective cognitive ability at T1 was

Study	Country of Study	Study Aim	Sample	Measurement Timepoints	Measures		Summary of Findings
					SPA	Cognition	
			293 middle aged people (*M* age at baseline = 43.7 [*SD* = .92]) from the ILSE cohort. Age ranges not reported				not significantly associated with change trajectories of ATOA.

Note. AAQ – Attitudes to Ageing Questionnaire, AD – Alzheimer's Disease, APOE - Apolipoprotein E, APOE ε2 – APOE ε2 allele, APOE ε4 - APOE ε4 allele, ATOA – Attitudes Towards Own Ageing, ATOP - Attitudes Toward Old People, B-APQ – Brief Ageing Perceptions Questionnaire, BLSA - Baltimore Longitudinal Study of Ageing, BVRT - Benton Visual Retention Test, DEAS - German Ageing Survey, *g* – general fluid-type cognitive ability, HRS - The Health and Retirement Study, ILSE - Interdisciplinary Longitudinal Study of Adult Development and Ageing, LBC1936 – Lothian Birth Cohort of 1936, LCS – latent change score, *M* – mean, MCI – Mild Cognitive Impairment, MCI-AD – Mild Cognitive Impairment-Alzheimer's Disease, MHT – Moray House Test No. 12, MMSE – Mini Mental State Examination, MRI – magnetic resonance imaging, NART – National Adult Reading Test, OR – odds ratio, PC – prospective cohort, PGCMS - Philadelphia Geriatric Center Morale Scale, PS – processing speed, RR – relative risk, *SD* – standard deviation, SMS1947 - Scottish Mental Survey of 1947, T1 – Timepoint 1, T2 – Timepoint 2, T3 – Timepoint 3, T4 – Timepoint 4, TICS - Telephone Interview for Cognitive Status, TICS-m - HRS abbreviated version of the Telephone Interview for Cognitive Status, TILDA – Irish Longitudinal Study on Ageing, WAIS-III - Wechsler Adult Intelligence Scale-III

[a] Cohen's (1992) effect sizes. *d:* small = .2 medium = .5, large = .8. *r*: small = .1 medium = .3, large = .5. η_p^2: small = .01 medium = 06, large = .14

Table 2.2

Studies' Findings, Strengths, Limitations and CASP Quality Rating

Study	Strengths	Limitations	CASP Scores													
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
1	Large sample size (*n* = 395 & 867) Predictor and outcome variables accurately measured using robust tools Practice effects minimised by using different but equivalent BVRT stimuli Low attrition rate for reasons other than death (6%) Included a large range of covariates (age, depression, education, marital status, number of chronic conditions, race, self-rated health and sex) Long follow up (38 years) Reports effect sizes	Whole sample is community-dwelling, which may limit generalisability to the general population Does not report full attrition data, as only lists attrition for reasons other than death Assessment of memory limited to visual memory, but this not made clear	2	2	2	2	2	2	1	2	2	2	2	2	2	1	Low risk of bias (92.86%)

Study	Strengths	Limitations	CASP Scores														
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
2	Predictor and outcome variables accurately measured using robust tools/methods Included a large range of covariates (age, sex, and education, health at time of baseline-age-stereotype assessment, neuroticism, cognitive performance and intracranial volume) Long follow up (25 years) Reports effect sizes	Whole sample is community-dwelling, which may limit generalisability to the general population Relatively small size (*n* = 52), although study was still sufficiently powered Does not report attrition	2	2	2	2	2	2	1	2	2	2	2	2	2	2	Low risk of bias (96.43%)
3	Predictor and outcome variables accurately measured using robust tools/methods Included a large range of covariates (age, sex, and education, health at time of baseline-age-stereotype assessment, neuroticism and cognitive performance) Long follow up (28 years) Brain autopsy investigators unaware of participant's SPA	Whole sample is community-dwelling, which may limit generalisability to the general population Relatively small size (*n* = 74), although study was still sufficiently powered Does not report attrition	2	2	2	2	2	2	1	2	2	2	2	2	2	2	Low risk of bias (96.43%)

Study	Strengths	Limitations	CASP Scores													
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	Reports effect sizes																
4	Large sample size (*n* = 4765) Predictor and outcome variables accurately measured using robust tools Researchers developed similar but parallel stimuli to minimise practice effects Large range of covariates included in final analysis (age, education, sex, race, cardiovascular disease, diabetes, APOE ε4 status and baseline cognitive performance) Reports RR	Whole sample is community-dwelling, which may limit generalisability to the general population Does not report attrition Fairly short follow up (4 years)	2	2	2	2	2	2	1	1	2	2	2	2	2	2	Low risk of bias (92.86%)
5	Large sample size (*n* = 3895), even distribution of males and females Used parallel but different stimuli at each wave when assessing cognition to attempt to reduce practice effects	Whole sample is community-dwelling, which may limit generalisability to the general population Selective drop out of participants over time	2	2	2	2	1	2	1	2	2	2	2	2	2	2	Low risk of bias (92.86%)

Study	Strengths	Limitations	CASP Scores														
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	Included a broad range of covariates (age, gender, race, marital status, baseline cognition, smoking history, depression, cardiovascular disease and diabetes) Predictor and outcome variables accurately measured using robust tools Long follow up (8 years) Effect sizes reported	may limit generalisability															
6	Participants recruited via cluster of addresses Large sample size (*n* = 5896), roughly half female Predictor and outcome variables accurately measured using robust tools Participants and interviewers were blind to study predictions Controlled for a broad range of covariates (age, gender, employment,	Whole sample is community-dwelling, which may limit generalisability to the general population Selective drop out of participants over time may limit generalisability The score awarded for the prospective memory task did not differentiate between participants who completed one or both tasks correctly	2	2	2	2	2	2	2	1	2	2	2	2	2	2	Low risk of bias (96.43%)

Study	Strengths	Limitations	CASP Scores													
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	education, employment status, marital status, a number of chronic health conditions, medication, difficulties with ADLs, loneliness, depression, self-rated health) and for changes in these between waves Low attrition rate of 14%. Attrition weights applied to analysis Effect sizes reported	Specific length of follow up unclear (1-3 years). A relatively short follow up															
7	Explored bidirectional relationships between SPA and cognition Large sample size (*n* = 8198), representative of population, randomly invited to partake in study, roughly half of sample were female Large age range of sample (40 – 93 years) Controlled for age, sex, education, place of residence and number of illnesses diagnosed by a doctor	Whole sample is community-dwelling, which may limit generalisability to the general population Three year follow up potentially too short for effects to present, fairly short follow up Attrition (49% lost to follow up) Selective drop out of participants over time may limit generalisability	2	2	2	2	1	2	2	1	2	2	2	2	2	2	Low risk of bias (92.86%)

Study	Strengths	Limitations	CASP Scores														
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	Predictor and outcome variables accurately measured using robust tools Effect sizes reported FIML estimation used to minimize potential attrition effects	Did not control for variables such as race, marital status, employment and subjective health Same assessment of PS used at each time point, increasing risk of practice effects. Only one measure of PS utilised															
8	Explored an alternate direction of relationship than the majority of previous studies Large sample size (*n* = 792) High response rate (95.3% when inviting to partake in study) No significant differences between those who did and did not engage in final stage of study Controlled for education, employment, living arrangements, childhood circumstances, social class, child deprivation, adult deprivation and	Whole sample is community-dwelling, which may limit generalisability to the general population Timeframe from cognitive testing at approximately 73 years old and AAQ completion varied (up to three years) Not stated how incomplete outcome variable was managed	2	2	2	2	2	2	1	2	2	2	2	2	2	2	Low risk of bias (96.43%)

Study	Strengths	Limitations	CASP Scores														
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	some measures of physical health Long follow up (62 years) Included univariate and multivariate analyses																
9	Participants recruited following random invitation Predictor and outcome variables accurately measured using robust tools or procedures (at least two specialists involved in diagnosis) Included healthy controls Controlled for gender, education, health at baseline and genetic predisposition OR reported Long follow up (12 years)	Whole sample is community-dwelling, which may limit generalisability to the general population Relatively small sample size (*n* = 260). Study may be underpowered to detect mediation effects Did not control for variables such as age, race, marital status, employment, SES Participants with MCI and AD were clustered, thus unclear if effects still hold for AD independently	2	2	2	2	1	2	2	2	2	2	2	2	2	2	Low risk of bias (96.43%)
10	Large sample (*n* = 352)	Whole sample is community-dwelling, which may limit	2	2	2	2	2	2	2	2	2	2	2	2	2	1	Low risk of bias (96.43%)

Study	Strengths	Limitations	CASP Scores														
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	Participants recruited following random invitation Predictor and outcome variables accurately measured using robust tools Controlled for education and objective health Inclusion of gender as a moderator Long follow up (12 years) To ensure findings did not result from systematic attrition, used estimation procedures and re-ran analyses	generalisability to the general population Demographic information of sample not reported Did not control for variables such as race, marital status, depression, SES status and subjective health Selective drop out of participants over time may limit generalisability															
11	Large sample size (*n* = 445) Participants recruited following random invitation Predictor and outcome variables accurately measured using robust tools Controlled for education, gender, objective health and depression	Whole sample is community-dwelling, which may limit generalisability to the general population Did not control for variables such as race, marital status, age, subjective health, SES, employment	2	2	2	2	1	2	1	2	2	2	2	2	2	2	Low risk of bias (92.86%)

Study	Strengths	Limitations	CASP Scores													
			1	2	3	4	5a	5b	6a	6b	7	8	9	10	11	12	Overall
	Compares two age groups Long follow up (20 years) Retained a strong response rate given the study length Indicated direction of effect of relationship between SPA and cognition	Selective drop out of participants over time may limit generalisability Difficulties establishing measurement invariance between the two groups reported															

Note. AAQ – Attitudes to Ageing Questionnaire, AD – Alzheimer's disease, ADLs – activities of daily living, APOE ε2 - Apolipoprotein E allele ε2, APOE ε4 - Apolipoprotein E allele ε4, BVRT - Benton Visual Retention Test, FIML - full information maximum likelihood, MCI – Mild Cognitive Impairment, OR – odds ratio, PS – processing speed, SES – socioeconomic status, SPA – self-perceptions of ageing

3.1 Participants

The 11 longitudinal cohort studies in this review comprised 25,211 participants. It is possible that some participants' data were analysed in multiple studies that all utilised the BLSA, HRS and ILSE cohorts. Based on the five studies that reported the breakdown of participants by gender (1, 2, 5, 6 & 7), 50.57% were female. Studies 3 and 8 did not report mean age at baseline. Of the remaining studies, the mean baseline age of participants was 54.15 (*SD* = 4.71) with range 43.70 - 71.07. All studies recruited community-dwelling individuals.

3.2 Study Length

Study length ranged from one to three years (study 6) to approximately 62 years (study 8), with a median of 16 years. Testing intervals ranged from one year (studies 2 & 6) to 59 years (study 8).

3.3 Measuring SPA and Cognition

Eight studies (1, 2, 3, 4, 5, 6, 9 & 10) included SPA as a predictor and cognition as an outcome/dependent variable, studies 7 and 11 used SPA and cognition simultaneously as predictors and outcomes/dependent variables and study 8 included cognition as a predictor and SPA as an outcome/dependent variable. Five of the studies (6, 7, 9, 10 & 11) measured SPA on multiple occasions. Five different measures were utilised to assess SPA, though these were not originally designed as indices of SPA, but as indices of ageing perceptions and attitudes to ageing. The most common measure was the Attitude Towards Own Ageing (ATOA) subscale of the Philadelphia Geriatric Center Morale Scale (PGMS; Lawton, 1975), used by five studies (4, 5, 9, 10 & 11).

All studies except 3 (and possibly 6) measured cognition at multiple timepoints, with testing intervals ranging from 1 – 62 years. A variety of cognitive assessments were used, though several studies (7-11) drew on subtests of the WAIS-R (Weschler, 1981). One study (8) assessed global cognitive function and two studies (2 & 3) assessed biomarkers of Alzheimer's type dementia. The remaining studies assessed specific cognitive domains, which included: memory, mathematical skills, verbal fluency, processing speed, abstract thinking, spatial skills, attention, perceptual reasoning and visual perception. Memory was the most commonly assessed cognitive function and was included in seven studies. There was little overlap between studies regarding the remaining cognitive functions assessed.

4.0 Critical Summary

4.1 Negative SPA and Cognition

Seven studies (1, 2, 3, 6, 7, 8, 9 & 11) investigated the relationship between negative SPA and cognitive functioning, all finding a relationship between negative SPA and poorer functioning across multiple cognitive domains.

Endorsing negative SPA at baseline was statistically significantly associated with change in later cognitive functioning at subsequent timepoints (e.g., timepoint two onwards): poorer visual memory (1)[1], but not immediate or delayed memory (6); poorer verbal fluency (6); poorer processing speed (7); a greater decline in general cognitive ability (11); a higher risk of MCI or AD diagnosis (9); and an increase in the presence of biomarkers of Alzheimer's disease (2 & 3).

Poorer general fluid-type cognitive ability at baseline was statistically significantly associated with negative SPA at subsequent timepoints (8). However,

[1] (1) represents study 1, (2) represents study 2, (3) represents study 3 etc.

processing speed (7 & 11), working memory and perceptual reasoning (11) at baseline did not statistically significantly predict later changes in SPA.

The shorter follow up of study 6 (1 – 3 years) in comparison to study 1 (38 years) may account for negative SPA at baseline predicting future deterioration in visual memory, but not immediate or delayed memory, as 1 – 3 years may not have been sufficient for an effect of negative SPA on immediate or delayed memory to develop. However, statistically significant associations were identified between negative SPA, poorer verbal fluency (6) and processing speed (7) during the same or similar follow up lengths, indicating that this was sufficient or that different cognitive domains may be influenced over different time courses.

Only study 7 attempted to limit potential attrition effects during data analysis, despite the presence of attrition across all studies. This should be considered when interpreting findings, given that some studies identified differences in the demographic characteristics of those who did and did not complete the study. A strength of studies 9 and 11 is the recruitment of participants via random invitation, potentially increasing the heterogeneity of participants. Due to the small AD sample, study 9 amalgamated MCI and AD participants, meaning it is unclear if the association between SPA and cognition is maintained for AD participants independently. Study 8 did not confirm the method of managing missing data, thus it is possible bias may have been introduced during this process.

The effect sizes (Cohen, 1992) of the statistically significant relationships reported varied from large (1, negative age stereotypes and visual memory) to small (2, negative age stereotypes and reduction in hippocampal volume; 3, negative age stereotypes and higher composite-Alzheimer’s-disease-pathology-scores; 8, general

fluid-type cognitive ability and two domains of attitudes to ageing, psychosocial loss and physical change) to very small (6, SPA and verbal fluency). Additionally, study 9 reported an OR of 1.27, indicating a weak association (Chen et al., 2010).

The number of covariates varied across studies, with studies 1, 2, 3 and 6 including a broad range. Studies 7, 8, 9 and 11, however, did not control for appropriate covariates (again, this varied between studies), such as marital status, SES, employment, subjective health and age. Study 11 found that when controlling for depressive affect at T4 (the most recent testing point), negative SPA no longer predicted cognitive decline, suggesting current depression may be a confounding factor. Importantly, this was the only study that controlled for current depression. Additionally, study 11 indicated that the relationship between negative SPA and cognitive decline was present only for older participants (*M* age at baseline = 62.5 [*SD* not reported]), not for middle-aged participants (*M* age at baseline = 43.7 [*SD* = .92]). Similarly, study 1 identified that the differences in visual memory scores between the groups that held positive and negative age stereotypes was greater for the older participants than the younger participants. Studies 11 and 1 indicate that the relationship between SPA and cognition may differ depending on life stage.

In summary, despite variations in study length and number of included covariates, which may have influenced study findings (although studies with good control of covariates did not tend to yield stronger or weaker results for SPA), there is consistent, good quality evidence that negative SPA is associated with poorer functioning across a broad range of cognitive functions, acknowledging that effect sizes may be small.

4.2 Positive SPA and Cognition

Six studies (4, 5, 6, 7, 8 & 10) explored the relationship between positive SPA and cognition, all indicating statistically significant relationships.

Endorsing positive SPA at baseline was statistically significantly associated with cognitive functioning at subsequent timepoints: a reduced risk of developing dementia, demonstrated via better memory and mathematical skills (4 & 5); higher verbal fluency scores (6); increased processing speed (7); and less decline in fluid cognitive ability, but not crystalised ability (10).

Increased processing speed at baseline was statistically significantly associated with an increase in positive SPA related to personal growth as measured by the AgeCog scale at subsequent timepoints (7). Intriguingly, lower peak prior cognitive ability at baseline was statistically significantly associated with positive SPA via the psychological growth domain of the AAQ at subsequent timepoints (8).

Limitations and strengths of studies 6, 7, and 8 were discussed in section 4.1. Studies 4 and 5 share strengths regarding the inclusion of a large range of covariates and adapting stimuli to minimise the risk of practice effects. Study 10 did not control for appropriate variables such as race, marital status, depression, SES and subjective health. Study 10 did, however, attempt to randomise participant recruitment via randomising invitation to the study and used estimation procedures to attempt to ensure the results were not attributed to systematic attrition, strengths not evident in the other studies exploring the relationship between positive SPA and cognition.

Where reported, effect sizes (Cohen, 1992) were either very small (5, positive age belief, memory and mathematical skills; 6, the B-APQ negative control and

consequences subscale and verbal fluency) or small (8, peak prior cognitive ability at age 70 and the psychological growth domain of the AAQ). Study 4 reported a RR of .81.

The statistically significant relationship between positive SPA and reduced risk of developing dementia (determined via memory and mathematical skills) was maintained when APOE genotype was statistically controlled for (4 & 5), with the inclusion of APOE genotype as a covariate a strength of studies 4 and 5. Study 4 concluded that positive SPA remains a protective factor for dementia development in APOE ε4 carriers, a genetic risk factor for dementia. Study 5 suggests a gene-environment interaction, whereby the APOE ε2 genotype is statistically significantly associated with a reduced risk of developing dementia for individuals who endorse positive SPA, but not those who endorse negative SPA. Study 10 identified a statistically significant association between positive SPA and greater fluid abilities, as measured by perceptual reasoning, spatial ability and working memory tests. However, this relationship became non-significant when education and objective health were included as covariates. Furthermore, the statistically significant relationship between SPA and fluid-type cognitive ability was maintained for males only when the model was differentiated by gender.

Despite fluctuation in study length and number of included covariates, there is good quality evidence indicating a consistent, albeit potentially small, relationship between positive SPA and greater functioning across a variety of cognitive functions. The differing quality of the studies did not appear to influence the strength of associations identified.

5.0 Discussion

5.1 Overview and Existing Literature

This systematic review sought to investigate the longitudinal relationship between SPA and cognition as well as the direction of this relationship. The findings indicate statistically significant associations between SPA and cognitive functioning, with these relationships primarily unidirectional (SPA predicting change in cognition), but with some evidence of reciprocity. Furthermore, these relationships were not confined to a specific cognitive domain.

Valence of SPA was important, with negative SPA at baseline predicting future deterioration in cognition and positive SPA at baseline predicting future maintenance or improvement in cognition. The evidence regarding baseline cognition predicting future change in SPA was less consistent, as positive SPA was predicted by increased processing speed (Seidler & Wolff, 2017) but lower peak prior cognitive ability (Shenkin et al., 2014). The different measures of cognition and SPA used may explain these seemingly contradictory results. Additionally, Seidler & Wolff (2017) could predict change in cognition over time by controlling for cognition at baseline, whereas Shenkin et al. (2014) could not.

The overall findings of the current review are consistent with the evidence base, indicating cognition may be influenced both positively and negatively congruent with SPA valence. Findings from the current review begin to fill a gap in the published empirical research by indicating that, in some instances, relationships between SPA and cognition may be reciprocal (Seidler & Wolff, 2017; Shenkin et al., 2014). The current review's findings are consistent with the mixed findings of the empirical literature regarding a similar concept: the reciprocal relationship between

subjective age and cognition (Hughes et al., 2013; Hughes & Lachman, 2018; Stephan et al., 2016). Overall, the studies included accounted for a broad range of covariates, ruling out potential alternative explanations for associations between SPA and cognition (e.g., poor health). However, the only study to control for current depression (Siebert et al., 2020) found that this made the relationship between negative SPA and greater decline in general cognitive ability non-significant, thus depression may possibly have a similar influence on relationships between SPA and other areas of cognitive functioning.

Two theories appear relevant to the current review's findings: SET (Levy et al., 2009) and socioemotional selectivity theory (SST; Carstensen et al., 1999). The current findings provide further support for SET and are consistent with SET's existing evidence base, indicating that valence of ageing stereotypes endorsed by an individual can be associated with cognitive functioning in later life. Levy (2009) stated that the self-relevance of ageing stereotypes influences the likelihood of these becoming internalised self-fulfilling prophecies. Consistent with existing literature (Hess et al., 2004; Levy, 1996), the current review provides evidence for the self-relevance of ageing stereotype, with greater effects of age stereotype on cognition observed when the ageing stereotype was self-relevant (Levy et al., 2011; Siebert et al., 2020). SET, in combination with the concept of awareness of age-related changes (AARC; Diehl & Wahl, 2010), could provide a possible explanation for a reciprocal relationship between SPA and cognition. As discussed, negative age stereotypes could lead to the development of cognitive difficulties congruent with the stereotype. If a person attributes the change in cognition to age-related changes, this may reinforce and potentially increase endorsement of negative age stereotypes.

Although SET in combination with AARC could account for the review's findings, SST may provide an additional and complementary insight into how cognition may influence SPA. SST is a lifespan theory of motivation that suggests that an individual's goal selection and pursuit is shaped by their apprehension of a finite lifetime, subsequently impacting upon resource allocation. When constraints on lifetime are perceived (e.g., when an individual ages), goals generally become focussed on optimising emotional homeostasis and equilibrium fostering enhanced well-being (Mather & Carstensen, 2005), with these positive experiences potentially manifesting as positive SPA. Older people generally demonstrate attentional biases towards positive stimuli (Mather et al., 2005; Reed & Carstensen, 2012; Reed et al., 2014), such as being less likely to attend to negative images than neutral or positive images (Mather & Carstensen, 2003) and listing more positive than negative attributes of an object (Kim et al., 2008). However, this positivity bias is suggested to require cognitive control (Mather & Carstensen, 2005). Therefore, perhaps an individual's level of cognitive functioning may support or hinder the ability to process positive information consistent with goals in later life, subsequently contributing to valence of SPA. It is, however, possible that there are other conceivable ways in which cognitive functioning may influence a person's goal accomplishment not accounted for by SST.

5.2 Strengths and Limitations of Studies

All studies included in this systematic review were of high quality. This may be partially attributable to the rigorous PECOS criteria applied, such as the necessity for studies to have utilised standardised measures of SPA and cognition. Partly, this may also reflect the nature of well-funded longitudinal studies conducted over many

years. As such, sample sizes were generally large and study design enabled consideration of a wide variety of covariates.

There were limitations present across most studies. Only four studies (Robertson et al., 2016; Siebert et al., 2018a, 2018b, 2020) attempted to randomise study recruitment, with the remaining seven (Levy et al., 2011, 2016, 2018, 2020; Seidler & Wolff, 2017; Shenkin et al., 2014) relying on voluntary sampling. Voluntary sampling can introduce self-selection bias (Nilsen et al., 2013), though it is acknowledged that randomising study invitation does not mitigate all risk of self-selection bias (Costigan & Cox, 2001). Self-selection bias may contribute to important differences (e.g., levels of motivation) between those who did and did not volunteer for the studies, which may not have been measured or controlled for, and could influence the findings. For example, participants more willing to engage in the study may also be more willing to engage in healthy behaviour that could contribute to better cognition and evaluations of ageing.

The sampling method may have, in part, contributed to the limited demographic composition of the sample, with most participants healthy, well-educated and community-dwelling. This may not be representative of the general older people population; thus, generalisability of the study findings may be limited. Another factor that may limit generalisability of the studies' findings is the selective drop-out of participants over time. Some studies identified statistically significant differences between participants who did and did not complete the studies, further restricting the range of the sample to younger, healthier participants with greater baseline cognition and positive SPA. This reduced variance could increase Type II errors.

A final limitation is that all effect sizes reported (Levy et al., 2011; 2016; 2020; Robertson et al., 2016; Shenkin et al., 2014) were small or very small. In the context of the large sample sizes, this could be cause for concern given that larger samples have statistical power to yield significant results regardless of their magnitude (Schäfer & Schwarz, 2019). It is, therefore, possible that the large sample sizes led to statistically significant detection of trivial differences (Sullivan & Feinn, 2012). Nevertheless, the effect sizes are consistent with the effect sizes of the demographic predictors in the included studies (Robertson et al., 2016; Shenkin et al., 2014; Siebert et al., 2018a).

5.3 Strengths and Limitations of the Review

Strengths of the review include the rigorous screening process, guided by robust PECOS criteria and adherence to the PRISMA-P Checklist (Page et al., 2021).

Several limitations of the current systematic review are acknowledged. A number of methodological quality rating tools were explored, guided by systematic reviews (Harrison et al., 2017; Ma et al., 2020; Mamikutty et al., 2021; Sanderson et al., 2007). These included, but were not limited to, the Newcastle-Ottawa Quality Assessment Scale for Cohort Studies (Wells et al., 2000) and Cohort Checklist (Scottish Intercollegiate Guidelines Network, n.d.). The CASP Cohort Study Checklist was selected, as although it does not have as strong evidence base as other tools, it appeared more applicable to the studies included in the review by covering a broad range of evaluation criteria. Thus, was considered better able to differentiate between study quality than other evaluation tools that contained a large proportion of items focusing solely on exposure. All studies in this review scoring within the high-quality range may, therefore, reflect a strength of the studies in this

area, rather than the CASP Cohort Study Checklist's inability to differentiate between the quality of the studies. The overlap between the evaluation tool items and the PECOS criteria could be perceived as a limitation (e.g., all studies scored highly on specific items of the CASP as a result of the PECOS criteria).

Another limitation of the review is that all studies were conducted within western countries, limiting cross-cultural understanding of the relationship between SPA and cognition. Culture may play a role in SPA, given attitudes towards ageing are associated with economic development, industrialisation and cultural values and beliefs (Löckenhoff et al., 2009). Furthermore, the literature indicates differences in cultural views of ageing, with eastern participants endorsing more positive societal views of ageing than western participants (Levy & Langer, 1994; Löckenhoff et al., 2009), though this finding is not consistently replicated (Boduroglu et al., 2006). It is unknown whether cultural differences in SPA valence alter the nature of the relationship between SPA and cognition, but may result in higher mean levels of positive SPA and greater cognitive functioning in eastern cultures.

A final limitation of the review is that it may reflect publication bias in the literature given the lack of grey literature included. Although a database of unpublished literature was searched, it did not yield articles that met the PECOS criteria and resource limitations prevented grey literature from being sought via other means. However, good quality longitudinal studies may have been more likely to reach publication than other study designs.

5.4 Implications

Based on the current review's findings it appears prudent that mental health services adopt a preventative approach to cognitive deterioration. Given the long-

term relationship identified between SPA and cognition and the potentially modifiable nature of SPA, it may be beneficial for mental health services to incorporate a measure of SPA into assessment processes for adults of all ages, to identify SPA valence and determine individuals who may subsequently be at greater risk of cognitive deterioration. A psychoeducational intervention could be developed to raise awareness of the relationship between SPA and cognition, addressing the negative social stereotypes of ageing by presenting a realistic depiction of older age. The development of an intervention aiming to improve an individual's cognitive function may also be implicated, given this may in turn have a beneficial effect on SPA. Improving the cognitive outcomes and SPA in older people is clinically important given the links with quality of life and psychological well-being. Furthermore, investing in the suggested preventative measures may have a beneficial effect on overall spending on cognitive impairment.

5.5 Conclusions

Statistically significant longitudinal relationships were identified between SPA and several cognitive functions, supporting the cross-sectional evidence base (Brown et al., 2021; Kisvetrová et al., 2021; Levy & Langer, 1996) and previous systematic reviews (Tully-Wilson et al., 2021; Warmoth et al., 2016). There was evidence that some cognitive functions at baseline statistically significantly predict improvement in SPA over time (Seidler & Wolff, 2017; Shenkin et al., 2014), which is a recent contribution to the evidence base. Primarily, however, positive SPA at baseline statistically significantly predicted improvement in a range of cognitive functions over time (Levy et al., 2011, 2016; Robertson et al., 2016; Seidler & Wolff, 2017; Siebert et al., 2018a), whilst negative SPA at baseline statistically significantly predicted deterioration in a range of cognitive functions over time (Levy et al., 2018,

2020; Robertson et al., 2016; Seidler & Wolff, 2017; Siebert et al., 2018b). Although cause and effect cannot be concluded from this review, adequate control of covariates (thus ruling out of rival overlapping predictors) suggests that positive and negative SPA may serve as protective and risk factors for cognitive deterioration. The current review's findings are consistent with SET and SST, though should be interpreted cautiously given the small effect sizes reported and limitations related to demographic characteristics of the samples.

Given the limited number of studies using baseline cognition to predict change in SPA over time, further research exploring this relationship would be beneficial. Additionally, it appears pertinent for future research to explore the mechanisms underlying these relationships, potential moderators of the relationship and the relationship between cognition and SPA cross-culturally. The review has clinical implications for older people's well-being, indicating a need for mental health services to consider implementing a preventative approach to maintaining/improving cognition and SPA over time.

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Appendices

Appendix A: Search Term Scoping Searches

Table 1 outlines the scoping searches conducted in regards to search terms. The search terms are presented as entered into PsycINFO, though variations in truncations and wildcards were appropriately adopted for each database.

Table 1

Search Term Scoping Searches

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
1	Attitude* OR Perception* OR Self-perception* OR belief* OR stereotype*	Dementia OR alzheimer's OR cognition OR cognitive	Age* OR ag?ing OR elder* OR older	6710	6625	7860	797	13 335	Number of articles suggests search terms not precise enough. Condense to 2 concepts and use phrase searching for concept 1
2	Attitude* to ag?ing OR attitude* toward* ag?ing	Dementia OR alzheimer's OR cognition OR cognitive	n/a	115	102	105	47	369	Next try adding perception of age* and self-

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
	OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype*								perception of age*
3	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age	Dementia OR alzheimer's OR cognition OR cognitive	n/a	122	109	105	47	383	Next try adding age perception*
4	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing	Dementia OR alzheimer's OR cognition OR cognitive	n/a	202	155	142	124	628	Appears to be the best possible option for search terms – includes all

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
	OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception*								relevant search terms for concept 1, whilst not including phrases not commonly used
5	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception*	Dementia OR alzheimer's OR cognition OR cognitive	n/a	128	115	115	48	406	Term age self-perception* not well-used in literature. Do not use these search terms

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
	OR age self-perception*								
6	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception* OR age self-perception* OR ag?ing belief* OR ag?ing stereotype*	Dementia OR alzheimer's OR cognition OR cognitive	n/a	150	134	134	58	476	Ag?ing belief* and ag?ing stereotype* are not commonly used phrases in the literature. Do not use these search terms
7	Attitude* to ag?ing OR attitude* toward* ag?ing	Dementia OR alzheimer's OR cognition OR cognitive	n/a	158	140	135	59	492	Attitude* to age and Attitude* toward* age

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
	OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception* OR age self-perception* OR ag?ing belief* OR ag?ing stereotype* OR Attitude* to age OR Attitude* toward* age								are not commonly used phrases in the literature. Do not use these search terms
8	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of	Dementia OR alzheimer's OR cognition OR cognitive OR Attention* OR Memory	n/a	919	Not conducted	Not conducted	Not conducted	n/a	Search conducted using PsychINFO as this database had returned the most

Search Number	Concept			Number of Articles Retrieved Per Database				Total Number of Articles Retrieved Across all Databases (Before Checking for Duplications)	Comments
	1	2	3	PsycINFO	Medline	Web of Science	Ageline		
	ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception*	OR Executive function* OR Percept* OR language OR processing speed*							responses out of all databases in previous searches. This is the same concept 1 search terms as those used in search no. 4, but with additional search terms for concept 2. Action: further compare articles returned for search numbers 4 and 8

Comparison of Searches Four and Eight using PsycINFO

Articles retrieved from the PsycINFO database for searches number four and eight were compared. Search four retrieved 202 articles, with 14 of these progressing to the full text screening stage. Of these 14 articles, 8 met the PECOS criteria for

inclusion in the systematic review. Six studies were excluded from the review due to not being a longitudinal design (n = 4), cognition being included solely as a moderator (n = 1) and the full text not being available (n = 1). Despite search number eight retrieving a much larger number of articles (n = 900) than search four, many were irrelevant to the review question, with only 17 articles progressing to the full text screening stage, including all 14 articles identified in search four. The additional three articles identified by search eight did not meet the review's PECOS criteria as a result of: not measuring cognition (n = 1); being a qualitative design (n = 1); and not being a longitudinal design (n = 1). Based on this scoping search, including search terms specific to cognitive domains did not result in an increase in articles that met PECOS criteria.

Appendix B: Search Strategy

Table 1

Search Terms for Systematic Review for Ovid Databases (PsycINFO, PsycEXTRA and Medline)

Concept	Search Terms
1	Attitude* to ag?ing OR attitude* toward* ag?ing OR perception* of ag?ing OR self-perception* of ag?ing OR age belief* OR age stereotype* OR perception* of age OR self-perception* of age OR age perception*
2	Dementia OR alzheimer's OR cognition OR cognitive

Table 2

Search Terms for Systematic Review for Web of Science Database

Concept	Search Terms
1	"Attitude$ to ag*ing" OR "attitude$ toward* ag*ing" OR "perception$ of ag*ing" OR "self-perception$ of ag*ing" OR "age belief$" OR "age stereotype$" OR "perception* of age" OR "self-perception* of age" OR "age perception$"
2	"Dementia" OR "alzheimer's" OR "cognition" OR "cognitive"

Table 3

Search Terms for Systematic Review for Ageline Database

Concept	Search Terms
1	"Attitude# to ag#ing" OR "attitude# toward# ag#ing" OR "perception# of ag#ing" OR "self-perception# of ag#ing" OR "age belief#" OR "age stereotype#" OR "perception# of age" OR "self-perception# of age" OR "age perception#"
2	“Dementia” OR “alzheimer’s” OR “cognition” OR “cognitive”

Appendix C: Adapted CASP

www.casp-uk.net
info@casp-uk.net
Summertown Pavilion, Middle Way Oxford OX2 7LG

CASP Checklist: 12 questions to help you make sense of a Cohort Study

How to use this appraisal tool: Three broad issues need to be considered when appraising a cohort study:

- Are the results of the study valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

The 12 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Cohort Study) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

CASP
Critical Appraisal Skills Programme

Paper for appraisal and reference:.....

Section A: Are the results of the study valid?

1. Did the study address a clearly focused issue?

Well addressed	
Partially addressed	
Not addressed	

HINT: A question can be 'focused' in terms of
- The population studied
- The risk factors studied
- Is it clear whether the study tried to detect a beneficial or harmful effect
- The outcomes considered

Comments:

2. Was the cohort recruited in an acceptable way?

Well addressed	
Partially addressed	
Not addressed	

HINT: Look for selection bias which might compromise the generalisability of the findings:
- Was the cohort representative of a defined population
- Was there something special about the cohort
- Was everybody included who should have been

Comments:

Is it worth continuing?

CASP
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3. Was the predictor accurately measured to minimise bias?

HINT: Look for measurement or classification bias:

Well addressed	☐
Partially addressed	☐
Not addressed	☐

- Did they use subjective or objective measurements
- Do the measures truly reflect what you want them to (have they been validated)
- Were all the subjects classified into the exposure groups using the same procedure

Comments:

4. Was the outcome accurately measured to minimise bias?

Well addressed	☐
Partially addressed	☐
Not addressed	☐

HINT: Look for measurement or classification bias:

- Did they use subjective or objective measurements
- Do the measures truly reflect what you want them to (have they been validated)
- Has a reliable system been established for detecting all the cases
- Were the measurement methods similar in the different groups
- Were the subjects and/or the assessor blinded to the exposure (does this matter)

Comments:

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5. (a) Have the authors identified all important confounding factors?

Well addressed	
Partially addressed	
Not addressed	

HINT:

- List the ones you think might be important, and ones the author missed

Comments:

5. (b) Have they taken account of the confounding factors in the design and/or analysis?

Well addressed	
Partially addressed	
Not addressed	

HINT:

- Look for restriction in design, and techniques e.g. modelling, stratified-, regression-, or sensitivity analysis to correct, control or adjust for confounding factors

Comments:

6. (a) Was the follow up of subjects complete enough?

Well addressed	
Partially addressed	
Not addressed	

HINT: Consider

- The good or bad effects should have had long enough to reveal themselves
- The persons that are lost to follow-up may have different outcomes than those available for assessment
- In an open or dynamic cohort, was there anything special about the outcome of the people leaving, or the exposure of the people entering the cohort

6. (b) Was the follow up of subjects **long** enough?

> 6 years	
1-6 years	
< 1 year	

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Comments:

Section B: What are the results?

7. Were the hypotheses clearly addressed by the results?

Well addressed ☐
Partially addressed ☐
Not addressed ☐

HINT: Consider

- What are the bottom line results
- Have they reported the rate or the proportion between the exposed/unexposed, the ratio/rate difference
- How strong is the association between exposure and

Comments:

8. How precise are the results?

Well addressed ☐
Partially addressed ☐
Not addressed ☐

HINT:

- Look for the range of confidence intervals, if given

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Comments:

9. Do you believe the results?

Well addressed ☐
Partially addressed ☐
Not addressed ☐

HINT: Consider
- Big effect is hard to ignore
- Can it be due to bias, chance or confounding
- Are the design and methods of this study sufficiently flawed to make the results unreliable

Comments:

Section C: Will the results help locally?

10. Can the results be applied to the local population?

Well addressed ☐
Partially addressed ☐
Not addressed ☐

HINT: Consider whether
- A cohort study was the appropriate method to answer this question
- The subjects in this study could be sufficiently different from your population to cause concern
- Your local setting is likely to differ much from that of the study
- You can quantify the local benefits and harms

Comments:

CASP
Critical Appraisal Skills Programme

11. Do the results of this study fit with other available evidence?

Well addressed	
Partially addressed	
Not addressed	

Comments:

12. What are the implications of this study for practice?

Well addressed	
Partially addressed	
Not addressed	

HINT: Consider

- One observational study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health policy decision making
- For certain questions, observational studies provide the only evidence
- Recommendations from observational studies are always stronger when supported by other evidence

Comments:

Amendments made to the CASP not already discussed were rewording of item three from ‘was the exposure accurately measured to minimise bias?’ to ‘was the predictor accurately measured to minimise bias?’ and item seven from ‘what are the results of this study?’ to ‘were the hypotheses clearly addressed by the results?’

Appendix D: Inter-rater Check at Full Text Screening Stage

Article	Inclusion/Exclusion Decision		Rationale	
	Primary Rater	Second Rater	Primary Rater	Second Rater
Brown et al. (2021)	Exclude	Exclude	Not longitudinal	Not longitudinal
Levy and Langer (1984)	Exclude	Exclude	Not longitudinal	Not longitudinal Did not use standardised measure to assess SPA
Levy et al. (2020)	Include	Include	Adhered to inclusion/exclusion criteria	Adhered to inclusion/exclusion criteria
Robertson et al. (2016)	Include	Include	Adhered to inclusion/exclusion criteria	Adhered to inclusion/exclusion criteria
Seidler and Wolff (2017)	Include	Include	Adhered to inclusion/exclusion criteria	Adhered to inclusion/exclusion criteria
Siebert et al. (2017)	Include	Include	Adhered to inclusion/exclusion criteria	Adhered to inclusion/exclusion criteria

Appendix E: Submission Guidance for Authors for International Journal of Geriatric Psychiatry

Author Guidelines

1. SUBMISSION

Free Format submission

International Journal of Geriatric Psychiatry now offers **Free Format submission** for a simplified and streamlined submission process.

Before you submit, you will need:

Your manuscript: this should be an editable file including text, figures, and tables, or separate files – whichever you prefer. All required sections should be contained in your manuscript, including abstract, introduction, methods, results, and conclusions. Figures and tables should have legends. Figures should be uploaded in the highest resolution possible. References may be submitted in any style or format, as long as it is consistent throughout the manuscript. Supporting information should be submitted in separate files. If the manuscript, figures or tables are difficult for you to read, they will also be difficult for the editors and reviewers, and the editorial office will send it back to you for revision. Your manuscript may also be sent back to you for revision if the quality of English language is poor.

An ORCID ID, freely available at https://orcid.org. *(Why is this important? Your article, if accepted and published, will be attached to your ORCID profile. Institutions and funders are increasingly requiring authors to have ORCID IDs.)*

The title page of the manuscript, including:

Your co-author details, including affiliation and email address. *(Why is this important? We need to keep all co-authors informed of the outcome of the peer review process.)*

Statements relating to our ethics and integrity policies, which may include any of the following *(Why are these important? We need to uphold rigorous ethical standards for the research we consider for publication):*

- data availability statement
- funding statement
- conflict of interest disclosure
- ethics approval statement
- patient consent statement
- permission to reproduce material from other sources
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To submit, login at **https://submission.wiley.com/journal/gps** and create a new submission. Follow the submission steps as required and submit the manuscript.

Authors should kindly note that submission implies that the content has not been published or submitted for publication elsewhere except as a brief abstract in the proceedings of a scientific meeting or symposium.

If you are invited to revise your manuscript after peer review, the journal will also request the revised manuscript to be formatted according to journal requirements as described below.

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The *International Journal of Geriatric Psychiatry* will consider for review articles previously available as preprints. Authors may also post the **submitted version** of a manuscript to a preprint server at any time. Authors are requested to update any pre-publication versions with a link to the final published article.

For help with submissions, please contact: **GPSeditorialoffice@wiley.com**

2. 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.

We also welcome qualitative research papers that further understanding of the perspectives, experiences and unmet needs of older people with mental health problems and their supporters. Articles should be methodologically rigorous and have clear applications for treatment, services and support. These types of research papers have a higher word limit of 6,000 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.

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.

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.

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.

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.

SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

EMPIRICAL PAPER

Are Age, Gender and the Interaction of Age and Gender Associated with Older People's Attitudes to Ageing?

Trainee Name:	**Alex Carol Brierley**
Primary Research Supervisor:	**Professor Ken Laidlaw** Professor of Clinical Psychology, University of Exeter
Secondary Research Supervisor:	**Dr Nick Moberly** Senior Lecturer, School of Psychology, University of Exeter
Target Journal:	International Journal of Geriatric Psychology
Word Count:	8783 (excluding abstract, table of contents, list of figures and tables, references and appendices)

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

Abstract

Objective: Negative attitudes to ageing (AtA) are associated with poorer health and well-being outcomes. Gendered ageing experiences may translate into gender differences in AtA. This study aims to explore whether there is a relationship between age, gender, their interaction and AtA.

Method: Cross-sectional relationships between age, gender, their intersection and AtA were investigated, using a sample of 260 British people aged 60 – 100 years. AtA were assessed by the Attitudes to Ageing Questionnaire's (AAQ; Laidlaw et al., 2007) three domains: Psychosocial Loss, Physical Change and Psychological Growth.

Results: Hierarchical multiple regressions indicated that greater age was statistically significantly associated with increased psychosocial loss and less favourable attitudes regarding physical changes, but not psychological growth. Gender and gender's interaction with age were not statistically significantly associated with any of the AAQ domains. Some demographic predictors were statistically significantly associated with domains of the AAQ, with this varying between domains.

Conclusions: The ageing experiences of the males and females in the sample were not fully representative of the general population, possibly contributing to the absence of statistically significant relationships between gender, the age by gender interaction and AtA. Specific demographic factors are associated with negative AtA for both genders. However, females may be at a heightened risk of endorsing negative AtA as they may be more likely to experience those demographic factors. The current study could be replicated within multiple, smaller age categories

of older people, to determine whether predictors of AtA vary across specific timepoints of later life.

Keywords: Attitudes to ageing, gender, age, older people, later life

1.0 Introduction

1.1 Demographic Change in Contemporary Britain

The number and relative proportion of older people in the population in Great Britain is increasing and this is expected to continue for the foreseeable future (Office for National Statistics [ONS], 2019), contributing to a relative ageing of society. This has societal and economic implications, for example: a reduction in working age populations (Sikken et al., 2008), greater public spending on pensions (ONS, 2019; Sikken et al., 2008) and increased demands on health and social care services (ONS, 2019).

It is important to support people to live well into later life (NHS, 2019), including psychological well-being. The World Health Organisation (WHO, 2017) launched a global action plan to support healthy ageing, whilst the UK identified ageing as one of its four grand challenges and provided funding for a healthy ageing programme, involving development of services and products to enable older people's independence and well-being, plus investment in age-related medical challenges (GOV.UK, 2018).

1.2 Negative Age Stereotypes and Attitudes to Ageing (AtA)

Ageing is a process rather than a state (Shenkin et al., 2014), involving contextual, social (Pruchno, 2018) and subjective (Diehl & Wahl, 2010) elements. In contemporary western culture, later life is often stereotyped as "a time of ill health, loneliness, dependency, and poor physical and mental functioning" (Dionigi, 2015, p. 1). AtA can be defined as a comprehensive personal view or judgement of the ageing experience over the life course (Kisvetrova et al., 2021).

Negative age stereotypes are associated with poorer physical functioning (Levy et al., 2000a, 2006, 2009b; Levy & Leifheit-Limson, 2009), poorer cognitive functioning (Levy et al., 2012; Levy & Leifheit-Limson, 2009; Sindi et al., 2012), increased depressive symptomology (Sindi et al., 2012) and a reduced will to live expressed by older people within a hypothetical scenario (Levy et al., 2000b).

Negative AtA are associated with poorer life satisfaction (Mock & Eibach, 2011) and increased depressive symptomology (Chachamovich et al., 2008), whereas positive AtA are associated with good mental health (Bryant et al., 2016), positive self-reported physical health (Bryant et al., 2012), higher life expectancies (Levy et al., 2002) and a positive quality of life (Kalfoss et al., 2010; Top et al., 2013). Although large sample sizes were generally utilised by the studies investigating associations with AtA, they could be criticised for using opportunistic samples, with self-presentational bias potentially contributing to the limited demographic characteristics of the samples.

A theory that could be applied to these findings is the stereotype embodiment theory (SET; Levy, 2009a). SET states that negative age stereotypes are endorsed, sometimes unconsciously, and uncritically accepted over the course of a lifetime. The stereotypes can become internalised self-stereotypes when the surrounding culture cues their self-relevance (i.e., cues a person's age), which can then influence the person psychologically, behaviourally and physiologically (Levy, 2009a). Although SET is widely cited in this field of literature, SET may be limited by lack of clarity regarding the cognitive and psychological processes underlying the theory (Fawsitt & Setti, 2017). Additionally, SET is challenging to falsify with indirect evidence relied upon (e.g., investigations of associations rather than testing causal mechanisms). However, SET does allow the effects of age stereotypes to be

explored from a lifespan perspective, given internalisation of stereotypes is considered a developmental process (Sun, 2017).

1.3 Ageing

It appears that older people may respond to age-related challenges using emotion-focussed strategies and positive reappraisal (Carstensen et al., 2003), as well as proactive loss-based strategies (Baltes & Baltes, 1990), facilitating psychological and emotional development. Compared to younger people, older people report enhanced emotion regulation skills, competence and emotional experience improving with age (Charles et al., 2003; Reed & Carstensen, 2012; Sims et al., 2015). Additionally, subjective well-being appears to remain stable or increase as people age (Hansen & Slagsvold, 2012; Kunzmann et al., 2000), despite the challenges of ageing. Exceptions to this trend include experiencing the loss of health or partner (Hansen & Slagsvold, 2012; Kunzmann et al., 2000).

Socioemotional selectivity theory (SST; Carstensen et al., 1999) attempts to explain this phenomenon, stating that as an individual's subjective length of life remaining reduces, the importance of goals related to emotion-regulation and well-being increase at the expense of future knowledge and resource acquisition related goals, with more resources invested in obtaining the former and a bias to attention and memory of positive material. The SST evidence base has been criticised for inconsistent findings, thought to be contributed to by variations in conceptualising and operationalising emotion and knowledge focussed goals (van der Goot et al., 2019). Grühn et al. (2016) found that limited future time perspective was associated with maladaptive rather than adaptive emotional profiles, challenging a central assumption of SET. Furthermore, there is ambiguity regarding how SST applies

when end of life is faced by means other than natural ageing (Sullivan-Singh et al., 2015).

1.3.1 Ageing and AtA

Studies from various countries found that older people generally report positive AtA (Bryant et al., 2012; Lu et al., 2009; Shenkin et al., 2014). Brown et al. (2015) in a study of 776 female participants reported that older women endorsed more positive AtA than middle-aged women, consistent with SST. This supported findings from a large-scale mixed gender sample that found older people had less anxiety about ageing than young and middle-aged adults (Lynch, 2000), although it could be argued that these studies measured different constructs. It is possible that the reality of later life is not as challenging as the negative stereotypes suggest.

Few studies have explored variation in AtA within older people. Those that did (Bryant et al., 2012; Shenkin et al., 2014; Top et al., 2013) reported varying findings, all using the robust measure of AtA, the Attitudes to Ageing Questionnaire (AAQ; Laidlaw et al., 2007), comprising three domains of AtA: Psychosocial Loss, Physical Change and Psychological Growth. Cross-sectional studies by Bryant et al. (2012), using an Australian sample of 421 older people, and Top et al. (2013), using a sample of 550 Turkish older people, identified age differences in AtA. Bryant et al. (2012) concluded that increased age was significantly correlated with higher psychosocial loss and Top et al. (2013) concluded that those aged 60-70 had statistically significantly more positively valenced attitudes towards physical change in later life than participants over 71 years of age. Shenkin et al. (2014), however, did not identify any statistically significant age differences in AtA within a sample of 729 participants from the Lothian Birth Cohort sample of older people (Deary et al., 2012). All three studies may have limited generalisability given the lack of diversity in

area of residence and financial status within the samples, both factors that could influence experiences of ageing. Additionally, cohorts were obtained via self-selection or convenience sampling, which could confound the results.

Compared to other life stages, later life is a large age category with much heterogeneity in ageing experiences. It could, therefore, be argued that important age differences may exist within the older people population, which may contribute to differences in AtA. There is a dearth of literature exploring this, with the small existing body of evidence indicating mixed findings.

1.4 Gendered Ageing

Ageing is characterised as a gender issue (United Nations Economic Commission for Europe [UNECE], 2020), as gender is considered a marker of inequality, with disadvantages accumulating over the lifetime and contributing to qualitatively different ageing experiences (Antonucci et al., 2014; UNECE, 2020). It is, therefore, important to explore the role of the intersection of age and gender, rather than the role of gender as a lone variable. This stance is supported by the 2002 United Nations (UN) political declaration and Madrid international plan of action on ageing, which states that understanding the differential impact of ageing on males and females is integral in order to integrate a gender perspective into ageing policies and legislations. Furthermore, the UN (2002) highlights the importance of understanding global ageing within the broader context of development, which could be impacted by gender. Feminist gerontology suggests the qualitatively different ageing experiences of males and females are “constructed socially and relationally through interactions and exchanges of power” (Thomeer, 2013, p. 1), with the privilege of one group linked to the oppression of another, regardless of intentionality (Calasanti, 2004) and intersecting oppressions throughout life (Hooyman et al.,

2002). This is consistent with the concept of intersectionality, which although rarely incorporated in gerontological research (Holman & Walker, 2020), can be used as a framework to consider how multiple aspects of a person's identity (e.g., female and older person) can combine to create experiences of discrimination (Crenshaw, 1989). This is consistent with the double jeopardy hypothesis, which indicates that the combined negative effects of occupying two stigmatised groups (e.g., female and older person population) are greater than occupying either group alone (Chappell & Havens, 1980). Additionally, the life course perspective highlights that life events and transitions can be gendered. It is also possible that physiological factors may contribute to different ageing experiences by gender (Hägg & Jylhävä, 2021).

Females have higher life expectancies than males across the globe (UN, 2017), though the extent of the gender discrepancy varies across countries (UN, 2017). Females tend to live more years with a disability and/or in poor health, with these amassing in older age (Carmel, 2019; Raleigh, 2019; Thomeer, 2013). Females are more likely than males to marry an older partner (Krekula, 2007) and become widowed, resulting in males often ageing with their spouse and females growing into later life partnerless and living alone (Calasanti & Kiecolt, 2007; Henning-Smith, 2016), though females' larger social networks in comparison to males' can mitigate this (Antonucci & Akiyama, 1987). Additionally, females tend to accumulate fewer financial resources over their lifetime than males, with this gap widening with age and it is argued that older women are at greater risk of poverty than older men (European Commission, 2018).

Another gender difference in ageing experience relates to physical changes. Halliwell and Dittmar (2003) conducted interviews with 42 males and females to explore experiences of age-related bodily changes, concluding that changes in

physical appearance were rated as more important and negatively valenced by females than males, with the functionality of the body more important for males than females. These findings could have been confounded by the sample containing a higher proportion of ‘overweight’ females, according to their body mass index, than males. Additionally, this study neglected to include participants aged over 62 years, leading to a limited insight into the experiences of older people.

The perception of the onset of ageing for males and females reportedly differs. A study of 391 undergraduate students indicated that both male and female participants perceived women to age earlier than males (Barrett & Von Rohr, 2008), potentially impacting upon internalisation of age stereotypes (Lytle et al., 2018). Wilcox (1997) suggested that females are viewed more negatively by others as they age in comparison to males due to physical attractiveness. This is referred to as a double standard of ageing and highlights the social construction of age. Conversely, a meta-analysis indicated that older males also experience a double standard of ageing, generally being perceived as less competent than females (Kite et al., 2005).

1.4.1 Gender and AtA

It is plausible to suggest that the genders’ differing ageing experiences may lead to gender differences in AtA. Few studies have explored the relationship between gender and AtA and those that did (Bryant et al, 2012; Kalfoss, 2016; Shenkin et al., 2014; Top et al., 2013) reported varying results, indicating an important gap in understanding the ageing process. Three of the four studies (Bryant et al, 2012; Shenkin et al., 2014; Top et al., 2013) were described in section 1.3.1, so details other than findings are omitted in the current section to avoid repetition.

Despite all four studies utilising the same measure to assess AtA, the AAQ, only one study identified statistically significant gender differences in AtA using the three AAQ domains (Shenkin et al., 2014). Shenkin et al. (2014) concluded that females scored more positively on the AAQ domain related to physical change than males, when controlling for age. Given this study had a larger sample size (n = 792) than the other studies (n = 421 – 550), it is possible that this may have contributed to identification of statistically significant results. Effect sizes were not reported by Shenkin et al. (2014). Furthermore, using a Norwegian sample of 482 older people within a cross-sectional design, Kalfoss (2016) identified statistically significant gender differences when analysing responses at an individual AAQ item level, though effect sizes were not reported. Kalfoss' (2016) study has limited generalisability, given the lack of diversity in demographic characteristics of the sample, in particular the sample was relatively healthy. All four studies did not consider the intersection of age and gender. Investigating the association between gender as a distinct variable and AtA provides an incomplete picture, as it does not take the interacting influences of gender and age into account, which is important given gender inequalities tend not to remain consistent as we age (UNECE, 2020).

1.5 The Current Study

In summary, ageing is a gendered issue (UNECE, 2020), as male and female ageing experiences appear to differ, contributed to by intersecting inequalities that accumulate over the lifetime. It is plausible that gender differences in the qualitative experience of ageing may translate into gender differences in AtA. It is important to understand what contributes to AtA, given the ramifications of negative AtA, with AtA being an area of potential intervention to support the well-being of older people and optimise quality of later life.

The relationship between gender, age and AtA are currently under-investigated, with inconsistent findings from the limited studies exploring the roles of gender and age as distinct variables. Research exploring the intersection of age experience and attitude with other identities is also under-researched (Swift & Steeden, 2020). Research exploring the age by gender interaction is recommended (Thomeer, 2013; WHO, n.d), but has not been present in previous studies.

The current study will, therefore, scientifically evaluate the relationship between gender, age, their interaction, and British older peoples' AtA, as measured by the AAQ's three domains: Psychosocial Loss, Physical Change and Psychological Growth.

1.5.1 Hypotheses

Given the differing qualitative experiences of ageing as male and female:

1. Females will report more negative AtA than males:
    a. Females will report higher psychosocial loss than males
    b. Females will report more negatively valenced attitudes towards physical changes than males
    c. Females will report lower psychological growth than males

Given the losses and changes associated with older age:

2. Age will be associated with AtA:
    a. Increased age will be correlated with higher psychosocial loss
    b. Increased age will be correlated with more negatively valenced attitudes towards physical changes

c. Increased age will be correlated with lower psychological growth

Given the possible intersection of age and gender:

3. There will be an interaction of age and gender, with older females reporting the most negative AtA:
    a. Older females will report the highest psychosocial loss
    b. Older females will report the most negatively valenced attitudes towards physical changes
    c. Older females will report the lowest psychological growth

Given that previous studies identified associations between depressive symptoms and AtA and sociodemographic factors have been identified as inequalities between the genders:

4. Increased psychosocial loss will be uniquely predicted by:
    a. Being widowed
    b. Having below average finances
    c. Poor subjective health
    d. Not living at home unsupported
    e. Depressive symptoms
5. Negatively valenced attitudes towards the physical changes associated with ageing will be uniquely predicted by:
    a. Being widowed
    b. Having below average finances

c. Poor subjective health

d. Not living at home unsupported

e. Depressive symptoms

6. Low psychological growth will be uniquely predicted by:

a. Being widowed

b. Having below average finances

c. Poor subjective health

d. Not living at home unsupported

e. Depressive symptoms

2.0 Method

2.1 Design

This study adopted a cross-sectional multivariate research design, utilising secondary data originally reported by Laidlaw et al. (2007) as part of a large multinational research study (QLRT-2000-00320 conducted under the auspices of the World Health Organization Quality of Life [WHOQoL] Group) that developed the AAQ.

2.2 Participants and Recruitment

Participants were an opportunistic sample of 261 older males (*n* = 92 [35.25%]) and females (*n* = 169 [64.75%]) recruited by the British WHOQoL centres, Edinburgh and Bath, as part of the AAQ study (4.69% of total AAQ sample). The mean age of participants overall was 73.23 years with a standard deviation (*SD*) of 9.54 (males = 71.88 [*SD* = 9.09]; females = 73.96 [*SD* = 9.72]) with age range from

60 to 100 years old. Inclusion and exclusion criteria were not applied to the current study, utilising the full British AAQ database.

2.3 Sensitivity Analysis

As the sample size was predetermined, sensitivity power analyses rather than a priori power analyses were conducted. Using G*Power software (Faul et al., 2007), sensitivity analyses inputting sample size (n = 261), alpha (α = .05) and power (1 – β = .8) indicated the study's ability to detect small effect sizes when assessing both overall model fit (f^2 = .06) and single regression coefficients (f^2 = .03) via hierarchical multiple regression. The single regression coefficients were utilised to determine if hypotheses 1 – 6 were supported.

2.4 Ethical Approval

Participants provided informed consent prior to participating in the original WHOQoL study (Laidlaw et al., 2007). Ethical approval for the current study was gained from Exeter University's Psychology Research Ethics Committee (Appendix A).

2.5 Measures

All measures were completed by participants at a single time point during the original study.

2.5.1 Demographics

Participants self-reported their age and used multiple choice options to report: gender, marital status, financial status, subjective health status and living arrangements.

2.5.2 Geriatric Depression Scale (GDS)

The GDS (Yesavage et al., 1982) is a 30-item self-report measure. Participants provide yes or no responses to each item, resulting in a cumulative total score, with scores 10-19 indicating mild depression and 20-30 indicating severe depression (Yesevage et al., 1982). A meta-analysis concluded that the GDS has good diagnostic accuracy among older people (Krishnamoorthy et al., 2020). A systematic review (Wancata et al., 2006) reported pooled sensitivity of .75 and pooled specificity of .77. Cronbach alpha in the current study was .43. As a result of this low reliability, the GDS data may be invalid and should be interpreted with caution.

2.5.3 Attitudes to Ageing Questionnaire (AAQ)

The 24-item AAQ (Laidlaw et al., 2007) is a psychometrically robust self-report measure specifically designed for use with older people. The data for the construction of the AAQ was collected in adherence to the WHOQoL Group methodology (1998a, 1998b). The construction of the AAQ entailed: extensive co-production with older people via focus groups across the world; Delphi studies with experts in ageing research; and an initial pilot trial of the measure with over 1400 participants recruited from 19 countries worldwide. The 24-item AAQ was constructed after extensive classical and modern psychometric analyses (exploratory and confirmatory factor analysis, structural equation modelling and Rasch analysis, etc.) and analysis of data from 5,566 older people recruited from 20 international WHOQoL testing centres.

The AAQ has three domains, each comprising eight items that participants score on a scale of one to five. The three domains are: Psychosocial Loss, which has a negative valence, for example, feeling lonely, depressed and disengaged from

society; Physical Change, relating to changes in physical well-being and health; and Psychological Growth, which has a positive valence, for example, coping, acceptance and wisdom. Cronbach alpha indicates good internal consistency between the three domains within the current study (.77, .74 and .76). The profile scores of the three domains can indicate positive or negative AtA. A positive profile is indexed by higher scores on the Psychological Growth and Physical Change domains and a lower score on the Psychosocial Loss domain. It is suggested that people in good health report average scores of 18 on the Psychosocial Loss domain, and 28 on the Psychological Growth and Physical Change domains (Laidlaw et al., 2018). Validity and reliability of the AAQ has been confirmed across cultures (Huang et al., 2010; Kalfoss et al., 2010; Lucas-Carrasco, 2013; Marquet, 2016).

2.6 Data Analysis

2.6.1 Preparation

IBM SPSS Statistics (SPSS) was used for all data preparation and analysis. The data was reviewed to ensure items were coded and formatted correctly, including the absence of impossible values.

Missing values per participant were analysed. 26.8% of participants had some missing data, with missing items ranging from 1.5 - 45.5% per participant. 6.7% (*n* = 18) of participants had >10% missing data. Missing data per variable was also analysed (Table 1.1), indicating relatively low levels of missing data for a large multinational study.

Table 1.1

Missing Values Per Variable

Variable	Missing Data (*n*)	Missing data (%)
Age	0	0
Gender	0	0
Marital Status	1	.4
Financial Status	5	1.9
Subjective Health Status	6	2.3
Living Arrangements	2	.8
Individual GDS Items	1 - 11	.4 – 4.2
Total GDS Score	48	18.4
Individual AAQ Items	11 - 19	4.2 - 7.3
AAQ Psychosocial Losses Domain	20	7.7
AAQ Physical Change Domain	24	9.2
AAQ Psychological Growth Domain	25	9.6

Note. Total GDS scores and AAQ domain scores were not computed if a single individual item that comprised that domain were missing

Missing value analysis was conducted to examine patterns in the missing data and none were identified. Little's (1988) missing completely at random (MCAR) test indicated that the data was MCAR, $\chi 2$ (455, 261) = 303.49, p = 1, suggesting that the causes of the missing data are unrelated to the data and the probability of being missing is the same for all cases (Buuren, 2012).

Boxplots were utilised to identify univariate outliers (Appendix B). Four were identified within GDS total score but were not removed as one was a result of the GDS not being completed (so could be rectified during data cleaning) and three were close to the other data points and consistent with the slightly negative skew of the data. Mahalanobis distance was utilised to check for multivariate outliers, of which one was identified and removed from the data set, resulting in a total sample size of 260 participants.

Multiple imputation (MI) was selected to address all missing data to attempt to minimise bias, given the technique's ability to restore the natural variability of the missing values (Kang, 2013) and the assumptions for MI were justified in this sample regarding the data being MCAR or missing at random (MAR). The likelihood of the data being missing not at random (MNAR) was considered low, given the variables collected. SPSS default settings were followed, with the fully conditional specification method selected and five imputations generated, considered a sufficient number of imputations (Graham et al., 2007). This resulted in six versions of the data set: original, imputation 1, imputation 2, imputation 3, imputation 4 and imputation 5. The predictors included in the imputation model were: marital status, financial status, subjective health status, living arrangements, all GDS items and all AAQ items. Once individual GDS and AAQ items were imputed, derived variables GDS total score and AAQ domains were recalculated to obtain accurate total scores. The imputation model and plausibility of the generated data was checked via comparing the observed and imputed data.

Gender, marital status, financial status, subjective health status and living arrangements were dummy coded. Marital status was operationalised as being widowed (1) or not (0), financial status was operationalised as having below average finances (1) or not (0), subjective health status was operationalised as having subjectively poor (1) or good (0) health and living arrangements was operationalised as living at home unsupported (1) or not (0). An interaction term was created by multiplying gender by age as a continuous variable.

2.6.2 Data Assumptions

Scatterplots indicated linear relationships between the predictor and outcome variables. An analysis of standard residuals indicated the presence of outliers

(Psychosocial Loss standard residual maximum ranged 2.96 - 3.13; and Psychological Growth standard residual minimum ranged -3.48 - -3.65), however, these were not considered problematic in the context of a large sample size. The data met the assumption of independent errors, with the values close to 2 (Durbin-Watson values: Physical Change, 1.83 - 1.9; Psychological Growth, 2.04 - 2.16; Psychosocial Loss, 1.85 - 1.9). The histogram of standardised residuals (Appendix C) and the normal P-P plot of standardised residuals (Appendix D) indicated that the data contained approximately normally distributed errors. The scatterplot of standardised residuals and standardised predicted values (Appendix E) indicated the assumption of homoscedasticity was met, meaning the variance of the residuals is roughly similar.

Multicollinearity was a potential concern, given the high variance inflation factor (VIF) and low tolerances of gender (VIF: Psychosocial Loss, 63.49 - 65.31; Physical Change, 61.64 - 65.31; PG, 62.47 - 65.31. Tolerance, .015 - .016) and the interaction term (VIF: Psychosocial Loss, 67.71 - 69.92; Physical Change, 65.88 - 69.92; Psychological Growth, 66.88 - 69.92. Tolerance, .014 - .015). Multicollinearity was a problem as it would impair the ability to distinguish between the individual effects of predictors on the outcome variables. To resolve the potential violation of multicollinearity, data were transformed via mean centering all predictors, including the dummy variables, as recommended when including interaction terms (Cohen et al., 2003; Tabachnik & Fidell, 2013). This had the intended effect of bringing the tolerance and VIF values into the accepted ranges (tolerance > .1 and VIF < 10).

Mean centering does not impact macro multicollinearity (the overall model fit) and estimate of higher order interaction, but does support meaningful interpretation of main effects and individual contributions of predictors on the outcome variables by

decreasing nonessential micro multicollinearity between the interaction term and its components (Dalal & Zickar; Iacobucci et al., 2015; Tabachnik & Fidell, 2006).

2.7 Data Analysis Plan

To test the hypotheses, three hierarchical multiple regressions were conducted, one per AAQ domain (Psychosocial Loss, Physical Change and Psychological Growth). The predictors were entered over three hierarchical models. In model one, widowed, below average finances, subjective poor health, living at home unsupported and depression were entered. Age and gender were entered in model two. In model three, the age by gender interaction (Age*female) was entered.

In handling missing data within the AAQ database the results using the multiply imputed data were pooled by SPSS for ease of interpretation. SPSS was not able to pool the results for the imputed data for the overall model fit. In these instances, the range of results across the imputations (original data set, imputation 1, imputation 2, imputation 3, imputation 4 and imputation 5) are reported.

3.0 Results

3.1 Sample Characteristics

Descriptive statistics are presented in Table 2.1, broken down by gender, with inferential statistics conducted to compare males and females across the other variables. Independent t-tests were conducted for continuous variables and chi-square ($\chi 2$) for categorical variables. Statistically significantly more females than males were widowed. However, there were not statistically significant gender differences regarding age, financial status, subjective health status and living arrangements. Pearson correlation coefficients (r) of all variables are presented in Table 2.2.

Table 2.1

Descriptive and Inferential Statistics

	Total Sample	Gender				
		Male	Female	*t*	$\chi 2$	*p*
Predictors						
Age, *M* (*SD*)	73.32 (9.54)	71.88 (9.09)	73.96 (9.72)	1.69	-	.05
Gender: female, *n* (%)	-	92 (35.25)	169 (64.75)	-	-	-
GDS Total Score, *M (SD*)	18.85 (2.95)	18.72 (3.09)	18.94 (2.86)	.53	-	.30
Marital status: widowed, *n* (%)	71 (27.30)	11 (12.10)	60 (35.50)	-	16.34	<.001
Financial status: below average, *n* (%)	30 (11.60)	8 (8.79)	22 (13.02)	-	1.04	.31
Subjective poor health, *n* (%)	31 (11.90)	14 (15.38)	17 (10.06)	-	1.60	.21
Living arrangements: at home unsupported, *n* (%)	89 (34.20)	12 (13.19)	21 (12.43)	-	.03	.86
Attitudes to Ageing						
Psychosocial Loss, *M* (*SD*)	16.50 (4.87)	16.70 (5.21)	16.38 (4.69)	.25	-	.81
Physical Change, *M* (*SD*)	26.83 (5.50)	26.92 (5.10)	26.77 (5.72)	.41	-	.68
Psychological Growth, *M* (*SD*)	26.06 (5.11)	26.48 (5.48)	25.83 (4.88)	.55	-	.58

N*ote.* This table displays the descriptive and inferential statistics calculated prior to MI, except for the t-test results for the AAQ domains, which were conducted post MI. The Cronbach's alpha of the GDS indicated low reliability, thus may be invalid and should be interpreted with caution.

Table 2.2

Pearson Correlation Coefficients of all Variables

	Widowed	Below average finances	Subjective poor health	Living at home unsupported	Depression	Age	Female	Age*female
Widowed	1.00	-.03 (.33)	.06 (.16)	.09 (.09)	-.03 (.30)	.50 (<.001)	.25 (<.001)	.21 (<.001)
Below average finances	-.03 (.33)	1.00	.31 (<.001)	-.03 (.29)	-.11 (.05)	.05 (.21)	.07 (15)	.02 (.41)
Subjective poor health	.06 (.16)	.31 (<.001)	1.00	-.20 (<.001)	-.41 (<.001)	.06 (.15)	-.09 (.07)	.10 (.06)
Living at home unsupported	.09 (.09)	-.03 (.29)	-.20 (<.001)	1.00	.12 (.03)	-.14 (.01)	.12 (.03)	-.07 (.12)
Depression	-.03 (.30)	-.11 (.05)	-.41 (<.001)	.12 (.03)	1.00	-.05 (.21)	.00 (.50)	.10 (.05)
Age	.50 (<.001)	.05 (21)	.06 (.15)	-.14 (.01)	-.05 (.21)	1.00	.10 (.05)	.36 (.12)
Female	.25 (<.001)	.07 (.15)	-.09 (.07)	.12 (.03)	.00 (.50)	.10 (.05)	1.00	-.03 (.05)
Age*female	.21 (<.001)	.02 (.41)	.10 (.06)	-.07 (.12)	.10 (.05)	.36 (<.001)	-.03 (.31)	1.00
PL	.22 (<.001)	.11 (.04)	.37 (<.001)	-.1 (.07)	-.39 (<.001)	.33 (<.001)	-.02 (.40)	.05 (.21)
PC	-.28 (<.001)	-.18 (<.001)	-.37 (<.001)	.10 (.06)	.25 (<.001)	-.27 (<.001)	-.03 (.34)	-.19 (<.001)
PG	-.05 (.22)	-.16 (.01)	-.09 (.09)	-.01 (.46)	.02 (.37)	-.04 (.25)	-.04 (.29)	-.04 (.25)

Note. r (*p*). The Cronbach's alpha of the GDS indicated low reliability, thus may be invalid and should be interpreted with caution.

3.2 Individual Contributions of the Predictors

Contributions of the individual predictors on the AAQ domains post MI are presented in Table 2.3 in order of input into the hierarchical regression models. The independent contributions of gender and age were interpreted using model 2, prior to the addition of the age by gender interaction in model 3. The following text will report and discuss the results in order of hypotheses. Unless otherwise stated, hierarchical multiple regression results are reported.

Table 2.3

Individual Contributions of Predictors on AAQ Domains

AAQ Domain	Model	Predictor	Unstandardised beta *(b)*	*SE(b)*	95% CI for *b* lower	Upper	sr^2	*t*	*p*
Psycho-social Loss	1	Widowed	2.256	.620	1.041	3.471	.040	3.639	<.001
		Below average finances	.220	.920	-1.587	2.026	.000	.239	.811
		Subjective poor health	3.424	.993	1.474	5.374	.038	3.448	<.001
		Living at home unsupported	-.345	.591	-1.504	.814	.001	.584	.560
		Depression	-.491	.110	-.707	-.274	.068	4.463	<.001
	2	Age	.145	.033	.080	.209	.055	4.404	<.001
		Female	-.449	.583	-1.593	.695	.002	.770	.442
	3	Age*Female	-.071	.060	-.189	.047	.004	1.178	.239
Physical Change	1	Widowed	-3.225	.703	-4.606	-1.844	.069	4.585	<.001
		Below average finances	-1.644	1.004	-3.612	.324	.009	1.638	.102
		Subjective poor health	-4.249	1.125	-6.464	-2.035	.049	3.776	<.001
		Living at home unsupported	.594	.652	-.684	1.873	.003	.911	.362
		Depression	.231	.117	.001	.462	.013	1.971	.049
	2	Age	-.078	.038	-.152	-.003	.013	2.040	.040
		Female	.197	.658	-1.092	1.486	.000	.299	.765
	3	Age*Female	-.114	.069	-.249	.022	.008	1.646	.100
Psycho-logical Growth	1	Widowed	-.551	.723	-1.969	.867	.002	.762	.446
		Below average finances	-2.239	1.025	-4.248	-.229	.019	2.184	.029

AAQ Domain	Model	Predictor	Unstandardised beta *(b)*	*SE(b)*	95% CI for *b* lower	Upper	sr^2	*t*	*p*
		Subjective poor health	-.864	1.184	-3.200	1.472	.002	.730	.466
		Living at home unsupported	-.162	.667	-1.470	1.146	.000	.243	.808
		Depression	-.029	.120	-.265	.207	.000	.238	.812
	2	Age	-.007	.039	-.083	.069	.000	.182	.856
		Female	-.194	.686	-1.538	1.151	.000	.282	.778
	3	Age*Female	-.028	.073	-.172	.116	.001	.378	.705

Note. The Cronbach's alpha of the GDS indicated low reliability, thus may be invalid and should be interpreted with caution

3.2.1 Hypotheses 1a-c: Gender

Hypotheses 1a, 1b and 1c predicted that, compared to males, females will report statistically significantly higher scores on the Psychosocial Loss domain and lower scores on the Physical Change and Psychological Growth domains of the AAQ.

Gender did not statistically significantly predict psychosocial loss, physical change or psychological growth, failing to support hypotheses 1a, 1b and 1c (Table 2.3). T-tests conducted before controlling for covariates also indicated no statistically significant gender differences in AtA (Table 2.1).

3.2.2 Hypotheses 2a-c: Age

Hypotheses 2a, 2b and 2c stated that increased age will statistically significantly predict higher scores on the Psychosocial Loss domain and lower scores on the Physical Change and Psychological Growth domains of the AAQ.

As demonstrated in Table 2.3, when controlling for the other demographic variables and depression, age statistically significantly predicted psychosocial loss and physical change, with psychosocial loss increasing with age and physical change scores decreasing (becoming more negatively valenced) with age. This supported hypotheses 2a and 2b. Age did not statistically significantly predict psychological growth, not supporting hypothesis 2c.

3.2.3 Hypotheses 3a-c: The Interaction of Age and Gender

Hypotheses 3a, 3b and 3c predicted that older females, compared to males and younger females, will report the most negative AtA, indicated by statistically significantly higher scores on the Psychosocial Loss domain and lower scores on the Physical Change and Psychological Growth domains of the AAQ.

The age by gender interaction did not statistically significantly predict psychosocial loss, physical change or psychological growth, when controlling for all other covariates (Table 2.3), failing to support hypotheses 3a, 3b and 3c. However, a statistically significant bivariate correlation was identified between the age by gender interaction and Physical Change domain (Table 2.2).

3.2.4 Hypotheses 4a-e, 5a-e and 6a-e: Demographic Variables and Depression

Hypotheses 4a-e, 5a-e and 6a-e stated that negative AtA, defined as higher scores on the Psychosocial Loss domain and lower scores on the Physical Change and Psychological Growth domains of the AAQ will be uniquely predicted by depression, being widowed, not living at home unsupported, having below average finances and reporting poor subjective health.

Of these variables, the only statistically significant predictors of higher psychosocial loss scores and lower physical change scores when controlling for the other demographic variables and depression were: being widowed, poor subjective health and lower depression scores (Table 2.3). This supported hypotheses 4a and c, as well as 5a and c. These findings did not support hypotheses 4b, d and e, or hypotheses 5b, d and e. However, statistically significant bivariate correlations were identified between having below average finances, psychosocial loss and physical change (Table 2.2). Of the demographic and depression variables, the only statistically significant predictor of increased psychological growth was having average or above average finances (Tables 2.2 & 2.3), supporting hypothesis 6b. These findings did not support hypotheses 6a, c, d and e.

3.3 Overall Model Fit

Overall model fit is presented in Table 2.4. The covariates accounted for 20.2 - 26.6% of variance in Psychosocial Loss, which was statistically significant. Gender

and age accounted for an additional 5.2 – 7.3% of variance in Psychosocial Loss, which was also statistically significant. The age by gender interaction explained an additional 0.4 - 0.5% of variance in Psychosocial Loss, which was not statistically significant.

The covariates explained 20.1 – 23.5% of variance in Physical Change, which was statistically significant. Inclusion of age, gender and the age by gender interaction only accounted for an additional 1.1 – 1.6% and 0.7 – 1.1% of variance in Physical Change, which was not statistically significant.

None of the models were statistically significant for Psychological Growth, with the covariates accounting for 2.4 – 3.8% of variance in Psychological Growth, age and gender accounting for an additional 0.0 – 0.3% of variance and the age by gender interaction accounting for a further 0.0 – 0.2% of variance.

Table 2.4

Overall Model Fit

AAQ Domain	Model	Imputation	df	R^2	ΔR^2	Change in F ratio	*p*
Psychosocial Loss	1	Original	5, 193	.202	.202	9.776	<.001
		1	5, 254	.266	.266	18.403	<.001
		2	5, 254	.252	.252	17.134	<.001
		3	5, 254	.250	.250	16.957	<.001
		4	5, 254	.237	.237	15.773	<.001
		5	5, 254	.221	.221	14.384	<.001
	2	Original	2, 191	.276	.073	9.680	<.001
		1	2, 252	.320	.054	9.920	<.001
		2	2, 252	.304	.052	9.364	<.001
		3	2, 252	.305	.055	9.906	<.001
		4	2, 252	.298	.061	10.894	<.001
		5	2, 252	.285	.064	11.281	<.001
	3	Original	1, 190	.280	.005	1.217	.271
		1	1, 251	.323	.004	1.350	.246
		2	1, 251	.308	.004	1.419	.235
		3	1, 251	.309	.004	1.534	.217
		4	1, 251	.301	.004	1.369	.243
		5	1, 251	.288	.004	1.291	.257
Physical Change	1	Original	5, 189	.223	.223	10.866	<.001
		1	5, 254	.229	.229	15.116	<.001
		2	5, 254	.235	.235	15.606	<.001
		3	5, 254	.201	.201	12.773	<.001
		4	5, 254	.224	.224	14.686	<.001
		5	5, 254	.226	.226	14.865	<.001
	2	Original	2, 187	.237	.014	1.668	.190
		1	2, 252	.246	.016	2.721	.068
		2	2, 252	.251	.016	2.697	.069
		3	2, 252	.212	.012	1.850	.159
		4	2, 252	.238	.013	2.201	.113
		5	2, 252	.237	.011	1.825	.163
	3	Original	1, 186	.248	.011	2.741	.099
		1	1, 251	.255	.010	3.205	.075
		2	1, 251	.258	.007	2.424	.121
		3	1, 251	.220	.008	2.523	.113
		4	1, 251	.246	.008	2.802	.095
		5	1, 251	.246	.008	2.766	.098
Psychological Growth	1	Original	5, 193	.036	.036	1.455	.206
		1	5, 254	.038	.038	2.033	.075
		2	5, 254	.034	.034	1.807	.112
		3	5, 254	.029	.029	1.502	.190
		4	5, 254	.024	.024	1.249	.287
		5	5, 254	.030	.030	1.549	.175

AAQ Domain	Model	Imputation	df	R^2	ΔR^2	Change in F ratio	*p*
	2	Original	2, 191	.040	.003	.345	.708
		1	2, 252	.039	.000	.063	.939
		2	2, 252	.035	.001	.107	.899
		3	2, 252	.029	.000	.038	.963
		4	2, 252	.024	.000	.030	.970
		5	2, 252	.030	.001	.078	.925
	3	Original	1, 190	.040	.000	.075	.784
		1	1, 251	.040	.001	.144	.705
		2	1, 251	.035	.000	.011	.915
		3	1, 251	.029	.000	.101	.751
		4	1, 251	.025	.001	.221	.639
		5	1, 251	.032	.002	.444	.506

Note. Model fit should be interpreted with caution, given the low Cronbach's alpha of the GDS entered in model one.

4.0 Discussion

The current study investigated, within a UK sample of older people aged 60 – 100 years, whether age, gender and the interaction of age and gender are associated with AtA. Whilst gender and the age by gender interaction were not statistically significantly associated with AtA, age was statistically significantly associated with two domains of the AAQ (Psychosocial Loss and Physical Change).

4.1 Gender

Despite the study being sufficiently powered to detect small effects, statistically significant gender differences were not identified in any of the AAQ domains, thus not supporting hypotheses 1a, b and c.

The analyses of covariates (Table 2.1) indicate the current study's male and female ageing experiences are inconsistent with the evidence base, with no statistically significant gender differences regarding financial status (European Commission, 2018), subjective health status (Carmel, 2019), and living arrangements (Henning-Smith, 2016). This is, however, consistent with the

descriptive statistics of the demographic characteristics reported by Kalfoss et al. (2016). Bryant et al. (2012) and Top et al. (2013) did not report descriptive statistics for males and females separately.

The current study's findings that gender does not statistically significantly predict AtA are consistent with the data from community samples using the AAQ across the world (Bryant et al., 2012; Kalfoss, 2016; Top et al., 2013). However, Shenkin et al. (2014) in a UK longitudinal sample of community dwelling older people, found females reported more positive attitudes in comparison to males within the AAQ physical change domain, with these differences statistically significant. Whereas the current study's participant ages ranged 60 – 100, all participants in Shenkin et al.'s (2014) study were approximately 73 years old at the time of AAQ completion, which could provide an explanation for the differing findings. Perhaps gender differences in physical abilities and/or attitudes related to this may be more or less prominent at certain timepoints within later life, rather than declining in a linear fashion across the whole of later life. Thus, gender differences in AtA may not be identifiable when examining older people as one large age category.

Being widowed statistically significantly predicted higher psychosocial loss scores and lower physical change scores. This could suggest that there may be gender differences in AtA, as the females in this sample were more likely to be widowed (Table 2.1). Perhaps the difference in AtA are not explicitly referenced by participants as a global construct (gender) but are present in the objective demographic data. The AAQ reports general (old age is a time of loneliness) and individual experiential attitudes (my identity is not defined by my age) and it possible that at an item level gender differences may emerge, which was found by Kalfoss

(2016). However, as already discussed, the demographic characteristics of Kalfoss' (2016) sample were limited, potentially reducing generalisability of study findings.

It is also possible that regardless of the nature and extent of gender inequalities experienced whilst ageing (e.g., being widowed, financial difficulties etc.), AtA remain relatively unaffected. SST may provide a potential explanation for this, as within the context of a person's life circumstances, they may carefully select goals and utilise the resources they have available to meet these, thereby maximising gains and minimising losses, subsequently optimising their well-being and AtA.

4.2 Age

Support was provided for hypotheses 2a and b, with age predicting two domains of AtA, contributing to the mixed findings of the evidence base regarding the association between age and AtA (Bryant et al., 2012; Shenkin et al., 2014; Top et al., 2013). As hypothesised, older age statistically significantly predicted higher psychosocial loss, supporting Bryant et al.'s (2012) findings. As hypothesised, older age predicted less favourable ageing attitudes related to physical change, inconsistent with Top et al.'s (2013) findings within a Turkish sample, where older age predicted more favourable ageing attitudes related to physical change. It is possible that this could reflect cultural differences between the UK and Turkey, given cultural differences can shape the ageing experience (Cramm & Nieboer, 2017). Korkmaz Aslan (2019) states that Turkish culture involves parents supporting children well into adulthood and the children generally adopting the carer role for their parents. Age was statistically significantly correlated with covariates being widowed (large effect size) and living at home unsupported (small effect size),

factors that could feasibly predict AtA, albeit living at home unsupported did not make a unique contribution to AtA in this sample.

Age did not statistically significantly predict psychological growth, not supporting hypothesis 2c, but consistent with the existing evidence base (Bryant et al., 2012; Shenkin et al., 2014; Top et al., 2013). It could be hypothesised that age differences in psychological growth may only become evident when ageing becomes more challenging, such as at the later years of later life. Therefore, the age range of the current sample may have been too large to detect such effects within a specific timepoint. Additionally, some individual items of the AAQ may be more sensitive to age than others, which may have prevented statistical significance at a domain level.

4.3 The Interaction of Gender and Age

The age by gender interaction did not statistically significantly predict AtA, thus did not provide support for hypotheses 2a, b and c, despite the study being sufficiently powered to detect small effects if present. Given these hypotheses were informed by the assumption that disadvantages resulting from intersecting age and gender identifies would impact upon ageing experiences, the non-significant findings could be partially attributed to the lack of qualitatively different ageing experiences reported by males and females in this sample (Table 2.1). Consistent with the differing life expectancies of males and females (UN, 2017), the current sample contained more females than males, particularly in the oldest ages. This may have reduced the ability to achieve a sensitive data analysis for the older ages, subsequently contributing to challenges identifying an age by gender interaction. As already suggested, the large age range of participants may have led to challenges detecting the nuanced differences in ageing experiences. For example, individuals in the latest stages of later life may generally experience more age-related challenges

than those at the earlier stages of later life. Furthermore, in the latest stages of later life, there is a higher proportion of females than males, plus the surviving males will likely have different experiences to the females in terms of being less likely to be widowed (Henning-Smith, 2016) and having more financial security (European Commission, 2018).

4.4 Sociodemographic Variables and Depression

Some of the demographic and depression variables statistically significantly predicted domains of the AAQ prior to controlling for age and gender, supporting hypotheses 4a and c, 5 a and c, and 6b.

Although being widowed and having poor subjective health were hypothesised to be statistically significantly associated with all three domains of the AAQ, they were only statistically significantly associated with increased psychosocial loss and less favourable ageing attitudes related to physical change when controlling for other covariates. It could be hypothesised that these two domains of AtA are affected by being widowed and subjective poor health, but psychological growth is not, as awareness of age-related changes (AARC; Diehl & Wahl, 2010) may be more easily achievable in these two domains, compared to the more abstract psychological growth. For example, becoming widowed and poor health could clearly be interpreted as a psychosocial loss and may highlight an individual's physical challenges/fragility by removing informal care potentially provided by the spouse (van Boekel et al., 2019). It is also possible that attitudes related to psychological growth have more stability and are less affected by stressors than other domains of AtA. This study's results are partially consistent with Bryant et al.'s (2012) finding that participants who were partnerless reported more negative AtA in regards to

psychosocial loss, though this relationship was also identified for psychological growth.

Although having below average finances was hypothesised to be statistically significantly associated with all three domains of the AAQ, it was only statistically significantly associated with reduced psychological growth when controlling for other covariates. This is inconsistent with the findings of Bryant et al. (2012), whereby poorer financial status was statistically significantly associated with negative attitudes regarding psychosocial loss and physical change, but not psychological growth. The current study's findings suggest financial insecurity may not necessarily impact upon perception of psychosocial losses (perhaps a reduction in finances is expected in older age so is not interpreted as a loss) or physical changes, but could affect psychological growth. This could be explained by Maslow's (1943) hierarchy of needs, a theory of motivation that states humans have a set of needs that are arranged hierarchically, with deficiency needs located at the bottom of the hierarchy that must be satisfied before growth needs higher up the hierarchy can be satisfied. Therefore, finances may facilitate fulfilment of basic needs, thereby providing opportunity to attend to higher psychological needs such as psychological growth (e.g., facilitating new hobbies/projects). It appears that finances are a significant limiter on psychological growth as we age.

Living at home unsupported was not statistically significantly associated with any of the AAQ domains, not supporting hypotheses 4d, 5d and 6d. The findings may be partially explained by the variable potentially not capturing what was intended, an indication of people living at home alone, an important gender difference in ageing experiences (Henning-Smith, 2016), as whilst it demonstrated whether a person was unsupported, it could not demonstrate if they lived alone.

Additionally, given all predictors control for each other in multiple regression, it is feasible that any contribution of living arrangements may have been adequately captured by the other variables. For example, living at home unsupported was statistically significantly correlated with subjective poor health, depression, age and gender, with these correlations small in size.

Higher depression scores did not statistically significantly predict lower psychological growth, less favourable ageing attitudes related to physical change or higher psychosocial loss, not supporting hypotheses 4e, 5e and 6e and the evidence base (Chachamovich et al., 2008). When interpreting this finding, it must be noted that the majority of the sample scored within the mild or severe depression range. The somewhat uniform distribution of depressive symptoms in this sample may have restricted the variance in AtA explained by depression. However, higher depression scores statistically significantly predicted more favourable ageing attitudes related to physical change and less psychosocial loss, a positive pattern of AtA. Although supporting evidence could not be identified, a potential tentative explanation for this finding is that individuals with increased depressive symptomology may possibly misattribute losses and changes they experience during ageing to depression, thus AtA may not become more negative with age. Other relevant literature suggests an alternative pattern, in which individuals' awareness of age-related losses is linked to an increase in depressive symptomology (Dutt & Wahl, 2019). The Cronbach's alpha for depression score was low, which could indicate reliability issues with that variable and that the GDS data may be invalid. Removing depression from the analysis was, therefore, considered. However, from a theoretical perspective, there was strong reason to retain depression in the analysis and subsequently interpret the findings in a cautious and advisory manner, as relationships have consistently been identified

between AtA and depression (Bai et al., 2016; Chachamovich et al., 2008; Kim et al., 2016; 2019; Segel-Karpas et al., 2022), thus not including depression would be a noticeable omission. Additionally, Taber (2017) reports that the alpha statistic is specific to a particular administration of an instrument for a particular sample on a particular occasion, thus should not be assumed to be a fixed feature of the instrument. This is relevant, as participants completed the GDS in differing ways, some with researchers and others independently (at testing centres or via post). As the GDS is a diagnostic (rather than symptom severity) measure, it is possible that administering this measure to a by and large healthy, non-depressed sample may result in odd or uneven responses, which could be reflected in the Cronbach's alpha. We should not, therefore, assume that the GDS will perform in exactly the same way for depressed and non-depressed samples. Cronbach (1951) argued that, although higher Cronbach alpha scores are desirable, it is more important for scores to be interpretable, which is often possible without high Cronbach alpha scores.

4.5 Strengths and Limitations

A strength of the study is the large sample size upon which the analysis was conducted, contributing to a well-powered study able to detect small effects. Another strength is the psychometrically robust measure of AtA utilised.

Several limitations of the study are acknowledged. The first limitation is that the sample contained a large age range of participants. Whilst this was intended to allow thorough inspection of the linear effects of ageing across later life, it did not acknowledge that later life can be viewed as involving multiple life phases (Smith, 2002) reflecting qualitatively different ageing experiences (Au et al., 2017; Park et al., 2019; von Humboldt & Leal, 2015). Thus, the use of one, large age category may have provided less opportunity to identify nuanced effects of ageing at different

timepoints of later life, than if the sample had been disaggregated into multiple later-life age categories. Additionally, the study solely investigated linear associations between age and AtA, thus was not able to explore potential non-linear relationships. This may be important given studies have consistently identified a non-linear U-shaped relationship between age and happiness during adulthood (Graham & Ruiz Pozuelo, 2017).

It is also acknowledged that adopting the well-used methodology of including or excluding participants into the study based upon chronological age has limitations. Chronological age may not correspond with other markers of ageing, such as disability, marital status, retirement status, living arrangements, or subjective age (Bowling et al., 2005). It may have been beneficial to include subjective age as an additional predictor, given studies have identified an association between subjective age and AtA in the form of AtA moderating the relationship between subjective age and other variables, such as well-being (Mock & Eibach, 2011) and depression symptoms (Segel-Karpas et al., 2022).

Generalisability may be limited by some characteristics of the participants, which may possibly have been influenced by opportunistic sampling, as individuals that chose to participate in the study may differ in characteristics to those that did not. For example, the sample was relatively healthy and wealthy, factors that could be hypothesised to provide a more comfortable and positive ageing experience in comparison to ageing in poor health and financial insecurity. Generalisability may also be limited by the majority of the sample (95.71%) scoring within the mild to moderate depression range (the reason for the high prevalence of depressive symptoms in this sample is unclear), thus does not represent the 8.7% prevalence of depression in the general British and Welsh older people population (McDougall et

al., 2007). As already discussed, this may have restricted the variance in AtA explained by depression.

The use of gender as a binary variable, thus not allowing for inclusion of individuals who do not identify their gender in this way, could also be considered a limitation. A review of 43 studies conducted worldwide (Goodman et al., 2019) concluded that the reported proportion of adults identifying as transgender or gender non-conforming ranged from 0.1 – 2.0%. However, evidence specific to the older people population is lacking. In light of these statistics, it is likely that the binary use of gender had limited impact on the current study overall. However, it could be speculated that there is even greater heterogeneity in the ageing experiences of people who identify as non-binary, given potential challenges faced at a societal and systemic level (Bariola et al., 2015; Matsuno & Budge, 2017).

A final limitation of the study is that the role of socioeconomic status (SES) was not able to be considered, as a result of this data not being present in the pre-existing database utilised for the current study. As stated in the author's declaration, the use of secondary data was partially made in response to the COVID pandemic. Lower SES has been associated with poorer physical health (Schöllgen et al., 2010), poorer mental health (American Psychological Association, 2010; Luo & Waite, 2005) and poorer cognition (Luo & Waite, 2005) in later life. Additionally, it could be hypothesised that experiencing lower SES may inhibit retirement, as a result of accumulating less financial security over the lifetime than individuals experiencing higher SES. These are factors that could impact upon individuals' ageing experiences; thus, SES would be important to consider in further research. Although the current study could not explore SES directly, financial status was included as a covariate in an attempt to provide some insight into this area.

4.6 Implications and Future Directions

The findings of the current study have implications for clinicians supporting the mental health of older people. As AtA are associated with well-being, psychological support aiming to increase the well-being of older people may be improved by taking AtA into consideration during assessment and age-appropriate formulation, to facilitate understanding of the person's mental health presentation. Factors such as age, marital status, subjective health status and finances should be routinely considered, given their relationship with AtA. These factors could be utilised to attempt to identify individuals who may be at greater risk of experiencing poor AtA. Psychoeducational interventions could be implemented to introduce the concept of AtA and association with health and well-being outcomes, whilst attempting to improve AtA. The current study's findings may serve as a reminder to clinicians that there is heterogeneity within the older people population, thus person-centred mental health care is essential.

It could be beneficial for this study to be replicated in separate samples of older people according to age (e.g., 60 – 74 years and 75+ years) consistent with previous gerontological research (Au et al., 2017; Park et al., 2019). This would provide an opportunity to understand if predictors of AtA vary across age groups and explore nuanced effects of ageing. Via longitudinal studies, it may also be beneficial to elucidate if the statistically significant relationships identified in the current study are maintained over time and whether the predictors can predict change in AtA over time.

4.7 Conclusion

AtA are associated with a range of outcomes, including psychological well-being and quality of life (Bryant et al., 2016; Chachamovich et al., 2008; Kalfoss et

al., 2010; Mock & Eibach, 2011; Top et al., 2013). This was one of few studies exploring differences in AtA within the older people age group and, to the researcher's knowledge, the first to explore whether the interaction of age and gender is associated with AtA.

Age was statistically significantly associated with components of AtA, specifically increased psychosocial loss and negatively valenced attitudes towards age-related physical changes, which appear to be a realistic appraisal of the trajectory of ageing. This relationship did not extend to psychological growth. Furthermore, gender, as well as its interaction with age were not statistically significantly associated with AtA as measured by the AAQ in this sample. These findings may partially be attributed to the ageing experiences and characteristics of the sample possibly not being representative of the general older people population and the data being analysed as one whole dataset. Poor subjective health, below average finances and widowhood are associated with negative AtA for both genders. However, as females are more likely to experience these factors than males in the general population, especially in later years, (though there were not gender differences regarding subjective health and finances in the current sample,) may be at greater risk of endorsing negative AtA than males. It is essential to facilitate the well-being of the increasing number of people growing into later life by better understanding ageing in a more psychologically sophisticated way, considering idiosyncratic experience within a generational context. By better understanding ageing and the developmental process, success of psychological interventions could be improved.

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Appendices

Appendix A: Ethical 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 Alex Brierley

Ethics application - eCLESPsy002011
Does Gender Affect Older Peoples’ Attitudes Towards Ageing?

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:
In the Appendix of the DClinPsy thesis, it would be helpful to include a copy of the original consen
t form for the study as evidence that participants consented to their data being used in future research.

- 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

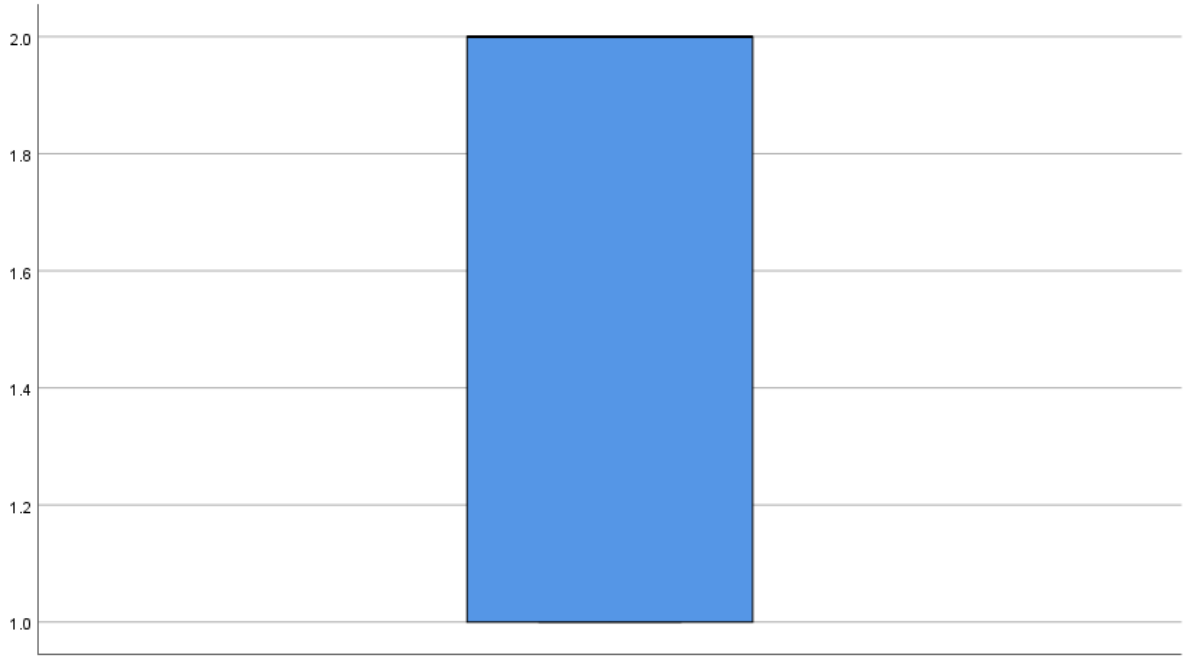
Date: 01/11/2021

CLES – Psychology Ethics Committee

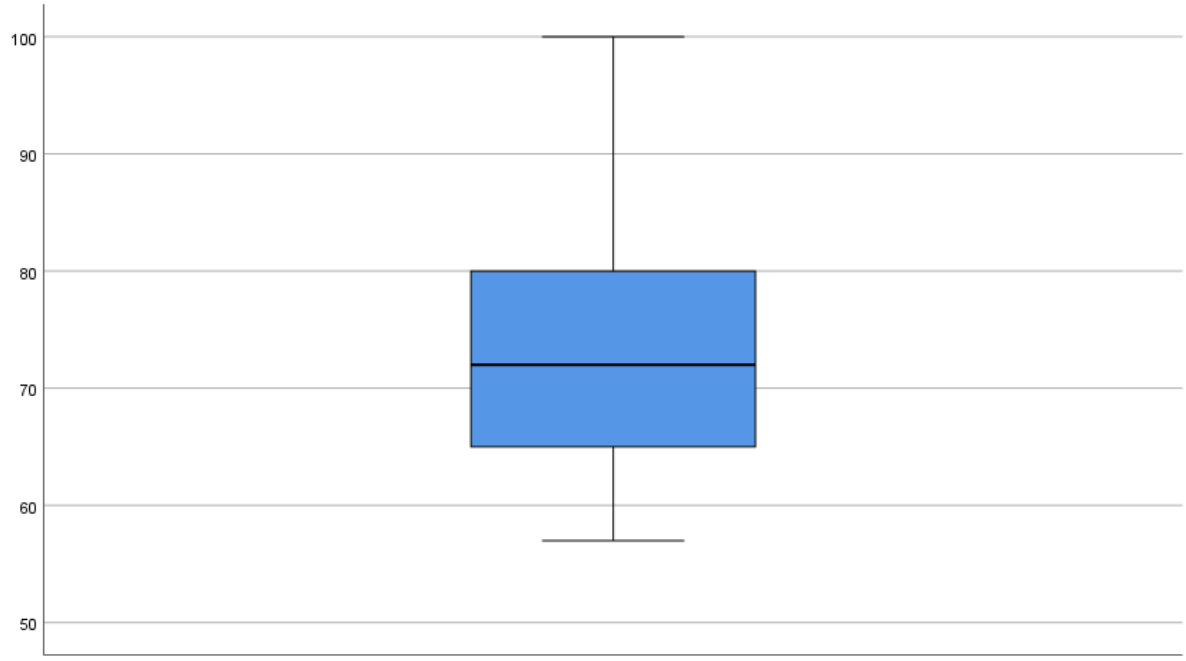
Appendix B: Boxplots for Univariate Outliers

Please note that the boxplots include participant ID 565, who was then removed from the dataset once identified as a multivariate outlier.

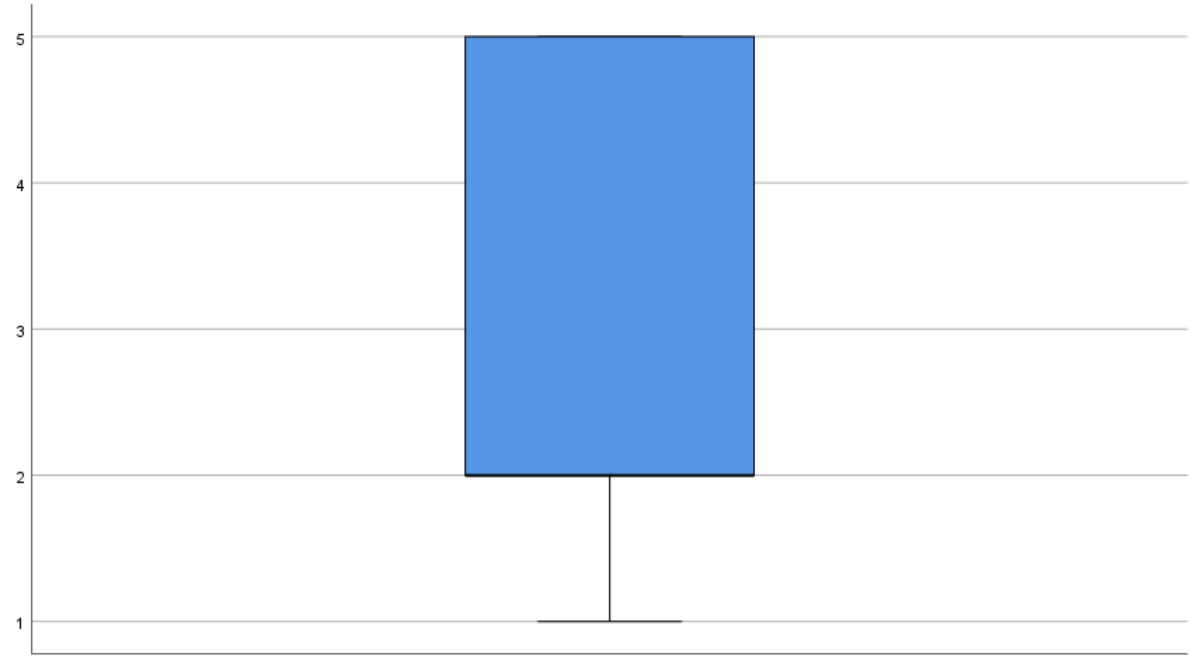
Gender



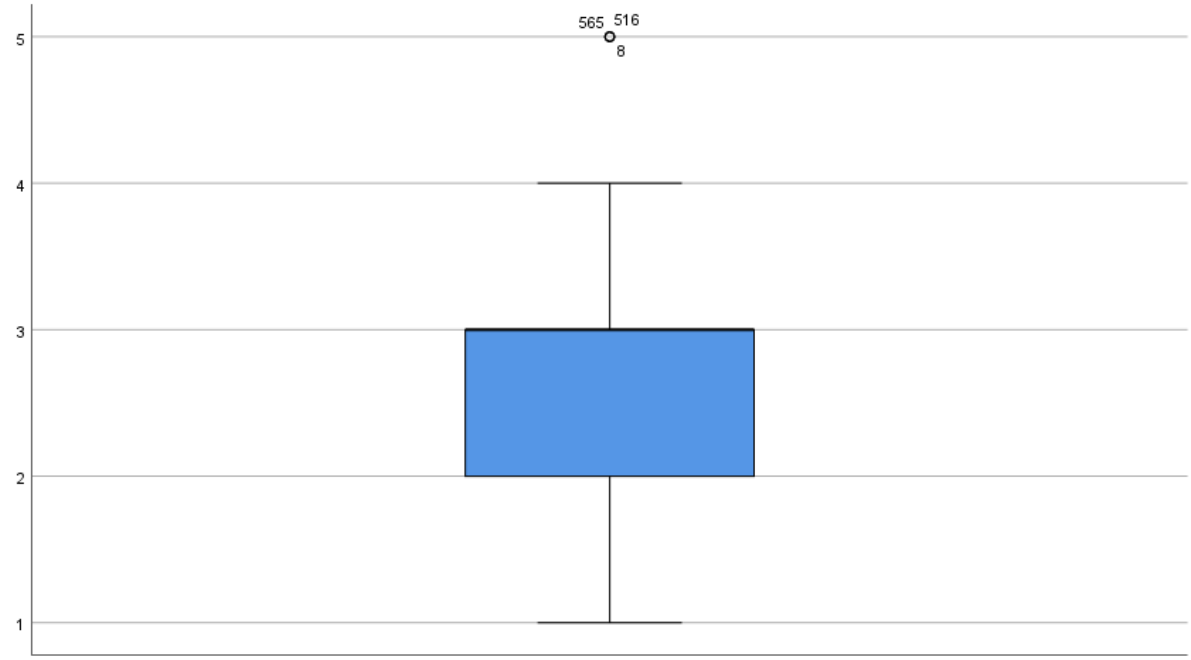
Age



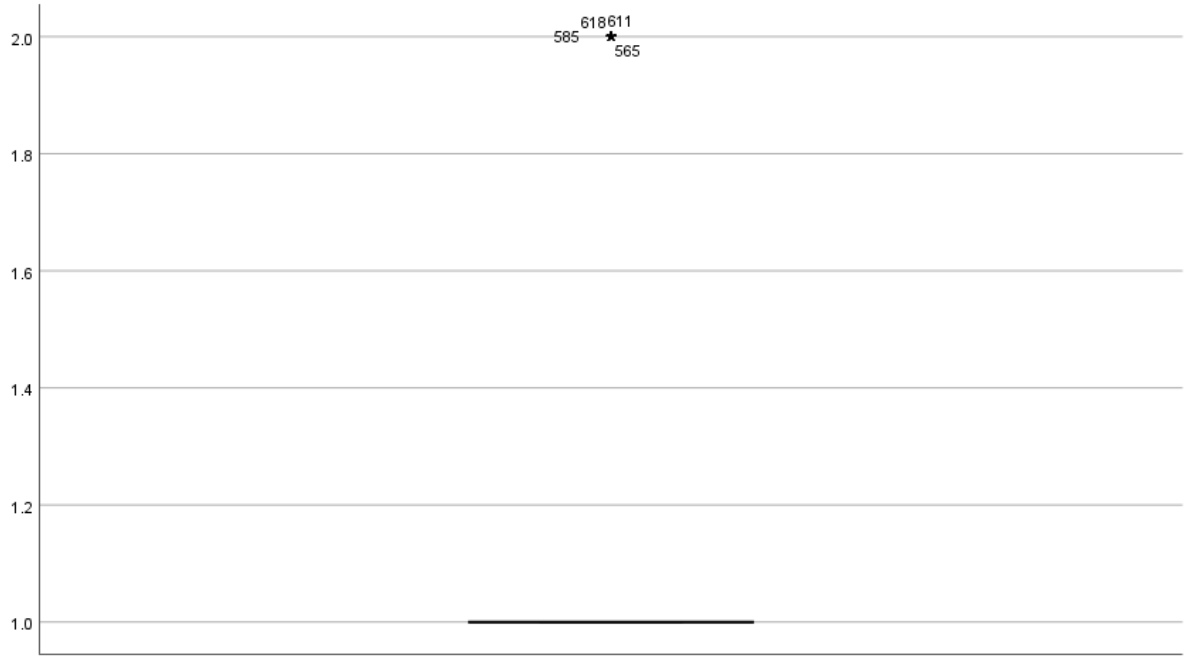
Widowed



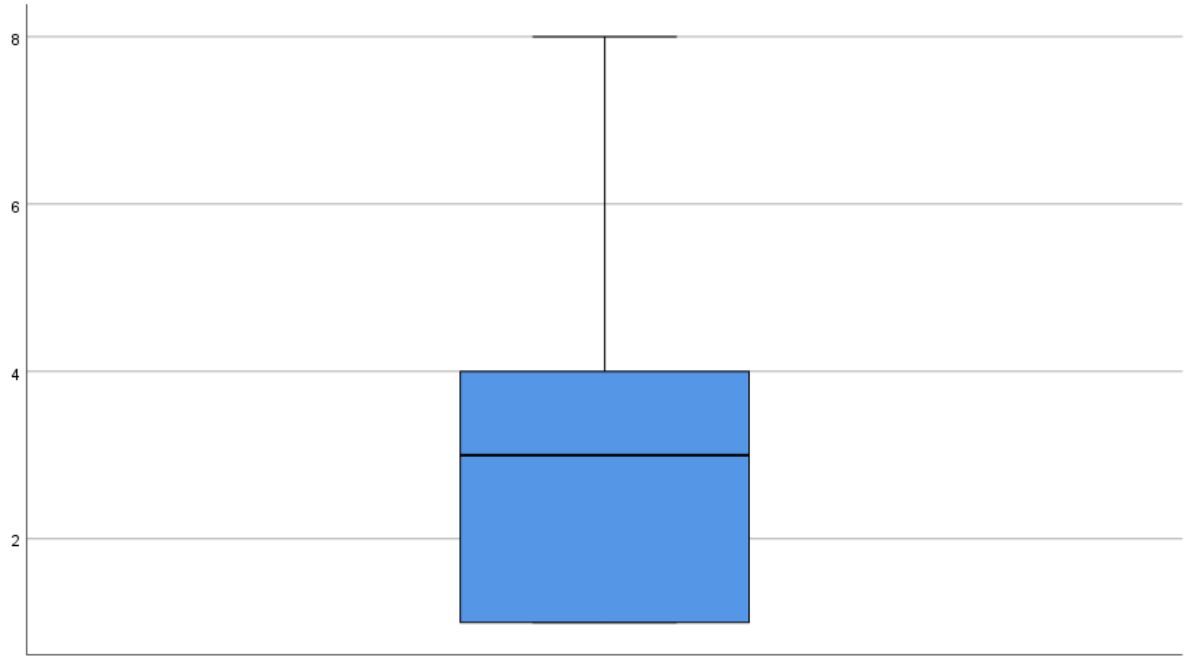
Financial Status



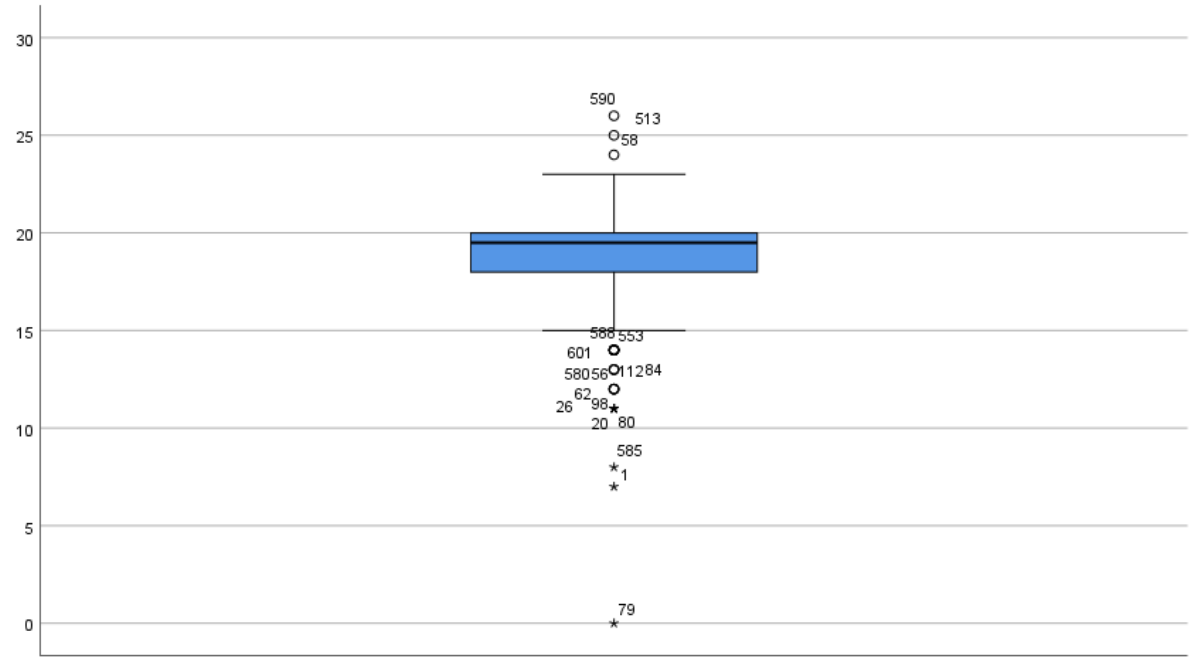
Subjective Health Status



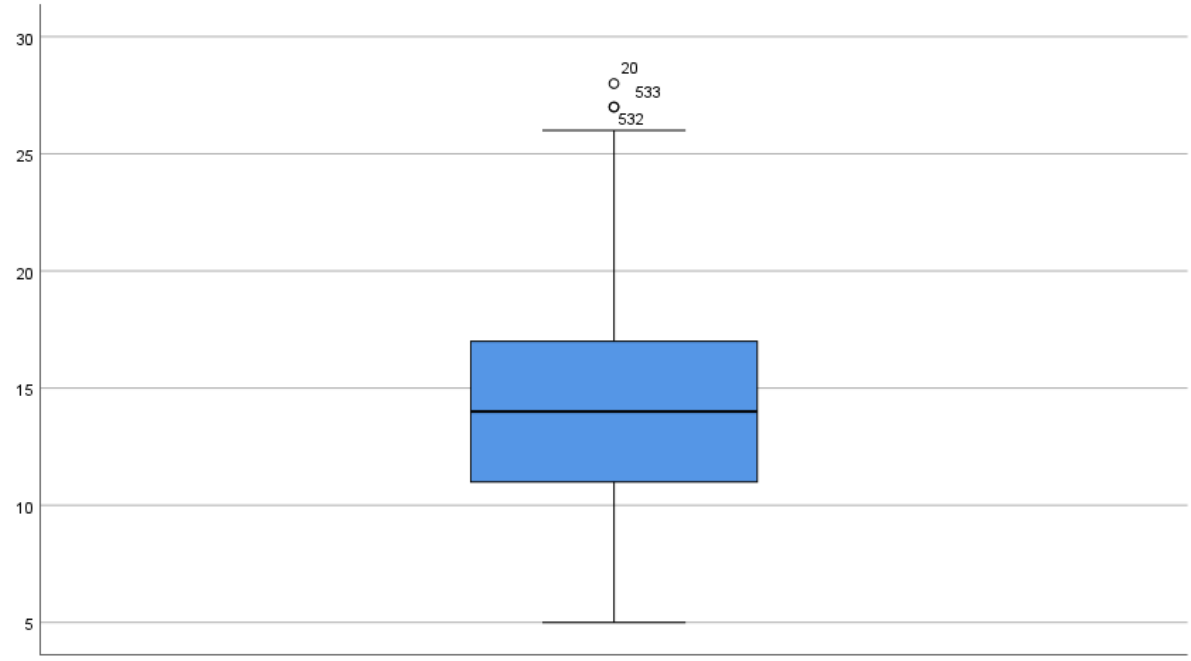
Living Arrangements



GDS Total Score



PL



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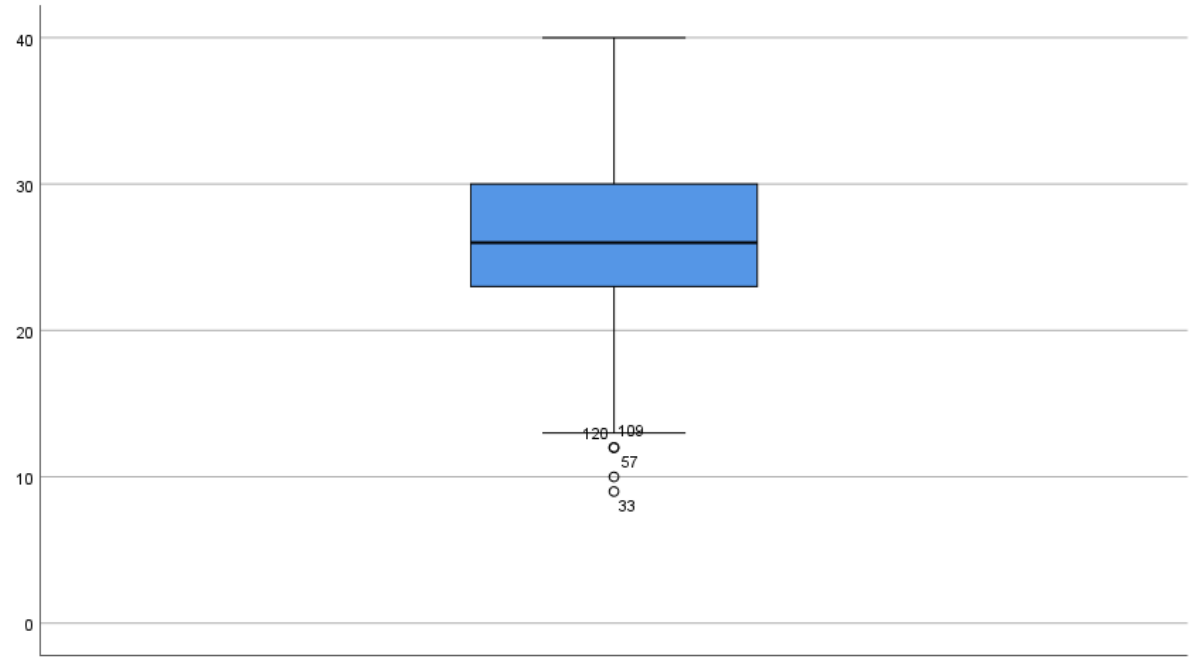

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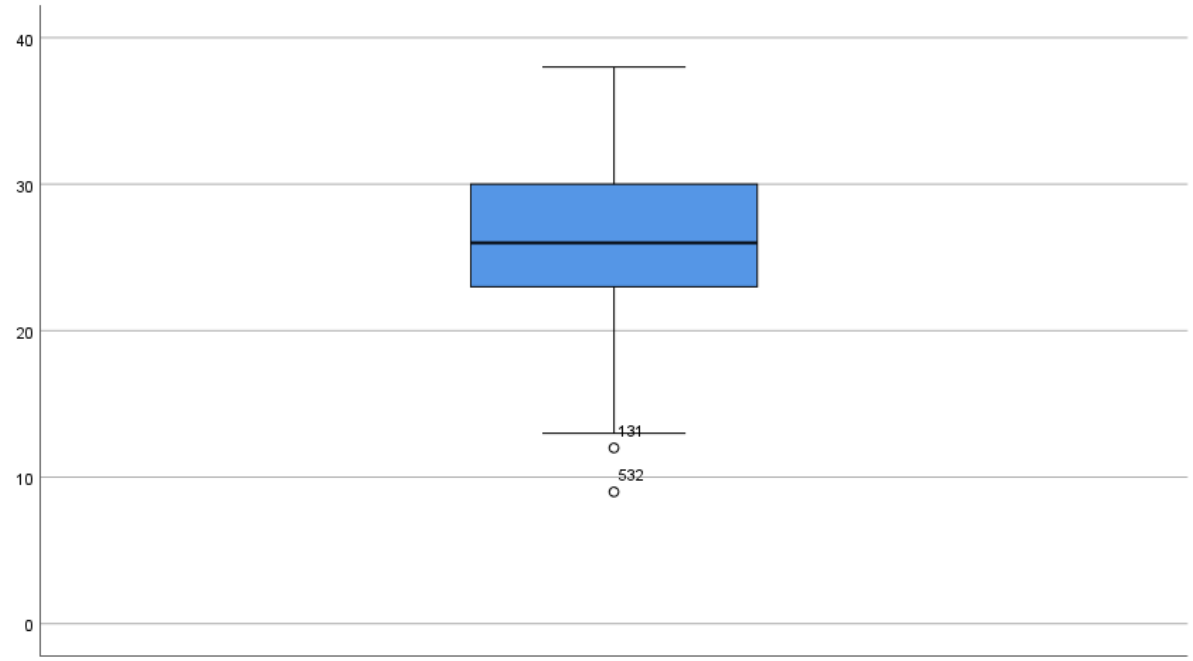
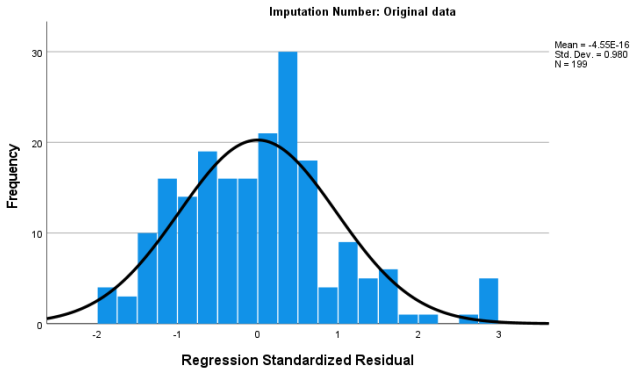
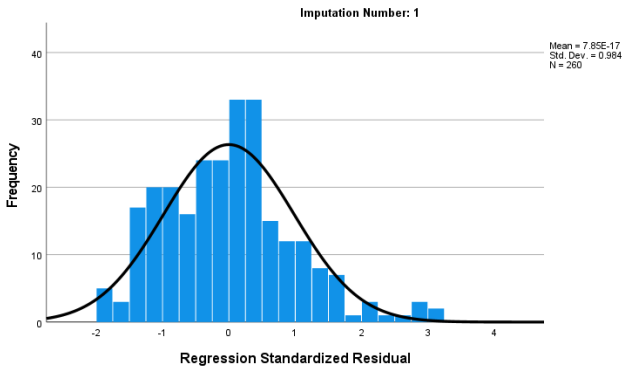
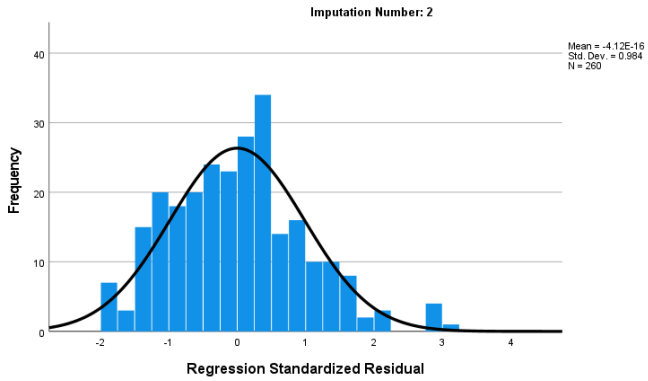


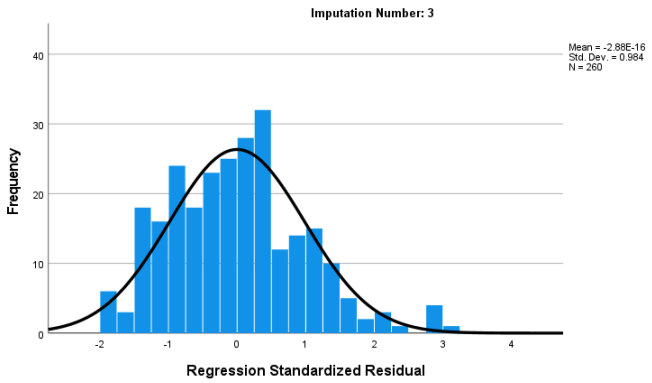
Appendix C: Histogram of Standardised Residuals

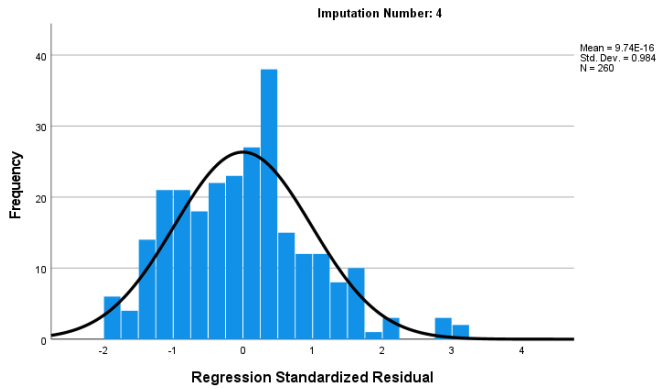
PL

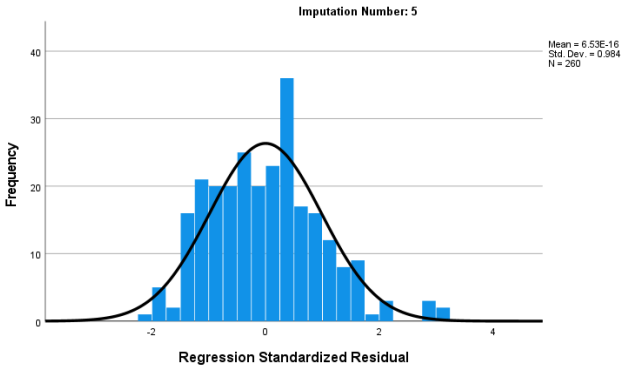




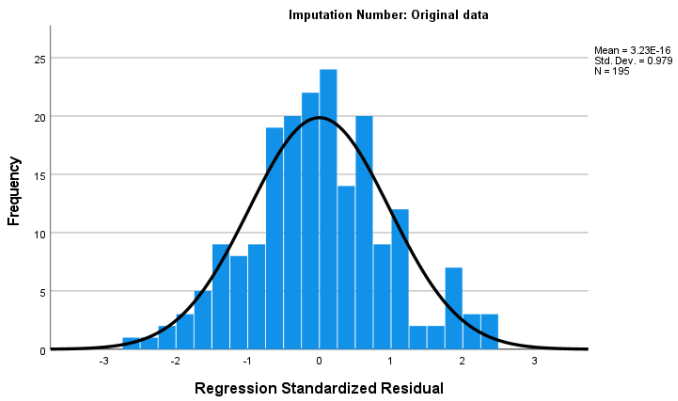


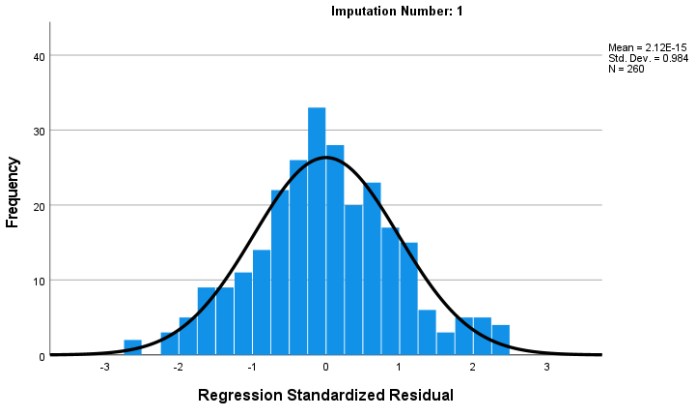


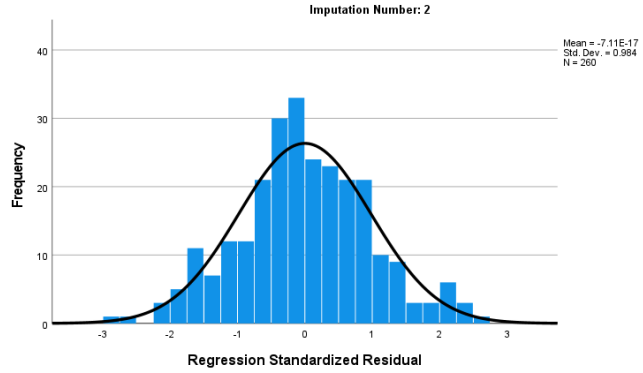


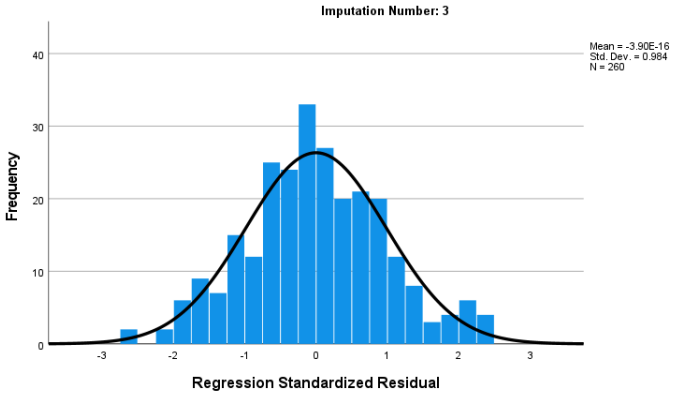


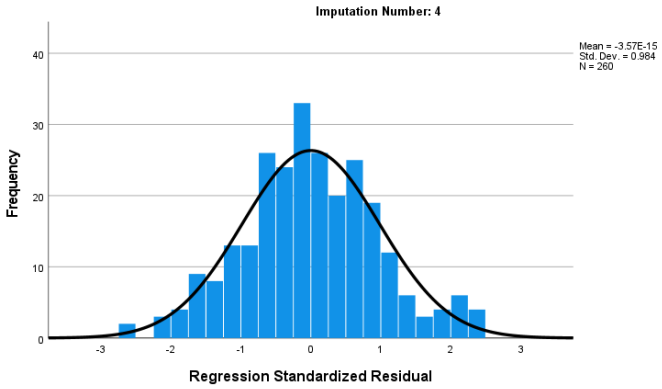
PC

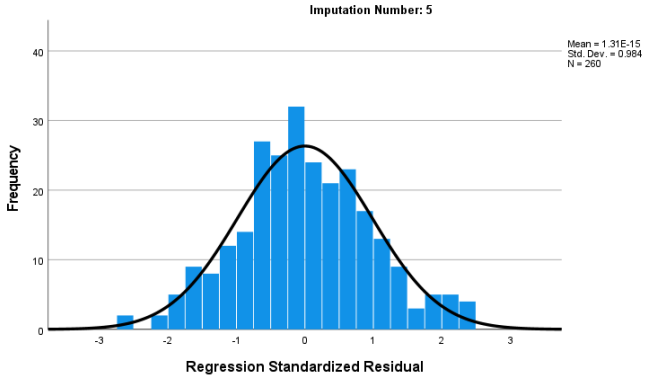

Imputation Number: Original data
Mean = 3.23E-16
Std. Dev. = 0.979
N = 195
Frequency
Regression Standardized Residual


Imputation Number: 1
Mean = 2.12E-15
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

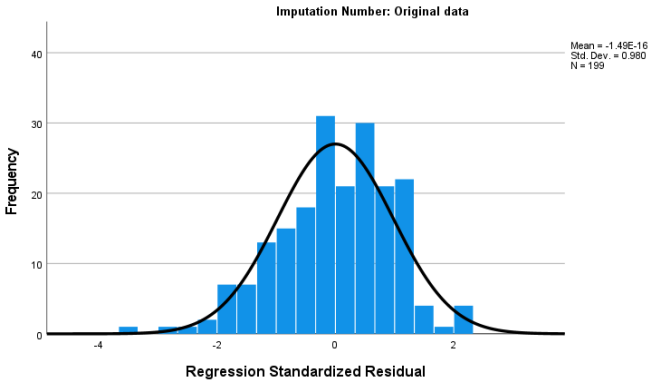

Imputation Number: 2
Mean = -7.11E-17
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

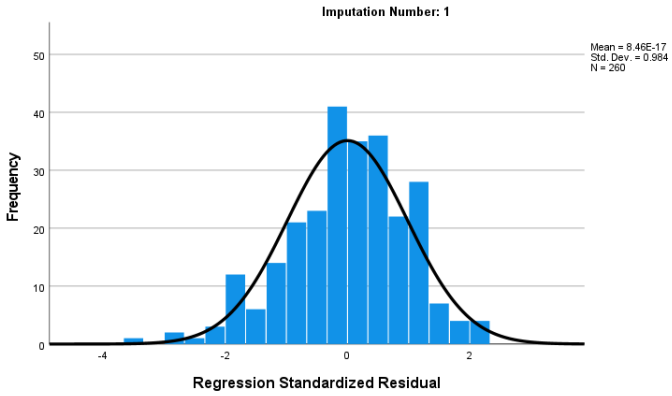

Imputation Number: 3
Mean = -3.90E-16
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

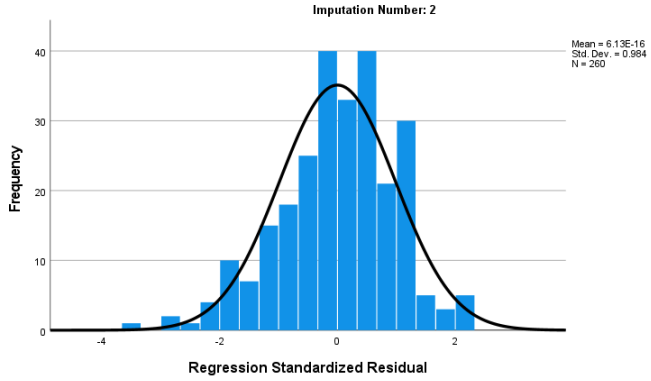

Imputation Number: 4
Mean = -3.57E-15
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

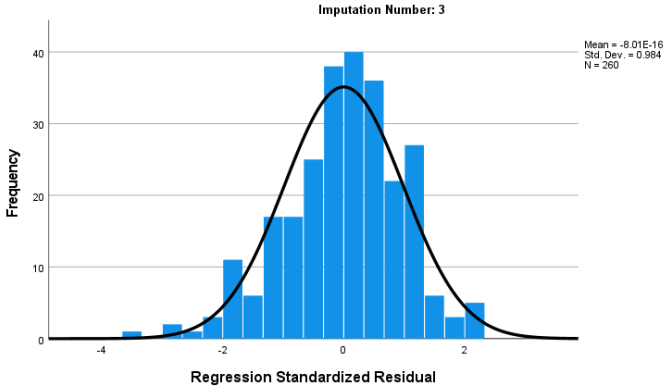

Imputation Number: 5
Mean = 1.31E-15
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

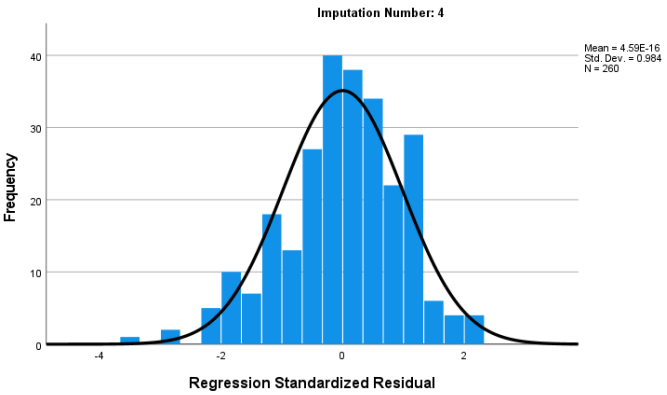
PG

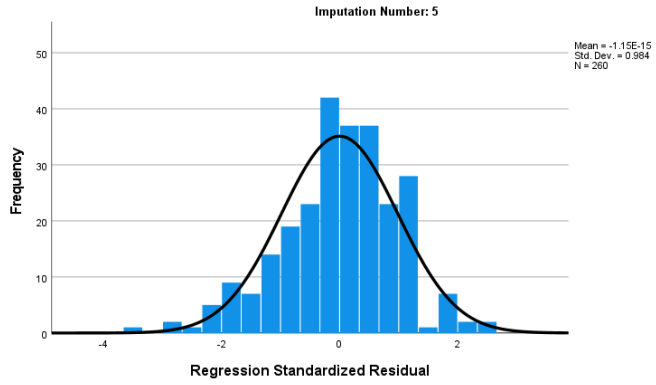

Imputation Number: Original data
Mean = -1.49E-16
Std. Dev. = 0.980
N = 199
Frequency
Regression Standardized Residual


Imputation Number: 1
Mean = 8.46E-17
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual


Imputation Number: 2
Mean = 6.13E-16
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

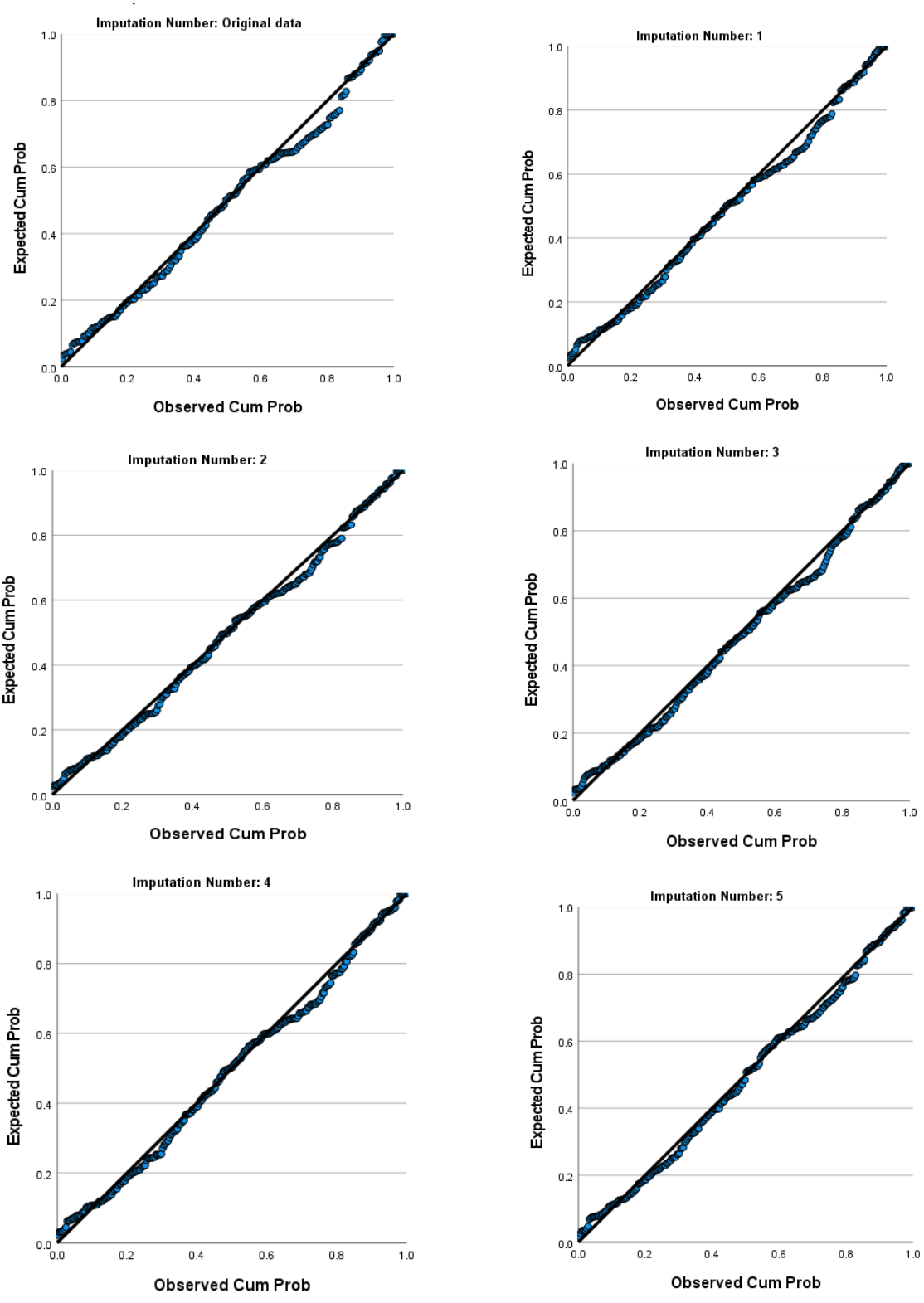

Imputation Number: 3
Mean = -8.01E-16
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual


Imputation Number: 4
Mean = 4.59E-16
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

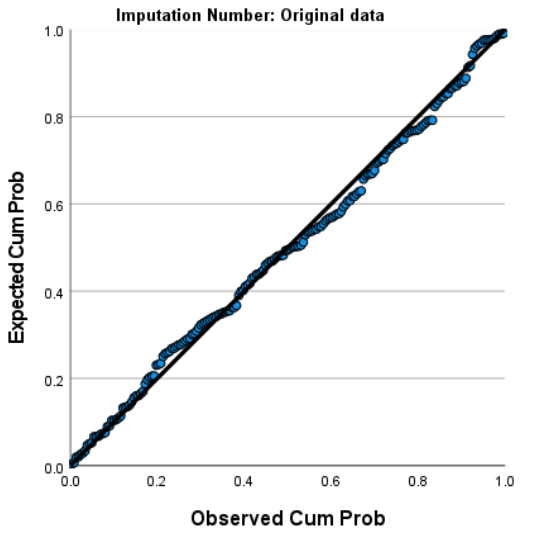

Imputation Number: 5
Mean = -1.15E-15
Std. Dev. = 0.984
N = 260
Frequency
Regression Standardized Residual

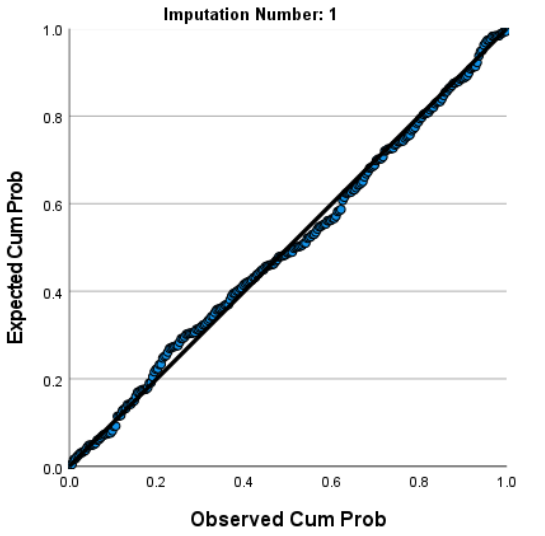
Appendix D: Normal P-P Plot of Standardised Residuals

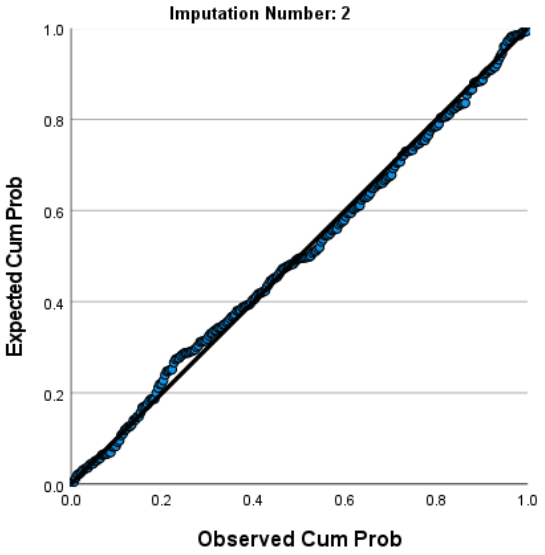
PL

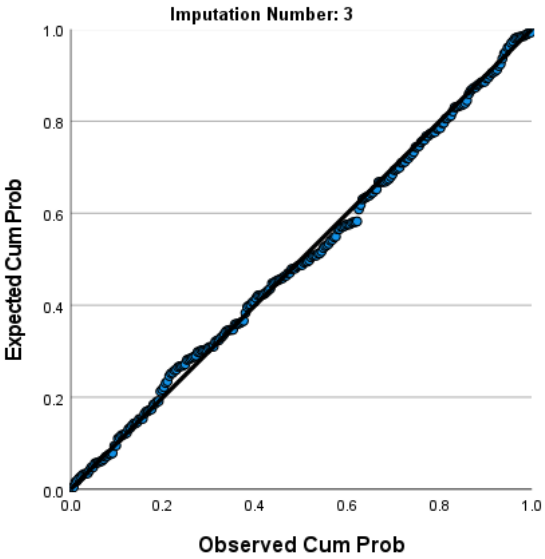


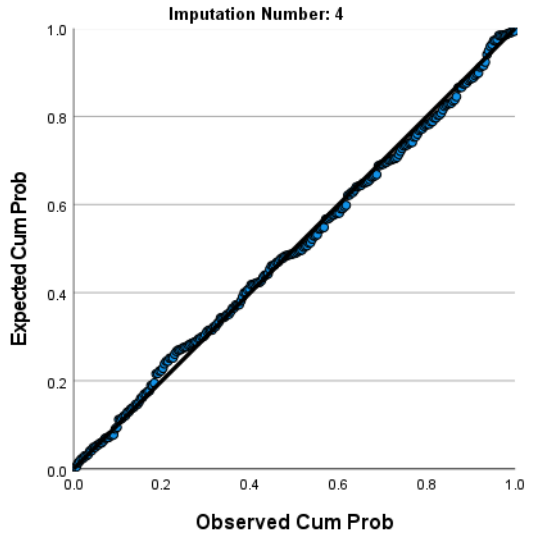
PC

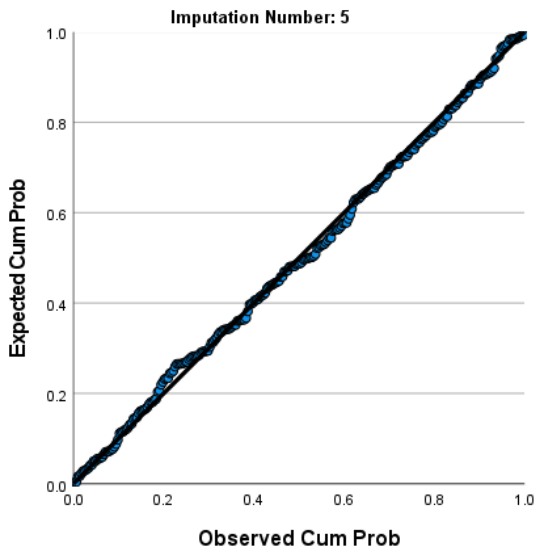

Imputation Number: Original data
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Imputation Number: 1
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

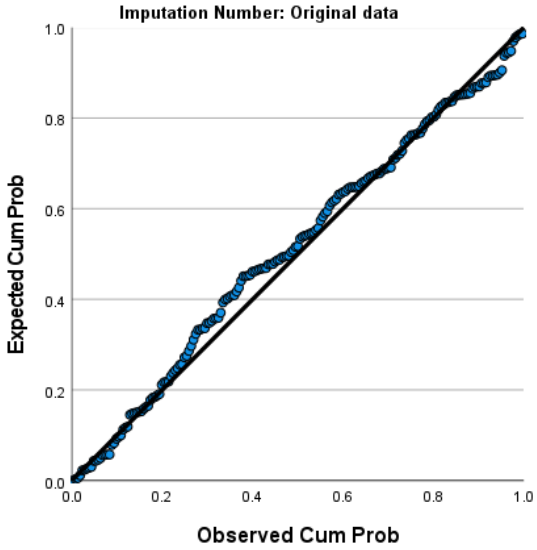

Imputation Number: 2
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

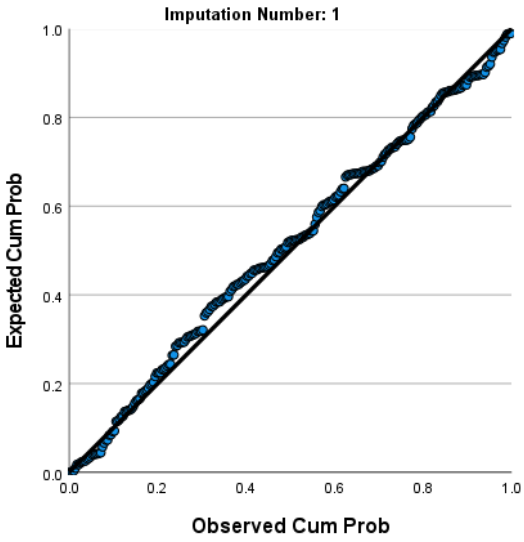

Imputation Number: 3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

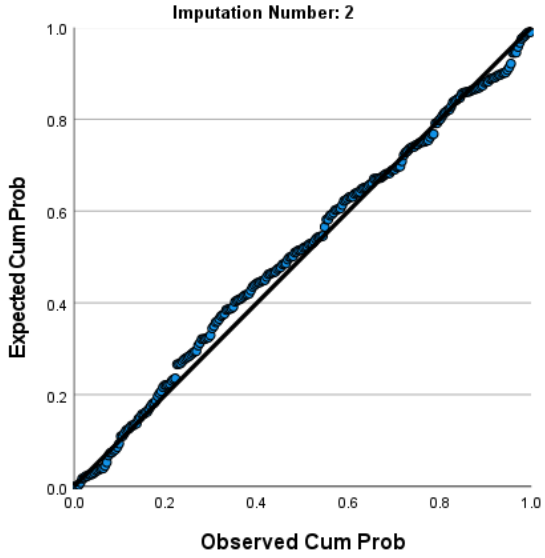

Imputation Number: 4
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

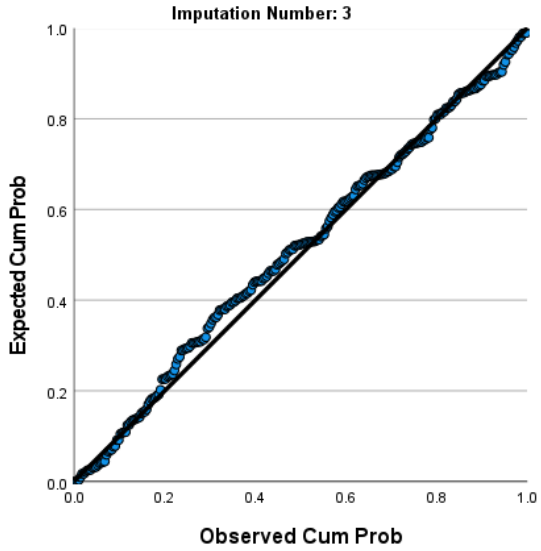

Imputation Number: 5
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

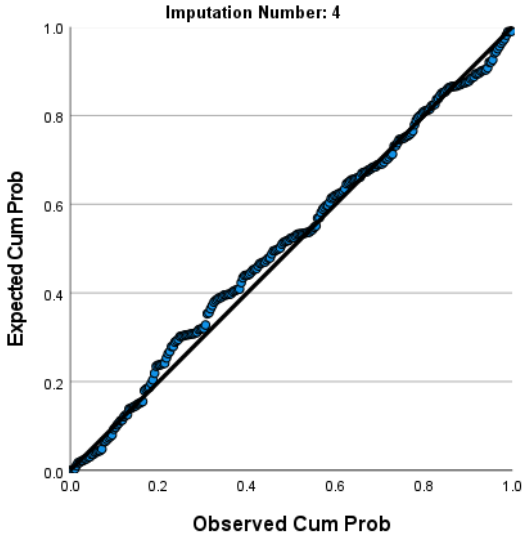
PG

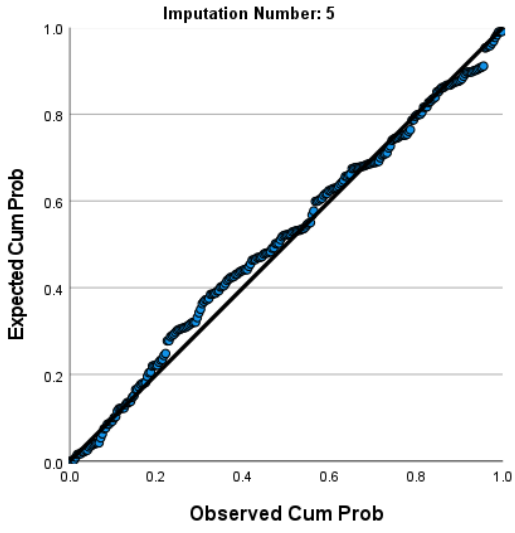

Imputation Number: Original data
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Imputation Number: 1
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Imputation Number: 2
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

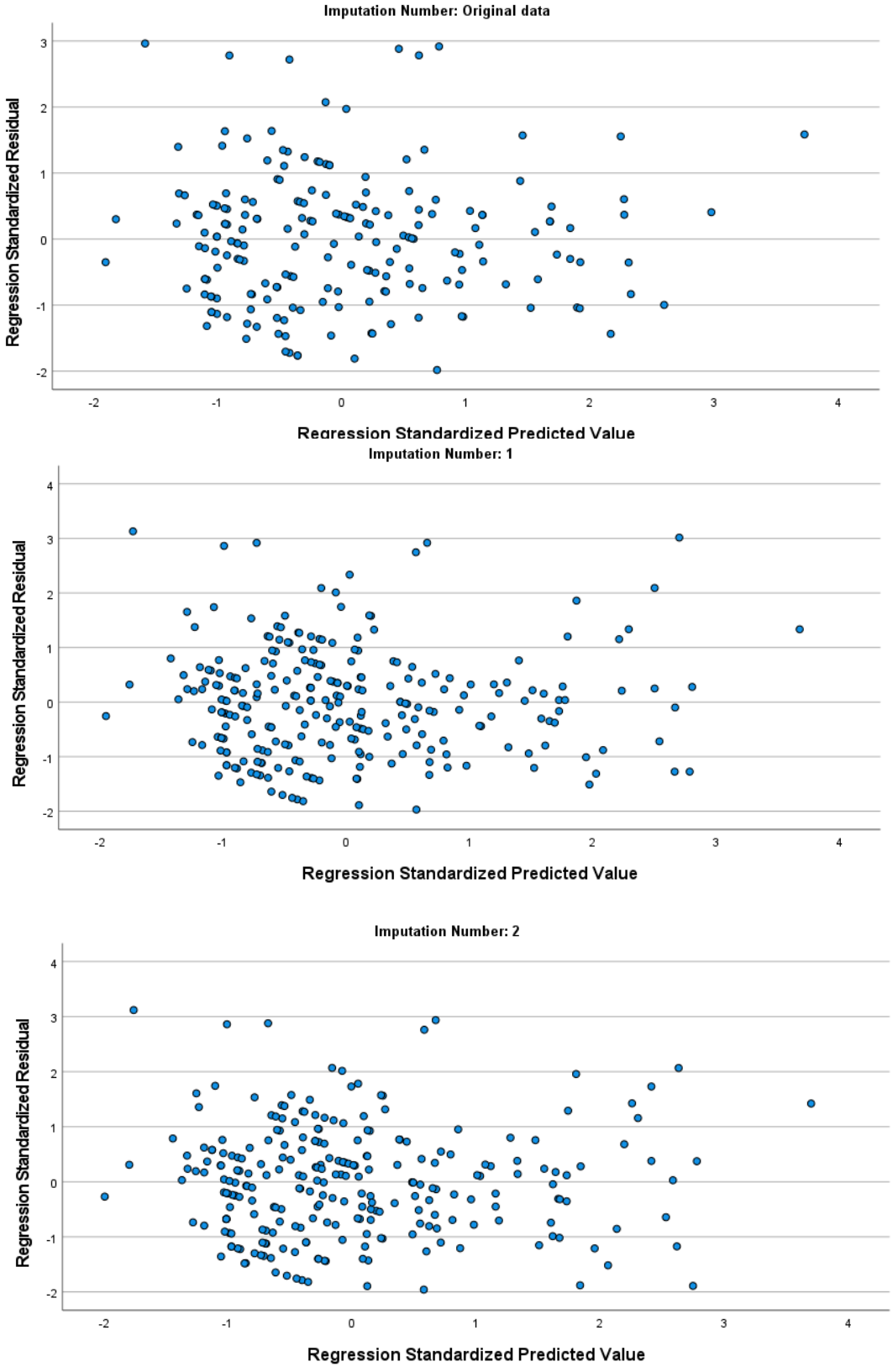

Imputation Number: 3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

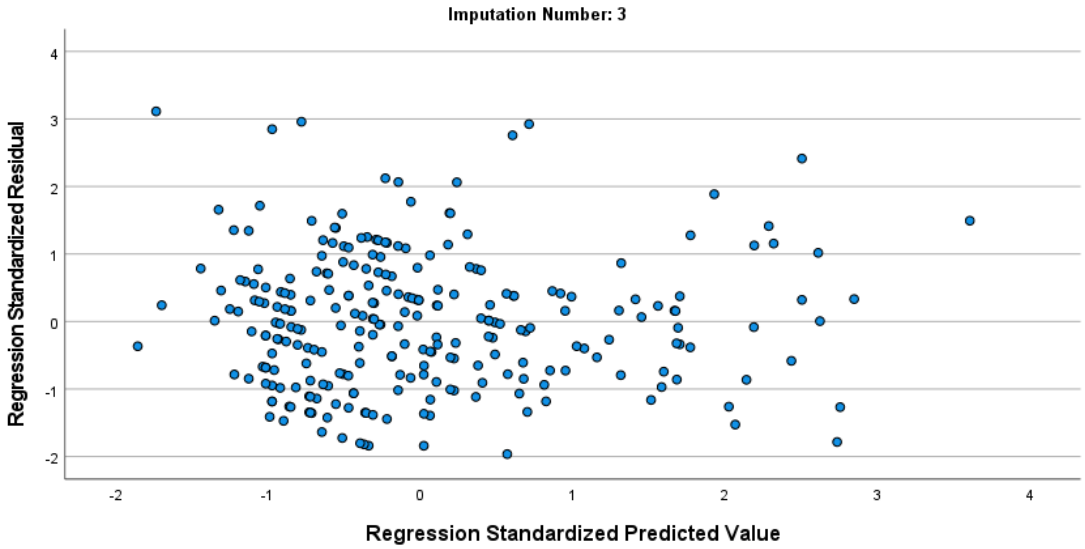

Imputation Number: 4
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

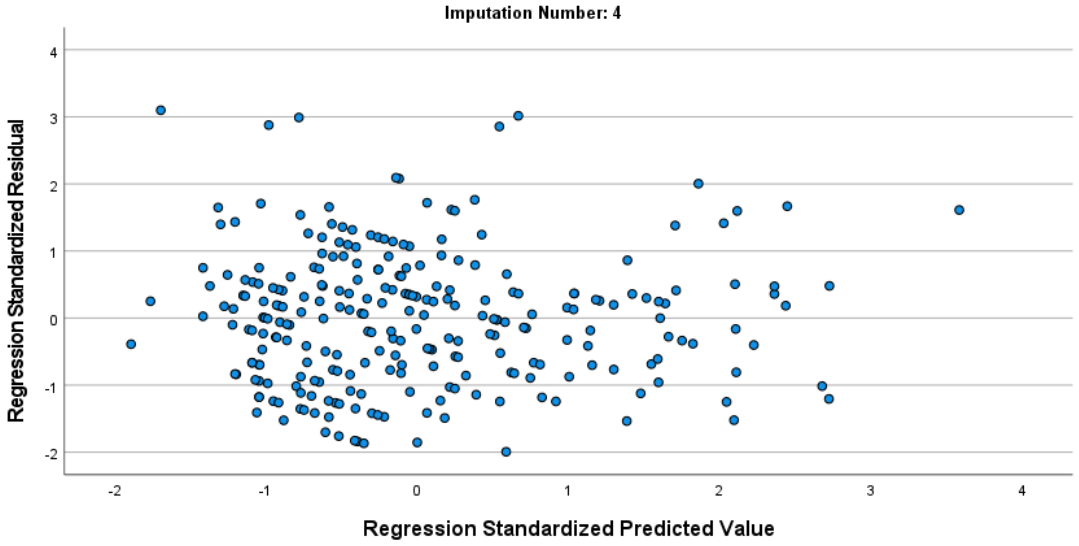

Imputation Number: 5
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

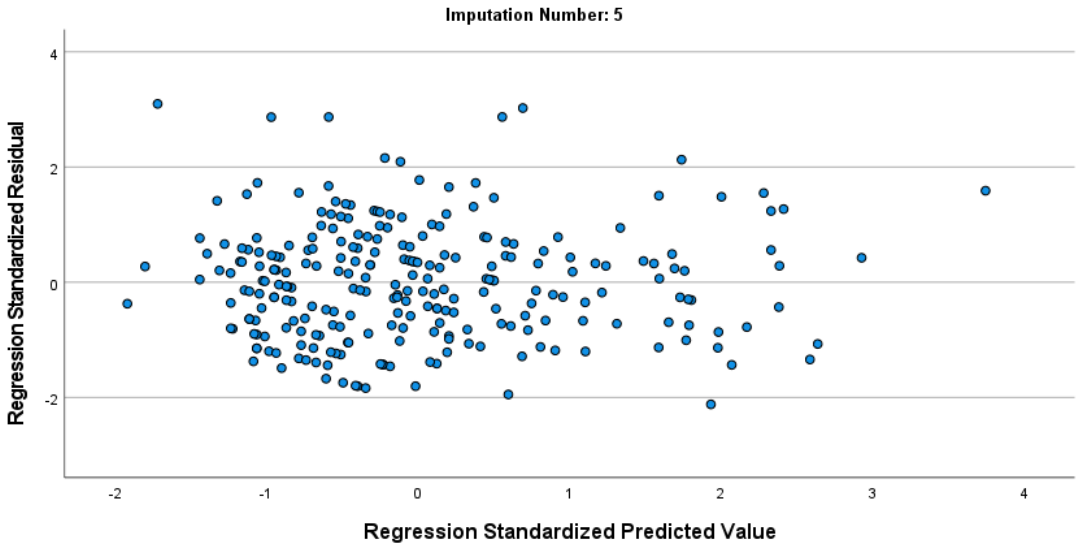
Appendix E: Scatterplot of Standardised Residuals and Standardised Predicted Values

PL

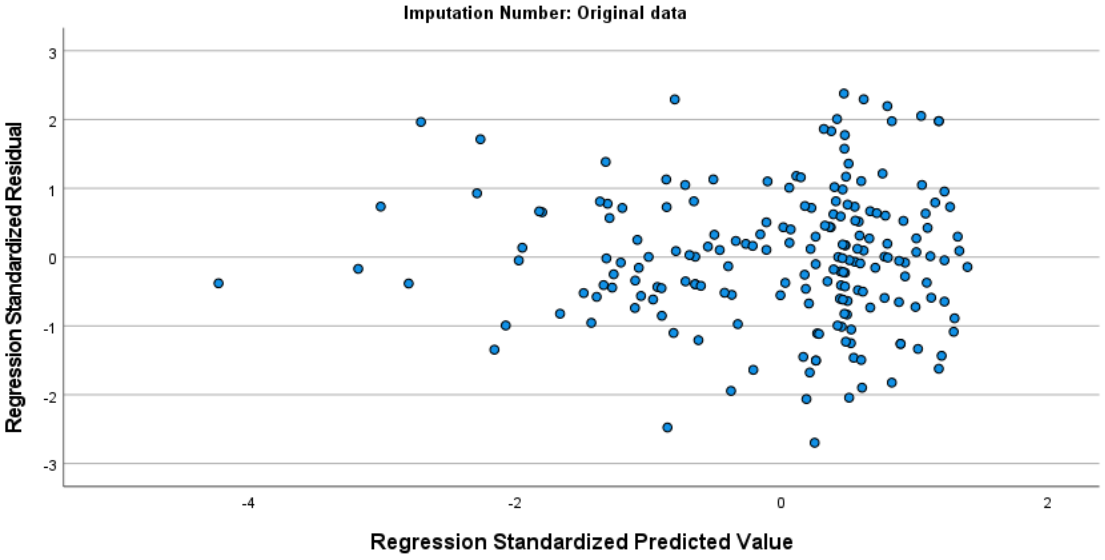


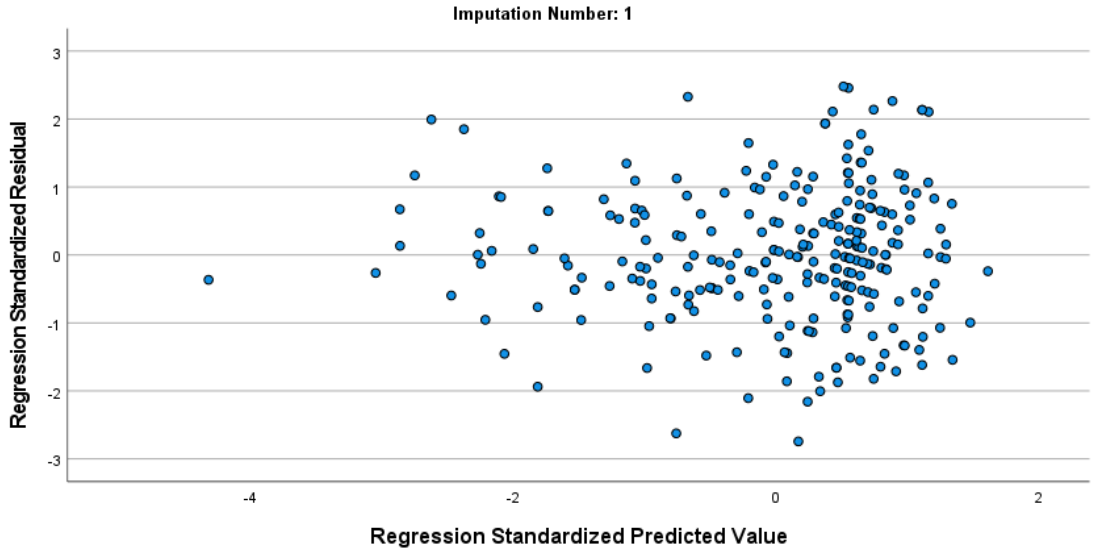

Imputation Number: 3
Regression Standardized Residual
Regression Standardized Predicted Value

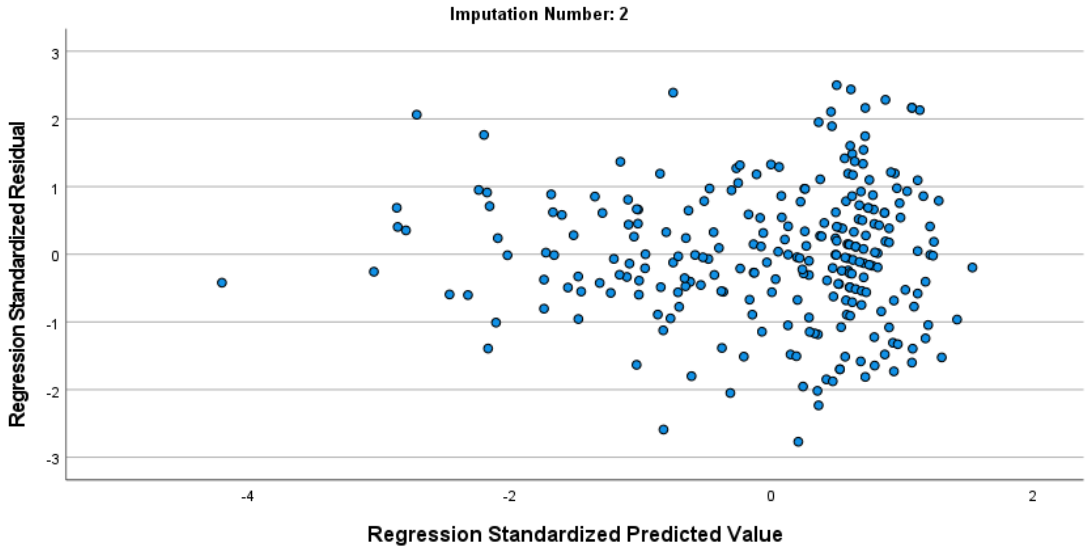

Imputation Number: 4
Regression Standardized Residual
Regression Standardized Predicted Value

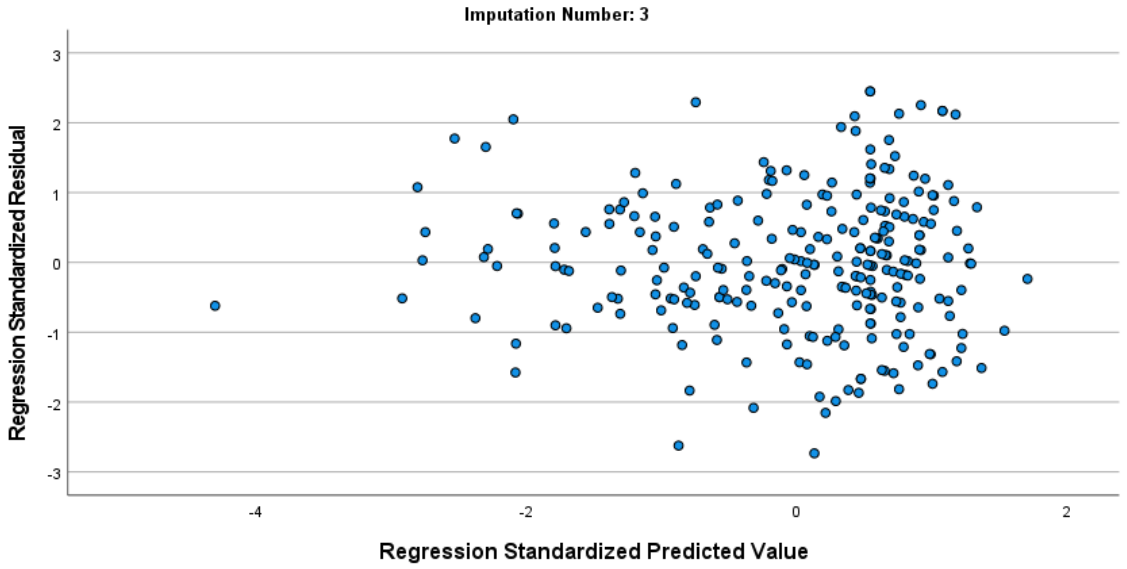

Imputation Number: 5
Regression Standardized Residual
Regression Standardized Predicted Value

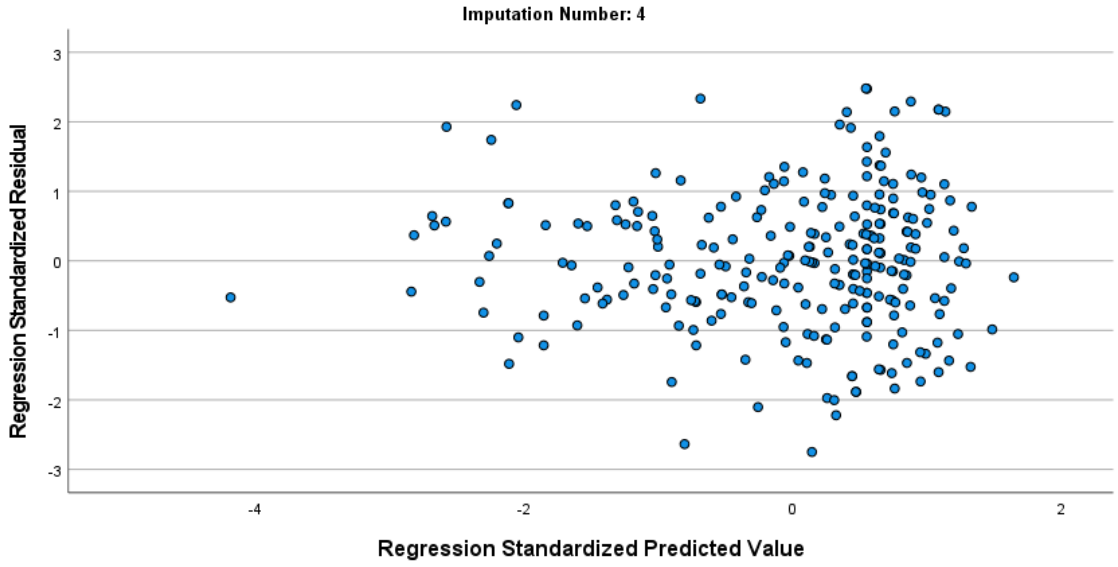
PC

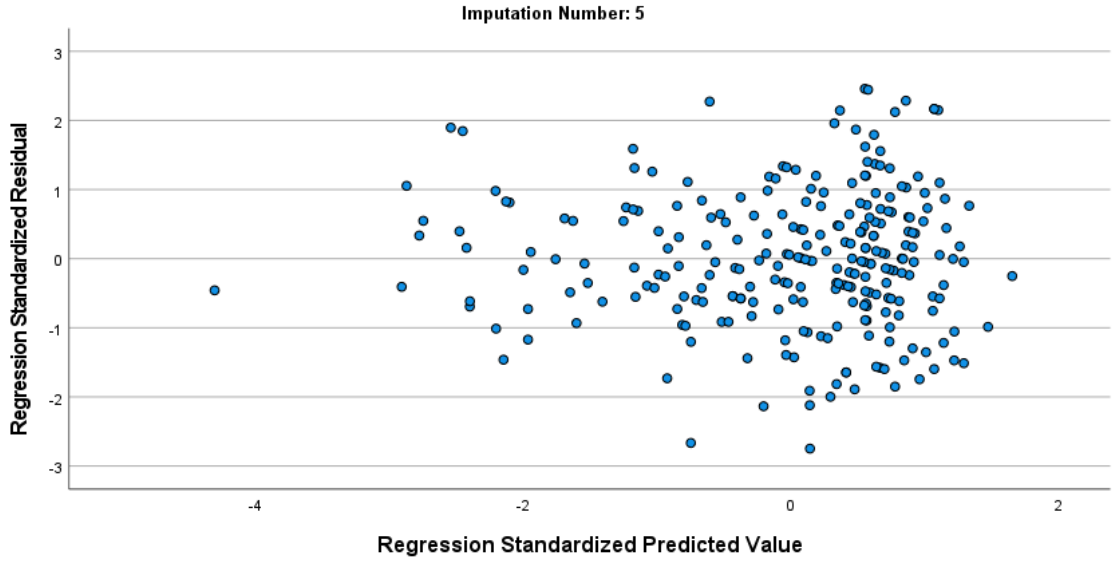

Imputation Number: Original data
Regression Standardized Residual
Regression Standardized Predicted Value


Imputation Number: 1
Regression Standardized Residual
Regression Standardized Predicted Value

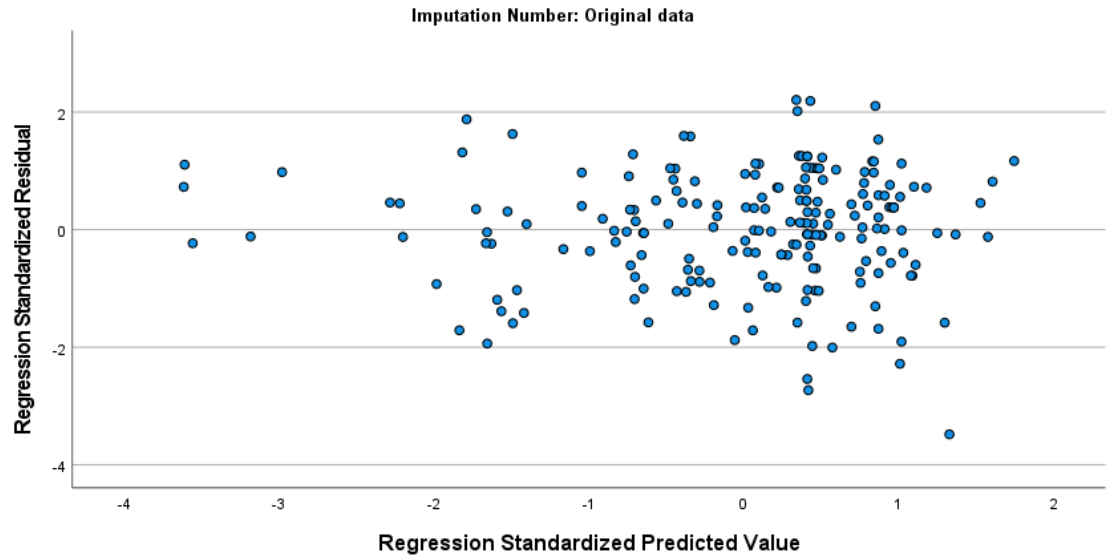

Imputation Number: 2
Regression Standardized Residual
Regression Standardized Predicted Value

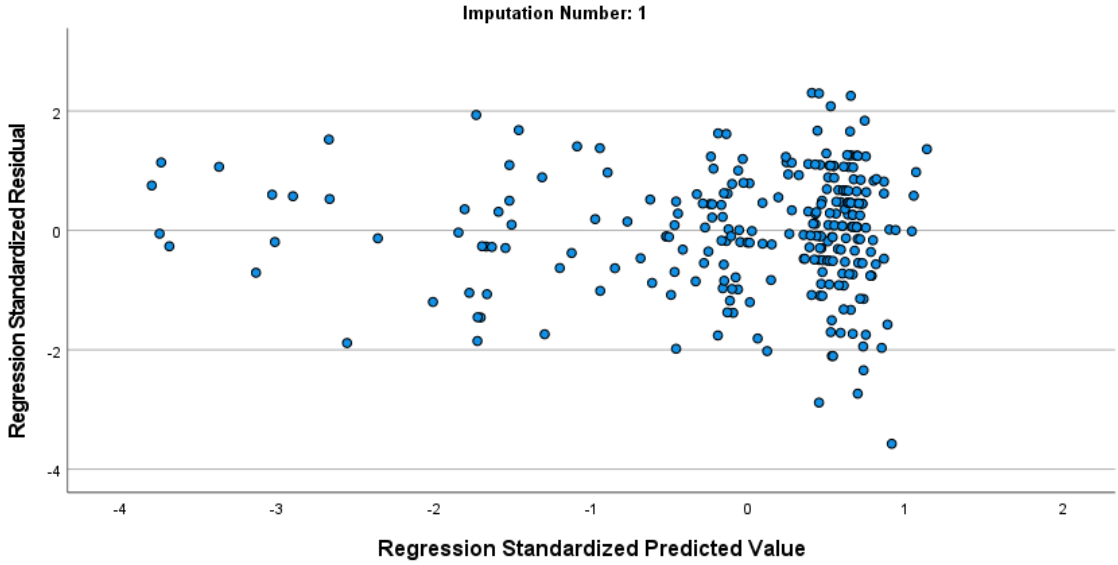

Imputation Number: 3
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-4
-2
0
2

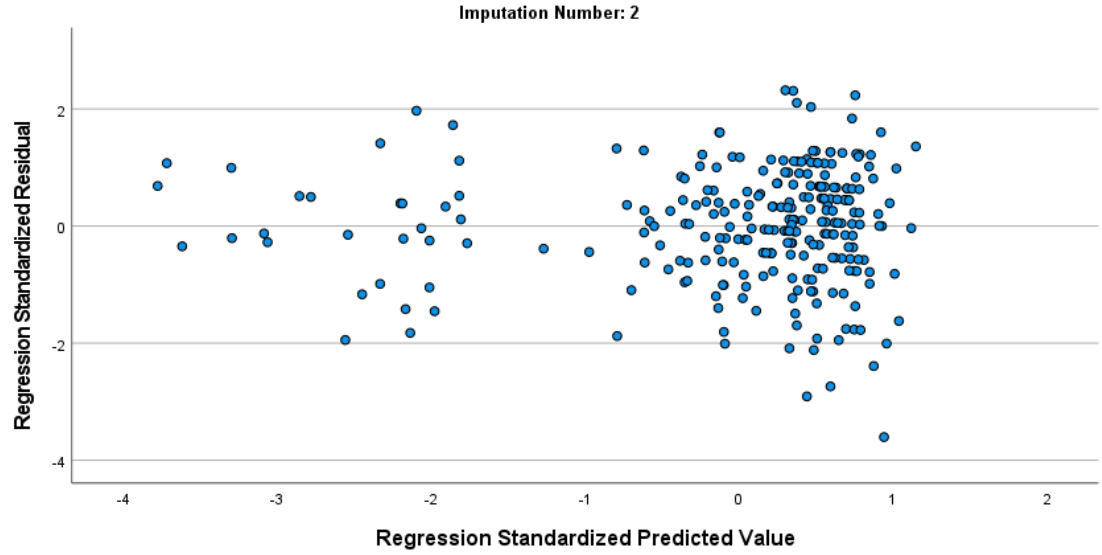

Imputation Number: 4
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-4
-2
0
2

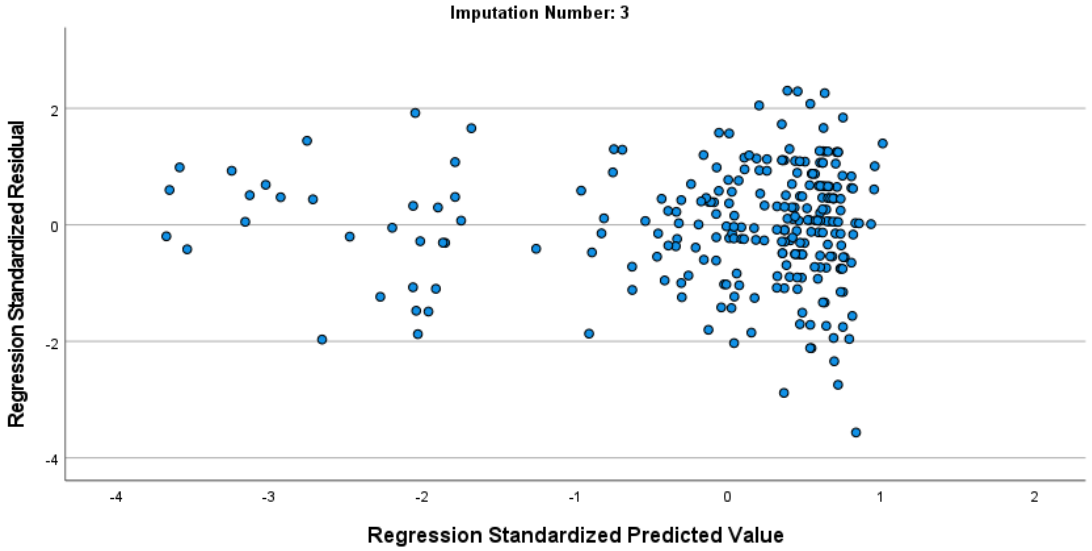

Imputation Number: 5
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-4
-2
0
2

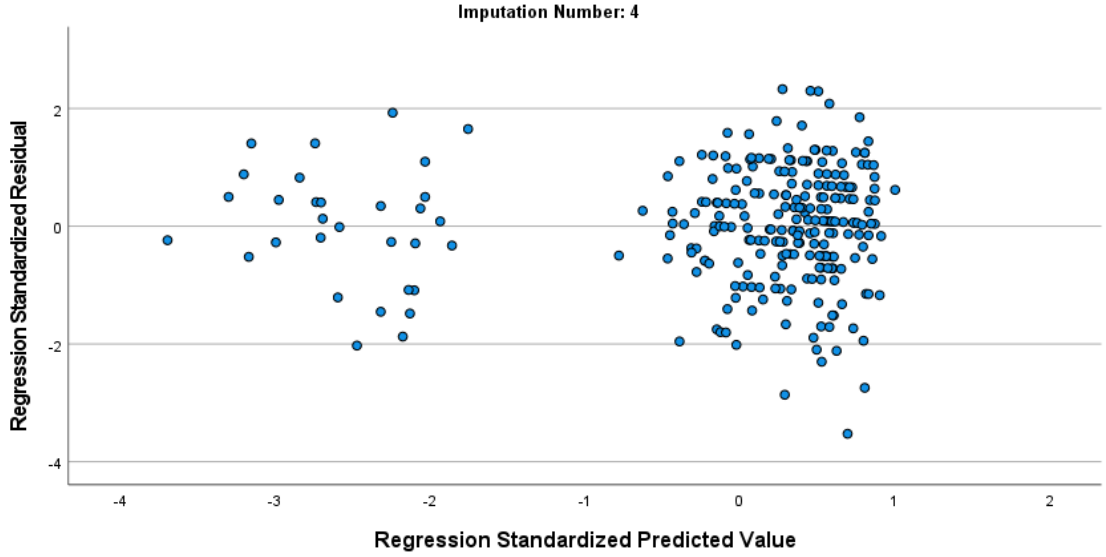
PG

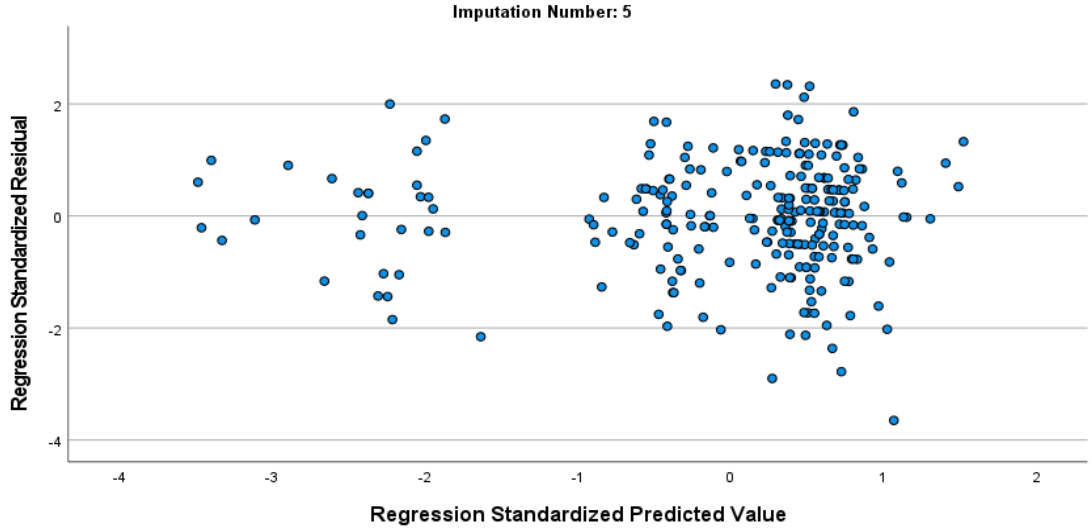

Imputation Number: Original data
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2


Imputation Number: 1
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2


Imputation Number: 2
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2


Imputation Number: 3
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2


Imputation Number: 4
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2


Imputation Number: 5
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-4
-3
-2
-1
0
1
2

Appendix F: Submission Guidance for Authors for International Journal of Geriatric Psychiatry

Author Guidelines

1. SUBMISSION

Free Format submission

International Journal of Geriatric Psychiatry now offers **Free Format submission** for a simplified and streamlined submission process.

Before you submit, you will need:

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If you are invited to revise your manuscript after peer review, the journal will also request the revised manuscript to be formatted according to journal requirements as described below.

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2. 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.

We also welcome qualitative research papers that further understanding of the perspectives, experiences and unmet needs of older people with mental health problems and their supporters. Articles should be methodologically rigorous and have clear applications for treatment, services and support. These types of research papers have a higher word limit of 6,000 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.

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.

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.

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.

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.