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**The Onwards Progression of Mild Cognitive Impairment and Acceptance
and Commitment Therapy with Older Adults**

Will Toomey

North Wales Clinical Psychology Programme



PRIFYSGOL
BANGOR
UNIVERSITY

Submitted in partial fulfilment for the degree of
Doctorate in Clinical Psychology

June 2019

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Declarations

I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards. –

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-

I would like to thank my fiancé Leo, the most generous person I know. You have been so supportive, patient and encouraging. I am so excited for this new chapter in our life.

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-

My privilege to work in mental health services would not have been possible if it wasn't for my Mum, second Mum, Dad, Chris, John, Di, Dick and Isobel; their care for me has shaped my occupational choices infinitely.

Thesis Abstract

The literature contained within this thesis aims to synthesise and explore the application of Acceptance and Commitment Therapy (ACT) in older adult populations and investigate the utility of neuropsychological assessment in prognostic predictions for those with amnesic Mild Cognitive Impairment (aMCI).

The first chapter contains a systematic review of ACT for older adults. With recent geropsychological literature supporting the compatibility between ACT and later life stages, and adaptations for older adults recommended across several papers, a review of studies was timely. Four databases returned 875 potential articles that were reduced to ten. Variability within the studies across design, attrition and representation of older adults inhibited the ability to make inference regarding acceptability. The promising nature of significant outcomes and high client satisfaction are put forward and recommendations made for future studies.

The second chapter explores the prognostic utility of cognitive Intra-Individual Variance (IIV), as measured using scores from the Repeatable Battery of the Assessment of Neuropsychological Status (RBANS) in patients with aMCI. Data collected in routine clinical practice over seven years was analysed to identify any relationships between IIV and conversion to a dementia syndrome. Significant relationships between language and other cognitive domains scores, and risk of conversion, are plotted on survival curves and discussed.

The third chapter explores the implications of former chapters for theory, research and clinical practice. Issues surrounding labels of impairment are discussed alongside person-centred care in memory clinics. Conflict between ACT and research processes are expanded upon, and recommendations made for future studies. Finally, reflections on the process of completing this thesis are shared, rooting the beginning of this work in a therapeutic relationship, and discussing the importance of supervision in research.

Chapter 1 -Literature Review

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Rogers, T. T., & McClelland, J. L. (2004). Semantic cognition: A parallel distributed processing approach. Cambridge, MA: MIT Press.

Gill, M. J., & Sypher, B. D. (2009). Workplace incivility and organizational trust. In P. Lutgen-Sandvik & B. D. Sypher (Eds.), *Destructive organizational communication: Processes, consequences, and constructive ways of organizing* (pp. 53–73). New York, NY: Taylor & Francis.

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References

Psychology and Aging. (2019). Retrieved from <https://www.apa.org/pubs/journals/pag/?tab=4>

Acceptance and Commitment Therapy for Older Adults: A Systematic Review and Evaluation of the Research

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Key Words: Older Adults, ACT, Evidence-base, Systematic Review, Methodological Quality

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Abstract

Objective: The purpose of this review was to identify what Acceptance and Commitment Therapy-based (ACT) interventions have taken place in older adult populations and to provide a critical review of available evidence.

Introduction: Older adults have indicated a preference for psychological over pharmacological treatments. Recent literature has highlighted the potential utility of ACT for people in later life and has made further recommendations regarding its adaptation for older adults. A review of literature to date would be timely for identifying the acceptability of ACT to older adults, what adaptations have been made and any methodological concerns that may be improved.

Methods: A systematic search of Web of Science, MEDLINE, CINAHL and PsychINFO returned 875 potential articles. Eligibility screening returned ten articles that met inclusion criteria of an ACT-based intervention with an average sample age of >60 years, with no participants younger than 50 years. Studies were assessed for quality and synthesised in a narrative review.

Results: Variability across clinical populations, designs, exclusion criteria, measures, interventions and attrition highlighted problematic methodology, limiting generalisability. There were statistically significant improvements reported in psychological and physical wellbeing. Where feedback was recorded, participants reported good to excellent levels of satisfaction with ACT.

Conclusions: Current literature is insufficient to make inference regarding the acceptability or efficacy of ACT in older adult populations. Recommendations are made to improve the methodology of future studies.

Introduction

The population is older and aging: in 1997, one in six people were aged 65 years or over in the United Kingdom, whilst current estimates suggest that the proportion now stands at one in five – a figure expected to increase again to one in four by 2037 (Office of National Statistics, 2018). These demographic shifts necessitate the development of care systems that are appropriately equipped to meet the needs of older age, including capacity to accommodate greater prevalence of long-term health conditions and an increasing risk of dementia (Dall et al., 2013). There is also a growing awareness of the importance of building services capable of responding to the mental health needs of an aging population, complemented by appropriate and effective psychological therapies and interventions (Saad & Bangash, 2016).

The Challenges of Older Age

Mental health challenges are by no means an inevitable consequence of the aging process (Carstensen et al., 2011). For many older adults, aging is accompanied by *enhanced* feelings of accomplishment, mastery, and personal growth (Scheibe & Carstensen, 2010). It is recognised, however, that the later stages of life can present unique challenges, many of which may have a deleterious impact on quality of life (Bowling, Banister, Sutton, Evans, & Windsor, 2002). Aging adults are often confronted by significant change and loss: from deterioration in physical health and decline in cognitive and sensory function, to diminishing social networks and bereavements. Most older people retire from the world of work, many also relocate, and large numbers are living with long-term conditions that impose considerable functional limitations, including high numbers living with chronic pain (Reid, Eccleston, & Pillemer, 2015). Older adults are more likely to find themselves providing or being in receipt of care, and many are at increased risk of social isolation and loneliness (Coyle & Dugan, 2012). It certainly appears reasonable to suggest that many of the changes typically experienced in older age require considerable adaptation, adjustment, and acceptance.

Mental Health in Older Age

Although aging itself is not associated with poorer mental health, many of the challenges commonly occurring in later life may increase the risk of mental health difficulties (Karel, Gatz, & Smyer, 2012). Estimating the prevalence of specific mental health conditions in older adults is complicated by interactions with declining physical health, cognitive impairment, and age itself – with important differences between adults in ‘younger’ older age (e.g. those in their 60s) and ‘older’ older age (e.g. those in their 80s and 90s).

In a recent cross-sectional study assessing a range of anxiety disorders in community-dwelling older adults, a UK prevalence of between 15.6% and 26% was reported (Canuto et al., 2018). Rates of low mood and depression appear similar, with around 28.7% of community-based adults reporting signs and symptoms of low mood and 6.6% considered to have a clinically significant mood disorder (Glaesmer, Riedel-Heller, Braehler, Spangenberg, & Lupp, 2011). It has been suggested that older adults’ experiences of depression may be complicated by factors common to older age, including sleep disturbance, psychomotor difficulties, memory impairment, poor concentration, slower processing speeds, and executive dysfunction (Christensen et al., 1999; Butters et al., 2004). Older adults often present with more somatic symptoms of depression than younger counterparts which may complicate assessment and treatment (Fiske, Wetherell, & Gatz, 2009).

Rates of both anxiety and low mood appear higher for older adults with physical comorbidities, cognitive deficits and in long-term residential care (Fiske et al., 2009; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). Generally, it is observed that rates of anxiety and depression are lower in older adults than in younger populations; however, the *co-occurrence* of these disorders appears with greater frequency in older populations (Fiske et al., 2009; Wolitzky-Taylor et al., 2010). Significant numbers of older adults also present with ‘sub-threshold’ anxiety and depression (i.e. presentations of lower severity that may not meet

threshold for formal clinical classification but still have an appreciable impact on quality of life and/or functioning). Estimates here range from 15–25% for anxiety and 24–43% for depression (Braam et al., 2014; Grenier et al., 2011; Kvaal, McDougall, Brayne, Matthews, & Dewey, 2008).

Older Adult Mental Health Services

In recent years, there has been growing concern regarding the appropriateness of mental health service provision for older adults, with some suggesting that generic services have been designed and resourced in ways that discriminate against older people (Anderson, Connelly, Meier, & McCracken, 2013). Of particular note, older adults appear to be under-represented in services offering psychological therapies (Chaplin, Farquharson, Clapp, & Crawford, 2015; Pettit et al., 2017). Older adults are more likely to be offered medication over psychological interventions, despite evidence to suggest that they are more likely than working age adults to complete therapy and to register clinically significant improvements (Chaplin et al., 2015). This is especially disappointing given that many older adults express preference for psychological over pharmacological treatments (Gum et al., 2006; Landreville, Landry, Baillargeon, Guérette, & Matteau, 2001).

Evidence to support the efficacy of psychological therapies in older populations has been accruing for some time (Chaplin et al., 2015; Huang, Delucchi, Dunn, & Nelson, 2015; Pinquart & Sörensen, 2001); however, the evidence-base for specific models remains modest – a fact reflected in the smaller number of approaches supported for older adults in emerging clinical guidelines (Cymru, 2017). To date, research has tended to focus on Cognitive Behavioural Therapy (CBT) for older adults, which appears to be more effective than waiting-list controls and treatment-as-usual in the treatment of anxiety (Stanley et al., 2009), depression (Serfaty et al., 2009), anxiety/depression in mild cognitive impairment and dementia (Orgeta, Qazi, Spector, & Orrell, 2015) and Parkinson's disease (Troeng, Egan, & Gasson, 2014).

It is, however, recognised that CBT is not always as effective for older adults as it is for younger adults (e.g. Kishita & Laidlaw, 2017). It also appears to have limited impact on specific presentations common to older age (e.g. the experience of later life chronic pain; Reid et al., 2015). Such findings have encouraged clinicians to explore new ways of supporting older adults as they navigate the challenges of later life, with attention afforded to emerging psychological therapies – including Acceptance and Commitment Therapy (ACT).

Acceptance and Commitment Therapy (ACT) for Older Adults

Acceptance and Commitment Therapy (ACT) evolved as part of the third-wave of behavioural therapies, providing a trans-diagnostic model that identifies *psychological inflexibility* as the underlying cause of all psychopathology. As such, the broad aim of ACT-based approaches is to increase psychological flexibility (Hayes et al., 2006). This is achieved through the nurturing of six core processes:

1. Acceptance as an alternative to experiential avoidance
2. Cognitive diffusion
3. Being mindfully present
4. Self-as-context
5. Values
6. Committed-action

Thus, whilst CBT may be considered a change-focused therapy, intended to reduce symptomology, ACT is presented as an acceptance-based approach, built on connection with personal values. In ACT, the aim is not to reduce clinical symptoms: techniques (e.g. mindfulness) are used to encourage openness towards and acceptance of distressing experiences. ACT aims to cultivate willingness and commitment to acting in ways congruent with personal values – ultimately, living a meaningful life. It has been suggested that these

components, and the degree of psychological flexibility held, may be important in determining responses to the aging process (Petkus & Wetherell, 2013).

Research exploring ACT for older adults appears to be some way behind this wider literature, and yet the potential for ACT as an intervention for older adults has been recognised for some time (Petkus & Wetherell, 2013). It has, for example, been suggested that older age may naturally encourage greater focus on what is important and meaningful in life, due to the recognition that time may be short and resources limited (Roberts & Sedley, 2016). The importance of re-appraising and connecting with values has also been identified as a process that may contribute to ‘successful’ aging (Wong, 2007).

ACT may also be particularly suited to support older adults given the multiplicity of challenges that they may experience in later life (e.g. mixed anxiety/depression, co-morbid physical health conditions, and psychosocial stressors such as role transitions and caring responsibilities). As a trans-diagnostic approach, ACT may be useful for addressing distress derived from multiple causes. This differs from traditional CBT approaches, which are typically protocol-driven and intended to address a single presentation (e.g. anxiety). By increasing psychological flexibility, ACT may also increase capacity to adapt to future change associated with aging, rather than to merely overcome current difficulties.

According to Roberts and Sedley (2016), ACT also has greater ‘face-validity’ for older adults, as compared to therapies that appear to challenge thoughts or encourage re-appraisals of age-related losses. Many of the transitions that take place in older age may be unavoidable and unchangeable: negative appraisals may be realistic, calling for an acceptance-based rather than change-based approach. ACT, much like the Selection, Optimisation and Compensation model of aging (SOC; Baltes & Baltes, 1990), encourages acknowledging and accepting changes or reduced ability, and committing to activity that fulfils purpose in an achievable way. Although the rationale for ACT with older adults has been presented, there remains some discussion over

its clinical application. This has included consideration of whether ACT might require the kinds of adaptations and modifications that have been recommended in the delivery of other psychological therapies (e.g. CBT; Chand & Grossberg, 2013).

Modifying ACT for Older Adults

Recommendations for the adaptation of psychological therapies for older adults come with caution regarding stereotyping, assumptions and expectation, and ultimately, treating older adults differently simply by virtue of chronological age. It is acknowledged that where adaptations are made, they should respect the vast diversity found in older adult populations and remain focused on enhancing the benefits of psychological therapy and clinical outcomes. Petkus and Wetherell (2013) make several recommendations regarding the adaption of ACT for older adults including: establishing values earlier on to address common experiences of anhedonia in older adults, encouraging early re-assessment and engagement with meaningful activity, shorter sessions, and pacing and repetition to take to account any age-related cognitive changes. Finally, it is recommended that efforts are made to directly address fusion of negative thoughts around ageing, acknowledging how such thoughts can often be predictive of distress in later life. Pachana, Laidlaw, Gillanders, and Laidlaw (2014) make a more conservative case for ensuring metaphors and imagery techniques are accessible to older generations and for consideration of the impact of poor physical health and functional limitations, which may pose additional barriers to the uptake in values-led activity in older age. It has been suggested that with these modifications, ACT has the potential to be an effective intervention to enhance physical and psychological wellbeing in older adults.

Aims

The theoretical rationale for applying ACT-based approaches with older adults is well established; however, it is unclear how robust the current evidence for use actually is. It is certainly possible that ACT will prove more effective in supporting older adults with the

challenges of aging than traditional CBT approaches; however, in a climate that values evidence-based practice, it is important to carefully consider and critically review empirical data. This review aims to evaluate the quality and clinical utility of research that describes ACT interventions for older adults. As part of this process, it will explore how acceptable older adults consider these interventions and describe any modifications made to meet the needs of this population. The efficacy of the interventions will be considered and proposals for clinical applications and future research will be put forward.

Methods

This review was guided by a detailed search protocol, devised in accordance with PRISMA guidelines (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). The methodology has been informed by the Participants, Interventions, Comparators, Outcomes, and Study design (PICOS; Liberati et al., 2009).

Search Strategy

Searches of titles and abstracts were undertaken in February 2019 across four electronic databases: Web of Science, MEDLINE, CINAHL and PsychINFO. Terms were deliberately broad and inclusive to reduce the risk of omitting relevant literature:

Population terms	Intervention Terms
"Old* adult*" OR "Old* people" OR Old person* OR "Elder*" OR late-life OR "Late* life" OR Late* adult OR "Old-age" OR "Old age" OR "Aged" OR "Over 50" OR "Over 55" OR "Over 60" OR "Over 65" OR "Over 70" OR "Over 75" OR Geriatric* OR senior* OR health OR hearing OR sight OR dementia OR "end of life"	"Acceptance and Commitment Therapy" OR "Third wave" OR "3rd wave" OR "Acceptance-based" OR "Acceptance based"

Searches were limited to empirical papers written in English and published in peer-reviewed journals. No restrictions were imposed on date parameters. After the initial search, abstracts were reviewed and retained according to more specific inclusion/exclusion criteria.

Inclusion and Exclusion Criteria

Inclusion/exclusion criteria were developed to ensure that papers reported ACT-based interventions for older adults, as defined by samples with a mean age of ≥ 60 years and a minimum age of 50 years. Age criteria were structured in this way to ensure that samples included adults meeting traditional cut-offs for older age (i.e. ≥ 65 years), while also allowing the inclusion of adults below this threshold that experienced challenges associated with later-life and aging. This mirrors changes in many older adult mental health services in the UK, where eligibility is increasingly predicated on need rather than age alone. Case-studies were excluded to reduce the risk of bias and improve confidence in generalisability. Full inclusion and exclusion criteria are presented in table 1.

Table 1. Criteria for inclusion

Parameter	Inclusion criteria	Exclusion criteria
Population	Older adults with a minimum age of 50 years, but mean age of >60 years	Populations with a mean age of <60 years, or an individual participant with an age of <50 years
Intervention	Acceptance and Commitment Therapy, or an adaptation with 50% or greater being ACT	Acceptance and Commitment Therapy as a secondary feature of an intervention
Comparison	Any comparisons	
Outcome	Intervention type, effects, quality, acceptability and adaptations for OA Amount and quality of literature to date Improvements identified for future research	
Study design	Randomised Control Trials Quasi-experimental studies Prospective cohort studies Retrospective cohort studies Case control studies Cross-sectional studies	Case studies Qualitative research

Study Selection

The primary author conducted screening and eligibility across all papers according to the PICOS-informed inclusion/exclusion criteria. In rare cases where required information was unavailable, authors were contacted to determine eligibility.

Data Extraction and Quality assessment

A data extraction form modelled on PICOS criteria was devised to enable systematic retrieval of key findings (Appendix 1). Quality assessments were undertaken to appraise both the content and delivery of interventions and the methodological rigour of the papers. The former was quantified by use of the Psychotherapy Outcome Study Methodological Rating Form (POSMRF: Ost, 2008), a 22-item Likert scale that includes items appraising the content of the intervention, training of therapists, and checks for treatment adherence. This scale has been used in previous ACT reviews, where it has demonstrated robust internal consistency (Öst, 2008). This measure was supplemented by a modified version of the Downs and Black Checklist (Downs & Black, 1998), which focuses more stringently on methodological strengths and weaknesses, including the quality of reporting, external/internal validity, and power. Items from this checklist that had already been considered in the POSMRF (e.g. compliance with the intervention) were removed to avoid duplication.

Quality assessments were conducted independently by the first and third author, with disagreements resolved by consensus. Kappa coefficient scores demonstrated ‘strong’ inter-rater reliability for the POSMRF $\kappa=.823$, $p<.001$ and ‘almost perfect’ for the Downs and Black $\kappa=.901$, $p<.001$ (Mchugh, 2012). All scores are reported in Appendix 2.

Data Synthesis

Due to heterogeneity of methods, measures, and outcomes identified during the screening process, it was not deemed appropriate to undertake a meta-analysis. Instead, the results are presented here in a narrative synthesis

Results

Study selection

Initial searches returned 875 articles, with 796 removed after abstract-review. These papers were either unrelated to ACT, did not include older adults, or were not empirical papers (e.g. protocols and reviews). Papers retained after screening were included in full-text checks against inclusion/exclusion criteria. Upon completion of eligibility assessment, ten papers met criteria and were included for review. References of included papers were checked for any further studies of relevance. Two additional articles were highlighted for screening; however, both failed to meet the inclusion criteria for age. A PRISMA flow chart demonstrates the process by which articles were selected (figure 1.). Characteristics of these studies are summarised in Table 2.

Figure 1. PRISMA flow chart

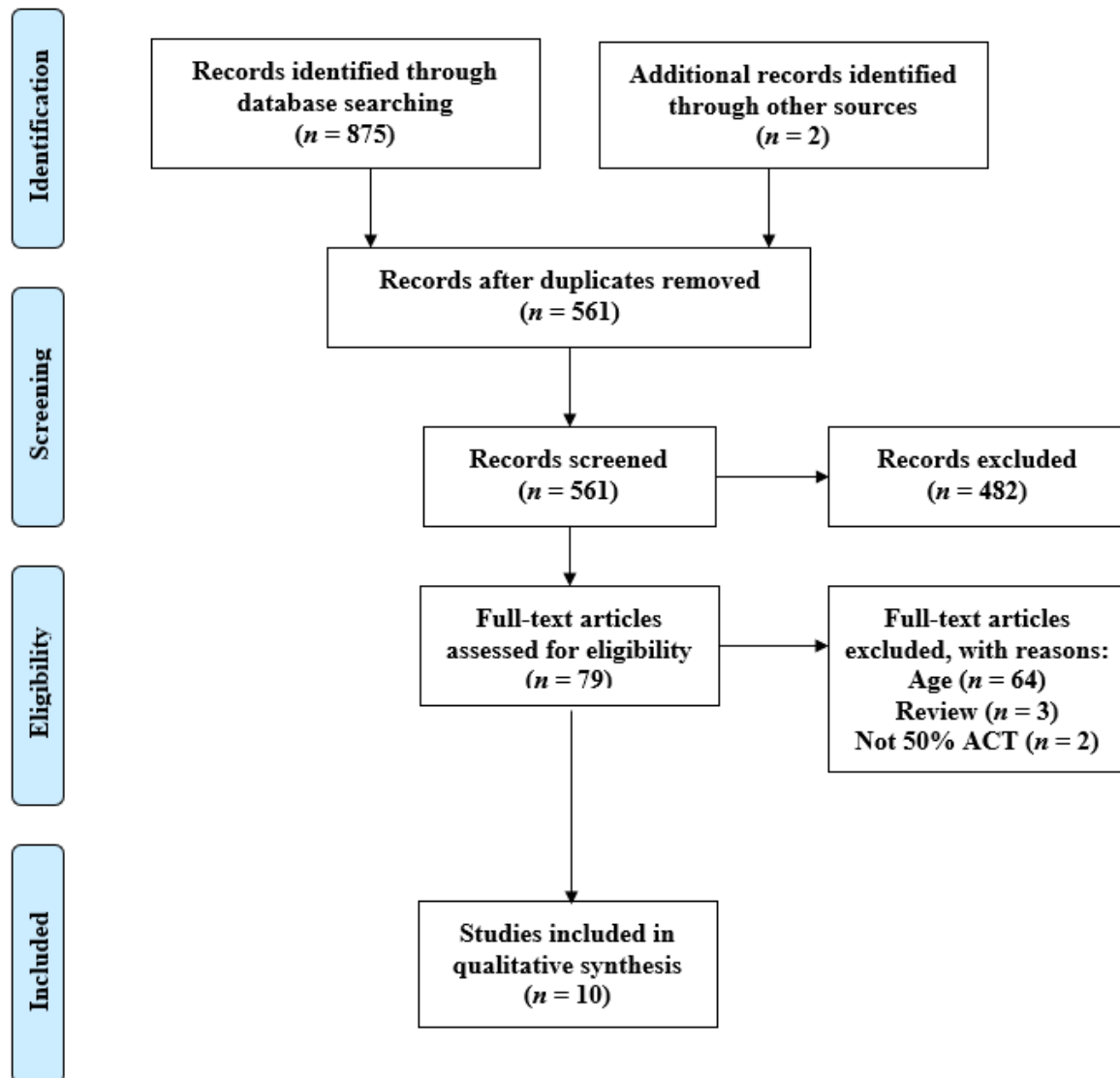


Table 2. Summary characteristics for included studies

Author	Title	Design	Sample	Intervention type	Measures	Limitations
(Wetherell et al., 2011), USA	Acceptance and commitment therapy for generalised anxiety disorder in older adults: A preliminary report	Type: RCT ACT vs. CBT	Older adults with generalised anxiety disorder $N = 21$ ACT $n = 11$ CBT $n = 10$ Age $M (SD)$: 70.8 (6.5) M/F: 52.5%/47.5%	<i>Therapy</i> : ACT vs. CBT <i>Delivery</i> : Individual sessions <i>Frequency</i> : Weekly 60-minutes (x12) Total <i>Hours</i> : 12	<i>Psychological</i> : Anxiety (HAMA), worry (PSWQ), depression (BDI-II) <i>Other</i> : QOL (SF-36), treatment satisfaction (CSQ)	Small sample Novice therapists
(Alonso, López, Losada, & González, 2013), Spain	Acceptance and commitment therapy and selective optimization with compensation for older people with chronic pain: A pilot study	Type: Controlled trial ACT-SOC vs. WLC	Older adults with chronic pain Nursing home $N = 16$ ACT $n = 9$ WLC $n = 7$ Age $M (SD)$: Not specified Age OA group $M (SD)$: 87 (2.44) M/F: 20%/80%	<i>Therapy</i> : ACT-SOC vs. WLC <i>Delivery</i> : Group sessions <i>Frequency</i> : Bi-weekly, 120-minutes (x10) <i>Total Hours</i> : 20	<i>Intervention-based</i> : SOC Questionnaire, Experiential avoidance (AAQ), pain and values (CPVI) <i>Psychological</i> : Depressive symptoms (GDS-10) <i>Physical</i> : Pain (BPI) <i>Other</i> : ADL (MHAQ), life satisfaction (SWLS), attitudes toward pain (SOPA), catastrophising beliefs (PCS), age-related stereotypes (ATOAs)	Alpha value of $p = .10$ Small sample size Different environments for different groups
(Karlin et al., 2013), USA	Effectiveness of acceptance and commitment therapy for depression: Comparison among older and younger veterans	Type: Analysis of pre-existing clinical data. Group comparison between younger and older adults	Older and younger adults $N = 731$ Older adults $n = 76$ Age $M (SD)$: Not specified M/F: 94.7%/5.3%	<i>Therapy</i> : ACT-D, manualised <i>Delivery</i> : Mixed (group and individual) <i>Frequency</i> : Mixed (weekly and bi-weekly) <i>Total Hours</i> : Unable to determine	<i>Psychological</i> : Depression (BDI-II) <i>Other</i> : QOL (WHOQOL-BREF) Therapeutic alliance (WAI-SR)	No control No screening for older adults (more likely to have motivated patients)

Table 2. Summary characteristics for included studies

Author	Title	Design	Sample	Intervention type	Measures	Limitations
(Alonso-Fernández, López-López, Losada, González, & Wetherell, 2015), Spain	Acceptance and commitment therapy and selective optimisation with compensation for institutionalised older people with chronic pain	Type: RCT ACT-SOC vs. Minimal Support	Older adults with chronic pain $N = 101$ ACT $n = 27$ Minimal support $n = 26$ Age $M (SD)$: 82.26 (10.0) M/F: 21.4%/78.6%	<i>Therapy</i> : ACT-SOC <i>Delivery</i> : Group sessions <i>Frequency</i> : Weekly, 120-minutes (x9) <i>Total Hours</i> : 18	<i>Intervention-based</i> : Pain acceptance (CPAQ) Psychological: Depression (GDS), Anxiety (PASS-20) <i>Physical</i> : Pain severity/Interference (BPI), catastrophising beliefs about pain (PCS) <i>Other</i> : Use of SOC strategies (SOC)	High attrition Mixed model Unequal time between groups No follow-up
(Wetherell et al., 2016), USA	Age moderates response to acceptance and commitment therapy vs. cognitive behavioral therapy for chronic pain	Type: Secondary data analysis, (Wetherell, 2011). Controlled trial ACT vs. CBT	Older, middle-aged and younger adults with chronic pain $N = 114$ Older adults: $n = 21$ Age $M (SD)$: 55 (12.5) Age OA $M (SD)$: 73.1 (7.8) M/F: 52.3%/47.7%	<i>Therapy</i> : ACT vs. CBT <i>Delivery</i> : Group sessions <i>Frequency</i> : Weekly 90-minutes (x8) <i>Total Hours</i> : 12	<i>Physical</i> : Pain (BPI)	Secondary data analysis
(Bayati, Abbasi, Ziapour, Parvane, & Dehghan, 2017), Iran	Effectiveness of acceptance and commitment therapy on death anxiety and death obsession in the elderly	Type: Controlled trial ACT vs. No intervention	Older adults with Death Anxiety 'Nursing home $N = 26$ ACT $n = 13$ No intervention $n = 13$ Age $M (SD)$: Not specified (all >60yrs) M/F: 100%/0%	<i>Therapy</i> : ACT <i>Delivery</i> : Not specified <i>Frequency</i> : Not specified, 90-minutes (8x sessions) <i>Total Hours</i> : 12	<i>Psychological</i> : Death anxiety (DAQ), death obsession (DOS)	Small sample Not blinded Missing information Potential treatment infidelity ("control thoughts/emotions")

Table 2. Summary characteristics for included studies

Author	Title	Design	Sample	Intervention type	Measures	Limitations
(Davison, Eppingstall, Runci, & O'Connor, 2017), New Zealand	A pilot trial of acceptance and commitment therapy for symptoms of depression and anxiety in older adults residing in long-term care facilities	Type: Controlled trial ACT vs. WLC	Older adults with symptoms of depression and anxiety in nursing homes $N = 41$ ACT $n = 22$ WLC $n = 19$ Age $M (SD)$: 85.3(9.2) M/F: 12.2%/87.8%	<i>Therapy</i> : ACT (author manualised) <i>Delivery</i> : Individual sessions <i>Frequency</i> : Bi-weekly, 60-minutes (x6) <i>Total Hours</i> : 12	<i>Psychological</i> : Self-reported depression (GDS), depression in dementia (CSDD), anxiety (GAI) <i>Other</i> : Treatment satisfaction (interview and questionnaire)	Did not control for concomitant treatments Not blinded Recruitment relied on untrained staff
(Nazari, Ebrahimi, Naseh, & Sahebi, 2017), Iran	Investigation of the effect of Acceptance and commitment therapy on chronic pain in the elderly	Type: Quasi-experimental Act vs. No intervention	Older adults with chronic pain $N = 30$ ACT $n = 15$ No intervention $n = 15$ Age $M (SD)$: Not specified (60-90yrs) M/F: 0%/100%	<i>Therapy</i> : ACT <i>Delivery</i> : Not specified <i>Frequency</i> : Not specified, 45-minutes (x8) <i>Total Hours</i> : 6	<i>Physical</i> : Pain (Likert and PRPDS)	Small sample Not blinded Missing information No follow-up
(Jacobs, Luci, & Hagemann, 2018), USA	Group-based Acceptance and Commitment Therapy (ACT) for older veterans: Findings from a quality improvement project	Type: Quality improvement project Original ACT intervention, then modified ACT intervention	Older veterans with symptoms of anxiety and depression $N = 17$ ACT (original) $n = 12$ ACT modified $n = 5$ Age $M (SD)$: 68 (6.59) Age Range: 55-84 55-64yrs: 23.5% M/F: 100%/0%	<i>Therapy</i> : Manualised and then adapted <i>Delivery</i> : Group sessions <i>Frequency</i> : Weekly, (x12) <i>Total Hours</i> : Unspecified	<i>Intervention-based</i> : Psychological flexibility (AAQ-II) <i>Psychological</i> : Anxiety (GAD-7), depression (GDS-15)	No control Small sample Areas of worsening

Table 2. Summary characteristics for included studies

Author	Title	Design	Sample	Intervention type	Measures	Limitations
(Ramos, Hastings, Bosworth, & Fulton, 2018), USA	Life programme: Pilot testing a palliative psychology group intervention	Type: Quality Improvement Project Original ACT/CBT intervention, then modified ACT/CBT intervention	Older veterans receiving palliative care $N = 39$ Age $M (SD)$: 65.87 Age Range: 50-95 50-64yrs: 53.8% M/F: 94.87%/5.13%	<i>Therapy</i> : Life program (ACT & CBT) <i>Delivery</i> : Group sessions <i>Frequency</i> : Cohorts 1&2: weekly 60-minute (x8) Cohort 3-5: Weekly 90-minutes (x8) Total Hours: 8	<i>Intervention-based</i> : Psychological flexibility (AAQ-II), self-compassion (SCSSF), mindfulness (TMS) <i>Psychological</i> : Depression (DASS-21)	Small sample Confounding therapeutic practice (thought control vs thought acceptance) No control

Note. **AAQ** – Acceptance and Action Questionnaire, **ATO**A – Attitudes Towards Own Ageing, **BDI-II** – Becks Depression Inventory, **BPI** – Brief Pain Inventory, **CPAQ** – Chronic Pain Acceptance Questionnaire, **CPVI** – Chronic Pain Values Inventory, **CSDD** – Cornell Scale for Depression in Dementia, **CSQ** – Client Satisfaction Questionnaire, **DAQ** – Death Anxiety Questionnaire, **DASS-21** - Depression, Anxiety and Stress Scales, **DOS** – Death Obsession Scale, **GAD-7** – Generalised Anxiety Disorder screen, **GAI** – Geriatric Anxiety Inventory, **GDS-10** – Geriatric Depression Scale, **HAMA** – Hamilton Anxiety Rating Scale, **MHAQ** – Modified Health Assessment Questionnaire, **PASS-20** – Pain Anxiety Symptoms Short-form, **PCS** – Pain Catastrophising Scale, **PRPDS** – Pain-Related Physical Disability Scale, **PSWQ** – Penn State Worry Questionnaire, **SCSSF** – Self-Compassion Scale Short-Form, **SF-36** Mental component score of the medical outcomes study 36-item short form self-report health survey, **SOC** – Selection, Optimisation and Compensation questionnaire, **SOPA** – Survey Of Pain Attitudes, **SWLS** – Satisfaction With Life Scale. **TMS** - Toronto Mindfulness Scale, **WAI-SR** – Working Alliance Inventory – Short Revised, **WHOQOL-BREF** – World Health Organisation Quality Of Life-BREF

Demographics

Across all ten studies, ACT-based interventions were delivered to 448 older adults. Ages ranged from 50-97 years, with a weighted mean of 76.27 years; 52.52% of participants were male. Most participants were older adults living in the community; however, three studies recruited older adults in residential care and one in residential care.

Design

Studies employed randomised-controlled trials ($n=2$), controlled trials ($n=7$), and quasi-experimental designs ($n=1$); the majority of papers utilised typical prospective structure ($n=6$), whereas some selected quality improvement designs ($n=2$), and retrospective designs ($n=2$) that analysed pre-existing clinical data. Where control groups were employed, treatment as usual (TAU) or no intervention conditions were favoured over evidence-based interventions such as CBT. Several studies did not have control groups and favoured quality improvement designs.

Papers included in the present study met on average 60.1% ($SD=11.33$) of the quality items on the modified Downs and Black checklist (see table 3.). Methodological strengths were identified in reporting and controlling for bias. Studies generally failed to take steps to control for confounding variables. Table 4 presents exclusion criteria employed by studies with poorer scores across sample representation. Any of the criteria listed are more common in older adult populations, and in reducing representation within samples, concerns regarding generalisability of findings in clinical populations arise. The design of most studies was notably problematic.

Table 3. Modified Downs and Black checklist scores

	Wetherell et al., 2011	Alonso et al., 2013	Karlin et al., 2013	Alonso-Fernández et al., 2015	Davison et al., 2017	Wetherell et al., 2016*	Bayati et al., 2017	Jacobs et al., 2018	Nazari et al., 2017	Ramos et al., 2018	Total
Reporting	60.0%	70.0%	70.0%	80.0%	70.0%	100.0%	70.0%	60.0%	60.0%	70.0%	71.0%
Confounding	33.3%	33.3%	66.7%	0.0%	33.3%	33.3%	0.0%	33.3%	0.0%	100.0%	33.3%
Bias	85.7%	57.1%	80.0%	57.1%	71.4%	85.7%	66.7%	60.0%	57.1%	60.0%	68.1%
External Validity	83.3%	66.7%	25.0%	50.0%	66.7%	100.0%	33.3%	0.0%	50.0%	60.0%	53.5%
Total	66.7%	59.3%	60.9%	55.6%	63.0%	85.2%	50.0%	45.5%	48.1%	66.7%	60.1%

*The majority of scores were calculated from the original paper (Wetherell et al., 2011b)

Table 4. Exclusion criteria in studies with reduced population representation

Alonso et al., 2013	Alonso-Fernández et al., 2015	Davison et al., 2017	Wetherell et al., 2016*	Bayati et al., 2017
Cognitive deterioration	Cognitive impairment*	Not nominated by care staff	Concurrent psychotherapy	Concurrent psychotherapy
Literacy*	Literacy*		<6 month history of psychosis	History of psychological disorder
Oncological pain	Oncological pain		History of psychosis/mania	Verbal literacy*
Sensory deficits*	Psychological/psychiatric disorder		Medical conditions*	
	Sensory deficits*			

*To a degree that could interfere with therapy

Follow-up assessments were undertaken in just three papers (Davison, Eppingstall, Runci, & O'Connor, 2017; Wetherell et al., 2011; Wetherell 2016). Where follow-up was included, time-periods were less than one year, constraining inferences to the effectiveness of ACT interventions in the long-term.

Interventions

Interventions targeted chronic pain (Alonso-Fernández et al., 2015; Alonso et al., 2013; Nazari, 2017; Wetherell et al., 2016) and depression and/or anxiety (Bayati et al., 2017; Davison et al., 2017; Jacobs et al., 2018; Karlin et al., 2013; Wetherell et al., 2011; Ramos et al., 2018). Two studies included only veterans and one study included only older adults receiving palliative care.

ACT interventions differed significantly in respect to content, modes of delivery, therapist expertise, frequency of sessions, and total hours provided. Eight interventions reported using manualised and publicly available protocols; the majority used generic ACT manuals, while some made adaptations by including elements of Selection Optimisation and Compensation (SOC; Alonso-Fernández et al., 2015; Alonso et al., 2013) and CBT (Ramos et al., 2018), or tailoring ACT to specific populations and presentations, namely depression (ACT-D; Karlin & Zhang, 2013) and palliative care (Ramos et al., 2018).

Treatment, where specified, was always delivered by qualified therapists, psychologists, or trainee psychologists; however, only four studies monitored model adherence/fidelity and therapist competence (Davison et al., 2017; Karlin & Zhang, 2013; Wetherell et al., 2011; Wetherell et al., 2016).

Studies delivered ACT in a group format ($n=5$), to individuals ($n=2$), and in a combined approach ($n=1$); two did not specify how interventions were delivered (Bayati et al., 2017; Nazari, 2017). All studies addressing depression or anxiety delivered individual therapy, with exception of Ramos et al., (2018). In contrast, all interventions targeting chronic pain used

group delivery. Frequency of sessions ranged from daily to weekly and total therapy contact time ranged from six to 20 hours. All interventions were delivered face-to-face.

Adaptations for older adults

No planned adaptations for an older adult population were reported in our sample. Where SOC had been included as part of the ACT intervention (Alonso-Fernández et al., 2015; Alonso et al., 2013), its inclusion was justified by reference to its usefulness in older populations; however, the ACT itself was not adjusted.

Two quality improvement projects in our sample modified the content of the ACT intervention following feedback from initial cohorts. In a focus group comprising six participants, Jacobs et al. (2018) found that experiential exercises were deemed more helpful than metaphors, and that interactive approaches were favoured. They also suggested reducing the number of therapy sessions from 12 to 10, informed by average attendance rates. Ramos et al. (2018) made a similar post-hoc adaptation by reducing sessions from eight 60-minute sessions to six 90-minute sessions. No further adaptations to interventions were observed.

Outcomes

Outcomes measured psychological/emotional wellbeing, physical health, and ACT-specific processes. Measures of depression, anxiety, worry, and attitudes towards pain were collected in all but two papers (Nazari, 2017; Wetherell et al., 2016). Subjective measures of pain were collected by all studies targeting chronic pain (Alonso-Fernández et al., 2015; Alonso et al., 2013; Nazari, 2017; Wetherell et al., 2016); this was the only statistically significant physical health outcome recorded in the included papers.

ACT-specific outcomes included measures of psychological flexibility, acceptance, values, and self-compassion. These were completed in less than half of the included studies (Alonso-Fernández et al., 2015; Alonso et al., 2013; Jacobs et al., 2018; Ramos et al., 2018).

Without ACT-specific measures, ability to determine the impact and relevance of ACT-related constructs was impaired. Other relevant outcomes included self-reported quality of life, activities of daily living, and measures of treatment satisfaction.

Outcomes varied greatly between studies, with most able to demonstrate statistically significant improvements in their results. Improvements were recorded in ACT-related processes such as psychological flexibility and acceptance (Alonso-Fernández et al., 2015; Alonso et al., 2013), depressive symptoms (Davison et al., 2017; Jacobs et al., 2018; Karlin et al., 2013; Wetherell et al., 2011; Ramos et al., 2018), anxiety, stress, or worry symptoms (Bayati et al., 2017; Ramos et al., 2018; Wetherell et al., 2011), and physical pain (Nazari, 2017) (table 5.). Ramos et al. (2018) were the only study to consider *clinical* significance in addition to statistical significance.

Table 5. Statistically significant findings & effect sizes where reported

Study	Summary of Effect Sizes
Wetherell et al. (2011)	<i>Psychological impact:</i> Reduction in depression scores ($p<.05$, $r=.57$) Reduction in worry ($p<.05$, $r=.52$)
Alonso et al., (2013)	<i>Psychological impact:</i> Less experiential avoidance* ($p=.07$, $d=-1.39$) <i>Physical Impact:</i> Less pain when walking* ($p=.10$, $d=1.25$)
Karlin et al. (2013)	<i>Therapeutic alliance:</i> Improved ($p<.05$, $d=.64$) <i>Psychological impact:</i> Reduction in depression scores ($p<.05$, $d=.95$) Quality of life improved ($p<.05$, $d=.53$)
Alonso-Fernández et al. (2015)	Improved pain acceptance ($p=.01$, $\eta^2=.09$) Maintained and improved use of SOC strategies ($p<.01$, $\eta^2=.01$)
Davison et al. (2017)	<i>Psychological impact:</i> Reduction in depression scores GDS ($p<.05$, $d=.66$) and CSDD ($p<.05$, $d=.59$)
Wetherell et al. (2016)	<i>Older adults are more likely to respond better to ACT than CBT</i> Odd's ratio post-treatment= 1.07, 95%CI [1.00, 1.16]. Odd's ratio follow-up = 1.08 95CI [1.01, 1.17]
Bayati et al., (2017)	<i>Psychological impact:</i> Reduced death obsession ($p=.001$, $d=0.72$) Reduced death anxiety ($p=.0001$, $d=.86$)
Ramos et al., 2018	<i>Psychological impact:</i> Reduced depression ($p<.05$, $d=.54$) Reduced stress ($p<.05$, $d=.57$)

* Where the paper considers an observed significance level of $p<.10$

Effect sizes ranged from small to large (Cohen, 2013). Nevertheless, the outcomes from our selected studies should be taken within the context of their limited methodological rigour.

Acceptability

Attrition

In all other studies, rates ranged from 0% to 53.8%. Two studies omitted data on attrition (Bayati et al., 2017; Nazari et al., 2017). Attrition in comparison groups conducted over an equal period of time in two studies ranged from 0% to 44% (Karlin & Zhang, 2013; Wetherell et al., 2011). In a large sample ($N=731$), Karlin and Zhang (2013) found that older adults were significantly less likely than working-aged adults to discontinue treatment, with attrition rates of 22.4% compared to 33.3%, whilst Wetherell et al. (2011) observed that those in a CBT intervention were more likely to dropout (44%) than those in ACT (0%). The latter result should, however, be interpreted cautiously given the small sample size ($N=21$). Wetherell et al. (2016), also comparing ACT and CBT groups, ($N=114$) did not find any attrition for older adults in either group, though did report attrition ranges of approximately 17% for younger to middle-aged adults in both groups (table 6.).

Table 6. Rates of attrition across studies by group.

Wetherell et al., 2011	Alonso et al., 2013	Karlin et al., 2013	Alonso-Fernández et al., 2015	Wetherell et al., 2016	Bayati et al., 2017	Davison et al., 2017	Nazari et al., 2017	Jacobs et al., 2018	Ramos et al., 2018
ACT 0%	ACT 22%	Older adults 22.4%	ACT 45.2%	ACT 0%	NS*	ACT 10%	NS*	1 st Cohort 25%	Overall 53.8%
CBT 44%	WLC 0%	Younger adults 33.3%	Control 29.1%	CBT 0%		WLC 21%		2 nd Cohort 20%	

Note. * = Not specified.

The most cited reason for withdrawal from interventions was physical health difficulties, with participants referring to pain burden (Ramos et al., 2018), physical deterioration (Davison et al., 2017), and general illness (Alonso-Fernández et al., 2015). It is notable that the study reporting the highest rate of attrition (Ramos et al. 2018) included patients receiving palliative care and who had considerably more comorbid physical health difficulties than were reported in other studies.

Where attrition was related to the intervention, participants suggested that ‘losing interest’ was the primary reason for discontinuing (Alonso-Fernández et al., 2015; Ramos et al., 2018), followed closely by the inclusion of homework, and relational difficulties with group members (Alonso-Fernández et al., 2015). Issues related to transportation and difficulty balancing caregiving commitments were also noted as reasons for dropout (Alonso-Fernández et al., 2015; Alonso et al., 2013).

Satisfaction

Self-reported satisfaction with ACT interventions was typically high across the included studies. Davison et al. (2017) administered the Client Satisfaction Questionnaire (CSQ 8th Edition; Attkisson & Zwick, 1982) to participants who had completed the intervention ($n=18$). The vast majority rated the program as good or excellent (88.9%), suggested that they would recommend it to a friend (83.3%), and felt that the majority of their needs had been met (66.6%). Residential care staff ($N=10$) included in this study indicated that the intervention had met the needs of participants and all rated the quality as ‘good’ or above, indicating that they would recommend the intervention to other facilities.

Wetherell et al. (2011) also included the CSQ, which was administered to 21 older adults receiving either CBT or ACT interventions. They found high levels of satisfaction across both groups. In Ramos et al. (2018) all participants that completed a Likert-scale questionnaire ($n=17$) agreed with statements such as “I am satisfied with the quality of my group experience.”

and “I am more likely to seek psychology services in the future.”; whilst 81% agreed with the statement “My overall wellbeing has improved.”.

Finally, Karlin & Zhang (2013) used the Working Alliance Inventory – Short Form (Hatcher & Gillaspie, 2006) to measure therapeutic alliance. While alliance improved across both younger and older adult groups, greater effect sizes were seen for older adults. This may be interpreted, cautiously, as an indirect measure of engagement and satisfaction with the therapeutic intervention.

Discussion

This review has identified and appraised empirical evidence for the use of ACT interventions within older adult populations. Papers were reviewed with the aim of evaluating the quality and clinical utility of the research, whilst also exploring how acceptable older adults considered the interventions described. The relatively small number of studies identified by this review suggests that ACT research is still in its infancy for people in later life. This is perhaps surprising given the strong theoretical rationale that has been presented in the wider literature (e.g. Petkus & Wetherell, 2013; Pachana, Laidlaw, Gillanders, & Laidlaw, 2014). This review is intended to provide clinicians and researchers with key information in these early stages, with recommendations for further research moving forward.

There was vast heterogeneity in the content, format, and delivery of ACT across studies – this included vast differences in total therapy hours, frequency of sessions, and overall duration of intervention. Study protocols rarely included checks regarding therapist competency or model fidelity and the ACT-specific qualifications and/or experience were often unreported. In a systematic review performed by Öst (2014), ACT interventions conducted mostly in adult populations were found to have considerably better design and higher rates of follow-up than studies included in the present review. Irrespective of this, studies including older adults populations were still able to outperform those undertaken in adult populations across therapist training, adherence and competency. This suggests that even in populations where ACT has been researched in excess of 15 years (Bach & Hayes, 2002), there is much room for development. Overall, our sample scored 38.3% across items on the POSMRF in comparison to an average of 42.8% across 60 randomised-controlled trials as found by Ost (2014).

Highly variable rates of attrition were found across ACT interventions for older adults; however, these are largely comparable with rates found for ACT in adult populations (Ong,

Lee, & Twohig, 2018). In studies that explored age-related differences in this review, attrition was observed to be greater for younger adults than it was for older adults: however, this may be a more general trend observable in other psychological therapies. Without direct comparisons between alternative interventions, it is difficult to state how ACT as an approach influenced attrition. It was observed that attrition in studies where patients were more likely to have physical health difficulties was greater. Several of the remaining studies excluded participants that may have health or other difficulties related to older age. This does not reflect the reality of most clinical services: the exclusion of these ‘complex’ presentations limits the clinical utility of the data. In a number of cases, exclusion criteria included relatively common challenges of older age (e.g. pain, cognitive impairment). This calls into question how representative the samples of older adults in these studies are, and if attrition would have reduced in response to adaptations recommended for ACT with older adults.

Feedback relating to content and efficacy was mostly good. Where areas for improvement were indicated, they concerned interactivity, frequency of sessions, and order of material. Studies with higher rates of attrition reported participants discontinuing due to “losing interest”, yet did not elaborate on which aspects participants lost interest in. Collectively, these limitations make it difficult to synthesise and compare results, limiting the conclusions that can be drawn in respect to the efficacy of ACT with older adults. We recognise that there may have been bias in the collecting of satisfaction ratings by researchers, with demand characteristics potentially encouraging participants to positively appraise the intervention due to the research context. A more detailed exploration of older adults’ experiences of ACT would be of great interest.

Individual studies reported statistically significant improvements across different psychological, physical and ACT-related domains. These findings are not considered by this review to be collectively meaningful due to the heterogeneity of publications to date.

Future research

In light of the limitations highlighted by our review, we put forward several recommendations to improve the validity and reliability of future studies. Where possible, we encourage existing RCTs and controlled-trials to be replicated. Two of the studies included in our review utilised pre-existing data sets and two conducted interventions in the context of quality improvement projects. While worthwhile, it may be more beneficial to provide consistent, controlled interventions in the earlier stages of piloting ACT with older adults, developing and modifying as the evidence-base builds strength. Trials designed to answer specific questions regarding the older adult population will allow for stronger study design and, eventually, systematic reviews and meta-analyses with improved homogeneity. It is, however, important to consider a combination of controlled empirical trials *and* practice-based evidence. It is important to ensure that samples accurately represent the clinical populations that may receive ACT in services.

There was a noticed decline in the use of ACT protocols in research since 2008 (Öst, 2014). In considering interventions to be tested, studies should be explicit in their choice of protocol; Hayes (2018) shares existing ACT protocols conducted within literature. At present we are unaware of any protocol developed for older adults and given the existing recommendations of adapting ACT (Pachana et al., 2014; Petkus, M A, & Wetherell, 2013), this is may be an area of interest.

We would encourage consultation with older adults regarding their experiences of ACT (e.g. via focus groups and qualitative interviews) to guide the development of intervention content and delivery. Where specific adaptations are made for the older adult population, these should be made explicit. Despite several recommendations existing within the literature, the studies reviewed did not report making any adaptations for older adults. Although no adaptations were made, this is not to say that they would not have been helpful. Further research

could explore ways of optimising ACT for this population and measure the effects of proposed modifications.

While several studies reported satisfaction with intervention, a lack of follow-up was noted in assessing reasons for dropout. There is evidence to support that older adults are less likely to drop-out from interventions than younger adults, and that ACT may be preferable to CBT. It is therefore important that researchers assess instances of dropout to determine whether the intervention may not be suitable or have adverse effects. There was a distinct negligence in the consideration of adverse effects across studies included in this review, even where studies had higher rates of attrition, or noticed non-statistically significant decline in psychological wellbeing. This should be addressed in prospective research to ensure that a balanced perspective of ACT informs clinical practice. A number of studies did report positive outcomes. Further research may usefully explore which components of ACT older adults find most useful, engaging, and clinically effective.

Limitations

In considering limitations of this review, we recognise that our searches included somewhat heterogeneous populations and presenting problems, as a result, findings may be less generalisable. This was felt necessary in the infancy of this research; however, as further studies are conducted, reviews within specific sub-populations and clinical presentations are likely to become possible. The search was conducted by just one author, potentially increasing the risk of bias when selecting articles to include. It was felt that the inclusion/exclusion criteria were clear enough for a broader, less refined search to take place, to allow the largest number of papers to be screened.

The inclusion of adults aged ≥ 50 years old breaks convention in some areas of older adult research, where more traditional age criteria (e.g. ≥ 65 years) are usually applied. Two articles in this review included participants below the age of 60 years (Jacobs et al., 2018;

Ramos et al., 2018); however, both highlight the importance of flexibility in defining older adulthood, promoting definitions of older age that prioritised aging-related needs in addition to chronological age. We feel that this is an important and useful consideration for researchers and clinicians. It is recognised, however, that more inclusive and flexible definitions of older age may inhibit generalisability to some degree. In being more inclusive, our findings should be interpreted with appropriate caution when considering the wider older adult population that they may be relevant to. As research accrues, future reviews may be more selective. Research that considers diversity within older adult populations, even at the level of differing age-ranges, should certainly be encouraged. There may be important differences between ‘younger’ and ‘older’ old adults.

The efficacy of ACT in the older adult population was not a primary focus of this review: we instead looked to examine the quality of the research exploring ACT with older adults. The heterogeneity described here certainly poses significant challenges to generalisability and to the confidence with which one may interpret results. This affirms, we believe, the importance of the quality of the research being held to account in the first instance. Reliable research is needed to inform clinicians as to whether or not any intervention is likely to be safe and effective. The need for such research is clear in respect to ACT and older adults.

Conclusions

This review provides an initial account of the quality of research exploring ACT interventions for older adult populations. We found that variable study designs, inconsistent interventions, and incomplete reporting inhibited our ability to find consensus. Where acceptability was concerned, the majority of participants reported satisfaction with ACT interventions and attrition rates varied, often falling within ranges expected of older adults engaging with other evidence-based psychological therapies. Despite the quality of the research

compromising conclusions regarding the efficacy of ACT for older adults, the responses of participants may be perceived as encouraging of further research in this area.

References

- Alonso-Fernández, M., López-López, A., Losada, A., González, J. L., Wetherell, J. L., Alonso-Fernandez, M., ... Wetherell, J. L. (2016). Acceptance and Commitment Therapy and Selective Optimization with Compensation for Institutionalized Older People with Chronic Pain. *Pain Medicine*, 17(2), 264–277. <https://doi.org/10.1111/pme.12885>
- Alonso, M. A., López, A., Losada, A., & González, J. L. (2013). Acceptance and commitment therapy and selective optimization with compensation for older people with chronic pain: A pilot study. *Behavioral Psychology / Psicología Conductual: Revista Internacional Clínica y de La Salud*, 21(1), 59–79. Retrieved from <https://search.proquest.com/docview/1506434139?accountid=14874>
- Anderson, D., Connelly, P., Meier, R., & McCracken, C. (2013). Mental health service discrimination against older people. *The Psychiatrist*, 37(3), 98–103. <https://doi.org/10.1192/pb.bp.112.040097>
- Attkisson, C. C., & Zwick, R. (1982). The client satisfaction questionnaire. Psychometric properties and correlations with service utilization and psychotherapy outcome. *Evaluation and Program Planning*, 5(3), 233–237. [https://doi.org/10.1016/0149-7189\(82\)90074-X](https://doi.org/10.1016/0149-7189(82)90074-X)
- Bach, P., & Hayes, S. C. (2002). The use of acceptance and commitment therapy to prevent the rehospitalization of psychotic patients: a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 70(5), 1129–1139. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12362963>
- Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. *Successful aging: Perspectives from the behavioral sciences*, 1(1), 1-34.

- Bayati, A., Abbasi, P., Ziapour, A., Parvane, E., & Dehghan, F. (2017). Effectiveness of Acceptance and Commitment Therapy on death anxiety and death obsession in the elderly. *World Family Medicine*, 15(10), 122–128. <https://doi.org/10.5742/MEWFM.2017.93148>
- Bowling, A., Banister, D., Sutton, S., Evans, O., & Windsor, J. (2002). A multidimensional model of the quality of life in older age. *Aging and Mental Health*, 6(4), 355–371. <https://doi.org/10.1080/1360786021000006983>
- Braam, A. W., Copeland, J. R. M., Delespaul, P. A. E. G., Beekman, A. T. F., Como, A., Dewey, M., ... Skoog, I. (2014). Depression, subthreshold depression and comorbid anxiety symptoms in older Europeans: Results from the EURODEP concerted action. *Journal of Affective Disorders*, 155(1), 266–272. <https://doi.org/10.1016/j.jad.2013.11.011>
- Butters, M. A., Whyte, E. M., Nebes, R. D., Begley, A. E., Dew, M. A., Mulsant, B. H., ... Becker, J. T. (2004). The nature and determinants of neuropsychological functioning in late-life depression. *Archives of General Psychiatry*, 61(6), 587–595. <https://doi.org/10.1001/archpsyc.61.6.587>
- Canuto, A., Weber, K., Baertschi, M., Andreas, S., Volkert, J., Dehoust, M. C., ... Härter, M. (2018). Anxiety Disorders in Old Age: Psychiatric Comorbidities, Quality of Life, and Prevalence According to Age, Gender, and Country. *American Journal of Geriatric Psychiatry*, 26(2), 174–185. <https://doi.org/10.1016/j.jagp.2017.08.015>
- Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershfield, H., Samanez-Larkin, G. R., ... Nesselroade, J. R. (2011). Emotional experience improves with age: evidence based on over 10 years of experience sampling. *Psychology and Aging*, 26(1), 21–33. <https://doi.org/10.1037/a0021285>
- Chand, S. P., & Grossberg, G. T. (2013). How to adapt cognitive-behavioral therapy for older adults. *Current Psychiatry*. St. Louis. Retrieved from <https://pdfs.semanticscholar.org/d005/b2c2fd4adf14ef6febab608c4d552dd292b0.pdf>

- Chaplin, R., Farquharson, L., Clapp, M., & Crawford, M. (2015). Comparison of access, outcomes and experiences of older adults and working age adults in psychological therapy. *International Journal of Geriatric Psychiatry*, 30(2), 178–184.
<https://doi.org/10.1002/gps.4122>
- Christensen, H., Jorm, A. F., Mackinnon, A. J., Korten, A. E., Jacomb, P. A., Henderson, A. S., & Rodgers, B. (1999). Age differences in depression and anxiety symptoms: A structural equation modelling analysis of data from a general population sample. *Psychological Medicine*, 29(2), 325–339. <https://doi.org/10.1017/S0033291798008150>
- Cohen, J. (2013). Statistical power analysis for the behavioral sciences. Routledge.
- Coyle, C. E., & Dugan, E. (2012). Social isolation, loneliness and health among older adults. *Journal of Aging and Health*, 24(8), 1346–1363. <https://doi.org/10.1177/0898264312460275>
- Cymru, M. (2017). Guidance for Delivering Evidence-Based Psychological Therapy in Wales. Retrieved from [https://www.bps.org.uk/system/files/user-files/DCP Faculty for](https://www.bps.org.uk/system/files/user-files/DCP%20Faculty%20for%20Wales.pdf)
- Dall, T. M., Gallo, P. D., Chakrabarti, R., West, T., Semilla, A. P., & Storm, M. V. (2013). An aging population and growing disease burden will require a large and specialized health care workforce by 2025. *Health Affairs*, 32(11), 2013–2020.
<https://doi.org/10.1377/hlthaff.2013.0714>
- Davison, T. E., Eppingstall, B., Runci, S., & O'Connor, D. W. (2017a). A pilot trial of acceptance and commitment therapy for symptoms of depression and anxiety in older adults residing in long-term care facilities. *Aging and Mental Health*, 21(7), 766–773.
<https://doi.org/10.1080/13607863.2016.1156051>
- Davison, T. E., Eppingstall, B., Runci, S., & O'Connor, D. W. (2017b). A pilot trial of acceptance and commitment therapy for symptoms of depression and anxiety in older adults residing in long-term care facilities. *Aging & Mental Health*, 21(7), 766–773.
<https://doi.org/file:///C:/Users/willi/Downloads/davison2016.pdf>

- Downs, S. H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health* (Vol. 52).
<https://doi.org/10.1136/jech.52.6.377>
- Fiske, A., Wetherell, J. L., & Gatz, M. (2009). Depression in older adults. *Annual Review of Clinical Psychology*, 5, 363–389. <https://doi.org/10.1146/annurev.clinpsy.032408.153621>
- Glaesmer, H., Riedel-Heller, S., Braehler, E., Spangenberg, L., & Lupp, M. (2011). Age- and gender-specific prevalence and risk factors for depressive symptoms in the elderly: a population-based study. *International Psychogeriatrics / IPA*, 23(8), 1294–1300.
<https://doi.org/10.1017/S1041610211000780>
- Grenier, S., Prévile, M., Boyer, R., O'Connor, K., Béland, S. G., Potvin, O., ... Brassard, J. (2011). The impact of DSM-IV symptom and clinical significance criteria on the prevalence estimates of subthreshold and threshold anxiety in the older adult population. *American Journal of Geriatric Psychiatry*, 19(4), 316–326.
<https://doi.org/10.1097/JGP.0b013e3181ff416c>
- Gum, A. M., Areán, P. A., Hunkeler, E., Tang, L., Katon, W., Hitchcock, P., ... Unützer, J. (2006). Depression treatment preferences in older primary care patients. *Gerontologist*, 46(1), 14–22.
<https://doi.org/10.1093/geront/46.1.14>
- Hatcher, R. L., & Gillasp, J. A. (2006). Development and validation of a revised short version of the Working Alliance Inventory. *Psychotherapy Research*, 16(1), 12–25.
<https://doi.org/10.1080/10503300500352500>
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour research and therapy*, 44(1), 1-25.

- Hayes, S. (2018). Treatment Protocol and Manuals | Association for Contextual Behavioral Science.
https://doi.org/https://contextualscience.org/treatment_protocols#
- Huang, A. X., Delucchi, K., Dunn, L. B., & Nelson, J. C. (2015). A systematic review and meta-analysis of psychotherapy for late-life depression. *American Journal of Geriatric Psychiatry*, 23(3), 261–273. <https://doi.org/10.1016/j.jagp.2014.04.003>
- Jacobs, M. L., Luci, K., & Hagemann, L. (2018). Group-based Acceptance and Commitment Therapy (ACT) for Older Veterans: Findings from a Quality Improvement Project. *Clinical Gerontologist*, 41(5), 458–467. <https://doi.org/10.1080/07317115.2017.1391917>
- Karel, M. J., Gatz, M., & Smyer, M. A. (2012). Aging and mental health in the decade ahead: What psychologists need to know. *American Psychologist*, 67(3), 184–198.
<https://doi.org/10.1037/a0025393>
- Karlin, B. E., Walser, R. D., Yesavage, J., Zhang, A., Trockel, M., & Taylor, C. B. (2013). Effectiveness of acceptance and commitment therapy for depression: Comparison among older and younger veterans. *Aging and Mental Health*, 17(5), 555–563.
<https://doi.org/10.1080/13607863.2013.789002>
- Karlin, B. E., & Zhang, A. (2013). Effectiveness of acceptance and commitment therapy for depression: Comparison among older and younger veterans. *Article in Aging and Mental Health*. <https://doi.org/10.1080/13607863.2013.789002>
- Kishita, N., & Laidlaw, K. (2017). Cognitive behaviour therapy for generalized anxiety disorder: Is CBT equally efficacious in adults of working age and older adults? *Clinical Psychology Review*, 52, 124–136. <https://doi.org/10.1016/j.cpr.2017.01.003>
- Kvaal, K., McDougall, F. A., Brayne, C., Matthews, F. E., & Dewey, M. E. (2008). Co-occurrence of anxiety and depressive disorders in a community sample of older people: Results from the MRC CFAS (Medical Research Council Cognitive Function and Ageing Study).

International Journal of Geriatric Psychiatry, 23(3), 229–237.

<https://doi.org/10.1002/gps.1867>

Landreville, P., Landry, J., Baillargeon, L., Guérette, A., & Matteau, E. (2001). Older adults' acceptance of psychological and pharmacological treatments for depression. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 56(5), P285-91.

<https://doi.org/10.1093/geronb/56.5.P285>

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., ... Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Journal of Clinical Epidemiology*, 62(10), e1-34. <https://doi.org/10.1016/j.jclinepi.2009.06.006>

Mchugh, M. L. (2012). Lessons in biostatistics Interrater reliability : the kappa statistic. *Biochemia Medica*, 22(3), 276–282.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., ... Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement (Chinese edition). *Journal of Chinese Integrative Medicine*, 7(9), 889–896.

<https://doi.org/10.3736/jcim20090918>

Nazari, Z. (2017). Investigation of the Effect of Acceptance and Commitment Therapy on Chronic Pain in the Elderly, 10(1), 1–5. <https://doi.org/10.1016/j.jcmg.2016.05.015>

Office of National Statistics. (2018). Overview of the UK population - Office for National Statistics. Retrieved from

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/november2018>

Ong, C. W., Lee, E. B., & Twohig, M. P. (2018). A meta-analysis of dropout rates in acceptance and commitment therapy. *Behaviour Research and Therapy*, 104, 14–33.

<https://doi.org/10.1016/j.brat.2018.02.004>

- Orgeta, V., Qazi, A., Spector, A., & Orrell, M. (2015). Psychological treatments for depression and anxiety in dementia and mild cognitive impairment: Systematic review and meta-analysis. *The British Journal of Psychiatry*, 207(4), 293–298.
<https://doi.org/http://dx.doi.org/10.1192/bjp.bp.114.148130>
- Öst, L. G. (2008). Efficacy of the third wave of behavioral therapies: A systematic review and meta-analysis. *Behaviour Research and Therapy*, 46(3), 296–321.
<https://doi.org/10.1016/j.brat.2007.12.005>
- Öst, L. G. (2014). The efficacy of Acceptance and Commitment Therapy: An updated systematic review and meta-analysis. *Behaviour Research and Therapy*, 61, 105–121.
<https://doi.org/10.1016/j.brat.2014.07.018>
- Pachana, N. A., Laidlaw, K., Gillanders, D., & Laidlaw, K. (2014). ACT and CBT in Older Age. In *The Oxford Handbook of Clinical Geropsychology*. Oxford University Press.
<https://doi.org/10.1093/oxfordhb/9780199663170.013.035>
- Petkus, A. J., A, M., & Wetherell, J. L. (2013). Acceptance and Commitment Therapy with Older Adults: Rationale and Considerations. *Cognitive and Behavioral Practice*, 20(1), 47–56.
<https://doi.org/http://dx.doi.org/10.1016/j.cbpra.2011.07.004>
- Pettit, S., Qureshi, A., Lee, W., Byng, R., Gibson, A., Stirzaker, A., & Henley, W. (2017). Variation in referral and access to new psychological therapy services by age: An empirical quantitative study. *British Journal of General Practice*, 67(660), e453–e459.
<https://doi.org/10.3399/bjgp17X691361>
- Pinquart, M., & Sörensen, S. (2001). Influences on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology*, 23(4), 245–266.
https://doi.org/10.1207/S15324834BASP2304_2

- Ramos, K., Hastings, S. N., Bosworth, H. B., & Fulton, J. J. (2018). Life Program: Pilot Testing a Palliative Psychology Group Intervention. *Journal of Palliative Medicine*, 21(11), 1641–1645. <https://doi.org/10.1089/jpm.2017.0454>
- Reid, M. C., Eccleston, C., & Pillemer, K. (2015). Management of chronic pain in older adults. *BMJ (Online)*, 350, h532. <https://doi.org/10.1136/bmj.h532>
- Roberts, S. L., & Sedley, B. (2016). Acceptance and Commitment Therapy with older adults: Rationale and case study of an 89-year-old with depression and generalized anxiety disorder. *Clinical Case Studies*, 15(1), 53–67. <https://doi.org/http://dx.doi.org/10.1177/1534650115589754>
- Saad , K., & Bangash, A. (2016). Ageless mental health services and the future of old age psychiatry in the UK. *J Geri Care Res*, 3(1), 21-3.
- Scheibe, S., & Carstensen, L. L. (2010). Emotional aging: Recent findings and future trends. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 65 B(2), 135–144. <https://doi.org/10.1093/geronb/gbp132>
- Serfaty, M. A., Haworth, D., Blanchard, M., Buszewicz, M., Murad, S., & King, M. (2009). Clinical effectiveness of individual cognitive behavioral therapy for depressed older people in primary care: A randomized controlled trial. *Archives of General Psychiatry*, 66(12), 1332–1340. <https://doi.org/10.1001/archgenpsychiatry.2009.165>
- Stanley, M. A., Wilson, N. L., Novy, D. M., Rhoades, H. M., Wagener, P. D., Greisinger, A. J., ... Kunik, M. E. (2009). Cognitive behavior therapy for generalized anxiety disorder among older adults in primary care a randomized clinical trial. *JAMA - Journal of the American Medical Association*, 301(14), 1460–1467. <https://doi.org/10.1001/jama.2009.458>
- Troeung, L., Egan, S. J., & Gasson, N. (2014). A waitlist-controlled trial of group cognitive behavioural therapy for depression and anxiety in Parkinson's disease. *BMC Psychiatry*, 14(1), 19. <https://doi.org/10.1186/1471-244X-14-19>

- Wetherell, J. L., Afari, N., Ayers, C. R., Stoddard, J. A., Ruberg, J., Sorrell, J. T., ... Patterson, T. L. (2011). Acceptance and Commitment Therapy for generalized anxiety disorder in older adults: a preliminary report. *Behavior Therapy*, 42(1), 127–134.
<https://doi.org/10.1016/j.beth.2010.07.002>
- Wetherell, J. L., Petkus, A. J., Alonso-Fernandez, M., Bower, E. S., Steiner, A. R. W., & Afari, N. (2016). Age moderates response to acceptance and commitment therapy vs. cognitive behavioral therapy for chronic pain. *International Journal of Geriatric Psychiatry*, 31(3), 302–308. <https://doi.org/10.1002/gps.4330>
- Wolitzky-Taylor, K. B., Castriotta, N., Lenze, E. J., Stanley, M. A., & Craske, M. G. (2010). Anxiety disorders in older adults: a comprehensive review. *Depression and Anxiety*, 27(2), 190–211.
<https://doi.org/10.1002/da.20653>
- Wong, P. T. (1989). Personal meaning and successful aging. *Canadian Psychology/Psychologie Canadienne*, 30(3), 516.

Chapter 2 – Empirical Paper

Journal Guidelines

Journal of the International Neuropsychological Society

The empirical paper that follows has been written in accordance with the guidelines and specifications set out by the journal of the International Neuropsychological Society. These have been taken from the journal's webpage and presented verbatim ("Instructions for contributors", 2019).

Instructions for contributors

Aims and Scope

The *Journal of the International Neuropsychological Society* is the official journal of the International Neuropsychological Society, an organization of over 4,500 international members from a variety of disciplines. The *Journal of the International Neuropsychological Society* welcomes original, creative, high quality research papers covering all areas of neuropsychology. The focus of articles may be primarily experimental, applied, or clinical. Contributions will broadly reflect the interest of all areas of neuropsychology, including but not limited to: development of cognitive processes, brain-behavior relationships, adult and pediatric neuropsychology, neurobehavioral syndromes (such as aphasia or apraxia), and the interfaces of neuropsychology with related areas such as behavioral neurology, neuropsychiatry, genetics, and cognitive neuroscience. Papers that utilize behavioral, neuroimaging, and electrophysiological measures are appropriate.

To assure maximum flexibility and to promote diverse mechanisms of scholarly communication, the following formats are available in addition to a *Regular Research Article*: *Brief Communication* is a shorter research article; *Rapid Communication* is intended for "fast breaking" new work that does not yet justify a full length article and is placed on a fast review track; *Case Report* is a theoretically important and unique case study; *Critical Review* and *Short Review* are thoughtful considerations of topics of importance to neuropsychology and include meta-analyses; *Dialogue* provides a forum for publishing two distinct positions on controversial issues in a point-counterpoint format; *Special Issue* and *Special Section* consist of several articles linked thematically; *Letter to the Editor* responds to recent articles published in the *Journal of the International Neuropsychological Society*; and *Book Review*, which is considered but is no longer solicited.

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Title Page

The Predictive Utility of Intraindividual Variance of Performance on the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) in Outcomes for those with Amnesic Mild Cognitive Impairment (aMCI)

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MESH TERMS: Neuropsychological tests, language, cognitive dysfunction, prognosis.

Abstract

Objective: The purpose of this study was to identify the prognostic utility, if any, of cognitive Intra-Individual Variance (IIV), as measured by the Repeatable Battery of the Assessment of Neuropsychological Status (RBANS), in an amnesic Mild Cognitive Impairment (aMCI) population.

Method: Initial neuropsychological assessment data collected in routine clinical practice between 2010 and 2017 was sought from two memory clinic sites in North Wales. Patients ($N=87$) with aMCI met inclusion criteria and their initial assessment data were anonymised for the purpose of this research. A Cox proportional hazard regression model was utilised to identify any relationship between IIV across RBANS scores and risk of conversion to a dementia syndrome.

Results: Average performance across RBANS domains indicated a more impaired cognitive profile than that of comparable studies. A significant relationship was found in IIV between participants language index score and total index score ($HR=1.051_{95\%CI=1.018-1.085}$, $p=.002$). Post-hoc analyses identified a stronger relationship in the IIV between language index scores and immediate memory index scores ($HR=1.046_{95\%CI=1.022-1.070}$, $p<.001$). In both cases, strengths in support of language scores indicated greater risk of conversion.

Conclusion: The RBANS may have potential to aid prognostic predictions in those with aMCI. The language domain may have potential in the prognostic utility of IIV, as one of the more consistent scores across aMCI populations. Further replication of these findings is necessary before influencing decisions made in clinical practice.

Introduction

Mild Cognitive Impairment (MCI) is a state widely understood to fall between normal cognitive health and dementia (Grundman et al., 2004) and is not considered to be a part of normal ageing. It is divided into two main subtypes: amnesic MCI (aMCI) and non-amnesic MCI (naMCI). It may be further categorised into single-domain (SD-MCI) or multiple-domain (MD-MCI) types, depending on the number of cognitive areas affected (Artero, Petersen, Touchon, & Ritchie, 2006). Outcomes in MCI populations include progression to a dementia syndrome, static impairment, and, in some cases, recovery. These outcomes vary widely between different MCI subtypes (Nordlund et al., 2010), with patient assessment and treatment pathways depending on accurate identification (Csukly et al., 2016).

Research to date has highlighted the potential prognostic value of neuropsychiatric factors, biomarkers, and neuropsychological assessment in MCI populations. Much of this research has explored such factors in broad and heterogeneous samples; however, it is now recognised that exploring prognostic indicators in MCI is most effective when distinguishing between MCI sub-types using high quality assessment interviews and neuropsychological tests. This type of differentiation is necessary to progress our understanding of MCI *and* subtype-specific prognosis.

Prevalence of aMCI, and prognostic outcomes

The Petersen (2004) criteria state that, at the time of identification, the patient with aMCI should have: (1) memory complaint usually corroborated by an informant, (2) objective memory impairment for age, (3) essentially preserved general cognitive function, (4) largely intact functional activities, and (5) should not have dementia. The use of neuropsychological assessment in the reliable and valid identification of MCI is, therefore, essential (Diniz et al., 2008; Jak et al., 2016; Petersen et al., 2018); any cognitive deficits identified must be *objectively* determined rather than merely subjectively perceived by clinicians. Although aMCI

is often regarded as a pre-clinical stage of Alzheimer's disease (AD), it has been observed that a high number of individuals remain mildly impaired or improve over time (Allegri, Glaser, Taragano, & Buschke, 2008). A review by Ward et. al (2012) reported prevalence of aMCI in older adult populations as low as 0.5% (Jungwirth, Weissgram, Zehetmayer, Tragl, & Fischer, 2005) and as high as 38.4% (Koivisto et al., 1995). A meta-analysis of 41 cohort studies by Mitchell & Shiri-Feshki (2009) reported a conversion rate of 39.2% from MCI to dementia (33.6% AD), with an annual conversion rate of 9.6%. In 36 of the studies included in this review, fewer than 50% of those with a diagnosis of MCI converted to dementia over periods of three to ten years. Conversion rates in aMCI populations have been reported as considerably higher; Mauri, Sinforiani, Zucchella, Cuzzoni, and Bono (2012) observed that 68.8% of their aMCI population ($N=208$) converted to dementia within six years, with an annual conversion rate of 11.5%. The increased risk of conversion in those with aMCI places greater importance on the prediction of course.

The value of prognostic predictions

Being able to make evidence-informed predictions about aMCI outcomes is likely to have considerable clinical benefit; decisions such as frequency of follow-up, depth and direction of assessment, and post-diagnostic counselling can become more person-centred. Without indication of outcomes, those with static presentations could receive unnecessary follow-up assessments that require additional time and resources and could cause anxiety for the individual; those going on to develop dementia may miss out on benefits associated with earlier diagnosis. Early identification of dementia syndromes has the potential to improve accuracy and delivery of treatment (NHS, 2017), it can provide more time for adjustment and is believed to delay the time in which people will need continuous care, allowing them to live independently for longer (Littlewood, Seymour, & Owen, 2010). Further to this, AD is typically treated with medication designed to temporarily halt or slow progressive deterioration

(Robinson, Tang, & Taylor, 2015). At present, no single medication is considered effective for management or improvement of symptoms for those with aMCI. Identifying the likelihood and time in which people may convert to AD may have significant benefits including adaptation, health promotion, and planning for the future.

Predictors of prognostic outcomes

Conversion in MCI populations has been correlated with a number of neuropsychiatric risk factors including anxiety (Gallagher et al., 2011; Mah, Binns, & Steffens, 2015), apathy (Palmer et al., 2010) and depression (Modrego & Ferrández, 2004; Teng, Lu, & Cummings, 2007). Conflicting findings have, however, reduced the confidence with which such factors can be relied upon in clinical settings (De Roeck et al., 2016; Devier et al., 2009). The use of biomarkers has highlighted differences between those who convert to a dementia syndrome and those who do not in core cerebral spinal fluid markers (Olsson et al., 2016), imaging (Ota, Oishi, Ito, & Fukuyama, 2016; Xu et al., 2016), and global grading (Tong et al., 2017). However, biomarker resources may not be readily available and often come with additional costs associated with time, finance, discomfort/pain, and health-related risks. Further, some biomarkers have not demonstrated predictive utility to the same degree as neuropsychological assessment (Gomar et al., 2011).

Cognitive domains related to conversion

Cognitive measures suggest that delayed recall (Gainotti, Quaranta, Vita, & Marra, 2014; Schmid, Taylor, Foldi, Berres, & Monsch, 2013), semantic verbal fluency (Gallucci et al., 2018), executive functioning (Clark et al., 2012; Fleisher et al., 2007; Tabert et al., 2006), and episodic memory (Fleisher et al., 2007; Marra et al., 2015) have predictive utility in identifying those who may convert to a dementia syndrome. Belleville et al. (2017) performed a systematic review and meta-analysis of 21 studies employing over 61 cognitive tests to measure the predictive utility of different domains in MCI outcomes. High sensitivity and

specificity scores indicated that poor performance on verbal memory measures acted as the strongest predictor of conversion, with lower language performance (e.g. picture naming and semantic fluency) more predictive of conversion in varying prodromal stages; semantic fluency was found to have stronger sensitivity in ≥ 31 month follow-ups in comparison to 12–24 month follow-ups, whereas the opposite was true for picture naming, which demonstrated greater specificity in the short term. Other areas of cognition, such as executive functions, visuo-constructive functions and visual episodic memory, were considered to have statistically significant but weaker predictive ability. Ultimately, Belleville et al. (2017, p. 328) concluded that “cognitive tests are excellent at predicting MCI individuals who will progress to dementia and should be a critical component of any toolkit intended to identify AD at the pre-dementia stage”.

Naturalistic and patient-centred research

Much of the current literature that focuses on predictors of conversion from aMCI first clinically identifies people as having aMCI and then undertakes further testing, examination, or assessment. While the investigation of aetiology and likely outcome is undeniably worthwhile, this approach requires further input from patients, can be invasive, and places additional demands on resources. In comparison, research using routinely collected assessment data from clinical practice at the point of MCI identification has several advantages: although follow-up may provide greater power to predictions, existing information can provide insight at no additional physical, emotional, or financial expense. The same cognitive scores used to diagnose aMCI may have additional utility in forecasting the course of their impairment, given that biological and neuropsychological changes associated with AD have been identified upwards of five years prior to diagnosis (Buchhave et al., 2012; Tondelli et al., 2012), in some cases 18 years prior (Rajan, Wilson, Weuve, Barnes, & Evans, 2015).

In neuropsychological assessment, age-normed standardized cognitive tests are used to provide insight into people's ability across several cognitive domains. Different neuropsychological batteries have demonstrated efficacy in the identification of those with MCI among those with cognitively normal performance and those with dementia (Duff, Hobson, Beglinger, & O'Bryant, 2010; Schweiger, Doniger, Dwolatzky, Jaffe, & Simon, 2003; Seo et al., 2010). To date, the authors are not aware of one specific measure that has been found to outperform others in respect to predictions within aMCI populations.

The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Identification and assessment of aMCI

The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph et al., 1998) is a common neuropsychological battery in memory clinic settings. It is comprised of 12 subtests that, when combined, provide standardised age-normed performance across five cognitive domains: memory (immediate and delayed), visuospatial/constructional abilities, attention, and language. The RBANS has been recognised as a valid measure in the identification of cognitive impairment in neurocognitive disorders (Duff et al., 2008; Randolph et al., 1998; Schmitt et al., 2010), and in MCI populations, when combined with similarly constructed neuropsychological tests (Heyanka, Scott, & Adams, 2015). Duff et al. (2010) have cautioned that the RBANS sensitivity for milder impairments is low when used in isolation and have recommended including additional clinical information in the identification of MCI.

Karantzoulis, Novitski, Gold, & Randolph (2013) credit the RBANS for its scope, brevity, accessibility and replicability in comparison with other measures of cognitive functioning. Their study of 81 aMCI patients and 81 matched healthy controls found differences in scores of up to two standard deviations (*SD*) in delayed memory between groups, with >95% specificity for both delayed memory and total scale scores and sensitivity of 55% and 32.1% respectively. They conclude by noting the utility of the RBANS total score

(indicating overall cognitive performance) and recommend the RBANS for future prognostic exploration.

Intra-Individual Variance (IIV)

Individual index scores on the RBANS capture domain-specific ability as a standalone measure, ostensibly independent of performance in other domains. Although in clinical practice these scores can be appraised individually, they are more commonly considered in relation to scores obtained in other domains. For example, an average range index score for the language domain could be considered acceptable when considered in isolation, yet if presenting alongside superior functioning across several other domains, could indicate a relative individual deficit. This may be described in terms of Intra-Individual Variance (IIV): a term that describes differences in an individual's behavioural or cognitive performance across one area at different time-points or different areas at one time-point. IIV can be calculated in numerous ways. One method, 'between-domain cognitive variability', examines IIV across two different areas of cognition (Fellows & Schmitter-Edgecombe, 2015). Another measure of IIV that could be conceptualised as 'overall IIV' is the difference between all cognitive areas at a given time point (Thaler, Hill, Duff, Mold, & Scott, 2015). Calculating scores of IIV in research attempts to capture in statistical analysis a process that commonly occurs in clinical practice.

Thaler, Hill, Duff, Mold, and Scott (2015) calculated coefficient of variation statistics as measures of overall IIV; an indication of participant's cognitive variance across *all* subtests at a single time point. They used RBANS data from 699 community-dwelling older adults with no identified cognitive impairment to explore the effects of IIV in clinical outcomes. Using methodology from Hill, Rohling, Boettcher, and Meyers (2013), IIV scores were calculated for each of participant, and were demonstrated to have a predictive relationship with self-reports of memory complaint and mortality within five to eight years. The authors provide information

relevant for replication in additional clinical samples; however, to our knowledge, no research relating to cognitive IIV has been undertaken within an aMCI population. Significant amounts of IIV will exist between memory and other domains by nature of aMCI cognitive profiles. For there to be an objective deficit in memory, other cognitive domains should be within ranges expected for the age, gender and education/occupation of the individual. The amount of variance will, however, differ between individuals and may have predictive utility in outcomes.

This paper seeks to define the prognostic utility of RBANS index scores, in assessing the likelihood of conversion to a dementia syndrome in those initially presenting with aMCI, by examining both between-domain variance and overall IIV. Further analyses will seek whether relationships, where present, remain statistically significant between those individuals whose presentation remains consistent with static aMCI or convert to Alzheimer's disease. Our primary objectives are to identify:

[1] Whether between-domain cognitive variability (in this case, individual domain-specific index scores compared to the total index score) has predictive utility in the risk of conversion from aMCI to a dementia syndrome.

[2] Whether overall IIV (IIV of scores across all domain-specific index scores) has predictive utility in the risk of conversion from aMCI to a dementia syndrome.

Methodology

Ethics

Ethical approval was given by Bangor University School of Psychology Ethics Committee and Wales Research Ethics Committee 5.

Sites

Two memory clinic sites serving the North West of Wales contributed data for this research. These sites serve a large geographical area and are comprised of a full multi-disciplinary team made up of clinical psychologists, healthcare support workers, nurses, occupational therapists and psychiatrists.

Procedure

A database was compiled and anonymised using historic and current clinical psychology files for patients who had received neuropsychological assessment. Cases were identified from a pre-existing electronic database of patient outcomes ($N = 84$) and psychology files in storage ($N = 613$). These were screened by the first author to ensure patients met strict inclusion criteria, namely:

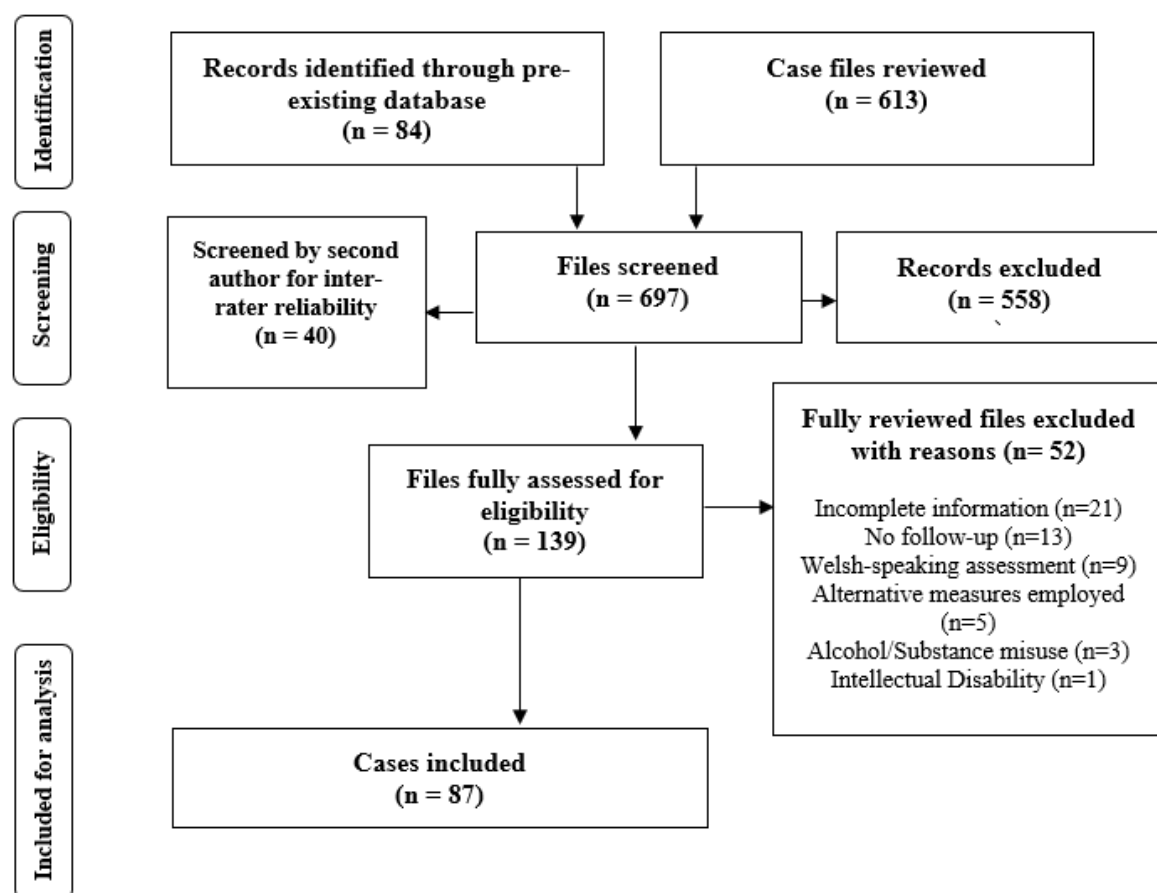
- (1) Petersen criteria (2004) of aMCI met between 2010 and 2017.
- (2) attended follow-up at least once after diagnosis,
- (3) no identified deficiency of vitamin B₁₂ and absence of acute physiological/neurological disorder.

Objective impairment was determined by differences greater than 1.5 standard deviations below the age-normed mean for memory (Brooks, Iverson, Holdnack, & Feldman, 2008). Where premorbid functioning, educational history and performance across cognitive domains indicated above-average ability, clinical judgement was used to determine whether cognitive variance between memory and other domains could be considered an objective impairment.

Diagnoses within the service were informed by a hypothesis-driven multi-disciplinary assessment and later established at a formulation-based diagnostics meeting. ICD-11 criteria were used for diagnosis of dementia, requiring evidence of objective impairment across two or more cognitive domains that significantly interfere with independence in activities of daily living. Differential diagnoses were determined by the MDT's formulation of relevant assessment information, including medical history, medical investigation, neuroimaging, neuropsychological assessment and informant reports, and comparing outcomes with relevant ICD-11 criteria.

Cases were excluded where RBANS were incomplete ($n=21$), patients did not attend for follow-up ($n=13$), neuropsychological assessment was conducted in Welsh ($n=9$; the measures have not yet been fully standardised in Welsh), where alternative psychometric measures were employed ($n=5$), where comorbid alcohol or substance misuse was present ($n=3$), and those with a diagnosed intellectual disability ($n=1$). Forty case files were then screened by the second author to assess inter-rater reliability, achieving a moderate level of agreement with $\kappa=.776$ (95% CI, .535 to 1.0), as suggested by Mchugh (2012). Where cases were not agreed upon ($n=3$), the decision of the primary author was assumed so as to maintain consistency through the remaining cases. Figure 1. Illustrates this process with a PRISMA-informed chart (Moher, Liberati, Tetzlaff, Altman, Altman, et al., 2009). Information regarding first/second language, ethnicity, level of education, smoking, and alcohol/substance misuse was often incomplete and, as such, was not included.

Figure 1. Data selection process



The sample

A total of 87 patients with aMCI were eligible for inclusion. Due to the naturalistic design of this study, data were collected at different time points: (1) when patients entered the memory service across the eight-year inclusion period, and (2) from any repeat assessments or re-referrals until they converted to dementia, dropped out, or were still open to the service at the study's conclusion. Data for each patient were captured over a mean of 28.62 months ($SD=18.09$), with the longest period of inclusion being 89 months.

Measures

The RBANS data used in this research were routinely collected in clinical practice. Neuropsychological assessments were administered and interpreted by a total of five clinical psychologists, and five trainee clinical psychologists under their supervision, over this period.

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)

The RBANS (Randolph et al., 1998) utilises 12 subtests to screen for age-normed strengths and weaknesses across immediate memory, visuospatial/construction, attention, language, delayed memory and a total index score. It has several alternate forms to control for practice effects and is favoured for its short administration time (approximately 25 minutes). Raw scores are transformed to provide an overall cognitive performance score, index scores for domains, and scaled scores or percentile groups for individual subtests. This provides broad and narrow information relevant to cognitive ability. The RBANS has demonstrated good levels of internal reliability and validity in the general older adult population (Gontkovsky, Beatty, & Mold, 2008) and cognitively impaired older adult populations (Humphreys, Dempsey, O'Bryant, & Sutker, 2006; Silva, Humphreys, Dempsey, O'Bryant, & Sutker, 2006), has good test-re-test and convergent validity (Dong et al., 2013), demonstrates similar levels

of strength when translated (Cheng et al., 2011; Tsatali, Fotiadou, Giaglis, & Tsolaki, 2018) and is recommended for use in this clinical population (Duff et al., 2008).

Data protection

Anonymisation included the removal of all direct and indirectly identifiable information. These data were only accessible to the authors of this paper and are stored and encrypted to standards set out by both data protection law and Betsi Cadwaladr University Health Board.

Between-domain variability

In an effort to replicate typical methods of clinical interpretation, where scores are rarely considered in isolation from one another and several between-score comparisons are typically made in the process of formulation, a between-domain variability score was formed. This was achieved by calculating the difference between each domain-specific index score and total index score. Index scores alone provide comparison of individual performance with others of a similar age, whereas this calculation allows us to compare performance in each domain across the individual's collective performance.

Overall Intraindividual Variance (IIV) scores

‘Overall IIV’ scores were calculated using methodology outlined by Thaler et al. (2015). When compared with other measures of IIV, the coefficient of variation has demonstrated strengths in calculations of effect-size (Tractenberg & Pietrzak, 2011), and provides IIV across all domains in a single score. The formula of this calculation is provided:

$$\text{CoV} = \frac{\sqrt{\frac{\sum (x_i - \bar{x})^2}{N}}}{\bar{x}}$$

Data analyses

A Cox proportional hazard regression model was used to estimate the effect of the variables of interest (e.g. variation in and between scores) on the time to event (i.e. diagnosis). This method was selected due to the continuous nature of most variables involved and because it permits the inclusion of data from censored (incomplete) cases. Censorship is unique to time-to-event (‘survival’) models and allows incomplete data to contribute to overall analysis; that is, where participants have been free of an event for a period of time but did not complete the study or where the study has ended prior to the event of interest occurring. The time that the participant was included in the study is captured and used comparatively, with only data acquired prior to censorship included in the analysis. As the complicated nature of this analysis has previously led to inappropriate reporting, advice from Singh and Mukhopadhyay (2011) and Zhu et al. (2017) was followed to improve validity.

Due to inconsistency of findings in the literature between multiple proportional hazard methods (Hiller, Marshall, & Dunn, 2015) used to test the assumptions of Cox regression, two were selected to establish congruence for each variable: a time-dependent Cox model demonstrated the hazard ratio’s independence of time and a further log(-log(survival)) vs

log(time) graph corroborated this, meeting the assumptions for the desired analysis across all variables.

Overall, 32.18% of cases were censored in analysis; 17.2% due to static presentation at the study endpoint (April 2019), 12.6% due to death, and 2.2% due to moving out of area. Patients who died over the timespan covered by this research were censored at the date of their last contact with the clinic. This approach meant that censoring could be considered non-informative. This, combined with only two patients being lost at follow-up, addressed assumption concerns for survival analysis raised by Ranganathan & Pramesh (2012).

A series of Cox regression analyses were then conducted independently to establish the predictive validity of all five between-domain variability scores and the overall IIV scores, controlling for age and gender in each. Bonferroni corrections for multiple statistical analyses ($n=6$) yielded a corrected alpha criterion of .0083. As Bonferroni corrections have received criticism for the risk of under-powering smaller studies, increasing the risk of type-II error (Nakagawa, 2004; Perneger, 1998), both typical and corrected alpha levels are reported.

Results

Descriptive Statistics

At the time of aMCI identification, performance on the RBANS revealed an average immediate memory score of 73.94 ($SD=13.02$), delayed memory score of 62.89 ($SD=14.22$) and RBANS Total Index score of 80.05 ($SD=9.07$). Other cognitive domains averaged within mean range. In total, 11 individuals (12.6%) with a diagnosis of static MCI died before the end of the study and were censored from the data at their last visit to clinic. Overall, 67.8% of the sample received a diagnosis of dementia: 36.7% Alzheimer's disease, 13.7% Mixed dementia, 12.6% Vascular dementia, and 4.5% unspecified type. The average time to conversion was 31.19 months, at an average age of 81.06 years. From the remaining patients, 29.8% had a static aMCI profile and 2.2% had reverted to cognitively normal by the end of the study (see table 1).

Table 1. Demographics (N=87)

	<i>M(SD)</i>
Age, years	
At MCI diagnosis	77.61(7.79)
At Final Diagnosis	79.97(7.72)
At Death (censored only) (N=11)	86.00(4.92)
RBANS Scores	
Total	80.05(9.07)
Immediate Memory	73.94(13.02)
Visuospatial	102.02(14.08)
Language	93.12(9.71)
Attention	92.29(15.17)
Delayed Memory	62.89(14.22)
Clinical Outcomes	
Cognitively Normal	2.2%
Mild Cognitive Impairment	29.8%
aMCI	29.8%
Dementia	67.8%
Alzheimer's disease	36.7%
Mixed Dementia	13.7%
Vascular dementia	12.6%
Not specified	4.5%
Age at conversion	81.06(6.61)
Months to conversion	31.19(19.64)

Gender differences

A series of independent *t*-tests and their non-parametric equivalents were undertaken to identify any gender differences in index scores, between-domain variability, and overall IIV scores. A statistically significant difference was found in visuospatial-constructional index scores, where males had a higher average of 106.85 (*SD*=14.46) compared to the female average of 97.19 (*SD*=12.49), $p = .007$. Further, average Language index performance was stronger among females 95.30 (*SD*=11.03) than males 90.57 (*SD*=7.23), $p = .036$. No further significant differences in respect to gender were identified in the data.

Analysis

Between-domain variability

The survival analysis for between-domain variability of language scores indicated higher rates of conversion where language scores were higher than total index scores ($HR=1.051_{95\%CI=1.018-1.085}$, $p=.002$); this suggests that patients with relative strength in language scores in comparison to total index scores were at greater risk of conversion. No further significant relationships were found in respect to between-domain variability and risk of conversion (see table 2.).

Overall IIV

Coefficient of variation scores (as a measure of overall IIV) were transformed into *z*-scores and reached statistical significance in predicting the risk of conversion to dementia $X^2=9.214$ (3, $N=87$), $p=.027$, with a hazard ratio of ($HR=1.53_{95\%CI=1.108-2.112}$, $p=.010$). However, this was not significant when alpha values were adjusted for multivariate comparisons: see table 2.

Table 2. Relationships between HIV and risk of conversion to dementia

	N	Wald	df	Sig.	Exp(B)	95.0% CI for	
						Lower	Upper
Between-Domain Variability							
Immediate memory vs. overall Performance	87	5.217	1	.022*	.965	.935	0.995
<i>Gender</i>		0.120	1	.729	1.109	0.618	1.988
<i>Age</i>		3.836	1	.05*	1.039	1	1.079
Visuspatial/Constructional vs. overall performance	87	0.019	1	.89	.998	.971	1.025
<i>Gender</i>		0.270	1	.603	.858	.483	1.527
<i>Age</i>		1.863	1	.172	1.027	.988	1.067
Language vs. overall performance	87	9.356	1	.002**	1.051	1.018	1.085
<i>Gender</i>		1.501	1	.22	.704	.401	1.234
<i>Age</i>		0.699	1	.403	1.017	.978	1.057
Attention vs. overall performance	87	1.009	1	.315	1.013	.988	1.038
<i>Gender</i>		0.162	1	.688	.896	.523	1.533
<i>Age</i>		2.174	1	.14	1.029	.99	1.07
Delayed Memory vs. overall performance	87	0.261	1	.609	.995	.975	1.015
<i>Gender</i>		0.220	1	.639	.879	.513	1.506
<i>Age</i>		1.799	1	.18	1.027	.988	1.067
Coefficient of Variance							
Overall intra-individual variance	87	6.683	1	.010*	1.53	1.108	1.074
<i>Gender</i>		0.031	1	0.86	1.051	.604	1.829
<i>Age</i>		2.17	1	0.14	1.031	0.989	1.073

* $P < .05$ - Statistically significant before controlling for multivariate comparisons

** $P < .0083$ - Statistically significant after controlling for multivariate comparisons

Post-hoc analyses

Domain Differences

The RBANS total index score is an aggregation of all index scores and, as such, a significant difference between this score and the language index score may suggest a stronger relationship exists between language and one or more of the remaining index scores. We therefore conducted post-hoc analyses examining dispersion between language and all other index scores. Bonferroni corrections for all ten possible between-domain comparisons, adjusted alpha levels were set at $p=.005$. Differences between language index scores and immediate memory scores yielded the most risk where differences were in favour of language $X^2=17.365$ (3, $N=87$), $p<.001$, with a significant hazard ratio (HR=1.046_{95%CI=1.022-1.070}, $p<.001$). This implies that stronger performance in language, when compared to immediate memory, indicates greater risk of conversion. Dispersion between language and visuospatial ability was significant at $p=.0316$; however, it did not reach significance after controlling for multivariate comparisons.

Alzheimer's Disease (AD) specific relationships

AD is identified as the most likely outcome for aMCI populations (Mauri et al., 2012): a finding replicated in this sample. Having identified that between-domain variability of language and overall IIV increased risk of conversion, we sought to identify any specific relationship with AD. These analyses excluded those in the sample that were diagnosed with any other form of dementia, leaving a sample of $n=57$ (65.5% of the original sample). Between-domain variability of language remained a statistically significant risk with a hazard ratio (HR=1.06_{95%CI=1.013-1.110}, $p=0.012$). This was also the case for differences between immediate memory and language (HR=1.043_{95%CI=1.008-1.080}, $p=.016$). The coefficient of

variation did not have a statistically significant relationship with risk of conversion in this smaller sample.

Discussion

Findings

Using pre-existing routinely collected clinical data from local memory services, we employed survival analyses to determine the prognostic utility of RBANS dispersion/variance scores in the outcomes of 87 patients with aMCI. On average, our sample had lower scores across RBANS domains when compared to studies with analogous clinical populations (England, Gillis, & Hampstead, 2014; Fyock & Hampstead, 2015; Hampstead, Khoshnoodi, Yan, Deshpande, & Sathian, 2016; Heyanka et al., 2015; Karantzoulis et al., 2013), and interpretation should be considered within this context (see table 3.).

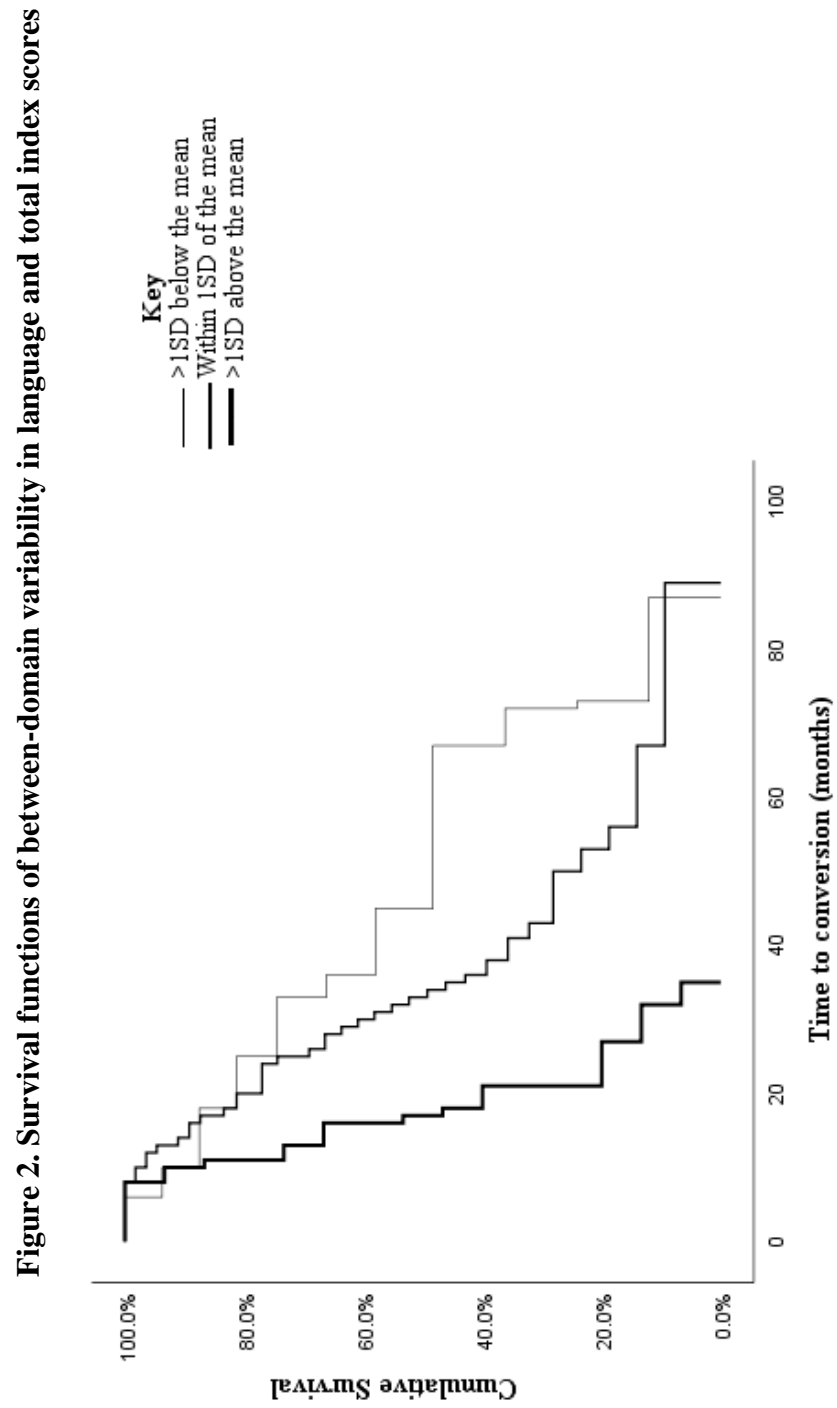
Table 3. RBANS scores across different aMCI populations

	Present study	Hampstead et al., 2016	Fyock & Hampstead, 2015	Heyanka et al., 2015	England et al., 2014	Karantzoulis et al., 2013
N	87	18	58	57	57	81
<i>Immediate Memory</i>	73.92 (13.02)	87.1 (13.2)	87.48 (14.55)	-	85.35 (13.87)	83.0 (14.1)
<i>Visuospatial/constructional</i>	102.02 (14.08)	94.9 (16.8)	95.60 (16.74)	-	94.04 (16.62)	87.8 (17.7)
<i>Language</i>	93.12 (9.71)	92.2 (7.1)	92.72 (15.02)	-	93.16 (9.57)	89.7 (11.6)
<i>Attention</i>	92.29 (15.17)	105.9 (11.8)	96.48 (14.58)	-	99.00 (14.40)	96.4 (14.6)
<i>Delayed memory</i>	62.89 (14.22)	74.9 (15.1)	80.09 (8.96)	-	76.75(16.68)	73.4 (16.5)
<i>Total Scale</i>	80.05 (9.07)	87.8 (10.4)	87.52 (11.78)	77.93	-	81.8 (11.1)

Our analyses suggest that where performance in the RBANS language domain exceeded that of one's total index score, individuals were at greater risk of conversion to dementia. Of those with the largest between-domain variability with higher scores in language, a greater than 75% absolute risk of converting to a dementia profile in less than two years was found. Of those with moderate between-domain variability and those with larger between-domain variability with higher total index scores, <25% converted within two years.

Figure 2. presents survival function curves for distribution of variance, with data separated into three groups: 1) IIV favouring overall performance, 2) IIV within one SD of distribution, and 3) IIV favouring language. Those in our sample with elevated language performance in relation to total index scores were at higher risk of converting to dementia. Similar findings when comparing only those that remained static or improved and those converting to AD did not reach statistical significance after multivariate comparisons. This suggests that, while not part of our original investigation, there may be utility in exploring various RBANS intraindividual variance profiles to see if risk relationships change between different dementia types for those with aMCI. The coefficient of variation did not have a significant effect when controlling for multiple comparisons.

Figure 2. Survival function of HIV between language scores and total index scores

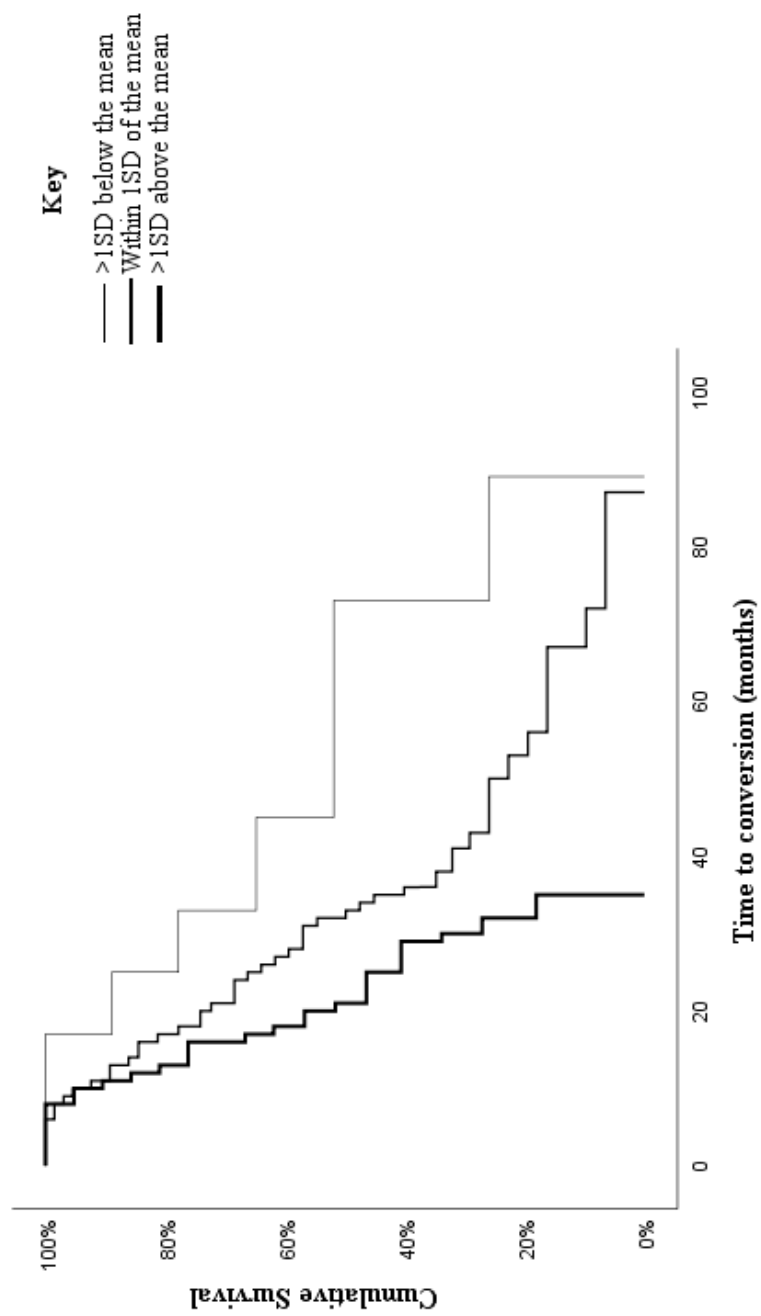


Findings continued.

The language domain is made up of a semantic fluency task and a picture naming task. Post-hoc analyses were unable to find an independent relationship between the dispersion of the semantic fluency or picture naming subtest with conversion, suggesting that they only provide predictive value when combined under the language domain. While semantic fluency is found to be more impaired in those with MD-MCI and AD, it has been found to be somewhat preserved in aMCI populations (Brandt & Manning, 2009; Eastman et al., 2013; Weakley, Schmitter-Edgecombe, & Anderson, 2013). Similar results have been found for picture naming (Picavet & Wanda Wendel-Vos, 2011; Willers, Feldman, & Allegri, 2016). Further, comparisons of language across different aMCI populations (table 3.) demonstrate more consistency than other cognitive domains, as reflected in the smaller standard deviation. In this respect, the RBANS language profile may provide a consistent score for the aMCI population, from which immediate memory, the most impacted, can be compared. A decline in immediate memory in the early stages of aMCI could be responsible for predictivity found in higher between-domain variability of language scores. Our post-hoc analysis found a statistically significant relationship for language and memory differences with clinical outcomes, which seems to support this hypothesis (see figure 3.).

Figure 3. Survival functions of between-domain variability in immediate memory and language

Figure 3. Survival functions of between-domain variability in immediate memory and language



It is possible that those with aMCI follow similar patterns in cognitive deterioration and we have captured an early profile, not typically presented in other research. Where studies have found predictive utility in semantic fluency for people with aMCI (Murphy, Rich, & Troyer, 2006; Nutter-Upham et al., 2008), the length of time participants have met aMCI criteria for is often unclear. Evidence suggests the prognostic value of this may be more evident in later stages of prodromal AD. In this respect, our findings may be less generalisable to those who are in later stages of aMCI, where decline in semantic fluency could potentially reduce the amount of between-domain variance in language. This was a variable that we were unable to control in this study. Nonetheless, it is of great interest that our findings suggest a relationship between IIV and risk of conversion to dementia in those with aMCI. It is certainly a finding that warrants further investigation.

Future research

This study has underlined the importance of research that utilises clinical data, demonstrating how existing datasets can be used to make a valuable contribution to our understanding of aMCI; in this case, revealing interesting insights into the predictive utility of IIV in aMCI outcomes. It is essential that future research into any MCI population continues to carefully describe and differentiate the populations that they are investigating and the diagnostic criteria used to do so (Petersen et al., 2014). Within these studies, new variables may be considered: for example, although the RBANS provides a comprehensive measure of cognitive function across multiple domains, it does not include a measure of executive functioning: future research could usefully examine the predictive utility of IIV for aMCI outcomes in this domain. Providing estimates of the length of time patients have met diagnostic criteria would also be useful in future research; early and late stages may be recorded by self or family-reported onset. Exploring risks of conversion at different stages in the MCI journey would be of great interest.

Limitations & Strengths

This paper has acknowledged limitations that should be taken into consideration. While the diagnostic procedures of the memory clinics involved in this research were relatively robust and included assessment from various professions and medical investigations, differences between consultants and MDT formulations may have led to differing interpretations of diagnostic criteria. Further, the record-keeping available to this research may not have captured nuanced team discussions to establish how differential diagnoses were derived. Caution should therefore be exercised where interpretation of differential diagnoses is concerned.

For the identification of aMCI, the balancing of cognitive variance in individuals with greater occupational, educational and cognitive ability inhibits the standardisation of criteria. While this ensures that patients with greater levels of cognitive ability are included in our sample, it highlights concern regarding the generalisability of our findings with similar research.

The RBANS does not include measures of executive functioning and, while the sample size was respectable for the specific clinical population we examined, it was smaller than other studies employing similar analyses. We recognise that generalisability should not be assumed without replication in a larger sample. Exclusion from the study was necessary where patients did not receive follow-up and therefore did not receive an updated diagnosis. It is reasonable to assume patients are more likely to request follow-up appointments where they are concerned deterioration has taken place and it is therefore possible that a number of those who remained static in their aMCI were censored too early in the data. Finally, we were unable to control for what stage patients presented to memory clinic; with estimates of onset often relatively vague (24–48 months previously). Such variables are difficult to control in naturalistic studies that rely on data captured in busy clinics.

It is important to note, however, that findings within this paper are the product of a robust inclusion/exclusion procedure, targeted at improving homogeneity of an aMCI sample.

Our sample size exceeded that of comparable explorations of RBANS performance in aMCI groups and provided indication of cognitive areas of importance for wider consideration in the identification of those at higher risk of converting to dementia from aMCI.

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References

- Allegri, R. F., Glaser, F. B., Taragano, F. E., & Buschke, H. (2008). Mild cognitive impairment: Believe it or not? *International Review of Psychiatry*, 20(4), 357–363.
<https://doi.org/10.1080/09540260802095099>
- Alonso-Fernández, M., López-López, A., Losada, A., González, J. L., & Wetherell, J. L. (2015). Acceptance and Commitment Therapy and Selective Optimization with Compensation for Institutionalized Older People with Chronic Pain. *Pain Medicine*.
<https://doi.org/10.1111/pme.12885>
- Artero, S., Petersen, R., Touchon, J., & Ritchie, K. (2006). Revised criteria for mild cognitive impairment: Validation within a longitudinal population study. *Dementia and Geriatric Cognitive Disorders*, 22(5–6), 465–470. <https://doi.org/10.1159/000096287>
- Belleville, S., Fouquet, C., Hudon, C., Zomahoun, H. T. V., & Croteau, J. (2017). Neuropsychological Measures that Predict Progression from Mild Cognitive Impairment to Alzheimer's type dementia in Older Adults: a Systematic Review and Meta-Analysis. *Neuropsychology Review*, 27(4), 328–353. <https://doi.org/10.1007/s11065-017-9361-5>
- Brandt, J., & Manning, K. J. (2009). Patterns of word-list generation in mild cognitive impairment and alzheimer's disease. *Clinical Neuropsychologist*, 23(5), 870–879.
<https://doi.org/10.1080/13854040802585063>
- Brooks, B. L., Iverson, G. L., Holdnack, J. A., & Feldman, H. H. (2008). Potential for misclassification of mild cognitive impairment: A study of memory scores on the Wechsler Memory Scale-III in healthy older adults. *Journal of the International Neuropsychological Society*, 14(3), 463–478.
- Buchhave, P., Minthon, L., Zetterberg, H., Wallin, Å. K., Blennow, K., & Hansson, O. (2012). Cerebrospinal fluid levels of β -amyloid 1-42, but not of tau, are fully changed already 5 to 10

years before the onset of Alzheimer dementia. *Archives of General Psychiatry*, 69(1), 98–106. <https://doi.org/10.1001/archgenpsychiatry.2011.155>

Cheng, Y., Wu, W., Wang, J., Feng, W., Wu, X., & Li, C. (2011). Reliability and validity of the repeatable battery for the assessment of neuropsychological status in community-dwelling elderly. *Archives of Medical Science*, 7(5), 850–857.
<https://doi.org/10.5114/aoms.2011.25561>

Clark, L. R., Schiehser, D. M., Weissberger, G. H., Salmon, D. P., Delis, D. C., & Bondi, M. W. (2012). Specific measures of executive function predict cognitive decline in older adults. *Journal of the International Neuropsychological Society*, 18(1), 118–127.
<https://doi.org/10.1017/S1355617711001524>

Csukly, G., Sirály, E., Fodor, Z., Horváth, A., Salacz, P., Hidasi, Z., ... Szabó, Á. (2016). The differentiation of amnesic type MCI from the non-amnesic types by structural MRI. *Frontiers in Aging Neuroscience*, 8(MAR), 52. <https://doi.org/10.3389/fnagi.2016.00052>

De Roeck, E., Ponjaert-Kristoffersen, I., Bosmans, M., De Deyn, P. P., Engelborghs, S., & Dierckx, E. (2016). Are depressive symptoms in mild cognitive impairment predictive of conversion to dementia? *International Psychogeriatrics*, 28(6), 921–928.
<https://doi.org/10.1017/S1041610215002409>

Devier, D. J., Pelton, G. H., Tabert, M. H., Liu, X., Cuasay, K., Eisenstadt, R., ... Devanand, D. P. (2009). The impact of anxiety on conversion from mild cognitive impairment to Alzheimer's disease. *International Journal of Geriatric Psychiatry*, 24(12), 1335–1342.
<https://doi.org/10.1002/gps.2263>

Diniz, B. S. D. O., Nunes, P. V., Yassuda, M. S., Pereira, F. S., Flaks, M. K., Viola, L. F., ... Forlenza, O. V. (2008). Mild cognitive impairment: Cognitive screening or neuropsychological assessment? *Revista Brasileira de Psiquiatria* (Vol. 30).
<https://doi.org/10.1590/S1516-44462008000400003>

- Dong, Y., Thompson, C. L., Huey Joanne Tan, S., Ben Swie Lim, L., Pang, W., & Li-Hsian Chen, C. (2013). Test-Retest Reliability, Convergent Validity and Practice Effects of the RBANS in a Memory Clinic Setting: A Pilot Study. *Open Journal of Medical Psychology*, 02(04), 11–16. <https://doi.org/10.4236/ojmp.2013.24b003>
- Duff, K., Hobson, V. L., Beglinger, L. J., & O’Bryant, S. E. (2010). Diagnostic accuracy of the RBANS in mild cognitive impairment: Limitations on assessing milder impairments. *Archives of Clinical Neuropsychology*, 25(5), 429–441. <https://doi.org/10.1093/arclin/acq045>
- Duff, K., Humphreys Clark, J. D., O’Bryant, S. E., Mold, J. W., Schiffer, R. B., & Sutker, P. B. (2008). Utility of the RBANS in detecting cognitive impairment associated with Alzheimer’s disease: Sensitivity, specificity, and positive and negative predictive powers. *Archives of Clinical Neuropsychology*, 23(5), 603–612. <https://doi.org/10.1016/j.acn.2008.06.004>
- Eastman, J., Hwang, K., Lazaris, A., Chow, N., Ramirez, L., Babakchanian, S., ... Apostolova, L. (2013). Cortical Thickness and Semantic Fluency in Alzheimer’s Disease and Mild Cognitive Impairment. *American Journal of Alzheimer’s Disease*, 1(2), 81–92. <https://doi.org/10.7726/ajad.2013.1006>
- England, H. B., Gillis, M. M., & Hampstead, B. M. (2014). RBANS memory indices are related to medial temporal lobe volumetrics in healthy older adults and those with mild cognitive impairment. *Archives of Clinical Neuropsychology*, 29(4), 322–328. <https://doi.org/10.1093/arclin/acu012>
- Fellows, R. P., & Schmitter-Edgecombe, M. (2015). Between-domain cognitive dispersion and functional abilities in older adults. *Journal of Clinical and Experimental Neuropsychology*, 37(10), 1013–1023. <https://doi.org/10.1080/13803395.2015.1050360>
- Fleisher, A. S., Sowell, B. B., Taylor, C., Gamst, A. C., Petersen, R. C., & Thal, L. J. (2007). Clinical predictors of progression to Alzheimer disease in amnesic mild cognitive

impairment. *Neurology*, 68(19), 1588–1595.

<https://doi.org/10.1212/01.wnl.0000258542.58725.4c>

Fyock, C. A., & Hampstead, B. M. (2015). Comparing the relationship between subjective memory complaints, objective memory performance, and medial temporal lobe volumes in patients with mild cognitive impairment. *Alzheimer's and Dementia: Diagnosis, Assessment and Disease Monitoring*, 1(2), 242–248. <https://doi.org/10.1016/j.dadm.2015.03.002>

Gainotti, G., Quaranta, D., Vita, M. G., & Marra, C. (2014). Neuropsychological predictors of conversion from mild cognitive impairment to Alzheimer's disease. *Journal of Alzheimer's Disease*. IOS Press. <https://doi.org/10.3233/JAD-130881>

Gallagher, D., Coen, R., Kilroy, D., Belinski, K., Bruce, I., Coakley, D., ... Lawlor, B. A. (2011). Anxiety and behavioural disturbance as markers of prodromal Alzheimer's disease in patients with mild cognitive impairment. *International Journal of Geriatric Psychiatry*, 26(2), 166–172. <https://doi.org/10.1002/gps.2509>

Gallucci, M., Di Battista, M. E., Battistella, G., Falcone, C., Bisiacchi, P. S., & Di Giorgi, E. (2018). Neuropsychological tools to predict conversion from amnesic mild cognitive impairment to dementia. The TREDEM Registry. *Neuropsychology, Development, and Cognition. Section B, Aging, Neuropsychology and Cognition*, 25(4), 550–560. <https://doi.org/10.1080/13825585.2017.1349869>

Gomar, J. J., Bobes-Bascaran, M. T., Conejero-Goldberg, C., Davies, P., Goldberg, T. E., & Initiative, for the A. D. N. (2011). Utility of Combinations of Biomarkers, Cognitive Markers, and Risk Factors to Predict Conversion From Mild Cognitive Impairment to Alzheimer Disease in Patients in the Alzheimer's Disease Neuroimaging Initiative. *Archives of General Psychiatry*, 68(9), 961. <https://doi.org/10.1001/archgenpsychiatry.2011.96>

- Gontkovsky, S. T., Beatty, W. W., & Mold, J. W. (2008). Repeatable Battery for the Assessment of Neuropsychological Status in a Normal, Geriatric Sample. *Clinical Gerontologist*, 27(3), 79–86. https://doi.org/10.1300/j018v27n03_07
- Grundman, M., Petersen, R. C., Ferris, S. H., Thomas, R. G., Aisen, P. S., Bennett, D. A., ... Thal, L. J. (2004). Mild Cognitive Impairment Can Be Distinguished from Alzheimer Disease and Normal Aging for Clinical Trials. *Archives of Neurology*, 61(1), 59–66. <https://doi.org/10.1001/archneur.61.1.59>
- Hampstead, B. M., Khoshnoodi, M., Yan, W., Deshpande, G., & Sathian, K. (2016). Patterns of effective connectivity during memory encoding and retrieval differ between patients with mild cognitive impairment and healthy older adults. *NeuroImage*, 124, 997–1008. <https://doi.org/10.1016/j.neuroimage.2015.10.002>
- Heyanka, D. J., Scott, J. G., & Adams, R. L. (2015). Improving the diagnostic accuracy of the RBANS in mild cognitive impairment with construct-consistent measures. *Applied Neuropsychology:Adult*, 22(1), 32–41. <https://doi.org/10.1080/23279095.2013.827574>
- Hill, B. D., Rohling, M. L., Boettcher, A. C., & Meyers, J. E. (2013). Cognitive intra-individual variability has a positive association with traumatic brain injury severity and suboptimal effort. *Archives of Clinical Neuropsychology*, 28(7), 640–648. <https://doi.org/10.1093/arclin/act045>
- Hiller, L., Marshall, A., & Dunn, J. (2015). Assessing violations of the proportional hazards assumption in Cox regression: does the chosen method matter? *Trials*, 16(S2), P134. <https://doi.org/10.1186/1745-6215-16-s2-p134>
- Humphreys, J.D., Dempsey, J.P. Sutker, P. B., & O'Bryan, D. E. (2006). Convergent validity of the Repeatable Battery for the Assessment of Neuropsychological Status in a memory disorder clinic sample. *Archives of Clinical Neuropsychology*, 21, 557-558.

- Jak, A. J., Preis, S. R., Beiser, A. S., Seshadri, S., Wolf, P. A., Bondi, M. W., & Au, R. (2016). Neuropsychological Criteria for Mild Cognitive Impairment and Dementia Risk in the Framingham Heart Study. *Journal of the International Neuropsychological Society*, 22(09), 937–943. <https://doi.org/10.1017/s1355617716000199>
- Jungwirth, S., Weissgram, S., Zehetmayer, S., Tragl, K. H., & Fischer, P. (2005). VITA: Subtypes of mild cognitive impairment in a community-based cohort at the age of 75 years. *International Journal of Geriatric Psychiatry*, 20(5), 452–458. <https://doi.org/10.1002/gps.1311>
- Karantzoulis, S., Novitski, J., Gold, M., & Randolph, C. (2013). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Utility in detection and characterization of mild cognitive impairment due to alzheimer's disease. *Archives of Clinical Neuropsychology*, 28(8), 837–844. <https://doi.org/10.1093/arclin/act057>
- Koivisto, K., Reinikainen, K. J., Hänninen, T., Vanhanen, M., Helkala, E. L., Mykkänen, L., ... Riekkinen, P. J. (1995). Prevalence of age-associated memory impairment in a randomly selected population from eastern Finland. *Neurology*, 45(4), 741–747. <https://doi.org/10.1212/WNL.45.4.741>
- Littlewood, C., Seymour, J., & Owen, V. (2010). Does treating Alzheimer's disease early, delay institutionalisation? *International Journal of Geriatric Psychiatry*, 25(12), 1307–1309. <https://doi.org/10.1002/gps.2446>
- Mah, L., Binns, M. A., & Steffens, D. C. (2015). Anxiety symptoms in amnesic mild cognitive impairment are associated with medial temporal atrophy and predict conversion to Alzheimer disease. *American Journal of Geriatric Psychiatry*, 23(5), 466–476. <https://doi.org/10.1016/j.jagp.2014.10.005>
- Marra, C., Gainotti, G., Fadda, L., Perri, R., Lacidogna, G., Scaricamazza, E., ... Quaranta, D. (2015). Usefulness of an Integrated Analysis of Different Memory Tasks to Predict the Progression from Mild Cognitive Impairment to Alzheimer's Disease: The Episodic Memory

Score (EMS). *Journal of Alzheimer's Disease*, 50(1), 61–70. <https://doi.org/10.3233/JAD-150613>

Mauri, M., Sinforiani, E., Zucchella, C., Cuzzoni, M. G., & Bono, G. (2012). Progression to dementia in a population with amnesic mild cognitive impairment: Clinical variables associated with conversion. *Functional Neurology*, 27(1), 49–54.

Mchugh, M. L. (2012). Lessons in biostatistics Interrater reliability : the kappa statistic. *Biochemia Medica*, 22(3), 276–282.

Mitchell, A. J., & Shiri-Feshki, M. (2009). Rate of progression of mild cognitive impairment to dementia - Meta-analysis of 41 robust inception cohort studies. *Acta Psychiatrica Scandinavica*, 119(4), 252–265. <https://doi.org/10.1111/j.1600-0447.2008.01326.x>

Modrego, P. J., & Ferrández, J. (2004). Depression in patients with mild cognitive impairment increases the risk of developing dementia of Alzheimer type: A prospective cohort study. *Archives of Neurology*, 61(8), 1290–1293. <https://doi.org/10.1001/archneur.61.8.1290>

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., ... Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement (Chinese edition). *Journal of Chinese Integrative Medicine*, 7(9), 889–896. <https://doi.org/10.3736/jcim20090918>

Murphy, K. J., Rich, J. B., & Troyer, A. K. (2006). Verbal fluency patterns in amnesic mild cognitive impairment are characteristic of Alzheimer's type dementia. *Journal of the International Neuropsychological Society*, 12(4), 570–574. <https://doi.org/10.1017/S1355617706060590>

Nakagawa, S. (2004). A farewell to Bonferroni: the problems of low statistical power and publication bias. *Behavioral Ecology*, 15(6), 1044–1045. <https://doi.org/10.1093/beheco/arh107>

- NHS. (2017). Benefits of early dementia diagnosis – Retrieved April 21, 2019, from <https://www.nhs.co.uk/conditions/dementia/early-diagnosis -benefits/>
- Nordlund, A., Rolstad, S., Klang, O., Edman, Å., Hansen, S., & Wallin, A. (2010). Two-year outcome of MCI subtypes and aetiologies in the Göteborg MCI study. *Journal of Neurology, Neurosurgery and Psychiatry*, 81(5), 541–546. <https://doi.org/10.1136/jnnp.2008.171066>
- Nutter-Upham, K. E., Saykin, A. J., Rabin, L. A., Roth, R. M., Wishart, H. A., Pare, N., & Flashman, L. A. (2008). Verbal fluency performance in amnesic MCI and older adults with cognitive complaints. *Archives of Clinical Neuropsychology*, 23(3), 229–241. <https://doi.org/10.1016/j.acn.2008.01.005>
- Olsson, B., Lautner, R., Andreasson, U., Öhrfelt, A., Portelius, E., Bjerke, M., ... Zetterberg, H. (2016). CSF and blood biomarkers for the diagnosis of Alzheimer’s disease: a systematic review and meta-analysis. *The Lancet. Neurology*, 15(7), 673–684. [https://doi.org/10.1016/S1474-4422\(16\)00070-3](https://doi.org/10.1016/S1474-4422(16)00070-3)
- Ota, K., Oishi, N., Ito, K., & Fukuyama, H. (2016). Prediction of Alzheimer’s Disease in Amnesic Mild Cognitive Impairment Subtypes: Stratification Based on Imaging Biomarkers. *Journal of Alzheimer’s Disease*, 52(4), 1385–1401. <https://doi.org/10.3233/JAD-160145>
- Palmer, K., Di Iulio, F., Varsi, A. E., Gianni, W., Sancesario, G., Caltagirone, C., & Spalletta, G. (2010). Neuropsychiatric predictors of progression from amnesic - Mild cognitive impairment to alzheimer’s disease: The role of depression and apathy. *Journal of Alzheimer’s Disease*, 20(1), 175–183. <https://doi.org/10.3233/JAD-2010-1352>
- Perneger, T. V. (1998). What’s wrong with Bonferroni adjustments. *BMJ (Clinical Research Ed.)*, 316(7139), 1236–1238. <https://doi.org/10.1136/bmj.316.7139.1236>
- Peters, F., Villeneuve, S., & Belleville, S. (2014). Predicting progression to dementia in elderly subjects with mild cognitive impairment using both cognitive and neuroimaging predictors. *Journal of Alzheimer’s Disease*, 38(2), 307–318. <https://doi.org/10.3233/JAD-130842>

- Petersen, R. C. (2004). Mild cognitive impairment as a diagnostic entity. *Journal of Internal Medicine*, 256(3), 183–194. <https://doi.org/10.1111/j.1365-2796.2004.01388.x>
- Petersen, R. C., Caracciolo, B., Brayne, C., Gauthier, S., Jelic, V., & Fratiglioni, L. (2014). Mild cognitive impairment: A concept in evolution. *Journal of Internal Medicine*, 275(3), 214–228. <https://doi.org/10.1111/joim.12190>
- Petersen, Ronald C., Lopez, O., Armstrong, M. J., Getchius, T. S. D., Ganguli, M., Gloss, D., ... Rae-Grant, A. (2018). Practice guideline update summary: Mild cognitive impairment report of the guideline development, dissemination, and implementation. *Neurology*, 90(3), 126–135. <https://doi.org/10.1212/WNL.0000000000004826>
- Picavet, H. S. J., & Wanda Wendel-Vos, G. C. (2011). Use it or lose it—but how to use? *Pain*, 152(10), 2198–2199. <https://doi.org/http://dx.doi.org/10.1016/j.pain.2011.05.006>
- Rajan, K. B., Wilson, R. S., Weuve, J., Barnes, L. L., & Evans, D. A. (2015). Cognitive impairment 18 years before clinical diagnosis of Alzheimer disease dementia. *Neurology*, 85(10), 898–904. <https://doi.org/10.1212/WNL.0000000000001774>
- Randolph, C., Tierney, M. C., Mohr, E., & Chase, T. N. (1998). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Preliminary Clinical Validity. *Journal of Clinical and Experimental Neuropsychology*, 20(3), 310–319. <https://doi.org/10.1076/jcen.20.3.310.823>
- Ranganathan, P., & Pramesh, C. (2012). Censoring in survival analysis: Potential for bias. *Perspectives in Clinical Research*, 3(1), 40. <https://doi.org/10.4103/2229-3485.92307>
- Robinson, L., Tang, E., & Taylor, J. P. (2015). Dementia: Timely diagnosis and early intervention. *BMJ (Online)*, 350, h3029. <https://doi.org/10.1136/bmj.h3029>
- Schmid, N. S., Taylor, K. I., Foldi, N. S., Berres, M., & Monsch, A. U. (2013). Neuropsychological signs of Alzheimer's disease 8 years prior to diagnosis. *Journal of Alzheimer's Disease*, 34(2), 537–546. <https://doi.org/10.3233/JAD-121234>

- Schmitt, A. L., Livingston, R. B., Smernoff, E. N., Reese, E. M., Hafer, D. G., & Harris, J. B. (2010). Factor analysis of the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) in a large sample of patients suspected of dementia. *Applied Neuropsychology*, 17(1), 8–17. <https://doi.org/10.1080/09084280903297719>
- Schweiger, A., Doniger, G. M., Dwolatzky, T., Jaffe, D., & Simon, E. S. (2003). Reliability of a novel computerized neuropsychological battery for mild cognitive impairment, 1(4), 407–413.
- Seo, E. H., Lee, D. Y., Lee, J. H., Choo, I. H., Kim, J. W., Kim, S. G., ... Woo, J. I. (2010). Total scores of the CERAD neuropsychological assessment battery: Validation for mild cognitive impairment and dementia patients with diverse etiologies. *American Journal of Geriatric Psychiatry* (Vol. 18). <https://doi.org/10.1097/JGP.0b013e3181cab764>
- Singh, R., & Mukhopadhyay, K. (2011). Survival analysis in clinical trials: Basics and must know areas. *Perspectives in Clinical Research*, 2(4), 145. <https://doi.org/10.4103/2229-3485.86872>
- Silva, M. E., Humphreys, J. D., Dempsey, J. P., Sutker, P. B., & O'Bryant, S. E. (2006). Test-retest reliability of the repeatable battery for the assessment of neuropsychological status in a memory disorder clinic sample. *Archives of Clinical Neuropsychology*, 21, 560-561.
- Tabert, M. H., Manly, J. J., Liu, X., Pelton, G. H., Rosenblum, S., Jacobs, M., ... Devanand, D. P. (2006). Neuropsychological prediction of conversion to alzheimer disease in patients with mild cognitive impairment. *Archives of General Psychiatry*, 63(8), 916–924. <https://doi.org/10.1001/archpsyc.63.8.916>
- Teng, E., Lu, P. H., & Cummings, J. L. (2007). Neuropsychiatric symptoms are associated with progression from mild cognitive impairment to Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders*, 24(4), 253–259. <https://doi.org/10.1159/000107100>
- Thaler, N. S., Hill, B. D., Duff, K., Mold, J., & Scott, J. G. (2015). Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) intraindividual variability in older

- adults: Associations with disease and mortality. *Journal of Clinical and Experimental Neuropsychology*, 37(6), 622–629. <https://doi.org/10.1080/13803395.2015.1039962>
- Tondelli, M., Wilcock, G. K., Nichelli, P., de Jager, C. A., Jenkinson, M., & Zamboni, G. (2012). Structural MRI changes detectable up to ten years before clinical Alzheimer's disease. *Neurobiology of Aging*, 33(4), 825.e25-825.e36. <https://doi.org/10.1016/j.neurobiolaging.2011.05.018>
- Tong, T., Gao, Q., Guerrero, R., Ledig, C., Chen, L., & Rueckert, D. (2017). A novel grading biomarker for the prediction of conversion from mild cognitive impairment to Alzheimer's disease. *IEEE Transactions on Biomedical Engineering*, 64(1), 155–165. <https://doi.org/10.1109/TBME.2016.2549363>
- Tractenberg, R. E., & Pietrzak, R. H. (2011). Intra-individual variability in alzheimer's disease and cognitive aging: Definitions, context, and effect sizes. *PLoS ONE*, 6(4). <https://doi.org/10.1371/journal.pone.0016973>
- Tsatali, M., Fotiadou, F., Giaglis, G., & Tsolaki, M. (2018). The repeatable battery for the assessment of the neuropsychological status (RBANS): a diagnostic validity study in Greek elderly. *Aging Clinical and Experimental Research*. <https://doi.org/10.1007/s40520-018-1076-9>
- Ward, A., Arrighi, H. M., Michels, S., & Cedarbaum, J. M. (2012). Mild cognitive impairment: Disparity of incidence and prevalence estimates. *Alzheimer's and Dementia*, 8(1), 14–21. <https://doi.org/10.1016/j.jalz.2011.01.002>
- Weakley, A., Schmitter-Edgecombe, M., & Anderson, J. (2013). Analysis of verbal fluency ability in amnesic and non-amnesic mild cognitive impairment. *Archives of Clinical Neuropsychology*, 28(7), 721–731. <https://doi.org/10.1093/arclin/act058>

Willers, I. F., Feldman, M. L., & Allegri, R. F. (2016). Subclinical naming errors in mild cognitive impairment: A semantic deficit? *Dementia & Neuropsychologia*, 2(3), 217–222.

<https://doi.org/10.1590/s1980-57642009dn20300010>

Xu, L., Wu, X., Li, R., Chen, K., Long, Z., Zhang, J., ... Yao, L. (2016). Prediction of progressive mild cognitive impairment by multi-modal neuroimaging biomarkers. *Journal of Alzheimer's Disease*, 51(4), 1045–1056. <https://doi.org/10.3233/JAD-151010>

Zhu, X., Zhou, X., Zhang, Y., Sun, X., Liu, H., & Zhang, Y. (2017). Reporting and methodological quality of survival analysis in articles published in Chinese oncology journals. *Medicine (United States)*, 96(50). <https://doi.org/10.1097/MD.00000000000009204>

Chapter 3 – Contributions to Theory and Clinical Practice

Contributions to Theory and Clinical Practice

Literature review – Implications for theory and research

The systematic review was unable to make conclusive statements regarding the efficacy of ACT and instead discussed the status of its practice within older adult populations to date. Methodological improvements that would benefit the assessment of ACT in older adult populations were suggested and the importance of measuring constructs at the core of ACT, such as acceptance and mindfulness made explicit. The interventions described within the literature raise questions regarding the compatibility between ACT and best-practice research methodology.

ACT acknowledges it's core business as different to other therapeutic modalities, it does not seek to reduce symptoms (Harris, 2009). It acknowledges the desirability of symptom reduction, and often sees this as a secondary benefit, however this is not the focus. An ACT therapist would be considered non-adherent if they were to suggest that emotions should be changing, or that they should be different; the goal in ACT is to reduce suffering, not pain. This is probably the most significant tension between research and ACT.

Outcome measure selection was the strongest point of methodology across all ten studies; these tended to have excellent psychometric properties and targeted the aims of each paper. Every sample had a symptom measure, be it for pain, depression or anxiety, yet only four of the studies measured a construct related to ACT. Only one study measured mindfulness, and another, values. If ACT theory targets acceptance, values and the ability to be in the present moment, it is incongruent to neglect these processes in measurement. The design employed by Karlin et al. (2013) measured depression with the Beck Depression Inventory (21 items;) at the beginning of each therapy session. We suspect that several other papers administered measures in a similar way, but this was not clarified in their reporting. Clients being reminded of the content and severity of their symptoms at the beginning of each therapy session, a journey

typically embarked on to seek relief, is likely have an impact on their belief in, and relationship with *acceptance*. Future studies should consider the way in which measures are used in ACT therapy and what unintended messages they may communicate. Further, they should employ measures that are specific to ACT-related processes such as acceptance, psychological flexibility and fusion.

ACT encourages therapists to engage with exercises, mindfulness and acceptance to the best of their ability. It asks therapists to sit with any discomfort in therapy and embrace its inevitable appearance in emotive work. Further, the model encourages therapists to listen to their clients and respond in ways that address their communicated needs in the present. In contrast to this overarching ethos, ACT therapy manuals contain materials that need to be delivered and guidance that needs to be followed. The ACT ‘hexaflex’ is comprised of interconnected factors that contribute to psychological flexibility. Its application is designed to conceptualise difficulty, acceptance and action as relevant in different proportions in relation to what is expressed. The way in which a manual will present the hexaflex to a therapist, and the way a therapist would present the hexaflex to a client are vastly different. Therapists may therefore be faced with a choice between client-lead and manual-lead therapy. Where possible, future studies should be explicit in their description of ‘manualised’ approaches when applying ACT; whether model-adherent with the therapist following pre-determined agendas (providing similarity of treatment to their sample), or client-lead with the therapist responding to individual concerns and difficulties (providing different therapeutic content and experiences for participants, but being guided by the ethos of ACT).

The research processes that encourage measures that demonstrate psychological improvement, and manuals that ensure reliability in intervention delivery, may be in conflict with the ethos of ACT. Evidence in older adult samples would indicate this may be the case.

Future research should consider how best to achieve methodological rigour in the exploration of a therapy that is flexible and accepting in its nature.

Literature review – Implications for future practice

Our paper has drawn attention to the initial stages of research in ACT for older adults. The systematic review highlights the exclusion of several groups that are commonly found in the older adult population. People who may have sensory difficulties, a cognitive impairment, literacy difficulties, pain or history of a psychological disorder were all excluded by at least one study, and often more. The research population we have identified stands in significant contrast to the clinical population we see in healthcare. It is likely that older adult clients have already experienced discrimination whereby judgements are made about their preferences for treatment or what is considered ‘normal’ for their age. If we take both the evidence of exclusion from our review and wider literature, we might use this to open a discussion with clients about their experiences of stigma and discrimination, educate them on their rights to receive equal treatment and foster a collaborative relationship distinctly different from the inhibitory systems they may have encountered across their journey into therapy. This would help to rebuild a sense of trust and reduce the likelihood of clients allowing discrimination to reoccur. More so, staff teams and general practitioners should be made more aware of practices that promote exclusion and be encouraged to highlight and address this wherever possible.

Further, our review emphasised a lack of adaptation to ACT interventions for older adults despite reasonable recommendations having been published (Pachana et al., 2014; Petkus, M A, et al., 2013). It may be beneficial for individual clinicians to integrate these recommendations with their practice. Flexibility provided by therapy, in contrast to the restrictiveness of controlled research, may provide a platform to an ACT approach that is more person-centred. In doing so, clinicians begin to build upon practice-based evidence, sharing

their findings with colleagues, and improving services for those that may not fit into conventional randomised-controlled trials.

Empirical paper – Implications for future practice

In consideration of the small sample we investigated and the replication required to ensure reliability, we do not anticipate that this specific project will impact directly on clinical practice. In the future, we expect that our work will be combined with further research to demonstrate the utility of initial assessment neuropsychological measures in prognostic prediction, influencing clinical practice within memory services greatly. The research is currently in its infancy and our findings are among some of the first in the predictive utility of intra-individual variance. We anticipate that as prognostic research progresses, assessments undertaken within clinical practice will become quicker, requiring less time and resource. The scheduling of re-assessments will be better informed by calculated risk from neuropsychological assessment and other investigations with prognostic value (e.g. imaging and biomarkers). Overall, we anticipate an improvement of service provision that makes decisions based on individual need, identifies those at higher risk of conversion, and makes earlier diagnoses of dementia in people that convert from amnesic Mild Cognitive Impairment (aMCI).

This project does, however, contribute to a much wider community of research in MCI, that when combined, has a profound impact across assessment, psychoeducation, self-education, and intervention. The literature splits its focus between impairment and individual, and in doing so calls into question where we need knowledge and where we need compassion.

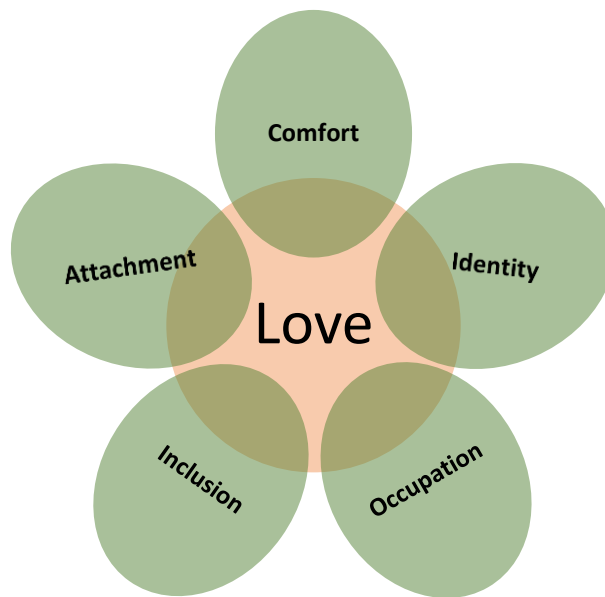
In practice, the label MCI has received criticism. Pierce et al. (2016) interviewed seven people with MCI and described themes of participants ‘not knowing’ about MCI, what it was, and how to explain it to others. Participants’ discourse relied heavily on media and was believed to be shaped by the absence of experts that could provide adequate explanation.

Negative and inaccurate discourses around dementia were also noticed, highlighting a need for improving public awareness of neurocognitive disorders more generally. They discuss medical experts as having introduced, and therefore ‘imposed’, MCI upon the public. The authors conclude by questioning whether clinicians have sufficient knowledge regarding MCI; a reasonable concern where evidence-based literature utilises multiple sets of criteria and has evolved rapidly over the years.

There are long-standing criticisms regarding the imposition of diagnoses and labels of which Rosenfield (1997) gives good account. We talk about ‘older adults’ and ‘MCI’ in hope that we are in some way helping and progressing. High quality research often demands the categorisation of people and exclusion of difference. This, however, seems to have spilled over into the sphere of services. Dementia charities, for example, have adopted the term MCI and incorporate it through their media, often resulting in a dementia logo next to all information. Research trials often exclude people over a certain age or with a cognitive impairment. Unhelpful language such as ‘minimal’ or ‘mild’ cognitive impairment can undermine the experiences of individuals that may be at risk of losing employment and straining relationships. While diagnostic process is a core function of a memory clinic, it is clear that diagnosis and definition is not sufficient for people with MCI to make sense of their experiences and process them.

The work of Kitwood (Kitwood & Bredin, 1992; G. Mitchell & Agnelli, 2015) describes a person-centred model of practice for people with dementia that has been adopted internationally. It is favoured largely for its conceptualisation of key recommendations in ways to develop ‘personhood’ in others. Kitwood’s flower of emotional needs (figure. 1) discusses five areas of need that are more accessible for those without dementia by virtue of independence, yet remain important in every human being.

Figure 1. Kitwood’s flower of emotional needs



This model can arguably be applied across all groups and all services. Take for example a patient visiting the memory clinic. Should the Kitwood model be implemented by the staff team, patients with MCI might expect the following interactions:

Identity

Pre and post-diagnostic counselling that seeks to know more about the individual, their values, wishes, and ethos. Patients should feel empowered by services and have ownership of their treatment. Language such as 'demented' would likely be replaced with 'those with dementia'.

Attachment

An open line of communication with the service, able to seek information and support when necessary. The clinical psychologist that fed back their MCI outcome will make efforts to see them, follow their care and be available for contact. One member of the team might be assigned as a care-coordinator to improve consistency in communication.

Comfort

Experiences and concerns will be met with validation and understanding. Staff will listen and engage in meaningful dialogue. Less telling, informing, or imposing will be observed. Breaks will be offered during lengthy neuropsychological assessment.

Inclusion

Being able to make decisions about their own care regarding re-assessment, counselling, and ongoing support. Providing opportunities to become involved with service evaluation and development.

Occupation

Occupational Therapy advice and assessments to support independence and activity in day-to-day life.

For us to empower clients with diagnoses of MCI, we need to go beyond assessment, diagnosis, feedback, and intervention. Knowledge and research are imperative to improving outcomes, but our ability communicate this in a way that is helpful for clients is equally important.

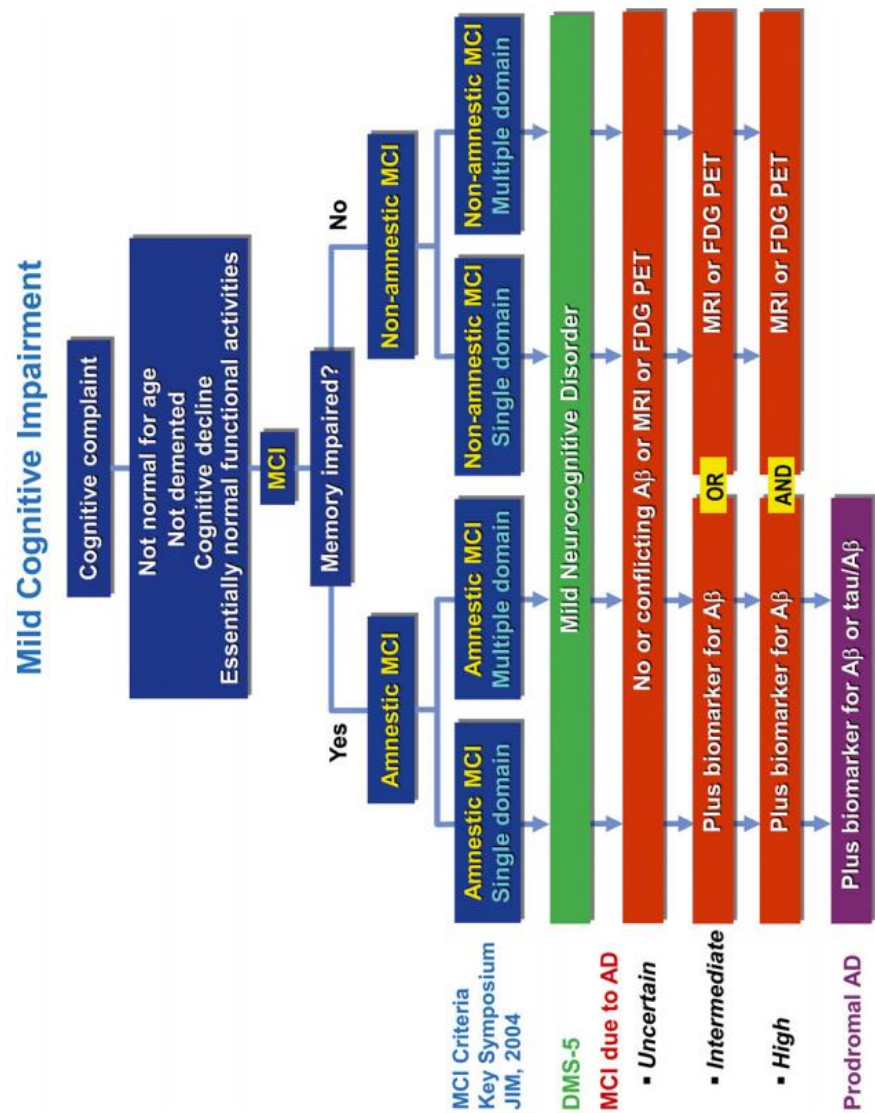
Clinical psychologists have a unique and interesting role in this improvement of service provision. In undertaking neuropsychological assessment, they are required to be knowledgeable and are more likely to be involved in MCI research. Simultaneously, they are trained in psychological models that may be more empathically oriented than medical models. In bringing together knowledge of characteristics and the psychological impact of MCI, clinical psychologists are in an excellent position within memory services to model, supervise, and provide teaching to improve discourse surrounding MCI in memory clinic teams.

Empirical paper – Implications for future research and theory

Criteria for MCI were first proposed in the 1990s and research interest grew exponentially soon after (Golomb, Kluger, & Ferris, 2004). Our understanding of MCI as a concept has evolved (R. C. Petersen et al., 2014) and we continue to advance in areas of relating to assessment (Duff et al., 2008; Randolph et al., 1998), prognostic factors (Gomar et al., 2011; Olsson et al., 2016; Ota et al., 2016; Tong et al., 2017), and intervention (Sherman, Mauser, Nuno, & Sherzai, 2017). The benefits of such research include better identification of MCI, improved diagnostic counselling, person-centred interventions, and planning for the future.

Petersen et al. (2014) provides an illustration of different MCI sub-types, combining criteria from the Key symposium (2003), Diagnostics and Statistics Manual 5th edition (APA, 2013), and research in the distinction of those experiencing prodromal Alzheimer's Disease (Albert et al., 2011) (see figure 2).

Figure 2. MCI sub-types



The importance for distinction between MCI subgroups is imperative to accurate findings in prognosis predictions. The empirical paper excluded all non-amnestic and multiple-domain presentations to strengthen homogeneity of its sample. In this sense, our research made every effort to improve homogeneity, and comment on specifically those with single-domain aMCI. As such, we have provided normative Repeatable Battery of the Assessment of Neuropsychological Status (RBANS) data for a larger aMCI population than in similar studies (England et al., 2014; Fyock & Hampstead, 2015; Hampstead et al., 2016; Heyanka et al., 2015; Karantzoulis et al., 2013). This information should help construct a better cognitive profile of aMCI, improving identification and prognostic prediction.

Our findings supported prognostic utility in the intra-individual variance between immediate memory and language scores on the RBANS for those with amnestic MCI. Where greater strengths in language performance in comparison to immediate memory were found, greater risk of conversion to a dementia profile was indicated. We hypothesised that this may have been due to the consistent nature of RBANS language scores across aMCI populations, as denoted by its standard deviation. Should replication support our findings, we encourage further research into language constructs beyond semantic fluency, and their relationship with immediate memory.

Further, our findings may encourage greater investigation into the role of intra-individual variance in MCI. To our knowledge this study was the first of its kind to use neuropsychological variance to predict risk in those with aMCI. The strong level of significance warrants further investigations, across different measures and non-amnestic populations.

The absence of a reliable executive functioning measure in our project meant we were not able to explore the utility of all cognitive domains and their relationship with one another. Sites in the process of collecting, or with pre-existing executive data, are encouraged to

replicate intra-individual analysis to identify any potential value. We expect that as research builds on this topic, hypothesised trajectories will highlight neuropsychological differences between those at higher and lower risk of conversion. We anticipate that data such as ours will be used to inform this mapping.

The theory and research underpinning MCI is of great importance in our journey towards developing a better understanding, and improving management and interventions. This being acknowledged, the research community should focus on methods of identification, assessment and intervention that are both proportionate and appropriate. In our infancy of understanding MCI, it is unrealistic to expect clients to be able to make use of research such as this and our efforts need to be equally focused on person-centred care.

Personal reflections

My first interest in working with older adults arose from my second placement on clinical training. It took only a short period of time for me to see the value in memory clinic services. The importance clients placed in services, resilience in the face of their biggest fear, and the role of clinical psychology in formulating from a truly person-centred perspective were striking factors. The first client referral I received had a diagnosis of aMCI and requested help with cognitive strategies. In our assessment, however, it soon became apparent that she was feeling overwhelmed. She spoke about less comfortable areas of her life which she would try to avoid and difficulties in sitting with the present moment. Working therapeutically with this lady ignited a curiosity in MCI as a concept. Her ‘recovery’ also made me want to explore evidence of acceptance and commitment therapy with older adults.

It was important to me from the beginning of my research journey that I did not burden clients beyond their existing cognitive concerns. With years of unresearched pre-existing data in existence, our protocol was able to take place without asking time, discomfort, or unnecessary assessment of service-users and families of the memory clinic. Over half of the

people who contributed data to this project have now passed away, many with dementia. Their contribution, albeit unknown to them, will move forward in the literature, helping others in similar circumstances, asking the same questions, wanting better answers.

In reflecting upon the process of implementing our research plan, the volume of data collection, management and analysis was the greatest challenge. I underestimated how dependent I would be on members of the team for administrative support. As my requests for support grew in frequency and intensity, I became more aware of the burden I was placing on members of the team. I began undertaking tasks that were originally assigned to others and lost focus of my role, and the importance of the work we were completing together as a team. The supervision I received during this time was invaluable to my learning and this project. The vast amounts of data being entered and processed became more personalised. Whilst extracting data from reports, I noticed my will for assessment outcomes to be positive and patients to recover. These brief and distant connections with clients kept my motivation and focus in what could have otherwise been a very clinical process in a data-heavy statistical piece of research. Open communication with members of the team lead to reassurances that they were not burdened by the unforeseen work, but they too were motivated by the project and found their involvement to be rewarding.

In choosing to work with older adults in my final year, I have further developed skills in the assessment of MCI, and sharing feedback with those clients identified as having a MCI. These interactions have been heavily transformed by my research and study of the literature. I have been better able to provide psychoeducation, answer questions and offer suggestions. I have noticed a shift between a pre-existing clinical stance for ‘cure’ and treatment, to one of adaptation, committed action, and acceptance. In my progression to employment within older adult services, I intend to continue learning from this wonderful group of people that have more to share in experience and knowledge than any other.

References

- Albert, M. S., DeKosky, S. T., Dickson, D., Dubois, B., Feldman, H. H., Fox, N. C., ... Phelps, C. H. (2011). The diagnosis of mild cognitive impairment due to Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimer's and Dementia*, 7(3), 270–279. <https://doi.org/10.1016/j.jalz.2011.03.008>
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th Ed.). Arlington, VA: Author.
- Duff, K., Humphreys Clark, J. D., O'Bryant, S. E., Mold, J. W., Schiffer, R. B., & Sutker, P. B. (2008). Utility of the RBANS in detecting cognitive impairment associated with Alzheimer's disease: Sensitivity, specificity, and positive and negative predictive powers. *Archives of Clinical Neuropsychology*, 23(5), 603–612. <https://doi.org/10.1016/j.acn.2008.06.004>
- England, H. B., Gillis, M. M., & Hampstead, B. M. (2014). RBANS memory indices are related to medial temporal lobe volumetrics in healthy older adults and those with mild cognitive impairment. *Archives of Clinical Neuropsychology*, 29(4), 322–328. <https://doi.org/10.1093/arclin/acu012>
- Fyock, C. A., & Hampstead, B. M. (2015). Comparing the relationship between subjective memory complaints, objective memory performance, and medial temporal lobe volumes in patients with mild cognitive impairment. *Alzheimer's and Dementia: Diagnosis, Assessment and Disease Monitoring*, 1(2), 242–248. <https://doi.org/10.1016/j.dadm.2015.03.002>
- Golomb, J., Kluger, A., & Ferris, S. H. (2004). Mild cognitive impairment: Historical development and summary of research. *Dialogues in Clinical Neuroscience* (Vol. 6). Retrieved from www.dialogues-cns.org
- Gomar, J. J., Bobes-Bascaran, M. T., Conejero-Goldberg, C., Davies, P., Goldberg, T. E., & Initiative, for the A. D. N. (2011). Utility of Combinations of Biomarkers, Cognitive

- Markers, and Risk Factors to Predict Conversion From Mild Cognitive Impairment to Alzheimer Disease in Patients in the Alzheimer's Disease Neuroimaging Initiative. *Archives of General Psychiatry*, 68(9), 961. <https://doi.org/10.1001/archgenpsychiatry.2011.96>
- Hampstead, B. M., Khoshnoodi, M., Yan, W., Deshpande, G., & Sathian, K. (2016). Patterns of effective connectivity during memory encoding and retrieval differ between patients with mild cognitive impairment and healthy older adults. *NeuroImage*, 124, 997–1008. <https://doi.org/10.1016/j.neuroimage.2015.10.002>
- Harris, R. (2009). ACT Made Simple: An easy-to-read primer on acceptance and commitment therapy. Oakland, CA: New Harbinger.
- Heyanka, D. J., Scott, J. G., & Adams, R. L. (2015). Improving the diagnostic accuracy of the RBANS in mild cognitive impairment with construct-consistent measures. *Applied Neuropsychology: Adult*, 22(1), 32–41. <https://doi.org/10.1080/23279095.2013.827574>
- Karantzoulis, S., Novitski, J., Gold, M., & Randolph, C. (2013). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Utility in detection and characterization of mild cognitive impairment due to alzheimer's disease. *Archives of Clinical Neuropsychology*, 28(8), 837–844. <https://doi.org/10.1093/arclin/act057>
- Karlin, B. E., Walser, R. D., Yesavage, J., Zhang, A., Trockel, M., & Taylor, C. B. (2013). Effectiveness of acceptance and commitment therapy for depression: Comparison among older and younger veterans. *Aging and Mental Health*, 17(5), 555–563. <https://doi.org/10.1080/13607863.2013.789002>
- Kitwood, T., & Bredin, K. (1992). Towards a Theory of Dementia Care: Personhood and Well-being. *Ageing and Society*, 12(03), 269–287. <https://doi.org/10.1017/S0144686X0000502X>
- Mitchell, A. J., & Shiri-Feshki, M. (2009). Rate of progression of mild cognitive impairment to dementia - Meta-analysis of 41 robust inception cohort studies. *Acta Psychiatrica Scandinavica*, 119(4), 252–265. <https://doi.org/10.1111/j.1600-0447.2008.01326.x>

- Olsson, B., Lautner, R., Andreasson, U., Öhrfelt, A., Portelius, E., Bjerke, M., ... Zetterberg, H. (2016). CSF and blood biomarkers for the diagnosis of Alzheimer's disease: a systematic review and meta-analysis. *The Lancet. Neurology*, 15(7), 673–684.
[https://doi.org/10.1016/S1474-4422\(16\)00070-3](https://doi.org/10.1016/S1474-4422(16)00070-3)
- Ota, K., Oishi, N., Ito, K., & Fukuyama, H. (2016). Prediction of Alzheimer's Disease in Amnesic Mild Cognitive Impairment Subtypes: Stratification Based on Imaging Biomarkers. *Journal of Alzheimer's Disease*, 52(4), 1385–1401. <https://doi.org/10.3233/JAD-160145>
- Pachana, N. A., Laidlaw, K., Gillanders, D., & Laidlaw, K. (2014). ACT and CBT in Older Age. In *The Oxford Handbook of Clinical Geropsychology*. *Oxford University Press*.
<https://doi.org/10.1093/oxfordhb/9780199663170.013.035>
- Petersen, R. C., Caracciolo, B., Brayne, C., Gauthier, S., Jelic, V., & Fratiglioni, L. (2014). Mild cognitive impairment: A concept in evolution. *Journal of Internal Medicine*, 275(3), 214–228. <https://doi.org/10.1111/joim.12190>
- Petkus, A. J., A, M., & Wetherell, J. L. (2013). Acceptance and Commitment Therapy with Older Adults: Rationale and Considerations. *Cognitive and Behavioral Practice*, 20(1), 47–56.
<https://doi.org/http://dx.doi.org/10.1016/j.cbpra.2011.07.004>
- Pierce, S., Lamers, C., & Salisbury, K. (2016). Knowingly not wanting to know: Discourses of people diagnosed with mild cognitive impairment. *Dementia*, 15(5), 1246–1259.
<https://doi.org/10.1177/1471301215600895>
- Randolph, C., Tierney, M. C., Mohr, E., & Chase, T. N. (1998). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Preliminary Clinical Validity. *Journal of Clinical and Experimental Neuropsychology*, 20(3), 310–319.
<https://doi.org/10.1076/jcen.20.3.310.823>
- Rosenfield, S. (1997). Labelling mental illness: The effects of received services and perceived stigma on life satisfaction. *American Sociological Review*, 660-672.

- Sherman, D. S., Mauser, J., Nuno, M., & Sherzai, D. (2017). The Efficacy of Cognitive Intervention in Mild Cognitive Impairment (MCI): a Meta-Analysis of Outcomes on Neuropsychological Measures. *Neuropsychology Review*, 27(4), 440–484. <https://doi.org/10.1007/s11065-017-9363-3>
- Tong, T., Gao, Q., Guerrero, R., Ledig, C., Chen, L., & Rueckert, D. (2017). A novel grading biomarker for the prediction of conversion from mild cognitive impairment to Alzheimer's disease. *IEEE Transactions on Biomedical Engineering*, 64(1), 155–165. <https://doi.org/10.1109/TBME.2016.2549363>

Appendices

Appendix 1 –

Data extraction protocol according to PICOS

Population

Age (SD)

Age range

Gender

Clinical population (eg chronic pain, anxiety)

Healthcare setting (eg nursing homes, inpatients, outpatients, general population)

Intervention

Type (ACT/ACT+1)

Delivery (individual/group/telephone)

Adaptations for older adults

Frequency

Length

Total hours

Attrition

Comparisons

Measures included

Clinical groups

Type of therapy

Outcomes

Main findings

Satisfaction

Study design

Authors

Country

Year published

Type of study

Limitations

Appendix 2 –

Quality assessment ratings

	Wetherell et al., 2011	Alonso et al., 2013	Karlin et al., 2013	Alonso-Fernández et al., 2015	Davison et al., 2017	Wetherell et al., 2016*	Bayati et al., 2017	Jacobs et al., 2018	Nazari et al., 2017	Ramos et al., 2018	Average
Psychotherapy outcome study methodology rating form											
1 Sample Description	2	1	1	1	1	1	2	1	1	2	1.30
2 Severity/Chronicity of disorder	1	1	1	2	0	1	0	0	1	1	0.80
3 Representativeness of sample	2	1	2	1	0	1	1	1	0	2	1.10
4 Reliability of diagnosis	1	0	1	1	0	1	0	0	0	1	0.50
5 Specificity of outcome measures	2	2	2	2	1	2	2	2	1	2	1.80
6 Reliability and Validity of measures	2	2	2	1	2	2	2	2	1	1	1.70
7 Use of blind evaluators	1	0	0	1	0	2	0	0	0	0	0.40
8 Assessor training	0	0	0	1	0	0	0	0	0	N/A	0.11
9 Assignment to treat	1	1	0	1	1	2	0	0	0	0	0.60
10 Design	2	0	0	1	0	N/A	1	0	0	0	0.44
11 Power analysis	0	0	0	0	0	0	0	0	0	0	0.00
12 Assessment Points	1	0	0	0	1	1	0	0	0	0	0.30
13 Manualised, replicable	1	1	2	1	1	1	0	1	0	1	0.90
14 Number of therapists	1	0	1	0	1	2	0	0	0	1	0.60
15 Therapist training/experience	1	1	2	2	1	1	0	0	0	1	0.90
16 Checks for treatment adherence	2	0	2	0	1	2	0	0	0	0	0.70
17 Checks for therapist competence	2	0	2	0	1	2	0	0	0	0	0.70
18 Control of concomitant treatments	1	0	0	0	0	1	1	0	0	0	0.30
19 Handling of attrition	0	0	1	1	2	2	0	0	2	0	0.80
20 Analyses and results	1	2	2	2	2	2	2	2	2	1	1.80
21 Clinical Significance	0	0	0	0	0	0	0	0	0	1	0.10
22 Equality of therapy hours	2	N/A	N/A	0	N/A	2	N/A	N/A	0	N/A	1.00
Total:	26	12	21	18	15	28	11	9	8	14	16.86
Modified Downs and Black Checklist											
1 Clear hypothesis/aim?	1	1	1	1	1	1	1	1	0	1	0.90
2 Main outcomes measured clearly	1	1	1	1	1	1	1	1	1	1	1.00
4 Intervention description?	1	1	1	1	1	1	0	1	1	1	0.90
5 Distributions of confounders described?	2	0	0	1	0	2	0	0	0	1	0.60
6 Main findings clear?	1	1	1	1	1	1	1	0	0	1	0.80
7 Report estimates of random variability?	0	0	1	1	1	1	1	1	1	0	0.70
8 Adverse events reported?	0	0	0	0	0	0	0	0	1	0	0.10
9 Characteristics of those lost to follow-up?	0	1	0	0	1	1	1	0	0	1	0.50
10 Actual Probability values?	0	1	1	1	0	1	1	1	1	0	0.70
11 Representative of wider population?	0	0	1	0	0	1	0	1	0	1	0.40
13 Representative of typical treatment?	0	1	0	0	1	0	0	0	0	0	0.20
14 Participants blind to intervention?	0	1	N/A	0	0	0	1	N/A	0	N/A	0.29
16 Post-hoc analysis clearly marked?	1	0	1	1	1	1	1	1	1	1	0.90
17 Adjustments for different follow-up?	1	1	N/A	0	1	1	N/A	N/A	1	N/A	0.83
21 All groups from same population?	1	0	N/A	1	1	1	1	N/A	1	1	0.88
22 All groups recruited in same time period?	1	1	0	0	1	1	0	N/A	1	1	0.67
24 Was randomisation concealed?	1	1	N/A	1	0	1	0	N/A	0	N/A	0.57
25 Adjustment for confounders in analysis?	0	0	0	0	0	1	0	0	0	0	0.10
26 Follow-up loss consideration?	1	1	1	0	1	1	1	0	1	1	0.80
Total:	12	12	9	10	12	17	10	7	10	11	
Percentage:	60.0%	60.0%	56.3%	50.0%	60.0%	85.0%	52.6%	46.7%	50.0%	55.0%	
Classification:											

*The majority of scores were calculated from the original paper (Wetherell et al., 2011b)

Psychotherapy outcome study methodology rating form - Where 0 = Poor, 1 = Fair and 2 = Good

Modified Downs and Black Checklist - 0 = No and 1 = Yes. Item 5 includes a 'partially met' response = 1.