LITERATURE REVIEW: A systematic review of the role of depression in subjective cognitive impairment and subsequent objective cognitive decline in older adults

EMPIRICAL PAPER: The role of trait self-compassion as a moderator of the relationship between subjective memory impairment and psychological distress in older adults

Submitted by Harriet Jayne Toop, to the University of Exeter

as a thesis for the degree of Doctor of Clinical Psychology, May 2018

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

Author's Declaration

Harriet Toop completed the literature review independently. For the empirical paper, Jessica Leighton-Price, an undergraduate Psychology student assisted with participant recruitment and data entry (completing approximately half of each). The analyses and the write-up of the empirical paper were completed independently by Harriet Toop.

Contents

List of Tables

Literature Review

Empirical Paper

List of Figures

Literature Review

Empirical Study

SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

LITERATURE REVIEW

A systematic review of the role of depression in subjective cognitive impairment and subsequent objective cognitive decline in older adults

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Abstract

Introduction: Researchers have suggested various explanations of the relationship between depression and subjective and objective cognitive impairment. These include, depression as a risk factor or prodrome of dementia; as leading to temporary changes in cognitive functioning; or negatively biased self-appraisals of functioning (Austin, Mitchell, & Goodwin, 2001; Muliyala & Varghese, 2010; Crane, Bogner, Brown, & Gallo, 2007).

Objective: The aim of this systematic review is to look at the relationship between depression, subjective cognitive impairment and cognitive decline. Specifically, to determine whether the presence or absence of depressive symptoms in subjective cognitive impairment is differentially associated with subsequent decline in objective cognitive function.

Methods: Three electronic databases were searched (PsychINFO, PubMed and CINAHL). Search terms were specified in accordance with the objectives of the review. These were “subjective cognitive impairment”, “depression” and “older adults”. The Population, Exposure, Comparator, Outcome, Study (PECOS) design framework was used to specify criteria and determine which studies were eligible for inclusion in the review. Following the identification of studies with relevance to the review topic, the quality of each study was evaluated using the Weight of Evidence framework (Gough, 2007).

Results: 515 records were identified across the three databases. Following screening, six studies were found to satisfy the PECOS criteria and were included in the review.

Studies were consistent in their reports that participants with higher levels of subjective cognitive impairment also had significantly higher levels of depressive symptoms. Studies suggested that report of subjective memory impaired increased the risk of subsequent cognitive decline approximately two-fold; and that the presence (or absence) of depressive symptoms does not contribute a significant covariate effect on this association.

Conclusion: Current research indicates that depressive symptoms do not have a significant effect on the predictive relationship between subjective cognitive impairment and subsequent cognitive decline. This finding is inconsistent with the hypotheses that depressive symptoms lead to temporary changes in cognitive functioning or that subjective cognitive impairment represents a negatively biased and/or inaccurate self-appraisal. It is not possible to draw conclusions about whether depression is a prodrome to dementia based on the findings of this review because there is no evidence to suggest that this depressive symptoms interacts with the risk posed by SCI. In order to formally determine whether an interaction does or does not exist, a hierarchical multiple regression analysis testing for depressive symptoms of a moderator of the relationship between SCI and cognitive decline would be a more appropriate statistical test.

Introduction

This systematic review seeks to develop understanding of the complex relationship between depression, subjective cognitive impairment and objective cognitive decline. The introduction will provide a background to relevant psychological theory about subjective cognitive impairment, objective cognitive decline, and depression, and the suggested relationships between these variables, before expanding on the rationale and aims of the review.

Defining Subjective Cognitive and Subjective Memory Impairment

Multiple and varied terms have been used to refer to the self-perception of difficulties or decline in performance on cognitive tasks, in the absence of objective evidence. Terms including subjective cognitive impairment, subjective cognitive decline, subjective cognitive complaints, subjective memory impairment, subjective memory decline, and memory complaints have all been used with varying definitions. To facilitate research on subjective cognitive impairment in the context of dementia, a formalised definition has recently been proposed by Jessen et al. (2014). They use the term ‘subjective cognitive decline’ (SCD) which is defined as: “Self-experienced persistent decline in cognitive capacity in comparison with a previously normal status and unrelated to an acute event”, in addition to “Normal age-, gender-, and education-adjusted performance on standardized cognitive tests, which are used to classify mild cognitive impairment (MCI) or prodromal AD” (Jessen et al., 2014, p. 4). The term ‘AD’ in their definition refers to Alzheimer’s disease. Their definition is important because it

confirms that subjective cognitive decline should occur in the absence of impaired performance on any single domain of cognitive functioning. It also points to the suggestion that subjective cognitive decline may extend the spectrum of MCI-dementia, representing a pre-MCI stage where compensation and subtle declines in performance are experienced by individuals but is not detectable on formal tests (Figure 1).

While subjective cognitive impairment refers to impairment in any of the cognitive

Figure 1. SCD in the Progression of Disease Pathology and Clinical States

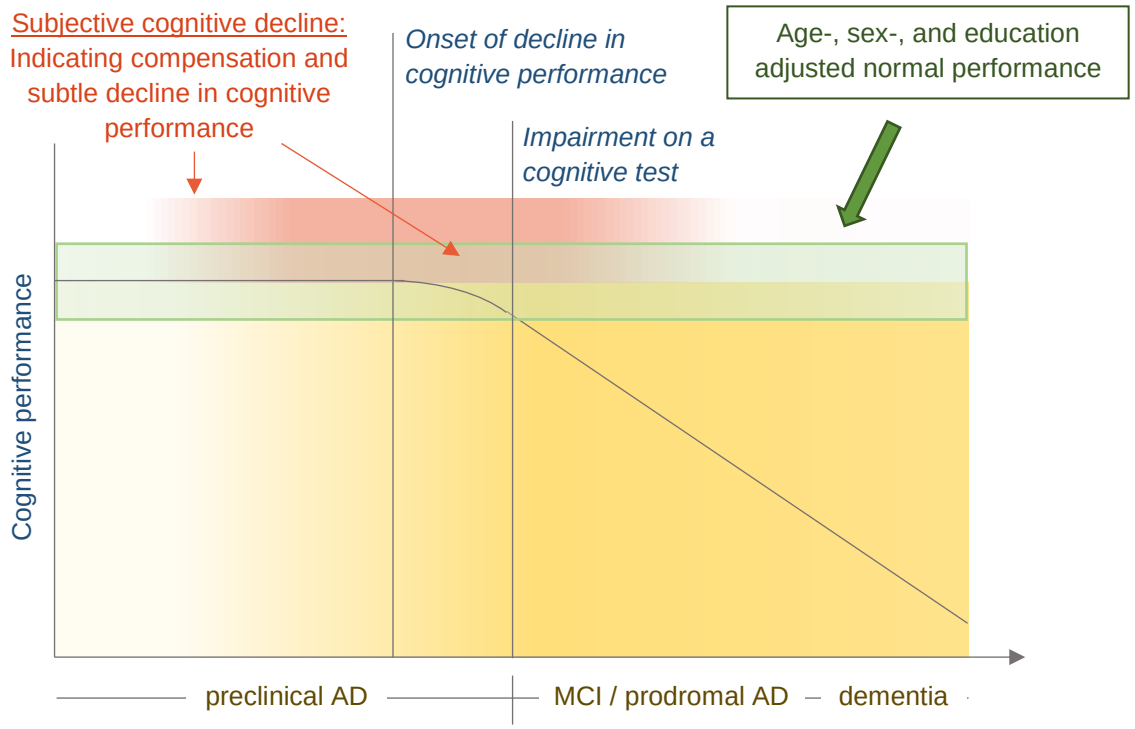

Figure 1. Reproduced from Jessen et al. (2014). AD = Alzheimer's disease; MCI = Mild Cognitive Impairment. It is suggested that SCD occurs at the late stage of preclinical AD, which is characterised by increasing compensatory cognitive efforts and subtle cognitive decline. Thus, SCD may indicate the late-stage preclinical AD before the threshold MCI/prodromal AD is reached.

domains: attention, memory, executive functioning, language, or visuospatial functioning, subjective memory impairment specifically refers to perceived difficulties in memory functioning. Changes in memory are frequently associated with dementia and specific scales to assess subjective memory impairment have been developed (e.g., Clare, Wilson, Carter, Roth, & Hodges, 2002). For the purposes of this review, both subjective cognitive impairment (SCI) and subjective memory impairment (SMI) will be considered. This is due to the special significance of SMI in subsequent cognitive decline (Jessen et al., 2014) and because relatively few studies examine reports of subjective impairment and depressive symptoms in the context of clinical progression. For ease of reference, the umbrella term subjective cognitive impairment will be used; however, the specific type of impairment under investigation will be specified when reporting on individual studies.

The Relationship Between Subjective Cognitive Impairment and Objective Cognitive Decline

As mentioned in the previous section, one well-regarded conceptualisation of SCI is that it exists on a continuum with MCI and dementia. Jessen et al. (2014) identified a series of features that indicate an increased likelihood of subsequent cognitive decline. They named this subtype of SCI, SCD plus (indicating that it was likely pre-clinical AD). The features of SCD plus are subjective decline reported specifically in memory functioning; onset within the past five years; onset after the age of 60; report of associated concerns; and feeling that they are performing worse than other people the same age. Support for this conceptualisation is evidence of biomarkers and AD-type

neuropathological changes (e.g. amyloid accumulation) years prior to the onset of observable changes on cognitive tests (Jack et al., 2014). It may be that subtle changes in cognitive functioning occur that are perceptible to the individual who then reports SCI, but undetectable on formal tests of cognition due to the early stage of the changes. Limitations of the tests used may also be an important factor – screening tools commonly used in clinical practice may not be sensitive enough to identify prodromal MCI, although more extensive neuropsychological assessment might detect subtle changes. Often test selection in practice is limited by restrictions on time and cost as well as access to neuropsychological expertise.

The importance of Jessen et al's (2014) SCD / SCD plus distinction is that it offers an explanation as to why SCI is not always predictive of subsequent cognitive decline or preclinical AD (e.g., Fernández-Blázqueza*,* Ávila-Villanueva, Maestú, & Medina, 2016; Hollands et al., 2015). In addition to the characteristics of SCI that increase the likelihood of clinical decline (i.e., those specified in the criteria for SCD Plus), another important factor may be the consistency of SCI reports. Inconsistent reports of SCI have been linked with reduced risk of MCI and dementia; such inconsistencies are purported to be linked with temporary clinical conditions out of which SCI may result, e.g., depression, fatigue, medications, etc. (Blackburn, Wakefield, Shanks, Harkness, Reuber, & Venneri, 2014; Kessler, Bowen, Baer, Froelich, & Wahl, 2012).

The Relationship Between Depression and Cognition

The relationship between depression and cognitive functioning has been much studied. Austin, Mitchell and Goodwin's (2001) review of research indicated that depression is associated with objective deficits in episodic memory, learning and executive functioning difficulties (specifically, set-shifting). The authors found that people with a greater severity of depression, and melancholic depression, were more likely to experience cognitive deficits.

One possible moderator of the relationship between depression and cognitive impairment as evidenced by cognitive tests is motivation. Motivation is described as the ability to initiate activity either spontaneously or in response to environmental cues (Lezak, 1995). Studies have linked depression with impaired motivation, e.g. showing a reduced response to stimuli that are typically rewarding in terms of task performance (Meehl, 1975; Hughes, Pleasants, & Pickens, 1985; Henriques, Glowacki, & Davidson, 1994). Individuals with depression also tend to show a conservative response bias on testing, suggesting that they seek greater certainty before responding (Miller & Lewis, 1977). Such studies suggest that motivation is reduced in individuals with depression and that reduced motivation affects test performance. However, it is notable that not all cognitive functions are affected by depressive conditions; were motivation the primary factor, one might expect performance across all tasks to be similarly impaired.

Turning to cognitive functioning in later life, and in particular the diagnosis of dementia, the relationship between depression and cognition becomes increasingly complex. In a review of the literature, Muliyala and Varghese (2010) report the prevalence of depression in dementia to be 9-68% and discuss studies that suggest depression to be either a risk factor for dementia or a prodrome of dementia (with a

history of depression found to nearly double the risk of developing dementia; Jorm, 2001). An alternative proposition is that depression compromises cognitive reserve such that symptoms of dementia become apparent at an earlier stage (Ganguli, 2009). Overall, Muliyala and Varghese (2010) suggest that the relationship between depression and dementia is far from conclusive, but the evidence suggested a complex interaction between the two conditions.

The Role of Depression in Subjective Memory Impairment and Subsequent Cognitive Decline

SCI is strongly associated with symptoms of depression, apathy and anxiety (Fernández-Blázqueza*,* et al., 2016). Research suggests that depression and anxiety are often stronger predictors of SMI than actual cognitive performance (Hollands et al., 2015; Jorm, Christensen, Korten, Jacomb, & Henderson, 2001), and may represent a negatively biased and/or inaccurate self-appraisal (Crane, Bogner, Brown, & Gallo, 2007).

At present, the role of depression and subjective cognitive impairment in cognitive decline is unclear. Some authors (e.g., Muliyala & Varghese, 2010) have suggested that depression may function as a risk factor, or even a prodrome to dementia. In which case it is likely that the co-occurrence of depression with subjective cognitive impairment increases the likelihood of clinical decline in cognitive functioning. On the other hand, depression may lead to temporary changes in cognitive functioning (Austin, Mitchell, & Goodwin, 2001) or self-appraisals (Crane, Bogner, Brown, & Gallo,

2007), such that if the depression resolves, so too will the perception of SCI and changes in cognitive functioning.

The aim of this systematic review is to look at the relationships between depression and subjective cognitive impairment and depression and cognitive decline. There is a specific focus on attempting to un-pick the potentially complex relationship between three inter-related phenomenon. Specifically, I aim to determine whether the presence or absence of depressive symptoms in subjective cognitive impairment is differentially associated with subsequent decline in objective cognitive function.

This review is influenced by the work of Hill et al. (2016) whose own review examined the relationships between SCI and affective symptoms in older adults. Hill and colleagues were interested in cross-sectional and longitudinal studies where symptoms of depression and/or anxiety were studied among individuals with and without cognitive impairment. With regards to the longitudinal relationship between SCI and depression, the authors found that in most cases the presence of SCI at baseline was associated with a greater risk of developing depression (i.e., a greater likelihood of meeting the threshold for diagnosis of depression at follow-up). The key difference between the paper by Hill and colleagues and the present review is that Hill et al. were interested in the relationship between SCI and depression in terms of whether SCI is a predictor of incident depression (as reported above). In contrast, the present review investigated outcomes related to objective cognitive performance over time, and the relationship between SCI and depression on this.

Given similarities between the Hill et al. study and the current review in relation to the topics of SCI and depression the original intention was to use the same search

terms and inclusion/exclusion criteria as Hill et al., while extending their search to ensure that any papers published after their review were identified. The search terms were broad and focused only on the construct of SCI, consequently, it was considered that they were likely to be overly inclusive, i.e., likely to return a high number of papers, though many would have been of low relevance to the review question. This wasn't considered problematic in itself, however on further examination of the longitudinal studies included in Hill et al.'s review, it became apparent that some of those studies should have been excluded at the screening stage based on their specified inclusion and exclusion criteria. For example, four of the nine papers identified included participants who were younger than the minimum age criteria set by the authors. Owing to concerns about the methodology of the review by Hill et al. the idea of extending their review was abandoned and new search terms were developed specific to the topics of interest of the current review: SCI, depression, and older adults.

Methods

Systematic reviews attempt to identify, collate, and evaluate all evidence pertinent to a specific topic or research question. They have become the reference standard for synthesising evidence because of their methodological rigor; using pre-defined criteria to minimise bias in the identification and evaluation of studies and enabling readers to appraise the review methods (Moher et al., 2015). In accordance

with this, the method used to guide the identification, screening, synthesis and evaluation of studies will be described in full in the following sections.

Information Sources

Three electronic databases were searched:

- PsychINFO: an extensive bibliographic database covering psychology and related disciplines
- PubMed: includes papers on all aspects of human medicine and related biomedical research
- The Cumulative Index to Nursing and Allied Health Literature (CINAHL): includes papers on nursing, midwifery and community healthcare.

The search was completed on 31st July 2018. Databases were searched from the beginning of each database (i.e., the earliest date that journals were included in each database) to the date of the search itself.

Search Strategy

Key search terms were specified, in accordance with the objectives of the review. The key constructs were “subjective cognitive impairment”, “depression” and “older adults” (Table 1). Related terms were identified through the review of pre-existing systematic reviews on related topics, and scoping searches. Terms were searched for in the title, abstract and keywords of articles. Searches were logged and a flow diagram (presented in the Results section) used to document the process of identifying,

Table 1.

Search Terms for Databases

	Subjective Cognitive Impairment Section 1 "OR"	**Depression Section 2 "OR"**	**Older Adults Section 3 "OR"**
Individual Search Terms (in title or abstract)	cognitive complaint*, cognitive concern*, cognitive difficult*, cognitive failure*, memory concern*, memory difficult*, memory failure*, perceived forgetfulness, self-reported cognitive impairment, self-reported memory problems, subjective cognitive decline, subjective cognitive dysfunction, subjective memory concern*, subjective memory impairment	depress*, negative bias, dysthym*, melanchol*, low mood, suicid*, sad*, hopeless, lack of motivation, loss of motivation, lack of interest, loss of interest	older adult, older people, older, old age, late* life, geriatric, aging, aged, elderly, retire*
Search	**Section 1 AND Section 2 AND Section 3**		

screening, judging eligibility, and inclusion of studies (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009).

Eligibility Criteria

The Population, Exposure, Comparator, Outcome, Study design (PECOS) framework was used to determine which studies were eligible for inclusion in the review. The specified criteria are detailed in Table 2. Only studies published in English, and

Table 2

Inclusion and Exclusion Criteria for Eligibility for Systematic Literature Review

Inclusion criteria	Exclusion criteria
Population • Older adults (≥50 years of age) • Reporting SCI in one or more cognitive domains • SCI must be established, via self-report, questionnaires or clinical judgement/diagnosis • Cognitive functioning must be assessed using standardised tests and found to be within a normal range at baseline.	**Participants** • Participants <50 years of age • Disease-specific clinical populations
Exposure • People reporting SCI and symptoms of depression at baseline	**Exposure** • Symptoms of depression were not assessed with a standardised measure at baseline
Comparator • People reporting SCI without symptoms of depression at baseline	**Comparator** • Symptoms of depression were not assessed with a standardised measure at baseline
Outcome • The presence or absence of cognitive decline at follow-up as confirmed by performance on cognitive tests or clinical diagnosis (i.e., subsequent diagnosis of MCI or dementia).	**Outcome** • Cognitive functioning was not assessed or reported on at both baseline and follow-up.
Study design • Longitudinal	**Study design** • Cross-sectional

Note. SCI = subjective cognitive impairment; MCI = mild cognitive impairment.

subject to a process of peer review (i.e., published in a peer-reviewed journal) were included. As cognitive decline was the outcome of interest it was necessary for

cognition to be assessed both at baseline and a follow-up time point. Measurement of SCI and symptoms of depression was only required at baseline.

The age for inclusion as an 'older adult' was specified as 50 years of age as this was the criterion selected by Hill et al. (2016). This is also the age that was accepted as a definition of an 'older adult' in the WHO Older Adult Health and Ageing in Africa Project (World Health Organisation, n.d.). However, the term is socially constructed, and its definition is open to debate. For example, Gorman (2000) suggests that in many developed countries the age of 60 or 65 (roughly equivalent to age at retirement) signals the beginning of old age.

The operationalisation of SCI followed Jessen et al.'s (2014) definition that there should be self-experience of decline in cognition in the context of normal performance for age, gender and education on standardised cognitive tests. The condition of self-experience was considered satisfied if there was self-report of cognitive decline, either through self-referral to a memory clinic, or report of SCI on a single-item question or questionnaire.

Finally, cognitive decline was operationalised as a statistically significant decline in performance at follow-up on standardised tests in at least one cognitive domain. Alternatively, diagnosis of MCI or dementia (representing clinical progression) by a trained professional was also accepted.

Risk of Bias in Individual Studies

In order to evaluate the extent that each piece of evidence (study) contributes to answering the review question it was considered important both to review the quality of the study, and its relevance to the review question. Such a process facilitates judgement about how much 'weight' should be given to the findings of each study in answering the review question. Several measures were considered for the evaluation of papers. Of the tools available for quantitative research, the Quality Assessment Tool for Quantitative Studies (Effective Public Health Practice Project, 1998), and the Cochrane Risk of Bias tool (Higgins et al., 2016) were considered better suited to the evaluation of experimental methodologies. Their focus on issues such as the randomisation to groups, blinding of participants, and the integrity of interventions were not relevant to the methodologies of the papers pertinent to the current review.

Ultimately, therefore, the Weight of Evidence framework (WoE; Gough, 2007) was chosen as a measure that could evaluate both how well the study was executed, and whether or not it is useful in answering the review question (in other words whether it is fit for purpose in relation to the review question). Given that several of the studies included in the review had research questions that were of low relevance to the review question, it seemed particularly important to include a judgement of relevance in the evaluation process.

The Weight of Evidence framework invites reviewers to make judgements based on three aspects:

- A judgement about the coherence and integrity of the evidence in its own terms (WoE A)

- A review-specific judgement about the appropriateness of that form of evidence (i.e., the research methodology) for answering the review question WoE B)
- A review-specific judgement about the relevance of the focus of the evidence for the review question (WoE C)

The criteria were based on those used by Hill et al. (2016), but with adaptations to some of the criteria in the Methodological Relevance and Topic Relevance sections in accordance with the aims of the current review. The criteria (with adapatations highlighted) are presented in Appendix A. Papers were assigned a rating of low, medium, or high for each dimension of the WoE.

Risk of Bias in the Systematic Review Process

To increase reliability and validity of conclusions drawn from the systematic review the screening and quality evaluation of a subset of papers was verified by a second rater. The second rater reviewed six studies that were included in the full text screening stage for eligibility and rated three of the studies that were included in the review using the WoE. Inter-rater reliability was 100% for the full text screening and 78% for the quality evaluation of papers. This represents a difference of opinion on two of the nine judgments made. Differences in ratings for the evaluation of papers were discussed until a consensus was reached.

Results

The process and results of the searching and screening process are detailed in Figure 2. 515 records were identified across the three databases using the search

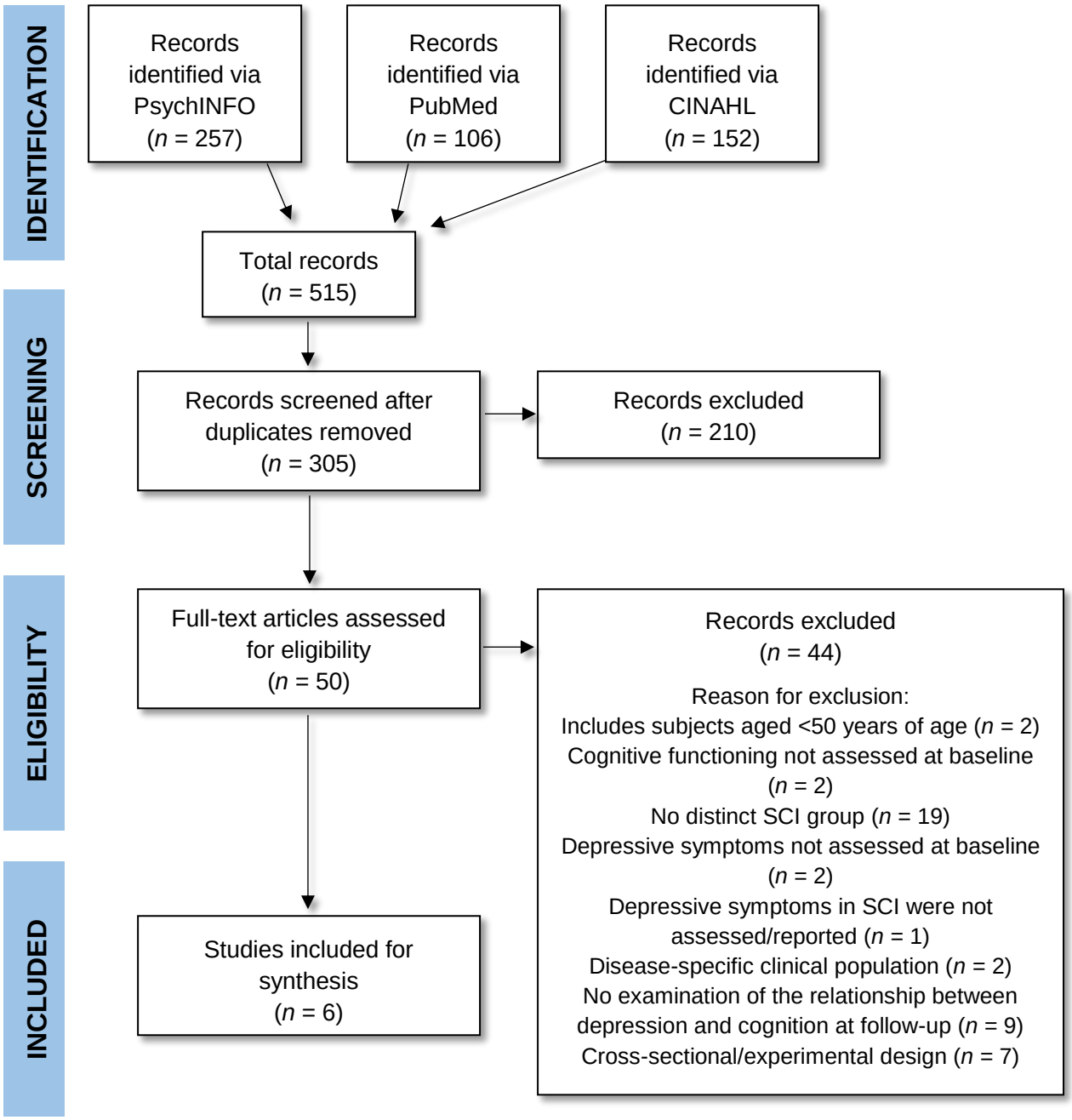

Figure 2. Results of Literature Search Strategy and Eligibility Screening. The flowchart is based on PRISMA protocol (adapted from Moher et al., 2009)

terms. The subsequent removal of duplicates resulted in a total of 305 records. 210 records were excluded based on title and abstract screening because they did not meet the PECOS criteria for the study (Table 2). Screening for the remaining 50 articles was completed using the full texts, leading to the exclusion of 44 articles (reasons for exclusion are given in Figure 2).

The six studies identified as eligible for the review are detailed in Table 3. Information relevant to the PECOS is outlined before describing the relevant findings and stating the outcome of the evaluation of each paper. The Exposure and Comparator both relate to the measurement of depressive symptoms, therefore, they have been combined into a single column.

Summary and Methodological Quality of Reviewed Studies

Participants. All studies included individuals older than 50 years of age. The mean age of participants varied considerably since each study applied different age criteria for participant inclusion. The youngest sample had a mean age of 68.9 years (*SD* = 3.00) and the oldest sample had a mean age of 81.1 years (*SD* = 3.41). All studies included participants with SCI or SMI. However, assessment of these constructs was often limited, e.g., using only one or two questions to establish SCI (studies 2, 4 and 5). While single-item questions can adequately represent a trait of interest (Beauducel & Hilger, 2015), longer scales may have greater content validity and be more reliable (Wolfsgrubber et al., 2015). In addition, while normal cognitive functioning at baseline was implied, it was often unclear exactly how normal cognition at

Table 3
Summary and Results of Eligible Studies

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
1. Dufouil, Fuhrer, & Alpérovitch (2005) Data source: The Epidemiology of Vascular Aging (EVA) Study	733 participants with a mean age of 68.9 (*SD* = 3.0). 555 completed the 6-year follow-up. The CDS (McNair & Kahn, 1983) was used to assess self-reported memory complaints. It also includes assessment of attention, language, temporal orientation, and psychomotor abilities. The CDS score was categorized by quartile. The fourth quartile (>46) was used to define SCI. The MMSE (Folstein, Folstein, & McHugh, 1975) was used to assess global cognitive functioning. Cognitive deficit was defined as an MMSE score below 26.	Measurement of depressive symptoms: French version of the CES-D (Fuhrer & Rouillon, 1989).	Cognitive decline was assessed by examining change of scores on the MMSE, the Digit Symbol Substitution Test of the WAIS-R (Wechsler, 1981), the Finger Tapping Test (Reitan & Davison, 1974), and the Auditory Verbal Learning Test. Decline was defined as a decrease between two assessments above the mean change-two standard deviations.	Longitudinal: 2-year follow-up.* *The study had a baseline, 4-, 5- and 6-year follow-ups. The CDS was only administered at 4-year, thus this was taken as the study's baseline. Only participants who had not declined between baseline and 4-year follow-up were included in the subsequent analysis. The analysis covered only the two-year period after baseline.	**FINDINGS:** Participants with more cognitive complaints were significantly ($p < .001$) more likely to have high levels of depressive symptoms than those with fewer cognitive complaints (27.9% vs. 6.5-16.9% of participants, respectively). Controlled analyses indicated that participants with more cognitive complaints at 4-year follow-up had greater cognitive decline on the MMSE 2 years later. This significant relationship persisted after adjusting for potential confounders, including depressive symptoms: mean-adjusted decline = -0.74 ± 0.18 for those with high CDS scores vs. mean-adjusted decline = -0.33 ± 0.09, $p = 0.1$). **Conclusion:** More cognitive complaints predict faster cognitive decline in the subsequent two years, this association was independent of baseline cognitive performance and depressive symptoms could not explain these findings. The study also looked at whether cognitive complaints are associated with previous cognitive decline and found that this relationship was weaker than the relationship between cognitive complaints and depressive symptoms. The authors underlined the importance of controlling for depression to assess the validity of cognitive complaints.	**Strengths:** Included participants with 'high' levels of depressive symptoms (15% of participants). Multiple cognitive tests used facilitating assessment of global cognitive functioning, attention, psychomotor speed, and immediate and delayed memory. **Limitations:** Although a SCI group was defined, the number of participants who met this criteria was not reported. It is unclear whether normative cognitive functioning was established at baseline and whether stability between baseline and 4-year follow-up was in relation to cognitive performance or CDS scores. The authors' report that the EVA study's sample had higher educational levels, higher income, better cognitive functioning, and fewer physical disabilities than the French general population of the same age range. A proportion of participants who agreed to participate initially did not undergo 6-year follow-up examination (24.3%). Those participants were older, less educated and had lower cognitive performance at 4-year follow-up. **Weight of Evidence:** A **=** M, B = L, C = M

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
2. Heser et al. (2013) Data source: The German Study on Ageing, Cognition, and Dementia in Primary Care Patients (AgeCoDe)	2,959 participants with a mean age of 81.3 years (*SD* = 3.3). Absence of dementia was determined based on the judgment of a GP. The German version of the MMSE (Folstein et al., 1975) was used to measure global cognitive functioning. Subjective memory impairment was assessed as a subjectively rated measure of cognitive functions by asking 'Do you feel your memory is becoming worse?' according to Geerlings, Jonker, Adèr, & Schmand (1999). Possible answers were 'no', 'yes, but this does not worry me', and 'yes, this worries me'.	Measurement of depressive symptoms: a shortened and modified version of section E of the CIDI (Wittchen & Pfister, 1997) was used to assess lifetime prevalence of major depression. The German version of the GDS-15 (Sheikh & Yesavage, 1986) was used to assess current depressive symptoms. GDS-15 scores were dichotomised using a cut-off score of 6 to indicate clinically relevant depression (Wancata, Alexandrowicz, Marquart, Weiss, & Friederich, 2006).	Diagnosis of dementia: based on the SIDAM according to DSM-IV and ICD-10 criteria implemented by a trained research assistant (psychologist or psychiatrist). AD was diagnosed according to DSM-IV criteria (American Psychiatric Association, 1994). VaD was diagnosed according to NINDS-AIREN criteria (Roman et al., 1993). Medical information was also reviewed by a neurologist to assist diagnosis. Ambiguous cases were discussed by a group of three neurological experts in order to reach a consensus diagnosis.	Longitudinal: 6 years with 3 follow-ups at 18 month intervals. Assessment of depression took place at follow-up 1. Outcome of dementia was assessed at follow-up 2, 3, and 4.	**FINDINGS:** There were 308 (11.6%) cases of incident dementia between follow-up 1 and follow-up 4. AD constituted 49.4% of cases. The authors found that very late-onset depression (aged ≥70 years) and current depressive symptoms was specifically predictive for later Alzheimer's disease (adjusted HR = 5.48, 95% CI 2.41-12.46, $p < 0.001$). Dementia of other aetiology was only marginally predicted by very-late onset depression and elevated depressive symptoms. When subjective memory impairment was entered as a variable, depression parameters did not predict any parameter except a marginal relationship between current depressive symptoms and all-cause dementia (HR = 1.55, 95% CI 0.95-1.86, $p < 0.10$) and between very late onset depression and dementia of other aetiology (HR = 2.05, 95% CI 0.89-1.97, $p < 0.10$). Subjective memory impairment with worries more than doubled the risk for all-cause dementia, AD, and dementia of other aetiology. **Conclusion:** Very late-onset depression in combination with current depressive symptoms is suggestive of the role of depression as a prodrome rather than a risk factor for AD. This relationship was not found for dementia of other aetiologies. Prediction of AD by the combination of very late-onset depression and current depressive symptoms was independent of objective cognition. The authors suggest that depression may have emerged as a prodrome of AD possibly as a consequence of subjectively perceived worrisome cognitive deterioration.	**Strengths:** Considered the impact of both historic diagnosis of depression and current depressive symptoms allowing temporal investigation of depression as a possible prodrome or risk factor of dementia. Psychiatric diagnosis and symptoms of depression were assessed with an instrument designed for geriatric samples. **Limitations:** SMI groupings ('no', 'yes, but this does not worry me', and 'yes, this worries me') were included only as a covariate in adjusted models for dementia risk – demographic information about these groups was not published. Because of the retrospective assessment of depression onset, recall bias might have lowered report rates of depression in the complete sample and in pre-dementia or pre-AD participants in particular. Generalisability might be limited by the fact that the results refer to a subgroup of 23 participants with combined very-late life onset depression and current depressive symptoms that make up <1% of the whole sample. The hypothesis that depression may be a prodrome of AD as a consequence SCI and associated worries is not explained. **Weight of Evidence:** A = M, B = M, C = M

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
3. Rönnlund, Sundström, Adolfsson, & Nilsson (2015). Data source: Betula Prospective Cohort Study	1,547 participants with a mean age of 71.5 years (*SD* = 8.8). Participants rated the frequency of everyday memory failures using the 16-item PRMQ (Smith, Della Sala, Logie, & Maylor, 2000).	Measurement of depressive symptoms: CES-D (Radloff, 1977).	Diagnosis of dementia. Participants with a score <1.8 SDs below age-based norms on a cognition and memory test; with decline in cognitive performance from a previous test occasion; who expressed worry of impaired memory; or with a MMSE score <24 underwent further evaluation. Diagnosis was made by a senior research geriatric psychiatrist according to the DSM-IV (American Psychiatric Association, 1994). NINCDS-ADRDA (McHann et al., 2011) criteria were taken into account for diagnosis of probable AD; and vascular complications for VaD.	Longitudinal: mean follow-up was 8.8 years. The study took place between 1998 and 2010. There were six test occasions approximately 5 years apart. The PRMQ was administered on the third test occasion which was taken as the baseline for the study.	**FINDINGS:** Over the study period, 225 participants developed dementia (132 with AD). Those who developed dementia had more depressive symptoms than those who remained dementia-free (No dementia: 6.7 ± 5.7; All-cause dementia: 7.9 ± 6.0, *p* <.01; AD: 8.1 ± 6.5, *p* <.05). In Cox proportional hazard regression models adjusted for demographic factors and depressive symptoms, PRMQ z-scores significantly (though only modestly) predicted incident dementia (HR = 1.19, 95% CI = 1.05-1.35 for all-cause dementia; HR = 1.22. 95% CI = 1.04-1.44 for AD, Ps < .01). **Conclusion:** Self-reported memory failures were associated with incident dementia, even after adjustment for depressive symptoms. The authors concluded that preclinical alterations in mood state are an unlikely source of the link between subjective memory assessment and incident dementia.	**Strengths:** Large sample size. Relatively long follow-up period. **Limitations:** It is unclear how normal cognitive functioning at baseline was assessed. The PRMQ was introduced when the study had already been running for 10-12 years and individuals who started the study prior to the baseline measurement were included in the analysis. By this point there had already been some attrition of participants, possibly resulting in a biased sample. CES-D scores for the sample suggest it is unlikely that many, if any, participants scored in a clinically significant range for depression. **Weight of Evidence:** A **=** H, B = L, C = M

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
4. Solfrizzi et al. (2017) Data source: Italian Longitudinal Study on Aging	2,150 participants with a mean age of 73.24 years (*SD* = 5.6). Pre-MCI SCD was assessed according to the positive response to item 14 of the GDS-30 (Yesevage et al. 1983): 'do you feel you have more problems with your memory than most?' adjusted for the GDS-30 total score to operationalise a self-experienced persistent decline in cognitive capacity in comparison with a previously normal status and unrelated to an acute event (according to criteria proposed by the SCD Initiative working group; Jessen et al., 2014). Reversible cognitive frailty was operationalised as the presence of physical frailty and pre-MCI SCD. Reversible cognitive frailty was diagnosed in 2.5% (*n* = 54) of the sample.	Measurement of depressive symptoms: the Italian version of the GDS-30 (Yesevage et al. 1983).	Diagnosis of dementia was based on the DSM-III (American Psychiatric Association, 1987) criteria for dementia syndrome, the NINCDS-ADRADA (McKhann, et al., 1984) criteria for possible and probable AD, the ICD-10 (World Health Organisation, 1992) criteria for VaD, and other dementing diseases. For MCI, Petersen et al's (1999) diagnostic criteria were used.	Longitudinal: 3.5 and 7-year follow-ups.	**FINDINGS:** Over a 3.5-year follow-up, 93 out of 2150 (4.3%) participants developed overall dementia, 8 among 54 reversible cognitive frailty participants (14.8%), of which 7 were affected by VaD (13.0%). Over a 7-year follow-up, 171 out of 2,150 (8.0%) participants developed overall dementia, 13 among 54 reversible cognitive frailty participants (24.1%), of which 9 were affected by VaD (16.7%). Significant differences (p <.01) in depressive symptoms were found across groups with and without reversible cognitive frailty (m = 19.19, SD = 5.4, vs. m = 9.18, SD = 5.79). Participants who developed dementia during the study period had more depressive symptoms at baseline (mean difference 3.1 points ± 0.6 for 3.5-year follow-up; mean difference 2.4 points ± 0.5 for 7-year follow-up). Participants with reversible cognitive frailty showed an increased risk of overall dementia [HR 2.30, 95% CI 1.02-5.18] and VaD (HR 6.67, 95% CI 2.12-20.99) over a 3.5-year follow-up. Similar results were shown after a 7-year follow-up, with an increased risk of overall dementia (HR 2.12, 95% CI 1.12-4.03) and VaD (HR 4.76, 95% CI 1.96-11.53). Vascular risk factors and depressive symptoms did not have any effect modifier on the relationship between reversible cognitive frailty and incident dementia. **Conclusion:** A model of reversible cognitive frailty was a short- and long-term predictor of overall dementia, particularly VaD (but not AD). Depression may be an additional risk factor for dementia, but does not moderate the relationship between cognitive frailty and incident dementia.	**Strengths:** Large sample size. **Limitations:** The paper suggests that participants would have had normal age-, sex-, and education-adjusted performance on standardized cognitive tests used to classify MCI or prodromal AD. However, it is not clear whether this was established or what tests were used. Published baseline statistics suggest the MMSE, Babcock Recall Story Test, and Digit Cancellation Test *may* have been used for this purpose. Only looked at the modifying role of the absence of depressive symptoms (GDS-30 <10) on the predictive role of reversible cognitive frailty on incident dementia. All individuals with SCD also necessarily had physical frailty (according to the primary variable of interest: cognitive frailty), therefore representing a specific subset of individuals with SCD and limiting the generalisability of the results of the study. Outcomes for individuals with SCD without physical frailty were not examined. **Weight of Evidence:** A **=** M/L, B = H, C = M

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
5. Wolfsgruber et al. (2016) Data source: The German Study on Ageing, Cognition, and Dementia in Primary Care Patients (AgeCoDe)	1,990 participants with a mean age of 81.1 years (*SD* = 3.41). Absence of dementia at baseline judged by a GP and of MCI based on recall performance within 1.5 *SD* for age, gender and education on the CERAD word list. SMI was assessed by two consecutive questions: 'Do you feel like your memory is becoming worse?' (possible answers yes/no/I don't know), and (in the case of a positive response to the first question, 'does this worry you?'. These questions were asked at baseline and 18-month follow-up. Participants were then classified into three groups: Controls with no SMI at baseline or follow-up (*n* = 613); inconsistent SMI with SMI report only at baseline or at follow-up (*n* = 637); consistent SMI but without/or with inconsistent worries (*n* = 610); and, consistent SMI with consistent worries (*n* = 130).	Measurement of depressive symptoms: the 15-item version of the GDS (Sheikh & Yesavage, 1986). Scores were dichotomized into <6 points (no evidence of depressive symptoms) and ≥6 points (evidence of depressive symptoms) according to the convention of the scale.	Dementia was diagnosed in a consensus conference with the interviewer (a trained psychologist or physician) and an experienced geriatrician or geriatric psychiatrist according to DSM-IV criteria, implemented as a standard diagnostic algorithm in the SIDAM (Zaudig & Hiller, 1996). The clinical diagnosis of AD was established according to the NINCDS-ADRDA criteria for probable AD (McKhann, et al., 1984).	Longitudinal: six years (five 18-month follow-ups with personal interviews and neuropsychol-ogical assessment).	**FINDINGS:** Significant differences in depressive symptoms (p <0.05) were found between controls (m = 1.52, SD = 1.85), those with inconsistent SMI (m = 1.80, SD = 1.94), those with inconsistent SMI without worry or with inconsistent worry (m = 2.31, SD = 2.22), and those with consistent SMI and worries (m = 3.57, SD = 3.04). Compared to the control group, the inconsistent SMI group had no significantly elevated risk of incident AD dementia (adjusted HR = 1.42, 95% CI: 0.9–2.25, p = 0.135). In contrast, consistent report of SMI without worries or with inconsistent worries was associated with a 2-fold increased risk of incident AD dementia compared to the control group (adjusted HR = 2.03, 95% CI: 1.30–3.15, p = 0.002). An additional analysis showed that within this group, those with no worries (n = 416) versus those with inconsistent worries (n = 194) did not further differ significantly in their AD dementia risk (p = 0.404). The highest risk of incident AD dementia was observed in the group of individuals reporting SMI with worries consistently at baseline and follow up 1. Risk in this group was almost 4-fold in comparison to the control group (adjusted HR = 3.72, 95% CI: 2.13–6.50, p <0.001). Significant covariate effects were observed for age and APOE, but not for level of depressive symptoms. **Conclusion:** The authors concluded that risk of AD dementia is greatly increased (4-fold) if subjective memory decline, which is appraised as worrying, and consistently reported over 1.5 years, are present in an individual.	**Strength:** Considered the consistency of SMI reports over time. **Limitations:** One of the inclusion criteria for the study was an age of 75 years or older – the study's results may therefore not be fully generalisable to relatively younger elderly samples relevant to preclinical AD research. Participants were asked to give an overall rating for their subjective memory decline. Requiring participants to summarise their experiences in different situations into a single response may be less reliable and have lower content validity than longer scales. GDS-15 scores for the sample suggest it is unlikely that many, if any, participants scored in a clinically significant range for depression. **Weight of Evidence:** A **=** H, B = L, C = M

Authors	**P**opulation	**E**xposure and **C**omparator	**O**utcome	**S**tudy design	**Results and Conclusion**	**Evaluation & WoE ratings**
6. van Harten, et al. (2018) Data source: The Mayo Clinic Study of Aging	1,167 participants with a mean age of 79.0 years (interquartile range = 75.3-83.6). SCD was assessed using two concurrent scales: the first five questions of the Blessed memory test (Blessed, Tomlinson, & Roth, 1968), and the 39-item ECog scale (Farias, et al., 2008), and a single question assessing worry about cognitive decline. 860 participants reported SCD on the Blessed memory test, 1,068 reported inconsistent SCD and 206 reported consistent SCD on the ECog scale.	Measurement of depressive symptoms: BDI-II (Beck, Steer & Brown, 1996).	Diagnosis of MCI based on clinical judgement of a consensus panel according to diagnostic criteria (Petersen, 2004). Judgements were informed by clinical assessment and a neuropsychological testing battery focusing on memory functioning (specifically delayed recall). Tests administered were Logical Memory II, Visual Reproduction II (Wechsler, 1987), and Auditory Verbal Learning Test (Ivnik et al., 1992)	Longitudinal: Median total follow-up of 3.9 years, with follow-ups every 15-months consisting of clinical and cognitive assessments.	**FINDINGS:** Significant differences (p <.0001) in depressive symptoms were found between participants who reported SCD with and without worry (m = 6.2, SD = 4.6, vs. m = 4.0, SD = 3.7). 143 participants (12%) developed MCI over the course of the study. Cox-proportional hazard ratios were used to examine the association between SCD and risk of incident MCI. In models examining a categorical variable of SCD (no SCD, occasional SCD, or consistent SCD) compared to no SCD, only consistent SCD was associated with an increased risk of MCI. Having any consistent SCD increased risk of incident MCI 2.17 times (HR = 2.17 [1.51-3.13], p<0.0001). Worry about memory/thinking problems increased risk of incident MCI 1.79 times (HR = 1.79 [1.24-2.58], p = 0.002). Models were adjusted for a broad range of possible confounders, including depressive symptoms, even after adjusting for these factors the association between SCD and risk of MCI remained. Separate Cox proportional hazards models were used to evaluate the association between each domain-specific average SCD score on the ECog scale. Memory SCD performed slightly better than language, executive functioning, and visuospatial functioning SCD (adjusted HR 1.99, CI: 1.45-2.74). No interaction was found between worry and consistent SCD (p = 0.22 in unadjusted models). **Conclusion:** Memory SCD, and also SCD regarding language, visuospatial functions, and executive functions were associated with incident MCI. This association persisted even after adjusting for depressive symptoms.	**Strength:** Looks at the role of both SMI and SCI (language, visuospatial abilities, and executive functioning). **Limitations:** Baseline BDI scores for the sample (m = 4.5, SD = 4.1) suggest few, if any, participants reported clinically significant levels of depressive symptoms. It is unclear how cognitive impairment at baseline was assessed. **Weight of Evidence:** A = M, B = L, C = H

Notes.
Abbreviations related to subjective cognitive impairment: SCD = subjective cognitive decline; SCI = subjective cognitive impairment; SMI = subjective memory impairment.
Abbreviations related to diagnosis: AD = Alzheimer's disease dementia; MCI = Mild Cognitive Impairment; VaD = Vascular dementia.
Abbreviations for assessment measures: BDI = Beck Depression Inventory; CDS = Cognitive Difficulties Scale; CIDI = Composite International Diagnostic Interview; CERAD = Consortium to Establish a Registry for Alzheimer's Disease; CES-D = Center for Epidemiological Studies Depression Scale; ECog = Everyday Cognition; GDS= Geriatric Depression Scale; MMSE = Mini Mental State Examination; PRMQ = Prospective and Retrospective Memory Questionnaire; SIDAM = Structured Interview for the Diagnosis of Dementia of Alzheimer type, Multi-infarct Dementia and Dementia of other aetiology.
Weight of Evidence classifications: L = low; M = medium; H = high.
Other: CI = confidence interval; GP = General Practitioner; HR = hazard ratio; NINCDS-ADRDA = National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association

baseline had been determined and what information was used to inform these judgements (studies 1, 3, 4 and 6).

Exposure and comparator. Assessment of depression most commonly focused on assessment of current depressive symptoms. Standardised measures were used in all cases. Studies 1 and 3 used the Center for Epidemiological Studies Depression Scale (Radloff, 1977; Fuhrer & Rouillon, 1989); studies 2, 4 and 5 used versions of the Geriatric Depression Scale (Yesevage et al., 1983; Sheikh & Yesevage, 1986); and study 6 used the Beck Depression Inventory – Second Edition (Beck, Steer, & Brown, 1996). One study (study 2) also assessed lifetime prevalence of depression using the Composite International Diagnostic Interview (Wittchen & Pfister, 1997).

Outcome. Three main outcome variables were evident in studies, all tracked from the baseline of the study to the point of final follow-up: statistically significant decline on standardised tests of cognitive functioning (study 1); conversion to MCI (study 6); or conversion to dementia (studies 2, 3, 4, and 5).

Study type. All included studies had a longitudinal design. Follow-up duration ranged from a total of 2 years (study 1) to a mean of 8.8 years (study 3). The mean duration across studies was 5.6 years.

Study quality. In general, studies had large sample sizes with a minimum of 733 participants (Study 1), and clearly defined groups of individuals who showed either cognitive decline or remained stable. While SCI and cognitive decline were

generally the primary variables of interest across the studies, depressive symptoms were reported only as a comparison of demographics between groups or as a covariate in the primary analyses. Consequently, the research design utilised in these studies is arguably poorly suited to answer the review question.

It was also not possible to identify subgroups within the samples according to the presence/absence of symptoms of depression, or levels of depression, instead the significance of differences among those who did/did not show objective cognitive decline were reported. The level of self-reported depressive symptoms varied considerably between papers. While some papers included participants with 'high' or clinically significant levels of depressive symptoms (studies 1, 2, and 4), scores reported on measures of depression for other papers indicated that it was unlikely that many, if any, participants scored in a clinically significant range for depression (studies 3, 5, and 6). This suggests that for those studies, any differences between depressive symptoms were very subtle and while they may be statistically different it is unlikely that they represent significant clinical differences among participants.

One final methodological consideration is the duration of follow-up. In the study of SCI by Koppara et al. (2015), cognitive decline was not detected on formal tests until six years after baseline assessment. Studies 1 and 6 have a comparatively short follow-up period (2 and 3.9 years, respectively); therefore, cognitive decline may not have been identified in these studies as an artefact of the follow-up duration.

The relationship between depressive symptoms and SCI. Studies were consistent in their reports that participants with higher levels of SMI also had significantly higher levels of depressive symptoms (studies 1, 4, 5). Study 1 found that participants with higher levels of SMI were significantly ($p < .001$) more likely to have high levels of depressive symptoms than those with fewer cognitive complaints (27.9% vs. 6.5-16.9% of participants, respectively). Study 4 found that individuals classified as being cognitively frail (SMI plus physical frailty) scored (on average) in the mild/severe range for depression, while individuals without cognitive frailty were in the normal/mild range for depressive symptoms. Study 6 replicated the finding of significant differences in depression scores between individuals with and without SMI, however, these differences would not have been considered clinically significant (unlike study 5), because all groups scored within a normal range for symptoms.

The relationship between depressive symptoms and longitudinal cognitive decline. Higher levels of depressive symptoms were also generally significantly associated with objective cognitive decline (studies 2, 3, and 4). Study 2 found that the presence of very late-onset depression (aged ≥70 years) and current depressive symptoms was predictive of later Alzheimer's disease (hazard ratio = 5.48, 95% CI 2.41-12.46, $p < 0.001$). Study 3 found significant differences of 1.2-1.4 points on the Center for Epidemiological Studies Depression Scale (Radloff, 1977) between those who did and did not develop dementia over the course of the study. Study 4 found a difference of 2.4-3.1 points on the Geriatric Depression Scale-30 (Yesevage et al., 1983) between those who did and did not

develop dementia. For these latter two studies, while the differences are statistically significant, their clinical significance given the relatively small differences in scores is likely to be questionable.

The relationship between depressive symptoms and longitudinal cognitive decline in SCI. In terms of the more complex inter-play between SCI, symptoms of depression, and objective cognitive decline, no clear role of depressive symptoms was found. There was no evidence to support the existence of a positive relationship between symptoms of depression and subsequent cognitive decline in the context of SCI, i.e., the risk of dementia did not increase when participants reported higher levels of depressive symptoms in addition to SCI. There was also no evidence found to support the other hypothesis of a negative association, whereby the presence of depressive symptoms is associated with a decreased likelihood of cognitive decline relative to lower levels of depression. It therefore appears that level of depressive symptoms does not modify the relationship between SCI and longitudinal decline.

Studies 1, 2, 4, 5, and 6 all constructed hazard ratio models looking at the association between SCI and risk of cognitive decline. All studies found a significant relationship between measures of SCI and cognitive decline, even when depression was included as a covariate in the model. Published hazard ratios suggest an approximately two-fold increased risk of cognitive decline (Alzheimer's disease and MCI) when reporting SMI or SCI (studies 5 and 6, respectively). Similarly, study 4, looking at reversible cognitive frailty (SMI plus physical frailty) found a two-fold increased risk of developing dementia (all types). The risk of

developing vascular dementia was even more pronounced, indicating a six-fold increased risk of developing vascular disease over the course of 3.5 years when reporting SMI.

Consistency of SMI reports were considered in studies 5 and 6, although in different ways. Participants in study 5 were asked the question: 'Do you feel like your memory is becoming worse?' at two different time points 18-months apart. Those who answered with an affirmative on both occasions were judged to be consistently reporting SMI. Study 6 used the Everyday Cognition scale (Farias et al., 2008), to ask participants on a single occasion to judge retrospectively whether there had been any change to their cognition over the past 10 years (asked via 39 questions) with options of 'no change or better', 'questionable or occasionally worse', 'consistently a little worse', or 'consistently much worse'. Arguably, study 6 employed a less reliable measure of SMI in that it sampled information about SMI only at one time-point using a self-report of their previous self-report. Study 5 found that higher depression scores were significantly associated with a two-fold increased risk of developing AD dementia when participants reported consistent SMI with or without associated concerns (hazard ratio = 2.03, 95% CI: 1.30–3.15, p = 0.002), but not for inconsistent reports of SMI (hazard ratio = 1.42, 95% CI: 0.9–2.25, p = 0.135). Unfortunately, study 6 did not analyse or report on the relationship between consistency of reports and depression.

Across the studies included in this review, greater SCI was found to be associated with an increased risk of cognitive decline, and the presence or absence of symptoms of depression did not affect the outcome. Study 3 adds further support for this relationship by way of examining the association between

depression and cognitive decline. The authors looked at the predictive nature of late-onset and current symptoms of depression on the subsequent development of Alzheimer's disease. The model was predictive (hazard ratio = 5.48, 95% CI 2.41-12.46, $p < .001$), but the model lost significance when SMI was entered as a covariate (HR = 1.55, 95% CI 0.95-1.86, $p < 0.10$).

Collectively, the evidence collated in this review suggests that the presence (or absence) of depressive symptoms does not contribute a significant covariate effect on the effect of SCI on subsequent cognitive decline, regardless of how consistently SCI is reported.

Discussion

This review sought to investigate relationships between depression, subjective cognitive impairment and cognitive decline with a novel focus on examining whether the presence or absence of depressive symptoms in subjective cognitive impairment is differentially associated with subsequent decline in objective cognitive function. Previous researchers have posited various hypotheses of the relationship between depression and subjective and objective cognitive impairment. These include, depression as a risk factor or prodrome of dementia; as leading to temporary changes in cognitive functioning; or leading to negatively biased self-appraisals of functioning resulting in SCI (Austin et al., 2001; Muliyala & Varghese, 2010; Crane et al., 2007).

This review examined six papers that investigated depressive symptoms and the relationship between subjective cognitive impairment and cognitive

functioning over time. The results were consistent across the studies in indicating that depressive symptoms do not have a significant effect on the predictive relationship between SCI and subsequent cognitive decline.

This finding that SCI increases the longitudinal risk of cognitive decline regardless of the level of depressive symptoms experienced by individuals is inconsistent with Muliyala and Varghese's suggestion that depressive symptoms lead to temporary changes in cognitive functioning and Crane et al.'s hypothesis that SCI represents a negatively biased and/or inaccurate self-appraisal. If either of these hypotheses had been correct it is more likely that there would have been no increased risk, or even a decreased risk, of cognitive decline (with SCI being an artefact of depression rather than an early symptom of MCI or dementia).

It is not possible to draw conclusions about whether depression is a prodrome to dementia based on the findings of this review because there is no evidence to suggest that this depressive symptoms interacts with the risk posed by SCI. Based on the collective results of the papers included in this review, it seems most likely that SCI and depressive symptoms each independently increase the risk of later cognitive decline. One important consideration, however, is that the papers included in the review were typically interested in the relationship between subjective cognitive impairment and objective cognitive decline, with depression only measured as a possible confounding variable, rather than in investigating the role of depression in its own right. In order to formally determine whether an interaction does or does not exist, a hierarchical multiple regression analysis testing for depressive symptoms of a moderator of the relationship between SCI and cognitive decline would be a more appropriate statistical test.

It is likely that methodological factors in how studies were designed affected the findings of the review. The different studies looked at SCI in various ways – some were interested in self-reported difficulties in multiple cognitive domains, others assessed only memory, or included physical frailty as a required component of their definition (of cognitive frailty). This, in combination with differences in the methods of assessment (a single question versus multiple questionnaires), may impact on the results of the review if depressive symptoms impact differently according to the specific definition and mode of assessment of SCI.

Participant factors might also have influenced the results. For example, although none of the studies excluded participants on the basis of clinical depression, levels of depressive symptoms reported by individuals were very low for three of the included papers. With this in mind, any effect of depression may not have been strong enough to be identified.

Strengths and Limitations of the Study

Strengths of the review include the investigation of a novel question in an attempt to un-pick the potentially complex relationship between three inter-related phenomenon: SCI, depression, and cognitive decline. Varied and conflicting hypotheses had previously been posed by different researchers, and this review provides a systematic review of relevant literature in order to determine whether there is empirical support for any of these hypotheses.

Several limitations exist in relation to this review in addition to those that have already been raised throughout the course of this report. Firstly, it is possible

that, although a thorough search of the literature was attempted, some studies that would otherwise have met the inclusion criteria were missed. This may have caused some degree of bias in the findings of the review. However, the limited number of studies that were found may simply be a reflection of the scarce body of research in this area. Due to time constraints, other avenues of record identification were not explored, however, papers cited by the included studies would ideally have been screened, and the authors of the papers that were included contacted for further information and possibly unpublished results. For example, where effect sizes were not published or where depression was included as a covariate in hazard ratio analyses. It is possible that analyses pertinent to the review question were undertaken but not included in the publication as they were not considered relevant to the aims of the empirical paper.

Finally, the appraisal of papers against the inclusion/exclusion criteria for the review was difficult since samples of participants with subjective cognitive impairment with or without depression were not clearly identified in the studies or reported on. Despite concerns about ensuring the reliability of including relevant papers in the review, there was sound inter-rater reliability at the full-text appraisal stage.

Clinical Implications

The review has implications for clinical care, suggesting that while depression is associated separately with both SCI and cognitive decline, the relationship between SCI and cognitive decline is still meaningfully predictive

regardless of level of depressive symptoms. Therefore it is important that SCI should be taken seriously when reported as if confers, at least, a two-fold increase in incident rates of MCI and dementia. Owing to the higher rates of depressive symptoms with both higher levels of SCI and cognitive decline it would be important to screen for depressive symptoms and treat these as indicated when assessing for possible MCI or dementia. It remains unclear whether interventions for depression may also help to alleviate subjective cognitive impairment in some cases.

Directions for Future Research

Although the results of the current review strongly indicate that depression does not affect the predictive relationship between SCI and subsequent cognitive decline, this would preferably be confirmed using a by a more methodologically robust empirical study, with depression not just included as a covariate in the analysis. This might be investigated according to a design to test moderation effects using hierarchical multiple regression analysis, as described previously. An alternative would be to conduct a study with individuals with subjective cognitive impairment clearly divided into two groups, those with clinical levels of depression and those without, and to examine hazard ratios (with conversion to Mild Cognitive Impairment or dementia as the outcome) for the two groups.

It is also possible that there are differences in the role of depression in subsequent cognitive decline among individuals with subjective cognitive impairment and those classified as SCD Plus. It is possible that depressive

symptoms play a role in only one of these conditions. For example, that depressive symptoms lead to negatively biased appraisals or temporary changes to functioning in subjective cognitive impairment; while individuals with SCD Plus are detecting early changes indicative of their increased risk of subsequent conversion to mild cognitive impairment and Alzheimer's disease (Jessen et al., 2016).

Finally, the specific question of whether depression may be a prodrome to dementia remains. For this purpose, the relationship between depression and dementia needs further study, not concerning SCI, as well as consideration of possible mechanisms by which depression may develop as an early symptom in the course of the development of dementia.

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Appendix A: Weight of Evidence Framework Applied for Critical Appraisal

Weight of Evidence Framework Applied for Critical Appraisal

	High	Medium	Low
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WoE B: Methodological Relevance • Review specific • Judgement about appropriateness of study design/method to answer the *review question*.	Aims of the study include investigating the role of depressive symptoms in SCI and cognitive decline.	Aims of the study include examination of the relationship between depression and SCI and/or cognitive decline. Incidental findings related to review.	Aims of the study or analyses are not relevant to the review.
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Notes. Reproduced, with adaptation, from Hill et al. (2016). Adaptations are highlighted in the Table. WoE = weight of evidence framework; SCI = subjective cognitive impairment.

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DOCTORATE IN CLINICAL PSYCHOLOGY

EMPIRICAL PAPER

The role of trait self-compassion as a moderator of the relationship between subjective memory impairment and psychological distress in older adults

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Abstract

Introduction: Subjective memory impairment (SMI) refers to the perception of memory difficulties in the absence of objective memory impairment. SMI is a relatively common phenomenon in later life, affecting 43-77% of people over the age 65 years (Larrabee & Crook, 1994). Experience of SMI is associated with psychological distress, e.g., SMI is predictive of symptoms of depression and anxiety (Hurt, Burns, & Barrowclaugh, 2011). Previous research has suggested that self-compassion is positively associated with aspects of well-being in older adults (Phillips & Ferguson, 2012) and has been found to moderate the relationship between subjective physical health and subjective well-being (Allen, Goldwasser & Leary, 2012).

Objective: The aim of the study was to extend the research of Allen, Goldwasser and Leary (2012) and investigate whether self-compassion moderates the relationship between subjective memory impairment and memory-related psychological distress in older adults.

Methods: A cross-sectional correlational design was used to examine relationships between SMI, psychological distress and trait self-compassion, while controlling for depression and anxiety. A sample of 71 adults over the age of 60 years completed a series of questionnaires to measure the constructs of interest. The Addenbrooke's Cognitive Examination – 3 (Hsieh, Shubert, Hoon, Mioshi, & Hodges, 2013) was used to verify that cognitive functioning was in a normal range for the participant's age.

Results: Self-reported psychological distress was significantly positively associated with SMI ($r = .51$, $n = 69$, $p < .01$). The hypothesis that trait self-compassion moderates

the relationship between SMI and psychological distress was unsupported (b = .01, $t(63)$ = .51, p = .61). A second, exploratory model, was found to be the best fit for the data, explaining 49% of the variance in memory-related psychological distress. The main effect of Self-Judgement (a subscale of the Self-Compassion Scale) made a significant contribution to explained variance (b = -2.50, $t(63)$ = -3.07 p = .003), however the interaction between Self-Judgement and SMI was non-significant.

Conclusion: Self-compassion (specifically self-judgement), does partially explain memory-related distress, even when general levels of anxiety and depression are controlled for. It is not possible to unequivocally say that there is no moderation effect due to the limitations of the sample size, however any effect (if one does exist) is likely to be small and require a very large sample size to detect.

Introduction

This introduction to the experimental study will provide a background to the literature and rationale for research on self-compassion in subjective memory impairment and associated psychological distress. In particular, the prevalence and detrimental impact of subjective memory impairment in older adults will be described, followed by the role of self-compassion as a protective factor and positive resource in ageing. Finally, a possible moderation model will be presented depicting self-compassion as a buffer against psychological distress when individuals experience memory lapses.

Normative Cognitive Ageing and Subjective Memory Impairment

Gradual decline in memory functioning commonly occurs with advancing age (Salthouse, 2010). Subtle declines in performance have consistently been observed on tasks of episodic memory (Salthouse, 2004), working memory (Wilson et al., 2002; Park et al., 2002), and memory for information presented verbally (Hedden & Gabrielli, 2004; Wilson et al., 2002).

However, predictions of own memory performance by normative participants (i.e., in normal ageing) are typically only moderate in their accuracy (Clare, Wilson, Carter, Roth, & Hodges, 2002). The term subjective memory impairment (SMI) is used to refer to the perception of memory difficulties in the absence of objective memory impairment. SMI is a relatively common phenomenon, the prevalence of which increases with age,

43% of people aged 65-74 years report concerns about their memory, with this figure rising to 77% over the age of 85 years of age (Larrabee & Crook, 1994). Canevelli et al. (2015) presented data on individuals examined in a memory clinic setting between 2002 and 2014. They found that one in four people who underwent assessment did not have any cognitive deficits. Their analyses also indicated that prevalence of SMI increased and individuals presented at an earlier age over the course of the study.

Subjective Memory Impairment and Dementia

Whether SMI exists on a continuum with dementia is the subject of ongoing debate. Some studies have found neurological changes characteristic of Alzheimer's disease pathology in individuals with SMI, including increased amyloid beta deposition, tau proteins in cerebrospinal fluid, and functional connectivity alterations (Perrotin et al., 2017; Garcia-Ptacek et al., 2016; Lopez-Sanz et al., 2017). Such biomarkers become increasingly abnormal from subjective cognitive impairment, to Mild Cognitive Impairment (MCI), to Alzheimer's disease (AD) (Colijn & Grossberg, 2015). This suggests that SMI may be a prodromal phase of AD in which neuropsychological tests are not sensitive enough to detect the subtle cognitive changes experienced by individuals themselves.

However, not all cases of SMI show subsequent clinical progression. In their review of the literature, Neto and Nitrini (2016) identified specific features in SMI that were associated with subsequent clinical progression (e.g., first report of SMI being after the age of 60 and concerns being confirmed by an informant). In instances where

progression does not occur, Cheng, Chen and Chiu (2017) highlight other possible causes, including psychological factors such as depression and health anxiety, and personality traits resulting in the experience, or report, of SMI. Associated with these factors, SMI may represent a negatively biased and/or inaccurate self-appraisal with accompanying distress (Crane, Bogner, Brown, & Gallo, 2007).

Subjective Memory Impairment and Psychological Distress

Experience of SMI is associated with psychological distress. In particular, SMI has been found to predict experience of depression and anxiety (Hurt, Burns, & Barrowclaugh, 2011). Importantly, these negative emotional reactions appear unrelated to the individual's level of objective cognitive impairment (Hurt, Burns, Brown & Barrowclough, 2010). One model which seeks to explain the relationship between SMI and psychological distress in older adults was introduced by Hurt, Burns, Brown and Barrowclough (2010). They sought to validate Leventhal, Nerenz and Steele's (1984) Common Sense Model (CSM) of health threat, in relation to SMI using an adapted version of the Illness Perception Questionnaire-Revised (IPQ-R; Moss-Morris, Weinman, & Petrie, 2002). The CSM explains how beliefs about the cause, consequences, longevity, controllability and label applied to symptoms inform the coping strategies that are adopted. This in turn, affects mental and physical health outcomes.

The Illness Perception Questionnaire-Memory (IPQ-M; Hurt et al., 2010) includes subscales for SMI and psychological distress related to perceived memory impairment.

These variables have been found to share variance with constructs of anxiety and depression (Hurt et al., 2011). Correlations of a medium effect size were found when comparing participant responses to questions about SMI and memory-related distress against scores on the Geriatric Depression Scale (Yesavage et al., 1983) and Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988).

Although a statistically significant relationship between SMI and memory-related psychological distress has been found, possible moderators of the relationship have not been investigated. If a moderator were identified it may be a useful target for clinical intervention in individuals presenting with SMI and high levels of psychological distress in the context of normal cognitive ageing. Of particular interest to the current proposal, a moderate correlation was found between symptoms of SMI and social comparison. Here, social comparison refers to the comparison of oneself with others in a similar situation (Hurt et al., 2010), rather than the conceptualisation presented in social rank theory which refers to the degree to which one feels inferior to others and looked down on (Price & Sloman, 1987; Gilbert, 1989; 1992). Hurt et al., (2010) suggest that social comparison can lead to increased subjective wellbeing as it enables individuals to gain comfort from a perceived shared fate (Taylor, Wayment, & Carrillo, 1996). This is remarkably similar to the ‘common humanity’ dimension of self-compassion and suggests self-compassion as a candidate to explain the relationship between SMI and psychological distress.

Self-Compassion

Self-compassion has been conceptualised by Neff (2003) in terms of self-kindness (experiencing kindness towards oneself when things go wrong), common humanity (recognising that one's experiences are part of the common human experience), and mindfulness (taking an understanding and non-judgmental attitude towards one's failures). Self-compassion interventions employing varied paradigms have shown that self-compassion can be taught to reduce self-criticism, symptoms of depression and anxiety, and increase feelings of safety (Shahar et al., 2012; Falconer et al., 2014).

When experiencing stressful events, people higher in self-compassion have been found to rely less on avoidance and escape and more on positive cognitive restructuring (Allen & Leary, 2010). Allen and Leary describe individuals with higher levels of self-compassion to be better able to acknowledge and try to understand emotions without disengaging or becoming overwhelmed. Individuals high in self-compassion are also more likely to accept responsibility for their failures. Interestingly, the authors' review of the literature surmised that people who have high levels of self-compassion are not necessarily more likely to seek support or try to change their situation than people with lower levels. Applied to SMI in older adults, this research suggests that individuals high in self-compassion are likely to be self-aware of memory lapses, but also curious and acknowledging some degree of personal control such that they feel better able to tolerate or manage SMI independently. In contrast to the idea that high self-compassion has no effect on an individual's likelihood to try and change their situation, Allen, Goldwasser and Leary (2012) found that in the early stages of memory difficulties (when memory difficulty was less than .34 standard deviations above the mean),

individuals high in self-compassion were more likely to make use of memory aids and strategies (e.g., memory mnemonics and asking people to repeat themselves).

Researchers have only recently started to examine self-compassion in older adults. Studies so far suggest that self-compassion increases over the lifespan (Allen et al., 2012; Homan, 2016). Indeed, higher levels of self-compassion are purported to be a positive resource in the experience of ageing, with self-compassionate individuals recognising that ageing and the accompanying changes are part of the shared human condition and experiencing a greater sense of connectedness with others.

The Relationship between Self-Compassion and Psychological Wellbeing in Later Life

Studying self-compassion in older adults, Phillips and Ferguson (2012) found that higher levels of self-compassion are positively associated with aspects of subjective well-being (positive affect and negative affect) and psychological well-being (ego integrity and meaning in life) in older adults. Self-compassion was also inversely associated with negative affect suggesting that older adults high in self-compassion are less likely to engage in self-criticism, feel alone in their suffering, and fixate on adverse experiences.

The role of self-compassion in the experience of distress associated with SMI has not yet been studied; however, Allen et al. (2012) examined the role of self-compassion in the relationship between subjective physical health and subjective

wellbeing in older adults. Self-compassion was associated with greater subjective wellbeing in participants with poorer physical health, while participants with good physical health had high subjective wellbeing regardless of their level of self-compassion.

Furthermore, Homan (2016) found the relationship between self-rated physical health and depression to be conditional upon self-compassion. Self-rated health and self-compassion were both significant predictors of depression – at low levels of self-compassion, poorer self-rated health was strongly associated with increased depression, while for individuals with high self-compassion, self-rated health did not show a statistically significant relationship with depression. Homan concluded that self-compassion buffered older adults from the negative impact that health problems can have on depression.

Aim and hypotheses

Aim. The present study builds on the work of Allen et al. (2012), who found that self-compassion moderated the relationship between subjective physical health and subjective well-being. In the context of SMI, a suggested moderation model is depicted in Figure 1.

If trait self-compassion as a unified construct is found not to moderate the relationship between SMI and memory-related psychological distress, then the study will

Figure 1. Path Diagram for the Proposed Moderation Model

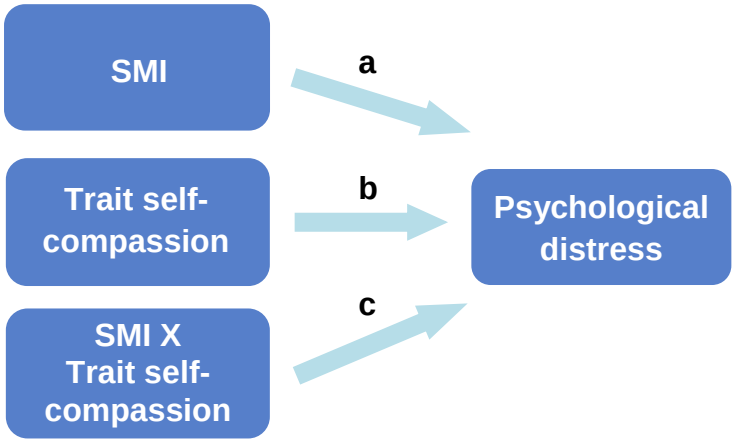

Figure 1. Variables: Subjective memory impairment (SMI) is the predictor variable; Psychological distress is the outcome variable; Trait self-compassion is the moderator variable. Paths: *a* is the impact of subjective memory impairment on psychological distress; *b* is the impact of trait self-compassion on psychological distress; *c* is the interaction or product of SMI and trait self-compassion on psychological distress. The moderator hypothesis is supported if the interaction (Path *c*) is statistically significant.

seek to determine whether individual components (e.g., self-kindness, common humanity, etc.) moderate the relationship.

Hypotheses. The following hypotheses were made:

1. *Self-reported psychological distress is significantly positively associated with SMI (Path a).*

2. *Trait self-compassion moderates the relationship between SMI and psychological distress (Path c) such that high levels of self-compassion will reduce the effect of SMI predicting psychological distress.*

These predictions are made in the context of controlling for symptoms of anxiety and depression owing to the established shared variance between memory-related psychological distress and constructs of anxiety and depression (Hurt et al., 2011). This is to ensure that the 'psychological distress' being measured is related to perceived memory functioning rather than more generalised levels of anxiety and/or depression.

Method

Design

A cross-sectional, correlational, within-subjects design was used to examine the relationships between SMI, memory-related psychological distress and trait self-compassion, while controlling for the effects of depression and anxiety. A series of questionnaires were completed by participants to measure the constructs of interest.

Participants and Recruitment Procedure

Seventy-three participants were initially recruited into the study. The intended population were older people who were experiencing memory lapses in the context of

typical, or normative, aging. Therefore, the Addenbrooke's Cognitive Examination - Third Edition (ACE-III; Hsieh, Shubert, Hoon, Mioshi, & Hodges, 2013) was administered to potential participants as a cognitive screen capable of detecting the possible presence of dementia. Two participants were excluded from the final sample because they fell below the specificity cut-off score (≤82/100) on the cognitive screen, resulting in a final sample of 71 participants. The study was purposely designed to be inclusive of varied physical and health conditions. While some conditions may impact on cognitive functioning and memory, it is not inevitable, and cognitive impairment owing to health conditions would have been detected on the cognitive screen. Owing to the intrinsic impact on cognitive functioning, the study exclusion criteria informed potential participants that they could not take part if they had a diagnosis of learning disability.

The final sample consisted of 46 female (64.8%) and 25 male (35.2%) participants. Inclusion criteria specified that individuals should be aged 60 years of age or over, with some experience of memory lapses (however infrequent). Ages ranged from 60-89 years (M = 70.99, SD = 7.08). 97.2% of participants identified themselves as "white", 1.40% identified as "mixed/multiple ethnic groups", and 1.40% did not provide a response to the question. Participants had spent an average of 15.5 years in education (SD = 3.29). 88.7% of participants rated their physical health as "average" to "excellent". 93.0% rated their income as "adequate" to "excellent". All participants were fluent in English and any hearing or visual difficulties were corrected by hearing aids, contact lenses or glasses.

On measures of anxiety and depression, 8.4% met caseness for anxiety and 8.4% met caseness for depression as indicated by scores of 10 on more on the Generalised Anxiety Disorder Assessment (Spitzer, Kroenke, Williams, & Löwe, 2006) and Patient Health Questionnaire-8 (Kroenke & Spitzer, 2002). On the Self-Compassion Scale (SCS; Neff, 2003), the mean self-compassion score was 20.08 (*SD* = 4.43). This is approximately similar to the scores obtained in Neff's (2003) original validation study in which 391 undergraduate students completed SCS (*M* = 18.25, *SD* = 3.75).

Recruitment was community-based and took place in the South-West of England between November 2017 and April 2018. Methods of advertisement and the numbers recruited are shown in Table 1. To provide an example of uptake, approximately 120 people were informed of the study via presentations, with only seven people ultimately recruited from this method (6% of those informed).

Ethical Approval and Considerations

The study was reviewed and received approval from the University of Exeter's College of Life and Environmental Sciences ethics committee (Appendix A). Participants were entered into a prize draw to win one of five £50 Love2Shop vouchers as a gesture of recognition of their time and to thank them for participating. Potential participants were informed that performance scores on the ACE-III screen might indicate problems with cognitive functioning and were asked to consider whether they

Table 1

Recruitment of the Study Sample

Method of advertisement	Number recruited
Presentations at social groups:	
Age UK	4
Westbank	0
Young at Heart	3
Advertisement on websites:	
University of the Third Age	17
Age UK	0
Press release:	
Local radio	1
Local newspapers	4
Posters and/or leaflets:	
Community centres	1
Bowling clubs	1
Library	0
Religious organisations	2
Choirs	0
Sheltered Housing properties	0
Theatres/cultural centres	1
E-mail to distribution list:	
National Trust volunteers	11
Centre for Research in Ageing and Cognitive Health (University of Exeter)	2
Lived Experience Group (University of Exeter)	0
Peninsula Public Involvement Group	0
Social media	
Mood Disorders Centre twitter (University of Exeter)	0
Friend/family of researcher	13
Referral by previous participants (snowball sampling)	13

would like their General Practitioner to be informed in the event of this (providing written consent accordingly).

Power Analysis

The sample size required to test for moderation with statistical power of .8 and alpha set at .05 was calculated following consideration of effect sizes found in previous studies. The medium estimated effect for Path *a* is based on Hurt et al. (2010) paper. They found that symptoms of SMI were significantly associated with negative emotional representations of memory problems (r = .42). The medium estimated effect for Path *b* was taken from Homan's (2016) paper looking at self-compassion and psychological wellbeing in older adults. Homan found that self-compassion was negatively associated with anxiety (r = -.28) and depression (r = -.65).

If the interaction between SMI and trait self-compassion is assumed to explain 4% of additional variance (a small-medium effect, with 50% of variance left unexplained), the effect size would be f^2 = .08. A G*Power 3.0 (Faul, Erdfelder, Land, & Buchner, 2007) calculation was run to determine the sample size required to detect this interaction effect with one tested predictor and five total predictors. A total of 101 participants were required to give a power of .8 with an alpha of .05.

Measures

All of the measures listed below can be found in the research pack of demographic questions and questionnaires in Appendix B.

Screening for cognitive impairment. The Addenbrooke's Cognitive Examination – 3 (ACE-III; Hsieh et al., 2013) was used to assess performance on tasks

of attention, memory, language, visuospatial ability and concentration. The ACE-III provides an objective measure of global cognitive functioning and is often used in clinical practice to detect probable dementia. Cut-off scores of 88/100 and 82/100 have been assigned for sensitivity and specificity of suspicion of dementia (Hsieh, Shubert, Hoon, Mioshi, & Hodges, 2013). For the purpose of this study, the cut-off score of 82/100 was used for maximum specificity. Only individuals who obtained a score of 83 or higher were included in the study to ensure that participants' experience of memory problems was more likely subjective than objective.

Subjective memory impairment and psychological distress. The Illness Perception Questionnaire – Memory (IPQ-M) developed by Hurt et al. (2010) is an adapted version of the Illness Perception Questionnaire – Revised (IPQ-R; Moss-Morris et al., 2002) and is suitable for use with individuals with SMI. The measure comprises 11 subscales related to SMI. All scales demonstrate good internal reliability with α between 0.68 and 0.89 (with the exception of treatment control which was not used in the study). Average inter-item correlations were between 0.2 and 0.4 for all subscales except illness coherence (0.67).

Two subscales of the IPQ-M were included in the present study to measure SMI and psychological distress (Table 2). The Identity (symptoms) subscale was used to measure SMI and the Emotional Representation subscale was used to measure psychological distress related to memory lapses. Correlations between these subscales and the Seriousness and General Forgetting subscales of the Memory Functioning

Table 2

Items Used to Measure Subjective Memory Impairment and Psychological Distress

Study variable	**IPQ-M construct**	**Items**	**Response scale**
Subjective memory impairment	Identity (symptoms)	Mind going blank when talking Difficulty remembering events Forgetting appointments Slower reactions Difficulty remembering names Forgetting items when shopping Forgetting telephone messages Feeling confused Panic Difficulty learning new things e.g. to use a new television Feeling anxious Forgetting where you put things e.g. car keys Forgetting directions to places Repeating yourself Forgetting to phone someone Forgetting what people have said to you Forgetting important dates e.g. birthdays Not being able to think of words Forgetting to do something e.g. household jobs	Yes/ No
Psychological distress	Emotional representation	Having memory problems is very embarrassing My memory problems make me feel angry My memory problems do not worry me When I think about my memory problems I get upset Having memory problems makes me feel like a fool I get depressed when I think about my memory problems My memory problems make me feel afraid My memory problems make me feel anxious	*Strongly disagree - Strongly agree* (5-point Likert scale).

Questionnaire (Identity: $r = .40$, $p < .05$ and $r = -.68$, $p < .5$, respectively; Emotional Representation: $r = -.37$, $p < .05$ and $r = -.35$, $p < .05$) and the Geriatric Depression Scale (Identity: $r = .40$, $p < .05$; Emotional Representation: $r = .38$, $p <. 05$) support the concurrent validity of the measure.

Internal consistency reliability of the IPQ-M Identity and Emotional Representation scales for the study data was estimated using Cronbach's alpha. Overall reliability of the Identity scale was Cronbach's $\alpha = .90$, which exceeds the minimum Cronbach's $\alpha = .80$ and is considered to indicate acceptability for use of the scale in research (Nunnaly & Bernstein, 1994). The corrected item-total correlations ranged between $r = .42$-$.70$ for each of the 19 items and the composite score of all the other remaining items. Furthermore, calculations for Cronbach's alpha if items were deleted failed to improve on the original estimate of Cronbach's alpha for the Identity scale, indicating that all items should be retained. Overall reliability of the Emotional Representation scale was Cronbach's $\alpha = .88$, again, indicating that it is acceptable to use the scale for research purposes. Corrected item-total correlations revealed correlations of between $r = .45$-$.79$ for each of the eight items and the composite score of all the other remaining items. Calculations for Cronbach's alpha if items were deleted failed to improve on the original estimate of Cronbach's alpha for the Emotional Representation scale, again, indicating that all items should be retained.

Permission was sought and granted by the lead author, Dr Catherine Hurt (Appendix C), to replace the dichotomous response (*yes/no*) option for the Identity (symptoms) subscale with a Likert-scale. This change followed feedback from an initial

consultation with representative stakeholders who felt that it was important to reduce difficulty deciding about the absolute presence or absence of symptoms. It was also anticipated that the use of a Likert-scale would increase variability in responses which is helpful in detecting a significant correlational relationship.

Self-compassion. A 26-item version of Neff's (2003) Self-Compassion Scale was used to measure trait self-compassion (Appendix B). Respondents indicated agreement with statements describing responses to difficult situations on a scale from (1) *Almost never* to (5) *Almost always*.

The structure of the SCS has been assessed in older adults by Phillips and Ferguson (2012) who found that a two-factor model was the best fit, accounting for 43.5% of variance in their dataset. The first factor contained *Negative* items, relating to self-judgment, isolation and overidentification; the second factor contained Positive items, relating to self-kindness, common humanity and mindfulness. The sets of SCS items demonstrated high internal consistency: Negative, $\alpha = .88$; Positive, $\alpha = .87$. SCS-Tot also exhibited high internal consistency ($\alpha = .88$). Neff (2003) previously calculated correlation coefficients between the SCS and other scales measuring similar constructs (i.e. self-criticism, connectedness, attention, clarity and repair) to test construct validity. Significant correlations were found between the SCS and each measure, with *r* between .11 and .65. Scoring of the SCS followed Kristen Neff's guidance to first reverse score the negative subscale items, then compute subscale scores by calculating the mean of subscale item responses, and finally compute the grand total of all six subscales.

Depressive symptoms. The presence of depression was assessed through the Patient Health Questionnaire-8 (PHQ-8; Kroenke & Spitzer, 2002). Participants were asked to rate eight statements using a four-point Likert-scale according to how often they have been bothered by each problem in the past two weeks. The scale is anchored between (0) *not at all* and (5) *nearly every day.* Problems are based on symptoms of depression identified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000).

The PHQ-8 is an adapted version of the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001), and was selected in accordance with recommendations for the use of the PHQ in research. The PHQ-8 omits one item which asks about thoughts of suicide and self-harm but retains comparable psychometric properties to the PHQ-9 (Kroenke & Spitzer, 2002). The final item scores ≥10 have a sensitivity of 88% and a specificity of 88% for major depression.

Anxiety symptoms. Symptoms of anxiety were measured using the Generalised Anxiety Disorder Assessment (GAD-7; Spitzer et al., 2006). The GAD-7 is based on diagnostic criteria for generalised anxiety disorder described in DSM-IV. Participants were asked to rate seven statements using a four-point Likert-scale according to how often they had been bothered by specific problems in the previous two weeks. The scale is anchored between (0) *not at all* and (5) *nearly every day.*

The measure has had good internal reliability (Cronbach $\alpha = .92$) and convergent validity ($r = 0.72$). Construct validity has also been demonstrated (increasing scores on the GAD-7 scale are strongly associated with multiple domains of functional

impairment). Using the threshold score of 10, the GAD-7 has a sensitivity of 89% and a specificity of 82% for generalised anxiety disorder.

Procedure

After expressing interest in the study, the Participant Information Sheet was provided to potential participants either via e-mail or in-person in the case of presentations (Appendix D). Potential participants were asked to confirm that they would like to take part in the study once they had read the study information. On electing to take part, a session with the researcher was arranged either at the University of Exeter or in participants' own homes (if attendance at the university was difficult due to transport, mobility or anxiety). 12.7% of participants completed the session in their own homes. Sessions were anticipated to take up to one hour but did take longer (up to two hours) for a small proportion of participants.

At the research session, participants were first asked to complete a consent form (Appendix E). Participants were informed of their right to withdraw from the study, how the data they provided would be managed and anonymised, and to state whether they would like their GP to be informed in the event that their ACE-III score indicated the possibility of a dementia. After obtaining consent, the ACE-III was administered, with participants receiving immediate feedback of the outcome. Participants who scored ≤82 on the ACE-III were informed of this and discussions took place about their emotional response to the news, including opportunities to note changes that they had observed in their daily lives. Where individuals wished their GP to be informed, contact

details were obtained and details of the letter agreed (including provision of their ACE-III score and a copy of the completed record form).

Individuals who 'passed' the cognitive screen were invited to complete some demographic information and a series of questionnaires (Appendix B) as described in the Measures section above. Participants were informed that they could omit responses to any questions they preferred not to answer and were able to clarify with the researcher any questions or responses they were unsure of. Following completion of the questionnaires, debriefing took place. This included consideration of participants' emotional responses to the process of completing the questionnaires, disclosure of the variable of interest in the study (i.e., self-compassion), and an invitation to be sent a summary of the study's findings. Written debriefing information which included contact details for further questions, thoughts, support and complaints was also provided (Appendix F).

Statistical Analyses

To test the first hypothesis, that self-reported psychological distress is significantly positively associated with SMI, partial correlation coefficients (controlling for the effects of anxiety and depression) were computed between SMI and memory-related psychological distress.

To test the second hypothesis, that trait self-compassion moderates the relationship between SMI and memory-related psychological distress, a series of hierarchical multiple regression analyses were conducted to test the main effects of self-

compassion, SMI and their interaction on the measure of distress. All continuous predictors were mean-centred and the interaction term created by multiplying SMI by trait self-compassion. SMI, trait self-compassion, depression, and anxiety were entered in Step 1, and the interaction between SMI and trait self-compassion was entered in Step 2 of the model. If the interaction term was significant it would suggest that the effect of SMI on memory-related psychological distress is different at different levels of trait self-compassion. In this event, it was planned that a regions of significance analysis (Johnson-Neyman, 1936) would be performed to investigate where the differences lay. In the event that the interaction term did not make a significant contribution to the model, it was planned that backwards and forwards stepwise regression would be used to determine which SCS subscales are predictive of psychological distress and should be retained and re-tested in the final model.

Missing data were dealt with by mean substitution. Where more than 5% of data was missing on a single variable for any given participant pairwise deletion was used, i.e., cases were included when they have no missing values relevant to a particular analysis. IBM SPSS Statistics 24 and the PROCESS macro (Hayes, 2012) were used to compute the analyses.

Results

Checking Assumptions

The following assumptions were tested with all variables entered into the regression model at the same time to determine the fit of the data to the model and validity of results:

Independence of observations. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.17.

Linearity. To test that independent variables collectively are linearly related to the dependent variable a scatterplot was plotted of the studentised residuals against the (unstandardised) predicted values (Appendix G). The residuals formed an approximate horizontal band, suggesting that the relationship between memory-related psychological distress and the independent variables was likely to be linear.

To test that each independent variable is linearly related to the dependent variable partial regression plots were produced between each independent variable and the dependent variable (Appendix H). All plots demonstrated approximately linear relationships, thus this assumption was accepted as satisfied.

Homoscedasticity of residuals. To test that residuals are equal for all values of the predicted dependent variable the spread of the plot of the studentised residuals against the predicted values was visually inspected (Appendix I). A marginal increasing funnel was evident; however, overall it was considered that homoscedasticity of residuals was satisfied.

No multicollinearity of variables. Examination of Pearson correlation coefficients revealed that the measures of anxiety and depression had a correlation

coefficient greater than 0.7 (r = 0.77, n = 69, p <.01). However, tolerence multicollinearity statistics were all above 0.1, suggesting that multicollinearity was not a problem for the dataset.

No significant outliers, high leverage points or highly influential points. No cases had standardised or studentised deleted residuals greater than ±3 standard deviations. Examination of leverage values identified one case higher than 0.2 (0.31), which would be considered risky. The ordered values for Cook's Distance were examined to determine whether there were any influential cases. There were no Cook's Distance values greater than 1. This suggests that the single case of high leverage did not lead to high influence on the model, consequently it was retained in the analysis.

Normal distribution of residuals. Distribution of residuals was visually inspected through a histogram and P-P Plot. Standardised residuals appeared approximately normally distributed, indicating that the analysis could proceed.

Report of Memory Problems and Memory-Related Psychological Distress

For the purpose of this report, a subjective report of a memory problem was defined as a frequency rating of "often" or "always" for any of the items included in the IPQ-M Identity scale. The frequency of reported memory problems among the sample is displayed in Table 3. The most frequently reported difficulties were difficulty remembering names (42.3% "often", 2.8% "always"); not being able to think of words (28.2% "often", 1.4% "always"); forgetting where you put things (23.9% "often", 2.8% "always"); and difficulty learning new things (16.9% "often", 5.6% "always").

Table 3

Frequency of Reported Memory Problems on the IPQ-M Identity Scale

Item no.	Symptom	*Often* or *Always*
5	Difficulty remembering names	45.1%
18	Not being able to think of words	29.6%
12	Forgetting where you put things	26.7%
10	Difficulty learning new things	22.5%
11	Feeling anxious	19.7%
6	Forgetting items when shopping	15.5%
2	Difficulty remembering events	14.1%
1	Mind going blank when talking	12.7%
19	Forgetting to do something	11.3%
4	Slower reactions	9.9%
17	Forgetting important dates	9.9%
13	Forgetting directions to places	8.5%
14	Repeating yourself	8.5%
16	Forgetting what people have said to you	8.5%
9	Panic	7.0%
8	Feeling confused	5.6%
15	Forgetting to phone someone	5.6%
7	Forgetting telephone messages	2.8%
3	Forgetting appointments	0.0%

Note. IPQ-M = The Illness Perception Questionnaire – Memory

Psychological distress in relation to perceived memory problems was defined as a rating of “agree” or “strongly agree” on the IPQ-M Emotional Representation scale. One item (My memory problems do not worry me) was scored in reverse, thus for this item only a rating of “strongly disagree” or “disagree” was taken as an endorsement of psychological distress. The frequency of reported memory-related psychological distress among the sample is displayed in Table 4. The most commonly reported feature of distress was embarrassment (39.4% “agree”, 2.8% “strongly agree”). Approximately one quarter of the sample also reported that having memory problems

Table 4

Frequency of Report of Emotional Distress on the IPQ-M Emotional Representation Scale

Item no.	Statement	*Agree* or *Strongly agree*
1	Having memory problems is embarrassing	42.4%
5	Having memory problems makes me feel like a fool	25.3%
3	My memory problems do not worry me	22.5%
8	My memory problems make me feel anxious	22.5%
4	When I think about my memory problems I get upset	14.1%
2	My memory problems make me feel angry	12.7%
7	My memory problems make me feel afraid	12.7%
6	I get depressed when I think about my memory problems	11.3%

Note. IPQ-M = The Illness Perception Questionnaire – Memory

makes them feel like a fool (22.5% “agree”, 2.8% “strongly agree”), feel worried (21.1% “disagree”, 1.4% “strongly disagree”), or anxious (22.5% “agree”).

Testing Hypotheses

Hypothesis 1: Self-reported psychological distress is significantly positively associated with SMI.

Table 5 shows the partial correlation coefficients between all pairs of study variables, controlling for the effects of anxiety and depression. Self-reported psychological distress was significantly positively associated with SMI (r = .40, n = 69, p =.001). This indicates a medium effect with higher levels of SMI resulting in heightened distress.

Table 5

Partial Correlations Between Study Variables, Controlling for Anxiety and Depression

	M	*SD*	SC	SMI
SC	20.04	4.44	-	
SMI	28.74	9.09	-.19	
PD	20.03	5.82	-.29	.40**

Note. Variable Names: SC = self-compassion; SMI = Subjective Memory Impairment; PD = Psychological Distress. *$p < .05$; **$p < .01$.

Hypothesis 2: Trait self-compassion moderates the relationship between SMI and psychological distress. To test the hypothesis that psychological distress related to memory problems is a function of multiple risk factors, and more specifically whether trait self-compassion moderates the relationship between self-reported memory problems and memory-related psychological distress, a hierarchical multiple regression analysis was conducted (Model 1 in Table 6). Levels of depression and anxiety were included as covariates in the analysis.

The overall model was significant, $R^2 = .42$, $F(5, 63) = 8.39$, $p < .001$, so 42% of the variance in memory-related psychological distress was related to the three predictors entered in the model (SMI, self-compassion, and the SMI x self-compassion interaction). The main effect of SMI contributed significantly to the model ($b = .23$, $t(63) = 3.14$, $p = .003$), indicating that for every 1 unit increase in SMI, there was a .26 increase in memory-related psychological distress. Computation of Cohen's d indicated that this represented a medium effect size ($d = .76$), with an overlap of approximately 43.0% between SMI and memory-related psychological distress. However, neither the

Table 6

Hierarchical Multiple Regression Models of Predictors of Psychological Distress

	b	*SE B*	*t*	*P*
Model 1				
Constant	19.00 [16.86, 21.14]	1.07	17.73	$p < .001$
SC (mean centred)	-.30 [-.77., .16]	.32	-1.29	$p = .199$
SMI (mean centred)	0.23 [.08, .37]	.07	3.14	$p = .003$
SC x SMI	.01 [-.03, .05]	.02	.51	$p = .614$
Model 2				
Constant	19.35 [17.54, 21.17]	.19	21.30	$p < .001$
SJ (mean centred)	-2.50 [-4.12, -.87]	.81	-3.07	$p = .003$
SMI (mean centred)	.22 [.09, .35]	.07	3.36	$p = .001$
SJ x SMI	-.03 [-.18, .12]	.07	-.37	$p = .709$

Note. SC = Self-compassion; SMI = Subjective Memory Impairment; SJ = Self-Judgement. Anxiety and depression scores were entered as covariates in both models.

main effect of self-compassion ($b = -.30$, $t(63) = -1.29$, $p = .199$), or the interaction term ($b = .01$, $t(63) = .51$, $p = .61$) explained a significant level of variance in the model. Therefore, the hypothesis that trait self-compassion moderates the relationship between SMI and psychological distress was unsupported.

Further Exploratory Analysis

As neither the interaction term nor the main effect of total self-compassion score contributed significantly to the model, the planned exploratory analysis was conducted to investigate whether any of the individual subscales of the SCS might moderate the relationship between SMI and memory-related psychological distress. Predictors included in the model were identified through the backward selection procedure in a stepwise regression analysis. The forward selection procedure was then selected to confirm the results. Psychological distress was entered as the outcome and each SC subscale as predictors in the model. These analyses revealed a single significant predictor, self-judgement (SJ) (b = -2.98, t(63) = -2.87, p = .006).

The moderation analysis was consequently re-run to determine whether self-judgement moderates the relationship between self-reported memory problems and memory-related psychological distress (Model 2 in Table 6). Levels of depression and anxiety were included as covariates in the analysis. The overall model was significant, R^2 = .49, F(5, 63) = 11.49, p < .001, so 49% of the variance in psychological distress was related to the three predictors entered in the model (SMI, SJ, and the SMI x SJ interaction). The main effect of SMI, again, contributed significantly to the model (b = .22, t(63) = 3.36, p = .001), indicating that for every 1 unit increase in SMI, there was a .22 increase in memory-related psychological distress. The effect size for this analysis (d = .81) was found to exceed Cohen's (1988) convention for a large effect. The main effect of SJ also made a significant contribution to explained variance (b = -2.50, t(63) = -3.07 p = .003), with evidence of a medium effect size (d = -.74). The interaction term, however, remained non-significant (b = -.03, t(63) = -.37 p = .71). Thus, both SMI and

SJ explain memory-related psychological distress, however there is no interaction in the relationship.

Consideration of Achieved Effect Sizes and Statistical Power

A final sample size of $N = 71$ indicates that the target sample size of $N = 101$ was not achieved for this study which has implications for the interpretations of the findings. Therefore, post-hoc effects size and power calculations were performed. The R^2 increase by the interaction term in Model 1 ($\Delta R^2 = .004$) suggests a very small effect size ($f^2 = .004$). A very large sample size of 1,957 would have been required to detect a significant effect with an alpha of .05 and power of .8. Sensitivity analysis revealed that for the sample size recruited in this study the interaction effect would have needed to achieve an almost medium effect size of $f^2 = .11$; i.e. an R^2 change of approximately 11%. Therefore, the sample size recruited was not sufficient to achieve acceptable statistical power for a small effect of the interaction term, whereas sufficient power and sample size was accomplished to detect an overall significant large effect of Model 1 ($f^2 = .72$).

Discussion

The aim of the present study was to investigate whether self-compassion moderates the relationship between subjective memory impairment and memory-related

psychological distress. Participants completed a cognitive screen to verify that reported memory lapses were within the realms of normal ageing. Next, a series of questionnaires was completed to assess the specific variables of interest: subjective memory impairment, self-compassion and psychological distress.

The analyses revealed a significant, large, positive relationship between subjective memory impairment and psychological distress related to memory functioning; with higher numbers of reported difficulties corresponding with elevated levels of distress. In the subsequent regression analysis, subjective memory impairment was found to be predictive of memory-related psychological distress. Self-compassion failed to moderate the relationship between subjective memory impairment and distress, nor predict distress itself, thus failing to support the study's second hypothesis. The finding that overall self-compassion did not explain significant variance in psychological distress is surprising given that previous research has found self-compassion to be a protective resource in ageing, associated with reduced psychopathology, and to amplify wellbeing when individuals are faced with poor subjective physical health (Phillips & Ferguson, 2012; MacBeth & Gumley, 2012; Allen et al., 2012).

Further exploratory analyses revealed that one component of self-compassion, self-judgement, was significantly predictive of memory-related psychological distress (showing a moderate effect size). The moderation hypothesis, was again, not supported, possibly a result of sample size limitations. Subjective memory impairment remained a bigger predictor in the final model, showing a large effect size. The variance explained by subjective memory impairment was fairly consistent across both

models, suggesting that the addition of self-judgement did not take variance away from subjective memory impairment.

Neff (2016) explains that self-judgement describes a cold and critical style of relating to the self and is on a spectrum of emotional self-to-self-relating, with self-kindness (showing care and understanding) at the other end. As supported by the results of this study, self-judgement can be considered to play an important role in negative emotional responses to perceived memory performance leading to associated distress. As symptoms of anxiety and depression were controlled for in the final model, this distress can be considered specific to memory and distinct from more general or widespread forms of psychological distress.

To the best of my knowledge, research into self-judgement and memory-related distress has not previously been conducted; therefore, the predictive role of self-judgement is a novel finding. Limited literature exists on the role of self-judgement on distress (outside of depression) or in relation to memory. However, in their meta-analysis Dickerson and Kemeny (2004) examined the impact of psychological stressors on cortisol levels, finding that high cortisol levels were elicited when participants believed that their performance would be negatively judged by others. While this evaluative threat related to external (social) judgements, a similar process may occur for internal (self) judgements, evoking distress due to perceived poor performance.

It is perhaps surprising that self-judgement was the only component of self-compassion that produced a large enough effect size to reach significance in the model. Theoretically, other self-compassion subscales might also have been expected to predict distress. For example, individuals who experience high levels of common

humanity might be expected to benefit from a degree of normalisation of memory difficulties, buffering potential distress, e.g., recognising that other people also go upstairs, only to realise they have forgotten what they were going up for. Similarly, over-identification, might lead to increased attention to lapses (self-monitoring) and catastrophising, such that any lapses detected are taken as confirmatory evidence of dementia leading to exacerbation of distress.

What can be concluded, however, is that self-compassion (specifically self-judgement), does partially explain memory-related distress, even when general levels of anxiety and depression are controlled for. It is not possible to unequivocally say that there is no moderation effect due to the limitations of the sample size, however any effect (if one does exist) may be small and require a very large sample size to detect.

Strengths and Limitations of the Study

Strengths of the current study include its novelty in seeking to extend previous research to a previously unexplored area: the role of self-compassion in psychological distress related to memory. The study also purposefully sought to maximise inclusion and minimise exclusion criteria in an attempt to increase the generalisability of the results. Given that many older people experience health difficulties that may impact on or increase worry about memory it seemed unhelpful to exclude these conditions from the study.

Limitations include the fact that the study lacked power for the moderation analyses, thus it is possible that we failed to detect an effect that does exist. However,

the analyses suggest that any effect would have been very small, of possibly limited clinical significance and would have required a very large sample size to detect. Under-recruitment of older people to research is a recognised phenomenon (McMurdo et al., 2011), and while exclusion rates were very low and drop-out non-existent in the current study, recruitment itself was challenging. Considerable efforts went into recruitment, including consulting relevant literature and following guidance to promote recruitment, e.g. cultivating relationships with community-based organisations (including involving stakeholders in consultation at the proposal stage of the project), and face-to-face contact with potential study participants (McHenry et al., 2015). Unfortunately, changes were required to the study subsequent to the consultation in order to improve the rigour of the study, namely the addition of a cognitive screen. This may have affected the level of interest in the study, acting as a deterrent in some cases and resulting in a sample of individuals that were either not worried at all, or worried/curious about potential problems yet able to tolerate this anxiety well enough to participate in the study. This hypothesis is based on informal conversations with some individuals who attended presentations and expressed concern that the screen would confirm their worries about their memory.

Clinical Implications and Directions for Future Research

Further research to confirm the study's results with a full sample size (to reach statistical power) would be required before considering the utility of interventions to reduce self-judgement and psychological distress. In the event that further research confirms the study's findings, then an intervention to reduce self-judgement using a

holistic self-compassion programme (e.g., Compassionate Mind Training, Gilbert, 2009) might be considered. This suggestion is based on Neff's (2016) claim that aspects of self-compassion engender one another. For example, while not identified on the self-kindness/self-judgement dimension, cultivating a more accepting, observing state of mindfulness also serves to lessen self-judgement. A single-case experimental design would be a suitable starting point to examine the validity of this claim in relation to memory-related distress.

In the event that an intervention is found to be effective then training might be provided to help staff working in memory services to understand the relationship between self-judgement and psychological distress. Assessment of self-judgement in the context of memory concerns that are unsubstantiated on objective testing should include both clinical interview and validated questionnaires, e.g., the Self-Judgement subscale of the Self-Compassion Scale (Neff, 2003). Staff could also be trained to deliver interventions that reduce self-judgement through the cultivation of self-compassion. Group-based interventions could be an efficient method for service delivery, and would also provide an opportunity to cultivate the common humanity dimension of self-compassion, through which individuals gain comfort through the recognition that others are struggling with similar problems.

Recognising and responding to the needs of people with dementia is a global priority and there are many public health campaigns aimed at raising awareness, reducing disease burden, and promoting healthier behaviours (WHO, 2012). Campaign messages often seek to raise awareness of factors that have been found to reduce the incidence of dementia, e.g., taking regular exercise, having a healthy diet, avoiding

smoking and excessive drinking. Part of this rhetoric is the importance of looking after oneself – in other words caring for oneself. This advice can be difficult for people who have low self-compassion or are highly self-judgemental, and so this message is not sufficient for behavioural change. In order to increase self-care and related help-seeking, it might be recommended that campaigns highlight that memory change is common (therefore increasing the sense of common humanity) and that interventions are available both for memory problems themselves (e.g., teaching of memory strategies), and memory-related worry (e.g., self-compassion interventions). This is based on Hurt, Burns, Brown and Barrowclough's (2011) finding that if someone believes that a situation can be changed, problem-focused strategies (e.g., help-seeking) are more likely to be used. If individuals can be encouraged to seek help regardless of the nature of the problem then professionals will be equipped to carry out a full assessment and help reduce barriers to self-care whether in relation to objective or subjective memory problems.

One final area of future research interest may be the difficulties experienced in recruiting to the study. One hypothesis might be that high levels of anxiety in relation to memory testing were a deterrent, with individuals fearful that worries would be confirmed. A study to examine the prevalence of subjective memory impairment and dementia worry among older people with specific consideration of possible contributing factors, e.g., familial experience, increased media coverage, etc., would facilitate an improved understanding of the extent of anxiety among this group as well as its sources. Additionally, qualitative interviews with individuals who were informed of study, expressed interest, but ultimately chose not to participate might shed light on the

exact factors that affected their decision and help to inform recruitment strategies in future research.

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Appendix A: Confirmation of Ethical Approval from the University of Exeter

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 Harriet Toop

Ethics application - eCLESPsy000129
The role of trait self-compassion as a moderator of the relationship between subjective memory impairment and psychological distress in o

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:
Anke Karl commented,

You are required to re-submit for full review/confirm that comments have been addressed before you begin your research.

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

Yours sincerely

Date: 10/11/2017

CLES – Psychology Ethics Committee

Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

ADDENBROOKE'S COGNITIVE EXAMINATION – ACE-III
English Version A (2012)

Name: Date of Birth: Hospital No. or Address:	Date of testing: ___/___/___ Tester's name:_____ Age at leaving full-time education:_____ Occupation: _____ Handedness: _____

ATTENTION

➢ Ask: What is the	Day _____	Date _____	Month _____	Year _____	Season _____	**Attention** [Score 0-5] ☐
➢ Ask: Which	No./Floor _____	Street/Hospital _____	Town _____	County _____	Country _____	**Attention** [Score 0-5] ☐

ATTENTION

➢ Tell: "I'm going to give you three words and I'd like you to repeat them after me: lemon, key and ball." After subject repeats, say "Try to remember them because I'm going to ask you later".
➢ Score *only* the first trial (repeat 3 times if necessary).
➢ Register number of trials: _____

Attention [Score 0-3] ☐

ATTENTION

➢ Ask the subject: "Could you take 7 away from 100? I'd like you to keep taking 7 away from each new number until I tell you to stop."
➢ If subject makes a mistake, do not stop them. Let the subject carry on and check subsequent answers (e.g., 93, 84, 77, 70, 63 – score 4).
➢ Stop after five subtractions (93, 86, 79, 72, 65): ____ ____ ____ ____ ____

Attention [Score 0-5] ☐

MEMORY

➢ Ask: 'Which 3 words did I ask you to repeat and remember?' _____ _____ _____

Memory [Score 0-3] ☐

FLUENCY

➢ **Letters**
Say: "I'm going to give you a letter of the alphabet and I'd like you to generate as many words as you can beginning with that letter, but not names of people or places. For example, if I give you the letter "C", you could give me words like "cat, cry, clock" and so on. But, you can't give me words like Catherine or Canada. Do you understand? Are you ready? You have one minute. The letter I want you to use is the letter "P".

Fluency [Score 0 – 7] ☐

≥ 18	7
14-17	6
11-13	5
8-10	4
6-7	3
4-5	2
2-3	1
0-1	0
total	correct

➢ **Animals**
Say: "Now can you name as many animals as possible. It can begin with any letter."

Fluency [Score 0 – 7] ☐

≥ 22	7
17-21	6
14-16	5
11-13	4
9-10	3
7-8	2
5-6	1
<5	0
total	correct

Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

MEMORY

➢ Tell: "I'm going to give you a name and address and I'd like you to repeat the name and address after me. So you have a chance to learn, we'll be doing that 3 times. I'll ask you the name and address later."

Score only the third trial.

Memory [Score 0 – 7] ☐

	1st Trial	*2nd Trial*	*3rd Trial*
Harry Barnes 73 Orchard Close Kingsbridge Devon	_____ _____ ___ _____ _____ _____ _____	_____ _____ ___ _____ _____ _____ _____	_____ _____ ___ ____ _____ _____ _____

MEMORY

➢ Name of the current Prime Minister.....
➢ Name of the woman who was Prime Minister .....
➢ Name of the USA president.....
➢ Name of the USA president who was assassinated in the 1960s.....

Memory [Score 0 – 4] ☐

LANGUAGE

➢ Place a pencil and a piece of paper in front of the subject. As a practice trial, ask the subject to "**Pick up the pencil and then the paper**." If incorrect, score 0 and do not continue further.

➢ If the subject is correct on the practice trial, continue with the following three commands below.
- Ask the subject to "**Place the paper on top of the pencil**"
- Ask the subject to "**Pick up the pencil but not the paper**"
- Ask the subject to "**Pass me the pencil after touching the paper**"

Note: Place the pencil and paper in front of the subject before each command.

Language [Score 0-3] ☐

LANGUAGE

➢ Ask the subject to write two (or more) complete sentences about his/her last holiday/weekend/Christmas. Write in complete sentences and do not use abbreviations.
Give 1 point if there are two (or more) complete sentences about the one topic; and give another 1 point if grammar and spelling are correct.

Language [Score 0-2] ☐

LANGUAGE

➢ Ask the subject to repeat: **'caterpillar'; 'eccentricity; 'unintelligible'; 'statistician'**
Score 2 if all are correct; score 1 if 3 are correct; and score 0 if 2 or less are correct.

Language [Score 0-2] ☐

Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

LANGUAGE

- Ask the subject to repeat: **'All that glitters is not gold'**

Language [Score 0-1] ☐

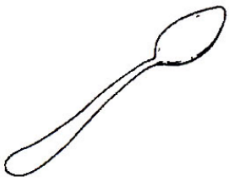
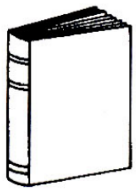
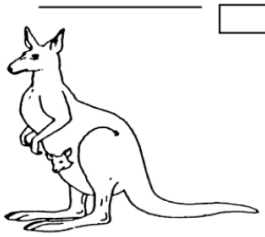
- Ask the subject to repeat: **'A stitch in time saves nine'**

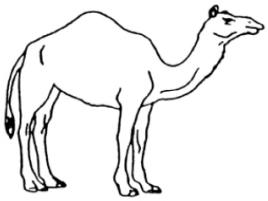
Language [Score 0-1] ☐

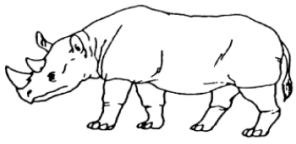
LANGUAGE

- Ask the subject to name the following pictures:

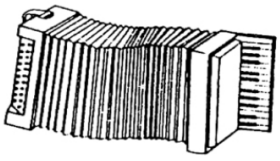
Language [Score 0-12] ☐







LANGUAGE

- Using the pictures above, ask the subject to:
  - Point to the one which is associated with the monarchy .....
  - Point to the one which is a marsupial .....
  - Point to the one which is found in the Antarctic .....
  - Point to the one which has a nautical connection .....

Language [Score 0-4] ☐

Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

LANGUAGE

➢ Ask the subject to read the following words: (Score 1 only if all correct)

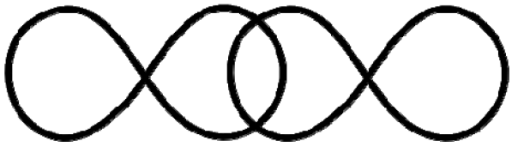
Language [Score 0-1] ☐

sew
pint
soot
dough
height

VISUOSPATIAL ABILITIES

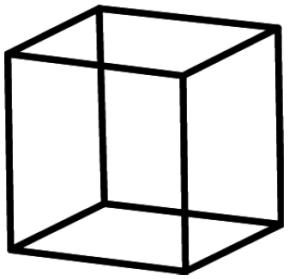
➢ Infinity Diagram: Ask the subject to copy this diagram

Visuospatial [Score 0-1] ☐



➢ Wire cube: Ask the subject to copy this drawing (for scoring, see instructions guide).

Visuospatial [Score 0-2] ☐



➢ Clock: Ask the subject to draw a clock face with numbers and the hands at ten past five. (For scoring see instruction guide: circle = 1, numbers = 2, hands = 2 if all correct).

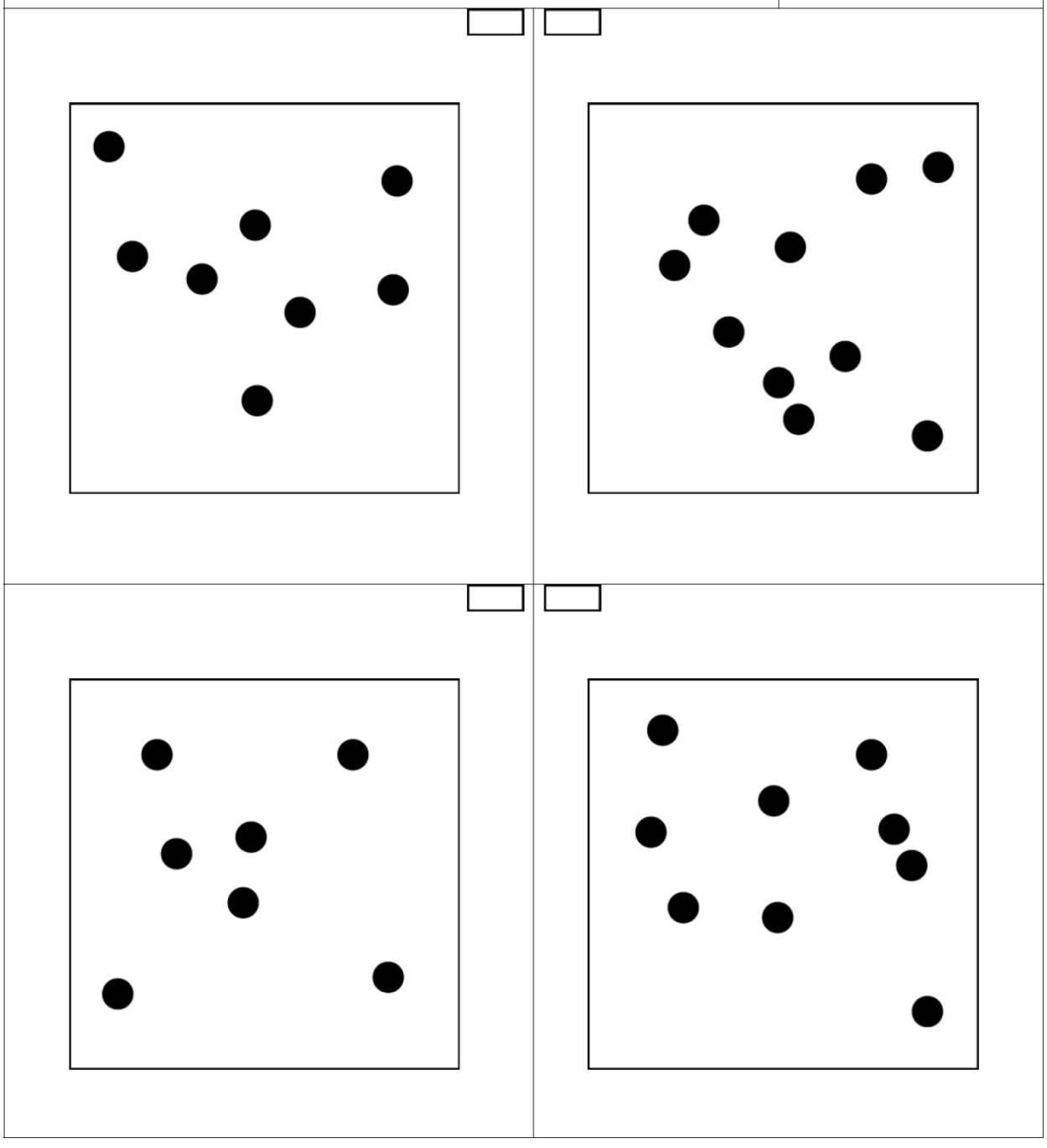
Visuospatial [Score 0-5] ☐

Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

VISUOSPATIAL ABILITIES

- Ask the subject to count the dots without pointing to them

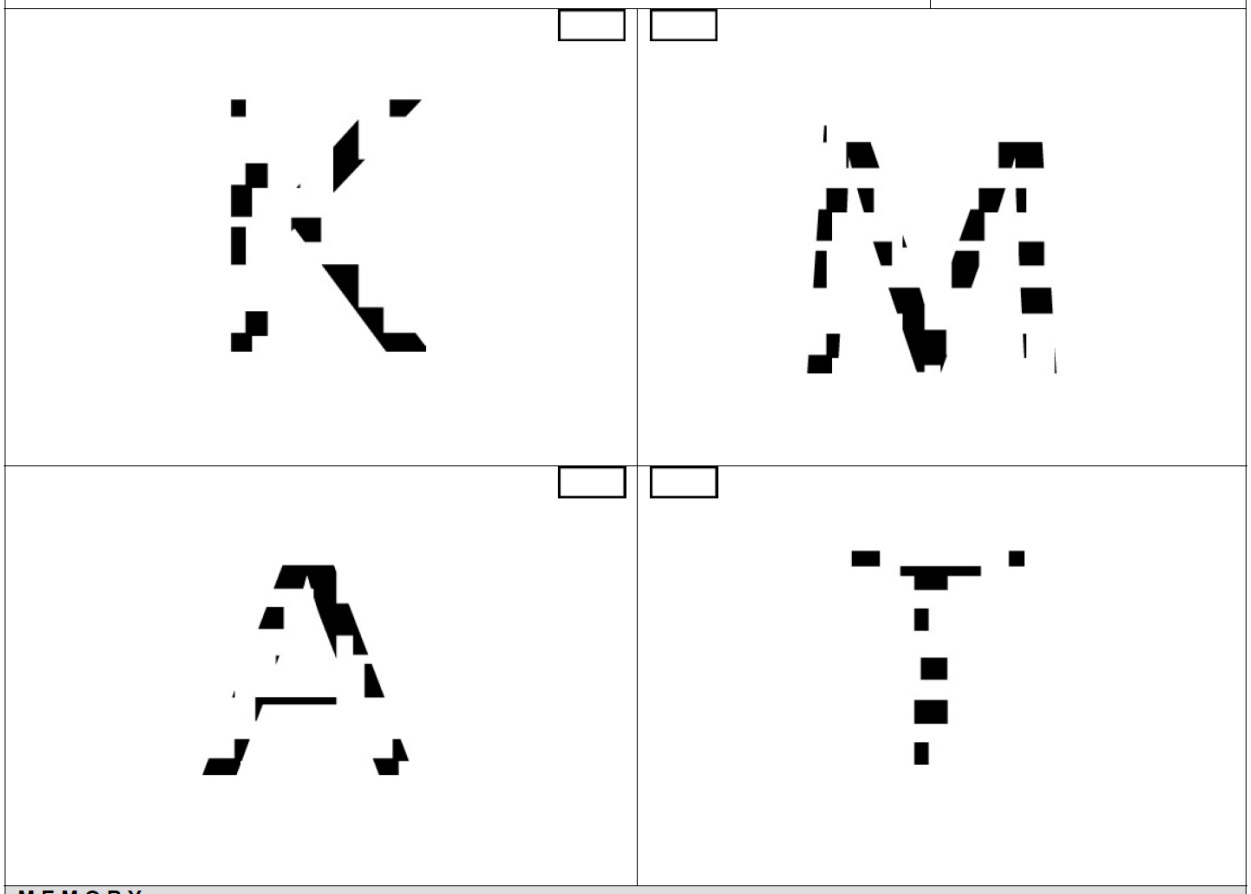
Visuospatial
[Score 0-4]



Appendix B: Measures used in the Study – Addenbrooke's Cognitive Examination - 3

VISUOSPATIAL ABILITIES

➢ Ask the subject to identify the letters	**Visuospatial** [Score 0-4] ☐



MEMORY

➢ Ask "Now tell me what you remember about that name and address we were repeating at the beginning"

Harry Barnes 73 Orchard Close Kingsbridge Devon	…… …… …… ……	**Memory** [Score 0-7] ☐

MEMORY

➢ This test should be done if the subject failed to recall one or more items above. It all items were recalled, skip the test and score 5. If only part was recalled start by ticking items recalled in the shadowed column on the right hand side; and then test not recalled items by telling the subject "ok, I'll give you some hints: was the name X, Y or Z?" and so on. Each recognised item scores one point, which is added to the point gained by recalling.	**Memory** [Score 0-5] ☐

Jerry Barnes	☐	Harry Barnes	☐	Harry Bradford	☐	recalled	☐
37	☐	73	☐	76	☐	recalled	☐
Orchard Place	☐	Oak Close	☐	Orchard Close	☐	recalled	☐
Oakhampton	☐	Kingsbridge	☐	Dartington	☐	recalled	☐
Devon	☐	Dorset	☐	Somerset	☐	recalled	☐

SCORES

TOTAL ACE-III SCORE	/100
Attention	/18
Memory	/26
Fluency	/14
Language	/26
Visuospatial	/16

Appendix B: Measures used in the Study – Introduction and Demographic Questions

DAILY EXPERIENCE OF MEMORY AND EMOTION

Thank you for your participation in this study. The final stage of the study asks you to answer some questions about yourself, your memory, and your emotions. Please take your time when answering the questions, and feel free to ask the researcher for assistance if any of the questions are unclear. It is helpful if you are able to complete as many questions as possible; however, if for any reason you wish to leave an answer blank, i.e., skip certain questions; you are welcome to do so.

INFORMATION ABOUT YOU

1. Please write your age: _____

2. Please indicate your gender: *(Please tick your response)*

- ☐ Male
- ☐ Female
- ☐ Other

3. Please indicate your ethnicity: *(Please tick your response)*

- ☐ White
- ☐ Mixed/Multiple ethnic groups
- ☐ Asian or Asian British
- ☐ Black/African/Caribbean
- ☐ Arab or Arab British
- ☐ Other (please specify): _____

4. Which of the following best describes the area you live in: *(Please tick your response)*

- ☐ Urban
- ☐ Rural

Appendix B: Measures used in the Study – Introduction and Demographic Questions

5a. At what age did you first leave full-time education?: _____

5b. If you completed additional part-time or full-time study after first leaving full-time education, how many whole years did this equate to? *E.g., if you studied a one-year Masters course over two year, you would write 'one year'.* _____

6. In general, how would you rate your physical health? *(Please circle your response)*

Poor	Average	Excellent

7. In general, how would you rate your income? *(Please circle your response)*

Insufficient to meet your needs	Adequate	Very good

Appendix B: Measures used in the Study – Illness Perception Questionnaire – Memory (Identity scale)

YOUR VIEWS ABOUT YOUR MEMORY

8. Listed below are a number of symptoms of memory problems that you may or may not have experienced. Please indicate how often you have experienced each symptom by ticking the appropriate box.

	Never	Rarely	Sometimes	Often	Always
Mind going blank when talking					
Difficulty remembering events					
Forgetting appointments					
Slower reactions					
Difficulty remembering names					
Forgetting items when shopping					
Forgetting telephone messages					
Feeling confused					
Panic					
Difficulty learning new things e.g. to use a new television					
Feeling anxious					
Forgetting where you put things e.g. car keys					
Forgetting directions to places					
Repeating yourself					
Forgetting to phone someone					
Forgetting what people have said to you					

Appendix B: Measures used in the Study – Illness Perception Questionnaire – Memory (Identity scale)

	Never	Rarely	Sometimes	Often	Always
Forgetting important dates e.g. birthdays					
Not being able to think of words					
Forgetting to do something e.g. household jobs					

Appendix B: Measures used in the Study – Illness Perception Questionnaire – Memory (Emotional Representation scale)

9. We are interested in your own personal views of <u>how you now see your memory problems</u>. Please indicate how much you agree or disagree with the following statements about your memory problems by ticking the appropriate box.

	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
Having memory problems is very embarrassing					
My memory problems make me feel angry					
My memory problems do not worry me					
When I think about my memory problems I get upset					
Having memory problems makes me feel like a fool					
I get depressed when I think about my memory problems					
My memory problems make me feel afraid					
My memory problems make me feel anxious					

Appendix B: Measures used in the Study – Generalised Anxiety Disorder Assessment (GAD-7)

YOUR VIEWS ABOUT YOUR MOOD

10. Over the <u>last 2 weeks</u>, how often have you been bothered by any of the following problems? (Use "✓" to indicate your answer").

	Not at all	**Several days**	**More than half the days**	**Nearly every day**
Feeling nervous, anxious or on edge				
Not being able to stop or control worrying				
Worrying too much about different things				
Trouble relaxing				
Being so restless it is hard to sit still				
Becoming easily annoyed or irritable				
Feeling afraid as if something awful might happen				

Appendix B: Measures used in the Study – Patient Health Questionnaire (PHQ-8)

11. Over the <u>last 2 weeks</u>, how often have you been bothered by any of the following problems?
(Use "✓" to indicate your answer").

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things				
Feeling down, depressed, or hopeless				
Trouble falling asleep or staying asleep, or sleeping too much				
Feeling tired or having little energy				
Poor appetite or overeating				
Feeling bad about yourself – or that you are a failure or have let yourself or your family down				
Trouble concentrating on things, such as reading the newspaper or watching television				
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual				

Appendix B: Measures used in the Study – Self-Compassion Scale (SCS)

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

12. Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost never				Almost always
1	2	3	4	5

	Response	
*1.	_____	I'm disapproving and judgmental about my own flaws and inadequacies.
*2.	_____	When I'm feeling down I tend to obsess and fixate on everything that's wrong.
3.	_____	When things are going badly for me. I see the difficulties as part of life that everyone goes through.
*4.	_____	When I think about my inadequacies, it tends to make me feel more separate and cut-off from the world.
5.	_____	I try to be loving towards myself when I'm feeling emotional pain.
*6.	_____	When I fail at something important to me I become consumed by feelings of inadequacy.
7.	_____	When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.
*8.	_____	When times are really difficult I tend to be tough on myself.
9.	_____	When something upsets me I try to keep my emotions in balance.
10.	_____	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
*11.	_____	I'm intolerant and impatient towards those aspects of my personality I don't like.
12.	_____	When I'm going through a very hard time, I give myself the caring and tenderness I need.

Appendix B: Measures used in the Study – Self-Compassion Scale (SCS)

Almost never				**Almost always**
1	**2**	**3**	**4**	**5**

*13.	_____	When I'm feeling down, I tend to feel like most other people are probably happier than I am.
14.	_____	When something painful happens I try to take a balanced view of the situation.
15.	_____	I try to see my failings as part of the human condition.
*16.	_____	When I see aspects of myself that I don't like, I get down on myself.
17.	_____	When I fail at something important to me I try to keep things in perspective.
*18.	_____	When I'm really struggling, I tend to feel like other people must be having an easier time of it.
19.	_____	I'm kind to myself when I'm experiencing suffering.
*20.	_____	When something upsets me I get carried away with my feelings.
*21.	_____	I can be a bit cold-hearted towards myself when I'm experiencing suffering.
22.	_____	When I'm feeling down I try to approach my feelings with curiosity and openness.
23.	_____	I'm tolerant of my own flaws and inadequacies.
*24.	_____	When something painful happens I tend to blow the incident out of proportion.
*25.	_____	When I fail at something that's important to me, I tend to feel alone in my failure.
26.	_____	I try to be understanding and patient towards those aspects of my personality I don't like.

Appendix B: Measures used in the Study – Questions About Current Practice of Self-Compassion

13. Self-compassion is defined as a kind, warm and understanding attitude towards oneself when faced with shortcomings, inadequacies, or failure.
Mindfulness is defined as being aware of what you are sensing and feeling in the present moment, without interpretation or judgement

Do you currently practice aspects of self-compassion or mindfulness? *(Please tick your response)*

- ☐ Yes
- ☐ No

14. If the answer to question 14 is "yes", how long have you been practicing for?
_____ years, _____ months

15. If the answer to question 14 is "yes", have you received any formal teaching or training on self-compassion or mindfulness? *(Please tick your response)*

- ☐ Yes
- ☐ No

16. If the answer to question 14 is "no", might you be interested in attending a program on self-compassion or mindfulness in the future?

- ☐ Yes
- ☐ No

THANK YOU.

You have reached the end of the questionnaire.

Appendix C: Confirmation of Permission to use the IPQ-M in Research

15/09/2017 Mail - hjt210@exeter.ac.uk

Re: Request to use the Illness Perception Questionnaire – Memory in research

Hurt, Catherine <Catherine.Hurt.1@city.ac.uk>

Sun 8/6/2017 5:59 AM

Inbox

To:Toop, Harriet <hjt210@exeter.ac.uk>;

Hi Harriet,

The IPQ-M is not copyrighted and you are free to use it.

Best of luck with your research.

Catherine

On 3 Aug 2017, at 16:34, Toop, Harriet <hjt210@exeter.ac.uk> wrote:

> Dear Dr Hurt,
>
> I hope you don't mind me contacting you, but I am a trainee clinical psychologist studying at the University of Exeter (completing my thesis under the supervision of Dr Anke Karl). I am investigating self-compassion as a moderator of the experience of psychological distress to perceived memory lapses in older people and am writing to request your permission to use an adapted version of your Illness Perception Questionnaire – Memory in my research.
>
> Please let me know if you would like any other information, but in the meantime thank you for your consideration of my request.
>
> Yours faithfully,
>
> Harriet
>
> Trainee Clinical Psychologist
>
> University of Exeter

Appendix D: Participant Information Sheet

Daily Experience of Emotion and Memory

Introduction and purpose of the study.

Researchers from the University of Exeter are conducting a research project to try to understand the factors that influence whether people experience worry or distress when they have memory lapses.

Changes in memory abilities often occur as we age, and more often than not are part of normal ageing rather than a sign of a medical condition, such as dementia. The results of the study will be used to identify possible interventions to help those who may be very worried or distressed by changes in their memory in the absence of diagnosable memory impairment, i.e., people who are worried, but well.

If the study interests you, we would love for you to consider participating in it. Further information about who can take part and what the study involves is provided on the following pages.

Who can take part?

We are currently recruiting men and women who:

- Are aged 60 or over
- Have personal experience of memory lapses (however infrequent)
- Do **not** have a diagnosis of dementia (e.g. Alzheimer's disease) or Mild Cognitive Impairment and are not seeking professional help or assessment for memory problems
- Do **not** have a diagnosis of learning disability.

Part of the study also involves completing tasks that require you to read and listen to instructions; unfortunately people who have impaired hearing or vision will therefore not be able to participate unless this has been corrected by a hearing aid or glasses/contact lenses. Please be aware that this study does not provide an assessment of any memory difficulties you may be experiencing. If you have serious worries or concerns about your memory then we recommended that you speak to your GP. If you, or other people, have serious

worries about your memory, then unfortunately we cannot invite you to take part in this research.

What does taking part involve?

You will be asked to attend a session with the researcher at the University of Exeter. You will have the opportunity to ask any questions and the researcher will check that you understand what you are taking part in and what taking part will involve.

You will then be asked to complete a test with the researcher. The test involves completing a number of short tasks, e.g. remembering an address and copying a drawing. This will take approximately 20 minutes to complete. This test is used to check that you don't have a level of cognitive impairment which may indicate that you have significant memory problems. The test itself is not diagnostic and there are many reasons other than cognitive impairment that someone might score lower than would be expected; however if you do obtain a score that indicates that you may have a degree of cognitive impairment we unfortunately won't be able to proceed further with the session.

If the test suggests that there are no problems, you will then be asked to complete a questionnaire that asks about your background (e.g., age and education), your experience of memory lapses, and how much distress (e.g., worry or embarrassment) you experience when you forget things. The survey also includes questions about how you would describe yourself as a person and whether you experience symptoms of depression or anxiety. These questions help us better understand the factors that influence the feelings people have about their memory**.** You are free to skip any questions you would prefer not to answer. In total, participation should take about 60 minutes. At the end you will be given further information about the study and asked whether you would like to be informed of the study results when they are available.

Who is running the study?

The project is being conducted by Harriet Toop (Trainee Clinical Psychologist) and Jessica Leighton-Price (Psychology student) under the supervision of Dr. Anke Karl (Senior Lecturer).

Appendix D: Participant Information Sheet

What do I do if I want to take part?

Your participation in the study is voluntary and you can withdraw at any time without giving a reason. If after reading the study information you would like to take part or would like to receive more information, please contact Harriet Toop by e-mail or telephone (contact details are provided at the end of this information).

Are there any benefits to taking part?

In addition to contributing to scientific understanding of the factors that prevent people from experiencing distress when they notice memory lapses, you are also invited to be entered into a prize draw to thank you for your time. The prize draw is for one of five £50 Love2Shop vouchers. You can be entered into the draw, even if you decide you do not want to take part in the study later. Winners will be randomly selected at the end of the study.

Are there any risks in taking part?

Occasionally people become anxious when completing tests. If you experience any anxiety as a result of participation you are encouraged to speak to one of the researchers. You are welcome to request breaks or additional support. If you wish to withdraw from the study, you may do so at any time without giving a reason.

It is also possible that spending time thinking about your memory and mood (as we ask you to do when answering the survey) may cause you to experience some worries. At the end of the survey you will be given some information about who you can contact if you have any worries.

It is also possible that the 20-minute cognitive assessment will indicate that you have some degree of cognitive impairment. As previously mentioned, the test is not diagnostic (e.g., cannot determine whether you have a dementia); however, if you do obtain a low score we can contact your GP on your behalf to inform them so they can request any further assessment that they think is necessary. It is your choice whether you want your GP to be informed in this event.

Will the information I provide be kept safe?

Yes. Any information collected as part of the study will be stored on a computer that is password protected. Only the research team will have access to the

data. Once the data has been anonymised it will be kept for five years in accordance with research guidance. When the study is complete, the responses you provide will be combined with data from lots of other people. The results of the study will then be written up and submitted to a scientific journal for publication. Only anonymous data will be used and there will be no way of anyone tracing the data back to you.

We will require your e-mal address or telephone number if you would like to be entered into the prize draw or receive a summary of the results at the end of the study. This will be stored in a separate file to the data and not linked to the data in any way. Your contact details will not be used for any purpose other than those described above and will be deleted immediately afterwards.

Who do I contact if I have any questions about the study?

If you have any questions about the study, please contact Harriet Toop.

Has the study been reviewed?

Yes. The study has been reviewed and received approval from the Ethics Committee at the University of Exeter (application reference: eCLESPsy000129). If you have any concerns or wish to make a complaint about the study please contact Dr Lisa Leaver (Chair of the University of Exeter Psychology Research Ethics Committee). Her address is Dr Lisa Leaver, Washington Singer Laboratories, University of Exeter, Perry Road, Exeter, EX4 4QG. Or telephone 01392 724641.

Contact details for Harriet Toop (Trainee Clinical Psychologist):

E-mail: hjt210@exeter.ac.uk
Telephone: 07986 939738

Supervised by:

Dr Anke Karl (Senior Lecturer)
E-mail: A.Karl@exeter.ac.uk

Appendix E: Written Consent Form

Study Number:

Participant Identification Number:

PARTICIPANT CONSENT FORM

Title of Project: Daily Experience of Emotion and Memory

Name of Researcher: Harriet Toop (Trainee Clinical Psychologist)

To participate in the study, please read the following statements. If you agree with the statement, please write your initials in the box; otherwise leave the box blank.

Please initial box

1. I confirm that I have read and understand the Participant Information Sheet dated 12.12.2017 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without reason. ☐
3. I understand that the data collected during the study may be looked at by individuals from the University of Exeter. I give permission for these individuals to have access to this data. ☐
4. I agree that my GP can be informed if any test results from my participation in the study indicate I have some degree of cognitive impairment myself that may need to be investigated. ☐

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

When completed: 1 for participant; 1 for researcher file

Daily Experience of Emotion and Memory

Thank you for your participation in this research!

The aim of this research was to examine factors that affect emotional responses to memory lapses. Specifically, we were interested in whether self-compassion might act as a buffer against distress, e.g. worry or low mood in relation to memory lapses. Self-compassion has been defined as consisting of three components (Neff, 2003):

- **Self-kindness:** being warm towards oneself when encountering pain and personal shortcomings, rather than ignoring them or hurting oneself with self-criticism.
- **Common humanity:** recognising that suffering and personal failure is part of the shared human experience.
- **Mindfulness**: taking a balanced approach to one's negative emotions so that feelings are neither suppressed nor exaggerated. Negative thoughts and emotions are observed with openness, so that they are held in mindful awareness. Mindfulness is a non-judgmental, receptive mind state in which individuals observe their thoughts and feelings as they are, without trying to suppress or deny them.

We were also interested in whether self-compassion might buffer against symptoms of anxiety and depression when people feel socially isolated or lonely, so questionnaires were included to measure this experience as well.

Results of this study will not include your name or any other identifying characteristics. The research did not use deception. You may request a summary of the research findings of this project (once it is completed). If you would like a summary of the findings of this research or have any further questions about the project, please contact me at the email address below.

Harriet Toop: hjt210@exeter.ac.uk

Appendix F: Written Debriefing Information

If you need to talk to someone about any distress that may have resulted from participation e.g., worry about your memory or mood, please contact either myself, or your GP. Alternatively, you can seek support from these organisations:

Samaritans

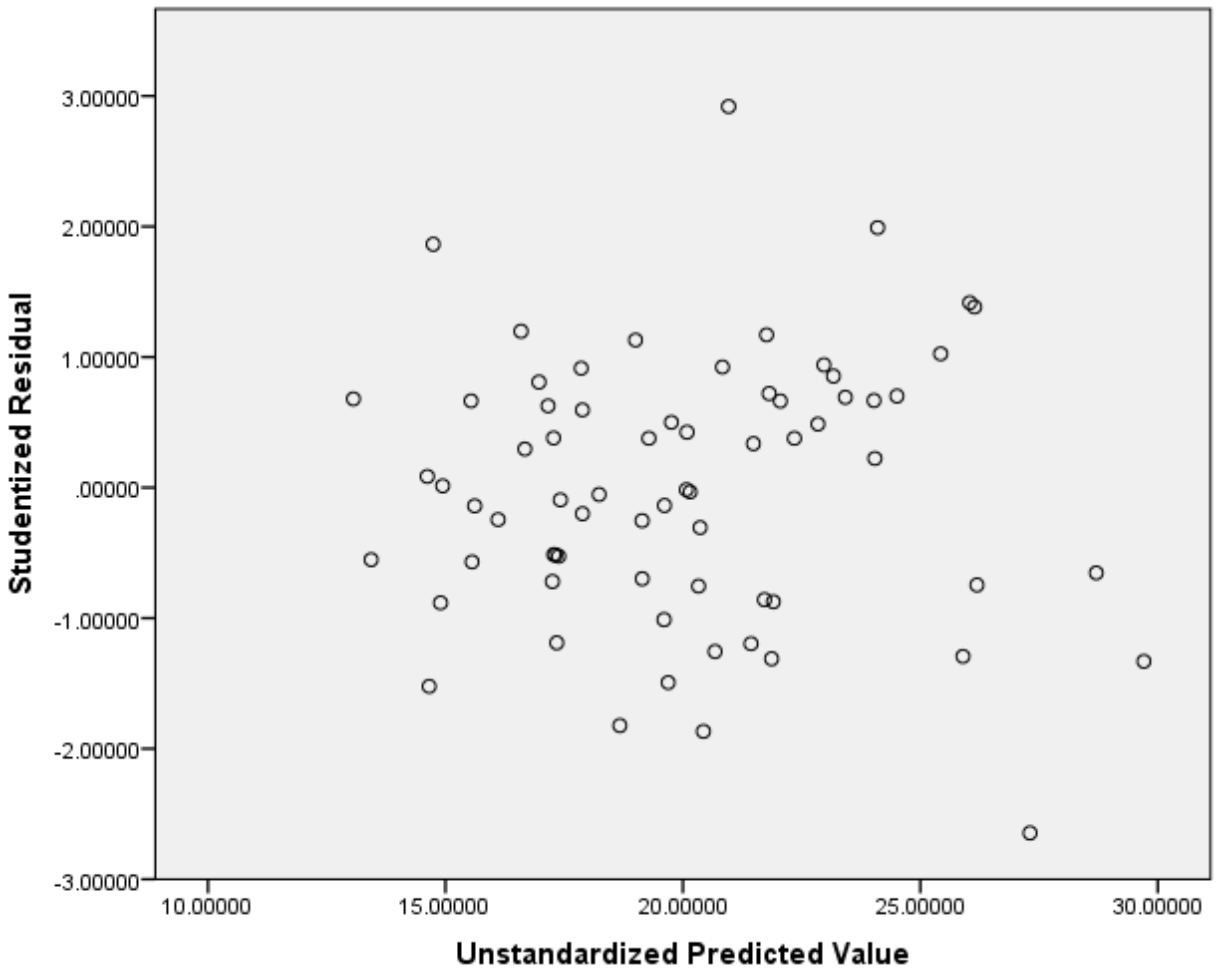
Samaritans provides confidential emotional support, 24 hours a day, for people who are experiencing feelings of distress or despair. Samaritans are there if you're worried about something, feel upset or confused, or just want to talk to someone.
Telephone (24 hours): 08457 90 90 90
E-mail: jo@samaritans.org
Website: http://www.samaritans.org

Depression Alliance

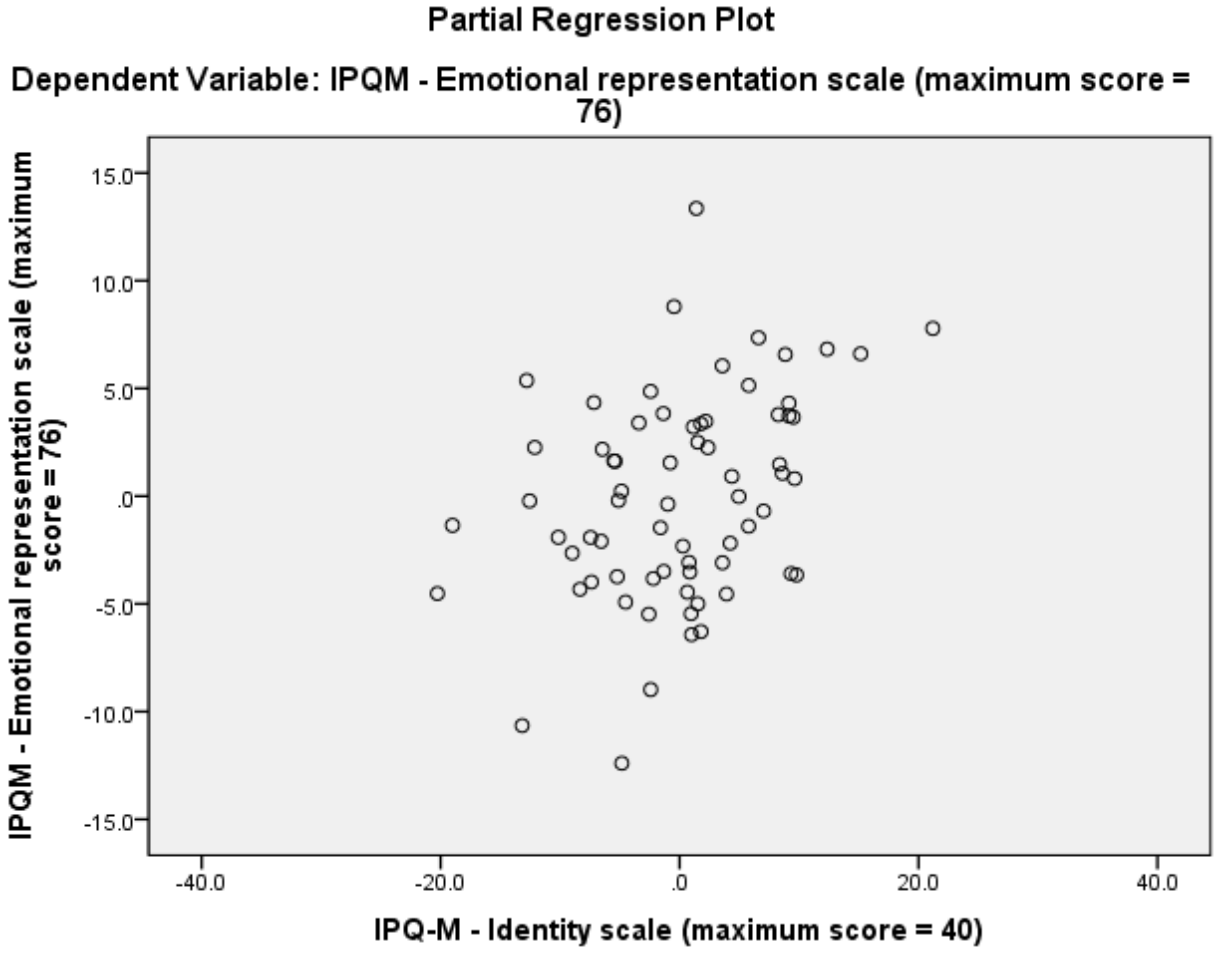
Depression Alliance is a charity which aims to assist people who are affected by depression. Depression Alliance offer information, a range of publications, self-help and support groups for people with depression.
Telephone (to request an information pack): 0845 123 23 20
E-mail: information@depressionalliance.org
Website: http://www.depressionalliance.org

If you have any concerns or wish to make a complaint about the study please contact Dr Lisa Leaver (Chair of the University of Exeter Psychology Research Ethics Committee). Her address is Dr Lisa Leaver, Washington Singer Laboratories, University of Exeter, Perry Road, Exeter, EX4 4QG. Or telephone 01392 724641.

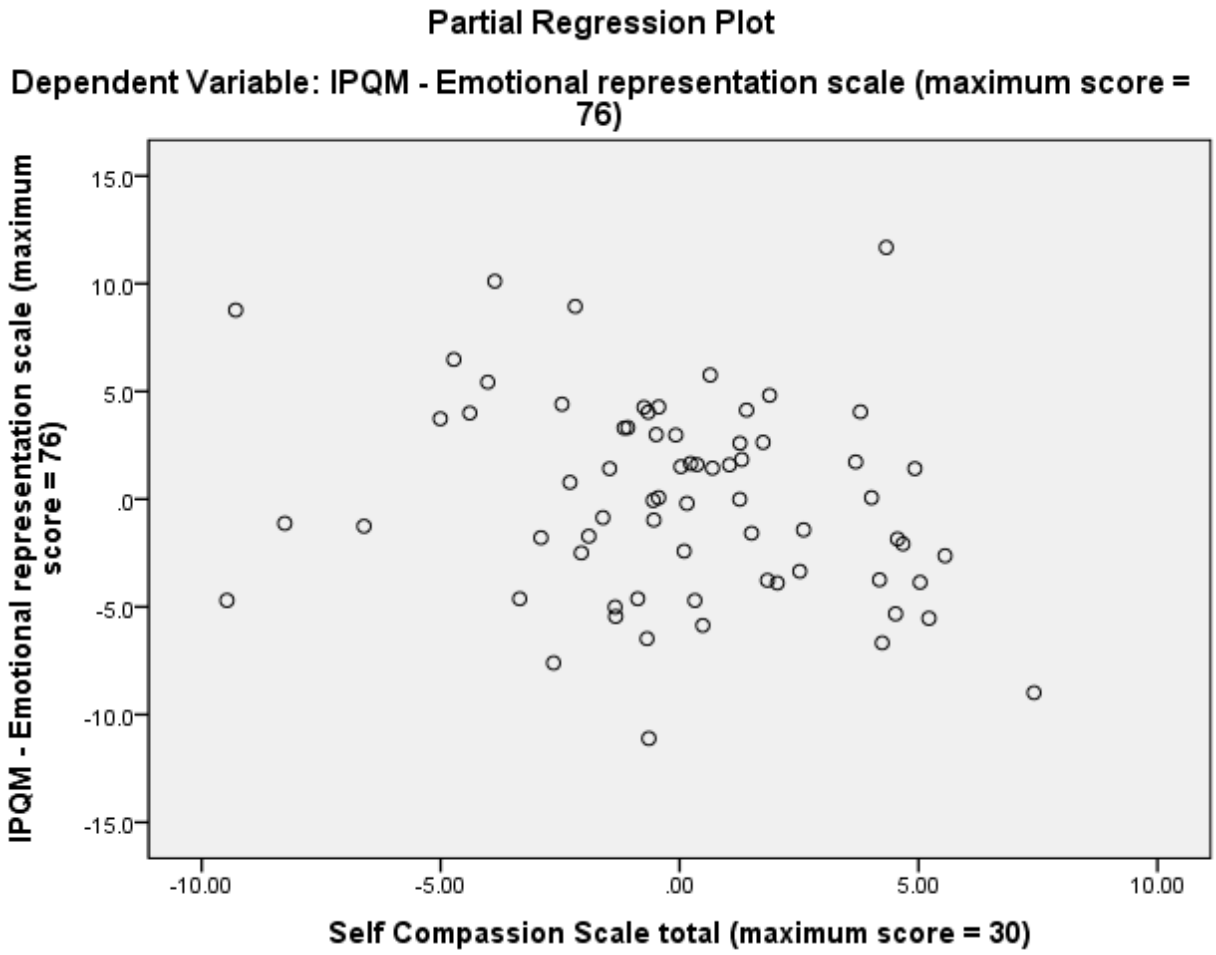
Appendix G: Scatterplot of the Studentized Residuals Against the (Unstandardized) Predicted Values for the Full Regression Model



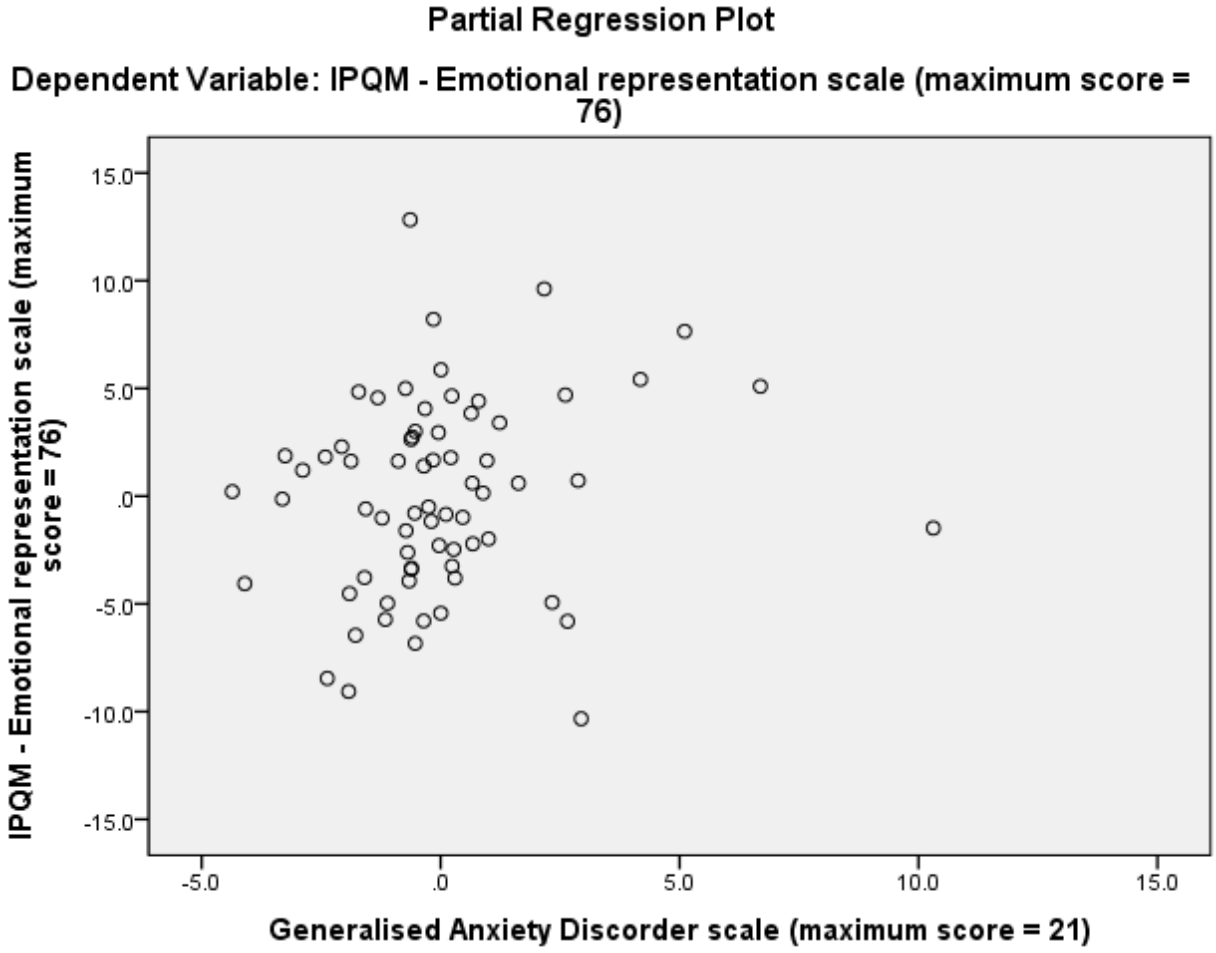
Appendix H: Partial Regression Plot Between Subjective Memory Impairment (the IPQ-M Identity scale) and Psychological Distress (the Emotional Representation scale)



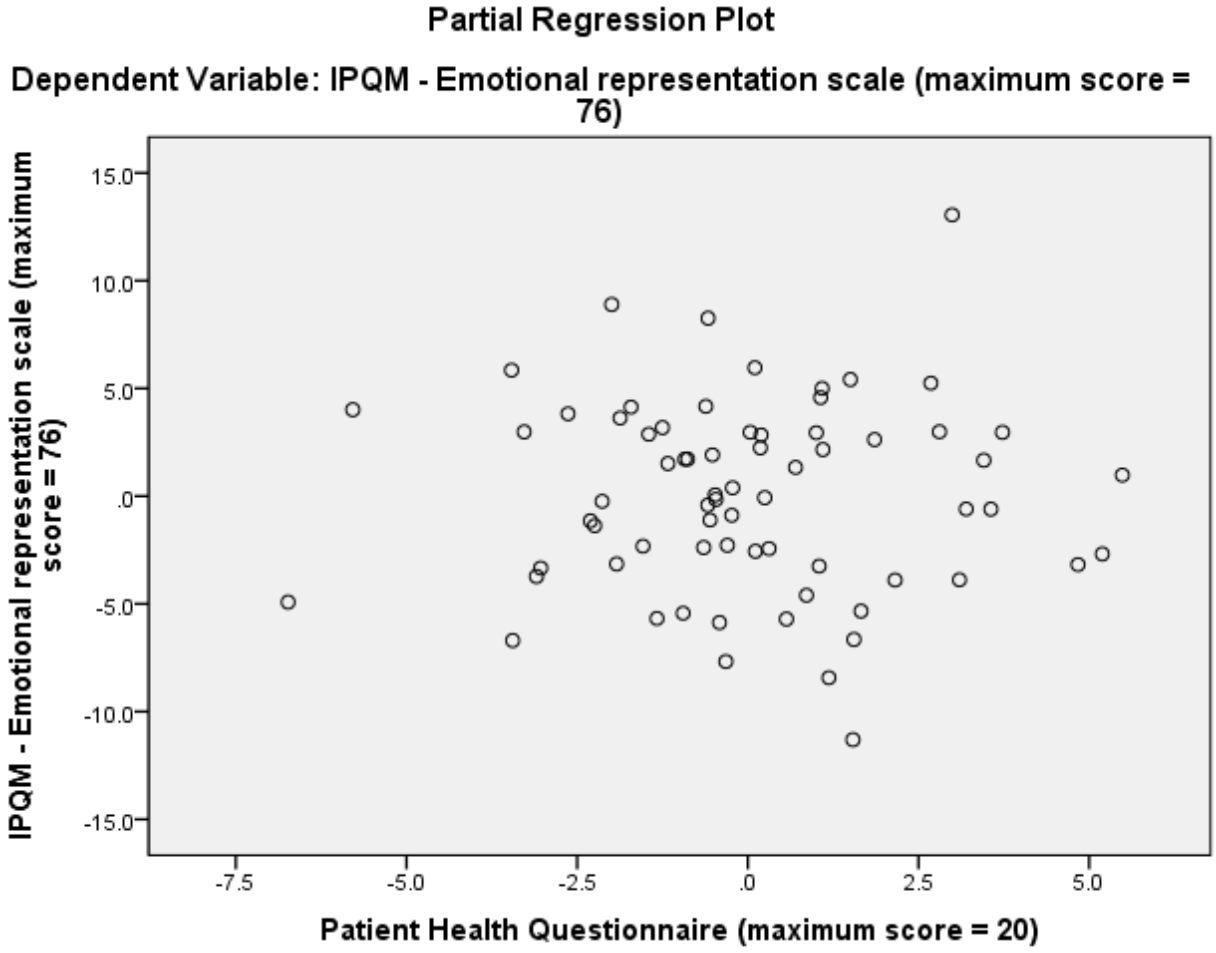
Appendix H: Partial Regression Plot Between Self-Compassion (the SCS Total Score) and Psychological Distress (the Emotional Representation Scale)



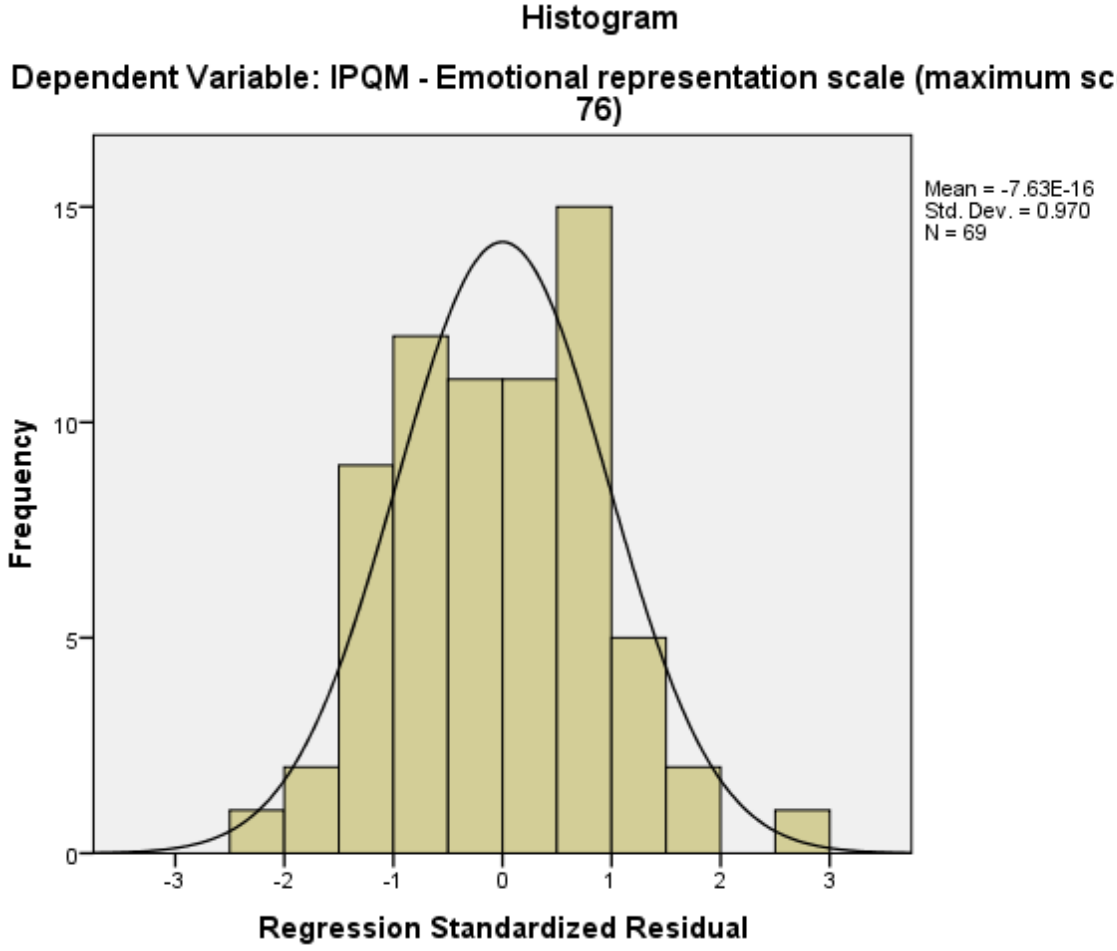
Appendix H: Partial Regression Plot Between Anxiety (the GAD-7 Total Score) and Psychological Distress (the Emotional Representation Scale)



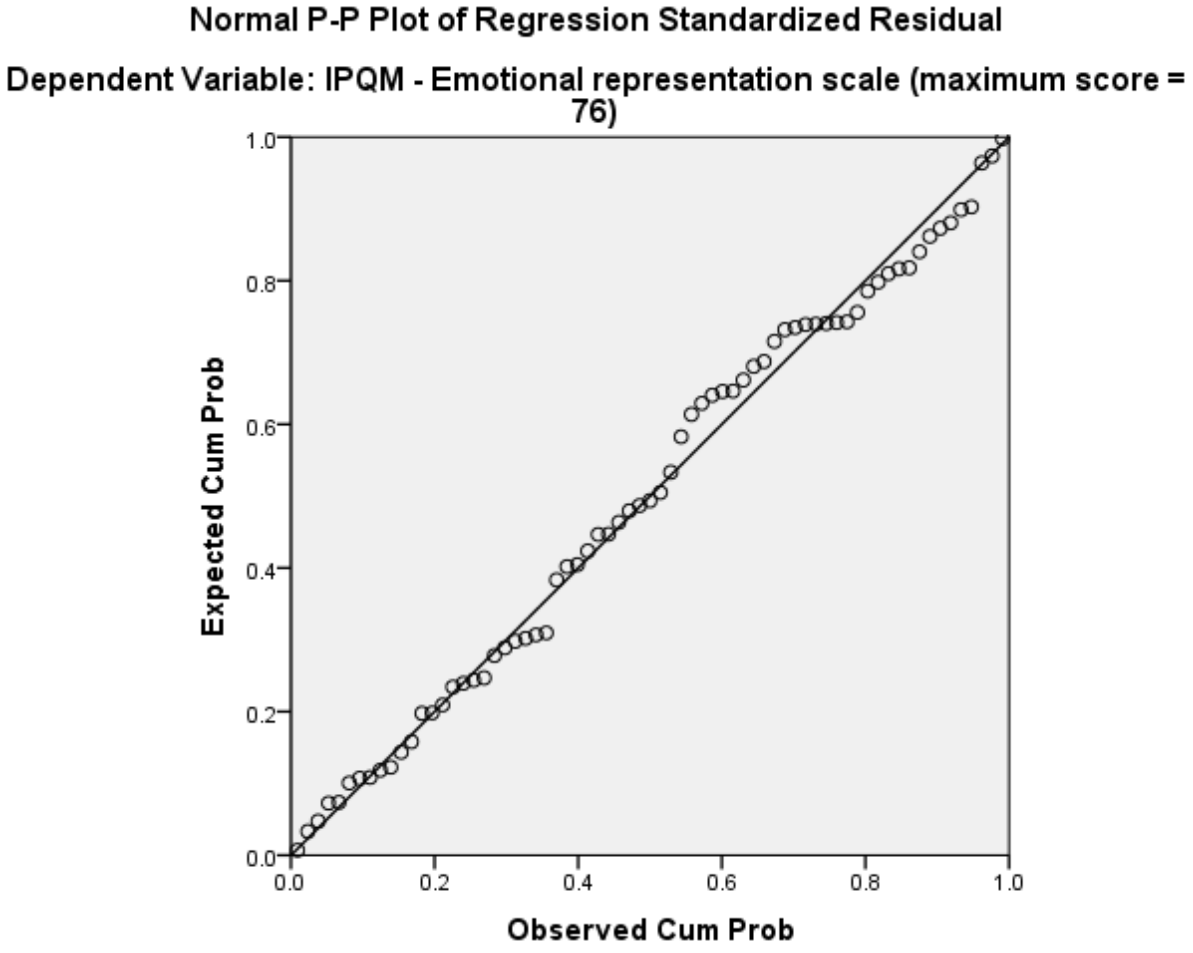
Appendix H: Partial Regression Plot Between Depression (the PHQ-8 Total Score) and Psychological Distress (the Emotional Representation Scale)



Appendix I: Histogram of Standardized Residuals



Appendix I: P-P Plot of Standardized Residuals



Appendix J: Dissemination Statement

Dissemination of results will take place on multiple levels. Firstly, all individuals who took part in the study were asked whether they would like to receive a summary of the results of the study. All opted to do so and their contact details were retained so that a lay summary of the findings can be sent to them via e-mail or postal mail (for individuals who do not have access to e-mail) in June 2018.

Secondly, the study findings will be disseminated via oral presentations. A talk at Exeter University been scheduled for June 2018 to present the findings to a colleagues and other professionals. Harriet Toop has also been invited to provide a presentation to the Exeter University Liaison group (which is open to all Exeter U3A members), who were involved in the initial consultation.

Finally, the revised manuscript of the empirical paper will be submitted for publication to a peer-reviewed journal, namely The Journal of Gerontology, Series B: Psychological Sciences (see Appendix K for information about the aims, scope and submission procedures of the journal).

Appendix K: Instructions for Contributors of The Journal of Gerontology, Series B: Psychological Sciences

INTRODUCTION

The Gerontological Society of America (GSA), the publisher of *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, was founded in 1945 to promote the scientific study of aging, to encourage exchanges among researchers and practitioners from the various disciplines related to gerontology, and to foster the use of gerontological research in forming public policy. The organization fosters collaboration between physicians, nurses, biologists, behavioral and social scientists, psychologists, social workers, economists, policy experts, those who study the humanities and arts, and many other scholars and researchers in aging. Through networking and mentorship opportunities, GSA provides a professional "home" for 5,500 career gerontologists and students at all levels. For more information about GSA, visit geron.org.

AIMS AND SCOPE OF THE JOURNAL

The Journal of Gerontology: Psychological Sciences publishes articles on development in adulthood and old age that advance the psychological science of aging processes and outcomes. Articles in the journal have clear implications for theoretical or methodological innovation in the psychology of aging or contribute significantly to the empirical understanding of psychological processes and aging. Areas of interest include, but are not limited to, attitudes, clinical applications, cognition, education, emotion, health, human factors, interpersonal relations, neuropsychology, neuroscience, perception, personality, physiological psychology, social psychology, and sensation. Applied research with theoretical significance is welcome, as are conceptually interesting examples of cutting-edge analytic approaches. Manuscripts reporting work that relates behavioral aging to neighboring disciplines are also appropriate. The Journal publishes three types of articles: (a) Research Articles, reportings on original research, preferably with multiple studies and/or samples, (b) Research Reports, for brief presentations generally of single studies, and (c) New Directions in Aging Research—reviews of cutting-edge topics with theoretical or methodological implications. See word and page limitations below. All submissions are peer-reviewed, with final decisions made by the Editor.

Due to the high volume of submissions, we are unable to offer pre-screening advice. Instead, please refer to the aims and scope of the journal to determine if *The Journal of Gerontology: Psychological Sciences* is a suitable venue for your work.

TYPES OF MANUSCRIPTS CONSIDERED

The Journal of Gerontology: Psychological Sciences will accept the following kinds of manuscripts:

Research Articles: This is the standard format for new empirical manuscripts; reporting

Appendix K: Instructions for Contributors of The Journal of Gerontology, Series B: Psychological Sciences
multiple studies (including replication studies) and/or multiple samples within the manuscript is

encouraged. The maximum allowable word count of manuscripts reporting empirical studies should not exceed **5,000 words**; in unusual circumstances (e.g., complex analyses), authors may submit up to **6,000 words** of text. The word count includes title page, abstract and text. The reference list is limited to **50 entries,** and the references, tables, and figures must not exceed an additional 10 pages.

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