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Age-Based Stereotype Threat and Cognitive Performance in Older Adults: Examination of Threat-Removal Strategies and Health Practitioner Beliefs

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Abstract

Research has demonstrated that negative ageing stereotypes can have detrimental effects on the cognitive test performance of older adults. Age-based stereotype threat (ABST) can pose serious risks in the cognitive assessment of older adults, especially in the context of early identification of cognitive impairment and dementia. To date, research in this field has predominantly focussed on the performance decrements older adults experience when faced with negative ageing stereotypes during cognitive assessment. Less focus has been placed on investigating whether health practitioners recognise the potential influence of ABST on the cognitive test performance of older adults and ways in which its negative effects can be reduced. Comprised of three studies, the broad objectives of this thesis were to advance understanding of health practitioner beliefs regarding the impact of ABST in clinical practice and ways to alleviate the impact of ABST on older adults' cognitive test performance.

Study 1 systematically reviewed studies investigating the use of threat-removal (TR) strategies to reduce the effects of ABST on the cognitive performance of older adults. Types of strategies, their effectiveness in optimising cognitive performance, and factors influencing their effectiveness were examined. A systematic search of five databases was conducted, the methodological quality of eligible articles was appraised, and narrative synthesis was used to summarise results. Thirty articles, reporting on 36 studies, were eligible and included. Overall, evidence for the efficacy of TR was mixed and varied according to the explicitness of strategies (i.e., blatant vs. subtle) and comparison conditions used. Studies evaluating blatant TR strategies, and those combining blatant and subtle ones, provided limited evidence of efficacy and support for their use. However, studies examining subtle TR strategies provided preliminary support for their efficacy in reducing ABST. The review highlighted key methodological shortcomings that have limited the conclusions that can be drawn about the effectiveness of TR strategies in reducing ABST. Additionally, the review provided

recommendations of ways to improve study design for more rigorous evaluation of TR strategy efficacy needed to improve the evidence base and guide their use in clinical practice.

Study 2 was a cross-sectional survey study that investigated health practitioners' ability to recognise the influence of ABST in the cognitive assessment of older adults and their perceptions of its impact in practice. Health practitioners (n = 129; 86% female; M age = 39.75, SD = 11.50) who had previous experience in conducting cognitive assessments with older adults completed an online survey comprising questions about their demographic and practice characteristics, ageing beliefs, a hypothetical cognitive assessment scenario, and perceived impact of ABST on practice. Health practitioners rated ABST factors in the assessment scenario as less detrimental to an older adult's cognitive performance than internal and external factors. Lower recognition of ABST in the assessment scenario and negative ageing beliefs significantly accounted for lower perceived impact of ABST on older adults' cognitive test performance in practice (R^2 = .37, p <.001), after accounting for other health practitioner variables. Overall, the results showed that health practitioners may not recognise the influence of ABST on assessment findings with older adults, especially if they hold negative ageing beliefs. The findings highlighted the need to improve health practitioners' knowledge of ABST to increase the validity of cognitive testing in older adults.

Study 3 was an experiment that examined the effectiveness of a multiple group membership intervention for reducing the effects of ABST on older adults' objective memory performance and subjective memory concerns. Healthy older adults (n = 68), aged 60-97 years, were allocated to an ABST+TR or ABST + active control (ABST+AC) condition. After activation of ABST, the ABST+TR condition completed a group-listing task and the ABST+AC condition completed a meal-listing task. Participants completed the Rey Auditory Verbal Learning Test and the Everyday Memory Questionnaire – Revised as the outcome measures. One significant difference was found in memory performance between the

conditions; after controlling for age, gender, and number of items generated in the listing tasks, those in the ABST+TR condition performed significantly better on the memory interference trial. Further, a greater number of group memberships listed was associated with better memory performance in the ABST+TR condition. Unexpectedly, participants in the ABST+TR condition reported significantly more subjective memory concerns than those in the ABST+AC condition. Overall, the findings indicated that raising the salience of multiple group memberships may be somewhat protective for older adults' cognitive test performance in the context of ABST. Nevertheless, TR interventions that involve listing group memberships may also inadvertently increase subjective memory concerns, potentially through priming the realisation of social losses among those with few group memberships.

Overall, this thesis advances understanding of health practitioner beliefs regarding ABST in clinical practice and ways to alleviate its impact on older adults' cognitive test performance. Key novel findings were that subtle TR interventions currently have the most consistent empirical support within the literature. However, the design of most existing studies prevents the drawing of clear conclusions regarding the efficacy of TR strategies in overcoming ABST (Study 1). In addition, it was revealed that health practitioners may not recognise the potentially detrimental influence of ABST in clinical contexts with older adults (Study 2). Finally, findings from a multiple group membership intervention were mixed; providing some protection for memory when controlling for demographics and listed items, but also being a possible source of subjective memory concern (Study 3). Collectively, these findings highlight the need for ongoing examination of ways to effectively address the impact of ABST on the cognitive test performance of older adults, as well as the importance of health practitioner education and training regarding the phenomenon. Research that improves the evidence base on ways to reduce ABST has the potential to increase the validity of cognitive test performance in older adults.

Statement of Originality

This work has not been previously submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Giverny Jayne Parker

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List of Abbreviations

ABST	Age-Based Stereotype Threat
ABST+AC	Age-Based Stereotype Threat + Active Control
ABST+TR	Age-Based Stereotype Threat + Threat-Removal
EMQ-R	Everyday Memory Questionnaire – Revised
ERA	Expectations Regarding Ageing
GAI	Geriatric Anxiety Inventory
GDS	Geriatric Depression Scale
MCI	Mild Cognitive Impairment
MIA	Metamemory in Adulthood
RAVLT	Rey Auditory Verbal Learning Test
TICS-M	Modified Telephone Interview for Cognitive Status
TOPF	Test of Premorbid Functioning
TR	Threat-Removal

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Acknowledgement of Published Papers included in this Thesis

Section 9.1 of the Griffith University Code for the Responsible Conduct of Research ("Criteria for Authorship"), in accordance with Section 5 of the Australian Code for the Responsible Conduct of Research, states:

> To be named as an author, a researcher must have made a substantial scholarly contribution to the creative or scholarly work that constitutes the research output, and be able to take public responsibility for at least that part of the work they contributed. Attribution of authorship depends to some extent on the discipline and publisher policies, but in all cases, authorship must be based on substantial contributions in a combination of one or more of:
>
> - Conception and design of the research project.
> - Analysis and interpretation of research data.
> - Drafting or making significant parts of the creative or scholarly work or critically revising it so as to contribute significantly to the final output.

Section 9.3 of the Griffith University Code ("Responsibilities of Researchers"), in accordance with Section 5 of the Australian Code, states:

> Researchers are expected to:
>
> - Offer authorship to all people, including research trainees, who meet the criteria for authorship listed above, but only those people.
> - Accept or decline offers of authorship promptly in writing.
> - Include in the list of authors only those who have accepted authorship.
> - Appoint one author to be the executive author to record authorship and manage correspondence about the work with the publisher and other interested parties.

- Acknowledge all those who have contributed to the research, facilities or materials but who do not qualify as authors, such as research assistants, technical staff, and advisors on cultural or community knowledge. Obtain written consent to name individuals.

Included in this thesis are papers in Chapters 3, 4, and 5 which are co-authored with other researchers. My contribution to each co-authored paper is outlined at the front of each relevant chapter. The bibliographic details/statuses for these papers, including all authors, are:

Chapter 3: **Parker, G. J.**, Ownsworth, T., Haslam, C., & Shum, D. H. K. (2022). Overcoming age-based stereotypes to optimise cognitive performance in older adults: A systematic review of methodology and existing evidence. *The Gerontologist*, *62*(3), e206-e223. doi:10.1093/geront/gnaa191

Chapter 4: **Parker, G. J.**, Haslam, C., Stuart, J., Shum, D. H. K., & Ownsworth, T. (Under review). Health practitioner beliefs regarding the impact of age-based stereotype threat on performance in the cognitive assessment of older adults.

Chapter 5: **Parker, G. J.**, Haslam, C., Stuart, J., Shum, D. H. K., & Ownsworth, T. (Manuscript submitted for publication). Examining the utility of a multiple group membership intervention for alleviating the effects of age-based stereotype threat on older adults' memory performance.

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) [redacted] (Date) 01/08/2022

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Supervisor: Professor Tamara Ownsworth

Chapter 1: Introduction and Orientation to the Thesis

As global life expectancy increases and more people live well into older age, the number of individuals living with dementia, and milder forms of cognitive impairment, is expected to increase (Alzheimer's Disease International, 2020; World Health Organization, 2016). There are currently over 50 million people living with dementia worldwide, a figure that is predicted to increase to 152 million by 2050 (Alzheimer's Disease International, 2020). This trend is accompanied by burgeoning financial costs (estimated at US$1.3 trillion worldwide in 2019, and rising to US$2.8 trillion by 2030) associated with providing medical, social, and informal care to people living with dementia (World Health Organization, 2021). In the absence of curative treatments for dementia in the near future (Winblad et al., 2016), health practitioners and researchers are focusing on addressing modifiable risk factors (Barnes & Yaffe, 2011), early screening, and timely diagnosis to better manage the symptoms and societal impacts of the disease (Dubois et al., 2015; Owens et al., 2020). Consequently, it is expected that older adults will be increasingly subjected to cognitive screening and assessment during their interactions with health care practitioners (Le Couteur et al., 2013; Swift et al., 2021).

Initiatives to screen older adults for pre-dementia syndromes and identify those who could go on to develop dementia may have unintended harmful consequences (Dubois et al., 2015; Le Couteur et al., 2013; Owens et al., 2020). Of particular concern is that striving for early identification and intervention may contribute to the overdiagnosis or false positive diagnoses of mild cognitive impairment and dementia (Le Couteur et al., 2013). This may, in turn, lead to unwarranted medical procedures, as well as undue stress and anxiety for individuals who are not developing dementia (Corner & Bond, 2006; Owens et al., 2020; Sabat, 2006). Importantly, the cognitive test performance of older adults is not only affected by age-related neuropathological changes, but also by the social context in which assessments

occur (Ben-David et al., 2018). In particular, negative stereotypes about ageing may be activated in testing situations and bias older adults' expectations of how they will perform on neuropsychological assessment, potentially interfering with cognitive functioning and contributing to poorer test performance (Régner et al., 2016).

Social identity threat or *stereotype threat* (Steele, 1997; Steele & Aronson, 1995; Steele et al., 2002) occurs when a person is made aware of negative stereotypes associated with their social group membership and their performance in stereotype-relevant domains is adversely impacted as a result. Social identity threat was initially introduced to understand academic underperformance in racial minority groups and women (Steele et al., 2002), but has subsequently been examined in the context of ageing with particular emphasis on memory underperformance (Barber, 2017). Stereotype threat concerning ageing has been shown to negatively impact test performance in different cognitive domains (e.g., memory, problem solving, inhibitory control) for older adults. Known as *age-based stereotype threat* (ABST), empirical research has robustly demonstrated detrimental effects on the cognitive test performance of older adults (Armstrong et al., 2017; Lamont et al., 2015). Older adults' performance on cognitive tests can have significant implications for their health care and decisions impacting their quality of life (Barber, 2020; Ben-David et al., 2018). By contributing to underperformance on neuropsychological tests, ABST poses serious risks to the validity of assessments used to screen older adults for cognitive impairment and to support a diagnosis of dementia (Régner et al., 2016).

Social identity theory (Tajfel & Turner, 1979) contends that people derive part of their self-concept from their perceived membership of relevant social groups. When integrated as part of the self or identity, social groups can influence people's thoughts, emotion, and behaviour. Important for the present thesis is the capacity for social groups to enrich people's lives by enabling beneficial psychological resources. These include companionship, practical

and emotional support, agency, self-esteem, learning, intellectual stimulation, and meaning in life (Haslam et al., 2018b; Jetten et al., 2017). Social groups also substantially influence health, resilience, and psychological well-being by buffering the effects of stress and life adversity (Greenaway et al., 2016; Haslam et al., 2018b). However, these effects of group identification are not always positive; particularly when groups engage in harmful health behaviours, or as relevant to this thesis, when the group is stigmatised or associated with negative stereotypes (Haslam et al., 2018a; Jetten et al., 2017).

Age group, for example, is a salient basis for self-definition, and this is especially the case for older individuals (Giles & Reid, 2005; Haslam et al., 2018a). However, unfavourable stereotypes abound regarding the cognitive capabilities of older adults (e.g., that older people are slow and forgetful; Cuddy et al., 2005; Haslam et al., 2018a). Holding negative perceptions of ageing is associated with a range of poor health outcomes in later life (Barber, 2020; Nelson, 2016). Moreover, research suggests that negative ageing stereotypes have the potential to lower older adults' performance on tests of memory, global cognition, and physical ability, bringing into question the validity of the results from such assessments (Haslam et al., 2012; Régner et al., 2016; Scholl & Sabat, 2008; Swift et al., 2021).

These influences of ABST on older adults' cognitive test performance are particularly important to understand and prevent in light of anticipated increases in the number of older adults being screened for mild cognitive impairment and dementia (Barber, 2017; Lamont et al., 2015; Régner et al., 2016; Swift et al., 2021). Clear gaps remain within the ABST research literature. Specifically, research has mostly focussed on the poorer cognitive test performance older adults exhibit when presented with negative information about ageing and cognitive ability that activates ABST (Armstrong et al., 2017; Lamont et al., 2015). Far less research has investigated whether health practitioners recognise its possible influence on cognitive assessment, and ways in which the adverse effects of ABST can be reduced, or

ideally eliminated. Health practitioners involved in conducting cognitive tests and interpreting performance have an integral role to play, both in judging older adults' cognitive capacity, including diagnostic decisions, and critically helping clients to overcome any potential effects of ABST on performance.

The current thesis aimed to address these gaps in the literature by exploring health practitioners' perceptions of the impact of ABST on the cognitive test performance of older adults and evaluating the effectiveness of threat-removal (TR) strategies for optimising cognitive test performance. It is expected that this research will advance understanding of health practitioners' beliefs regarding the impact of ABST in clinical practice and ways to alleviate the impact of ABST on older adults' cognitive assessment performance. Figure 1.1 summarises the aims of each study and the corresponding order of presentation in this thesis.

Chapters and Aims of the Thesis

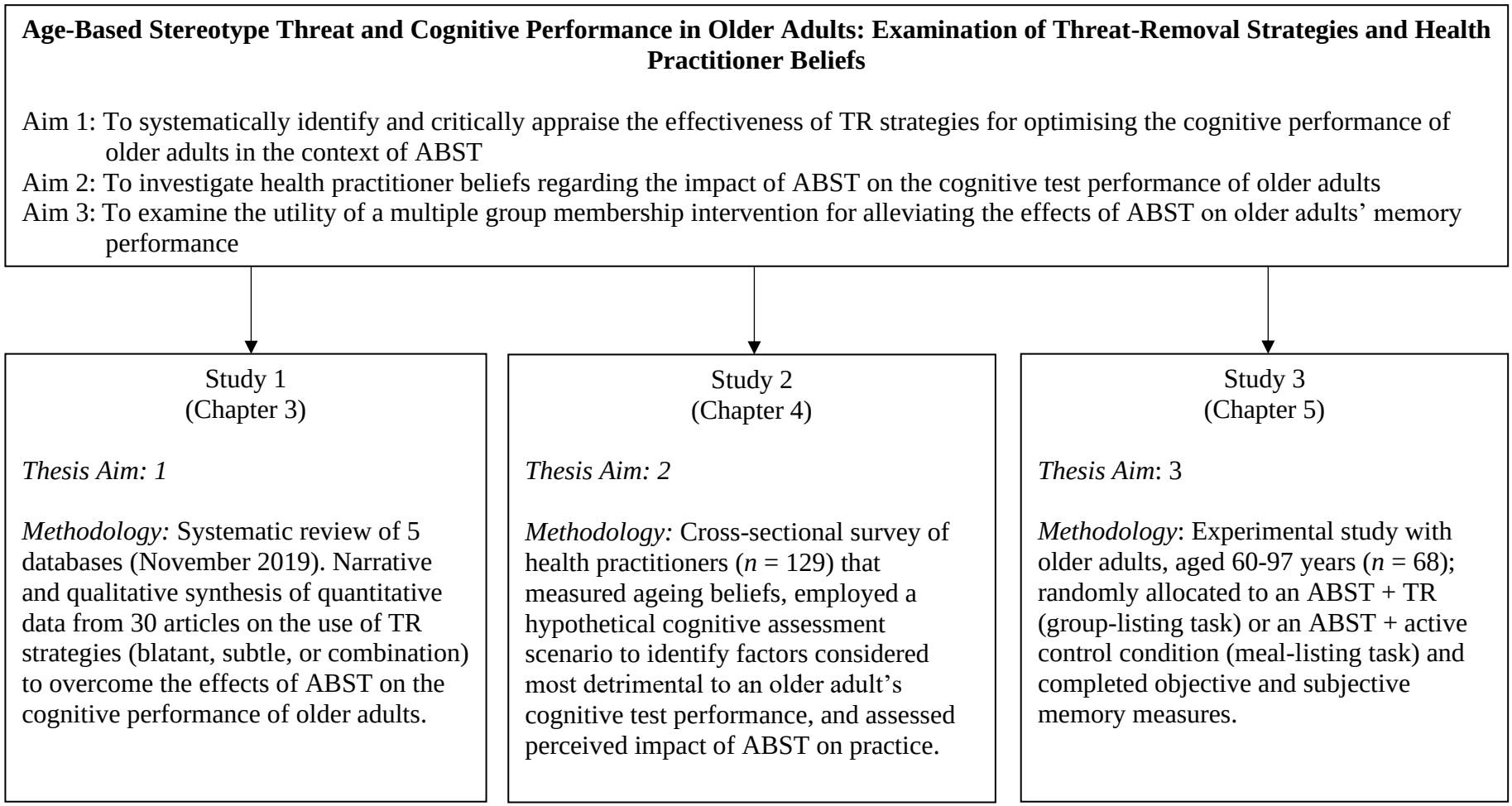
This thesis includes six chapters: A brief introduction and orientation to the thesis (Chapter 1); a general introduction to ABST and cognitive performance in older adults (Chapter 2); a systematic review (Chapter 3); a survey of health practitioners (Chapter 4); an experimental study with older adults (Chapter 5); and a general discussion (Chapter 6). Study 1 (Chapter 3) has been published in an international peer-reviewed journal, Study 2 (Chapter 4) has been revised and is under review with an international peer-reviewed journal, and Study 3 (Chapter 5) has been submitted to an international peer-reviewed journal. All chapters are presented in accordance with the Publication Manual of the American Psychiatric Association, Seventh Edition (2020).

Chapter 2: General Introduction to ABST and Cognitive Performance in Older Adults

Chapter 2 provides an overview of background literature relevant to ABST. This includes information on population ageing and dementia, the social and psychological implications of cognitive assessment and diagnosis, stereotypes of ageing, and stereotype

Figure 1.1

Summary of the Aims and Order of Studies in the Thesis



threat. Theoretical frameworks underpinning the current research are outlined, and the current evidence and knowledge gaps in the ABST research literature are summarised, leading to the rationale for and aims of the studies comprising the thesis.

Chapter 3: Overcoming Age-Based Stereotypes to Optimise Cognitive Performance in Older Adults: A Systematic Review of Methodology and Existing Evidence

Chapter 3 presents a systematic review published in *The Gerontologist* (Parker et al., 2022) that aimed to identify and critically appraise the methodology and existing evidence of studies investigating TR strategies to optimise the cognitive performance of older adults in the context of ABST. Specifically, the review aims were to: 1) identify the types of TR strategies employed to address the detrimental effects of ABST on cognitive performance in older adults; and 2) critically appraise the methodology and existing evidence of studies evaluating the effectiveness of TR strategies for optimising the cognitive performance of older adults and factors influencing their effectiveness.

Chapter 4: Health Practitioner Beliefs Regarding the Impact of ABST on Performance in the Cognitive Assessment of Older Adults

Chapter 4 presents a survey of health practitioners (n = 129) that is currently under review by an international peer-reviewed journal. This study aimed to investigate health practitioners' beliefs regarding the impact of ABST on the cognitive test performance of older adults. Specifically, the study aims were to: 1) investigate health practitioners' ability to recognise the potential influence of ABST in the cognitive assessment of older adults, and 2) investigate factors associated with health practitioners' recognition of ABST and their perceptions of its impact on older adults' cognitive test performance in practice.

Chapter 5: Examining the Utility of a Multiple Group Membership Intervention for Alleviating the Effects of ABST on Older Adults' Memory Performance

Guided by the findings from Study 1, Chapter 5 presents an experimental study that examined the effectiveness of a multiple group membership intervention in alleviating the effects of ABST on older adults' (n = 68) memory outcomes. The aims were to: 1) investigate whether a subtle TR intervention (that involved increasing the salience of multiple group membership) would alleviate the impact of ABST on older adults' objective memory performance and subjective memory concerns. This manuscript has been submitted to an international peer-reviewed journal.

Chapter 6: General Thesis Discussion

Chapter 6 synthesises the key findings of each study and contextualises these within the existing literature. The general discussion also highlights the ways in which the current research has advanced knowledge in the field, including theoretical and clinical implications arising from the findings of the thesis. Methodological limitations and recommendations for future research are also discussed.

Chapter 2: General Introduction to ABST and Cognitive Performance in Older Adults

Population Ageing and Dementia

Population ageing due to increasing life expectancy is a major global issue (World Health Organization, 2016). In Australia alone, the number of people aged 65-84 years is projected to more than double (from 3.1 to 7 million) by 2055, while the number of those aged 85 years and over will quadruple (from 500,000 to 2 million; Commonwealth of Australia, 2015). One of the anticipated consequences of this trend is an increase in the number of people living with dementia. The number of Australians living with dementia currently exceeds 386,200 and, in the absence of the development of effective preventative or curative treatments, is expected to more than double; reaching 849,300 by 2058 (Australian Institute of Health and Welfare, 2021). Worldwide, there are over 50 million people living with dementia, which is also predicted to increase to 152 million by 2050 (Alzheimer's Disease International, 2020). Furthermore, the costs associated with managing dementia are high. The total estimated worldwide cost of dementia is over US$1.3 trillion, and this figure is anticipated to rise to US$2.8 trillion by 2030 (World Health Organization, 2021). Population ageing and dementia therefore present substantial global challenges to health and aged care, as well as economic and social policy.

Relatedly, the question of what constitutes 'normal' cognitive ageing has been the subject of much research in the ageing field. Cross-sectional research has consistently shown increasing age to be associated with poorer cognitive performance (Salthouse, 2009). However, longitudinal studies show that the majority of adults maintain generally stable cognitive functioning as they age, with many individuals only showing more marked cognitive decline closer to death (Burns & Morris, 2008; Howieson et al., 1997; Karr et al., 2018; Rubin et al., 1998; Schaie & Willis, 2016; Storandt et al., 2002). Thus, while the proportion of individuals who show cognitive decline increases with each decade lived over

60 years of age, substantial decline and pathology are not inevitable with ageing (Burns & Morris, 2008; Kawas et al., 2021; Schaie & Willis, 2016). Nevertheless, a significant subgroup of older adults show progressive cognitive and functional impairment in early, middle, or advanced old age and are diagnosed with dementia (Schaie & Willis, 2016; Smith, 2016).

Dementia is characterised by a progressive and irreversible deterioration of cognitive, behavioural, social, motor, and sensory functioning over time, and is the result of various neurodegenerative pathologies such as Alzheimer's disease, frontotemporal dementia, vascular dementia, and dementia with Lewy bodies (American Psychiatric Association, 2013; Lezak et al., 2012). Alzheimer's disease is the most common cause of dementia, with more than two-thirds of all dementia cases attributable to this disease, and its prevalence increases with age – from less than 1% under 60 years of age to greater than 40% above 85 years of age (Beydoun et al., 2014; Burns & Morris, 2008; Lezak et al., 2012). While there have been reports that the population incidence of dementia is declining (Wolters et al., 2020), in the absence of the development of curative treatment, dementia prevalence and its associated burden will continue to increase as average life expectancy and the number of at-risk older persons increases (Satizabal et al., 2016).

Currently, no treatment halts or reverses the underlying pathology of Alzheimer's disease and other dementias (Winblad et al., 2016). The absence of effective preventive measures or disease-modifying treatments for dementia has led to an increased focus on treating modifiable risk factors, early screening, and timely diagnosis in an attempt to reduce the incidence, delay onset, manage symptoms, and monitor progression to reduce the overall burden of the disease (Barnes & Yaffe, 2011; Dubois et al., 2015; Milne, 2010; Owens et al., 2020). It has been estimated that as many as one third to one half of all dementia cases are attributable to modifiable risk factors (Ashby-Mitchell et al., 2017; Norton et al., 2014).

These include hearing loss, diabetes, midlife obesity, midlife hypertension, physical inactivity, smoking, low educational attainment, social isolation, depression, and subjective cognitive decline (Ashby-Mitchell et al., 2017; Norton et al., 2014; Pike et al., 2021; Sutin et al., 2020). This knowledge of modifiable lifestyle risk factors for dementia has contributed to a burgeoning area of research that focuses on how individuals can play an active role in reducing their risk of developing dementia and maintain their cognitive health into older age (Lisko et al., 2021; Norton et al., 2014; Smith, 2016). In addition, greater focus is being placed on improving and increasing dementia screening to aid the early detection of individuals who are asymptomatic, or have only mild symptoms, but are likely to develop dementia (Burns & Morris, 2008; Le Couteur et al., 2013; Owens et al., 2020).

In line with this emphasis on early identification of individuals at-risk of developing dementia, diagnostic terminology has evolved to include pre-dementia syndromes (Burns & Morris, 2008; Le Couteur et al., 2013; Smith, 2016). For instance, the term *mild cognitive impairment* (MCI) was introduced in the early 1990s (Flicker et al., 1991; Petersen et al., 1999; Petersen et al., 2014) to distinguish the intermediate stage between the cognitive changes associated with normal ageing and clinical dementia syndromes. The core clinical criteria for MCI across major diagnostic guidelines include 1) self- or informant-reported cognitive complaint, 2) objective cognitive impairment, 3) preserved independence in functional abilities, and 4) the absence of dementia (for a review, see Petersen et al., 2014). Clinical practice guidelines and consensus statements recommend the use of biomarker assessments (e.g., cerebrospinal fluid and neuroimaging) and neuropsychological testing (viz. cognitive testing, assessment of activities of daily living, and functional assessment) in the screening and diagnosis of MCI (Chen et al., 2021). Despite considerable variability in the way MCI has been operationalised across clinical practice guidelines and consensus statements (Chen et al., 2021), the prevalence of MCI has been estimated to range from 3%

to 42% in individuals 65 years and older, with prevalence rising with increasing age, particularly between the ages of 65 and 85 years (Petersen et al., 2014; Ward et al., 2012). Moreover, individuals meeting the criteria for MCI are at increased risk of future cognitive decline and progression to a dementia disorder over time (Albert et al., 2011; Plassman et al., 2008; Winblad et al., 2004).

While the goal of early screening and identification of potentially progressive dementia syndromes is important, distinguishing the cognitive changes that constitute normal ageing from the cognitive changes that reflect a dementia disorder (or the early stages of such) is fraught with difficulty (Burns & Morris, 2008; Lezak et al., 2012). The use of MCI as a diagnostic entity in its own right has rapidly gained momentum, yet there is growing concern over its validity as a condition and its diagnostic criteria, as well as their sensitivity and specificity in identifying individuals who will develop clinical dementia (Klekociuk et al., 2016). In particular, there is considerable variability in the progression versus remission of MCI. Approximately 5% to 15% of people identified as having MCI convert to a diagnosis of dementia annually, while most do not progress; either remaining stable or showing improved performance in line with age-appropriate levels of cognitive functioning, even at 10-year follow-up (Han et al., 2012; Mitchell & Shiri-Feshki, 2009; Plassman et al., 2008; Summers & Saunders, 2012). Indeed, most individuals with MCI do not show structural brain changes consistent with the early stages of dementia (Stephan et al., 2012). Furthermore, while MCI inherently carries the assumption of incipient dementia, these findings show it is a heterogeneous condition that can encompass individuals with non-progressive conditions. This could include the ‘worried well’, or individuals with reversible forms of cognitive impairment stemming from the effects of medical illnesses or medications, depression or anxiety disorders, and subjective cognitive decline (Burns & Morris, 2008; Edmonds et al., 2014; Le Couteur et al., 2013).

More generally, there is considerable controversy over whether MCI is indeed a prodromal stage of dementia or whether the evolution of pre-dementia terminology is medicalising normal age-related cognitive decline and thus overestimating the prevalence of older adults experiencing genuine cognitive decline (Klekociuk et al., 2016; Le Couteur et al., 2013; Milne, 2010). Nonetheless, belief in the value of screening for pre-dementia syndromes and applying diagnostic terminology is gaining widespread support in clinical practice (Le Couteur et al., 2013). Given current biomarkers (e.g., neuroimaging and cerebrospinal fluid) are not sufficiently reliable for predicting the progression of MCI or detecting early dementia (Ahmed et al., 2014; Petersen et al., 2018), neuropsychological assessment and evaluation play a crucial role in diagnosis early in the course of degenerative diseases, as well as in ongoing monitoring (Chen et al., 2021; Lezak et al., 2012). With more widespread screening encouraged to aid earlier detection of cognitive impairment and diagnosis of dementia, there is growing debate over the potential benefits and harms of such an approach (Dubois et al., 2015; Le Couteur et al., 2013; Lin et al., 2013; Martin et al., 2015; Owens et al., 2020).

An emerging concern is that the current emphasis on early identification of dementia may lead to overdiagnosis or false positive diagnoses (Edmonds et al., 2015; Le Couteur et al., 2013), especially in the context of increasing pressure on health practitioners to routinely screen for dementia based on minimal history and the widespread use of rapid screening devices such as short cognitive tests (Borson et al., 2013; Brown, 2015; White & Spooner, 2016). Notably, a meta-analysis of 15 studies indicated that dementia is incorrectly identified by general practitioners in 20% of patients (Mitchell et al., 2011). Moreover, an investigation of the use of MCI diagnostic criteria (Winblad et al., 2004) resulted in a false positive diagnosis of MCI for 23.73% of the sample (Klekociuk et al., 2014). Therefore, although increased screening and early identification may be beneficial to initiate treatment and care planning, exposing people to screening for memory and cognitive problems unnecessarily

may increase the risk of overidentification and labelling those not developing dementia (Le Couteur et al., 2013; Owens et al., 2020).

Psychological and Social Implications of Cognitive Assessment and Diagnosis

Currently, early screening and diagnosis of pre-dementia syndromes, such as MCI, is widely considered beneficial given it allows for the provision of referral and access to specialist information and support, which is believed to maximise any benefits of disease modifying treatments (Corner & Bond, 2004; Lin et al., 2013; Owens et al., 2020; Petersen et al., 2014). However, the potential for misdiagnosis and unwarranted intervention may have unintended adverse effects for older individuals who are not developing dementia (Le Couteur et al., 2013).

Consequences of misdiagnosis can include adverse effects from the prescription and use of unnecessary 'anti-dementia' medications (e.g., acetylcholinesterase inhibitors), and financial costs from the utilisation of health care services (Le Couteur et al., 2013; Owens et al., 2020). On an individual level, receiving a diagnosis of MCI can cause undue anxiety and stress related to the prospect of ongoing health decline, loss of independence (e.g., driving capacity) and dignity, as well as negatively impact the individual's sense of self and psychological wellbeing (Beard & Neary, 2013; Corner & Bond, 2006; Lingler et al., 2006; Sabat, 2006). Furthermore, having negative perceptions of ageing, an older subjective age, and perceived or expected cognitive decline may contribute to further cognitive decline and the development of dementia among older adults (Levy et al., 2016; Pike et al., 2021; Robertson et al., 2016; Stephan et al., 2017). More broadly, family members are faced with the prospect of caring for someone with a progressive disease. Indeed, the case of a woman incorrectly diagnosed with Alzheimer's disease has illuminated the detrimental consequences of receiving a false positive diagnosis (Merckelbach et al., 2012).

Specifically, Merckelbach and colleagues (2012) reported on the case of a 58-year-old Dutch woman who consulted a neurologist due to memory concerns. She had a family history of Alzheimer's disease and had begun to require a calendar to remember appointments. Based on the woman's concerns and the neurologist's assessment, which included an account of her medical history, neuroimaging, and an estimated Mini-Mental State Examination score, she was diagnosed with mild-to-moderate Alzheimer's disease and prescribed rivastigmine. In the months after receiving the diagnosis, the woman was reported to be "permanently in a state of confusion" (Merckelbach et al., 2012, p. 61) and experienced suicidal ideation. After she was encouraged to seek a second opinion and a more comprehensive neurological examination was performed (including further neuroimaging and a neuropsychological assessment), the diagnosis was revoked. This was explained to the patient, however, it proved difficult to convince her that she was not experiencing the initial symptoms of dementia. Merckelbach et al. (2012) argued that the woman's firm belief that she had Alzheimer's disease resembled the development of false memories and that the diagnosis proved intractable not only because it made sense of her experience but also because it was provided by a person of authority. However, the case also demonstrates how a person can internalise the category of 'dementia sufferer', and continue to experience decline as a consequence of living out the meaning of this self-categorisation (Haslam et al., 2018a). Hence, misdiagnosis can have pervasive and chronic effects on people's lives and health outcomes.

Despite the likelihood of normative ageing processes, older adults are likely to hold pre-conceived ideas about the relationship between ageing and cognition. With increased awareness of dementia in society, many older adults are fearful of developing the condition (Corner & Bond, 2004; Cutler, 2015; Suhr & Kinkela, 2007). This can lead healthy older adults, and their families, to become more mindful of their memory abilities and worry over potentially benign age-related cognitive changes. Such behaviour, referred to as *anticipatory*

dementia, may lead individuals to seek formal assessment (Cutler & Hodgson, 1996; Kinzer & Suhr, 2016; Le Couteur et al., 2013; Milne, 2010; Scholl & Sabat, 2008).

A considerable body of research has demonstrated that people's beliefs about their own abilities and related perceptions of *self-efficacy*, play a key role in their performance (Bandura, 1989). Of particular concern for older individuals is that people's sense of efficacy about their memory abilities (i.e., memory self-efficacy), decreases with age and is related to memory performance (Beaudoin & Desrichard, 2011). Many older adults believe that their memory abilities decline with age and feel helpless in preventing this decline or improving their memory performance (Beaudoin & Desrichard, 2017; Hertzog et al., 1990; Lachman, 1991). Negative appraisals of one's own memory have been associated with several other behavioural outcomes, including reduced motivation, effort, and strategy use during memory tasks, avoidance of situations which require good memory function, dependency, anxiety and depression, disengagement and social withdrawal, as well as unnecessary medical attention or medication use (Bandura, 1989; Beaudoin & Desrichard, 2011). Furthermore, beliefs about one's own memory ability declining and perceived helplessness in being able to prevent further decline contribute to older adults' poorer performance on memory tests (Beaudoin & Desrichard, 2017; Desrichard & Köpetz, 2005; Hertzog et al., 1990; Lachman, 1991). A view that is gaining increasing empirical support is that psychosocial and contextual factors play a critical role in the outcomes of cognitive assessment (Ben-David et al., 2018). In particular, the abundance of age-related stereotypes in our society may have detrimental effects on the cognitive test performance of older adults who are conscious of their age.

Stereotypes of Ageing

Crucial to the promotion of healthy cognitive ageing is challenging the widespread negative stereotypes regarding the cognitive and physical competence of older individuals, especially in Western cultures (Nelson, 2016; Swift et al., 2017). Mainstream society holds

pervasive stereotypes of older adults as warm, albeit incompetent (Cuddy & Fiske, 2002; Cuddy et al., 2005). Furthermore, assumptions that advanced age is a time of memory and cognitive decline, as well as the development of other undesirable psychological and physical characteristics, tend to be more prevalent than positive stereotypes of ageing (e.g., wisdom, knowledge, and life experience; Hummert, 2011). Such stereotypes are often acquired unconsciously in childhood through various environmental sources (e.g., family and media), reinforced during adulthood, and become increasingly self-relevant as a person ages (Allport, 1954; Haslam et al., 2018a; Kotter-Grühn & Hess, 2012; Scholl & Sabat, 2008).

Holding negative perceptions of ageing or negative ageing stereotypes earlier in life has been associated with poorer long-term cognitive and physical outcomes, including greater cognitive decline, brain changes associated with Alzheimer's disease (e.g., accumulation of amyloid plaques and neurofibrillary tangles, hippocampal-volume loss), and higher mortality rate (Levy et al., 2016; Robertson et al., 2016; Stewart et al., 2012). Furthermore, it has been proposed that negative ageing stereotypes (e.g., that old people are slow and incompetent) may implicitly permeate cognitive testing situations and bias older adults' expectations of how they will perform on neuropsychological assessment, potentially contributing to poorer test scores and inflating diagnostic rates of MCI and dementia (Gauthier et al., 2019; Régner et al., 2016; Scholl & Sabat, 2008).

In addition to the stress that attending hospitals and memory clinics and completing cognitive tests can elicit for older adults (Manthorpe et al., 2013), such health contexts may unintentionally serve as a reminder of older adults' age and make salient a host of negative stereotypic expectations associated with ageing (e.g., the inevitability of physical illness and cognitive decline; Haslam et al., 2018a; Scholl & Sabat, 2008; Swift et al., 2016). These threats can have adverse effects on the test performance of healthy older adults, especially those involving memory (Schlemmer & Desrichard, 2018). Indeed, taking a memory test, or

even simply being in a context where memory testing is anticipated, has been found to lead older adults to subjectively report feeling older than their actual age (Hughes et al., 2013). Moreover, older adults' apprehension of confirming internalised negative ageing stereotypes may create additional performance anxiety when completing cognitive assessments (Régner et al., 2016). This increased anxiety could tax their cognitive resources (e.g., working memory capacity) and undermine successful test performance, leading older individuals to perform below their true abilities (Mazerolle et al., 2012; Régner et al., 2016; Schmader & Johns, 2003). It follows that such a phenomenon, referred to as *stereotype threat*, could be quite problematic in the context of screening older adults for cognitive impairment and dementia; assessments which predominantly comprise tests of memory ability.

Stereotype Threat

Many in society belong to one or more groups for which negative stereotypes exist (e.g., racial minorities, women, and the elderly; Steele et al., 2002). In settings where group stereotypes apply, situational cues can arise that place the individual under threat of devaluation and discrimination (Steele et al., 2002). Stereotype, or *social identity*, threat occurs when individuals face a situation that puts them at risk of confirming or being judged by a negative stereotype about a group they belong to and identify with, which leads them to underperform on stereotype relevant tasks (Steele & Aronson, 1995; Steele et al., 2002). For this to occur, individuals do not necessarily have to endorse the relevant stereotype, but they must recognise that they belong to the stereotyped group, be aware of the stigma associated with membership of that particular group, and be aware that they could possibly be judged in accordance with the stereotype. That is, the stereotype must be personally relevant and present a threat to one's social identity (Steele & Aronson, 1995; Tajfel & Turner, 1979). Originally investigated in relation to stereotypes surrounding the intellectual test performance of African Americans and the mathematical achievement of women (Steele, 1997), a growing

body of research (e.g., Armstrong et al., 2017; Lamont et al., 2015; Meisner, 2012; Vailati Riboni & Pagnini, 2021) has studied the implications of the phenomenon for older adults' cognitive test performance based on prevalent negative ageing stereotypes (e.g., that older adults are forgetful due to their deteriorating memory abilities; Kit et al., 2008). Similar to the findings for other stigmatised racial and gender groups (Appel et al., 2015; Nguyen & Ryan, 2008; Steele et al., 2002), stereotype threat could also have detrimental effects on the performance of older adults during real-life, high stakes testing (e.g., assessment of cognitive impairment or dementia).

The literature on *age-based* stereotype threat (ABST) has robustly shown that the activation of negative ageing stereotypes (e.g., memory decline in old age) leads older adults to underperform on cognitive tests (Armstrong et al., 2017; Lamont et al., 2015; Meisner, 2012; Vailati Riboni & Pagnini, 2021). Typically, experimental studies have demonstrated the detrimental effects of ABST by comparing the memory test performance of older adults in heightened threat conditions (e.g., task instructions emphasise the memory component of a test) with that of older adults assigned to reduced threat conditions (e.g., tests are presented as non-memory tasks; Chasteen et al., 2005; Desrichard & Köpetz, 2005; Hess et al., 2003; Mazerolle et al., 2012). A variety of situational or instructional cues have been used to induce ABST (Vailati Riboni & Pagnini, 2021). These cues vary in their explicitness, ranging from subtle (e.g., participants are told that a task is diagnostic of memory ability) to blatant (e.g., participants are given 'scientific' articles presenting evidence that older adults have poorer memory abilities than young adults) manipulations (Armstrong et al., 2017; Lamont et al., 2015). Concerningly, these cues do not need to be overtly threatening to affect performance. Understandably, the instructions for most memory tests emphasise the memory requirements of the task and yet such language appears to automatically disadvantage older individuals (Desrichard & Köpetz, 2005; Rahhal et al., 2001). Thus, it is easy to imagine how ABST

could be elicited through standardised instructions used to prepare older adults for memory assessment and when introducing individual memory tests during the course of formal neuropsychological testing (Haslam et al., 2012; Régner et al., 2016).

Research is uncovering the applied health implications of ABST for older adults (Barber, 2020). Specifically, research has shown that when older adults are presented with negative ageing stereotypes, their self-reported symptoms of age-related health problems increase (e.g., suspected hearing loss, cognitive decline, and onset of dementia; Barber & Lee, 2016; Bouazzaoui et al., 2016; Caughie et al., 2022; Fourquet et al., 2020; St Claire & He, 2009; Wong & Gallo, 2019). In addition, their performance on physical tasks (e.g., gait speed, handgrip strength, and persistence) and driving also declines (Hausdorff et al., 2019; Lambert et al., 2016; Swift et al., 2012). Regarding cognitive performance, ABST has been shown to significantly impair older adults' performance on mental status examinations used widely in dementia assessment (e.g., Addenbrooke's Cognitive Examination-Revised [ACE-R], Mini-Mental State Examination [MMSE], and Montreal Cognitive Assessment [MoCA]; Barber et al., 2015; Haslam et al., 2012; Mazerolle et al., 2017). Alarmingly, ABST reduced performance on these cognitive screening tests to the extent that substantial proportions of older adults in the threat conditions (i.e., 40-72%) met clinical cut-off scores for suspected MCI or dementia, compared to older adults in reduced threat conditions (10-14%; Haslam et al., 2012; Mazerolle et al., 2017).

Social identity theory (Tajfel & Turner, 1979) and its application to health (Haslam et al., 2018b) provides an account as to why age-based group membership can have such effects on the cognitive performance of older adults. Specifically, social group memberships provide a meaningful basis for identification and belonging, and this can impact performance when the group membership is integrated as part of one's identity. When that is the case and the identity is salient (e.g., cued by situational circumstances), a person will think, feel, and act,

in ways that are consistent with that identity (e.g., an older adult behaving as they expect an older adult to). For example, an older adult's beliefs and expectations can be informed by negative stereotypes about what ageing and the self-category of "old" entails (e.g., memory loss; Giles & Reid, 2005; Haslam et al., 2012). This is illustrated by the aforementioned case of a 58-year-old Dutch woman misdiagnosed with Alzheimer's disease (Merckelbach et al., 2012). This case demonstrates that the effects of ageing stereotypes are not always transient, and can have an ongoing impact on behaviour. Hence, older adults' test performance and ongoing behaviour can be compromised by age-based group membership and self-categorisation (Haslam et al., 2012).

Various factors which increase older adults' susceptibility to ABST have been identified. Interestingly, ABST appears to have greater impact on the performance of "young-old" adults (aged 60 to 70 years) compared to "old-old" adults (aged 71 to 82 years; Eich et al., 2014; Hess, Hinson et al., 2009). This could be due to the increased salience and self-relevance of ageing stereotypes for those entering older age compared to those more firmly established in old age (Hess, Hinson et al., 2009; Lamont et al., 2015; Régner et al., 2016; Scholl & Sabat, 2008). Based on Steele and Aronson's (1995) seminal research on stereotype threat, threat effects are thought to become more pronounced as one's identification with the stereotyped domain increases. Accordingly, older individuals who place greater value on their memory abilities seem to be more vulnerable to the effects of ABST (Hess et al., 2003). Moreover, older adults who are more educated (Hess, Hinson et al., 2009), have an external locus of control (Hehman & Bugental, 2013) or poor memory self-efficacy (Desrichard & Köpetz, 2005), more strongly identify with their age-group, and report high levels of stigma consciousness or perceived stereotype threat (Chasteen et al., 2005; Kang & Chasteen, 2009) also appear more susceptible to the effect of ABST. Culturally, there is ample evidence that ABST impairs the cognitive performance of older adults from Western cultures (Lamont et

al., 2015). However, research has begun to examine the implications for people from Eastern cultures, with evidence that ABST can also adversely affect the memory performance of Asian older adults (Febriani & Sanitioso, 2021; Liu et al., 2017; Tan & Barber, 2020).

Research has also revealed some of the possible mechanisms underlying the effects of ABST on the cognitive test performance of older adults. Stereotype threat theory proposes that once activated, a stereotype elicits fear within targeted individuals that they will confirm, and hence be judged in accordance with, the negative stereotype. This, in turn, elicits pressure to avoid stereotype fulfilment (Steele & Aronson, 1995; Steele et al., 2002). The performance pressure related to the evaluation of their memory abilities can then lead to underachievement (Barber & Mather, 2014). It has been proposed that increased levels of test-related anxiety (Abrams et al., 2006; Chasteen et al., 2005; Hess & Hinson, 2006) deplete cognitive resources, namely attention and working memory capacity, that would usually aid recall and successful task performance (Mazerolle et al., 2012; Sabat, 2006; Schmader & Johns, 2003). ABST may also reduce the memory self-efficacy of older adults whereby they expect to perform poorly on a memory test and underperform due to their reduced performance expectations (Desrichard & Köpetz, 2005). An alternative perspective, *regulatory fit*, contends that ABST impairs performance when there is a mismatch between a person's motivational focus and the reward structure of a task (Barber & Mather, 2014). Here, older adults exposed to ABST may shift from promotion (i.e., striving to provide correct responses) to prevention (i.e., aiming to avoid mistakes) in which they adopt a more cautious, risk-averse approach to tasks, slowing response times and reducing test scores (Barber et al., 2015).

Despite the lack of consensus regarding the mechanisms of ABST, it appears that a combination of heightened negative emotion, lowered performance expectations, executive control interference, and motivational factors, might underlie the relationship between ABST and cognitive test performance in older adults (Barber & Mather, 2014; Lamont et al., 2015).

Most importantly, the research literature on ABST has demonstrated how influential negative ageing stereotypes can be on older adults' cognitive test performance, leading to concerns that ABST could contribute to misleadingly poor results on clinical assessments of cognitive impairment and subsequent diagnostic decisions (Gauthier et al., 2019; Régner et al., 2016).

Current Evidence and Knowledge Gaps in the ABST Research Literature

Two key meta-analyses have reviewed and summarised the extant literature on ABST. Firstly, Lamont and colleagues (2015) reviewed 32 studies (including a combination of published and unpublished articles) that investigated the effects of ABST on older people's performance. The review differentiated stereotype-based (i.e., subtle) experimental manipulations of ABST from fact-based (i.e., blatant) ones and found that older adults displayed greater performance decrements from stereotype-based (d = 0.52) than fact-based ABST manipulations (d = 0.09). Moreover, effects were greatest for tests of general cognitive ability (i.e., tasks that measure broad cognitive skills such as problem-solving, mathematics, and processing speed; d = 0.36), as opposed to memory tests (i.e., tasks that measure the recognition or recall of novel information such as words, sentences, and shapes; d = 0.21). When examining comparison conditions, no differences were identified between control conditions that ignored ageing stereotypes and those that attempted to nullify ABST (Lamont et al., 2015). In the other meta-analysis, Armstrong and colleagues (2017) focused on ABST and older adults' memory performance, reviewing 19 published and four unpublished studies. Reliable effects of ABST emerged for both working memory (d = 0.37) and episodic memory (d = 0.25). However, the significance of these effects was contingent on the explicitness of the ABST manipulation; the effect of ABST was only significant when blatant manipulations were used with episodic memory tasks or when subtle manipulations were used with working memory tasks (Armstrong et al., 2017). Evidence of the detrimental effects of ABST on older adults' memory (Armstrong et al., 2017) and cognitive (Lamont et al., 2015) test performance

has been robustly demonstrated through these meta-analytic reviews. However, these studies, and subsequent reviews and commentary (Barber, 2017; Barber, 2020; Swift et al., 2021), have highlighted critical gaps in the ABST literature. These relate to the exploration of interventions to ameliorate the negative effects of ABST and the provision of recommendations for practitioners in contexts where these effects occur.

The research literature on ABST to date has predominantly focussed on the cognitive costs (i.e., performance decrements on memory and cognitive tests) older adults experience when exposed to negative ageing stereotypes. Far less focus has been placed on investigating ways to reduce the effects of ABST. Such knowledge, however, is crucial in determining how older adults can be assisted to reduce and overcome ABST-induced performance decrements which may contribute to false positive diagnoses of MCI and dementia (Gauthier et al., 2019; Régner et al., 2016). A variety of *threat-removal* (TR) strategies have been examined in other populations (e.g., African Americans and women) to address racial and gender-based stereotype threat (Nadler & Clark, 2011; Nguyen & Ryan, 2008; Walton & Cohen, 2003). For instance, these have included presenting tests as gender- or race-fair (Good et al., 2008), and stating that a stigmatised group (e.g., African Americans) performs better than a non-stigmatised one (e.g., White Americans; Cadinu et al., 2003). Similar strategies have then been applied in ABST studies to form reduced threat conditions (e.g., Barber et al., 2019; Mazerolle et al., 2012). However, research is yet to critically examine the types of TR strategies that have been used to date or their effectiveness in alleviating the effects of ABST.

Barber's (2017) review of the ABST literature provided theoretical guidance for the ongoing development and evaluation of effective TR strategies. Specifically, Barber (2017) argues that ABST poses a threat to the self-concept (or self-integrity) of older adults and that such threats may best be challenged by affirming their value in other domains of personal importance. Intertwining social identity theory, identification with multiple social groups can

have psychological benefits and buffer the effects of adverse life events (Haslam et al., 2018b). Identification with multiple social groups could also buffer the negative effects of ABST on older adults' cognitive performance. Similar strategies, where people are guided to see their self-concept as comprised of multiple roles and identities, have been beneficial in reducing stereotype threat among other populations (e.g., women; Gresky et al., 2005; Rydell et al., 2009). It is unclear, however, whether belonging to a greater number of groups or the subjective meaning of one's identification with groups is important. Moreover, research is yet to examine whether guiding older adults to think of their multiple social group memberships or identities can alleviate the negative effects of ABST on their memory test performance.

Before health practitioners involved in the cognitive screening and assessment of older adults can be provided with recommendations regarding ABST and the use of TR strategies, insights into their perceptions of the phenomenon would be beneficial. Activation of ABST can be achieved through seemingly innocuous situational or instructional cues (Kang & Chasteen, 2009; Nelson, 2016; Sabat, 2006). Older adults may be exposed to a significant amount of ABST when presenting to hospitals or 'memory clinics' for cognitive testing (e.g., seeing brochures on age-related health conditions such as stroke and dementia, writing down their age on an intake form). Moreover, health practitioners may inadvertently activate or exacerbate stereotype threat prior to, as well as during the course of, administering standardised cognitive assessment instructions and procedures (e.g., informing patients they will complete tests of their memory abilities). In order for testing environments to facilitate optimal performance and reduce the risk of misinterpreting older adults' poor test performance as evidence of pathological cognitive decline, health practitioners who conduct cognitive assessments with older adults should be aware of ABST. However, health practitioners' perceptions of ABST in clinical practice and their ability to recognise its potential influence in the cognitive assessment of older adults are yet to be evaluated.

Summary and Aims of the Current Research Project

As outlined in the preceding review, it is evident that psychosocial and contextual factors such as ABST can lead older adults to underperform on tests of their cognitive ability, aside from any possible effects of neuropathological change (Armstrong et al., 2017; Lamont et al., 2015). Without denying that normal ageing can be associated with cognitive decline, the extant literature has shown that negative ageing stereotypes may inflate the appearance of cognitive impairment in older adults (Gauthier et al., 2019; Haslam et al., 2012; Mazerolle et al., 2017; Régner et al., 2016). Alarmingly, however, such findings are yet to influence assessment and diagnostic practices with older adults in clinical settings (Barber, 2020; Haslam et al., 2012; Régner et al., 2016).

With worldwide population ageing and health systems increasingly striving to identify and treat MCI and dementia in a timely fashion, we can anticipate that the number of older adults being screened for cognitive impairment or dementia will increase in the coming years (Le Couteur et al., 2013). Indeed, in Australia alone, older adults represent an increasing proportion of those referred for cognitive assessment (Pachana et al., 2016). Given the significant clinical impression and diagnostic implications of underperformance on cognitive tests for this population, it is critical that tests of cognitive function are accurately introduced, administered, and interpreted in clinical practice (Pachana et al., 2016; Scholl & Sabat, 2008). It will therefore become increasingly pertinent for health practitioners to be able to recognise the potential influence of ABST on cognitive test performance and ensure low-threat testing environments when screening and assessing the cognitive abilities of older individuals.

It is currently unclear to what extent health practitioners recognise the detrimental effects of ABST on the cognitive assessment performance of older adults. Accordingly, research is needed to examine health practitioners' understanding of ABST and their beliefs regarding its impact in clinical practice. This knowledge would inform efforts to educate and

train health practitioners about ABST and strategies for reducing its influence. Furthermore, given concerns that ABST may prevent older adults from reaching their performance potential on cognitive measures, it is imperative to investigate ways to promote resistance to negative ageing stereotypes in the course of facilitating the optimal cognitive performance of older adults facing formal cognitive assessment (Barber, 2017; Lamont et al., 2015; Mazerolle et al., 2017). Specifically, the types of TR strategies that have been used with older adults and their effectiveness in assisting them to overcome the effects of ABST on their cognitive performance remains to be examined. Greater understanding here would better guide the future design and examination of TR interventions for ABST, especially those that could be used in clinical practice when preparing older adults for cognitive assessment.

Building upon the well-established research literature on ABST, the broad objectives of the current thesis were to investigate health practitioners' perceptions of the impact of ABST on the cognitive test performance of older adults and to evaluate the effectiveness of TR interventions for optimising cognitive test performance. To provide an initial foundation for the subsequent empirical studies, Study 1 (Chapter 3) involved a systematic review that aimed to identify and critically appraise the methodology and existing evidence concerning the effectiveness of TR strategies for optimising the cognitive test performance of older adults in the context of ABST. Study 2 (Chapter 4) aimed to survey health practitioners involved in the cognitive assessment of older adults to investigate their ability to recognise the influence of ABST on older adults' cognitive test performance and their perceptions of its impact in practice. Finally, Study 3 (Chapter 5) sought to examine the effectiveness of a TR strategy (viz. multiple group memberships) in alleviating the impact of ABST on the memory test performance of older adults.

Chapter 3: Statement of Contribution to Co-Authored Published Paper

This chapter includes a co-authored paper which has been published in an international peer-reviewed journal. This paper has been included as published with the exception of changes to style and formatting of headings, tables, figures, and referencing to maintain consistency throughout the thesis. The bibliographic details of the co-authored paper, including all authors, are:

Parker, G. J., Ownsworth, T., Haslam, C., & Shum, D. H. K. (2022). Overcoming age-based stereotypes to optimize cognitive performance in older adults: A systematic review of methodology and existing evidence. *The Gerontologist*, *62*(3), e206-e223. doi:10.1093/geront/gnaa191

The candidate's contribution to the paper involved conception of the study design, literature review, data extraction and synthesis, and writing of the manuscript.

(Signed) [redacted] (Date) 30/07/2022

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Chapter 3: Overcoming Age-Based Stereotypes to Optimise Cognitive Performance in Older Adults: A Systematic Review of Methodology and Existing Evidence

Introduction

Challenging negative stereotypes regarding the cognitive and physical competence of older adults is crucial to the promotion of healthy ageing (Nelson, 2016). Stereotypes are overstated beliefs or unchallenged myths that are widespread and entrenched within society (Allport, 1954). Most societies hold pervasive age-based stereotypes of older people as warm, albeit incompetent (Cuddy et al., 2005). Negative stereotypes of ageing, such as advanced age being a time of cognitive decline, tend to be more prevalent than positive stereotypes of ageing (e.g., wisdom and life experience; Hummert, 2011). Holding negative perceptions of ageing has been associated with poorer long-term health outcomes, including greater cognitive decline, brain changes associated with Alzheimer's disease, and reduced lifespan (Levy et al., 2016; Robertson et al., 2016). Moreover, there is now evidence that age-based stereotype threat can lead older adults to underperform on tests of cognitive ability (Lamont et al., 2015).

The cognitive performance of older adults can be affected by neuropathological changes, such as those that are characteristic of dementia, and the social context in which performance is assessed (Ben-David et al., 2018). It has been suggested that negative ageing stereotypes (e.g., older adults are forgetful) implicitly permeate neuropsychological assessment settings. These could bias the expectations of older adults, as well as the expectations of clinicians, as to how well they will perform when assessed; potentially contributing to lower performance and increasing the risk of mild cognitive impairment and dementia diagnosis (Ben-David et al., 2018; Régner et al., 2016). Current practices in dementia care strive for earlier screening and diagnosis to better manage symptoms and their wider impact on daily living (Le Couteur et al., 2013).

With increasing numbers of older adults expected to be screened for dementia in the future, it is important to understand how age stereotypes contribute to underperformance on cognitive testing, and how this might be mitigated.

Stereotype threat (ST) occurs when individuals face situations which place them at risk of confirming or being judged by a negative stereotype about a group they identify with, and consequently underperform on stereotype relevant tasks (Steele & Aronson, 1995). Individuals need not endorse the stereotype to be affected, but it must present a threat to their social identity (Steele et al., 2002). The effects of ST were originally investigated on the intellectual test performance of African Americans and the mathematical achievement of women (Steele et al., 2002). Though, increasingly, research is focusing on the implications of age-based stereotype threat (ABST) for the cognitive test performance of older adults given widespread stereotypes about cognitive competence decreasing with age (Lamont et al., 2015). Attending hospitals or memory clinics to complete cognitive tests can be a stressful experience. Such contexts may also unintentionally serve as a reminder of an older adult's age and make salient the host of negative stereotypic expectations associated with ageing (e.g., physical and cognitive decline; Haslam et al., 2018a; Scholl & Sabat, 2008). This can have adverse effects on older adults, especially affecting their assessment performance.

Systematic reviews and meta-analyses investigating ABST have shown that older adults demonstrate performance decrements on memory and general cognitive ability tests, including those widely used in cognitive screening (e.g., Mini-Mental State Examination [MMSE], Montreal Cognitive Assessment [MoCA]), when negative age-based stereotypes are made salient (Armstrong et al., 2017; Lamont et al., 2015). Performance decrements can even be present when subtle forms of ABST are experienced, as is likely in operational testing settings (Shewach et al.,

2019). Indeed, the instructions for most memory tests understandably emphasise the memory component of the task and such language can be sufficient to disadvantage older adults (Rahhal et al., 2001). Hence, it is easy to imagine how ABST could be elicited through standard instructions used to introduce older adults to memory assessment raising the risk of reduced performance during high-stakes testing (e.g., dementia assessment; Régner et al., 2016).

Research has identified factors that increase older adults' susceptibility to ABST. ABST appears to have greater impact on "young-old" adults (60-70 years) than "old-old" adults (71-82 years; Hess, Hinson et al., 2009). This could be due to increased salience and self-relevance of ageing stereotypes for those entering older age compared to those more established in old age (Hess, Hinson et al., 2009). However, Lamont and colleagues' (2015) meta-analysis suggested the effects of ABST are found across older age groups, and that women may be more vulnerable to its effects than men. ST effects also appear to become more marked as one's identification with the stereotyped domain increases (Steele & Aronson, 1995). Consistent with this are data showing greater impact of ABST on older adults who place greater value on their memory (Hess et al., 2003) and are more educated (Hess, Hinson, et al., 2009). Other factors exacerbating performance decline include lower self-efficacy (Desrichard & Köpetz, 2005), external locus of control (Hehman & Bugental, 2013), and stronger age-group identification (Kang & Chasteen, 2009).

Evidence is mixed on the role of various mechanisms underlying ABST, such as increased test-related anxiety (Abrams et al., 2006), reduced performance expectations (Desrichard & Köpetz, 2005), and depletion of cognitive resources (e.g., working memory) to support performance (Mazerolle et al., 2012). Others have suggested that changes in one's regulatory focus may better account for the effects of ABST (Popham & Hess, 2015). This

perspective contends that older adults exposed to ABST shift from a promotion focus (i.e., striving to perform their best) to a prevention focus (i.e., aiming not to perform their worst) in which they adopt more cautious, risk-averse response strategies, slowing their performance and reducing test scores (Barber, 2017). Despite lack of consensus about mechanisms, there is general recognition that ABST has significant potential to compromise the validity of cognitive assessment as older adults may underperform relative to their true abilities and this may be incorrectly interpreted as evidence of pathological cognitive impairment (Ben-David et al., 2018; Régner et al., 2016). Consequently, it is imperative for research to investigate ways to promote resistance to ABST and facilitate optimal cognitive performance in older adults (Barber, 2017). However, the literature on ABST to date has largely focussed on performance decrements on memory and cognitive tests (Lamont et al., 2015) than ways of overcoming ABST.

Manipulations to induce or remove ST have been classified as "blatant" or "subtle" (Armstrong et al., 2017; Nguyen & Ryan, 2008). Blatant manipulations explicitly inform a stereotyped group that they are expected to underperform (or perform better) in a domain (e.g., stating that a test is diagnostic of ability and shows group differences in performance). In contrast, subtle manipulations indirectly increase (or decrease) the perceived relevance of a stereotype by manipulating features of the test environment (e.g., presenting a test as diagnostic [or non-diagnostic] of ability without reference to group differences, or referring to a positively [or negatively] stereotyped group; Nadler & Clark, 2011; Nguyen & Ryan, 2008). Blatant and subtle manipulations have also been conceptualised as "fact-based" (i.e., presenting statements about group differences grounded in purported evidence) or "stereotype-based" (i.e., alluding to widespread societal assumptions; Lamont et al., 2015), respectively. Hence, blatant threat-removal (TR) strategies for ABST could refer to a memory test as free of age bias (i.e., older

adults perform just as well as younger adults). Conversely, subtle TR strategies may frame tests as non-diagnostic of impairment or provide descriptions favouring the performance of older adults (e.g., successful task performance requires life experience). Prior reviews on TR strategies in other stigmatised populations have revealed mixed results (Nadler & Clark, 2011; Nguyen & Ryan, 2008). Specifically, Nguyen and Ryan (2008) found blatant TR strategies were more effective than subtle ones in the case of gender stereotypes, whereas the opposite was true for racial stereotypes. It is therefore unclear what effect blatant and subtle TR strategies will have in the context of ABST.

Lamont et al.'s (2015) meta-analysis found older adults showed greater performance decrements in response to stereotype-based (i.e., subtle; $d = 0.52$) than fact-based (i.e., blatant) ABST manipulations ($d = 0.09$). However, no difference was found between control conditions and those that attempted to nullify ABST. More recently, Armstrong et al. (2017) found that the effect of ABST was only significant when blatant manipulations were used with episodic memory tasks or when subtle manipulations were used with working memory tasks. However, neither review considered the effectiveness of TR strategies for overcoming ABST. Moreover, these reviews highlighted differences in the methodological design of studies investigating ABST; hence, conclusions regarding the effectiveness of strategies to overcome ABST must be interpreted in relation to the comparison conditions employed. To address these gaps, this review was conducted to identify and appraise studies investigating the use of TR strategies to optimise the cognitive performance of older adults in the context of ABST. The aims of the review were to: (a) identify the types of strategies employed to overcome the detrimental effects of ABST on cognitive performance in older adults; and (b) critically appraise the methodology and existing

evidence of studies evaluating the effectiveness of TR strategies for optimising the cognitive performance of older adults and any factors influencing their effectiveness.

Methods

This review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009) and the protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO, registration no. CRD42019118035).

Search Strategy

Articles were initially identified through title and abstract searches of PsycINFO, PubMed, Embase, Web of Science, and Scopus from 1st January 1995 (i.e., when the concept of ST emerged) to 7th December 2018. An updated search was conducted on 6th November 2019. A search strategy (see Appendix A) was developed in consultation with a health sciences librarian and used within each database. The strategy comprised three sets of search terms with variants related to population (e.g., "older adults"), manipulation (e.g., "stereotyp*"), and outcome (e.g., "cogniti*"). Subject headings, MeSH terms, and Emtree terms were applied as relevant to each database. Where permitted, database searches were restricted to articles on human subjects, written in or translated into English, and published in peer-reviewed journals. Limits related to sample age were also applied (e.g., "aged"), where possible. Backward and forward citation searches were conducted on all eligible articles and key reviews in the area (Armstrong et al., 2017; Barber, 2017; Lamont et al., 2015).

Study Selection

During initial screening, the first author independently screened the titles and abstracts for eligibility using Rayyan (Ouzzani et al., 2016). Articles were excluded if they did not meet

preliminary criteria related to sample (i.e., not older adults), manipulation (i.e., not within the ST field), outcome (i.e., did not measure objective or subjective cognition), or publication type (e.g., review).

Full-texts of remaining articles were exported into EndNote X7 and screened independently by the first two authors according to the following eligibility criteria: (1) sample comprised healthy, community-dwelling older adults with at least one participant group with a mean age of ≥60 years (with a minimum participant age of 55 years); (2) implemented a manipulation which sought to overcome the detrimental effects of ABST; (3) applied this manipulation through a conscious priming method; (4) the experimental procedure noted the age or stereotype relevance of the task(s); and (5) included at least one outcome measure of objective cognitive performance or subjective cognition, as both approaches are commonly used in a comprehensive cognitive assessment of older adults. TR strategies were conceptualised as manipulations which activated positive stereotypes of ageing or negative stereotypes of younger adults, refuted negative ageing stereotypes, or presented other manipulations that aimed to improve cognitive performance relative to an ABST or control condition. Objective cognitive performance included results of neuropsychological tests or laboratory-based tasks of cognitive abilities (e.g., memory, executive function, visuospatial construction; Lezak et al., 2012). Subjective cognition included results of self-report measures that assessed older adults' beliefs or judgements regarding their own cognitive abilities (e.g., metamemory). Studies that employed measures of motor performance, sensory perception (e.g., hearing), complex multi-skill activities (e.g., driving), or other independent activities of daily living were excluded.

Articles were excluded if the mean age of the participant group was <60 years, or if the sample was of continuous mixed age without subgroup analyses. Articles were also excluded if

researchers made no attempt to overcome ABST, used a subliminal priming task, did not include age-based stereotypes, or activated stereotypes unrelated to cognition. Disagreement regarding the inclusion or exclusion of articles was resolved through consultation with the third author until consensus was reached.

Data Extraction and Quality Assessment

Details of study methodology and results were extracted and summarised for all articles. ABST manipulations and TR strategies were coded as involving subtle, blatant, or combined strategies (i.e., use of both blatant and subtle approaches) for activating or removing threat. The results of analyses comparing ABST+TR, TR, and ABST or control conditions and those examining factors moderating or mediating the effects of TR strategies were recorded. The first author completed data extraction, with interpretation of findings confirmed by the second author. Effect sizes (i.e., Cohen's *d*) for predicted effects involving ABST+TR or TR conditions relative to an ABST or control condition, were extracted or calculated, where possible. Due to considerable variability in study design, manipulation types, and cognitive measures, meta-analysis was not used to synthesise the data. Instead, findings from each study are detailed in Table 3.1 and qualitative synthesis is provided.

The methodological quality of studies was examined using an adaptation of the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE; von Elm et al., 2014) guidelines. Articles were rated against eight criteria regarding descriptive, internal validity, and statistical components (see Appendix B), scoring 0 (did not meet) or 1 (met), and those meeting a larger number of criteria were judged to be of stronger methodological quality for the purposes of this review. A random selection of 30% of articles was independently rated by the first two authors to assess consensus in rating methodological quality. Due to substantial

agreement, the first author completed the risk of bias assessment for the remaining articles and discussed these collaboratively with the second author.

Results

Search Results

Overall, the database and backward and forward citation searches yielded 6125 articles (see Figure 3.1). This reduced to 3281 following duplicate removal. A further 3208 articles were excluded based on title and abstract, with 73 articles screened as full-texts. There was 89% agreement between the two independent raters concerning the inclusion or exclusion of these articles. This identified 30 eligible articles, which reported on 36 relevant studies. Table 3.1 outlines the study characteristics and key findings of the 30 eligible articles.

Quality Assessment

There was substantial agreement on the presence or absence of methodological quality criteria ($\kappa = .70$, $p < .001$), with disagreement resolved through discussion to yield final ratings. Most studies (≥75%) sufficiently outlined sample characteristics, design and procedure, variables and outcome measures, provided descriptive statistics on outcome measures, and employed statistical control methods (see Table 3.2). Over half (63%) outlined recruitment sources and eligibility criteria, and controlled for experimental bias. Conversely, only 20% justified their sample size. The mean methodological quality rating was 5.80, with a range of 4-8.

Experimental Design and Methodology

Sample Characteristics

In total, 2855 older adults were included in the 36 studies reported across 30 articles (n = 25-210 per study). Average age ranged from 61 to 76 years. Most articles (50%) reported on research conducted in the United States of America.

Figure 3.1

Flow Chart of the Article Selection Process, with Reasons for Exclusions

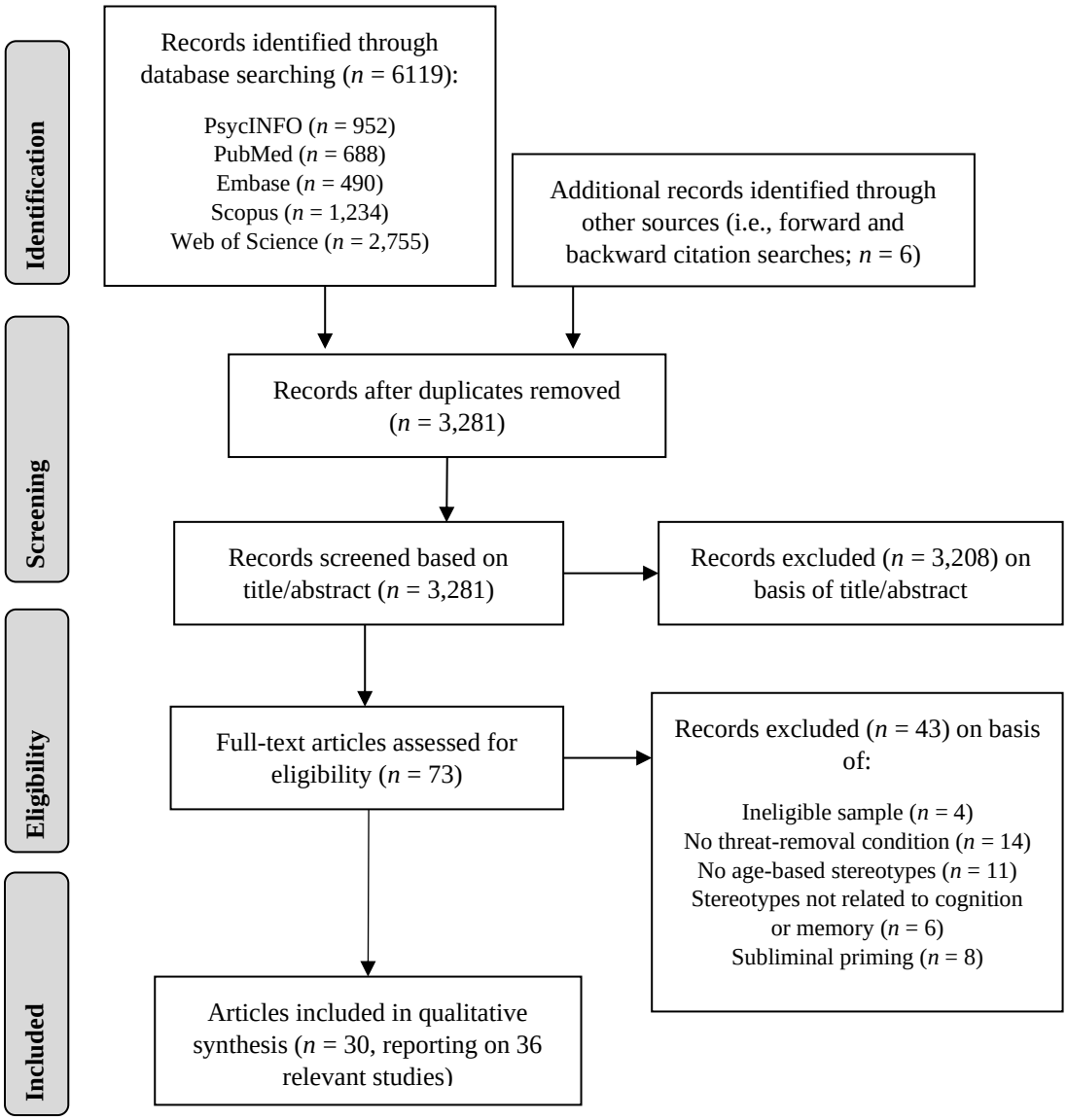

Table 3.1

Characteristics and Main Findings of Included Articles

Study, Country	Participants	ABST Manipulation: Type/Stereotyped Domain	Comparison Condition(s): Type/Manipulation	Cognitive Outcome: Type/Measure(s)	Key Findings[a]
Abrams et al. (2008), UK	Exp 2: 84 OA (*M* age = 72.2 years, *SD* = 8.23), 34 males	Subtle/Intellectual performance	Subtle TR + ABST/ Imagined intergenerational contact + ABST Control/No ABST	Objective/Mathematics test	TR + ABST > ABST (d = 0.49), mediated by reduced test anxiety. TR + ABST = control condition.
Aisenberg et al. (2015), Israel	Exp 1: 48 OA (*M* age = 71.9 years, *SD* = 5.8); 45 YA Exp 2: 36 OA (TR: *M* age = 72 years, *SD* = 6.8; Neutral: *M* age = 73 years, *SD* = 6.2)	Exp 1: Subtle/ Memory and thinking speed Exp 2: No ABST	Exp 1 and 2: Subtle TR/ Vignette of counter-stereotypical exemplar Neutral/Vignette of neutral exemplar	Objective/The Simon task	OA demonstrated greater inhibitory control following TR, compared to ABST (Exp 1) and neutral (Exp 2) conditions.
Alquist et al. (2018), USA	Exp 1: 103 OA, 65-77 years (*M* = 67.7, *SD* = 2.12), 60.96% male Exp 2: 210 OA, 65–77 years (*M* = 67.7), 69.70% male	Blatant/Memory	Exp 1 and 2: Blatant TR/Articles on the maintenance of memory abilities across lifespan Exp 2: Control/Articles about nature	Objective/Delay discounting task	Exp 1: TR chose delayed rewards more frequently than ABST (d = 0.47). Exp 2: TR chose delayed rewards more frequently than ABST (d = 0.76), mediated by discrepancy in subjective and chronological age. TR = controls.
Andreoletti & Lachman (2004), USA	Mixed age sample (YA, middle-aged, and OA): 50 OA, 60-80 years (*M* = 69.38, *SD* = 5.46)	Blatant/Memory	Blatant TR/Test presented as age-fair Control/No ABST	Objective/Word list recall Subjective/Beliefs About Memory Ability and Concern About Memory Decline	No significant Age × Condition interaction or main effect of condition reported. Study focussed on recall by education and list trial. Across ages, those in TR with more education had greater recall than ABST and controls.
Barber & Mather (2013a), USA	Exp 1a: 56 OA, 60-79 years (*M* = 69.29, *SD* = 5.48), 61% male Exp 1b: 56 OA, 59-78 years (*M* = 65.61, *SD* = 5.18), 20% male	Blatant/Memory	Blatant TR/Articles on the preservation and improvement of memory with age	Objective/Sentence span task	TR > ABST with gain-based reward structure (d = 0.97). ABST > TR with loss-based reward structure. TR performance did not vary as a function of reward structure.
Barber & Mather (2013b), USA	Exp 1: 31 OA, 63-78 years (*M* = 70.42, *SD* = 4.76), 71% female	Blatant/Memory	Exp 1: Blatant TR/Articles on the preservation and improvement of memory with age	Objective/Word list free-recall and recognition	Exp 1: TR > ABST on word recall (d = 0.87); ABST > TR on recall accuracy. Exp 2: ABST > TR on recall accuracy and recall of loss-based items. ABST

Study, Country	Participants	ABST Manipulation: Type/Stereotyped Domain	Comparison Condition(s): Type/Manipulation	Cognitive Outcome: Type/Measure(s)	Key Findings[a]
	Exp 2: 64 OA, 61-86 years (*M* = 70.85, *SD* = 5.82), 50% female		Exp 2: Combined TR/ Test presented as non-diagnostic (Subtle) and age-fair (Blatant)		had more conservative response bias and fewer false alarms on recognition memory.
Barber et al. (2015), USA	80 OA, 61-80 years (*M* = 69.54, *SD* = 5.33), 53.7% female	Blatant/Memory and general cognition	Combined TR/Articles on cognitive abilities preserved with age (Blatant) and primed OA to self-categorise as younger (Subtle)	Objective/Word List Memory Test, ACE-R, and MMSE	TR > ABST on Word List Memory Test and MMSE with gain-based (*d* = 0.97-1.34) but not loss-based reward structure. A consistent pattern of results on the ACE-R was not significant.
Barber et al. (2019), USA	Exp 1: 49 OA, 57-88 years (*M* = 73.33), 33% female; 55 YA Exp 2: 90 OA, 60-79 years (*M* = 70.07), 50 females	Blatant/Memory	Exp 1 and 2: Blatant TR/Informed OA and YA perform equally well Exp 2: Subtle TR + ABST/Primed positive qualities associated with ageing + ABST	Objective/Affective (positive or negative valence images) picture recall test	Exp 1: TR > ABST on recall of positive pictures (*d* = 0.38). No difference in recall of negative pictures. Exp 2: All conditions equivalent on recall of negative pictures. TR > ABST (*d* = 0.54) and TR + ABST (*d* = 0.70) on recall of positive pictures. ABST = TR + ABST on positive picture recall.
Brubaker & Naveh-Benjamin (2018), USA	Exp 1: 60 OA, 65-87 years, (*M* = 72.52, *SD* = 6.29), 23% male; 60 YA	Blatant/Memory	Combined TR/Test presented as non-diagnostic of memory (Subtle) and provided information favouring performance of OA (Blatant)	Objective/Item and associative memory recognition test (face-scene picture pairs and unrelated word pairs)	TR > ABST on associative memory, with greater accuracy (*d* = 0.29-0.35) and lower false alarm rate (*d* = 0.28-0.40). Item memory did not change as a function of condition.
Chapman et al. (2016), Australia	86 OA, 65-86 years (*M* = 73.58, *SD* = 6.08), 55% female	Blatant/Detection of driving hazards	Blatant TR/Provided information favouring performance of OA	Objective/Timed hazard perception task	No significant differences in hazard perception. Driving confidence reduced in ABST condition from pre- to post-test.
Fernández-Ballesteros et al. (2015), Spain	112 OA, 55-78 years (*M* = 61.72, *SD* = 5.26), 62% female; Controls: 34 OA, 55-78 years (*M* = 61.47, *SD* = 5.23), 61% female	Blatant/Memory	Blatant TR/Provided information favouring performance of OA Control/No ABST	Objective/Auditory verbal learning test	TR > ABST and controls when OA in TR condition had poorer self-perceptions of ageing.
Fresson et al. (2017), Belgium	72 OA, 59-70 years (*M* = 64.04, *SD* = 2.87), 37 females	Blatant/Memory and general cognition	Blatant TR/Articles on the preservation of cognitive abilities with age	Objective/Attention (e.g., WAIS-IV Coding), memory (e.g., WAIS-III Digit Span),	TR > ABST (*d* = 0.67) on overall executive function when ABST condition had moderate or high fear of AD. TR made fewer errors on Stroop task than ABST (*d* = 0.58). No

Study, Country	Participants	ABST Manipulation: Type/Stereotyped Domain	Comparison Condition(s): Type/Manipulation	Cognitive Outcome: Type/Measure(s)	Key Findings[a]
				and executive tests (e.g., Stroop task) Subjective/Cognitive complaints questionnaire	differences in memory and attention performance, or subjective cognitive complaints.
Haslam et al. (2012), UK	68 OA, 60-70 years (*M* = 65.1, *SD* = 3.1), 33 females	Blatant/Memory and general cognition	Subtle TR + ABST/ Primed OA to self-categorise as younger + ABST	Objective/WMS-III Logical Memory and ACE-R	TR + ABST > ABST on all tests, contingent on ageing expectations. OA who self-categorised as younger and expected memory decline had greater immediate (*d* = 1.13) and delayed recall (*d* = 1.12). OA who self-categorised as younger and expected general cognitive decline performed better on ACE-R (*d* = 1.63).
Hehman & Bugental (2013), USA	54 OA, 62-92 years (*M* = 75, *SD* = 8.22), 37 females; 81 YA	Subtle/General cognition (i.e., fast responses)	Subtle TR/Task description favoured qualities of OA	Objective/WAIS-III Block Design	TR > ABST (*d* = 0.86).
Hess et al. (2003), USA	48 OA, 62-84 years (*M* = 70.8), 27 females; 48 YA	Blatant/Memory	Blatant TR/Articles rejecting inevitability of memory decline Control/No ABST	Objective/Word list free-recall Subjective/MIA questionnaire (Memory Anxiety and Achievement subscales)	TR > ABST (*d* = 0.90). TR = control condition. No significant correlation between recall and value placed on memory ability in TR condition.
Hess, Emery, et al. (2009), USA	82 OA, 60-86 years (ABST deadline: *M* = 70.4, *SD* = 7.2; ABST unlimited: *M* = 70.1, *SD* = 6.8; TR deadline: *M* = 71.7, *SD* = 6.7; TR unlimited: *M* = 71.3, *SD* = 5.6), 43 females	Blatant/Memory	Combined TR/Test presented as non-diagnostic of memory (Subtle) and provided information favouring performance of OA (Blatant)	Objective/Word list recognition Subjective/Remember vs. Know metamemory task	TR > ABST when memory decisions were time limited. ABST deadline condition reported lower ratio of 'remember' (i.e., remembered learning words and recalled associated contextual details) to 'know' (i.e., words were identified as familiar, but no contextual details were recalled) responses.
Hess, Hinson, et al. (2009), USA	103 OA: 53 young-old – 60-70 years (*M* = 64.2), 26 females; 50 old-old – 71-82 years (*M* = 75.4), 25 females	Blatant/Memory	Blatant TR/Test presented as age-fair	Objective/Word list free-recall and computation span task	Young-old OA with higher education had poorer free-recall in ABST condition. Pattern reversed but not significant in TR condition.

Study, Country	Participants	ABST Manipulation: Type/Stereotyped Domain	Comparison Condition(s): Type/Manipulation	Cognitive Outcome: Type/Measure(s)	Key Findings[a]
Horton et al. (2010), Canada	96 OA (36 males: *M* age = 68.33, *SD* = 4.02; 60 females: *M* age = 66.33, *SD* = 5.04)	Blatant/Memory and physical ability	Blatant TR/Informed about the maintenance of memory and physical abilities with age	Objective/Word list recall Subjective/MIA questionnaire (Memory Achievement subscale)	No significant difference between conditions in recall performance. No significant correlation between recall and investment in memory ability.
Jordano & Touron (2017), USA	90 OA, 60-75 years (*M* = 67.51, *SD* = 3.89); 30 YA	Blatant/Memory	Combined TR/Articles rejecting inevitability of memory decline (Blatant) and presented test as non-diagnostic of memory (Subtle)	Objective/Operation span task Subjective/MIA questionnaire (Memory Anxiety and Achievement subscales)	TR had greater recall accuracy (*d* = 0.61) and reported less task-related interference than ABST (*d* = 0.61).
Kalenzaga et al. (2019), France	25 OA, 66-80 years (*M* = 71.28, *SD* = 4.86); 25 YA	Blatant/Memory	Blatant TR/OA were informed the test was easy for their age group	Subjective/Remember vs. Know metamemory task Objective/Running-span and trail making	TR produced more 'remember' responses (*d* = 1.47) and fewer 'know' false alarms (*d* = 0.94) than ABST.
Liu et al. (2017), China	Exp 2: 95 OA >55 years (ABST: *M* = 68.83, *SD* = 4.26; ABST + positive identity: *M* = 67.83, *SD* = 5.14; ABST + negative identity: *M* = 67.36, *SD* = 5.96; ABST + multiple identities: *M* = 66.35, *SD* = 5.66)	Blatant/Memory	ABST + Blatant TR/ ABST + Article on advantages (positive identity) or advantages and disadvantages (multiple identities) of OA vs. YA ABST + negative identity/ABST + article on disadvantages of OA vs. YA	Objective/Word list recognition task	ABST + multiple identities > ABST (*d* = 0.77) and ABST + negative identity (*d* = 0.65). No significant differences reported between ABST + positive identity, ABST + negative identity, and ABST conditions.
Marquet et al. (2017), Belgium	58 OA, 57-83 years (ABST: *M* = 66.57, *SD* = 5.77; TR: *M* = 66.37, *SD* = 5.78), 38 females	Blatant/Memory	Combined TR/Test presented as non-diagnostic of memory (Subtle) and age-fair (Blatant)	Objective/Word list recall and Brown-Peterson task	No significant effect of condition on task performance.
Mazerolle et al. (2017), France	80 OA, 60-93 years (*M* = 75, *SD* = 8.31)	Subtle/Memory	Combined TR/Presented Test 1 as age-fair, and educated OA on ABST prior to Test 2 (Blatant); Test 2 presented as under construction (Subtle)	Objective/MMSE and MoCA	TR > ABST on cognitive screening tests (*d* = 0.81). Effects of ABST eliminated after OA debriefed and educated about ABST.

Study, Country	Participants	ABST Manipulation: Type/Stereotyped Domain	Comparison Condition(s): Type/Manipulation	Cognitive Outcome: Type/Measure(s)	Key Findings[a]
Mazerolle et al. (2012), France	110 OA (*M* = 69.01 years, *SD* = 5.67), 71 females; 110 YA	Subtle/Memory	Blatant TR/Test presented as age-fair	Objective/Reading span and word list cued-recall tasks	TR > ABST on working memory (*d* = 0.54) and controlled recollection in cued-recall (*d* = 0.07).
Mazerolle et al. (2015), France	38 OA, 60-83 years (*M* = 69.33, *SD* = 5.71); 40 YA	Subtle/Memory	Blatant TR/Test presented as age-fair	Subjective/Remember vs. Know metamemory task	TR reported more 'remember' responses (*d* = 0.67) and fewer 'know' responses (*d* = 0.55) than ABST.
Plaks & Chasteen (2013), Canada	Exp 3: 84 OA, 60-80 years (ABST: *M* = 69.64, *SD* = 0.98; TR: *M* = 68.9, *SD* = 0.82), 44 females	Blatant/Cognitive and memory ability	Blatant TR/Article rejecting inevitability of cognitive decline	Objective/Word list free-recall and reading span tasks	TR > ABST on free-recall (*d* = 0.52) and reading span (*d* = 0.52). Better performance in TR associated with lower pre-task worry.
Popham & Hess (2015), USA	63 OA, 65-83 years (TR: *M* = 70.8, *SD* = 4.2; ABST: *M* = 71.1, *SD* = 3.7), 31 females; 64 YA	Blatant/Cognitive ability and mental agility	Combined TR/Task description favoured qualities (Subtle) and performance of OA (Blatant)	Objective/Letter-cancelling and operation span tasks	TR faster on letter-cancelling (*d* = 0.63) but made more mistakes than ABST.
Swift et al. (2013), UK	Exp 2: 120 OA, 61-95 years (*M* = 76.16), 71 females	Subtle/Intellectual performance (i.e., math and spatial skills)	Subtle TR/Task description favoured qualities of OA Control/No ABST	Objective/Crossword and cognitive (i.e., problem-solving) tasks	TR > ABST on crossword (*d* = 0.98) and cognitive (*d* = 1.02) tasks. TR > controls on crossword task (*d* = 0.46). TR = controls on cognitive task.
Tan & Barber (2020), USA	107 Chinese OA, 55-84 years (*M* = 68.5), 56 females 85 American OA, 56-91 years (*M* = 71.76, *SD* = 6.39), 53 females	Blatant/Memory	Blatant TR/Test presented as age-fair Subtle TR + ABST/ Primed age-positive cultural values + ABST	Objective/Word list recall	TR > ABST for Chinese (*d* = 0.59) and American (*d* = 0.63) OA. For Chinese OA, TR + ABST > ABST (*d* = 0.59). TR = TR + ABST.
Thomas et al. (2020), USA	Exp 1: 62 OA (*M* age = 73.51), 38 females Exp 2: 66 OA (*M* age = 72.59), 51 females	Blatant/Memory	Blatant TR/Article describing research showing that some types of memory do not decline with age	Objective/Operation span (Exp 1), cued-recall eyewitness memory (Exp 1 and 2), and source monitoring tests (Exp 2)	Exp 1: ABST produced fewer correct responses (*d* = 0.77) and more omission errors (*d* = 1.06) than TR. Exp 2: ABST ≥ TR. TR less accurate than ABST on source monitoring.

Notes. ABST = age-based stereotype threat; ACE-R = Addenbrooke's Cognitive Examination-Revised; AD = Alzheimer's Disease; MIA = Metamemory in Adulthood; MoCA = Montreal Cognitive Assessment; MMSE = Mini Mental State Examination; OA = older adults; TR = threat-removal; WAIS-IV = Wechsler Adult Intelligence Scale – Fourth Edition; WMS-III = Wechsler Memory Scale – Third Edition; YA = young adults.

[a] Effect size reported when able to calculate on the basis of data reported. For consistency, effect sizes are all reported as Cohen's *d* (0.20 = small, 0.50 = medium, 0.80 = large) and were converted from partial eta-squared, when necessary.

Table 3.2

Methodological Quality of Articles Included in Review

Study	Sample characteristics	Participant recruitment and screening	Sample size justification	Study design and group allocation	Experimental control	Experimental variables and outcome measures	Descriptive statistics on outcome measures	Statistical control	Total
Abrams et al. (2008)	x	x		x		x	x	x	6
Aisenberg et al. (2015)			x	x		x	x	x	5
Alquist et al. (2018)			x	x		x	x		4
Andreoletti & Lachman (2004)	x	x		x	x	x	x	x	7
Barber & Mather (2013a)	x		x			x	x	x	5
Barber & Mather (2013b)	x				x	x	x		4
Barber et al. (2015)	x			x	x	x	x	x	6
Barber et al. (2019)	x	x		x		x	x	x	6
Brubaker & Naveh-Benjamin (2018)	x	x			x	x	x		5
Chapman et al. (2016)	x	x		x	x	x		x	6
Fernández-Ballesteros et al. (2015)	x	x		x	x	x	x	x	7
Fresson et al. (2017)	x	x	x	x	x	x	x	x	8
Haslam et al. (2012)	x	x		x	x	x	x	x	7
Hehman & Bugental (2013)	x	x		x	x	x	x	x	7
Hess et al. (2003)	x			x	x	x	x	x	6
Hess, Emery, et al. (2009)	x	x				x	x	x	5
Hess, Hinson, et al. (2009)	x			x		x		x	4
Horton et al. (2010)	x	x		x	x	x	x	x	7
Jordano & Touron (2017)	x	x		x		x	x	x	6
Kalenzaga et al. (2019)				x	x	x	x	x	5
Liu et al. (2017)		x		x	x	x	x	x	6
Marquet et al. (2017)	x	x		x	x	x		x	6
Mazerolle et al. (2017)		x		x	x	x	x		5
Mazerolle et al. (2012)	x			x		x	x		4
Mazerolle et al. (2015)		x		x		x	x	x	5
Plaks & Chasteen (2013)	x			x	x	x	x		5
Popham & Hess (2015)	x			x	x	x	x	x	6
Swift et al. (2013)	x	x		x	x	x	x	x	7
Tan & Barber (2020)	x	x	x	x	x	x	x	x	8
Thomas et al. (2020)	x	x	x	x		x	x		6

Table 3.3

Stereotype TR Strategies Included in Review

Strategy	Studies
Subtle	
Framed test as non-diagnostic task (e.g., memory test as verbal comprehension task)	Barber & Mather (2013b); Brubaker & Naveh-Benjamin (2018); Hess, Emery, et al. (2009); Jordano & Touron (2017); Marquet et al. (2017)
Reduced evaluative performance pressure (e.g., informed participants the test they are about to complete is under construction)	Mazerolle et al. (2017)
Primed participants with positive qualities associated with ageing or provided task description favouring performance of those with qualities associated with older age (e.g., wisdom, life experience, problem-solving)	Barber et al. (2019); Hehman & Bugental (2013); Popham & Hess (2015); Swift et al. (2013)
Manipulated age-based self-categorisation (i.e., primed participants to self-categorise as younger)	Barber et al. (2015); Haslam et al. (2012)
Primed older adults with age-positive cultural values (e.g., Confucian value of filial piety or respect for one's parents, elders, and ancestors)	Tan & Barber (2020)
Exposed older adults to an imagined intergenerational contact scenario	Abrams et al. (2008)
Provided vignettes, pictures, or videos of counter-stereotypical exemplars (i.e., older adults in positive or astereotypical roles)	Aisenberg et al. (2015)
Blatant	
Provided information on the preservation and/or improvement of cognitive abilities with age; presented information on the malleability of age-related cognitive change (i.e., induced a growth mindset); or rejected the inevitability of cognitive decline (e.g., "cognitive decline is preventable")	Alquist et al. (2018); Barber & Mather (2013a, 2013b); Barber et al. (2015); Fresson et al. (2017); Hess et al. (2003); Horton et al. (2010); Jordano & Touron (2017); Plaks & Chasteen (2013); Thomas et al. (2020)
Presented test as free of age bias or "age-fair" (i.e., younger and older adults perform equally as well)	Andreoletti & Lachman (2004); Barber & Mather (2013b); Barber et al. (2019); Hess, Hinson, et al. (2009); Marquet et al. (2017); Mazerolle et al. (2012, 2015, 2017); Tan & Barber (2020)
Provided research 'evidence' favouring the performance of older adults or stated older adults perform better than younger adults	Brubaker & Naveh-Benjamin (2018); Chapman et al. (2016); Fernández-Ballesteros et al. (2015); Hess, Emery, et al. (2009); Kalenzaga et al. (2019); Popham & Hess (2015)
Primed multiple identities relevant to one's age (e.g., positive and negative aspects of being older compared with being younger)	Liu et al. (2017)
Provided education or debriefed older adults about stereotype threat	Mazerolle et al. (2017)

ABST Manipulations

Twenty-eight studies (78%) used blatant ABST manipulations, with the remaining eight employing subtle manipulations to induce ABST. Twenty-four studies activated ABST specific to memory ability, and 12 studies activated ABST related to general cognitive (e.g., intellectual performance) or multiple cognitive (e.g., memory and processing speed) abilities.

TR Strategies

TR strategies (see Table 3.3) were examined in 38 conditions across the 36 included studies; two studies (Barber et al., 2019; Tan & Barber, 2020) included separate subtle and blatant TR conditions within the same experiment. Eight conditions (21%) involved subtle TR strategies. Examples included providing pre-test information referring to positive qualities stereotypically associated with ageing (e.g., wisdom; Barber et al., 2019), providing a vignette of a counter-stereotypical older adult (e.g., "His memory is as good as ever"; Aisenberg et al., 2015), or priming older adults to self-categorise as younger relative to others in the study (e.g., Haslam et al., 2012). Twenty-two conditions (58%) comprised blatant TR strategies. Examples included providing information about cognitive abilities that are preserved or improve with age (e.g., Fresson et al., 2017), providing pre-test information that explicitly favoured older adults' performance (e.g., Fernández-Ballesteros et al., 2015), or presenting tests as free of age bias (e.g., Mazerolle et al., 2012). Eight conditions (21%) combined subtle and blatant strategies in the same manipulation (e.g., presented test as non-diagnostic of memory [i.e., subtle] and age-fair [i.e., blatant]). Interestingly, the explicitness of ABST manipulations and TR strategies did not match (e.g., blatant ABST was paired with subtle TR) in 36% of studies (i.e., 13 studies, including the eight using combined TR strategies).

Comparison Conditions

Of the 36 studies, 24 (67%) compared ABST conditions against TR conditions alone. A further seven studies (19%) included a control condition (Aisenberg et al., 2015; Alquist et al., 2018; Andreoletti & Lachman, 2004; Fernández-Ballesteros et al., 2015; Hess et al., 2003; Swift et al., 2013). Four studies (11%) compared an ABST condition with a condition that included some type of TR strategy in addition to the ABST manipulation (i.e., an ABST+TR condition; Barber et al., 2019; Haslam et al., 2012; Liu et al., 2017; Tan & Barber, 2020). Finally, one study (3%) included both an ABST+TR condition and a control condition (Abrams et al., 2008). Importantly, the 24 studies comparing ABST against TR conditions alone cannot address the second aim of the review as conclusions regarding the effectiveness of these TR strategies depend on the effectiveness of the ABST inductions. In other words, they do not allow one to distinguish the benefits of the TR strategy from the detrimental impact of the ABST manipulation. Hence, studies that included control and/or ABST+TR conditions are most relevant to understanding the effectiveness of TR strategies for optimising the cognitive performance of older adults. The five studies comparing ABST and ABST+TR conditions directly address the second aim of this review and, as such, will receive greater emphasis in the synthesis of results.

Outcome Measures

Twenty-eight studies (78%) employed only objective cognitive measures. A further seven studies used both objective and subjective measures, and one study used a subjective measure alone. Of the studies using objective measures, 20 used memory tests exclusively (e.g., episodic or working memory), seven used a combination of memory and other cognitive tests, and eight used tests of other cognitive or executive functions (e.g., inhibitory control). Regarding subjective measures, three studies used a Remember vs. Know metamemory judgement task. Three studies employed subscales from the Metamemory in

Adulthood questionnaire to examine potential mediators and/or moderators of ABST. Others included self-report measures of cognitive complaints, and beliefs or concerns about memory.

Synthesis of Results

Key findings from the 36 relevant studies, which reported on 38 TR conditions, are synthesised in the following sections according to the type of TR strategy used to overcome ABST. Although the methodology and key findings of all studies are initially summarised, greater emphasis is placed on the studies employing relevant comparison conditions when drawing conclusions regarding the effectiveness of TR strategies for optimising the cognitive performance of older adults.

Subtle TR Strategies

Eight studies included conditions which employed subtle TR strategies. One study only compared a TR condition with an ABST condition (Hehman & Bugental, 2013). Participants in the TR condition outperformed those in the ABST condition on visuospatial construction (Hehman & Bugental, 2013). However, as relevant to the second aim of this review, this study did not provide clear evidence about the effectiveness of TR in overcoming ABST. Three studies compared TR conditions with control or neutral valence conditions (Aisenberg et al., 2015; Swift et al., 2013). TR conditions outperformed control conditions on inhibitory control (Aisenberg et al., 2015) and a crossword task (Swift et al., 2013). While Swift et al.'s (2013) TR condition also outperformed an ABST condition on crossword and problem-solving tasks, there was no difference between the TR and control conditions on problem-solving. However, this was in line with author predictions.

Four studies compared an ABST+TR condition with an ABST condition (Abrams et al., 2008; Barber et al., 2019; Haslam et al., 2012; Tan & Barber, 2020). Three provided evidence of participants in ABST+TR conditions outperforming those in ABST conditions on a mathematics test (Abrams et al., 2008), word list recall (Tan & Barber, 2020), immediate

and delayed verbal memory, and global cognitive status on the Addenbrooke's Cognitive Examination-Revised (Haslam et al., 2012). This was mediated by lower test-related anxiety in Abrams et al.'s (2008) study. In contrast, Barber et al. (2019) did not find support for their subtle TR strategy in buffering ABST, with no significant difference between their ABST and TR+ABST conditions in recall of positive valence pictures on an affective picture recall test. Abrams et al. (2008) also found no significant difference between their TR+ABST and control conditions on math performance.

Overall, the evidence for studies investigating subtle TR strategies varied according to the comparison condition used. However, on balance, there was moderate evidence with three studies providing support for the effectiveness of subtle TR strategies relative to control conditions, and three studies supporting the effectiveness of subtle TR strategies in overcoming ABST (i.e., those comparing an ABST+TR condition with an ABST condition), with medium to large effect sizes (d = 0.46-1.63). Across all eight studies, effect sizes ranged from small to large (d = 0.25-1.63) and findings were significant across studies using tests of general cognition, executive function, and memory. Ratings of methodological quality for articles reporting on subtle TR strategies ranged from 5-8/8 (M = 6.57). Most lacked sample size justification, except for Aisenberg et al. (2015) and Tan and Barber (2020), and failed to incorporate measures to address possible sources of experimental bias, such as use of a manipulation check (Abrams et al., 2008; Aisenberg et al., 2015; Barber et al., 2019). Three studies (Barber et al., 2019; Haslam et al., 2012; Tan & Barber 2020) used subtle TR to address blatant ABST. This inconsistency in matching the explicitness of the manipulations may have contributed to the different results obtained by Barber et al. (2019); their subtle TR strategy may have been insufficient to overcome blatant ABST in this study.

Blatant TR Strategies

Twenty-two studies included conditions which employed blatant TR strategies. Fifteen studies only compared TR conditions with ABST conditions. Participants in TR conditions outperformed those in ABST conditions on tasks of verbal memory (Barber & Mather, 2013b; Mazerolle et al., 2012; Plaks & Chasteen, 2013), working memory (Mazerolle et al., 2012; Plaks & Chasteen, 2013), eyewitness memory (Thomas et al., 2020), subjective metamemory judgements (Kalenzaga et al., 2019; Mazerolle et al., 2015), delay discounting (Alquist et al., 2018), and executive function (Fresson et al., 2017), and recalled more positive valence pictures on an affective picture recall test (Barber et al., 2019). Better performance in a TR condition was associated with lower pre-task worry (Plaks & Chasteen, 2013). Interestingly, participants in Fresson et al.'s (2017) TR condition had better executive function performance only when compared to those in the ABST condition who reported moderate-to-high fear of Alzheimer's disease. However, three studies (Chapman et al., 2016; Hess, Hinson, et al., 2009; Horton et al., 2010) found no significant differences between TR and ABST conditions on their cognitive outcome measures. Moreover, some studies (Barber & Mather, 2013b; Thomas et al., 2020) found evidence of participants in ABST conditions outperforming those in TR conditions on memory tests. For example, TR conditions outperformed ABST conditions when tests had a gain-based reward structure (i.e., poker chips earned for words recalled). Conversely, ABST conditions outperformed TR conditions when a loss-based reward structure was applied (i.e., poker chips lost for words forgotten; Barber & Mather, 2013a). However, as relevant to the second aim of this review, these studies do not provide evidence of the effectiveness of TR in overcoming ABST as they did not compare an ABST+TR condition with an ABST condition.

Four studies compared TR conditions with control conditions (Alquist et al., 2018; Andreoletti & Lachman, 2004; Fernández-Ballesteros et al., 2015; Hess et al., 2003). While

TR conditions outperformed ABST conditions on verbal memory (Hess et al., 2003) and delay discounting (Alquist et al., 2018), with better performance mediated by participants subjectively feeling younger than their chronological age in Alquist et al.'s (2018) study, both studies found no significant difference in cognitive performance between TR and control conditions. Fernández-Ballesteros et al. (2015) found that the TR condition outperformed ABST and control conditions on memory recall, but only when those in the TR condition had negative self-perceptions of ageing. Similarly, Andreoletti and Lachman (2004) reported a moderating effect of education, whereby only participants with high levels of education in the TR condition had greater recall than participants in ABST and control conditions.

Two studies compared blatant TR strategies with an ASBT condition as well as a subtle TR+ABST condition investigated within the same experiment (Barber et al., 2019; Tan & Barber, 2020). The blatant TR conditions outperformed ABST conditions on verbal memory (Tan & Barber, 2020) and recalled more positive valence pictures on an affective picture recall test (Barber et al., 2019). However, mixed findings were observed when comparing the blatant TR and subtle TR+ABST conditions. Participants in Barber et al.'s (2019) blatant TR condition outperformed those in the subtle TR+ABST condition, recalling more positive valence pictures on an affective picture recall test, suggesting the blatant TR condition was more effective in optimising performance. Conversely, Tan and Barber (2020) found no significant difference between their blatant TR and subtle TR+ABST conditions, suggesting both were equally effective in optimising performance, relative to an ABST condition. While interesting to compare the findings of these studies, they did not provide evidence of the effectiveness of blatant TR in overcoming ABST.

Only one study investigating a blatant TR strategy compared an ABST+TR condition with an ABST condition. Liu et al. (2017) investigated whether priming multiple age-based stereotypic identities could buffer ABST. They induced ABST and presented participants

with articles outlining advantages of being older (positive identity), disadvantages of being older (negative identity), or both advantages and disadvantages of being older (multiple identities) compared to being younger. No significant differences were reported between the ABST+positive identity condition and the standard ABST or ABST+negative identity conditions. However, the ABST+multiple identities condition outperformed the ABST and ABST+negative identity conditions on recognition memory.

Overall, the evidence for studies investigating blatant TR strategies was mixed and insufficient to address the second aim of this review due to the methodological designs employed. Of the 22 studies, only five were designed in ways that allow conclusions to be drawn regarding the effectiveness of blatant TR strategies. Evidence from the four studies incorporating control conditions was mixed, although these highlighted some interesting findings concerning the moderating effects of education, subjective age, and self-perceptions of ageing on the effectiveness of TR. The one study (Liu et al., 2017) directly evaluating the effectiveness of blatant TR strategies in overcoming ABST, provided support for their TR strategy (i.e., priming multiple identities), with medium to large effect sizes (d = 0.65-0.77). Effect sizes across the 22 studies ranged from negligible to large (d = 0.07-1.47). The bulk of studies examining blatant TR strategies used memory tests, as opposed to tests of other cognitive abilities. Methodological quality ratings for articles reporting on blatant TR strategies ranged from 4-8/8 (M = 5.72). Studies were limited by their failure to screen for participants' cognitive status or report education level (e.g., Alquist et al., 2018), justify sample size (e.g., Kalenzaga et al., 2019) and group allocation (e.g., Barber & Mather, 2013a, 2013b), report participant eligibility criteria (e.g., Hess et al., 2003), and include measures to address possible sources of experimental bias (e.g., Hess, Hinson, et al., 2009; Thomas et al., 2020). Two studies (Mazerolle et al., 2012, 2015) used blatant TR strategies to address subtle

ABST. This inconsistency in the explicitness of their manipulations could have amplified their effects relative to studies that matched the nature of their TR and ABST manipulations.

Combined TR Strategies

Eight studies combined subtle and blatant TR strategies in the same manipulation. The content of these manipulations is summarised in Table 3.1. All eight studies compared TR conditions with ABST conditions alone; none included control or ABST+TR conditions. Participants in TR conditions outperformed those in ABST conditions on working memory (Jordano & Touron, 2017), associative memory (Brubaker & Naveh-Benjamin, 2018), and general cognition (MMSE and MoCA; Mazerolle et al., 2017). Findings from the other five studies were mixed. Hess, Emery et al.'s (2009) TR condition outperformed the ABST condition on recognition memory and a subjective metamemory judgement task. However, this only applied when tasks required time-limited decisions. Interestingly, although participants in Popham and Hess' (2015) TR condition were faster on a letter-cancelling task, they were less accurate than those in the ABST condition. In line with their previous studies, Barber and colleagues (2015) found that participants in the TR condition outperformed those in the ABST condition on the MMSE and a word list memory test when the tests had a gain-based reward structure, but not a loss-based structure. Moreover, when the reward structure for a recognition memory test was loss-based, the ABST condition outperformed the TR condition on several aspects of task performance (e.g., words recalled, recall accuracy, and false alarm rate; Barber & Mather, 2013b). Finally, Marquet and colleagues (2017) found no significant difference between TR and ABST conditions.

Overall, the evidence for studies using a combination of blatant and subtle TR strategies was mixed and insufficient to address the second aim of this review due to the methodological designs. Two studies provided support, four provided partial support, and two provided no support for the effectiveness of TR relative to ABST. Effect sizes across the

eight studies ranged from negligible to large (d = 0.04-1.34), and results did not vary according to the type of cognitive test used. Ratings of methodological quality for articles reporting on combined TR strategies ranged from 4-6/8 (M = 5.38). Studies were limited by their failure to fully detail participant eligibility criteria (e.g., Barber et al., 2015) and the basis for group allocation (e.g., Hess, Emery, et al., 2009), as well as their failure to include experimental or statistical control methods (e.g., Brubaker & Naveh-Benjamin, 2018). Moreover, none of the studies justified their sample sizes. Critically, as none of these studies included control or ABST+TR conditions, they do not allow conclusions to be made about the effectiveness of TR in overcoming ABST. Finally, caution is needed when interpreting findings for combined TR strategies, as there was inconsistency in the explicitness of the ABST and TR manipulations across all eight studies.

Discussion

This review aimed to identify and critically appraise the methodology and existing evidence of studies investigating the use of TR strategies to overcome the detrimental effects of ABST on the cognitive performance of older adults. The types of TR strategies, their effectiveness in optimising the cognitive performance of older adults relevant to appropriate comparison conditions, and the factors influencing their effectiveness were examined. Thirty articles, reporting on 36 studies and examining 38 TR conditions, were identified. The design and methodology of included studies differed in terms of the TR strategies employed and the comparison conditions used. Fewer studies evaluated subtle TR strategies than blatant ones, and few studies were designed in ways that permitted conclusions to be drawn regarding the effectiveness of TR in overcoming ABST. Most studies (24 studies or 67%) exclusively compared TR conditions against ABST conditions. This precluded differentiation of the potential benefits of TR strategies from the detrimental effects of the ABST manipulations. Nevertheless, seven studies (19%) included a control condition and five studies (15%)

compared an ABST condition with a condition that included some type of TR strategy in addition to the ABST manipulation. These latter studies have greater utility for advancing knowledge of the effectiveness of TR strategies as relevant to the second aim of this review.

Overall, evidence for the effectiveness of TR strategies varied according to the explicitness of strategies and the comparison conditions employed. The evidence from studies examining blatant and combined TR strategies was mixed and, due to the methodological designs employed, did not permit conclusions regarding the effectiveness of TR strategies for overcoming ABST. As one exception, the study by Liu et al. (2017) which compared ABST and ABST+TR conditions provided support for a blatant TR strategy overcoming ABST, with medium to large effect sizes.

Evidence from the eight studies examining subtle TR strategies also varied according to the comparison condition used, but generally yielded more consistent empirical support. Three of the four studies comparing subtle TR and control conditions provided support for the effectiveness of TR. Moreover, of the four studies examining subtle TR strategies through comparison of ABST and ABST+TR conditions, three provided support for the effectiveness of TR in overcoming ABST, with medium to large effect sizes. Articles reporting on subtle TR strategies also typically met a higher number of methodological quality criteria, than those examining blatant or combined TR strategies. Overall, the existing studies provided limited evidence regarding the effectiveness of TR strategies in overcoming ABST. As such, this review only provides initial support for the effectiveness of subtle TR strategies.

In providing preliminary support for the effectiveness of subtle TR strategies in overcoming ABST, the current findings are consistent with those of a previous review on the effectiveness of TR for overcoming racial stereotypes (Nguyen & Ryan, 2008). However, Nguyen and Ryan (2008) also found that blatant TR strategies were more effective than subtle ones in overcoming gender-based ST. Although there was insufficient evidence

concerning the effectiveness of blatant TR strategies in the current review, a potential reason why these may be less effective in overcoming ABST is that blatant information regarding expectations for older adults' cognitive performance, even when positively framed, may still induce evaluative performance pressure and result in underperformance (i.e., "choking under pressure"; Baumeister, 1984).

Research examining blatant versus subtle methods for activating ST (Stone & McWhinnie, 2008) found support for a dual process model whereby blatant and subtle ST cues operate through independent mechanisms and detrimentally affect performance in different ways. Likewise, blatant and subtle TR strategies may have independent beneficial effects on performance. For example, blatant TR may increase efficiency, while subtle TR may improve accuracy. Importantly, as Shewach et al. (2019) note, it is unlikely people encounter blatant ST in real-world assessments due to ethical guidelines for conducting cognitive assessment; thus, targeting these may be counterproductive. Subtle ABST (e.g., mentioning that a test assesses memory) is likely more prevalent in these contexts and hence subtle TR strategies may have greater utility for mitigating its effects (Shewach et al., 2019).

Regarding factors influencing the effectiveness of TR relative to ABST or control conditions, performance varied according to test characteristics, including reward structure, time-limits, and valence of stimuli (Barber et al., 2019; Barber & Mather, 2013a; Hess, Emery, et al., 2009), education level (Andreoletti & Lachman, 2004), self-perceptions of ageing (Fernández-Ballesteros et al., 2015), and fear of Alzheimer's disease (Fresson et al., 2017). Further, reduced pre-task or task-related anxiety and younger subjective age mediated the effects of TR strategies on cognitive performance (Abrams et al., 2008; Alquist et al., 2018; Plaks & Chasteen, 2013). Therefore, a combination of test characteristics, participant factors, and emotional and subjective appraisal variables appear to influence the effectiveness of TR strategies.

Theoretical accounts of ST also provide some explanation as to the effectiveness of particular TR strategies. Steele et al. (2002) theorised people are less susceptible to the effects of ST when they distance themselves from or de-identify with the negatively stereotyped group. This would suggest that TR strategies that reduce identification with a group (e.g., older adults) or performance domain (e.g., cognitive ability) would have greater efficacy. Similarly, the strategy of encouraging individuals to maintain a positive self-identity through de-emphasising the salience of the domain to one's self-worth may also aid efficacy (Haslam et al., 2018a; Steele et al., 2002). Consequently, when encountering negative stereotypes, ABST will have little impact if older adults do not self-categorise as older and instead focus on other identities (e.g., family or community roles).

Barber (2017) conceptualised ABST as a threat to self-integrity, rather than group-reputation, which can be addressed through affirming an older adult's worth in an alternative domain of personal importance (e.g., family, religion). Research within other stereotyped groups (e.g., women and mathematics performance) has shown that ST can be overcome by increasing the salience of other identities in the same domain (Rydell et al., 2009) or by reminding people of multiple roles and identities (Gresky et al., 2005). While Liu et al. (2017) found that priming multiple identities (e.g., the advantages and disadvantages of being older compared to being younger) has positive effects on memory performance, these were domain-relevant. It would be beneficial for future research to investigate whether reminding older adults of multiple roles and identities unrelated to their cognitive abilities is helpful in overcoming ABST.

Limitations

This review identified that evidence regarding the effectiveness of TR in overcoming ABST is currently limited due to the small number of studies employing relevant comparison conditions. Studies examining ways of overcoming ABST have infrequently used control or

ABST+TR conditions in evaluating the effectiveness of TR strategies. As a further design issue, 34% of studies were not consistent in matching ABST and TR conditions on the explicitness of their manipulations (e.g., blatant ABST paired with subtle TR). Some researchers have suggested that subtle TR may be insufficient to overcome performance decrements due to blatant ABST (Stone & McWhinnie, 2008), although this remains to be investigated. Hence, reported effects (or lack thereof) in the reviewed studies could be due not only to the design of the TR manipulation, but also the choice of ABST induction. To increase confidence in conclusions drawn regarding the effectiveness of TR strategies in overcoming ABST it is recommended that future studies ensure that the explicitness of TR and ABST manipulations is consistent and that ABST conditions are compared with ABST+TR conditions.

The current findings are based on a set of heterogeneous studies with variable methodological quality. There was considerable variability with respect to study design, type of ABST manipulations and TR strategies examined, and measurement of cognition. This limited quantitative meta-analysis or other statistical analysis to address methodological problems. A recent meta-analysis by Shewach and colleagues (2019) examining ST effects (but excluding ABST) on the cognitive ability testing of adults found that effects were negligible to small when accounting for methodological problems. The effectiveness of TR strategies for overcoming ABST when controlling for methodological issues remains to be examined. Additionally, most studies were conducted in Western cultures and articles not published in English were excluded; hence, the relevance and effects of TR strategies for overcoming ABST in Eastern cultures requires further investigation.

Conclusion

Test performance affected by ABST can have a major bearing on interpretation and diagnostic decisions in the context of dementia assessment (Haslam et al., 2012). Given the

significant diagnostic implications of underperformance on cognitive tests for this population, it is important that cognitive assessments of older adults are appropriately introduced, administered, and interpreted (Régner et al., 2016; Scholl & Sabat, 2008). In the context of increased cognitive screening of older adults, investigating ways to optimise their cognitive performance by overcoming the detrimental effects of ABST is a valuable research objective. This is the first review to evaluate the effectiveness of TR strategies for overcoming the effects of ABST on older adults' cognitive performance. Overall, existing studies provided limited evidence regarding the effectiveness of TR strategies in overcoming ABST. This was in part due to the lack of studies employing ABST+TR or control comparison conditions. Nonetheless, preliminary support from a small number of studies was evident for the effectiveness of using subtle TR strategies to overcome ABST. It is imperative that future studies employ designs that enable the benefits of TR strategies to be differentiated from the detrimental effects of ABST. Such research has the potential to inform regarding ways to overcome or mitigate ABST in clinical practice.

Chapter 4: Statement of Contribution to Co-Authored Published Paper

This chapter includes a co-authored paper which is under review with an international peer-reviewed journal. This paper has been included as submitted with the exception of changes to style and formatting of headings, tables, figures, and referencing to maintain consistency throughout the thesis. The bibliographic status of the co-authored paper, including all authors, is:

Parker, G. J., Haslam, C., Stuart, J., Shum, D. H. K., & Ownsworth, T. (Under review). Health practitioner beliefs regarding the impact of age-based stereotype threat on performance in the cognitive assessment of older adults.

The candidate's contribution to the paper involved conception of the study design, literature review, data collection and analysis, and writing of the manuscript.

(Signed) [redacted] (Date) 30/07/2022

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Chapter 4: Health Practitioner Beliefs Regarding the Impact of ABST on Performance in the Cognitive Assessment of Older Adults

Introduction

Globally, the number of people aged 60 years and over is expected to double by 2050 (World Health Organization, 2020). A consequence of this trend is increased focus on the detection of pre-dementia syndromes (Le Couteur et al., 2013). Alongside growing demand for the cognitive screening of older adults, concerns have been raised regarding false positive diagnoses of mild cognitive impairment or dementia related to the effects of age-based stereotype threat on cognitive test performance of older adults (Régner et al., 2016).

Pervasive stereotypes exist about people's physical and cognitive competence in older age (Cuddy et al., 2005), which can influence older adults' performance. Specifically, older adults have been shown to underperform on cognitive tests (e.g., memory) in situations that put them at risk of confirming a negative ageing stereotype (e.g., older adults have poor memory; Barber, 2020). The phenomenon of age-based stereotype threat (ABST) and its detrimental impact on cognitive test performance is supported by robust evidence from systematic reviews and meta-analyses (Armstrong et al., 2017; Lamont et al., 2015). ABST not only reduces older adults' objective performance to clinical levels of impairment on mental status examinations (Barber et al., 2015; Haslam et al., 2012; Mazerolle et al., 2017) but also inflates subjective cognitive complaints (Bouazzaoui et al., 2016). As such, ABST has significant implications for the conduct and validity of cognitive assessment with older adults (Barber, 2020). Clinically, ABST increases the likelihood of health practitioners incorrectly interpreting underperformance on tests and subjective cognitive complaints as evidence of pathological cognitive decline (Ben-David et al., 2018; Régner et al., 2016).

Blatant and subtle ABST have been examined in research. Blatant forms can involve directly informing older adults of age-related differences (i.e., compared to younger adults) on

a test or ability. Subtle forms can involve priming a person's group membership (e.g., asking their age) or referring to a test as assessing memory. Of these, subtle ABST is more likely to occur in clinical settings from practitioners following pre-test procedures or test instructions (Shewach et al., 2019). Asking older adults their age, exploring age-related health concerns, prompting their use of glasses and/or hearing aids, or informing them memory is being tested, are all ways in which health settings (e.g., hospitals, memory clinics) can activate and perpetuate negative age-based representations (Ben-David et al., 2018; Haslam et al., 2018a; Scholl & Sabat, 2008). Such cues may prime a person's age-based identity which, in turn, can increase performance expectations and anxiety, reduce working memory, and result in poorer performance (Abrams et al., 2008; Follenfant & Atzeni, 2020; Mazerolle et al., 2012).

Neuropsychological assessment manuals and compendiums (e.g., Lezak et al., 2012; Strauss et al., 2006) stress the importance of preparing patients for assessment and optimising their performance. They encourage examiners to minimise environmental distractors (e.g., noise) and consider psychological or physical states (e.g., anxiety, fatigue) that may result in poorer performance. However, there is less emphasis on addressing the impact of ABST, such as patients holding negative beliefs about their cognitive abilities and being fearful of dementia (Fresson et al., 2017; Scholl & Sabat, 2008). Clinical guidelines for assessment of older adults (e.g., Laver et al., 2016; Petersen et al., 2018; Pottie et al., 2016) also typically lack reference to the influence of ABST on performance. This omission is starting to be addressed, with guidelines (e.g., American Psychological Association, 2021) encouraging health practitioners to be mindful of how age biases can interfere with older adults' optimal cognitive performance. Hence, health practitioners who are well informed by research (Barber et al., 2015; Haslam et al., 2012; Mazerolle et al., 2017) may be conscious of ABST in clinical contexts. However, it is unknown to what extent health practitioners can recognise the potential impact of ABST on test performance and understand implications for their practice.

In addition to gauging health practitioners' understanding of the impact of ABST on cognitive test performance, the factors influencing their ability to recognise ABST and its perceived impact on practice are important to ascertain. Research has shown health practitioners' attitudes toward ageing can vary according to the frequency and type of contact they have with older adults (Swift et al., 2016). For instance, viewing declining health and function as a normal part of increasing age was more common among primary care practitioners who had worked for a longer period with older adults (Davis et al., 2011).

These associations seem complicated by ageism, which encompasses hostile (i.e., contemptuous prejudice) and benevolent (i.e., patronising and/or overaccommodating behavior) attitudes toward older adults (Cary et al., 2017). Cary et al. (2017) found hostile and benevolent ageist attitudes predict different outcomes. Of relevance to ABST, those high on benevolent ageism viewed older adults as less competent. While interventions such as intergenerational contact would suggest greater exposure to older adults reduces ageist beliefs and leads to more positive attitudes (Drury et al., 2016), there is evidence to the contrary for health practitioners (Bettens et al., 2014; Drury et al., 2017). For example, aged care workers who experienced negative interactions with residents were found to generalise benevolent ageist attitudes to other older adults (Drury et al., 2017). Hence, it is conceivable greater exposure to older adults in clinical contexts and benevolent ageist attitudes may be associated with reduced recognition of ABST and lower perceived impact of ABST on practice.

With increasing numbers of older adults expected to present for cognitive assessment in future, it is imperative health practitioners understand the psychosocial factors influencing cognitive test performance (Ben-David et al., 2018). To understand the extent to which health practitioners believe ABST can impact on cognitive assessments with older adults, it is important to initially assess their ability to recognise ABST in the context of other factors that may influence test performance, based on their pre-existing knowledge (i.e., without being

cued or educated about ABST). Accordingly, this study aimed first to investigate health practitioners' ability to recognise the potential influence of ABST in the cognitive assessment of older adults. A hypothetical cognitive assessment scenario was presented, without reference to ageing stereotypes or ABST, that required health practitioners to identify factors detrimental to an older adult's cognitive performance. It was hypothesised health practitioners would identify external (i.e., environmental distractors) and internal (i.e., negative physical and psychological states) factors as significantly more detrimental to cognitive performance than ABST factors (i.e., stimuli priming one's age-based identity and/or negative ageing stereotypes).

The second aim was to investigate factors associated with health practitioners' recognition of ABST in the assessment scenario and their perceptions of its impact on older adults' cognitive test performance in practice, once they had been provided with information about ABST. It was hypothesised negative ageing beliefs, greater benevolent ageism, and more frequent clinical interaction with older adults would be significantly associated with lower recognition of ABST in the assessment scenario and lower perceived impact of ABST. Furthermore, it was hypothesised lower recognition of ABST in the assessment scenario would be significantly associated with lower perceived impact of ABST in practice, after controlling for health practitioner variables.

Methods

Participants

Health practitioners (including postgraduate trainees) from any discipline with experience in conducting cognitive assessments with older adults (e.g., psychologists, neuropsychologists, geriatricians, psychiatrists, occupational therapists, speech pathologists) were eligible to participate. Additional eligibility criteria included residing in Australia. Participants' English fluency was inferred from their ability to successfully complete the

survey. Participants were recruited from the researchers' professional networks and Australian multidisciplinary professional membership bodies and interest groups (see Procedure).

An a priori power analysis (G*Power 3.1.9.4; Faul et al., 2009) was conducted for sample size estimation for the multivariate analysis. We used a small to medium effect size (f^2 = .085) based on previous research examining factors related to ageist beliefs (Davis et al., 2011; Drury et al., 2017). With alpha set at .05, a sample size of 95 participants would have 80% power to detect a significant effect of recognition of ABST in the assessment scenario on perceived impact in practice, controlling for up to seven other predictors.

A total of 185 respondents began the survey. Of these, 12 were ineligible (e.g., practitioners outside Australia) and 13 did not answer any questions. A further 31 respondents did not complete the full survey. Overall, 129 participants met inclusion criteria and completed sufficient survey sections. Sample characteristics are described in the Results.

Materials

The survey was conducted using the Griffith University Online Research Survey Tool, powered by LimeSurvey (Version 2.59). Piloting was conducted prior to dissemination. A sample of clinical researchers (n = 6) belonging to a postgraduate laboratory group were presented the survey as a group, completed the survey independently, and provided feedback on its structure, functionality, wording, and the order of questions as they completed the measure. Their feedback was incorporated into the final survey and their data were not used. Following an information sheet, the survey contained 69 questions (see Appendix C) presented across eight pages and took approximately 30 minutes to complete. After the survey, respondents had the opportunity to enter a prize draw to win one of five $50 eGift cards through a separate weblink. All questions prompted a mandatory response with the exception of Australian state (in case they were based overseas) and open-ended responses. The survey comprised the following sections, in the order presented.

Demographic and Workplace Characteristics

Respondents provided their age, gender, ethnicity, country of residence, Australian state, education, training status (e.g., currently undertaking a postgraduate degree), discipline, years of experience, practice setting (multiple responses permitted), and patient population.

Beliefs and Expectations About Ageing

The 12-item Expectations Regarding Ageing survey (ERA-12; Sarkisian et al., 2005) measured respondents' ageing beliefs. Items (e.g., "Forgetfulness is a natural occurrence just from growing old.") are rated on a 4-point scale (1 = *Definitely True*, 4 = *Definitely False*). Total and subscale (physical health, mental health, and cognitive function) scores were computed, with lower scores indicating more negative ageing beliefs (i.e., expectations of decline in mental health, cognitive, and physical functioning with ageing). Internal consistency for the sample was good (Total, $\alpha = .80$).

The 9-item benevolent ageism subscale from the Ambivalent Ageism Scale (Cary et al., 2017) measured respondents' benevolent attitudes toward older adults. Items (e.g., "Even though they do not ask for help, older people should always be offered help.") were rated on a 7-point scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*), with higher scores representing greater benevolent ageism. Internal consistency for the sample was acceptable ($\alpha = .74$).

Level of Interaction and Scope of Practice with Older Adults

Respondents were asked to indicate their scope of practice and interaction with older adults (i.e., aged $\geq$60 years). Questions included how often (1 = *Never*, 7 = *Almost Always–At least once per day*) they see older adults (personally and professionally), their level of clinical experience with older adults and frequency of cognitive assessments, and the most common referral question received. Respondents were asked to answer these questions according to their usual practice with older adults prior to the COVID-19 pandemic.

Hypothetical Assessment Scenario

An assessment scenario (see Appendix D), with follow-up questions presented on the same page, measured health practitioners' ability to recognise the potential impact of ABST on cognitive test performance in an assessment context. Participants read a scenario describing an older adult (Mr. Smith) attending a memory clinic for cognitive assessment. The scenario was designed to include ABST stimuli, derived from previous research (Follenfant & Atzeni, 2020; Haslam et al., 2018a), that make older adults' age salient and/or reinforce negative age stereotypes. These included attending a memory clinic, reading pamphlets on dementia and stroke, patients' beliefs about age and memory ability, being asked their age, and being told they will complete tests of their memory abilities. The scenario also included factors conventionally recognised as detrimental to assessment performance, derived from neuropsychological assessment guidelines (Lezak et al., 2012; Strauss et al., 2006). These were classified as internal or external factors. Internal factors included personal phenomenon such as physical discomfort (e.g., leg cramp, fatigue from not taking a rest break) and psychological states (e.g., feeling nervous about the appointment, having a dubious attitude toward assessment). External or environmental factors included distracting stimuli within or near the assessment room (e.g., loud voices from the next room, someone knocking on the door). Five factors from each of these three categories (i.e., ABST, internal, external) were embedded within the scenario (see Table 4.1).

After reading the scenario, respondents immediately rated each of the 15 factors based on how detrimental they perceived them to be on the older adult's cognitive performance (1 = *Not at all*, 5 = *Extremely*). Presentation order was randomised on each page load. Ratings for each factor type were summed and averaged. Respondents were also asked to rank the five most detrimental factors. A principal component analysis supported the 15 items loaded on three components, which explained 65.6% of the variance. The ABST items loaded on the

Table 4.1

Assessment Scenario Factors

Factor type	Factor
ABST	Attending a memory clinic
	Reading pamphlets about stroke and Alzheimer's Disease
	Mr Smith's belief that declining memory is to be expected for someone of his age
	Being asked to provide his age
	Being told he will complete tests of his memory abilities
Internal	Feeling nervous about the appointment
	Having a lot on his mind about his financial situation and family disagreements
	Feeling doubtful about the need for the assessment
	Experiencing a leg cramp
	Not taking a rest break when offered
External/environmental	Air conditioning making the room feel quite cold
	Fluorescent light overhead occasionally flickering
	Loud voices coming from the next room which was difficult to block out at times
	Knock on the door by someone checking if the room was available
	Being seated in an uncomfortable chair

same component (communalities: .59-.83), and items loaded satisfactorily on the external (communalities: .62-.78) and internal (communalities: .45-.76) components, despite cross-loadings for two internal items (experiencing a leg cramp; feeling doubtful about the need for assessment). Internal consistencies for the three components were good (ABST, $\alpha = .86$; internal $\alpha = .81$; external, $\alpha = .87$).

Perceived Impact of ABST in Practice

This measure indexed respondents' perceived impact of ABST on older adults' performance in practice. Prior to completing this measure, respondents were provided with a brief explanation of ABST and how it might impact older adults' performance on cognitive assessment. They were then asked to rate the extent (1 = *Not at all*, 5 = *Extremely*) to which they believed ABST impacts the cognitive performance of older adults in general, in their

place of practice, and in their broader profession (e.g., “To what extent do you believe that age-based stereotypes affect the cognitive performance of older adults in general?”). Internal consistency of the 3-item scale was good (α = .86).

Procedure

The study was approved by the Griffith University Human Research Ethics Committee (ref no:2020/636). Participants were recruited via convenience sampling through advertising within the researchers’ professional networks via social media and emailing the survey advertisement (see Appendix E) to colleagues and key representatives from national multidisciplinary professional bodies and interest groups in Australia (e.g., Brain Impairment Clinician and Researcher Peer Network, Australian Psychological Society’s Psychology and Ageing Interest Group, Neuropsychologists in Australia) whose memberships comprise health practitioners involved in cognitive assessment and/or working with older adults. Snowballing recruitment was also employed in which prospective respondents were encouraged to forward the survey link to their colleagues. The estimated number of people the survey link reached exceeded 2500. The survey was open from 29/10/2020 to 17/02/2021, with initial recruitment mainly occurring in November 2020 and a reminder sent in mid-December 2020.

Data Analysis

Data screening and analysis was conducted using SPSS, version 27, following recommendations by Field (2013). In the addition to the 13 surveys that contained no responses, 31 surveys contained insufficient data on key sections (i.e., most typically from the hypothetical assessment scenario section onwards) and were excluded from analysis. One-way ANOVA or chi-square analyses indicated no differences between excluded participants (n = 31) and those retained for analysis (n = 129) in age, gender, years of experience, ethnicity, education, and discipline. However, compared to respondents retained for analysis, a higher proportion of those with insufficient data resided outside Queensland (state survey

originated in), $X^2(1, 160) = 8.43$, $p = .004$, and were completing ongoing training, $X^2(1, 160) = 5.19$, $p = .028$.

Data were screened for relevant assumptions prior to analysis. Transformations (e.g., square root) conducted to improve significant deviations from normality (±1.96) on some variables did not alter the significance of results. Hence, findings based on non-transformed data are reported. Descriptive statistics and repeated measures ANOVA were used to address hypothesis one. Hypotheses two and three were examined using correlations and hierarchical multiple regression. The hypotheses and results of the correlation analysis guided selection of factors examined in the regression. Collinearity statistics indicated acceptable levels of multicollinearity for variables in the regression (Field, 2013).

Results

Sample Characteristics

As shown in Table 4.2, participants' average age was 39.75 years (*SD* = 11.50), and the majority were female (86%). The sample was highly educated, with most respondents having attained a Doctorate or PhD (46%). Most had completed their professional training (83%), and respondents had an average of 11.77 (*SD* = 9.80) years of experience since attaining their highest qualification (i.e., PhD, Masters, or Honours). Neuropsychology/ clinical neuropsychology was the most common discipline, followed by occupational therapy, and psychology/clinical psychology. The largest proportion of respondents worked in a public hospital, followed by private practice, and university. The majority of respondents indicated they worked mainly with older adults (57%), followed by younger to middle aged adults (27%), a balance of all ages (13%), or with paediatric patients (2%).

The majority of the sample (69%) endorsed older adults as an area of speciality or expertise and rated themselves as "quite" or "highly" experienced in conducting cognitive assessments with older adults. Over half of respondents indicated they "very frequently" or

Table 4.2

Sample Characteristics (n = 129)

Characteristics	*M (SD)/N (%), range*
Age (years)	39.75 (11.50), 23-72
20-29	31 (24%)
30-39	36 (27.9%)
40-49	34 (26.4%)
50-59	16 (12.4%)
60-72	12 (9.3%)
Gender	
Male	18 (14%)
Female	111 (86%)
Ethnicity	
Australian	106 (82.2%)
European	9 (7%)
Asian	9 (7%)
Other	5 (3.9%)
Australian state of residence	
Queensland	62 (48.1%)
New South Wales	22 (17.1%)
Victoria	38 (29.5%)
Other	7 (5.4%)
Education level (highest attained)	
Bachelor's degree	26 (20.2%)
Honours Degree	18 (14%)
Master's degree	26 (20.2%)
Doctorate/PhD	59 (45.7%)
Training status	
Complete	107 (82.9%)
Ongoing (i.e., postgraduate degree and/or registrar program)	22 (17.1%)
Years of experience (since attaining highest qualification)	11.77 (9.80), 0-40
Discipline	
Psychology/Clinical Psychology	14 (10.9%)
Neuropsychology/Clinical Neuropsychology	63 (48.8%)
Occupational Therapy	43 (33.3%)
Other (e.g., speech pathology)	9 (7%)
Practice setting	
Public hospital	87 (67.4%)
Private practice	36 (27.9%)
University	25 (19.4%)
Other (e.g., private hospital)	27 (20.9%)
Patient population	
Mainly paediatric	3 (2.3%)
Mainly younger to middle aged adults	35 (27.1%)
Mainly older adults	74 (57.4%)
Balance of all ages	17 (13.2%)

"almost always" see older adults in practice (61%) and interact with them outside practice (54%). A large proportion of respondents (44%) indicated they "very frequently" or "almost always" conduct cognitive assessments with older adults. The highest proportion of the sample indicated they mainly used selected tests or subtests (43%), followed by cognitive screening tests (33%), as opposed to comprehensive test batteries (18%). Respondents most commonly received referral questions regarding assessment and/or diagnosis of memory problems or cognitive decline (53%), followed by assessment of cognitive function following a significant health or neurological event (33%).

Descriptive Data and Preliminary Analyses

Participants generally held neutral beliefs regarding the maintenance of overall health (*M* = 63.07, *SD* = 13.10), as well as physical health (*M* = 51.74, *SD* = 17.14) and cognitive function (*M* = 54.97, *SD* = 19.53), with ageing. They held positive beliefs regarding the maintenance of mental health with ageing (*M* = 82.49, *SD* = 13.70) and were low on benevolent ageism (*M* = 14.87, *SD* = 5.34) relative to non-health practitioner samples (Cary et al., 2017; Sarkisian et al., 2005). Due to few psychologists/clinical psychologists (*n* = 14) completing the survey and the overlap in training backgrounds between psychology and neuropsychology, these were grouped into a single discipline ("psychologists"; *n* = 77) for ease of comparison.

Health Practitioner Recognition of ABST in the Assessment Scenario

Participants' ratings of assessment scenario factors are summarised in Table 4.3. A repeated measures ANOVA showed participants' ratings of assessment scenario factors differed significantly according to factor type, $F(2, 256) = 222.42$, $p < .001$, $\eta_p^2 = .64$. Post-hoc contrasts revealed participants rated ABST factors as significantly less detrimental to performance than external (Mean difference = -0.96, 95% CI [-1.11, -0.80], $p < .001$) and internal (Mean difference = -0.99, 95% CI [-1.11, -0.86], $p < .001$) factors. There was no

Table 4.3

Health Practitioner Ratings of Assessment Scenario Factors and Perceived Impact of ABST (n = 124-129)

	Not at all/ Slightly	Moderately	Considerably/ Extremely	*M* (*SD*)
	n (%)	*n (%)*	*n (%)*	
Assessment scenario factors				
ABST				2.39 (0.82)
Attending a memory clinic	76 (58.9)	31 (24)	22 (17)	2.44 (1.01)
Reading pamphlets about stroke and Alzheimer's Disease	59 (45.7)	38 (29.5)	32 (24.8)	2.78 (1.04)
Mr Smith's belief that declining memory is to be expected for someone his age	74 (57.4)	38 (29.5)	17 (13.2)	2.39 (1.00)
Being asked to provide his age	103 (79.8)	19 (14.7)	7 (5.4)	1.73 (0.98)
Being told he will complete tests of his memory abilities	66 (51.2)	35 (27.1)	28 (21.7)	2.62 (1.08)
Internal				3.38 (0.74)
Feeling nervous about the appointment	19 (14.7)	46 (35.7)	64 (49.7)	3.50 (0.98)
Having a lot on his mind (financial situation and family disagreements)	7 (5.4)	34 (26.4)	88 (68.3)	3.84 (0.88)
Feeling doubtful about the need for the assessment	53 (41.1)	34 (26.4)	42 (32.6)	2.95 (1.14)
Experiencing a leg cramp	23 (17.8)	43 (33.3)	63 (48.9)	3.47 (0.99)
Not taking rest break when offered	33 (25.6)	52 (40.3)	44 (34.1)	3.12 (0.94)
External/environmental				3.35 (0.79)
Air conditioning making the room feel quite cold	37 (28.7)	45 (34.9)	47 (36.4)	3.15 (0.97)
Fluorescent light overhead occasionally flickering	34 (26.4)	49 (38.0)	46 (35.7)	3.22 (0.99)
Loud voices coming from next room	5 (3.9)	38 (29.5)	86 (66.6)	3.87 (0.82)
Knock on door by someone checking if the room was available	35 (27.1)	42 (32.6)	52 (40.4)	3.27 (1.10)
Being seated in an uncomfortable chair	34 (26.4)	45 (34.9)	50 (38.8)	3.22 (0.98)
Perceived impact of ABST on cognitive performance of older adults				2.65 (0.77)
General impact	48 (38.7)	48 (38.7)	28 (22.6)	2.82 (0.91)
Impact in place of practice	67 (54)	49 (39.5)	8 (6.5)	2.42 (0.80)
Impact in broader profession/field	49 (39.5)	55 (44.4)	20 (16.1)	2.70 (0.90)

Note. Additional analyses (two-proportion *z*-tests) indicated that the average proportion that responded 'not at all/slightly' across the ABST items ($n = 76$) was significantly higher than the average proportions responding 'not at all/ slightly' across the internal ($n = 27$; $z = 6.23$, $p < .001$) and external ($n = 29$; $z = 5.96$, $p < .001$) items. However, the average proportions selecting this response across the internal and external items did not significantly differ ($z = -0.30$, $p = .76$).

significant difference between ratings for internal and external factors (p >.05). Further inspection of ranking data revealed only 26% of respondents included at least one ABST factor in their top five most detrimental factors.

Occupational therapists rated ABST, $t(71.15) = 3.06$, $p = .003$, internal, $t(118) = 4.00$, p <.001, and external, $t(118) = 4.15$, p <.001, factors as more detrimental to cognitive performance than psychologists. However, the proportion of respondents who included at least one ABST factor in their top five selections did not differ by discipline, $X^2(1, 120) = 2.23$, $p = .136$. Hence, these discipline differences were more reflective of a general tendency of occupational therapists to rate factors as more detrimental than psychologists.

Factors Associated with ABST Recognition and Perceived Impact of ABST in Practice

Small correlations were found between recognition of ABST factors and ageing beliefs regarding physical health ($r = .20$, $p = .025$) and cognitive function ($r = .19$, $p = .03$), indicating those with more positive beliefs regarding the maintenance of these functions with ageing were better able to recognise ABST. As shown in Table 4.4, contrary to expectations, benevolent ageism was not significantly associated with recognition of ABST ($r = -.11$, $p = .200$). No significant associations between years of experience or frequency of interaction with older adults and recognition of ABST were found.

A small positive correlation was found between ageing beliefs and perceived impact of ABST on the cognitive performance of older adults in practice ($r = .20$, $p = .026$). Older practitioners ($r = -.34$, p <.001) and those with more years of experience ($r = -.32$, p <.001), greater frequency seeing older adults in practice ($r = -.19$, $p = .03$), and greater experience in conducting cognitive assessments ($r = -.29$, p <.001) had significantly lower perceptions of the impact of ABST in practice. Moreover, greater recognition of ABST factors ($r = .46$, p <.001) in the assessment scenario was significantly associated with higher perceived impact of ABST in practice. Small-to-medium positive associations were found between recognition

Table 4.4

Correlations Between Socio-Demographic and Work Characteristics, Ageing Beliefs, and ABST Variables

Variable	1	2	3	4	5 (ρ)	6 (ρ)	7	8	9	10	11	12
1. Age	-											
2. Gender[a]	-.10	-										
3. Discipline[b]	-.08	-.15	-									
4. Years of experience	.81***	-.08	.17	-								
5. Frequency older adults seen (ρ)	.03	-.11	.33***	.09	-							
6. Cognitive assessment experience (ρ)	.45***	-.19*	-.01	.48***	.32***	-						
7. ERA Total[c]	-.03	-.10	.21*	.01	.26**	.12	-					
8. Benevolent ageism	-.31***	-.02	-.15	-.27**	-.06	-.13	-.40***	-				
9. ABST factors	-.07	-.12	.29***	-.11	-.02	-.16	.16	-.11	-			
10. Internal factors	-.21*	-.10	.35***	-.22*	.10	-.16	.17	.01	.74***	-		
11. External factors	-.04	-.14	.36***	-.04	.07	-.15	.16	-.03	.60***	.79***	-	
12. Perceived impact of ABST	-.34***	.02	.01	-.32***	-.19*	-.29***	.20*	.06	.46***	.36***	.24**	-

[a] Female = 1, male = 2. [b] Psychologists = 1, occupational therapists = 2. [c] ERA = Expectations regarding ageing.
*p <.05; **p <.01; ***p <.001.

of internal factors (r = .36, p <.001) and external factors (r = .24, p = .006) and perceived impact of ABST. Perceived impact of ABST in practice was not related to benevolent ageism (r = .06, p = .502) and did not significantly differ according to discipline, $t(114)$ = .007, p = .995.

A hierarchical multiple regression (see Table 4.5) was conducted to determine whether recognition of ABST factors in the assessment scenario was significantly related to perceived impact of ABST in practice after controlling for age, years of experience, frequency older adults are seen, experience in conducting cognitive assessments, ageing beliefs, and recognition of internal and external factors in the assessment scenario. The health practitioner variables entered at Step 1 significantly accounted for 28% of the variance in perceived impact of ABST in practice, $F(7, 116) = 6.58$, p <.001. Frequency older adults are seen (β = -.21, p = .020), ageing beliefs (β = .21, p = .015), and recognition of internal factors (β = .31, p = .024) each accounted for significant unique variance in perceived impact of ABST. At Step 2, recognition of ABST factors in the assessment scenario was entered and significantly explained a further 8% of the variance in perceived impact of ABST in practice, $F_{chg}(1, 115) = 15.09$, p <.001. Recognition of ABST factors (β = .45, p <.001) and ageing beliefs (β = .19, p = .019) each accounted for significant unique variance.

Discussion

This study sought to investigate health practitioners' ability to recognise the potential influence of ABST in the cognitive assessment of older adults as well as their perceptions of its impact on older adults' cognitive test performance in practice, once they were provided with information about ABST. As hypothesised, health practitioners rated ABST factors in the assessment scenario as less detrimental to cognitive performance than internal and external factors. This may suggest low recognition of ABST by health practitioners or, alternatively, reflect that ABST is perceived to have less detrimental effects on cognitive

Table 4.5

Hierarchical Multiple Regression Analysis of Health Practitioner Variables on Perceived Impact of ABST (n = 124)

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
Step 1	.28***	-					
Age			-0.01	0.01	-.15	-1.11	-.01
Years of experience			-0.01	0.01	-.09	-0.68	-.00
Frequency older adults seen			-0.12	0.05	-.21	-2.36*	-.03
Cognitive assessment experience			-0.04	0.07	-.07	-0.68	-.00
ERA Total[a]			0.01	0.01	.21	2.48*	.04
Internal factors			0.33	0.14	.31	2.29*	.03
External factors			-0.04	0.13	-.04	-0.32	-.00
Step 2	.37***	.08***					
Age			-0.02	0.01	-.22	-1.70	-.02
Years of experience			-0.01	0.01	-.08	-0.61	-.00
Frequency older adults seen			-0.09	0.05	-.17	-1.94	-.02
Cognitive assessment experience			-0.04	0.06	-.06	-0.61	-.00
ERA Total			0.01	0.01	.19	2.38*	.03
Internal factors			-0.05	0.17	-.04	-0.27	-.00
External factors			-0.03	0.12	-.03	-0.25	-.00
ABST factors			0.42	0.11	.45	3.89***	.08

[a] ERA = Expectations regarding ageing.
*p <.05; **p <.01; ***p <.001.

performance than other factors such as physical discomfort and environmental distractors. Lower recognition of ABST in the assessment scenario, negative ageing beliefs, and more frequent exposure to older adults in professional practice were associated with lower perceptions of the impact of ABST on older adults' cognitive test performance in practice. Conversely, greater recognition of ABST in the assessment scenario was associated with the perception ABST has a greater impact in practice.

Health practitioners holding positive beliefs regarding the maintenance of physical and cognitive function with ageing were more likely to recognise the possible influence of ABST in the assessment scenario. As such, holding positive expectations of ageing may mean practitioners are less accepting of age-related biases in assessment contexts. Contrary to expectation, benevolent ageism was not significantly associated with ABST recognition, nor perceived impact of ABST in practice. While it was anticipated holding patronising views toward older adults and perceiving them as less competent would result in poorer recognition of ABST in the assessment scenario, this was not the case. Years of experience and frequency of interaction with older adults were also not significantly associated with recognition of ABST in the assessment scenario but were associated with perceived impact of ABST in practice. Hence, while greater years of experience and exposure to older adults do not appear to influence health practitioners' ability to recognise ABST, they instead contribute to the perception ABST does not impact on assessments with older adults in practice.

As an important novel finding, the ability to recognise ABST factors in an assessment scenario and ageing beliefs uniquely accounted for perceived impact of ABST in practice, after controlling for practitioner age, years of experience, frequency of interaction with older adults, experience in conducting cognitive assessments, and their recognition of internal and external factors. One possible explanation for this finding is, upon learning about ABST through the information provided after the assessment scenario ratings were given, health

practitioners who endorsed negative ageing beliefs and had not recognised the possible negative impact of ABST on Mr Smith's test performance were motivated to downplay the impact of ABST in practice. It is further possible that health practitioners with greater experience in working with older adults may feel more confident in their ability to deal with any issues that could undermine a patient's performance. Alternatively, health practitioners with greater experience in working with older adults may have a more fixed view on biological changes associated with ageing (Drury et al., 2017), as opposed to recognising social contextual influences such as ABST (Ben-David et al., 2018).

In support of this, Bettens et al. (2014) found aged care practitioners typically viewed the cognitive effects of normal ageing as consistent with mild Alzheimer's disease, thus reflecting a pathological view of normal ageing. Health practitioners working with older adults may come to see poor health and cognitive decline as an inherent part of ageing and, as such, may not recognise when age-based categorisations or negative ageing stereotypes are salient in assessment contexts, nor be motivated to address their impact on performance. However, those with greater ability to recognise ABST in an assessment context are more likely to perceive the potential impact of ABST on the cognitive assessment performance of older adults in practice. This finding highlights the importance of continuing professional development programs for practitioners working with older adults targeting lack of knowledge or misconceptions about ABST and using robust evidence (e.g., Armstrong et al., 2017; Lamont et al., 2015) to demonstrate the impact of ABST on assessment performance.

The low recognition or perceived importance of ABST in the assessment scenario may reflect the current sample's lack of training regarding the potential impact of ageing stereotypes on older adults' cognitive performance. Notably, ABST is not specifically referred to in clinical guidelines and handbooks on the cognitive assessment of older adults (e.g., Lezak et al., 2012; Petersen et al., 2018). Accordingly, if ABST is not perceived to

negatively impact cognitive performance or compromise the validity of assessments, health practitioners are unlikely to be motivated to address it. Overall, the findings highlight a need for cognitive assessment manuals and training to improve knowledge of ABST and encourage health practitioners to view it as posing a similar threat to performance as other psychological and contextual factors that can undermine test performance. More recent practice guidelines for the cognitive assessment of older adults (e.g., American Psychological Association, 2021) refer to the impact of ABST on cognitive test performance and encourage health practitioners to be mindful of how negative age biases can interference with optimal performance. However, limited guidance is provided as to the ways in which health practitioners can mitigate its impact, especially in clinical practice. This may be reflective of the limited research in this area.

Stimulated by evidence of the impact of ABST on cognitive test performance (Armstrong et al., 2017; Lamont et al., 2015), a recent systematic review (Parker et al., 2020) examined the effectiveness of strategies for overcoming ABST through blatant and/or subtle threat-reducing strategies. Although the evidence was mixed overall, there was preliminary support for the effectiveness of subtle threat-reducing strategies (e.g., highlighting positive qualities associated with ageing) for reducing the effects of ABST on cognitive performance (Parker et al., 2020). Strategies aimed at reducing the threat to one's self-integrity posed by ABST are thought to hold promise (Barber, 2017), such as affirming an older adult's worth in an alternative domain of personal importance to alleviate the burden of age-based social identity (Follenfant & Atzeni, 2020). However, further research is needed to evaluate such strategies and guide their implementation into clinical practice.

Swift and colleagues (2016) provide some practical recommendations for mitigating ageism in healthcare settings. For example, at an organisational level, use of categorisations based on age or age-related deficits (e.g., "geriatric ward" and "memory clinic") that

segregate older adults and perpetuate negative ageing stereotypes, is discouraged. At an individual level, it is recommended health practitioners avoid making a patient's age salient before administering tests (e.g., memory tests) vulnerable to the effects of ABST. Understandably, such strategies of avoiding priming of age-based categorisations or downplaying the memory component of cognitive assessments may not always be feasible (Haslam et al., 2018a). Nonetheless, a useful starting point is for training programs to focus on increasing health practitioners' understanding of how ageism and negative ageing stereotypes can impact the cognitive assessment of older adults.

The current findings must be interpreted in the context of various limitations. Specifically, the small, convenience sample of Australian health practitioners may limit the generalisability of our findings. The recruitment sources led to an overrepresentation of psychologists and overlooked other disciplines involved in the cognitive assessment of older adults (e.g., geriatricians and psychiatrists). Moreover, recruiting participants via professional membership bodies and interest groups (especially those with a focus on brain injury) may have increased the number of health practitioners involved in cognitive assessment following neurological injury as opposed to the assessment of age-related cognitive changes. This may have conflated assumptions around the inevitability of observing poor performance in patients presenting for assessment. The convenience sampling approach may have also biased the findings by including more health practitioners with a stronger interest in ageing issues and those more engaged in research and professional networking. The perspectives of health practitioners who do not conduct as many cognitive assessments with older adults or hold this professional interest or practice area may not have been reflected. Recruiting health practitioners who work more often with older adults may have inadvertently biased the main findings toward desensitisation to ageing stereotypes and reduced recognition of the potential influence of ageing stereotypes in cognitive assessments.

As a further limitation, there was a relatively high attrition rate (25%) in terms of participants who initiated the survey but did not complete any or most of the questions, with survey responses typically incomplete from the hypothetical assessment scenario onwards. This may suggest the time commitment and cognitive effort involved in reading and making judgements regarding the assessment scenario was burdensome for some respondents. Lack of renumeration of respondents may have also contributed to the high attrition rate, although respondents were able to enter a random prize draw. Participants' English fluency was not screened for, and low English proficiency may have contributed to the attrition rate. More generally, these limitations highlight the need for some caution in generalising the findings to the broader population of health practitioners involved in the cognitive assessment of older adults. Use of a broader range of recruitment avenues for different disciplines would help improve the representation of health professions involved in the cognitive assessment of older adults and thus enhance the generalisability of findings.

Overall, health practitioners rated ABST as less detrimental to cognitive performance than internal and external factors in an assessment scenario. Lower recognition of ABST and negative ageing beliefs were found to predict lower perceived impact of ABST on older adults' cognitive performance in practice. These findings underscore the need to improve health practitioners' knowledge of ABST and ways to avoid inadvertently activating negative ageing stereotypes in assessments. Further research also needs to examine the potential benefits of threat reduction strategies for mitigating the impact of ABST on older adults' cognitive test performance.

Chapter 5: Statement of Contribution to Co-Authored Published Paper

This chapter includes a co-authored paper which has been submitted to an international peer-reviewed journal. This paper has been included as submitted with the exception of changes to style and formatting of headings, tables, figures, and referencing to maintain consistency throughout the thesis. The bibliographic status of the co-authored paper, including all authors, is:

Parker, G. J., Haslam, C., Stuart, J., Shum, D. H. K., & Ownsworth, T. (Manuscript submitted for publication). Examining the utility of a multiple group membership intervention for alleviating the effects of age-based stereotype threat on older adults' memory performance.

The candidate's contribution to the paper involved conception of the study design, literature review, data collection and analysis, and writing of the manuscript.

(Signed) [redacted] (Date) 30/07/2022

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Supervisor: Professor Tamara Ownsworth

Chapter 5: Examining the Utility of a Multiple Group Membership Intervention for Alleviating the Effects of ABST on Older Adults' Memory Performance

Introduction

When older adults are made aware of negative stereotypes (e.g., declining cognitive competence) about their age they are found to underperform on stereotype-relevant tasks, or experience age-based stereotype threat (ABST; Haslam et al., 2018b; Lamont et al., 2015). This occurs on cognitive tests (Lamont et al., 2015), especially those assessing memory (Armstrong et al., 2017), and leads older adults to evaluate their own abilities poorly and underperform despite the absence of known pathology (Fourquet et al., 2020). Consequently, ABST raises concerns about the interpretation of older adults' performance on clinical assessments of cognition (Barber et al., 2015; Haslam et al., 2012; Mazerolle et al., 2017), particularly diagnostic implications of impaired cognitive test performance in this population. To address this, there is increasing focus on investigating threat-removal (TR) interventions for ameliorating the effects of ABST so health professionals are better equipped to help older adults perform optimally during cognitive testing (Barber, 2017; Régner et al., 2016).

Theoretical accounts of stereotype threat provide a basis for identifying effective TR strategies. According to stereotype threat theory (Steele & Aronson, 1995; Steele et al., 2002), once a negative stereotype is activated it elicits fear and primes self-evaluations in accordance with the harmful stereotype. In turn, these self-evaluations elicit performance pressure to avoid stereotype fulfilment. Steele et al. (2002) theorised that people are less susceptible to stereotype threat when they deidentify with a threatened domain or identity. Building on earlier theoretical accounts (Shapiro & Neuberg, 2007; Steele et al., 2002), Barber (2017) conceptualised ABST as a self-concept threat, that could be addressed by affirming one's worth in an alternative identity or domain of personal importance (e.g., family, religion). Hence, TR strategies that aim to distance an individual from a stereotyped

identity (e.g., older adult) or performance domain (e.g., cognition) and encourage identification with other, more positive (i.e., non-threatened), identities could be effective in reducing ABST (Barber, 2017; Haslam et al., 2018b). Consequently, ABST may have less detrimental impact on performance if older adults are guided to expand their identity beyond 'older adult' and focus on other valued identities (e.g., family or community roles).

These approaches to managing ABST emphasise the role of social identity, or the sense of self a person derives from their social group memberships (Tajfel & Turner, 1979). Application of social identity theory to health highlights the value of group memberships as health-related psychological resources (Haslam et al., 2018b). Specifically, identification with social groups that are perceived to have a positive influence in one's life can buffer the adverse effects of stress, provide an avenue through which people can access support, and help people feel in control of their lives (Greenaway et al., 2016; Jetten et al., 2010). With multiple group memberships, the resources at one's disposal are increased (Haslam et al., 2018b). Accordingly, studies have found that having more groups with which one strongly identifies is protective for mental health (Cruwys et al., 2013), promotes physical resilience (Jones & Jetten, 2011), and contributes to cognitive health in older age (Haslam et al., 2014).

Research examining the effects of TR interventions in younger adults has shown that gender-based stereotype threat can be overcome by increasing the salience of their other identities in the same performance domain (Rydell et al., 2009), reminding them of their multiple roles and identities (Gresky et al., 2005), or by affirming their positive social bonds (Shnabel et al., 2013). Specifically, Rydell et al. (2009) found that presenting a positive self-relevant stereotype (e.g., college students are good at math) alongside a negative one (e.g., women are bad at math) eliminated threat effects in female college students. Supporting social identity theory (Tajfel & Turner, 1979), Rydell et al. (2009) concluded that when people can identify with multiple social categories, they will align themselves with those that

promote a positive and competent self-image. Similarly, Gresky et al. (2005) activated gender stereotypes and asked men and women to draw self-concept maps with few nodes (i.e., four nodes, such as family, friends, hobbies) or many nodes (i.e., several nodes branching from other nodes in a hierarchical fashion). Highly math-identified women who drew many nodes performed as well as highly math-identified men on a mathematics test, whereas women in the few nodes condition performed significantly worse than their male counterparts. Further, Shnabel and colleagues (2013) found that asking female college students to write about how their personal values contributed to positive social relationships buffered the effects of stereotype threat on their math performance, as this emphasised a sense of social belonging. Together, these studies suggest that activating multiple social roles could be protective against stereotype threat. Theoretically, the more identities one has, the greater the potential to shift focus away from a stigmatised identity (Gresky et al., 2005).

Within the ABST literature, this reasoning has been applied to evaluate identity-based TR strategies and reduce the negative impacts of age stereotypes (Barber et al., 2019; Tan & Barber, 2020). In a recent systematic review, Parker et al. (2022) identified preliminary support for the effectiveness of subtle TR strategies (e.g., priming older adults to self-categorise as younger) in overcoming the effects of ABST on older adults' cognitive test performance (Abrams et al., 2008; Haslam et al., 2012; Tan & Barber, 2020). As an example of identity-based strategies, Liu et al. (2017) found that presenting older adults with positive and negative ageing stereotypes, to balance their self-concept, reduced the effects of ABST on memory performance. However, a similar approach of increasing the salience of a positive stereotype (e.g., older adults are wise) relative to a negative stereotype (e.g., older adults are senile) was not effective in reducing ABST (Barber et al., 2019).

Parker et al. (2022) identified that most studies compared TR conditions with ABST conditions, rather than comparing ABST+TR conditions to ABST conditions. Hence, the

review was unable to distinguish the benefits of TR strategies from the detrimental effects of ABST manipulations. Consequently, the question of how to promote resistance to ABST and facilitate optimal test performance in older adults remains. When an older adult's self-integrity is threatened by ABST, thinking about multiple group memberships could reduce the salience of a stigmatised identity (e.g., older adult) and increase that of other identities, many of which are likely more positive (e.g., grandparent, volunteer) and unrelated to cognition and thus, impervious to ageing stereotypes (Gresky et al., 2005). This may expand available identities, allowing greater potential to shift from a threatened identity to positive or non-threatened ones (Rydell et al., 2009).

This study aimed to investigate whether a subtle, multiple group membership TR intervention would alleviate the impact of ABST on objective memory performance and subjective memory concerns. It was hypothesised that older adults who received a group-listing task to increase the salience of multiple group memberships following activation of ABST (i.e., ABST+TR condition) would show better memory performance and report fewer subjective memory concerns, relative to older adults who were exposed to ABST and received a meal-listing task (i.e., ABST + active control [ABST+AC] condition). It was also anticipated that a greater number of groups would be associated with better memory performance and fewer subjective memory concerns in the ABST+TR condition.

Method

Participants

An a priori power analysis (G*Power 3.1.9.4; Faul et al., 2007) estimated the required sample size for the main analyses. Previous studies comparing ABST+TR conditions with ABST only conditions reported medium-to-large effect sizes (d = 0.49-1.63; Abrams et al., 2008; Haslam et al., 2012; Tan & Barber, 2020). Assuming a medium-to-large effect size (d

= 0.65), and alpha set at .05 (one-tailed), a total sample of 60 participants would have 80% power to detect a significant effect of condition on memory performance.

Participants were eligible if aged 60 years and over, sufficiently fluent in English, had sound general cognition (i.e., score ≥25 on the Modified Telephone Interview for Cognitive Status [TICS-M]) and normal or corrected-to-normal vision and hearing. Participants were excluded if they had a neurological disorder (e.g., epilepsy), neurodegenerative disease (e.g., dementia), psychiatric illness (e.g., schizophrenia), or were experiencing severe depression (i.e., ≥11 on Geriatric Depression Scale) or anxiety (i.e., ≥9 on Geriatric Anxiety Inventory).

Overall, 81 older adults were recruited by convenience sampling via advertisement in the notices and/or social media of community clubs and retirement villages in South-East Queensland, or through their connections with people accessing these services using a snowballing technique. Eleven participants were excluded based on Phase 1 pre-testing screening (TICS-M ≤24, n = 8; severe depression or anxiety, n = 3), and two declined to continue to Phase 2. Consequently, 68 participants (see Results for sample characteristics) were eligible and participated in the experimental procedure.

Materials and Experimental Procedure

The research was approved by the Griffith University Human Research Ethics Committee (ref no.2021/122). Data collection occurred between April 2021 and March 2022, across two phases. Table 5.1 outlines the order of all measures and reports internal consistencies, as appropriate. Phase 1 involved a telephone interview (30-45 mins) for screening and pre-testing measures. Phase 1 participants received a $20 gift card. Eligible participants were invited to participate in Phase 2; ineligible participants were thanked and debriefed. Phase 2 involved an in-person assessment session (45-60 mins) during which participants completed the experimental procedure (see Figure 5.1). This session was

Table 5.1

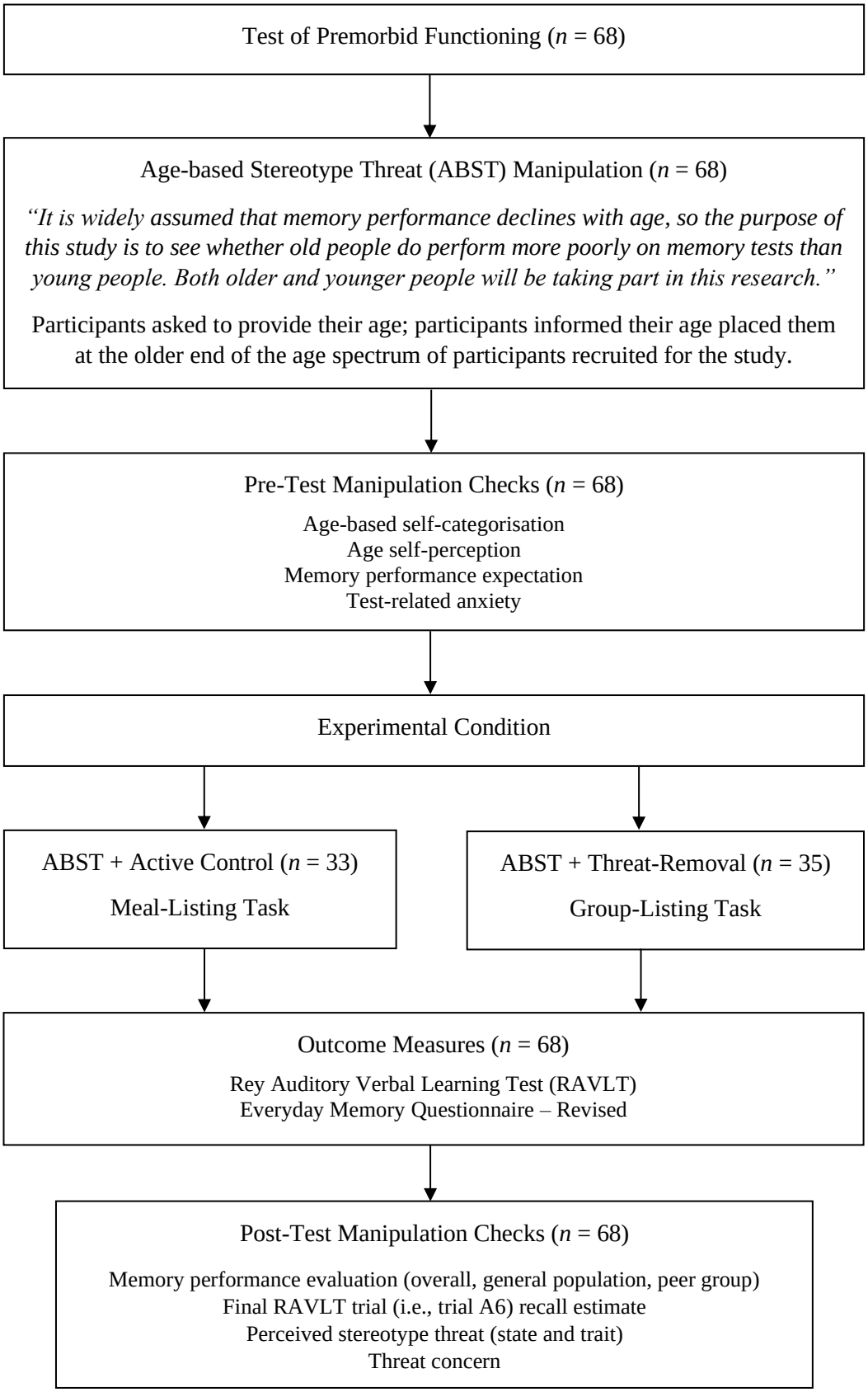
Presentation Order and Internal Consistencies of Telephone Interview and In-Person Assessment Tests and Measures

Tests and measures	Cronbach's α
Telephone interview (30-45 mins)	
Pre-testing measures	
Self-reported physical health	-
Modified Telephone Interview for Cognitive Status	-
Geriatric Depression Scale	.56
Geriatric Anxiety Inventory	.80
Metamemory in Adulthood-Revised – Capacity and Change	.91
In-person assessment session (45-60 mins)	
Test of Premorbid Functioning	-
Pre-test manipulation checks	
Age-based self-categorisation	-
Age self-perception	.92
Performance expectation	-
Test-related anxiety	.83
Outcome measures	
Rey Auditory Verbal Learning Test – Immediate Recall	-
Everyday Memory Questionnaire – Revised	.85
Post-test manipulation checks	
Memory performance evaluation (overall, general population, peer group)	-
Perceived stereotype threat – state	.69
Perceived stereotype threat – trait	.78
Threat concern	.78

Note. Cronbach's α scores reported are from the current sample.

Figure 5.1

Experimental Procedure of the In-Person Assessment Session



scheduled within 1-2 weeks of Phase 1 and took place at the participant's home or a quiet room in a library or university.

Pre-Testing Measures

Participants answered questions regarding their demographics, English fluency, and health. Participants were screened for a history of neurological and psychiatric conditions, communication difficulties, and sensory impairments. Participants rated their physical health on a single-item 5-point scale (1 = *Very Poor*, 5 = *Excellent*).

Modified Telephone Interview for Cognitive Status (TICS-M; de Jager et al., 2003). The TICS-M is a 13-item telephone assessment of cognitive function. It measures four domains: (1) orientation; (2) memory; (3) attention/calculation; and (4) language. The Australian version (Bentvelzen et al., 2019) was used to assess participants' global cognition, using the ≤24 cut-off for detection of mild cognitive impairment versus normal cognition.

Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986). The GDS is a 15-item measure of depression in older adults. Respondents answer "*Yes/No*" to items (e.g., "*Do you often feel helpless?*") based on the previous week. Responses are summed to obtain a total score, with scores ≥11 indicating severe depression.

Geriatric Anxiety Inventory (GAI; Pachana et al., 2007). The GAI is a 20-item measure of anxiety in older adults. Respondents answer "*Agree/Disagree*" to items (e.g., "*I often feel nervous*") based on the previous week. Items are summed to obtain a total score, with scores ≥9 indicating severe anxiety.

Metamemory in Adulthood Questionnaire (MIA; Dixon et al., 1988). A revised 20-item version of the Change and Capacity subscales (McDonough et al., 2020) measured participants' beliefs regarding their memory abilities. Statements (e.g., "*The older I get the harder it is to remember clearly*") are rated on a 5-point scale (1 = *Agree Strongly*, 5 = *Disagree Strongly*), with higher scores reflecting more favourable beliefs.

In-Person Experimental Procedure

Test of Premorbid Functioning (TOPF; Wechsler, 2009). The TOPF is a word pronunciation test that provides an estimate of general intelligence. Raw scores (number of words correct) were converted to standardised scores based on age.

ABST Manipulation. Using pre-test instructions from previous research (Abrams et al., 2008; Haslam et al., 2012), all participants were informed they would be taking part in two tasks; a listing task and a memory test. Participants were told, *"It is widely assumed that memory performance declines with age, so the purpose of this study is to see whether old people do perform more poorly on memory tests than young people. Both older and younger people will be taking part in this research."* Participants were then asked to provide their age and were informed their age placed them at the older end of the age spectrum of participants in the study.

Pre-Test Manipulation Checks. Four brief measures were administered as pre-test manipulation checks. First a single-item measured age-based self-categorisation (Haslam et al., 2012). Participants indicated on a 5-point scale (1 = *Younger*, 5 = *Older*) whether they felt younger or older than the other participants. A 4-item age self-perception scale assessed the extent to which participants identified as older (Haslam et al., 2012). Participants responded to items (e.g., "*I think of myself as an older person*") on a 5-point scale (1 = *Strongly Agree*, 5 = *Strongly Disagree*). A single-item ("*How well do you think you will do on the memory test?*") measured performance expectation regarding the memory test, on a 5-point scale (1 = *Extremely Poorly*, 5 = *Extremely Well*). Finally, an 8-item scale assessed test-related anxiety (Abrams et al., 2006). Participants rated the extent to which they felt anxious (e.g., *under pressure*) about the upcoming tasks on a 7-point scale (1 = *Not at all*, 7 = *Very much*).

Experimental and Control Tasks. A computer-generated sequence assigned participants to one of two experimental conditions (ABST+TR or ABST+AC) via stratified

random allocation based on age (60-74 vs ≥75) and education (<Grade 12 vs ≥Grade 12). The ABST+TR condition involved a group-listing task based on social identity mapping (Cruwys et al., 2016) and other procedures from social identity and stereotype threat research (Gresky et al., 2005; Jones & Jetten 2011). Participants were given A3 paper, post-it notes, and a pen, and were prompted to list up to 10 different groups they belonged to by writing the name of each group on separate post-it notes and placing these on the paper. After listing, participants rated the importance (1 = *Not at all important*, 10 = *Very important*) and positivity (1 = *Not at all positive*, 10 = *Very positive*) of each group. Finally, participants were asked to think about their groups and, for the three they liked best, write a few words about what the groups meant to them and why they were positive or important.

The AC task was designed to use the same materials and time commitment as the TR task, but not increase the salience of other group memberships or be cognitively demanding. For this purpose, participants completed a meal-listing task in which they were asked to list up to 10 different meals they eat for lunch or dinner. After listing, participants rated how often they ate (1 = *Very rarely*, 10 = *Very often*) and how much they usually enjoyed (1 = *Not at all*, 10 = *Very much*) each meal. Participants were then asked to think about their meals and, for three meals, write a few words about what they liked or disliked about them and why.

Outcome Measures.

Rey Auditory Verbal Learning Test (RAVLT; Schmidt, 1996). The RAVLT assesses episodic verbal memory and learning. It consists of a 15-item wordlist (List A) read aloud with five learning trials (trials A1-A5). Following each trial, participants were asked to recall as many words as possible. Subsequently, an interference wordlist (List B) of 15-items was presented, with participants asked to recall as many words as possible from this second list. Participants were then asked to recall the original list without another presentation (trial A6).

The RAVLT delayed recall and recognition trials were not administered. Trial A1 (auditory attention), trial A5 (learning outcome), total learning (A1-A5, acquisition/sustained recall effort), and trial B1 (cognitive flexibility) were the primary indices of interest.

Everyday Memory Questionnaire – Revised (EMQ-R; Royle & Lincoln, 2008). The EMQ-R is a 13-item self-report measure of memory failure in everyday life. The frequency of memory-related behaviours (e.g., *"Having to check whether you have done something that you should have done."*) are rated on a 5-point scale (0 = *Once or less in the last month*, 4 = *Once or more in a day*), with higher scores indicating greater subjective memory concerns.

Post-Test Manipulation Checks and Debriefing. A series of brief measures were administered as post-test manipulation checks. First, participants evaluated their memory performance on a single, 5-point scale (1 = *Extremely Poorly*, 5 = *Extremely Well*) item (i.e., "*How well do you think you did on the memory test?*"). Two items then asked participants to compare their performance to the general population and people their own age on a 5-point scale (1 = *Well Below Average*, 5 = *Well Above Average*). Participants were asked to estimate how many words they remembered from the first 15-item wordlist on the final RAVLT recall (i.e., trial A6). A 6-item perceived stereotype threat scale (Barber et al., 2015; Kang & Chasteen, 2009) assessed perceptions of stereotyping during the in-person session. Three items measured situational perceptions (e.g., *"Today I felt the experimenter expected me to do poorly because of my age"*) and three measured dispositional perceptions (e.g., "*In general, people often underestimate my memory ability because of my age*"). These were rated on a 5-point scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*). Finally, participants completed a threat concern scale (Swift et al., 2013). Participants rated two items (e.g., "*Were you worried that if you performed poorly on the test, the researcher would attribute your poor performance to your age?*") on a 7-point scale (1 = *Not at all*, 7 = *Very much*). Participants were then debriefed about ABST and the study aims.

Data Analysis

Data screening and analysis was conducted using SPSS, version 27, with no missing values detected. Normality was assessed by skewness and kurtosis values. Transformations were conducted to address deviations from normality for experimental task duration, number of items (i.e., groups/meals), RAVLT trial A1, A5, and B1, and EMQ-R. Where these altered the significance of findings, results based on transformed data are reported. Chi-square or *t*-tests assessed group comparability on demographic characteristics and pre-testing measures. Correlations and regression analyses were used to test the hypotheses concerning the effects of experimental condition and number of groups on RAVLT performance and EMQ-R scores. Given that memory performance and the effects of ABST can vary as a function of age and gender (Lamont et al., 2015; Lezak et al., 2012), moderated regression was used to examine whether the efficacy of the TR intervention varied as a function of age or gender. Collinearity statistics indicated acceptable levels of multicollinearity for variables included in the regressions (Field, 2013).

Results

Sample Characteristics and Descriptive Data

Descriptive data for demographic, pre-testing, cognitive, and manipulation check measures by experimental condition are summarised in Table 5.2. Sixty-eight older adults (57% female) aged 60-97 years (M = 75.78, SD = 7.29) participated in the experimental procedure. They had an average of 12.68 years of education (SD = 2.42) and identified as Australian (n = 51), British (n = 10), New Zealander (n = 3), and other (n = 4).

Thirty-five participants were randomly assigned to the ABST+TR condition and 33 to the ABST+AC condition. As shown in Table 5.2, conditions were matched on age, gender, education, and estimated IQ (p >.05). They also showed comparable global cognition, self-reported physical health, anxiety, depression, and memory beliefs at pre-testing (all p >.05).

Table 5.2

Descriptive Data for Demographic, Pre-Testing, Cognitive, Pre- and Post-Test Manipulation Check Measures by Experimental Condition

	ABST+TR *M* (*SD*)	ABST+AC *M* (*SD*)	χ^2/t (*p*)	Overall *M* (*SD*)
Sample size (*n*)	35	33		68
Demographics				
Age	76.34 (6.64)	75.18 (7.98)	0.65 (.516)	75.78 (7.29)
Gender	22 F, 13 M	17 F, 16 M	0.89 (.345)	39 F, 29 M
Years of education	12.77 (2.49)	12.58 (2.37)	0.33 (.741)	12.68 (2.42)
Pre-testing				
Physical health	4.00 (0.69)	4.12 (0.86)	0.65 (.521)	4.06 (0.77)
GDS	1.46 (1.60)	0.91 (1.18)	1.62 (.111)	1.19 (1.43)
GAI	1.89 (2.64)	0.94 (1.89)	1.71 (.093)	1.43 (2.34)
MIA – Capacity and Change	62.49 (14.04)	64.85 (11.91)	0.75 (.458)	63.63 (13.01)
Cognitive				
TICS-M	28.14 (2.83)	27.21 (2.46)	1.44 (.153)	27.69 (2.68)
TOPF	111.11 (9.08)	107.27 (9.88)	1.67 (.100)	109.25 (9.60)
Pre-test manipulation checks				
Age-based self-categorisation	3.40 (1.26)	3.18 (1.26)	0.71 (.479)	3.29 (1.26)
Age self-perception	11.89 (3.95)	11.58 (4.31)	0.31 (.758)	11.74 (4.10)
Performance expectation	2.83 (0.75)	2.85 (0.87)	0.10 (.920)	2.84 (0.80)
Test-related anxiety	18.69 (7.07)	18.67 (6.92)	0.01 (.991)	18.68 (6.94)
Post-test manipulation checks				
Memory performance evaluation				
Overall	2.23 (0.81)	2.55 (0.79)	1.63 (.054)	2.38 (0.81)
General population	2.51 (0.70)	2.73 (0.80)	1.17 (.124)	2.62 (0.75)
Peer group	2.94 (0.68)	3.03 (0.64)	0.55 (.294)	2.99 (0.66)
Estimated and actual recall discrepancy	1.09 (2.37)	1.21 (2.80)	0.20 (.421)	1.15 (2.57)
Perceived stereotype threat				
State	6.29 (2.44)	6.67 (2.47)	0.64 (.263)	6.47 (2.45)
Trait	7.57 (2.29)	8.67 (2.86)	1.75 (.043)	8.10 (2.62)
Threat concern	2.61 (1.58)	2.73 (1.46)	0.31 (.380)	2.67 (1.51)

Note. ABST+TR = Age-based Stereotype Threat + Threat-Removal; ABST+AC = Age-based Stereotype Threat + Active Control; GDS = Geriatric Depression Scale; GAI = Geriatric Anxiety Inventory; MIA = Metamemory in Adulthood; TICS-M = Modified Telephone Interview for Cognitive Status; TOPF = Test of Premorbid Functioning.

Experimental and Control Tasks

Despite efforts to equate tasks, participants in the ABST+TR condition took longer (M = 14.80 mins, SD = 4.17) to complete the listing task than those in the ABST+AC condition (M = 12.61 mins, SD = 4.01), $t(66) = 2.21$, $p = .031$. In addition, participants in the ABST+AC condition generated more meals (M = 9.21, SD = 1.39) than groups generated by those in the ABST+TR condition (M = 7.09, SD = 2.43), $t(54.62) = -4.46$, $p < .001$. However, task duration and number of items generated (i.e., groups/meals) were not significantly correlated ($r = .01$, $p = .907$).

Manipulation Checks

As expected, after both conditions received the same ABST manipulation, there were no significant differences between conditions on pre-test manipulation checks ($p > .05$). However, following completion of the experimental task and outcome measures, the conditions differed on a post-test manipulation check related to stereotype threat. Specifically, those in the ABST+TR condition reported lower trait perceived stereotype threat, $t(66) = -1.75$, $p = .043$. Unexpectedly, those in the ABST+AC condition had a marginally higher overall memory performance evaluation, although this was not significant, $t(66) = -1.63$, $p = .054$. The conditions were equivalent on self-perceived performance relative to general population and peer group, discrepancy between estimated and actual recall performance on trial A6, state perceived stereotype threat, and threat concern ($p > .05$).

Memory Performance

Descriptive data are reported in Table 5.3. Prior to conducting the regression analyses, associations between demographics, experimental variables, and memory performance were examined (see Table 5.4). Age was significantly positively correlated with experimental and control task duration ($r = .36$, $p = .003$), and significantly negatively correlated with memory performance on all key RAVLT indices (rs = -.25 to -.38, $p < .05$). Gender was significantly

Table 5.3

Descriptive Data for Memory Outcome Measures

	ABST+TR *M* (*SD*)	ABST+AC *M* (*SD*)	Overall *M* (*SD*)
RAVLT trial A1	6.77 (2.09)	6.76 (1.98)	6.76 (2.02)
RAVLT trial A5	11.83 (2.53)	12.24 (2.03)	12.03 (2.29)
RAVLT trial B1	5.17 (2.80)	4.88 (1.88)	5.03 (2.39)
RAVLT total learning	49.51 (10.72)	50.39 (9.53)	49.94 (10.09)
EMQ-R	15.03 (9.45)	11.42 (6.42)	13.28 (8.27)

Note. ABST+TR = Age-based Stereotype Threat + Threat-Removal; ABST+AC = Age-based Stereotype Threat + Active Control; RAVLT = Rey Auditory Verbal Learning Test; EMQ-R = Everyday Memory Questionnaire – Revised.

correlated with performance on trial A5, trial B1, and total learning (*r*s = .29-.31, $p < .05$), whereby female gender was associated with better performance. Duration of the experimental and control tasks was not significantly correlated with memory performance ($p > .05$). However, the number of items generated (i.e., groups/meals) during the tasks was significantly positively correlated with trial A5 ($r = .38$, $p = .001$), total learning ($r = .43$, $p < .001$), and trial B1 ($r = .35$, $p = .003$) performance.

Subsequent correlation analyses for subsamples in each condition revealed that number of items was significantly positively correlated with trial A5 ($r = .40$, $p = .017$), total learning ($r = .56$, $p < .001$), and trial B1 ($r = .48$, $p = .003$) performance in the ABST+TR condition, but not in the ABST+AC condition ($r = .30$-$.33$, $p > .05$). Subjective ratings provided by participants during the experimental task were not significantly associated with memory performance in either condition ($p > .05$). Hence, listing more groups in the ABST+TR condition was related to better recall performance, regardless of their importance or positivity. Correlation analysis also explored the possible basis for the significant

Table 5.4

Correlations between Experimental Variables and Memory Performance

Variable	1	2	3	4	5	6	7	8	9
1. Age	-								
2. Gender	-.09	-							
3. Experimental condition[a]	-.08	-.12	-						
4. Experimental task duration	.36**	.10	-.26*	-					
5. Number of groups/meals	-.15	.08	.48***	.01	-				
6. RAVLT trial A1	-.34**	.18	-.01	.01	.22	-			
7. RAVLT trial A5	-.25*	.29*	.09	.03	.38**	.35***	-		
8. RAVLT trial B1	-.26*	.31*	-.06	-.02	.35**	.63***	.36**	-	
9. RAVLT total learning	-.38**	.29*	.04	-.01	.43***	.69***	.84***	.58***	-

Note. RAVLT = Rey Auditory Verbal Learning Test.

[a]Age-based Stereotype Threat + Threat-Removal = 1, Age-based Stereotype Threat + Active Control = 2.

*p <.05; **p <.01; ***p <.001.

associations between number of items and performance on three RAVLT indices. TICS-M and TOPF scores were not significantly correlated with number of items (r = -.12-.06, p >.05), nor were age or gender (r = -.15-.08, p >.05). Hence, it is unlikely participants' demographic characteristics or cognitive function accounted for these associations. Given the unexpected finding that number of items generated during the experimental task differed between the ABST+TR and ABST+AC conditions, this raised a question as to whether prior task experience confounded the relationship between condition and memory performance. This was further examined by including number of items as a variable in the regression analyses.

Moderated hierarchical multiple regressions (see Table 5.5) were conducted to determine whether memory performance differed between experimental conditions after controlling for age, gender, and number of items, where appropriate (see Table 5.4). For trial A1, it was only relevant to examine the interaction between age and condition. As shown in Table 5.5, 12% of the variance in performance was accounted for by age in Step 1, F_{chg} (1, 66) = 8.66, p = .004. At Step 2, condition did not account for significant additional variance (ΔR^2 = .01, p = .792); only age (β = -.34, p = .005) accounted for significant variance in the model, F(2, 65) = 4.31, p = .018. At Step 3, the interaction between age and condition did not account for significant additional variance (ΔR^2 = .01, p = .491).

For trial A5, age, gender, and number of items were controlled for and the interactions between number of items and condition, age and condition, and gender and condition were examined. At Step 1 of the first model, age and gender significantly accounted for 13% of the variance in performance, F(2, 65) = 4.87, p = .011. Gender (β = .27, p = .026) accounted for significant unique variance in performance, with no significant association between age and performance. At Step 2, number of items and condition explained a further 13% of the variance in performance, F_{chg}(2, 63) = 5.28, p = .008. However, only gender (β = .25, p =

Table 5.5

Hierarchical Multiple Regression Analyses of Demographic and Experimental Variables on Memory Performance

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
RAVLT trial A1							
Step 1	.12**	-					
Age			-0.10	0.03	-.34	-2.94**	-.12
Step 2	.12*	.01					
Age			-0.10	0.03	-.34	-2.93**	-.12
Experimental condition			-0.12	0.47	-.03	-0.27	-.01
Step 3	.12*	.01					
Age			-0.17	0.11	-.60	-1.54	-.03
Experimental condition			-3.59	5.02	-.89	-0.71	-.01
Age x condition			0.05	0.07	.88	0.69	.01
RAVLT trial A5							
Model 1							
Step 1	.13*	-					
Age			-0.07	0.04	-.22	-1.91	-.05
Gender			1.22	0.53	.27	2.28*	.07
Step 2	.26***	.13**					
Age			-0.05	0.04	-.17	-1.55	-.03
Gender			1.14	0.51	.25	2.25*	.06
Number of items			0.40	0.13	.39	3.11**	.11
Experimental condition			-0.36	0.57	-.08	-0.63	-.01
Step 3	.26**	.01					
Age			-0.05	0.04	-.17	-1.53	-.03
Gender			1.14	0.51	.25	2.22*	.06
Number of items			0.41	0.40	.40	1.03	.01
Experimental condition			-0.27	2.73	-.06	-0.10	-.01
Items x condition			-0.01	0.31	-.03	-0.03	-.01

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
Model 2							
Step 1	.08*	-					
Gender			1.31	0.54	.29	2.42*	.08
Step 2	.14*	.06					
Gender			1.28	0.54	.28	2.37*	.08
Age			-0.07	0.04	-.21	-1.82	-.04
Experimental condition			0.48	0.53	.11	0.90	.01
Step 3	.14*	.01					
Gender			1.28	0.54	.28	2.35*	.08
Age			-0.05	0.12	-.15	-0.38	-.01
Experimental condition			1.43	5.68	.31	0.25	.01
Age x condition			-0.01	0.08	-.21	-0.17	-.01
Model 3							
Step 1	.06*	-					
Age			-0.08	0.04	-.25	-2.06*	-.06
Step 2	.14*	.08					
Age			-0.07	0.04	-.21	-1.82	-.04
Gender			1.28	0.54	.28	2.37*	.08
Experimental condition			0.48	0.53	.11	0.90	.01
Step 3	.15*	.01					
Age			-0.07	0.04	-.22	-1.83	-.05
Gender			2.31	1.71	.50	1.35	.02
Experimental condition			1.56	1.78	.34	0.88	.01
Gender x condition			-0.69	1.08	-.32	-0.64	-.01
RAVLT trial B1							
Model 1							
Step 1	.15**	-					
Age			-0.08	0.04	-.23	-2.04*	-.05
Gender			1.39	0.55	.29	2.53*	.08

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
Step 2	.30***	.14**					
Age			-0.06	0.04	-.19	-1.80	-.04
Gender			1.20	0.52	.25	2.34*	.06
Number of items			0.46	0.13	.43	3.57***	.14
Experimental condition			-1.21	0.58	-.26	-2.10*	-.05
Step 3	.31***	.01					
Age			-0.07	0.04	-.21	-1.96	-.04
Gender			1.25	0.52	.26	2.43*	.07
Number of items			0.87	0.40	.82	2.19*	.05
Experimental condition			1.71	2.74	.36	0.62	.01
Items x condition			-0.33	0.31	-.88	-1.09	-.01
Model 2							
Step 1	.10*	-					
Gender			1.49	0.56	.31	2.67*	.10
Step 2	.15*	.06					
Gender			1.36	0.56	.28	2.44*	.08
Age			-0.08	0.04	-.24	-2.05*	-.06
Experimental condition			-0.23	0.55	-.05	-0.42	-.01
Step 3	.15*	.01					
Gender			1.36	0.56	.28	2.42*	.08
Age			-0.05	0.13	-.15	-0.38	-.01
Experimental condition			1.19	5.87	.25	0.20	.01
Age x condition			-0.02	0.08	-.31	-0.24	-.01
Model 3							
Step 1	.07*	-					
Age			-0.09	0.04	-.26	-2.19*	-.07
Step 2	.15*	.09*					
Age			-0.08	0.04	-.24	-2.05*	-.06

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
Gender			1.36	0.56	.28	2.44*	.08
Experimental condition			-0.23	0.55	-.05	-0.42	-.01
Step 3	.17*	.02					
Age			-0.08	0.04	-.24	-2.11*	-.06
Gender			3.38	1.75	.71	1.93	.05
Experimental condition			1.88	1.82	.40	1.03	.01
Gender x condition			-1.34	1.11	-.59	-1.22	-.02
RAVLT total learning							
Model 1							
Step 1	.21***	-					
Age			-0.49	0.15	-.36	-3.20**	-.13
Gender			5.13	2.25	.25	2.28*	.06
Step 2	.37***	.16***					
Age			-0.42	0.14	-.30	-2.98**	-.09
Gender			4.52	2.06	.22	2.20*	.05
Number of items			2.07	0.52	.46	4.00***	.16
Experimental condition			-3.49	2.31	-.17	-1.51	-.02
Step 3	.38***	.01					
Age			-0.45	0.14	-.32	-3.14**	-.10
Gender			4.73	2.06	.23	2.30*	.05
Number of items			3.79	1.58	.85	2.39*	.06
Experimental condition			8.84	10.95	.44	0.81	.01
Items x condition			-1.41	1.23	-.88	-1.15	-.01
Model 2							
Step 1	.08*	-					
Gender			5.79	2.39	.29	2.42*	.08
Step 2	.21**	.13**					
Gender			5.24	2.28	.26	2.30*	.07

Variable	R^2	ΔR^2	*B*	*SE* (*B*)	B	*t*	sr^2
Age			-0.49	0.16	-.35	-3.13**	-.12
Experimental condition			0.91	2.25	.05	0.40	.01
Step 3	.21**	.01					
Gender			5.24	2.30	.26	2.28*	.07
Age			-0.49	0.52	-.36	-0.95	-.01
Experimental condition			0.64	24.00	.03	0.03	.01
Age x condition			0.01	0.32	.01	0.01	.01
Model 3							
Step 1	.14**	-					
Age			-0.52	0.16	-.38	-3.33**	-.14
Step 2	.21**	.07					
Age			-0.49	0.16	-.35	-3.13**	-.12
Gender			5.24	2.28	.26	2.30*	.07
Experimental condition			0.91	2.25	.05	0.40	.01
Step 3	.21**	.01					
Age			-0.49	0.16	-.35	-3.11**	-.12
Gender			5.68	7.24	.28	0.79	.01
Experimental condition			1.37	7.53	.07	0.18	.01
Gender x condition			-0.29	4.57	-.03	-0.06	-.01

Note. RAVLT = Rey Auditory Verbal Learning Test.
*p <.05; **p <.01; ***p <.001.

.028) and number of items (β = .39, p = .003) accounted for significant unique variance in the model, $F(4, 63) = 5.40$, p <.001. At Step 3, the interaction between items and condition did not account for significant additional variance (ΔR^2 = .01, p = .973). As outlined in Table 5.5, further regression models for trial A5 revealed no significant interactions between age and condition (ΔR^2 = .01, p = .868), or gender and condition (ΔR^2 = .01, p = .527).

For total learning, age, gender, and number of items were controlled for and the interactions between number of items and condition, age and condition, and gender and condition were examined. At Step 1 of the first model, age and gender significantly accounted for 21% of the variance in performance, $F(2, 65) = 8.48$, p <.001. Age (β = -.36, p = .002) and gender (β = .25, p = .026) each accounted for significant unique variance in performance. At Step 2, number of items and condition explained a further 16% of the variance in performance, $F_{chg}(2, 63) = 8.10$, p <.001. However, only age (β = -.30, p = .004), gender (β = .22, p = .032), and number of items (β = .46, p <.001) accounted for significant unique variance in the model, $F(4, 63) = 9.22$, p <.001. At Step 3, the interaction between items and condition did not account for significant additional variance (ΔR^2 = .01, p = .254). As shown in Table 5.5, further regression models for total learning revealed no significant interaction between age and condition (ΔR^2 = .01, p = .991), or gender and condition (ΔR^2 = .01, p = .949).

For trial B1, age, gender, and number of items were controlled for and the interactions between number of items and condition, age and condition, and gender and condition were examined. At Step 1, age and gender significantly accounted for 15% of the variance in performance, $F(2, 65) = 5.80$, p = .005. Age (β = -.23, p = .046) and gender (β = .29, p = .014) each accounted for significant unique variance in performance. At Step 2, number of items and condition explained a further 14% of the variance in performance, $F_{chg}(2, 63) = 6.46$, p = .003. Gender (β = .25, p = .023), number of items (β = .43, p <.001), and condition

(β = -.26, p = .040) each accounted for significant unique variance. Specifically, the ABST+TR condition was associated with better performance on the memory interference trial, when controlling for age, gender, and number of items. At Step 3, the interaction between items and condition did not account for significant additional variance (ΔR^2 = .01, p = .281). Hence, number of items generated and experimental condition both independently accounted for significant unique variance in trial B1 performance. Further regression models tested (see Table 5.5) for trial B1 revealed no significant interaction between age and condition (ΔR^2 = .01, p = .809), or gender and condition (ΔR^2 = .01, p = .229).

Subjective Memory

Contrary to expectation, participants in the ABST+TR condition reported more subjective memory concerns than those in the ABST+AC condition, $t(66) = 1.83$, p = .036. Number of items was not significantly correlated with EMQ-R scores in the ABST+TR condition (r = -.09, p = .613), ABST+AC condition (r = -.15, p = .391), or the overall sample (r = -.20, p = .111).

Discussion

This study investigated the effectiveness of a multiple group membership intervention for alleviating the effects of ABST on older adults' memory outcomes. Specifically, it examined whether, following activation of ABST, guiding older adults to list their group memberships (ABST+TR condition), as opposed to meals (ABST+AC condition), would result in better objective memory performance and fewer subjective memory concerns. Only limited support was found for this hypothesis, whereby the ABST+TR condition performed better than the ABST+AC condition on one RAVLT trial (viz., memory interference), after controlling for demographic variables and the number of items generated in the listing tasks. Nonetheless, there was support for the prediction that generating a greater number of groups would be associated with better memory performance in the ABST+TR condition. Contrary

to prediction, participants in the ABST+TR condition reported more subjective memory concerns than those in the ABST+AC condition.

Regarding the main hypothesis, only one significant difference was found in objective memory performance (trial B1) between the ABST+TR and ABST+AC conditions. This largely contrasts with Haslam et al. (2012) and Tan and Barber (2020) who found that TR strategies were effective in eliminating ABST-related performance deficits on memory tests in older adults. A possible explanation for the current findings relates to the nature of the experimental and control tasks. Specifically, group-listing generated fewer items and may have been more cognitively demanding than meal-listing. This raises the possibility that prior task experience with item generation may have been more salient than the nature of items generated. However, this explanation cannot account for why number of items was only significantly associated with better memory performance in the ABST+TR condition.

A key finding was that memory interference performance (trial B1) was higher in the ABST+TR condition and among individuals who had listed more social identities. On the one hand, this is consistent with the hypothesis that older adults who listed more group memberships would benefit more from this TR strategy. Conversely, previous research suggests that greater social identity complexity is related to more complex cognitive representations (Roccas & Brewer, 2002); for example, acceptance of diversity (Brewer, 2010). It is therefore possible that having multiple group memberships requires greater cognitive flexibility. Accordingly, individuals in the ABST+TR condition who listed more social identities may have had greater cognitive flexibility which, in turn, could account for their better memory performance on trial B1. Notably, there was no significant interaction between condition and number of items generated (i.e., the effect of condition on trial B1 performance did not vary as a function of the number of items generated). However, some caution is needed in interpreting these findings due to the modest sample size for moderated

regression. Overall, given that only measures of memory function were included in this study, it is not possible to further tease these possibilities apart within the current data. Future studies could delineate this by including measures of cognitive flexibility.

Consistent with social identity and stereotype threat research (Gresky et al., 2005; Jones & Jetten, 2011), the availability of multiple group memberships in the ABST+TR condition showed some benefits in alleviating the effects of ABST on memory performance. When presented with a threat to their self-integrity under ABST, providing older adults with the opportunity to list multiple group memberships may help reduce the salience of their stigmatised 'older adult' identity while increasing the salience of other identities (Gresky et al., 2005). This may allow greater potential to distance oneself from a stereotyped identity to one viewed as more positive or competent (Rydell et al., 2009). More broadly, this finding aligns with existing research that belonging to more social groups is protective for cognitive function in older age (Haslam et al., 2014).

While the main hypothesis regarding differences in memory outcomes between conditions was largely unsupported, participants in the ABST+TR condition performed better on the RAVLT memory interference trial than those in the ABST+AC condition, after controlling for age, gender, and number of items. Compared to other RAVLT indices, trial B1 measures the ability to recall a new (distractor) word list after a single presentation while carrying the cognitive load of the original word list (List A) presented five times (Lezak et al., 2012; Strauss et al., 2006). Hence, participants need to cognitively shift from having learned List A to learning List B. Participants who received the group-listing task may have been able to better withstand the proactive interference of previously learned material (List A) disrupting the learning of new material (List B). More broadly, listing multiple group memberships may be more helpful in alleviating the effects of ABST on more complex cognitive tasks involving mental flexibility and inhibition. While prior research has typically

examined the impact of ABST on episodic memory tasks without executive demands (Armstrong et al., 2017), this finding aligns with studies (Abrams et al., 2008; Haslam et al., 2012) that have shown benefits of subtle TR strategies for alleviating the effects of ABST on tasks involving executive functions.

Contrary to the findings for some objective memory indices, number of groups listed was not correlated with EMQ-R scores, indicating differential effects for objective versus subjective memory. Furthermore, the ABST+TR condition reported more subjective memory concerns than the ABST+AC condition. Post-test manipulation checks also found a tendency for participants in the ABST+AC condition to perceive they had done better on the memory test. Previous research has shown older adults' memory performance can be affected by prior task success (Cavuoto et al., 2021; Geraci & Miller, 2013). It is therefore possible that our AC task, which was associated with greater item generation, provided threat alleviating benefits through prior task success. In future research it is recommended that tasks which could inadvertently impact participants' sense of prior task success be avoided to better understand the mechanisms through which multiple group membership interventions have potential to alleviate the effects of ABST.

Limitations

The current findings must be interpreted in the context of several limitations. Despite efforts to match the experimental and control tasks on components other than identity salience, the ABST+TR condition generated fewer items and took longer to finish the group-listing task. Meals may have been a more accessible and abundant category to list, making it easier and faster for those in the ABST+AC condition to generate items, compared to listing one's group memberships (more likely a fixed number) in the ABST+TR condition. Further, the group-listing task may have contributed to the realisation of social losses among participants who produced few group memberships. Together, these issues may have

counteracted the effects of the TR intervention that intended to increase the salience of multiple positive group memberships and alleviate ABST. Hence, participants in the ABST+AC condition may have had a greater sense of having done well on the meal-listing task which may have had unintended benefits in alleviating the effects of ABST on subjective memory concerns. Conversely, difficulty remembering one's social groups under ABST may have increased subjective memory concerns in the ABST+TR condition. Finally, while this study sought to address a key shortcoming of the current research on TR strategies used to address ABST (Parker et al., 2022) by prioritising the comparison of an ABST+TR condition with an ABST+AC condition, no control condition (i.e., ABST only) was included. The lack of a comparison group that did not receive ABST precluded examination of the potential threat reducing benefits of the ABST+AC condition and the effectiveness of the ABST induction. In turn, these issues make it difficult to evaluate the efficacy of the TR intervention.

Identifying interventions that can effectively alleviate the effects of ABST on older adults' cognitive test performance remains an important research endeavour in the stereotype threat literature (Barber, 2017; Tan & Barber, 2020). Moreover, having brief and clinically applicable TR strategies, alongside improving health practitioner awareness of the detrimental effects of ABST (Haslam et al., 2012), would facilitate their uptake in clinical practice to optimise older adults' performance on cognitive assessments.

Conclusion

The current study provided some evidence that priming multiple group memberships can be beneficial for alleviating the effects of ABST on older adults' objective memory performance. However, this did not extend to subjective memory concerns. The findings broadly support the protective effects of multiple group memberships for cognitive function in ageing. Although greater identification of group memberships was associated with better

memory performance under ABST, the benefits of the TR intervention may have been counteracted by the effects of prior task success, priming the realisation of social losses among those with few group memberships, and inadvertently increasing subjective memory concerns. These findings advance the ABST literature and can inform the design of TR strategies in future research.

Chapter 6: General Thesis Discussion

ABST has the potential to adversely impact the cognitive test performance of older adults and health practitioners' interpretations, including diagnostic decisions related to dementia (Haslam et al., 2012; Régner et al., 2016). The negative impact of ABST on older adults' cognitive test performance is well established (Armstrong et al., 2017; Lamont et al., 2015). However, there has been far less research focus on health practitioners' perceptions and understanding of ABST, and strategies to reduce the effects of ABST. The broad objectives of this thesis were to advance understanding of health practitioners' recognition and beliefs regarding ABST and ways to alleviate the impact of ABST on older adults' cognitive performance in the clinical assessment context. This final chapter provides a synthesis of the key findings from each study, discusses overarching theoretical and clinical implications, highlights methodological limitations, and outlines recommendations for future research arising from the thesis findings. An overview of the key findings and implications of each study is presented in Table 6.1.

Summary of Key Findings from Thesis Studies

Study 1: Overcoming Age-Based Stereotypes to Optimise Cognitive Performance in Older Adults: A Systematic Review of Methodology and Existing Evidence

This systematic review identified and critically appraised the methodology and existing evidence from studies investigating the use of TR strategies to overcome the detrimental effects of ABST on the cognitive performance of older adults. The 30 eligible articles reported on 36 studies that recruited healthy older adults (mean age ≥60 years), examined an experimental manipulation that sought to overcome the negative effects of ABST, and included at least one outcome measure of objective cognitive performance or subjective cognition. Evidence for the efficacy of TR strategies was mixed and varied according to the explicitness of strategies (i.e., blatant, subtle, or a mix of both) and the

Table 6.1

Summary of Key Findings and Theoretical and Clinical Implications for Thesis Studies

Chapter, Study, and Aim	Key Findings	Theoretical Implications	Clinical Implications
Chapter 3: Study 1 Aim: To systematically identify and appraise the effectiveness of TR strategies for optimising the cognitive performance of older adults in the context of ABST	Evidence for the effectiveness of TR strategies varied according to the explicitness of strategies and comparison conditions used. Preliminary support for the effectiveness of subtle TR strategies in overcoming ABST, but few studies could distinguish the benefits of TR strategies from the detrimental effects of ABST.	Subtle TR strategies may be more effective than blatant TR strategies in alleviating ABST. Receipt of explicit information about performance expectations, even when positively framed, may induce evaluative performance pressure in older adults and result in underperformance.	Subtle TR strategies (e.g., highlighting positive cultural values or qualities associated with older age, imagined intergenerational contact, priming youthful self-categorisations) could be used in clinical practice to overcome ABST. More research is required to support their efficacy.
Chapter 4: Study 2 Aim: To investigate health practitioner awareness and beliefs regarding the impact of ABST on the cognitive test performance of older adults	Health practitioners rated ABST factors in a hypothetical assessment scenario as less detrimental to older adults' cognitive performance than internal and external factors. Recognition of ABST in an assessment scenario, ageing beliefs, and frequency of exposure to older adults influenced perceived impact of ABST on older adults' cognitive test performance in practice.	Health practitioners' own beliefs regarding the maintenance of physical and cognitive function with ageing influences their ability to recognise the possible impact of ABST on older adults' test performance. More frequent exposure to older adults in professional practice and negative ageing beliefs may contribute to beliefs that age-based cognitive decline is inevitable.	Health practitioners may not recognise the potential influence of ABST in assessment contexts with older adults, especially if they hold negative beliefs regarding ageing. Professional training initiatives are needed to improve health practitioner knowledge of ABST. Increased knowledge may encourage the use of strategies to alleviate ABST and increase the validity of cognitive testing in older adults.

Chapter, Study, and Aim	Key Findings	Theoretical Implications	Clinical Implications
	Health practitioner ability to recognise ABST factors in an assessment scenario and ageing beliefs uniquely accounted for perceived impact of ABST on older adults' cognitive test performance in practice.		
Chapter 5: Study 3 Aim: To examine the utility of a multiple group membership intervention for alleviating the effects of ABST on older adults' memory outcomes	One significant difference in objective memory performance was found between the experimental conditions. Participants in the ABST+TR condition performed significantly better on the RAVLT interference trial after controlling for demographic variables and number of items generated in the listing tasks. Number of groups listed was positively associated with objective memory performance for the ABST+TR condition only. The ABST+TR condition reported significantly more subjective memory concerns than the ABST+AC condition.	Multiple group memberships may be somewhat protective for older adults' cognitive test performance under ABST. Specifically, the availability of several identities may afford people greater opportunity to move to a non-stigmatised facet of their identity under conditions of potential ABST. TR interventions that involve multiple group memberships may inadvertently increase older adults' subjective memory concerns and prime the realisation of social losses for people with few group memberships.	The findings highlight the potential utility of asking older adults about positive groups they are part of (e.g., that increase the salience of their identity as a grandparent, volunteer, gardener, etc.) in the context of information gathering to reduce perceptions of ABST. However, caution is needed in using group list generation tasks per se, in case these prime the realisation of social losses.

comparison conditions employed (i.e., TR conditions compared with a neutral control condition, ABST condition, or an ABST+TR condition). Support for the effectiveness of blatant TR strategies, and strategies involving a combination of blatant and subtle techniques, was mixed and impacted by methodological constraints. Comparatively fewer studies had examined the effectiveness of subtle TR strategies and, albeit preliminary, these generally yielded more consistent empirical support for their efficacy in overcoming ABST.

Overall, this review highlighted issues with the methodological design of previous studies investigating TR strategies for addressing the negative effects of ABST on older adults' cognitive test performance. Few studies (n = 5) were designed to adequately detect differences in the benefits of TR strategies from the detrimental effects of ABST (Abrams et al., 2008; Barber et al., 2019; Haslam et al., 2012; Liu et al., 2017; Tan & Barber, 2020). Drawing on this finding, the review identified the need for future studies to include ABST+TR conditions (alongside ABST control conditions) to determine the effectiveness of TR strategies in overcoming ABST.

Study 2: Health Practitioner Beliefs Regarding the Impact of ABST on Performance in the Cognitive Assessment of Older Adults

Given the well-established empirical finding that ABST negatively impacts the cognitive test performance of older adults (Armstrong et al., 2017; Lamont et al., 2015), this study aimed to investigate health practitioners' ability to recognise the influence of ABST in the cognitive assessment of older adults and their perceptions of its impact in practice. Using a hypothetical assessment scenario, the study found that health practitioners (n = 129) rated ABST as less detrimental to an older adult's cognitive performance than internal (e.g., anxiety, physical discomfort) and external (e.g., environmental distractors) factors. As a further novel finding, health practitioners were less likely to perceive any negative impact of age-based stereotypes on cognitive test performance in clinical practice if they had lower

recognition of ABST in the assessment scenario, reported negative ageing beliefs, and more frequent exposure to older adults in professional practice.

Overall, the findings from Study 2 indicated a tendency for health practitioners to overlook or minimise the potential impact of ABST in assessment settings with older adults. However, this tendency was greater for practitioners who hold negative beliefs regarding ageing. Health practitioners who held more optimistic beliefs regarding the maintenance of physical and cognitive health with age were more likely to recognise the potential impact of ABST in clinical practice. This may be because health practitioners with positive ageing beliefs are less likely to believe that cognitive decline is inevitable and recognise that there are factors that can temporarily impact performance. The lack of recognition or perceived importance of ABST in health practitioners may reflect the failure to consider ABST in neuropsychological testing compendiums (e.g., Lezak et al., 2012; Strauss et al., 2006) or in teaching during professional training. These findings highlight the need to improve health practitioner knowledge of ABST, given its possible bearing on the way older adults are introduced to cognitive assessments and, in turn, clinical judgements about their test performance based on assessment results. This would ideally be done through health practitioner education and feedback to promote reflective practice through training and supervision (i.e., continuing professional development) on effective ways to reduce the detrimental effects of ABST. However, given that the knowledge base supporting the effectiveness of TR strategies is in its infancy, further research is needed to inform the development of evidence-based strategies.

Study 3: Examining the Utility of a Multiple Group Membership Intervention for Alleviating the Effects of ABST on Older Adults' Memory Performance

Informed by the findings from the systematic literature review (i.e., Study 1), Study 3 aimed to examine the effectiveness of a subtle TR strategy in reducing ABST. Specifically,

an experiment was designed to compare the memory outcomes of participants assigned to an ABST+TR condition with participants in an ABST+AC condition. The subtle TR strategy involved a group-listing task designed to increase the salience of multiple group membership. Following activation of ABST, older adults (n = 68) completed either the group-listing task (ABST+TR condition, n = 35) or a meal-listing task (ABST+AC condition, n = 33) before completing measures of objective (RAVLT) and subjective (EMQ-R) memory. Overall, only one significant difference in objective memory performance was found between the conditions. Specifically, older adults in the ABST+TR condition outperformed those in the ABST+AC condition on the RAVLT interference trial (trial B1), after controlling for age, gender, and the number of items generated on the listing tasks.

An important novel finding was that participants in the ABST+TR condition who identified as belonging to a greater number of groups performed significantly better on several objective memory indices (viz., RAVLT Trial A5, Trial B1, and total learning). This is in line with previous studies in which priming multiple group memberships was found to be effective in reducing the effects of stereotype threat (Gresky et al., 2005) and promoting physical resilience (Jones & Jetten, 2011). Specifically, the finding supports the idea that the availability of several identities may afford people greater opportunity to move to a non-stigmatised facet of their identity when a specific one is compromised by a negative stereotype (Rydell et al., 2009). More broadly, it supports the capacity for social group membership to function as a potentially protective factor for cognitive performance in older age (Haslam et al., 2014).

Unexpectedly, significantly more subjective memory concerns were reported by older adults in the ABST+TR condition than those in the ABST+AC condition. This highlighted a potential shortcoming of the TR strategy whereby the group-listing task may have primed the realisation of social losses for those with few group memberships, which in turn may have

inadvertently increased concerns about one's memory. Alternatively, the ease of item generation (i.e., meal-listing) for participants in the active control condition may have fostered a sense of prior task success, thus enhancing their subjective beliefs about their memory. Nevertheless, this did not translate to a performance advantage for the ABST+AC condition on the objective memory test, suggesting memory enhancement was a function of the TR strategy employed. Overall, the findings from Study 3 suggest that multiple group memberships may offer some protection for the memory performance of older adults under conditions of ABST. However, based on the current findings, this strategy should be used with caution until it is established whether applying group-listing tasks as part of TR interventions inadvertently primes the realisation of social losses and increases older adults' subjective memory concerns. Moreover, further research is needed to investigate the efficacy of wider strategies, not just increasing the salience of multiple group memberships, to identify those most optimal in alleviating the effects of ABST in cognitive assessment.

Theoretical Implications of Integrated Thesis Findings

Considered together, the findings from this thesis extend the research literature on ABST by advancing understanding of health practitioner beliefs regarding the impact of ABST in clinical practice and ways to alleviate its impact on the cognitive test performance of older adults. These knowledge advances have important theoretical implications relating to the nature of TR strategies used and the methodological design of studies investigating their effectiveness, factors associated with health practitioners' perceptions of ABST, and the application of social identity theory and multiple group membership interventions in addressing ABST.

The systematic review reported in Study 1 extends the knowledge base regarding the potential for TR strategies to alleviate ABST and highlights the need for theory-guided interventions informed by stereotype threat and social identity theory. While a previous

review (Lamont et al., 2015) identified TR conditions used in ABST research based on their attempt to nullify or challenge negative ageing stereotypes, the current review extended on this classification. In line with previous stereotype threat reviews in other stigmatised populations (e.g., Nguyen et al., 2008), TR strategies were categorised according to the explicitness of the manipulations (i.e., subtle versus blatant; see Chapter 3, Table 3.3) to determine their efficacy. A key novel finding from Study 1 was that the majority (67%) of ABST studies that had included a TR condition exclusively compared these with ABST only conditions. By not including both ABST and ABST+TR conditions, this literature limits understanding of the capacity for TR strategies to alleviate ABST as opposed to TR based performance lifts. Hence, while preliminary support was found for the effectiveness of subtle TR strategies in overcoming ABST, further examination of TR strategies through inclusion of both ABST and ABST+TR conditions is required. Ultimately, for TR strategies to be effectively applied in practice, health practitioners need to recognise the potential detrimental effects of ABST on older adults' cognitive assessment.

Study 2 illuminated factors associated with health practitioner beliefs about ABST and its perceived impact in practice. Health practitioners were less likely to recognise the potentially detrimental effects of ABST on an older adult's cognitive performance as compared to other internal and external factors. Such low recognition of ABST and its impacts in clinical practice appeared to be related to health practitioners' own beliefs about ageing (i.e., a greater tendency to perceive age-related decline as inevitable) and more frequent exposure to older adults. These findings could indicate that health practitioners acquire more fixed views regarding the inevitability of cognitive decline with ageing during the course of their practice with older adults (Bettens et al., 2014; Drury et al., 2017). Alternatively, health practitioners with more years of experience in the ageing field and frequency of interaction with older adults may have greater confidence in their ability to

circumvent any issues (including bias from negative ageing stereotypes) that may undermine a patient's test performance. This does not exclude the possibility that health practitioners with greater experience may be less willing to acknowledge the potential influence of social contextual factors such as those contributing to ABST (e.g., wording of test instructions) in the cognitive assessment of older adults. Hence, it would be beneficial for ABST to be directly targeted in education and training to support health practitioners to identity and manage these issues when they arise. In particular, training can be directed at taking into account their own personal beliefs about ageing through reflective practices and drawing upon research evidence to improve understanding of how ABST can influence cognitive test performance in older adults.

The current thesis also examined a novel and theory-guided TR strategy within the ABST literature; namely, a multiple group membership experimental manipulation to alleviate ABST (Study 3). This built upon existing examinations of identity-based TR strategies that have aimed to reduce the negative impacts of age stereotypes (Barber et al., 2019; Follenfant & Atzeni, 2020; Liu et al., 2017; Tan & Barber, 2020). Typically, these studies prime multiple identities to broaden older adults' self-concept or sense of self by highlighting a positive self-relevant ageing stereotype (e.g., older adults are wise) alongside a negative self-relevant ageing stereotype (e.g., older adults are senile). Although often used in research, this approach has had mixed effects and thus has not consistently been found to reduce the adverse effects of ABST (Barber et al., 2019). Similarly, the current approach of priming multiple group memberships (i.e., getting older adults to generate a list of their own social groups) had limited benefit relative to an active control condition.

As outlined previously, several factors may have contributed to the largely non-significant results of Study 3, including the group-listing task inadvertently priming the realisation of social losses for some participants. Another possible explanation for the results

relates to the subjective meaning of the social groups generated. Social identity theory (Tajfel & Turner, 1979) proposes that people define themselves through their membership of social groups. However, social groups are only health enhancing to the extent that they are a source of positive influence and support (Haslam et al., 2018b). Although the subjective ratings (i.e., importance and positivity) provided by participants during the group-listing task were not significantly associated with memory performance, the task could have instructed older adults to specifically describe groups they perceived as positive. Thus, identification with multiple positive groups during the experimental task might have strengthened the impact of the TR strategy and provided better threat alleviation. Nonetheless, the current findings add to our understanding of how social identity processes may offset ABST in testing environments. When the positivity of the group that defines a person's social identity (e.g., age) is threatened in some way (as it is by negative ageing stereotypes), this reduces the capacity for social identity to function as a beneficial psychological resource (Haslam et al., 2018a). Hence, creatively shifting how the ageing identity is viewed (i.e., it is just one of multiple diverse identities), by highlighting the multiple social groups to which one belongs, may facilitate better memory performance under ABST. This supports previous findings in the gender-based stereotype threat literature (Gresky et al., 2005; Rydell et al., 2009), where increasing the salience of multiple identities alleviated stereotype threat effects, likely by allowing people to align themselves with alternative (non-threatened) identities and retain a sense of positivity or competence in their social group memberships.

Clinical Implications of Integrated Thesis Findings

The findings of this thesis have several implications for clinical practice. Primarily, these relate to the need to improve knowledge of ABST among health practitioners and ways to reduce its impact on older adults. First, the current thesis provided novel insights into health practitioners' recognition of ABST and their perceptions of its impact in clinical

practice (Study 2). The findings revealed general low recognition and perceived importance of ABST in the sample of health practitioners recruited. A key implication arising from this study relates to the need to educate health practitioners about ABST and its potential impact on older adults' cognitive assessment performance. Ideally, ABST would then be viewed as having the potential to compromise the validity of cognitive testing to a similar degree as more conventionally recognised performance detractors (e.g., noise, fatigue, anxiety; Lezak et al., 2012).

As a start, evidence from systematic reviews and meta-analyses on ABST, and theoretical accounts of age stereotypes more broadly, should be referenced within clinical guidelines and handbooks on the neuropsychological and cognitive assessment of older adults. Continuing professional development programs for practitioners working with older adults could also provide training on identifying activators of stereotype threat (e.g., asking older adults to report their age, emphasising the assessment of memory ability) or address misconceptions about ABST in light of robust evidence demonstrating its impact on test performance (e.g., Armstrong et al., 2017; Lamont et al., 2015). In addition, clinical supervision could promote reflective practice regarding health practitioners' own beliefs about ageing and how this might influence their assessment approach and interpretations of test results. As is current practice, it is recommended that health practitioners continue to work with older adults so that they understand the purposes and procedures involved in neuropsychological evaluations to aid accurate and optimal performance (American Psychological Association, 2021). While evidence-based practice guidelines are not currently available, some recommendations for avoiding the activation and reducing the impact of ABST in clinical practice can be made. These relate to organisational changes at a health system level, in combination with practice changes at an individual practitioner level (American Psychological Association, 2021; Spencer et al., 2016; Swift et al., 2016).

In line with Swift et al.'s (2016) ideas, at an organisational level, the use of age-based categorisations that segregate older individuals and reinforce negative ageing stereotypes (e.g., "geriatric ward" or "memory clinic") should be avoided in health care settings. Peak organisations involved in training health practitioners (e.g., Australian Psychological Society, American Psychological Association, British Psychological Society) could facilitate workshops (e.g., continuing professional development) for clinicians and supervisors focused on improving awareness of ABST and strategies for mitigating its possible influence in practice. For trainee practitioners, universities could play an important role in increasing awareness of ABST by integrating education regarding the phenomenon into cognitive assessment training courses and/or modules. Such organisational initiatives and involvement of professional societies at a discipline level would support practitioners to stay abreast of important practice developments and evidence-based guidelines to inform adaptations to cognitive testing processes in practice.

At an individual level, it would be optimal for health practitioners to be aware of older adults' vulnerability to age prejudice and stereotyping processes (i.e., self-stereotyping or stereotype threat effects) and the implications of these for how well they may perform on cognitive tasks (Swift et al., 2016). In assessment contexts, it is recommended that health practitioners be vigilant for situational cues which may activate internalised ageism and undermine older adults' true performance. These could include factors such as referring to the patients' age, test instructions that emphasise memory evaluation, or asking about their memory or cognitive concerns just prior to testing, as well as patients' own metacognitive beliefs or negative expectations for performance that may be informed by negative ageing stereotypes. Health practitioners could assess the possible influence of the latter informally (e.g., during the course of collecting personal history and presenting concerns), or through the use of self-report measures (e.g., Metamemory in Adulthood Questionnaire; Dixon et al.,

1988; McDonough et al., 2020). However, given that these could also activate ABST, such measures may best be administered after testing has concluded. If ABST is a concern in an assessment, health practitioners could implement TR strategies to address or reduce its impact on performance. Alternatively, they could make note of any of the aforementioned factors and take these into consideration when interpreting assessment performance. For now, however, efforts to improve health practitioners' knowledge and use of strategies for reducing ABST is constrained by a lack of accompanying evidence and associated guidelines.

Aside from organisational changes and improving the awareness and actions of health practitioners, older individuals could receive education and strategy training to avoid or counteract ABST themselves. For instance, older adults could be encouraged to maintain a positive self-view by focusing on other valued personal and social attributes or roles (e.g., integrity, mother, painter, friend, volunteer) that could help them to distance themselves from the stereotyped group (i.e., 'older adult') and lessen the personal relevance of the threat (i.e., viewing themselves as something other than 'old'; Barber, 2017; Haslam et al., 2018a). Prior to taking a potentially threatening test, they could likewise be taught to use coping strategies, such as self-affirmation (e.g., writing about or reflecting on core personal values, special interests, or hobbies) or mindfulness (e.g., paying attention to multiple sensory experiences; Spencer et al., 2016). However, while most of these strategies have been effective in reducing racial and gender-based stereotype threat (e.g., Ambady et al., 2004; Keller & Sekaquaptewa, 2008; Sherman et al., 2013; Weger et al., 2012), their utility is yet to be tested with older adults to address ABST.

This thesis also extends understanding of strategies that have the potential to reduce the effects of ABST on the cognitive test performance of older adults. Study 1 provided preliminary support for the efficacy of subtle TR strategies in overcoming ABST. In addition, Study 3 provided some evidence to support the benefit of increasing the salience of one's

wider group memberships and identities in enhancing older adults' memory performance under ABST; albeit with the limitations raised above. To aid both health practitioners and researchers in understanding the current strength and quality of supporting evidence for the efficacy of different TR strategies, Table 6.2 summarises the current evidence base for TR strategies that have been used to address ABST. This forms an extension of Table 3.3 (see Study 1), adapting the GRADE approach (GRADE Working Group, 2013) and taking into account features specific to the ABST literature (e.g., comparison conditions used, TR strategy used in conjunction with another strategy thereby preventing assessment of unique efficacy). For the purposes of the current summary, low quality evidence entails studies that have not compared an ABST+TR condition with an ABST only (or ABST+control) condition, whereas moderate quality evidence refers to at least one study that has compared an ABST+TR condition with an ABST only condition and yielded significant positive effects of TR. Although no TR strategies were found to have high quality evidence, this would entail evidence from two or more well-designed studies that compared an ABST+TR with an ABST control condition and yielded significant positive effects of TR.

As shown in Table 6.2, and as highlighted by the systematic review reported in Study 1, there is a general lack of well-controlled studies providing evidence for the positive effects of ABST+TR on cognitive test performance relative to ABST only. Prior studies have rarely included an ABST+TR condition. Instead, most studies have compared TR conditions only with ABST conditions. Across these studies, the magnitude of the ABST effects likely vary, as do the efficacy of the TR strategies. Hence, attempts to quantify the difference between TR

Table 6.2

TR Strategies for Addressing ABST and Quality of Supporting Evidence

Strategy	Studies	Quality of Supporting Evidence[a]	Explanation
Subtle			
Priming positive cultural values associated with ageing (e.g., filial piety, or respect for one's elders)	Tan & Barber (2020)	Moderate	Single high-quality[b] study; compared ABST+TR condition with ABST condition (significant findings)
Imagined intergenerational contact	Abrams et al. (2008)	Moderate	Compared ABST+TR condition with ABST condition; single moderate quality study (significant findings)
Priming youthful age-based self-categorisation	Barber et al. (2015); Haslam et al. (2012)	Moderate	Single high-quality study examining strategy in isolation; compared ABST+TR condition with ABST condition (significant findings)
De-emphasising the memory requirement of a test or framing it as non-diagnostic of memory (e.g., presenting a memory test as a verbal comprehension task)	Barber & Mather (2013b); Brubaker & Naveh-Benjamin (2018); Hess, Emery, et al. (2009); Jordano & Touron (2017); Marquet et al. (2017)	Low	Multiple studies of low to moderate quality; no ABST+TR vs. ABST only comparisons; almost always used in conjunction with other strategies (mixed findings)
Priming positive qualities associated with ageing (e.g., wisdom, life experience, problem-solving) or describing task in a way that favours the performance of older adults	Barber et al. (2019); Hehman & Bugental (2013); Popham & Hess (2015); Swift et al. (2013)	Low	Multiple moderate-to-high quality studies; no ABST+TR vs. ABST only comparisons; sometimes used in conjunction with other strategies (mixed findings)
Priming multiple group memberships (e.g., listing social groups)	Parker et al. (Manuscript submitted for publication)	Low	Single high-quality study; compared ABST+TR condition with ABST+AC condition (mixed findings)
Reducing evaluative performance pressure (e.g., presenting cognitive test as under construction)	Mazerolle et al. (2017)	Low	Single moderate quality study; used with another strategy (significant findings)

Strategy	Studies	Quality of Supporting Evidence[a]	Explanation
Individuation (e.g., answering questions about leisure activities, moral values, and personality traits)	Follenfant & Atzeni, 2020	Low	Single study of moderate quality; did not compare ABST+TR condition with ABST only condition (significant findings)
Presenting vignettes, pictures, or videos of counter-stereotypical exemplars (i.e., older adults in positive or astereotypical roles)	Aisenberg et al. (2015)	Low	Single low-quality study; compared TR condition with ABST only and control conditions (significant findings)
Blatant			
Priming multiple identities relevant to age (e.g., positive and negative aspects of older age vs. youth)	Liu et al. (2017)	Moderate	Single study of moderate quality; compared ABST+TR condition with ABST condition (significant findings)
Providing information about the preservation and/or improvement of cognitive abilities with age or challenging the inevitability of cognitive decline	Alquist et al. (2018); Barber & Mather (2013a, 2013b); Barber et al. (2015); Fresson et al. (2017); Hess et al. (2003); Horton et al. (2010); Jordano & Touron (2017); Plaks & Chasteen (2013); Thomas et al. (2020)	Low	Several studies of low to high quality, comparing TR conditions with ABST only and/or control conditions; no ABST+TR vs. ABST only comparisons; often used in conjunction with other strategies (mixed findings)
Providing research evidence favouring the test performance of older adults	Brubaker & Naveh-Benjamin (2018); Chapman et al. (2016); Fernández-Ballesteros et al. (2015); Hess, Emery, et al. (2009); Kalenzaga et al. (2019); Popham & Hess (2015)	Low	Several moderate-to-high quality studies, comparing TR conditions with ABST only and/or control conditions; no ABST+TR vs. ABST only comparisons; often used with other strategies (mixed findings)
Presenting tests as free of age bias or "age-fair" (i.e., younger and older adults perform equally as well)	Andreoletti & Lachman (2004); Barber & Mather (2013b); Barber et al. (2019); Hess, Hinson, et al. (2009); Marquet et al. (2017); Mazerolle et al. (2012, 2015, 2017); Tan & Barber (2020)	Low	Several studies of low to high quality, comparing TR conditions with ABST only and/or control conditions; no ABST+TR vs. ABST only comparisons; sometimes used in conjunction with other strategies (mixed findings)
Providing education about ABST	Mazerolle et al. (2017)	Low	Single moderate quality study; used with another strategy (significant findings)

[a] Low = no studies have compared an ABST+TR condition with an ABST only (or ABST+control) condition; Moderate = at least one study has compared an ABST+TR condition with an ABST only condition and yielded significant positive effects of TR. [b] Quality classifications referred to in the explanation column are drawn from the methodological quality ratings reported in Parker et al. (2022).

and ABST conditions could reflect study differences in the strength of the induced ABST effects, or differences in the strength of the effectiveness of the TR strategies. This unfortunately constrains the current recommendations that can be provided to clinicians on the efficacy of TR strategies. Future research needs to rectify this problem within the ABST literature by employing experimental designs that incorporate ABST, ABST+TR, and control conditions. This would enable more confident conclusions regarding the implementation of TR strategies in practice. Nonetheless, currently, the highest level of quality of supporting evidence is moderate. TR strategies with a moderate quality of supporting evidence to date include imagined intergenerational contact (Abrams et al., 2008), priming older adults to self-categorise as younger (Haslam et al., 2012), highlighting positive cultural values associated with ageing (Tan & Barber, 2020), and priming multiple identities relevant to age (Liu et al., 2017). Such strategies could be used in real life testing settings to address ABST. However, greater empirical support from well-designed research is needed to support recommendations for the uptake of TR strategies in clinical practice.

Methodological Limitations and Recommendations for Future Research

Several methodological limitations related to the current thesis are important to acknowledge. Specifically, these relate to the inability to utilise meta-analytic techniques, the representativeness of the samples recruited, and the experimental design and tasks used. These issues may limit the conclusions drawn and the generalisability of the current findings.

First, due to considerable variability in the design, manipulations, and outcome measures of studies included in the systematic review, Study 1 did not utilise meta-analytic techniques. Hence, the conclusions drawn from the resulting narrative synthesis may be limited by the lack of quantitative analyses to assess the strength of evidence for the efficacy of TR strategies. The recruitment and sampling approaches used in Studies 2 and 3 resulted in small, convenience samples of Australian health practitioners and older adults, respectively.

Regarding health practitioners, recruiting participants predominantly through psychology and occupational therapy professional membership bodies or interest groups contributed to low representation of other professions involved in the cognitive assessment of older adults (e.g., geriatricians, psychiatrists). Similarly, recruiting older adults primarily through community-based social clubs may have biased our sample toward older adults who were well connected and engaged in their communities, compared to those more isolated, possibly influencing our results regarding group membership and memory outcomes. This may have especially been the case as older adult participants were recruited between April 2021 and March 2022 while the Australian community was still affected by the COVID-19 pandemic and its associated restrictions.

Of further note regarding recruitment and sampling, ABST does not appear to be exclusive to Western cultures (Febriani & Sanitioso, 2021; Liu et al., 2017; Tan & Barber, 2020), and there is a need to understand how cultural diversity influences the phenomenon. Little research, however, has examined ABST in non-Western cultures. The current thesis has not advanced this ongoing research objective, and was likewise limited by its sample demographics, predominantly recruiting White Australian older adults. Finally, the experimental design and tasks employed in Study 3 may have contributed to the limited support found for the multiple group membership intervention. Study 3 attempted to address the dearth of ABST+TR comparison groups in previous studies examining TR strategies (Parker et al., 2022). Due to feasibility considerations (e.g., recruitment challenges during the COVID-19 pandemic) and the desire to maximise statistical power, only a two-condition experiment was deemed appropriate. To address previous design limitations, a comparison of an ABST+TR condition with an ABST+AC condition was prioritised. However, due to the lack of control condition that did not receive ABST it was not possible to evaluate the effectiveness of the ABST induction. Hence, clear conclusions cannot be drawn regarding the

efficacy of the TR intervention. Piloting and greater refinement of the tasks used may have improved the utility of the multiple group membership intervention in addressing ABST. For example, specifically directing participants to describe their social group memberships that are positive may have better facilitated the availability of non-stigmatised identities, assisting older adults to retain a positive self-view in the face of ABST. Moreover, developing an active control intervention that avoided the possible influence of prior task success may also have strengthened the design and outcomes.

In addition to addressing the above shortcomings, it is recommended that future research continues to evaluate TR strategies, including alternative approaches, for alleviating ABST. This remains an area for ongoing research in the ABST field, especially given the lack of high quality supporting evidence within the current literature on TR strategies (see Table 6.2). Notably, the research literature on TR interventions for ABST has largely focused on examination of reconstrual interventions, or efforts to lead participants to perceive a lower level of threat or the testing situation as non-threatening (Spencer et al., 2016). However, coping interventions that teach participants a particular strategy (e.g., mindfulness or self-affirmation) to aid their performance despite ongoing high-threat testing situations (Spencer et al., 2016) could also be examined. This provides another avenue that could prove beneficial in overcoming the consequences of ABST, especially within real-world testing situations (Spencer et al., 2016).

Results from clinical studies may also facilitate greater health practitioner awareness and motivation to take measures to avoid or reduce ABST in testing situations (Spencer et al., 2016). Indeed, the first randomised controlled trial (for protocol, see Gauthier et al., 2019) is now examining the impact of negative ageing stereotypes on the cognitive performances of older adults attending memory clinics for neuropsychological evaluation. This research will help elucidate the influence of ABST in the diagnosis of MCI (Gauthier et al., 2019). Further,

the use of neuroimaging in experiments to examine the impact of ABST on older adults' brain activity during cognitive tasks (e.g., Chen et al., 2022) has the potential to improve understanding of neural correlates.

Conclusion

Overall, this thesis advances the ABST literature with regards to better understanding health practitioner beliefs regarding the impact of ABST in clinical practice and ways to alleviate the effects of ABST on the cognitive test performance of older adults. Specifically, the systematic review in Study 1 found that, currently, the most consistent empirical evidence supports the use of subtle TR strategies to address ABST. However, it also highlighted how methodological shortcomings in the literature limit conclusions regarding the effectiveness of TR strategies. The survey conducted in Study 2 revealed that health practitioners may not recognise the possible influence of ABST in assessment contexts with older adults, or perceive it as having a detrimental impact in clinical practice more broadly, especially if they hold negative beliefs regarding ageing. Finally, Study 3 demonstrated that a multiple group membership intervention had some, albeit limited, benefit in enhancing older adults' objective memory performance under ABST. Collectively, these findings highlight the need to improve health practitioner awareness of ABST and identify more effective methods of alleviating its impact on older adults' cognitive test performance. This may be achieved through methodological refinement in the application of existing identity-based approaches or examination of alternative novel strategies to bolster performance. Ultimately, such research may contribute to evidence-based guidelines for clinicians to draw upon in clinical practice to increase the validity of cognitive testing results in older adults.

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Appendix A

Example of Search Strategy Applied in PsycINFO on 6 November 2019

#	Searches	Results
1	(("older adults" OR "older people" OR "age" OR "ageing" OR "aging" OR "elderly" OR "seniors") AND ("stereotyp*" OR "social identity threat" OR "self-categori?ation" OR "positive priming" OR "positive information" OR "positive perception*" OR "positive expecta*" OR "positive self-concept") AND ("cogniti*" OR "performance" OR "test" OR "thinking" OR "memory" OR "attention" OR "processing" OR "executive function*" OR "neuropsychological" OR "subjective" OR "self-report" OR "perceived")).ab	2448
2	(("older adults" OR "older people" OR "age" OR "ageing" OR "aging" OR "elderly" OR "seniors") AND ("stereotyp*" OR "social identity threat" OR "self-categori?ation" OR "positive priming" OR "positive information" OR "positive perception*" OR "positive expecta*" OR "positive self-concept") AND ("cogniti*" OR "performance" OR "test" OR "thinking" OR "memory" OR "attention" OR "processing" OR "executive function*" OR "neuropsychological" OR "subjective" OR "self-report" OR "perceived")).ti	93
3	((exp aging/) AND (exp stereotyped attitudes/) AND (exp cognition/ OR exp cognitive processes/ OR exp cognitive ability/ OR exp cognitive assessment/ OR exp neuropsychological assessment/ OR exp memory/))	100
4	1 OR 2 OR 3	2483
4	Limit 4 to (adulthood <18+ years> AND ("300 adulthood <age 18 yrs and older>" OR "360 middle age <age 40 to 64 yrs>" OR "380 aged <age 65 yrs and older>" OR "390 very old <age 85 yrs and older>") AND "0110 peer-reviewed journal" AND English AND human AND yr="1995 - Current")	952

Appendix B

Criteria for Quality of Methodology

Topic	Criterion
Sample characteristics	Provided descriptive information (i.e., *N*, *M* (*SD*), %, or range) on both age and gender characteristics of the participant sample, and on either education level or objective cognitive status (e.g., MMSE, MoCA)
Participant recruitment and screening	Sources of participant recruitment, as well as eligibility criteria (at least two inclusion or exclusion criteria) were specified
Sample size justification	Provided some rationale for how the study's sample size was arrived at and/or included a power analysis
Study design and group allocation	Both the study design and procedure (i.e., allocation) for group assignment (e.g., random or matched) were clearly outlined
Experimental control	Employed at least one of the following methods to address potential sources of experimental bias: 1) used a manipulation check; 2) counterbalanced order of outcome measures; and/or 3) used experimenter blinding
Experimental variables and outcome measures	Clearly outlined experimental manipulations (e.g., verbatim script) for each group, procedures for administration, and outcome measures employed (i.e., name and nature of objective or subjective cognitive outcome measure)
Descriptive statistics on outcome measures	Means/medians and standard deviations/standard errors/ranges for cognitive outcome measures were reported in text, table, or graph
Statistical control	Statistically examined (i.e., via *t*-test or χ^2 test) comparability of groups on demographic characteristics and/or baseline measures of cognitive function, and/or statistically controlled for potential covariates, where relevant

Appendix C

Consent Form and Survey

PARTICIPANT INFORMATION

Project title: Health professionals' perceptions and practices in the cognitive assessment of older adults

[Ethical clearance and details of investigator team]

Why is the research being conducted?
Older adults (i.e., individuals aged 60 years and over) form an increasing proportion of the global population. A consequence of this trend is an increasing number of older individuals presenting or being referred to healthcare services to screen for age-related cognitive impairment or possible dementia. As such, the cognitive assessment of older adults is becoming an increasing part of the clinical practice of many health professions.

The broad aim of this study is to gain a greater understanding of the perceptions and practices of health professionals who conduct cognitive assessments with older adults. We seek to understand the factors contributing to the performance of older adults on cognitive tests. The findings from this study may contribute to the development of practice recommendations for those who conduct cognitive assessments with older adults.

The research is being conducted as part of the requirements for a PhD in Clinical Psychology for Giverny Parker.

Can I participate?
You are eligible to take part in this study if you:

- are over 18 years of age; and
- are a clinician from any health discipline (including, but not limited to, psychology, neuropsychology, and occupational therapy) whose professional work or training involves, or has involved, conducting cognitive screening and/or assessment with older adults (i.e., individuals aged 60 years and over)

At a minimum, eligible participants will currently be undertaking or have previously completed a professional placement through which they have gained some experience in conducting cognitive screening and/or assessment with older adults.

What will I be asked to do?
You are invited to complete an online survey that will take approximately 15 minutes of your time. Information collected will include:

- Demographic characteristics and work history;
- Beliefs and expectations regarding ageing;
- Scope of practice and engagement with older adults, and how this may have changed as a consequence of the COVID-19 pandemic;
- Perceptions and practices regarding cognitive assessments with older adults; and
- Questions related to a hypothetical scenario regarding a client attending a memory clinic for cognitive assessment.

The expected benefits of the research
It is not anticipated that you will receive any direct benefits from participating in this research. However, by participating in this study, you will help to improve our understanding of factors influencing the performance of older adults on cognitive testing. Such insights are expected

to contribute to the development of practice recommendations for those who conduct cognitive assessments with older adults.

[Details about random prize draw, risks, confidentiality, and privacy statements]

Consent to participate
Please save or print a copy of this information sheet and retain it for your records. By completing the survey, you will be deemed to have consented to participate in the research. By clicking 'Next' at the bottom of this page, you confirm that you have read and understood the above participant information sheet and that you consent to participate.

Demographic Information

The following questions ask you to provide information about yourself and your profession.

Q1: What is your age in years?

- _____ (numerical input only)

Q2: What is your gender?

- Female
- Male
- Other

Q3: Which ethnic group do you identify with?

- Australian
- Indigenous Australian or Torres Strait Islander
- New Zealander
- Maori
- Asian
- Indian
- Middle Eastern
- European
- North American
- South American
- African
- Other: _____

Q4: Please select or indicate your country of residence:

- Australia
- New Zealand
- Other: _____

Q5: If your country of residence is Australia, please select the state or territory in which you reside:

- Queensland
- New South Wales
- Australian Capital Territory
- Victoria
- Tasmania
- South Australia
- Northern Territory
- Western Australia

Q6: What is the highest level of education that you have attained?

- Year 10
- Year 12

- TAFE/Other Certification
- Bachelor Degree
- Honours Degree
- Masters
- Doctorate/PhD
- Other: _____

Q7: Please indicate whether you are still undertaking professional training for your discipline:

- No, I have completed my training
- Yes, I am currently completing an undergraduate degree
- Yes, I am currently completing a postgraduate degree (e.g., Masters, Doctorate, or PhD)
- Other: _____

Q8: In which discipline or profession do you work?

- Psychology (General)
- Clinical Psychology
- Neuropsychology / Clinical Neuropsychology
- Occupational Therapy
- Speech Pathology
- Other: _____

Q9: Please indicate the total number of years of experience you have working in your discipline or profession, since attaining your highest qualification:

- _____ (numerical input only)

Nature of Work and Client Population

The following questions ask you about the nature of your work and the clients (or patients) you see.

Q10: What is the title of your currently held position or role?

- _____

Q11: Select your practice setting (select all that apply):

- Private practice
- Private hospital
- Public hospital
- Government department
- Community organisation
- University
- Residential aged care
- Other: _____

Q12: Which client population do you spend most of your time working with?

- Mainly paediatric (i.e., children and/or adolescents)
- Mainly younger to middle aged adults
- Mainly older adults
- Balance of all ages

Beliefs and Expectations About Ageing

[12-item Expectations Regarding Aging survey (from Sarkisian et al., 2005) and 9-item benevolent ageism subscale from the Ambivalent Ageism Scale (from Cary et al., 2017)]

Scope of Practice and Interaction with Older Adults

The following questions ask you about your scope of practice and level of interaction with older adults (i.e., aged 60 years and over).

We are aware that your usual practice may have been affected by the COVID-19 pandemic. Please answer the following questions according to your usual scope of practice and level of interaction with older adults **PRIOR** to the COVID-19 pandemic.

Q34: In your professional practice, how often do you see clients who are older adults?

- 1;Never
- 2;Very rarely – Once a year
- 3;Infrequently – A few times a year
- 4;Occasionally – Every couple of months
- 5;Frequently – At least once per month
- 6;Very frequently – At least once a week
- 7;Almost always – At least once per day

Q35: Do you consider working with older adults to be one of your areas of specialty or expertise?

- Yes
- No

Q36: Outside of your professional practice, how often do you interact with older adults?

- 1;Never
- 2;Very rarely – Once a year
- 3;Infrequently – A few times a year
- 4;Occasionally – Every couple of months
- 5;Frequently – At least once per month
- 6;Very frequently – At least once a week
- 7;Almost always – At least once per day

Current Practices or Views on Conducting Cognitive Assessment with Older Adults

The following questions ask you about your current practices or views about conducting cognitive assessments with older adults (i.e., aged 60 years and over).

For the purposes of this survey, cognitive assessment includes the use of cognitive screening tests (e.g., MMSE, MoCA) as well as more comprehensive assessment batteries (e.g., WAIS, WMS).

We are aware that your usual practice may have been affected by the COVID-19 pandemic. Please answer the following questions according to your usual practices or views with regards to conducting cognitive assessments with older adults **PRIOR** to the COVID-19 pandemic.

Q37: During normal circumstances, how often do you conduct cognitive assessments with older adults?

- 1;Never
- 2;Very rarely – Once a year
- 3;Infrequently – A few times a year
- 4;Occasionally – Every couple of months
- 5;Frequently – At least once per month
- 6;Very frequently – At least once a week
- 7;Almost always – At least once per day

Q38: How experienced do you consider yourself to be in conducting cognitive assessments with older adults?

- 1;Not very experienced
- 2;Somewhat experienced
- 3;Moderately experienced
- 4;Quite experienced
- 5;Highly experienced

Q39: In your role, what is the typical nature of cognitive assessment conducted with older adults?

- N/A – I do not currently conduct cognitive assessments with older adults
- I mostly use cognitive screening tests
- I mostly use selected tests or subtests to assess cognitive function
- I mostly use comprehensive test batteries to assess cognitive function

Q40: With reference to the cognitive assessment of older adults, what is the most common referral question you receive (or have received)?

- Assessment and/or diagnosis of memory problems or cognitive decline (e.g., mild cognitive impairment, dementia)
- Assessment of cognitive function following a significant health or neurological event (e.g., stroke, brain injury)
- Capacity assessment
- Mental health
- Other: _____

Q41: Please select or indicate the names of the cognitive tests or batteries you most commonly use (or would use) when conducting cognitive assessments with older adults (select all that apply). Providing widely known acronyms is welcomed, if you are selecting "Other":

- Addenbrooke's Cognitive Examination (ACE)
- Mini-Mental State Examination (MMSE)
- Montreal Cognitive Assessment (MoCA)
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)
- Rowland Universal Dementia Assessment Scale (RUDAS)
- Wechsler Adult Intelligence Scale (WAIS)
- Wechsler Memory Scale (WMS)
- Other: _____

Q42: How do you (or how would you) introduce cognitive tests to older adults? Please indicate if you adapt or alter standardised manual instructions in any way. Please describe briefly.

- _____

Q43: How do you (or how would you) help an older adult to perform at their optimal level on cognitive assessment so that you can obtain a reliable and valid test score? Please describe briefly.

- _____

Hypothetical Assessment Scenario

Please read the following assessment scenario and respond to the questions below.

Mr Smith, a 76-year-old gentleman, was referred to a memory clinic at a local geriatric assessment and rehabilitation service by his General Practitioner after he expressed concerns about recent forgetfulness. Although nervous about the appointment, he arrived on time and was told to take a seat in the clinic waiting room. There were various leaflets in the room that he picked up and read to fill the time – pamphlets about stroke and Alzheimer's Disease, as well as a community exercise program for seniors. Mr Smith was greeted by the health professional and guided to an assessment room. He noticed the air conditioning made the room feel quite cold and the fluorescent light overhead occasionally flickered. The health professional collected information about Mr Smith's presenting concerns and history. Mr Smith explained his memory was not what it used to be but that that was to be expected for someone of his age.

As the discussion progressed, Mr Smith noticed occasional loud voices coming from the next room which was difficult to block out at times. Mr Smith told the health professional he had a lot on his mind at the moment; he was concerned about his finances, which had led him to decide to downsize and put his house on the market. He was also not getting along with some of his family members after arguments over the sale. Before the assessment began, Mr Smith was asked to provide his age to the assessor. It was explained to Mr Smith that he would be asked to complete a number of different tests, including ones that tested his memory, concentration, and problem-solving abilities. On hearing this, Mr Smith felt somewhat doubtful of the need for the assessment. Part way through the assessment, there was a knock on the door and the door was opened slightly by someone checking if the room was available; realising the room was in use, the person apologised and closed the door. As the assessment progressed, Mr Smith found the chair somewhat uncomfortable and noticed a leg cramp which eased with stretching under the table. Halfway through the 90-minute session Mr Smith was offered a rest break, which he declined.

We are interested in your perceptions of the factors in the assessment scenario that might have affected Mr Smith's cognitive assessment performance, aside from any possible neuropathological changes or his true abilities.

Please rate the extent to which you believe each of the following factors may have detrimentally affected Mr Smith's cognitive performance:

	Not at all	Slightly	Moderately	Considerably	Extremely
Q44: Attending a memory clinic	☐1	☐2	☐3	☐4	☐5
Q45: Feeling nervous about the appointment	☐1	☐2	☐3	☐4	☐5
Q46: Reading pamphlets about stroke and Alzheimer's Disease	☐1	☐2	☐3	☐4	☐5
Q47: Air conditioning making the room feel quite cold	☐1	☐2	☐3	☐4	☐5

Q48: Fluorescent light overhead occasionally flickering	☐1	☐2	☐3	☐4	☐5
Q49: Mr Smith's belief that declining memory is to be expected for someone of his age	☐1	☐2	☐3	☐4	☐5
Q50: Loud voices coming from the next room which was difficult to block out at times	☐1	☐2	☐3	☐4	☐5
Q51: Having a lot on his mind about his financial situation and family disagreements	☐1	☐2	☐3	☐4	☐5
Q52: Being asked to provide his age	☐1	☐2	☐3	☐4	☐5
Q53: Being told he will complete tests of his memory abilities	☐1	☐2	☐3	☐4	☐5
Q54: Feeling doubtful about the need for the assessment	☐1	☐2	☐3	☐4	☐5
Q55: Knock on the door by someone checking if the room was available	☐1	☐2	☐3	☐4	☐5
Q56: Being seated in an uncomfortable chair	☐1	☐2	☐3	☐4	☐5
Q57: Experiencing a leg cramp	☐1	☐2	☐3	☐4	☐5
Q58: Not taking a rest break when offered	☐1	☐2	☐3	☐4	☐5

Please select what you believe to be the top five factors, from the assessment scenario, that may have detrimentally affected Mr Smith's cognitive performance during the assessment.

Please order your top five based on how detrimental you consider them to be (i.e., rank them in order of their impact on performance, with your top ranking item being the most detrimental). Please select each factor only **ONCE**:

- Q59 – #1: _____
- Q60 – #2: _____
- Q61 – #3: _____
- Q62 – #4: _____
- Q63 – #5: _____

Impact of Age-Based Stereotypes

We are interested in your perceptions of the impact of age-based stereotypes on the cognitive performance of older adults.

Society holds pervasive negative stereotypes about ageing and older people (e.g., that older adults are forgetful).

Age-based stereotype threat occurs when an older adult faces a situation (e.g., attending a memory clinic) which increases the salience of their age and puts them at risk of confirming or being judged by a negative stereotype. Consequently, they may underperform on stereotype relevant tasks (e.g., memory tests).

Research has shown that older adults underperform on tests of memory and general cognitive ability when negative age-based stereotypes are salient within a testing context.

Q64: To what extent do you believe that age-based stereotypes affect the cognitive performance of older adults in general?

- 1;Not at all
- 2;Slightly
- 3;Moderately
- 4;Considerably
- 5;Extremely

Q65: To what extent do you believe that age-based stereotypes affect the cognitive performance of older adults in your place of practice?

- 1;Not at all
- 2;Slightly
- 3;Moderately
- 4;Considerably
- 5;Extremely

Q66: To what extent do you believe that age-based stereotypes affect the cognitive performance of older adults in the broader profession or field that you work in?

- 1;Not at all
- 2;Slightly
- 3;Moderately
- 4;Considerably
- 5;Extremely

Q67: Please indicate any additional thoughts that you may have about the impact of age-based stereotypes that was not captured by the above questions:

- _____

Impact of COVID-19 Pandemic

We are interested in whether your usual practice with older adults has changed as a result of the COVID-19 pandemic and, if so, how it has changed.

Q68: Please select or indicate one of the following which best describes any changes to your usual practice in conducting cognitive assessments with older adults:

- N/A – I do not conduct cognitive assessments with older adults in my usual practice
- I have continued to see older adults as usual and conduct face-to-face cognitive assessments
- I have adjusted my administration of cognitive assessments with older adults, where possible (e.g., use of online assessment tools, and/or remote assessment via telehealth)
- I have reduced the number of cognitive assessments I conduct with older adults
- I have ceased seeing older adults for the purposes of cognitive assessment
- Other: _____

Q69: Please describe any other relevant impacts of the COVID-19 pandemic on your assessments with older adults: _____

Thank you for completing this survey. Your participation is greatly appreciated!

If you have any questions or concerns with regards to this survey, you can contact the HDR Student Investigator Miss Giverny Parker on (07) 3735 3304 or giverny.parker@griffithuni.edu.au, or the Primary Investigator, Professor Tamara Ownsworth on (07) 3735 3307 or t.ownsworth@griffith.edu.au

If you would like to enter the prize draw, please follow the below link to the separate survey:

[PRIZE DRAW LINK]

Appendix D

Hypothetical Assessment Scenario

Mr Smith, a 76-year-old gentleman, was referred to a **memory clinic** at a local geriatric assessment and rehabilitation service by his General Practitioner after he expressed concerns about recent forgetfulness. Although nervous about the appointment, he arrived on time and was told to take a seat in the clinic waiting room. There were various leaflets in the room that he picked up and read to fill the time – **pamphlets about stroke and Alzheimer's Disease,** as well as a community exercise program for seniors. Mr Smith was greeted by the health professional and guided to an assessment room. *He noticed the air conditioning made the room feel quite cold* and the *fluorescent light overhead occasionally flickered*. The health professional collected information about Mr Smith's presenting concerns and history. Mr Smith **explained his memory was not what it used to be but that that was to be expected for someone of his age.**

As the discussion progressed, Mr Smith noticed occasional *loud voices coming from the next room which was difficult to block out at times*. Mr Smith told the health professional he had a lot on his mind at the moment; he was concerned about his finances, which had led him to decide to downsize and put his house on the market. He was also not getting along with some of his family members after arguments over the sale. Before the assessment began, Mr Smith was **asked to provide his age** to the assessor. It was explained to Mr Smith that he would be asked to complete a number of different tests, including ones that **tested his memory**, concentration, and problem-solving abilities. On hearing this, Mr Smith felt somewhat doubtful of the need for the assessment. Part way through the assessment, there was a *knock on the door and the door was opened slightly* by someone checking if the room was available; realising the room was in use, the person apologised and closed the door. As the assessment progressed, Mr Smith found the *chair somewhat uncomfortable* and noticed a leg cramp which eased with stretching under the table. Halfway through the 90-minute session Mr Smith was offered a rest break, which he declined.

Bold text = ABST factors
Underlined text = Internal factors
Italic text = External/environmental factors

Appendix E

Email and Social Media Advertisement

Subject: Invitation to participate in a survey on cognitive assessments with older adults

Dear health professional/researcher,

Have you ever wondered whether older adults' performance on cognitive testing reflects their actual abilities?

My name is Giverny Parker and I am completing a PhD in Clinical Psychology at Griffith University, under the supervision of Professor Tamara Ownsworth.

My research seeks to understand the various factors that might contribute to older adults' performance on cognitive tests and practices which may help to facilitate their optimal performance.

Such insights may contribute to practice recommendations for health professionals conducting cognitive assessments with older adults.

To help us achieve this important objective, please consider participating in a 15-minute survey on your perceptions and practices regarding cognitive assessment of older adults.

Any health professional with experience in conducting cognitive assessments with older adults is eligible to participate.

The study has received ethical clearance by Griffith University's Human Research Ethics Committee (GU HREC Ref No: 2020/636).

Participation is voluntary and your responses will be anonymous.

You will be invited to enter a random prize draw to win **1 of 5 x $50 Amazon.com.au eGift Cards**.

If you are interested in learning more and taking part, please click on the weblink below:

[SURVEY LINK]

Please also consider forwarding this email to any colleagues who you think may be interested in participating.

Thank you for your time.

Yours sincerely,

Giverny Parker

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