

So you think you can dance?

Investigating perceived dance efficacy and dance program participation in older adults

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Statement of Authenticity

To the best of my knowledge and belief, the work presented in this thesis is original work except where otherwise acknowledged. I hereby declare that I have not previously submitted this content, either in full or in part, for a degree at this or any other institution.



Martha Jane Waugh

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Abstract

Dance is cognitively challenging, socially engaging physical activity. However, although dance participation is widely proposed to benefit health and wellbeing in later life, empirical evidence remains inconsistent and somewhat inconclusive. Individual factors may account for some discrepancies in dance program effects. Self efficacy is a psychological construct which may reflect individual differences in factors likely to influence program participation and health and wellbeing outcomes among older adults. However, there is currently no tool that assesses dance efficacy in any population.

This study first investigated the psychometric properties of six novel dance efficacy items for older adults participating in two large scale dance intervention trials (Merom, Grunseit, et al., 2016; Merom, Mathieu, et al., 2016). Results indicated that dance efficacy was weaker in older participants, people with less dance experience, poorer mental health, poorer cognitive and physical abilities, insufficiently active, and with a reduced social network. Participants with low dance efficacy before starting the dance program went on to have lower program attendance, and low attendance was associated with further declines in dance efficacy.

These findings informed further dance efficacy scale development. This process extends the measure to represent a broader range of dance tasks and impediments to social dance participation in later life, including scheduling issues. Dance efficacy concepts and items were generated predominately through deductive theory driven analysis of qualitative focus group data from an aged care dance trial (Merom, Mathieu, et al., 2016), followed by an empirical study of the expert review process of potential dance efficacy items. The final item set is brought forwards for further scale development and validation. Measuring dance efficacy in older adult dance for health research and practice may improve the assessment of dance program participant needs and intervention effects, and dance program evaluation.

Keywords

Dance; older adults; self efficacy; arts and health; dance intervention; tests of validity; scale development; active aging; creative aging

Introduction

Active and creative aging

The global population is aging at an increasing pace. By 2050, the number of adults over 65yrs is projected to double, impacting healthcare, social care, retirement, caregiving, and quality of life (United Nations, Department of Economic and Social Affairs, 2020). Physiological, social, and emotional change occurs with normal human aging. Even without additional health conditions, older adults experience declines in cardiovascular function, muscular strength and neuromotor fitness which impact functional mobility, gait speed, motor coordination and control, and balance. These changes are strongly associated with both cognitive deterioration and impaired ability to perform daily living activities which can lead to difficulties maintaining independence (Izquierdo et al., 2021; Singh, 2002).

Chronic diseases typical to aging such as cardiovascular disease, diabetes, cancer, cognitive impairment and dementia, musculoskeletal and neurological disorders such as arthritis and Parkinson's disease, falls and injury each can further compound the natural process of aging and lead to disability. As people age, they are more likely to experience several health conditions at the same time: 80% of Australians aged 65 and over live with at least one chronic health condition, with 51% experiencing multimorbidity (Australian Institute of Health and Welfare, 2020). Psychosocial circumstances also change in later life, with common stressors such as experiencing decreased socioeconomic status and social connectedness with retirement, bereavement, or taking on informal caring responsibilities. These age related changes can cause vulnerability to reduced social contact and poor mental health and wellbeing (World Health Organisation, 2015). Reduced mobility, loss of independence, pain, and frailty are also risk factors for psychological distress and isolation.

Exercise can attenuate age related declines in the vast majority of physiological fitness domains (Bull et al., 2020; Izquierdo et al., 2021; Singh, 2002). Physical activity is the key determinant of 'Active Aging': There is abundant evidence that exercise can prevent the above mentioned chronic conditions. Engaging in physical activities can also sustain social outcomes such as increased social support and community involvement, psychological and wellbeing outcomes, and functional status outcomes, as well as assisting older people in the management of diabetes and other metabolic risks, improved heart health and rehabilitation (Bauman et al., 2016; Bull et al., 2020). However, although physical activity is a cost effective, non invasive, and nonpharmacological method of health promotion, older people are not sufficiently active (Guthold et al., 2018; World Health Organisation, 2015). In Australia, only 17.2% of people over 65yrs met regular physical activity recommendations in 2017 18, with 69% of males and 74.5% of females over 65yrs categorised as insufficiently active (Australian Institute of Health and Welfare, 2018). Physical activity participation rates decline further into older age, particularly after 75yrs (Australian Institute of Health and Welfare, 2018; Guthold et al., 2018). Research strongly suggests that, coupled with the use of low cost behavioural support strategies, designing more personalised activity programs that cater for diverse preferences, programs that older people enjoy and find meaningful, supports physical activity uptake, maintenance, and adherence and the associated health benefits (Lachman et al., 2018; Zubala et al., 2017).

Alongside active aging, there is renewed attention on the potential benefits of 'Creative Aging': Creative aging encourages active and receptive cultural engagement and participation in creative arts activities such as music, theatre, visual arts, and dance to promote health and wellbeing in later life (Fancourt et al., 2020; Larson & Perlstein, 2003; World Health Organisation, 2017). A recent review of arts and leisure activities by Fancourt and colleagues (2021) identified and mapped over 600 potential mechanisms driving psychological, biological, social and behavioural change. Evidence from intervention and epidemiological studies suggest creative aging may protect against some of the difficult to tackle negative features associated with older age including increased anxiety and depression, social isolation, low social support, sedentary behaviour, and lack of cognitive and emotional stimulation (Evans et al., 2022; Fancourt & Finn, 2020; Fancourt & Tymoszuk, 2019). Engaging older adults in

effective and enjoyable exercise, leisure, and arts programs to protect physical and cognitive health is a global research priority (World Health Organisation, 2017).

The case for dance: Thesis overview

Dance addresses many of the recommendations for active and creative aging. There are numerous mechanisms of action through which dancing may positively impact health and wellbeing: Dancing is cognitively demanding (Brown & Parsons, 2008) physical activity (Yan et al., 2018) which is socially engaging (Coogan et al., 2021; Sheppard & Broughton, 2020) and performed in an environment enriched with music, and opportunities for expression, artistry, creativity and play (Chappell et al., 2021). As a form of physical activity, dance is accessible and can be modified to train specific abilities and areas of functioning or for clinical populations. Dance also shows promise for rehabilitation (Dhami et al., 2014).

However, the evidence base for dance as a health resource remains preliminary and somewhat inconclusive. In their recent review of the dance, music and health literature, Sheppard and Broughton identified a “lack of theory with which to organise and explain the current research results and formulate predictions for future research.” (Sheppard & Broughton, 2020, p. 4). Alongside other dance for health researchers, we argue for greater focus on the role of individual factors influencing dance participation and health outcomes when designing and evaluating dance programs for older adults (McGill et al., 2014; Predovan et al., 2019).

Dance is a complex social activity that involves skill acquisition with varied task demands, creating many potential impediments to success. Dance self efficacy situation specific confidence for dancing is a psychological factor which may reflect real and perceived capability for social dance program participation (Bandura, 1977, 1997). An extensive body of health behaviour research has highlighted the key role of self efficacy as a predictor and mediator of uptake, retention, attrition, and engagement in successful physical activity programs for older adults (McAuley, Szabo, et al., 2011; van Stralen et al., 2009). Exercise and arts programs can be challenging and

are often designed to enhance participants' efficacy for the activity. Measuring self efficacy in health intervention research and practice, therefore, improves the assessment of both intervention needs and intervention effects.

Self efficacy for dance, however, has not been researched or measured in any population. Given the popularity of dance as an intervention to support health in later life, an exploration of dance efficacy in older adult social dancers is warranted. This thesis will demonstrate that dance efficacy in older people is a multifaceted construct which requires the development of a dedicated dance efficacy measurement tool. The current research project is a novel, preliminary investigation of perceived dance efficacy and dance program participation in older adults. The thesis has three parts:

1. A literature review of the field of dance and health in later life, the concept of self efficacy and applied research.
2. Study 1 is a secondary analysis of quantitative data from two large scale social dance control trials for older adults living in the community (Merom, Grunseit, et al., 2016) and aged care residents (Merom, Mathieu, et al., 2016). These studies featured a preliminary short dance efficacy scale devised by the thesis supervisor, Professor Dafna Merom, and validated by the current thesis author (Waugh et al., 2021)¹.
3. Study 2 commences formal dance efficacy scale development. Deductive, theory driven analysis of qualitative focus group data from the aged care dance trial underpins dance efficacy concept and item generation. This process is extended by an empirical study of the expert review process of potential dance efficacy items.

¹ Study 1 was published in 'Arts and Health' in 2021. Parts of the thesis introduction, literature review and Study 1 appear in Waugh et al. (2021).

Literature review: Aging, dance, and self-efficacy

Dance for health and wellbeing in later life

Dance has been identified as an optimal activity to support the health and wellbeing of older adults. While there are many mechanisms of action through which dancing may positively impact health, the current literature review discusses four key interconnected 'active factors' of dance referenced frequently in specialised dance and health research, as well as the wider health and wellbeing research literature for the older population. These four active factors are: 1) Combined physical and cognitive training; 2) Social engagement; 3) An enriched environment and; 4) The accessibility, flexibility, and adaptability of dance to different populations or different needs and preferences.

Dance is combined physical activity and cognitive training

Firstly, dance is cognitively complex, multicomponent physical activity. As a physical activity, meta analyses have established dance is as effective as other structured exercise to improve physical health outcomes, including cardiorespiratory fitness, in the older population (Rodrigues Krause et al., 2016; Yan et al., 2018). Furthermore, exercise that demands greater cognitive engagement has been consistently demonstrated to have a stronger effect on cognitive, and particularly executive function compared to simpler physical activities (Netz, 2019). Dance naturally integrates sensorimotor complexity with progressively challenging cognitive components (Brown et al., 2006; Dhami et al., 2014), requiring neuromotor skill

acquisition and neuromuscular coordination with substantial attention, perception, spatial cognition, learning processes, and memory demands.

A meta analysis of cognitively complex physical activities including dance and martial arts found significantly larger gains in cognition in older adults compared with simple physical activities (Gheysen et al., 2018). Integrated physical activity and cognitive training is likely to further benefit cognition via both similar and divergent pathways (Bamidis et al., 2014; Prakash et al., 2015). In addition to optimising the beneficial effects on cognitive brain health, multicomponent exercise also improves characteristics of frailty such as endurance mobility, gait ability, strength, activity levels, and energy, enhancing functional capacity in aging (Izquierdo et al., 2021). As such, complex physical activity is a recommended exercise modality.

Dance is a socially engaging, enjoyable group activity

The second 'active ingredient' of dance participation is social engagement (Koch et al., 2019; Sheppard & Broughton, 2020). Social interaction in older age protects physical (Cacioppo et al., 2015), cognitive (Kuiper et al., 2015), and mental health (Bone et al., 2022; Mackenzie & Abdulrazaq, 2021). While physical activity interventions alone do not appear to benefit loneliness, social support or social networks (Shvedko et al., 2018), leisure and arts activities can promote social connectedness (Fancourt et al., 2021) and may help tackle loneliness and social isolation in older people (Poscia et al., 2018). Meta review findings do suggest older adults are motivated to engage in community exercise programs by opportunities for friendship, social contact and belonging (Zubala et al., 2017). An intervention for older people comparing dance with strength/stability/stretching, walking, and walking combined also reported increased social support, and reduced stress and loneliness in all groups (Ehlers et al., 2017). Group physical activities have also been demonstrated to reinforce positive exercise behaviour through increased motivation and social support (Farrance et al., 2016; Lachman et al., 2018): Enhanced social connectedness is, in turn, associated with substantial health benefits (Holt Lunstad, 2021; Holt Lunstad et al., 2010).

Dance is also fun! Older adults are highly motivated by pleasurable group activities such as dance (Franco et al., 2015; Kraft et al., 2015; Zubala et al., 2017). For example, Coogan and colleagues (2021) qualitatively examined the determinants of successful engagement of a ballroom dancing program. The participants reported overwhelmingly that they enjoyed the program. Participant dancers and teachers considered that the positive group dynamic that developed over the course of the program fostered a strong sense of community. This social support facilitated participants' engagement with dancing by boosting their self esteem and self efficacy. Further evidence from qualitative studies strongly suggest that older people participating in or considering dance programs highly value the social aspects of dancing (Brustio et al., 2018; Coogan et al., 2021; Moe, 2014; Nadasen, 2008; Thøgersen Ntoumani et al., 2018). A qualitative review of the contributions of dance for health and wellbeing at all ages highlighted the sense of belonging associated with social dancing, the shared group identity and experiences, and welcoming and supportive environment (Chappell et al., 2021). Collectively, these studies suggest that social engagement may be key to supporting dance program participation and adherence, and also contribute to health benefits.

Dance provides an enriched environment

The enrichment effects associated with social dancing are the third active factor promoting health, particularly cognitive health, to be explored in this review. Kattenstroth and colleagues propose that dance provides an environment enriched with “increased sensory, motor and cognitive demands” (2013, p. 1). These stimulating elements include rhythmic motor coordination, interpersonal coordination, music, emotion, and opportunities for expression, creativity, play, affection, and physical contact (Basso et al., 2021; Chappell et al., 2021; Kattenstroth et al., 2010; Teixeira Machado et al., 2019). There is strong evidence that enriched environments are cognitively stimulating and promote functional cognitive capacity in older adults (Hertzog et al., 2008) and may support psychosocial health (Koch, 2017). The complex and unique environment of social dance provides a rich experience shared with peers. Older adults are motivated by meaningful and purposeful activities, and often perceive

the exercise component of these activities as a by product (Franco et al., 2015; French et al., 2014). One of the strengths of dance is that the health promoting properties of participation are rarely the focus of the activity.

Dance is an accessible and adaptable activity

Finally, dance is accessible and adaptable. Dance can be modified to train specific features such as falls prevention (Goldsmith & Kokolakis, 2021) or dual task performance (Hamacher et al., 2015), and specific populations such as people with Parkinson's (Ismail et al., 2021), or dementia (Mabire et al., 2019). This is exemplified by work by Beaudry and colleagues (2019) who developed an adapted dance program for sub acute post stroke rehabilitation delivered in an inpatient setting. The program focused on several rehabilitation themes including stimulation of the stroke affected side of the body, breathing, co ordination, expression, movement symmetry, postural control and proprioception. The adaptability of dance is the fourth active factor as it allows for sub group individuation for specific needs, goals, and contextual factors, which may improve outcomes and adherence (Lachman et al., 2018), as well as providing targeted social support from peers experiencing similar circumstances. In summary, dance has multiple properties that independently and interactively benefit health and social dance programming has been recognised as an effective and innovative approach to supporting a range of health factors into older age.

Health outcomes of dance intervention trials for older adults

The sum of the evidence presented in the current review strongly favours dance as an excellent activity to support active and creative aging. Promisingly, longitudinal cohort studies suggest that dancing regularly benefits health in the longer term including reduced risk of cardiovascular disease mortality (Merom, Ding, et al., 2016), dementia and cognitive decline (Kattenstroth et al., 2010; Verghese et al., 2003), and lower incidence of disability (Osuka et al., 2019). Enthusiasm for dance as a lifestyle intervention has inspired a substantial body of control trials for older people examining the benefits of dancing on a range of specific health outcomes.

Experimental findings from dance efficacy trials for older people, however, have not always aligned with the positive results reported in observational epidemiological studies. Increased attention on arts and health evidence synthesis has produced at least fourteen recent systematic reviews and meta analyses examining domain specific evidence for dance program related health benefits in older people. This review benefits, therefore, from up to date evidence synthesis. The evidence appears most consistent for improved physical function (McCrary et al., 2021), although Liu et al. (2021) found benefits to mobility, but not gait. There is currently insufficient evidence to conclude that dance interventions improve balance and falls risk outcomes without including explicit balance challenges (Fernández Argüelles et al., 2015; Liu et al., 2021; Sherrington et al., 2020).

The benefits of dance to other areas of health and wellbeing are, so far, less reliable and inconclusive. A recent meta analysis examining the cognitive benefits of dance for older people reported improvements to global cognitive function, but inconsistent results across trials for executive function, and no benefit to complex attention, learning and memory (Hewston et al., 2020). A meta analysis investigating the benefits of dance to psychosocial health – quality of life, and mood, predominately depression and anxiety – found large, significant, but inconsistent effects (Koch et al., 2019). An umbrella review of the dance and health field reported a generally positive picture, but mixed and low quality evidence for the benefits of dance to health with substantial heterogeneity across studies (McCrary et al., 2021).

Understanding dance and health outcome variability

Overall, the differential effects reported in dance and health interventions (and subsequent reviews) can be partially explained by wide variations in study design, particularly the nature of the control or comparison groups and dose of exposure (McCrary et al., 2021; Predovan et al., 2019). Dance programs demonstrating the largest effects are unsurprisingly those with no intervention control groups or comparison groups allocated to a sedentary activity such as colouring or health education (e.g. Doi et al., 2017). In these studies, benefits derived from dancing could be explained by increased physical activity rather than the distinctive properties of dance.

In addition, many diverse genres of dance are represented in the research with substantially different program content and levels of physical intensity. This variability produces inconsistent results and obscures the potential mechanisms of action whereby dance affects health. The issue is compounded by a tendency for dance and health studies to provide incomplete or superficial descriptions of program content and pedagogy, compromising cross study comparison, transparency, and reproducibility (Beaudry et al., 2019).

Physical intensity and cognitive training

Considering the physical intensity of senior dance programs, from observational cohort studies it appeared that moderate to vigorous dancing is protective for heart health, whereas low intensity dancing was not protective (Merom, Ding, et al., 2016). This finding is supported by the dance and health umbrella review which reported that lower intensity dance was generally less effective than moderate vigorous programs (McCrary et al., 2021). The intensity of the senior dance programs studied in efficacy trials varied from moderate vigorous intensity Zumba through to lower intensity ballroom and expressive dance such as ballet (Rodrigues Krause et al., 2018). Complicating the issue further, few dance studies for older people were designed to determine and validate program intensity (Yan et al., 2018). Evidently, understanding how strenuous different dance programs are relative to their efficacy is important when making recommendations about health protective exercise and dance

program design. Differences in other training elements such as balance challenges are also likely to impact health outcomes, making overall interpretation of results difficult.

Regarding cognitive training elements, dance programs ranged from the very basic to highly complex. Programs varied from studies learning a single waltz dance with simple, repetitive steps (e.g. Kosmat & Vranic, 2017), through to complex partnered dancing such as tango (e.g. Hackney et al., 2015) or programs purposefully structured to provide progressive cognitive challenges by introducing a number of new dances every few weeks that were increasingly complicated and difficult (e.g. Merom, Mathieu, et al., 2016; Müller et al., 2017; Rehfeld et al., 2017). One aerobic dance study used a single routine, learned and repeated three times/week for 12mo without variation (Qi et al., 2019; Zhu et al., 2018), while another program was entirely improvised creative dance with no set steps (Coubard et al., 2011). The cognitive tasks and domain specific demand associated with all these programs would be very different.

It is also important to recognise that, on an individual level, cognitive training does require mental effort: Animal models and preliminary human research strongly suggests reaching sufficient cognitive challenge is required to drive change in brain structure and function and, therefore, cognition (Gheysen et al., 2018; Voelcker Rehage & Niemann, 2013). Insufficiently stimulating programs may therefore contribute to null findings.

Social and enriched components of dance programs

Dance program design and content may also influence social engagement and the enrichment effects associated with dancing. For example, the interpersonal and group interactions will be different for participants engaged in unstructured improvised dance classes (e.g. Coubard et al., 2011; Cruz Ferreira et al., 2015) compared to structured aerobic dance (e.g. Zhu et al., 2018), or partnered (e.g. Granacher et al., 2012; Marquez et al., 2017) and unpartnered dance (e.g. Kattenstroth et al., 2013). There is little evidence to allow comparisons across studies regarding the social aspects of dance programs both during and outside sessions. Analysis of the impact of enriching elements of dance programs such as participant responses to music, playfulness,

creative opportunities and even to physical contact and partnered dancing are also largely absent. Likewise, dance studies have typically not examined adverse responses to the dance programs despite increasing literature suggesting that arts and health interventions and research often does not sufficiently consider the psychological and cultural safety of participants, particularly those from vulnerable groups (Lenette et al., 2019; Nunn, 2020; Pavarini et al., 2021).

Clift and colleagues (2021) have strongly challenged the overwhelmingly positive conclusions of recent arts and health evidence reviews (e.g. Fancourt & Finn, 2020) for poor methodology, overextending conclusions, and overstating the strength of the evidence base. The authors draw on observations from Belfiore (2006) that arts reviews ignore indications of negative impacts from arts engagement and fail to consider the quality of the artistic, aesthetic, and creative components of programs, particularly when assessing outcomes. It is certainly clear that, together with clearer descriptions of dance program pedagogy and content, dance and health research would benefit from reflecting upon how older adult participants experience dance participation.

Individual factors, dance participation, and health outcomes

So far, this review has focused on the potential active health promoting factors associated with social dancing. We then moved on to discuss how dance study and program characteristics may affect differentially affect health outcomes and compromise program evaluation and comparison. The following section will explore the individual and social factors that are also likely to account for some of the discrepancies in dance program efficacy.

Older people are not a homogenous group. Seniors represent a broad age range, covering more than 30 years, experiencing substantial age related developmental change. There is considerable variability in the aging process, the capacity to engage in physical activities due to disability, and the physical intensity level tolerated (Taylor et al., 2004). Substantial heterogeneity also exists in neurocognitive aging, which can

affect general cognition as well as different specific cognitive abilities across older individuals such as processing speed, delayed recall and executive functions (Harada et al., 2013). Likewise, motor skill learning ability and performance improvement can be negatively impacted by aging, particularly as task difficulty increases, potentially due to neurodegeneration and poorer motor plasticity, although older adults still retain capacity for extensive skill learning (Voelcker Rehage, 2008). Even within similar cohorts such as aged care residents there can be wide variation in individual factors likely to affect capability for dance participation.

Individual differences in activity levels and exercise behaviour, and other physical and psychological factors such as functional mobility, cardiovascular fitness levels, balance control, cognitive ability, and mental health are also likely to influence capability for organised dance programs and consequently, health outcomes (Keogh et al., 2009; McAuley, Mailey, et al., 2011; McGill et al., 2014; Stock et al., 2012).

Furthermore, as dance is a skilled activity, on an individual level, a person's dance capability and performance level will be affected by their familiarity with dance tasks and their existing neuro motor co ordination and control abilities for dance movements and sequences (Voelcker Rehage, 2008): Previous and current dance experience will markedly influence involvement in dance programs. However, dance and health research rarely considers the above mentioned individual factors when designing and evaluating dance programs for older adults.

In one of the first reviews of the health benefits of dancing in older age, Keogh and colleagues (2009) recommended investigating potential factors that may influence the uptake of, and adherence to, dance programs. Adherence to exercise programs more generally, for example, is positively associated with demographic factors such as socioeconomic status and living alone, better health status, stronger physical and cognitive abilities, and better mental health (Picorelli et al., 2014). McGill and colleagues (2014) further proposed a more person centred approach to dance research, developing a program evaluation framework for dance for Parkinson's research based on the WHO's conceptualisation of functioning, disability, and health (World Health Organisation, 2002). This framework considers the impact of personal factors on activity participation and outcomes. McGill (2014) advocates for the consideration of individual characteristics, coping styles, past and current experience, lifestyle, and

behaviour patterns when evaluating dance programs. However, the authors did not identify potential instruments to facilitate this research as they have for assessing the impact of other factors on dance such as mobility limitations in the same paper.

In practice, to accommodate different skills and abilities, dance programming for young people and adults is often delivered at different levels or grades from beginner classes through to advanced, sometimes with introductory courses for novices (e.g. Francis, 2016). Dance efficacy trials and programs for the older adults, however, are usually open and 'one size fits all'. It is possible that open classes do not accommodate the varied needs and abilities of the older adult dancers. For older adults learning a new skill such as dancing, it is particularly important to make sure the difficulty level of the program matches the abilities of the participants (Kraft et al., 2015). While few older adult dance studies offered training for complete beginners, our research for the present review of dance efficacy trials for older adults tentatively suggests that dance trials for older people who are inactive and do not have previous dance experience at baseline (e.g. Kattenstroth et al., 2013; Rehfeld et al., 2018) appear overall to be more effective than trials with more open recruitment policies, although this requires formal validation.

Individual differences and capability for social dance

The potential impact of personal factors on dance program participation and outcomes can be illustrated by examining how individual differences might relate to the physical training aspects of dancing. The fitness and general capability of an individual together with the level of skill they have previously acquired determines the demand associated with a dance task (Rodrigues Krause et al., 2018). A simple stepping sequence may challenge a previously inactive novice dancer, but not test a fit and active person with considerable recent dance experience. The effort involved in senior dance program participation will be different for everyone, but far more so if a wide range of ability levels are present. As effort drives physical and cognitive health outcomes, variability in task demand may differentially impact health. In addition, perceived task difficulty can affect program participation more broadly. Motivation for

an activity, for example, can be undermined by threats to competence for tasks which are perceived as too demanding (Deci & Ryan, 2000).

Physical and cognitive demands are also interdependent in dance. More complex dance tasks demand more attention and conscious control before achieving neuro muscular co ordination, resulting in a less efficient performance and reduced physical intensity (Rodrigues Krause et al., 2018). Evidence from both community and professional dancers suggest that the complexity of a dance task in combination with the skill and capability of an individual determines performance intensity (Rodrigues Krause et al., 2018; VanSwearingen & Studenski, 2014; Wyon, 2010). Furthermore, increased cognitive load is associated with poorer balance control (increased sway and poorer gait) in older adults, particularly for people with existing balance issues and poorer working memory (Al Yahya et al., 2011; Barra et al., 2006; Faulkner et al., 2007; Li et al., 2018). Less able senior dancers with less dance experience may contend with compounded challenges when attempting to tackle more difficult dance tasks.

Evidence of individual factors influencing dance participation

It is difficult to draw conclusions about how dance program content and design may interact with individual factors to affect health outcomes. As previously discussed, few dance studies account for individual differences. A community dance trial conducted by Merom, Grunseit and colleagues (2016) examined differences between older adult participants who left the study early compared to program completers. The study reported significant differential attrition by cognitive function in the dance groups, but not the walking groups. Older people with the poorest working memory, verbal memory, and executive function at the start of the study were more likely to leave the dance program. This introduced attrition bias into the study. Loss of participants with weaker cognitive functioning at baseline who may have had the most to gain from participating in dance also reduces the power of a study to detect an effect (Merom, Grunseit, et al., 2016).

Observational qualitative dance researchers have explored the impact of individual factors on dancing. Here though, dance participants self select into dance programs. Very few randomised dance efficacy trials following the 'one size fits all'

strategy to standardise the dance programs provide qualitative evidence of participant experiences. One notable exception is the dance motivation study by Coogan (2021) discussed earlier. Both instructors and dancers observed that some senior dance participants perceived mental barriers to dance participation including a lack of confidence in their ability to master the dance tasks and fear of failure. The teachers noted that the participants who lacked confidence, or those with perfectionist tendencies tended to struggle most with the dance material. The prior qualitative study of barriers to complex activity participation also concluded that, although the perceived challenge of complex activities does not obstruct inclination to try difficult tasks, embarrassment and discomfort due to lack of ability is a barrier to participation (Kraft et al., 2015).

Research Gap 1: Understanding personal factors in a dance context

Together, this evidence suggests that individual differences likely influence many different aspects of dance program participation. It is unclear whether open level programming is suitable or can provide appropriately challenges for participants with a wide range of skills and abilities. We believe that evidence from multiple sources suggests that the ‘one size fits all’ approach the dance programming may contribute to weak and inconsistent dance intervention driven health and wellbeing outcomes. It is not currently possible to estimate how widespread these issues may be.

The complex, engaging, and multifaceted nature of dance has moved health researchers, practitioners, as well as medical providers such as BUPA (2010) to identify dance as an excellent activity to support health and wellbeing. On an individual level, however, the picture is more complicated. To disentangle the attributes of programs that positively impact health and wellbeing and the individuals they work for, it is evidently necessary to conduct further robust dance and health studies for older adults to examine the differential impact of specific program features and participant characteristics using quantitative and qualitative approaches. Program features may include physical intensity, complexity and perhaps opportunities for creativity. We also need to improve the way these studies are reported. To understand the positive impact of dancing and dance programs on an individual level, it is essential to identify

tools and methodologies and, if necessary, to develop purpose built psychometric instruments to account for individual differences in dance program participation and engagement.

Self-efficacy for social dance participation

Self-efficacy

One construct that may reflect capability for dance is dance efficacy. Self efficacy, or situation specific self confidence, is an extensively researched concept within health psychology and has been demonstrated to be a consistent determinant of many health related behaviours and behaviour change (Bandura, 1997; Maddux, 1995; McAuley & Blissmer, 2000). A key active construct in Bandura's social cognitive theory, self efficacy can be defined as a person's perception of their ability to carry out a course of action or behaviour (Bandura, 1977). The efficacy belief system is, therefore, highly task dependent and context specific, and can be influenced by people's physical, cognitive and mental health (Bandura, 1997). Self efficacy is ostensibly unrelated to skill and ability, but instead concerns behavioural persistence. Maddux (1995) further conceptualises self efficacy as a dual construct, separating the ability to cope with challenges and barriers which may make performing an activity difficult (*coping self efficacy*) from self efficacy for performing the activity itself (*task self efficacy*).

The primary sources of self efficacy beliefs and information are theorised to include: Mastery experiences; relatable vicarious experiences via social models; social persuasion; interpretation of affective and physiological responses associated with performing the task or behaviour (Bandura, 1997), and the ability to visualise success (Maddux, 1995). Efficacy expectations affect behaviour, specifically task choice, effort expenditure, and persistence in the face of challenges and setbacks. Choice, effort, and persistence are key to adopting and maintaining a skilled activity such as dance (Feltz, 2008; McAuley, Szabo, et al., 2011). Efficacy judgements are also considered to

influence thought patterns and emotional reactions, including goal setting, success and failure attribution, and performance anxiety (Bandura, 1997; Feltz, 2008).

Exercise and self-efficacy

Several meta analyses have demonstrated the importance of exercise efficacy in the initiation and maintenance of exercise in later life (van Stralen et al., 2009). Research also reliably links exercise efficacy to a range of individual factors that influence exercise participation in later life including functional limitations, physical abilities (McAuley, Szabo, et al., 2011), and psychosocial wellbeing (Miller et al., 2019). There is consistent evidence of exercise efficacy declining with age (e.g. Anderson Bill et al., 2011), which is likely to reflect real and perceived decreases in physiological and cognitive abilities (McAuley, Szabo, et al., 2011).

Regular exercisers tend to have stronger exercise efficacy (A. E. Bauman et al., 2012; McAuley, Szabo, et al., 2011), in line with Bandura's concept that self efficacy beliefs are driven, in part, by experience (Bandura, 1997). After controlling for previous exercise behaviour, several long term exercise intervention studies for older people report stronger exercise self efficacy at baseline consistently predicts higher physical activity levels at 2 and 5 year follow up (McAuley et al., 2007; McAuley, Mailey, et al., 2011; Oman & King, 1998). Furthermore, compared to infrequent exercisers, older adults who exercise frequently report a more positive exercise experience and higher levels of exercise related social support, factors which then predict self efficacy gains (McAuley et al., 2003). Indeed, researchers have suggested a reciprocal, positively reinforcing relationship between exercise behaviour and exercise self efficacy (Bandura, 1997; McAuley, Szabo, et al., 2011).

Self efficacy is also a consistent key predictor, and potential mediator, of health related benefits associated with physical activity interventions, particularly in older adults (Rhodes & Pfaeffli, 2010). Exercise intervention trials for older adults, therefore, typically account for the ongoing influence of exercise self efficacy on program adherence and experience and monitor program related changes to self efficacy. Experimental exercise trials demonstrate that, after controlling for baseline exercise efficacy and previous exercise behaviour, successful exercise programs are

associated with improved domain specific exercise efficacy (Higgins et al., 2014; McAuley, Mailey, et al., 2011).

In the context of exercise behaviour and participation, and in response to previous research highlighting lack of time and poor schedule management as a major barrier to exercise participation (McAuley et al., 2003; Rodgers et al., 2008), coping efficacy for exercise is measured separately as barriers self efficacy and scheduling self efficacy. For exercise behaviours, intervention research has demonstrated that task related efficacy, coping efficacy for barriers to participation and scheduling efficacy are somewhat independent and behave differently over time (McAuley, Mailey, et al., 2011; Rodgers et al., 2008).

Given that exercise efficacy appears to play such a pivotal role in physical activity uptake, adherence, exercise experience, and health outcomes, exercise interventions also specifically target exercise self efficacy for improvement as a modifiable psychological factor (McAuley, Szabo, et al., 2011; Williams & French, 2011). Successful behaviour change strategies appear to improve both exercise self efficacy and activity adherence (French et al., 2014). When integrated into exercise programs, the psychological techniques associated with improved efficacy for exercise include goal setting, self monitoring (e.g. heart rate while exercising and adverse events), providing normative information, reinforcing effort towards health positive behaviour, and giving performance feedback (McAuley, Szabo, et al., 2011; Williams & French, 2011). Cognitive restructuring techniques tackling negative self talk, misconceptions and self defeating attitudes may also be effective (Lachman et al., 2018; Neupert et al., 2009). McAuley, Szabo and colleagues (2011) recommend designing interventions to target the four sources of efficacy information highlighted earlier, but particularly the opportunity to experience performance successes.

Self-efficacy for social dance activities

Qualitative dance studies have highlighted improved self worth, self esteem, and confidence associated with dance program participation (Chappell et al., 2021; Coogan et al., 2021). Successful dancing experiences may positively impact general self efficacy. However, the single study for older adults to examine the effect of dance

participation on general efficacy reported no benefit to perceived self efficacy after 10 weeks of ballroom dancing (Kosmat & Vranic, 2017). Self esteem, self worth, and confidence are global evaluations of personal worth, value, or strength. Perceived self efficacy is a “judgement of capability” (Bandura, 2006, p. 309) for specific tasks or behaviours within differing social circumstances (Rodgers et al., 2014), and is therefore sensitive to specific circumstances. Decontextualising self efficacy compromises meaning and predictive utility.

Some exercise efficacy findings can be extrapolated to dance efficacy beliefs and dance participation. For example, older adult dance study participants also describe group social support and improved self esteem facilitating their participation in a community ballroom program, specifically the ability to cope with impediments to dance participation such as balance, mobility and memory challenges (Coogan et al., 2021). Social support included sharing movement cues and using humour and empathy to normalise performance difficulties. However, although the challenges of exercising regularly and dancing do overlap, the current review contends that generalised exercise efficacy measures would not sufficiently capture the unique task demands required of older adult dance program participants. Likewise, efficacy for coping with impediments associated with generic exercise maintenance is also unlikely to represent coping with challenges to social dance participation (Rodgers et al., 2008).

Applicability of existing self-efficacy measures to dance efficacy

Exercise efficacy measures focus predominately on overcoming barriers to successfully maintain good general activity levels such as a person experiencing stress or anxiety, bad weather and scheduling issues. Bandura describes this as self regulatory efficacy: Perceived capability to regularly perform tasks that, broadly, you know how to do (Bandura, 2006). For example, Resnick and Jenkins’ (2000) Self Efficacy for Exercise Scale has respondents rate their confidence to exercise three times per week if they did not enjoy it, felt tired, were too busy with other activities or were bored by the program or activity. Bandura’s Exercise Self Efficacy Scale (Bandura, 1997) also asks respondents to rate their certainty they can keep exercising regularly

when, for example, recovering from injury, without social support, with visitors present and when feeling anxious or depressed. For generalised exercise scales, only Rodgers and Sullivan's (2008) Multidimensional Exercise Self Efficacy Scale specifically measures task efficacy. This tool has respondents rate confidence to complete exercise using proper technique, follow directions to complete exercise, and perform the required movements. None of these scales define activities that sufficiently represent the range of tasks tackled by older adult dance program participants. For example, remembering dance sequences over the longer term.

Bandura stressed that self efficacy scales should be tailored to reflect the situational demands and conditions of specific domains of functioning to maximise explanatory and predictive value (Bandura, 2006). The content domain of a psychometric efficacy tool must therefore correspond to areas of functioning that need to be regulated in order to perform the activity. This is particularly true for a skilled, multifaceted activity such as dance. Bandura further emphasised that perceived efficacy for an activity must be estimated against the level of difficulty represented by graduated challenges or task demands (Bandura, 2006). Dance movements and sequenced movements vary considerably in terms of difficulty level, from simple step patterns to Swan Lake whereas general exercise efficacy scales do not differentiate between simple and more complicated physical activity tasks. Older adult dancers may also exercise influence over their motivation, performance level, emotional states, thought processes, attention, actions, and interpersonal functioning to participate in organised dance sessions (Bandura, 1997).

Besides exercise self efficacy, a range of other efficacy constructs capture elements relevant to the task of dancing in later life. The earlier review of age related physical, social and cognitive changes indicate the following efficacy constructs would be germane to social dancing: Motor efficacy (e.g. 'I believe I am able to control movements as well as most others my age'; Potter et al., 2009); memory efficacy (e.g. 'I am good at remembering: [Conversations/directions]'; McDonough et al., 2019); efficacy for specific skill acquisition such as using technology (e.g. 'Computers are far too complicated for me'; Cassidy & Eachus, 2002); and social efficacy (e.g. 'Confidence to: [Be involved in group activities]'; Smith & Betz, 2000). Efficacy scales have also previously been developed for other distinctive exercise activities such as weight

training. Overall, these issues suggest a specialised dance self efficacy measure is warranted.

Research Gap 2: Measuring dance self-efficacy in older adult dancers

Currently, however, dance efficacy has not been researched or measured in any population. In the context of dance and health research, understanding the role of dance self efficacy in dance program participation may serve several purposes. First, dance program evaluation (Rodgers et al., 2008): Programs that focus on skills acquisition and provide appropriate support and challenges (Kraft et al., 2015) should improve dance confidence. Second, to support participation and program engagement, dance efficacy can be targeted for improvement using established behaviour change strategies (McAuley, Mailey, et al., 2011). Third, as a pre program screening tool, the measure would allow dance researchers and teachers to identify participants with low dance self efficacy who may need more support or stream participants into dance programs tailored to their skill and ability.

Finally, accounting for dance efficacy would allow researchers to understand the potential influence of dance efficacy on dance program participation and health and wellbeing outcomes. As with other forms of exercise, confidence for dance is likely to impact not only program attendance, but also how participants engage with dance. For example, confident dancers may produce bolder, more expansive, energetic movements, performing sequences at a higher intensity using a larger range. Confidence for dance, particularly improved dance efficacy could, therefore, be a particularly pertinent psychological mediator of intervention efficacy on cognitive and physical health outcomes.

Overall aims and objectives

The current thesis aims to address the lack of knowledge regarding self efficacy for social dancing in older age. We sought to understand the personal factors that contribute to dance efficacy beliefs, the barriers that older adult dancers consider when making efficacy judgements about their capability for social dancing, and the impact of dance efficacy on dance program participation in later life. The eventual purpose is to establish the utility of a novel dance efficacy measure, and to contribute to formal development of a standardised psychometric tool to assess dance efficacy in the older adult population. Specifically, the overall objectives of the thesis were:

1. To determine the measurement properties of, and validate, six novel items intended to capture dance efficacy in participants of two dance control trials for older adults (Study 1).
2. To expand the preliminary dance efficacy items, developing a set of dance efficacy concepts (or dimensions) and generating a larger pool of items based on older adults' qualitative view of their experiences of a 12mo dance program. This scale would be tested through the process of expert review (Study 2).

Study 1

The first study of the thesis is a secondary analysis of data from two large scale dance trials involving older people (Merom, Grunseit, et al., 2016; Merom, Mathieu, et al., 2016). Six novel questions intended to capture dance efficacy were included in the survey instruments of these efficacy trials. The studies also employed an extensive battery of objective and subjective tests of physical and cognitive functioning, psychosocial wellbeing, and exercise behaviour. The present study investigates the potential usefulness of this preliminary measure of self efficacy for dance for older adult dance program participants and determines the preliminary validity of the item set and dance efficacy as a construct (Waugh et al., 2021).

We hypothesised that 1) total scores on dance efficacy items will discriminate novice and experienced dancers (criterion validity); 2) dance efficacy individual items and total scores will be positively associated with stronger psychosocial, physical,

motor, cognitive and behavioural attributes that are important to social dance participation and dance performance (construct validity); 3) within the dance group, dance efficacy total scores predict dance program attendance such that participants with stronger dance efficacy at baseline will have higher attendance rates (predictive validity); and 4) dance efficacy items will demonstrate sensitivity to change, with greater improvements in dance efficacy in the dance intervention group relative to controls, and further gains in dance efficacy in participants attending more dance sessions (responsiveness).

Study 2

Building on the validity evidence from Study 1, the second study begins formal dance efficacy scale construction, broadening the initial 6 item measure to represent dance efficacy in older people more accurately and sufficiently. This process began with formally defining dance efficacy and developing concepts associated with dance efficacy for older adult social dancers through literature review and theory driven deductive analysis of focus group discussions from the Dance and Falls aged care study (Merom, Mathieu, et al., 2016). The dance efficacy concepts reflected the theorised structure of efficacy for exercise activities: Task based dance efficacy, coping dance efficacy for barriers to social dancing, and scheduling efficacy for organised dance programs.

New scale items were generated inductively, composed from excerpts from the Dance and Falls focus group discussions, through personal experience of delivering dance programs for older adults, and deductively by adopting or adapting questions from existing relevant scales and indicators. To establish construct validity, we sourced and developed additional items including assessments of dancing ability, competence relative to same aged peers. The final stage of scale development within the scope of the current project was testing the items against expert opinion by conducting an expert review of the dance efficacy items. The expert feedback and responses were analysed and a final set of dance efficacy items prepared take forwards to survey the target population.

Study 1: The psychometric properties of a novel measure of dance efficacy for older adult dance program participants

Materials and methods

Two social dance programs were delivered to older adult participants living in NSW, Australia. The DAnCE and Falls cluster RCT by Merom, Mathieu and colleagues (2016) was conducted with aged care residents (Western Sydney University Human Ethic ref: 9468), and the Dancing Minds RCT, (Western Sydney University Human Ethic ref: 9987) involved community dwelling adults ≥ 60 yrs. (Merom, Grunseit, et al., 2016).

Participants

The DAnCE and Falls trial comprised 530 participants aged 72–96, 85% female, living in 23 self care retirement villages in NSW. Villages were randomised to receive the social dance intervention or waitlisted to the control condition. The Dancing Minds study included 131 participants aged 60–86, 76% female, living independently in the community. Participants were randomised to local ballroom dance classes or active control (walking). Adults with significant cognitive impairments were excluded. Participants were able to walk at least 50m, obtained medical clearance and provided written informed consent. Further details on study recruitment, data collection procedures, and the dance program content can be found in the trial protocol (Merom et al., 2013).

Measures

Task-based dance self-efficacy items

Dance efficacy for older adult dance participants was measured using six novel self report items (See Appendix I for full measure). The process of item development identified features inherent to all social dancing that rarely occur in other activity contexts, as well as key drivers of seniors' motivation or barriers to participation in exercise, including dance. The items were developed by the principal investigator, an epidemiologist and dance specialist, and were reviewed by an expert exercise psychologist specialising in motivational theory who provided preliminary confirmation of the face validity of item content.

The synchronisation of steps to music and the ability to maintain co ordination and pace with tempo increases both draw on motor efficacy and skills acquisition which can improve with practice (item 1). Memorising intricate steps and movements in and through space aligns with memory efficacy and skills acquisition (items 2 and 3). Perceived ability to enjoy an activity is a primary motivating factor to participation in any type of exercise which features in exercise and social efficacy scales (item 4). Perceived capability to overcome the physical effort involved in dancing refers to health status, fitness levels, and mental resilience, all influencers of exercise efficacy. Poor health is a major barrier for exercise and improving health fitness is a also major motivation to exercise (Macniven et al., 2014).

Confidence to enjoy dancing with a person you do not know relates to several features that are fairly unique to dance including comfort with being in close physical contact with strangers and co operation to co ordinate movement with another person, tapping into social efficacy. While social dance provides the opportunity to socialise identified in dance research as a strong motivator to join and adhere to social dance programs (Coogan et al., 2021; Thøgersen Ntoumani et al., 2018) this can be achieved only in welcoming and relaxed social environments. While positively framed, the social dance efficacy item challenges the respondent to consider an aspect of dance participation which may compromise their social experience and impact motivation to participate. The decision to restrict the dance efficacy items to six was

made to keep the self report questionnaire brief in order to reduce participant burden, with priority afforded to primary and secondary study outcome measures.

For both dance studies, the preliminary dance efficacy items featured in the survey section 'experience and confidence with dance' which begins with questions about previous dance experience. The dance efficacy block is introduced with the statement: Whether or not you have danced before, please rate how confident you feel that you can do each of the following when dancing. Participants are directed to indicate how confident they feel in their ability to: 1. Keep up with the *tempo*; 2. Remember the *steps*; 3. Remember *directions*; 4. *Enjoy* doing the classes; 5. Overcome the *physical effort*; and 6. *Enjoy dancing* with a *partner* you do not know. Answers on a 5 point Likert scale range from 'not at all confident' to 'extremely confident' with higher scores indicating stronger dance efficacy.

Prior exposure to dance

Previous dance experience and current dance practice were used to establish the capacity of the dance efficacy instrument to differentiate novice and experienced dancers (concurrent validity). A screening question enquired if respondents are currently participating in social dancing or dance classes. A main survey item asked 'have you ever participated or currently participate in social dancing (examples given) or structured dance classes (examples given) regularly, i.e., at least once a month, not including free dancing in parties?' Negative responses were categorised as *dance novice*. Positive responders were asked, 'did you dance regularly for recreation, exercise or learning the skill at least once a week?' Negative responses were classified as having *moderate*, and positive responses, *high* past dance experience.

Physical and cognitive measures

Physical and cognitive attributes that were expected to influence both dance participation and self efficacy for dance include objective and subjective measures of physical and cognitive health and functioning. The aged care residents study conducted the Short Physical Performance Battery (SPPB; Guralnik et al., 1994), a composite measure of functional mobility including tests of standing, gait speed, and

chair rises. The dance in the community trial included chair rise and gait speed tests. Participants also self rated their general health.

Cognitive and executive domains examined include processing speed, learning and memory (verbal), and task switching/cognitive flexibility. Everyday mental functioning was measured by the Mini Mental State Examination (MMSE; (Folstein et al., 1983) for the aged care study, and the Telephone Interview of Cognitive Status (TICS; De Jager et al., 2003), TICS in the community trial. Participants scoring 24-27 on the MMSE or 21-25 on TICS were considered to have mild to moderate cognitive impairment (MCI; De Jager et al., 2003). For both studies, verbal learning and memory was assessed with Rey Auditory Verbal Learning Tasks (RAVLT; Schmidt, 1996), which involves word learning, recollection and delayed recall. This measures immediate memory span, which is sensitive to attentional capacities (Papazoglou et al., 2008), verbal learning capacity, immediate recall (post interference) and delayed recall. The Trail Making Tests A and B (TMT A&B; Tombaugh, 2004) are number only (A) and number/letter alternating (B) 'dot to dot' puzzles which capture processing speed and task switching/cognitive flexibility. Composite scores for cognitive performance were estimated by summing z transformed cognitive variables scores, the standard method for producing composite measures of cognition to allow general comparisons to be made (Müller et al., 2017; Riordan, 2017).

Psychosocial and behavioural measures

Finally, the psychosocial and behavioural attributes identified to support the validity of the dance efficacy items and total scores. Mental health was assessed using the Geriatric Depression Scale (Yesavage & Sheikh, 1986) where higher scores indicate poorer mental health and scores ≥ 5 represent depression. Social network was recorded using an abbreviated validated tool (Lubben et al., 2006) with the extent of the participants' friend network used for the present evaluation. Planned physical activity (exercise behaviour) was estimated using self reported hours of planned sport and walking for exercise per week (Merom et al., 2014). Participants engaging in ≥ 2.5 hours of exercise per week were considered active (vs. insufficiently active).

Older adults participating in the Dance and Falls trial were offered approximately 85 dance sessions, twice per week for 48 weeks (with some variation across sites). Dance program attendance for age care residents was available as a categorical variable only with three levels: Low attendance < 25 sessions; moderate attendance 26–55 sessions; and high attendance > 55 sessions. Program attendance data is unavailable for the community dance trial due to administrative issues.

Statistical analysis

Statistical analyses were conducted using IBM SPSS 26.0. To determine if the samples yielded different patterns of results, throughout the analysis we evaluated data from the community dwelling participants and aged care residents separately before combining the two samples in a single dataset. Parametric test assumptions were checked before running all analyses. Specifically, normality was assessed using the Shapiro Wilks test, histograms and normal probability plots, and homogeneity of variance using Levene's test. Welch's *F* test was considered for analyses involving unequal sample sizes. All analyses were two tailed and the level of significance for all statistical tests was set at $p = .05$.

Data quality and internal consistency

Data quality was evaluated by examining response rates per item and the proportion of scale scores missing. For each item, a missing rate of 5% or less was considered acceptable. Scaling assumptions, including equivalence of item means and standard deviations (SD), item score range and distribution, and item total corrected correlations of $\geq .5$, were also checked. The structural factorial validity of the dance efficacy measure was assessed by Principal Component Analysis, retaining components with eigenvalues ≥ 1 and items with loadings $\geq .4$. Dance efficacy items will be summed if scaling assumptions are met. Cronbach's alpha coefficient was used to determine internal consistency.

Criterion and known-groups validity

The mean and SD of the self rated dance efficacy score was compared between older adults currently dancing vs. not dancing, dance novices and participants with moderate and high past dance experience, reflecting criterion validity. Significant differences were estimated using independent t tests (where there were two groups), or ANOVA (where there were >2 groups) with Scheffe post hoc contrast testing to control for Type I error. These statistical tests were also applied to examine between group differences by age (blocked in decades); gender; cognitive status (MCI vs. normal); mental health scores (depression vs. not depressed); and physical activity (active vs. insufficiently active) to determine known groups validity. We expected dance efficacy to be stronger in younger participants with normal cognitive status, no depression, and engaging in regular exercise, but predicted no gender based differences in dance efficacy.

Construct validity: Single item and total dance efficacy score

Pearson's coefficients for correlations were used to determine the match between single dance efficacy items and a related measure. For example, ability to keep up with the *tempo* in dance class was matched with gait speed (walking tempo), and *enjoy dancing* was matched with mental health (depression) scores. We expected all matched items to be positively correlated, with the exception of mental health scores and enjoyment for dance, and all cognitive processing speed and task switching (faster reaction times are better) which we expected to correlate negatively.

To determine construct validity of the dance efficacy total scores, we ran a series of linear regression models to establish whether baseline scores for factors that potentially impact self efficacy for dance independently predicted baseline self scored dance efficacy (the outcome variable). First, we regressed age as a continuous variable on dance efficacy to test for covariance. Further models were adjusted for significant covariates age and past dance experience. Then we ran separate models for each predictor variable, regressing dance efficacy total scores on general health, social network (friends), physical health (SPPB, gait speed, sit to stand, and physical activity), cognitive function (composite scores, RAVLT and TMT A & B), and mental

health (GDS). Stronger physical, cognitive, and psychosocial health was expected to predict higher dance efficacy.

Predictive validity and responsiveness to change

For older adults who completed the research trials, ANCOVA analysis, adjusted for significant covariates age and past dance experience, examined whether self rated efficacy for dance at baseline predicted dance program attendance. Bonferroni adjusted planned contrast testing compared baseline dance efficacy at different attendance categories. Older adults with lower dance efficacy at baseline were expected to attend fewer dance sessions.

Assessing responsiveness to change of the dance efficacy item set, ANCOVA was further employed to test change in dance efficacy from baseline to follow up in the dance group relative to active controls (community study) and waitlisted controls (aged care study). The same statistical approach was also used to examine change in dance efficacy at different levels of dance program attendance, with greater gains expected for high attenders compared to low attenders. Dance program participation was predicted to improve dance efficacy, particularly in novice dancers and high attenders.

Results

Sample characteristics

Sample characteristics for the combined dance studies, and the aged care and community studies individually is displayed in Table 1. The study included a combined sample of 661 older adults aged 60–96 with a mean age (*SD*) of 76.6 (7.79) years, 82.9% female. Aged care residents comprised 80.2% of the sample and were significantly older than community dwelling study participants ($t(657) = 12.76, p < .01, 95\% \text{ CI } [7.37, 10.04]$). The median age in the community dwelling sample was 69yrs versus 78yrs in the aged care sample. Of the participants living in the community, 54% reported dancing regularly immediately before the study commenced, compared to only 6% of aged care residents ($\chi^2(1) = 184.01, p < .01$). There were comparable proportions of male and female participants with high past dance experience (9%) and current regular dancers (16% women, 14% men). However, there were a disproportionate number of dance novices among male participants (40% men vs. 28% women) with more women reporting some regular past dance experience ($\chi^2(2) = 9.03, p = .03$).

For the Dance and Falls aged care dance trial, 106 participants did not finish the study. Attrition rates were similar in the dance group and waitlisted controls: 78% of the dancers completed the study compared to 82.5% of waitlisted controls. Dance session attendance varied considerably among participants allocated to the dance groups: 14.3% were low attenders (< 26 sessions, with some participants attending no dance sessions), 24.9% were moderate attenders (26–55 sessions) and 60.8% high attenders (> 55 sessions). For the Dancing Minds community trial, 69% of participants completed the study, including 66% of the dance group.

Table 1. Socio-demographic characteristics of the two older adult dance study populations

Individual factors	All (N = 661)		Aged-care residents (N = 530)		Community- dwelling (N = 131)	
	N	%	N	%	N	%
Age						
60-69yrs	137	20.7	66	12.5	71	54.2
70-79yrs	266	40.2	217	40.9	49	37.4
80+	256	38.7	245	46.2	11	8.4
Gender						
Male	113	17.1	82	15.5	31	23.7
Female	548	82.9	448	84.5	100	76.3
Current Dancers						
Dancing	102	15.4	32	6.0	70	54.3
Not dancing	556	84.1	497	93.8	59	45.7
Dance experience						
High	61	9.2	38	7.2	23	18.3
Moderate	398	60.2	346	65.3	52	41.3
Novice	197	29.8	146	27.5	51	40.5
Cognitive Status ¹						
Normal	512	77.5	433	81.7	79	60.3
MCI	128	19.4	97	18.3	31	23.7
Mental Health ²						
Normal	554	83.8	451	85.1	103	78.6
Depression	96	14.5	78	14.7	18	14.9
Physical Activity ³						
Active	390	59.0	341	62.5	49	66.2
Insufficiently active	212	32.1	187	34.2	25	33.8
Allocation						
Dance group	342	51.7	279	52.6	63	48.1
Controls	308	46.6	251	47.4	57	43.5

¹Cognitive Status: MMSE, < 27 indicates mild cognitive impairment (MCI), TICS \leq 25 indicates MCI;
²Mental health: Geriatric Depression Scale (GDS), \leq 5 indicates depression; ³Physical activity: sport and walking < 2.5 hrs per week indicates insufficiently active; italics indicate total scores; % of participants with no missing data

Data quality and internal consistency

Proportion of data missing, means, SD, skew, kurtosis, response range, item scale correlation, and individual item loadings are displayed in (Table 2). Overall, dance efficacy data quality was excellent. On average, 1.9% of data for each item data was missing with little variation between items. For the whole sample, unrotated Principal Component Analysis confirmed that all 6 items loaded on a single component ‘dance efficacy’ with 62.8% of the variance explained. Item communalities ranged in value between .72 and .48. Item correlations ranged from .69 to .45 except for the *steps* and *directions* items which correlated strongly ($r = .81$; Table 3).

Table 2. Scaling assumptions and acceptability of the dance efficacy items for all older adult study participants

Dance efficacy item	Missing data (%)	M	SD	Skew	Kurtosis	ITCC	Item loadings
Tempo	2.3	3.26	0.89	-0.07	0.29	.75	.72
Steps	1.7	3.03	0.83	-0.06	0.60	.73	.70
Directions	1.7	3.16	0.82	-0.03	0.51	.74	.71
Enjoy dancing	2.0	3.87	0.89	-0.50	0.19	.69	.62
Physical effort	2.0	3.58	0.84	0.01	-0.23	.63	.54
Dancing partner	1.7	3.23	1.01	-0.19	-0.24	.58	.48
Dance efficacy total score	2.7	20.16	4.14	-0.04	0.45	-	-

ITCC = item-total corrected correlation; Item loadings on single component; italics indicate results for dance efficacy total (summed) score

Table 3. Correlation matrix of single dance efficacy items for the whole sample of older adult study participants

Dance efficacy items	Tempo	Steps	Directions	Enjoy dancing	Physical effort	Dancing partner
Tempo	-	.69	.67	.62	.57	.45
Steps	.69	-	.81	.52	.44	.45
Directions	.67	.81	-	.54	.47	.46
Enjoy dancing	.62	.52	.54	-	.58	.50
Physical effort	.57	.44	.47	.58	-	.49
Dancing partner	.45	.45	.46	.50	.49	-

All data quality and scaling assumption criteria were satisfied and total dance efficacy scores were generated by summing the scores across the six items. The percentage of participants with complete data for the full item set was 97.3%, and data imputation was considered unnecessary. The mean (*SD*) dance efficacy total score in the sample was 20.16 (4.1) and ranged from 6 to 30, reasonably normally distributed with some negative skew (Figure 1). Cronbach's alpha coefficient was .88 for the dance efficacy total in the overall sample, .90 in the community group, and .87 for aged care participants, indicating high internal consistency reliability. For future scale development, extending the Likert measure for the dance efficacy items from 5 categories to rating confidence out of 10 may allow further distinction between item level and scale scores in the upper ranges.

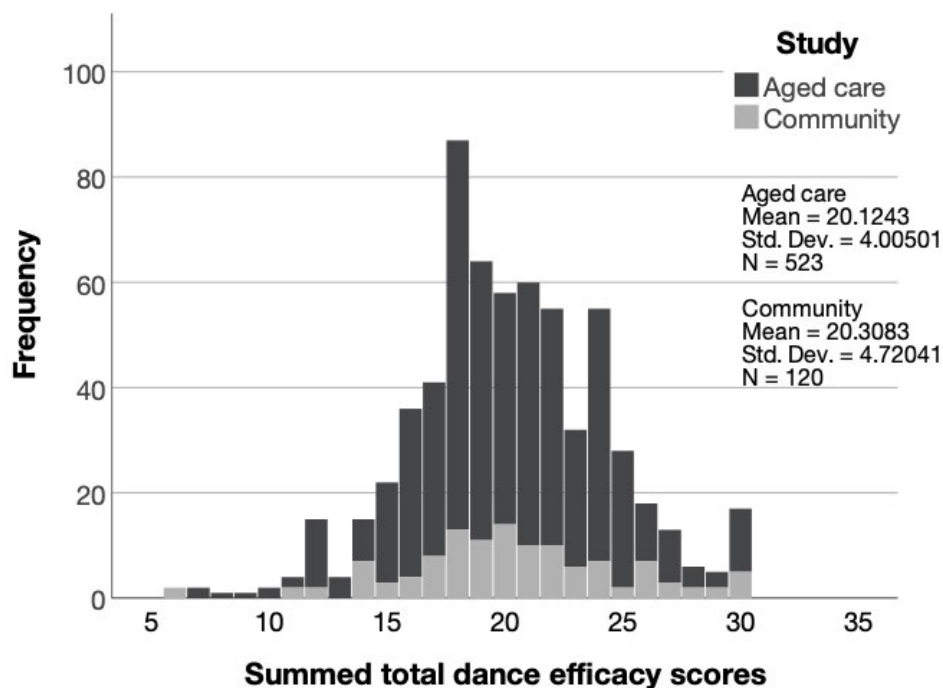


Figure 1. Frequency distribution of the summed total dance efficacy scores at baseline for aged care and community study participants respectively

Criterion validity and known-groups validity

The dance efficacy total scores across socio demographic, diagnostic, and dance related groups are displayed in (Table 4). Older adults with more exposure to dance tended self rate higher in dance efficacy, supporting the criterion validity of the dance efficacy item set. Significantly higher dance efficacy scores were found for current dancers and participants with regular past dance experience. Predictions regarding known group validity – the capacity for the dance efficacy item set to distinguish among established socio demographic and diagnostic groups – were partially supported. Overall, dance efficacy scores differed significantly in the expected direction according to age, mental health (depression vs. no depression), and approached significant difference by physical activity level (active vs. insufficiently active).

Although the direction of group differences in dance efficacy appears stable across the aged care and community samples, the magnitude of those differences was variable. For example, insufficiently active community dwelling older adults self rated lower in dance efficacy than active participants, but this effect was not apparent among aged care residents. There were no gender based differences in self reported dance efficacy, but closer inspection of the dance efficacy item level responses revealed that men were more confident than women that they could cope with the *physical effort* involved in dancing ($t(641) = 2.97, p < .01, 95\% \text{ CI } [0.09, 0.43]$), with a potential tendency to be less confident about *remembering the steps* ($t(641) = 1.90, p = .06, 95\% \text{ CI } [-0.01, 0.38]$).

Table 4. Average dance efficacy total scores across the population sample by subgroup

Individual factors	Baseline dance efficacy total scores								
	All			Aged care residents			Community-dwelling		
	M (SD)	t/F	p	M (SD)	t/F	p	M (SD)	t/F	p
Dance efficacy total*	20.2 (4.0)	-	-	20.1 (4.1)	-	-	20.3 (4.7)	-	-
Age									
60-69yrs	20.5 (4.3)	3.40	.03 ^{*4}	20.9 (3.6)	5.24	.00 ^{*5}	20.1 (5.0)	0.89	.41
70-79yrs	20.5 (4.0)			20.6 (3.9)			20.1 (4.3)		
80+	19.6 (4.2)			19.5 (4.2)			(n = 8)**		
Gender									
Male	20.1 (4.1)	0.35	.73	20.2 (4.0)	0.57	.57	20.0 (3.8)	1.44	.15
Female	20.3 (4.6)			19.9 (4.4)			21.4 (4.2)		
Current Dancers									
Dancing	21.7 (4.3)	4.10	.00 [*]	23.0 (3.7)	4.31	.00 [*]	21.1 (4.5)	1.91	.06
Not dancing	19.9 (4.1)			19.9 (4.0)			19.4 (4.9)		
Dance experience									
High	20.1 (4.2)	15.89	.00 ^{*1}	20.1 (4.4)	12.75	.00 ^{*2}	20.2 (3.8)	3.88	.02 ^{*3}
Moderate	20.8 (3.9)			20.7 (3.8)			21.6 (4.8)		
Novice	18.8 (4.2)			18.7 (4.1)			19.0 (4.7)		
Cognitive Status ¹									
Normal	20.2 (4.1)	0.48	.63	20.1 (4.0)	0.54	.59	20.9 (4.7)	1.98	.05
MCI	20.0 (4.0)			20.3 (3.9)			19.0 (4.3)		
Mental Health ²									
Normal	20.4 (4.1)	4.05	.00 [*]	20.4 (3.9)	3.18	.00 [*]	20.7 (4.7)	2.61	.00 [*]
Depression	18.6 (4.2)			18.8 (4.1)			17.5 (4.2)		
Physical Activity ³									
Active	20.4 (4.1)	1.93	.05	20.3 (4.1)	0.92	.36	21.4 (4.8)	2.76	.00 [*]
Insufficiently active	19.7 (4.0)			19.9 (3.9)			17.9 (4.8)		
Allocation									
Dance group	20.2 (4.0)	0.39	.70	20.1 (3.9)	0.42	.67	20.9 (4.6)	1.60	.11
Controls	20.1 (4.3)			20.2 (4.2)			19.5 (4.8)		

¹For all older adults, participants with past dance experience have higher dance efficacy scores ($MD = 1.7$) than novice dancers ($F(1, 640) = 16.62, p = .00, 95\%CI [.86, 2.46]$) using Scheffe post-hoc test.

²In older adult aged care residents, participants with past dance experience have higher dance efficacy scores ($MD = 1.6$) than participants with no dance experience ($F(1, 520) = 12.26, p = .00, 59\% CI [.72, 2.56]$) using Scheffe post-hoc test.

³In older adults living in the community, participants with past dance experience have higher dance efficacy scores ($MD = 1.9$) than novice dancers ($F(1, 117) = 4.55, p = .05, 95\% CI [.14, 3.66]$) using Scheffe post-hoc test.

⁴For all older adults, participants over 80 have lower dance efficacy scores ($MD = .87$) than participants aged 60-79 ($F(1, 638) = 6.52, p = .03, 95\%CI [.20, 1.54]$) using Scheffe post-hoc test.

⁵In aged care residents, participants over 80 have lower dance efficacy scores ($MD = 1.20$) than participants aged 60-79 ($F(1, 518), p = .01, 95\% CI [.45, 1.94]$) using Scheffe post-hoc test.

*Italics indicate overall total dance efficacy scores for the whole sample and totals for each population.

**Results not reported in subgroups where $n \leq 10$

Construct validity: Single items and total dance efficacy scores

The single dance efficacy items correlated with the matched measures and the direction of the associations were in line with our expectations (Table 5). The associations between the dance efficacy items and these domains were unsurprisingly small (unsurprising because we are comparing a subjective confidence rating between 1 and 5 for a specific dance related task with predominately objective cognitive and physical health and wellbeing measures). Again, there was again some variation in the degree of associations in the two populations. The psychosocial and behavioural factors matched with single dance efficacy items were consistently and more strongly correlated across both older adult populations. However, objective measures of physical function and cognitive ability related to the dance efficacy items for aged care residents only.

Table 5. Construct validity of single dance efficacy items using Pearson's correlation coefficients of each item with a corresponding single domain measure

Dance efficacy item	Physical, psychosocial, and behavioural health indicators		
	All	Aged care residents	Community Dwelling
Steps	Immediate Recall	Immediate Recall	Immediate Recall
	.09*	.12*	.08
Steps	Delayed Recall	Delayed Recall	Delayed Recall
	.10*	.13*	.06
Directions	Processing Speed	Processing Speed	Processing Speed
	-.13*	-.16*	-.07
Directions	Task Switching	Task Switching	Task Switching
	-.05	-.08	.03
Directions	Learning Capacity	Learning Capacity	Learning Capacity
	.11*	.13*	.13
Tempo	Gait speed	Gait speed	Gait Speed
	.09*	.12*	.03
Enjoy dancing	Mental Health	Mental Health	Mental Health
	-.20*	-.20*	-.22*
Physical effort	Physical activity	Physical activity	Physical activity
	.19*	.16*	.28*
Physical effort	General health	General health	General health
	.29*	.30*	.24*
Dancing partner	Social Network	Social Network	Social Network
	.10*	.08	.24*

RT = reaction time scores, where lower scores represent stronger performance; Processing Speed and task switching tasks are reaction time tasks where lower scores indicate better performance; Physical activity in hours per week of planned exercise or walking; Social network friends scores only; general health is self-rated. *Indicates statistically significant correlation

Overall, the series of linear models supported the hypothesis that stronger cognitive, physical, and psychosocial health and more frequent physical activity predicts better self efficacy for dance (Table 6). Age as a continuous variable was significantly negatively associated with dance efficacy. Additional investigation revealed that age and dance efficacy related negatively in aged care residents but related somewhat positively in community dwelling older adults. Further models regressed dance efficacy total scores on physical, cognitive, and mental health measures and physical activity behaviour, adjusted for both age and past dance experience as covariates. The strongest independent predictors of dance efficacy total scores were self rated general health, the sit to stand test, mental health (depression), and the cognitive composite score (Table 6). Please note that both the unstandardised beta coefficient (b) and standardised beta (β) are displayed in the regression table because the dance efficacy item set is not a fully validated tool and the relevance of raw score change in dance efficacy total scores is yet to be established.

Table 6. Dance efficacy total scores at baseline (health and wellbeing variables adjusted for age and past dance experience) regressed on predictor variables: psychosocial health, cognitive status, physical ability, and exercise behaviour, with separate linear regression models

Individual factors	Self-reported dance efficacy total scores**					
	ΔR^2	Unstandardised			Standardised	
		b	SE(b)	95% CI (b)	β	p
Age	.01	-0.05	0.02	[-0.10, -0.01]	-.10	.01*
Past dance experience						
Moderate (vs. novice)	.05	2.01	0.36	[1.31, 2.71]	.24	.00*
High (vs. novice)	-	1.31	0.60	[0.12, 2.49]	.10	.03*
General health (self-rated)	.07	1.42	0.20	[1.03, 1.82]	.26	.00*
Social network (friends)	.01	0.15	0.05	[0.05, 0.25]	.11	.00*
Physiological health						
SPPB: Aged care only	.03	0.40	0.10	[0.19, 0.59]	.18	.00*
Gait speed	.01	1.6	0.66	[0.30, 2.89]	.11	.02*
Sit to stand test (RT - secs)	.03	-0.18	0.04	[-0.26, -0.09]	-.17	.00*
Physical activity						
#hrs/wk sport & walking	.01	0.06	0.03	[0.00, 0.12]	.08	.05*
Mental Health						
Geriatric Depression Scale	.04	-0.39	0.07	[-0.53, -0.25]	-.21	.00*
Cognitive functioning						
Composite score (Z)	.07	0.12	0.04	[0.04, 0.20]	.12	.00*
Attention (RAVLT 1)	.01	0.19	0.09	[0.02, 0.37]	.09	.03*
Verbal learning capacity (RAVLT 1:5)	.01	0.03	0.02	[0.03, 0.01]	.10	.03*
Verbal recall: immediate (RAVLT 6)	.01	0.10	0.05	[0.04, 0.20]	.08	.04*
Verbal recall: delayed (RAVLT 8)	.01	0.10	0.05	[0.01, 0.19]	.08	.05*
Processing speed (TMT a)*	.02	-3.94	1.11	[-6.12, -1.76]	-.15	.00*
Exec func; task switching (TMT b/a)*	.00	-0.13	0.14	[-0.40, 0.13]	-.04	.33

b is the unstandardised beta regression coefficient and β is the standardised beta coefficient; ΔR^2 is the change in R^2 after adjusting the model for age and past dance experience; RT = reaction time scores, where lower scores represent stronger performance; Geriatric Depression Scale has lower scores indicate greater mental distress; Z = z-transformed scores; *log transformed scores

**NOTE: For all health and wellbeing variables, total dance efficacy scores used for regression models adjusted for the significant co-variables age and past dance experience

Predictive validity and responsiveness to change

Self-rated dance efficacy at baseline predicted dance program attendance in aged care study participants. Adjusting for age and past dance experience, dance efficacy total scores significantly predicted future dance program attendance, a small moderate effect ($F(5,205) = 4.4, p = .01, \text{partial } \eta^2 = .04$). At baseline, low attenders self-scored 2.3 raw units lower on average than moderate attenders ($SE = .78, 95\% \text{ CI } [4.15, .40], p = .01$), and 1.7 lower than high attenders ($SE = .69, 95\% \text{ CI } [3.38, .04], p = .04$). There was no difference in baseline dance efficacy scores between moderate and high attenders.

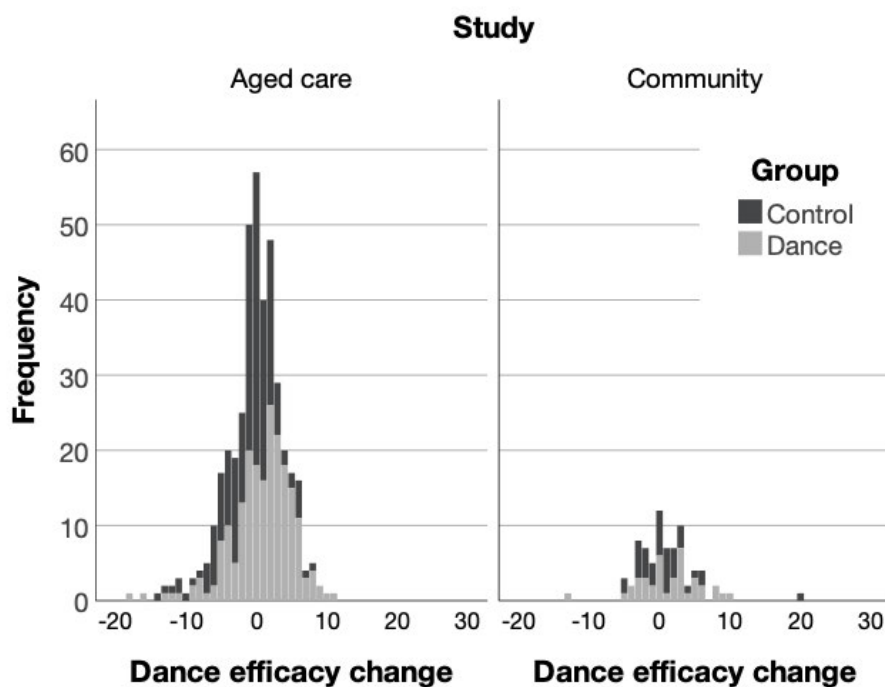


Figure 2. Dance intervention-related change (difference) in dance efficacy total scores between baseline and follow-up measures in aged care resident dancers and waitlisted controls, and community-dwelling older adult dancers and controls (group walking)

The responsiveness of the item set to change was partially demonstrated: Intervention related improvements in dance efficacy in the dance group was found for aged care resident participants only (Figure 2). For both sample populations, the covariates age and past dance experience were unrelated to change in dance efficacy. As expected there was a significant effect of intervention group on change in dance efficacy for aged care residents after controlling for age and dance experience (MD

(SE) = 1.89 (0.40), $F(4, 398) = 22.04$, $p = .01$, 95% CI [1.10, 2.67], partial $\eta^2 = .05$), an effect size in the medium range. On average, dance efficacy increased in the dance group by 0.81 ($SD = 4.4$) and decreased in waitlisted controls by 1.0 ($SD = 3.5$). Contrary to our hypothesis, no between group differences were found in community participants allocated to dance or walking. Dance efficacy increased, on average in the dance group by 1.3 ($SD = 4.4$) and in active controls by 0.74 ($SD = 4.2$).

For aged care dance group participants, dance session attendance promoted dance efficacy, in support of the dance efficacy items responsiveness to change. Figure 3 displays change in dance efficacy total scores at different levels of program attendance (low, moderate and high). After adjusting for covariates age and past dance experience, there was a significant effect of attendance on change in dance efficacy ($F(5, 205) = 17.18$, $p < .01$, partial $\eta^2 = .15$), a strong effect. Compared to low attenders, high attenders gained 4.40 in dance efficacy scores ($SE = .84$, 95% CI [2.38, 6.42], $p < .001$). Even against moderate attenders, high attenders self rated 2.56 higher in dance efficacy ($SE = .68$, 95% CI [.92, 4.22], $p < .001$). On average, moderate and low dance program attenders, decreased in dance efficacy by .48 ($SE = .58$) and 2.31 ($SE = .75$) respectively.

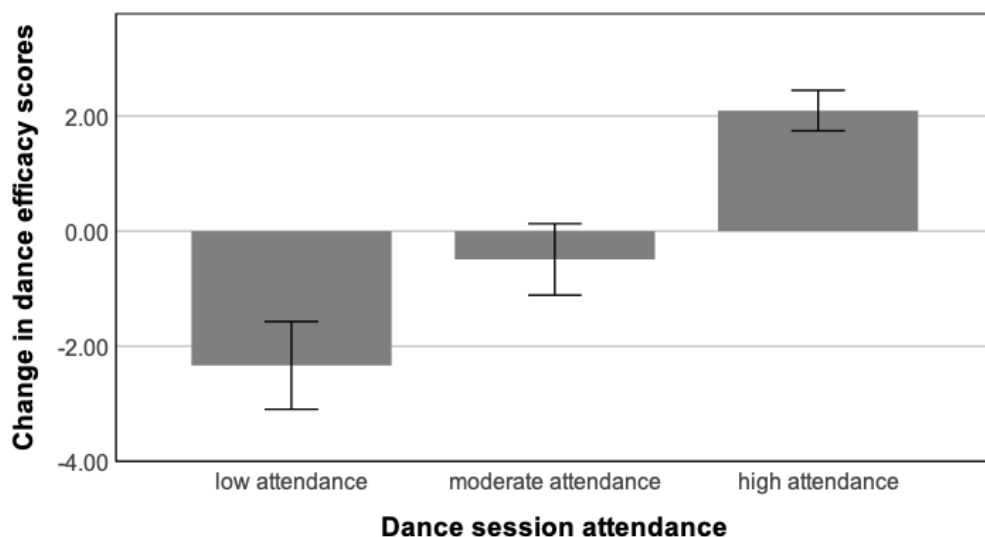


Figure 3. Change in dance efficacy total scores between baseline and follow-up measures in aged care resident dancers at different levels of attendance: Low attendance ≤ 25 sessions; moderate attendance 26-55 sessions; and high attendance ≥ 56 sessions. Error bars signify the standard error of the point estimate.

Finally, we further investigated intervention related change in dance efficacy at different levels of past dance experience (Figure 4). Although no contrasts were significant after Bonferroni adjustment, aged care participants with high past dance experience showed no change in dance efficacy (0.07) while dancers with moderate experience and novice dancers showed modest gains of 0.83 and 0.96 respectively. The opposite was found for the community dancers: Experienced dancers self scored dance efficacy gains of 3.5, while moderately experienced and novice dancers increased their dance efficacy scores by only 0.69 and 0.44 respectively.

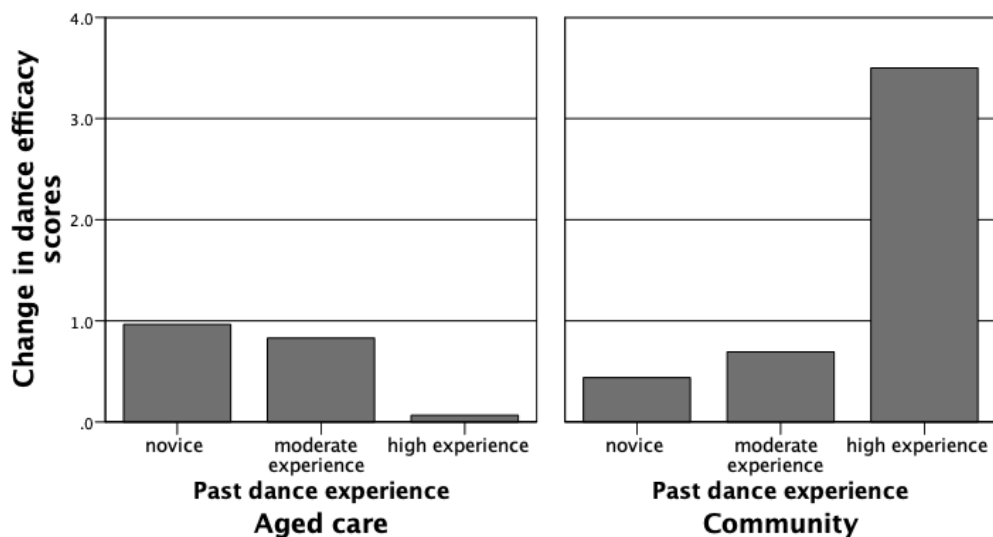


Figure 4. Dance intervention-related change in dance efficacy total scores in aged-care resident and community-dwelling older adult dance program participants at different levels of prior dance experience

Study 1: Discussion

This is the first validation study presenting a potential measure of dance efficacy which may reflect and influence capability for social dancing in old age. In general, the dance efficacy 6 item set performed well, with strong internal consistency and support for the single component model: Dance self efficacy. Importantly, across both dance trials, older people with greater exposure to dance self reported higher dance efficacy, establishing good criterion validity. Overall, we found strong support for construct validity, broad but variable support for known groups validity of the dance efficacy item set, strong predictive validity, and evidence of responsiveness to change within the aged care sample population only.

Age and gender

The dance efficacy item set captured variability in individual factors likely to affect social dance program engagement and health related outcomes. Older participants demonstrated weaker efficacy for dancing, in line with other studies demonstrating age related decline in exercise self efficacy. However, a dance study which comprised a single question inviting respondents to rate their dance skills compared to others their age reported steadily increasing perceived dance confidence after 60yrs (Lovatt, 2011). We found no age related effect in dance efficacy in community dwelling participants though, potentially due to the narrow age range (60-86yrs with n = 8 over 80yrs). Among aged care residents, lower efficacy for dance was notable in participants over 80yrs which may reflect perceived and actual decreases in both physical abilities and cognitive capacity (McAuley, Szabo, et al., 2011). Indeed, weaker dance efficacy was consistently associated with, and predicted by, poorer cognitive ability and physical function in aged care residents. Together, this suggests that dance efficacy may not decrease substantially with age but rather reflects the physical and cognitive status each individual presents throughout the process of aging. Age as a determinant of dance efficacy is possibly meaningful in decades (ie., for every 10 years) because decades would better discriminate between levels of function relevant for dance than continuous age.

We found no gender differences in dance efficacy. The Lovatt study above (2011) also found no gender differences in dance confidence in the over 60s. These results are somewhat surprising given that past performance accomplishments inform self efficacy and in Australia and the U.K. more women engage in recreational dancing than men (approximately 2.5:1 female to male: Merom et al., 2012; Merom, Ding, et al., 2016). The current study had a 4:1 female to male gender ratio with a higher proportion of novice dancers among men. However, efficacy researchers have proposed that novices lack the experiences to inform accurate efficacy expectations and often overestimate their capabilities (McAuley, Mailey, et al., 2011) which could explain why men did not initially self score lower in dance efficacy despite lower dance exposure. Male participants also self rated higher in confidence for coping with the physical effort of dancing compared to female participants, which further closed the gap. Nonetheless, men seem to be as confident about dancing as women despite less experience. In general, it is possible that lack of confidence is not a barrier to dance participation for men: Men may feel positive about dancing, but not take up dance due to stronger cultural barriers or perceived lack of opportunity.

Physical ability, cognitive health, and psychosocial wellbeing

The dance efficacy item set did capture variability in individual factors likely to affect capability for social dance participation. Dance efficacy and the perceived capability to enjoy dancing appeared to be negatively impacted by poor mental health, findings which were consistent across the whole sample. Prior research has demonstrated exercise self efficacy negatively associates with, and independently predicts, depressive symptoms in older adults (Byrne & Horgan, 2018; Miller et al., 2019). Overall, indicators of physical and cognitive health were associated with, and predicted, dance efficacy, particularly in aged care residents where more variability may have been expected, also in line with prior exercise efficacy research (Mullen et al., 2012). Older adults with a stronger social network tended to report higher efficacy for dance, particularly among the community cohort. Furthermore, dance efficacy and the perceived ability to cope with the physical effort of dancing was stronger in more physically active people, an effect that was also more pronounced in community

dwelling participants. These findings replicate numerous previous studies of exercise self efficacy, exercise participation, and social support (McAuley, Szabo, et al., 2011; Miller et al., 2019).

Dance program-related change in dance efficacy

Overall, dance exposure was positively related to dance efficacy. Greater prior dance experience predicted stronger dance efficacy at baseline. For aged care residents, dance program participation had a moderate, positive effect on dance efficacy. Although the reliability of the dance efficacy items has not been established to determine the random measurement error, the magnitude of program related improvements in dance efficacy observed in aged care residents is similar to task specific efficacy gains reported in other studies: For example, McAuley, Mailey, and colleagues (2011) investigation examining longitudinal changes in self efficacy in older adults also reported walking and flexibility toning balance classes had a moderate effect on walking self efficacy ($d = .44$). This suggests that the observed change in dance efficacy scores reflects real gains in self efficacy for dance.

For age care residents, dance efficacy and change in dance efficacy was also directly related to dance program attendance. Baseline dance efficacy predicted program attendance: Participants with lower initial efficacy for dance went on to attend less dance sessions than participants higher in dance efficacy. Subsequently, low attenders experienced decreased efficacy for dance whereas high attenders reported substantive dance efficacy gains. These associations mirror the reciprocal, reinforcing relationship established for exercise behaviour and exercise self efficacy and provide support for dance efficacy as a modifiable psychological factor to monitor and possibly target for improvement on an individual and group level.

In the community based dance study however, dance efficacy did not similarly improve overall in dance program participants. Several factors deserve consideration to explain this outcome. First, the community cohort had over half of the participants already engaged in social dancing, so baseline dance efficacy may have been more stable and accurate. Second, community residents are likely to experience different challenges to program participation such as scheduling and transport issues, which

would affect aspects of dance efficacy not captured by this 6 item measure. Third, there are preliminary indications that dance efficacy may have improved in more experienced dance participants in the community and less experienced aged care residents. The lack of consistency between studies in terms of the responsiveness to change of the dance efficacy item set may, therefore, be a product of the suitability of the respective dance programs for older adults with varying capability for dance.

The community dance program was designed as a fun and sociable experience rather than a technical dance class. Indeed, some participants reported finding the dance program insufficiently challenging. However, the instructors indicated that participants varied in their ability to master the dance routines such that it was necessary to simplify the dance sequences and modify the class progression plan. The study also reported greater attrition from the community dance program among older adults with poorer cognitive abilities at baseline. We propose that experienced dancers may have mastered the dances, improving their efficacy for dance, while less experienced and/or less able dancers struggled to become proficient.

The community dance study authors argued that the lack of dance program related health benefits could be partially explained by selective attrition and heterogenous dance abilities (Merom, Grunseit, et al., 2016). The aged care dance program did explicitly teach ballroom technique, which may have supported the dance efficacy of less experienced older adults whilst not inspiring skill development and efficacy gains in more experienced dancers. Including a measure of dance efficacy in dance intervention studies is likely to allow more nuanced assessment of outcomes and contribute to explanation of program outcomes.

Strengths and limitations

The primary contribution of the current study is the novel examination of self reported dance efficacy using a broad range of objective health and wellbeing measures and test outcomes relevant to dance capability and participation. We acknowledge several limitations to our study. First, the dance efficacy item set had limited expert review and was not evaluated by the target population of older adults prior to inclusion in the trial surveys. This may compromise content validity (Boateng

et al., 2018). In particular, the *steps* and *directions* items overlap, and it is not clear if *directions* refer to spatial directions or instructions from the teacher, although the similar response pattern to *steps* and *directions* indicates participants were considering aspects of dance class participation that required recalling information, but not the exactly the same information. Second, it was not possible to assess the reliability of the item set before the survey. Third, attendance data was not available for community dance program participants and attendance data for the aged care study was available only in three categories (low, moderate, and high), limiting our analysis of dance efficacy and attendance.

Data for the current study has been drawn from two large and methodologically robust dance efficacy trials for older people. Typically though, new psychometric constructs are validated against other self report data exploring similar domains. This was unavailable here and should be a focus for future research. Overall, Study 1 results indicate that dance efficacy is a critical construct to understand and measure in the context of dance for health research and practice. Although we observed strong coherency between self rated dance efficacy and parameters that we can expect to affect individual capacity for dance program participation, it is likely that the items did not fully represent the wide range of capability judgements for dance tasks and barriers to participation. Expanding the item set to represent dance efficacy in older adults more comprehensively may be worthwhile.

Study 2: Dance efficacy scale development: item generation and expert review

Design, methods, and procedure

Study 2 extends the preliminary dance efficacy item set evaluated in Study 1, broadening the content domain to represent a wider range of dance tasks, and challenges and impediments to social dance participation in later life. The purpose of extending the six item dance efficacy measure was to improve predictive and explanatory capacity and utility. This requires that the domain of dance efficacy is accurately defined and sufficiently sampled. The dance efficacy items assessed in the Study 1 did not consider behavioural performance under different emotional conditions or scheduling issues, both of which are characteristic of exercise efficacy scales. Expanding the scope of the domain of dance efficacy and item content to further explore facets of task based and coping dance efficacy, as well as dance task demand characteristics that represent varying impediments to dance participation. This may capture more of the variability of dance efficacy among older adults.

Dance efficacy concepts and items were generated through two core processes: 1) Literature review of age related deterioration in abilities likely to impact dance program participation and existing standardised self efficacy instruments for older adults capturing tasks and activities that share properties and characteristics with dancing; 2) Deductive, theory driven qualitative analysis of older adult dance program participant focus group data conducted for the DAnCE and Falls cluster RCT by Merom, Mathieu and colleagues (2016) for dance task characteristics and features of dance programs which were perceived as barriers to participation. Common features of senior dance programs such as improvisation and performance opportunities were also considered in order to maximise the use of the self efficacy tool to a variety of

dance sessions. The current dance efficacy scale is developed specifically for non clinical adults ≥ 65 yrs.

Theoretical model guiding scale development

Scale development was informed by DeVellis' (2017) text on scale development, and Bandura's guide for self efficacy scale construction (Bandura, 2006). A literature review of the theoretical foundation for self efficacy in social cognitive theory (Bandura, 1977, 1997; Maddux, 1995) and related psychological constructs informed the conceptual definition of dance efficacy as well as the measurement goals. For conceptual clarity, we also examined psychological concepts adjacent to dance efficacy such as motivation (Social Determination Theory; Deci & Ryan, 1985, 2000) and outcome expectancies (Rodgers et al., 2014; Teixeira et al., 2012).

Age-related difficulties which may inform dance efficacy judgements

Age related decline has been recognised for physical abilities, motor abilities including balance control, and cognitive abilities, all of which are employed during dance activities, and previously reviewed for the current thesis. Study 1 provided additional, preliminary evidence that dance efficacy in older people varies according to numerous individual factors affected by aging; Exercise behaviour, self rated health, social support (social friend network), physical health including functional mobility (gait speed and sit to stand), mental health (depression), and cognitive health (processing speed, learning capacity and verbal memory). We therefore generated dance efficacy items for aspects of dance participation connected to changes in these abilities and individual factors.

For physical abilities and exercise behaviour, items were constructed based on movement range, endurance, and tolerance for dancing and sustained dance participation through personal challenges, including lifestyle. For balance and motor abilities, items were constructed based on neuro muscular control, motor learning and co ordination, and balance challenges including direction changes and moving at speed. For cognitive abilities, items were constructed based on attentional control, learning abilities for dance movements and sequenced movements, and memory for

dance sequences. We further considered openness to dance related artistic, creative and aesthetic experiences. Perceived social support, coping strategies, social skill, and personal characteristics and behaviours affecting participation in group activities including shyness, social anxieties, and playfulness also underpinned item development.

Existing psychometric efficacy instruments relevant to dance efficacy

The literature review also incorporated existing psychometric scales operationalising efficacy constructs related to aspects of dance efficacy, and challenges and impediments to completing activities that share features with social dance. We considered instruments measuring exercise efficacy, falls efficacy, motor efficacy (activities of daily living), social efficacy, and memory efficacy.

Table 7 lists the psychometric instruments, other efficacy tools employed to direct dance efficacy item generation.

Table 7. Socio-demographic characteristics of the two older adult dance study populations

Scale (Abbreviation; reference)	# Items	Domain
Exercise Self-Efficacy Scale (ESE; Bandura, 2006)	18	Coping and scheduling efficacy for domain general exercise most days of the week
Multidimensional Exercise Self-Efficacy Scale (MESE; Rodgers & Sullivan, 2001)	9	Task, coping, and scheduling efficacy for domain general exercise
Self-Efficacy for Exercise Scale (SEES; Resnick & Jenkins, 2000)	11	Coping and scheduling efficacy for general exercise 3 times per week
Barriers Self-Efficacy Scale (BARSE; McAuley, 1992)	13	Coping and scheduling efficacy for general exercise 3 times per week for 3 months
Perceived motor-efficacy scale for older adults (Potter et al., 2009)	39	Motor capability beliefs of healthy older adults (≥ 60) across a range of daily action tasks, with 9 subscales
Self-Rated Abilities for Health Practices Scale (SRAHP; Becker et al., 1993)	7	Self-perceived ability to implement health-promoting behaviours. Exercise subscale only
Falls Efficacy Scale – International (FES-I; Yardley et al., 2005)	16	Perceived likelihood of falling in different circumstances
Perceived Social Self-Efficacy Scale (PSSSES, Smith & Betz, 2000)	25	Perceived ability to engage in social interactional tasks necessary to initiate and maintain interpersonal relationships

Metamemory in adulthood questionnaire – revised (MiA; McDonough et al., 2020)	20	Subjective memory performance concerns (memory efficacy) including changes and capacity
Computer Self-Efficacy Scale (CSES; Durnell & Haag, 2002; Steelman & Tislar, 2019)	18	Efficacy and anxiety for older adults using and learning how to use technology (skill acquisition)
Goldsmiths Dance Sophistication Index (Gold-DIS; Rose et al., 2020)	28	Participatory and observational dance experience, level of dance sophistication Subscales of 1) body awareness, 2) social freestyle dancing 3) urge to dance 4) dance training

Materials and methods for qualitative data analysis: Dance and Falls study

Focus group participants and data collection

The material used to develop the dance efficacy concepts and items was data taken from the transcription of focus groups with participants who completed the Dance and Falls cluster RCT (Merom, Mathieu, et al., 2016). Ten in person focus groups (N = 60) were conducted at participating age care retirement villages after dance program delivery was complete. At the end of the trial, the follow up survey had an embedded question asking program participants whether they would be willing to participate in a focus group to share their experience with the dance program. A research assistant contacted everyone who agreed to participate to invite them to attend a focus group. The number of older adults per focus group ranged between 1 and 9. The meetings were facilitated by two experienced investigators who were not otherwise involved in the study which enabled the interviewers to approach the sessions impartially.

A semi structured interview guide was designed to explore perceived barriers, facilitators, and motivators for dance program participation, within an interpretive paradigm. Focus group questions were divided into four sections: 1) Initiating engagement in the dance for falls prevention program (self, village, and national

level)'; 2) Continuing engagement in the dance program (self, village, and national level); 3) Dance class content; 4) Dance class composition, location, timing, and teaching. Questions for the first two sections focused on understanding why older people took part in the programs, and what factors encourage participants to keep dancing throughout the programs and into the future including the perceived benefits of social dance and challenges to regular involvement. The final two sections concerned older adults' experiences of the dance classes including the style, intensity, and level of stimulation involved, the duration and frequency of classes, teacher and peer characteristics, and the classes in the context of retirement village life.

Our goal was to understand the personal perspectives of the individual, so participants were given the opportunity to digress when responding to the interview questions. Key questions were identified, but interviewers were otherwise not required to cover all predetermined questions. At the beginning of each focus group, the interviewers assured the participants that they could be honest, their opinions were valid and that there were no right or wrong responses. Participants gave informed consent to participate, gave permission for recording, and the aims of the focus groups were clearly explained. The focus groups lasted between 26:47 and 1:22:42 mins and were recorded into an audio format and transcribed verbatim by a research assistant.

Qualitative data analysis

Analysis was conducted by a single researcher – the current author – using a primarily theory driven, deductive approach. In deductive analysis, concepts and interpretation are driven by established theory (Braun et al., 2016; Braun & Clarke, 2013; Green & Thorogood, 2018), in this case self efficacy and the factors of task, barriers and scheduling efficacy for the activity of social dancing, considering age related changes likely to influence dance efficacy in older people. Although the coding plan for the focus group data was also largely pre determined, the data did generate new insights and novel concepts were constructed to better reflect the complexity of the phenomena.

This deductive approach generated detailed analysis of a specific aspect of the focus group dataset, prioritising theory based meaning (Braun & Clarke, 2019) Dance

program elements affecting dance self efficacy that were particular to the dance program, such as the individual characteristics and pedagogical approach of the dance instructors, were removed. Evidence of psychological constructs related to self efficacy were similarly separated out from evidence for capability judgements for dancing. This was to ensure our material and codes were underpinned only by the pre determined objectives.

Both semantic and latent coding were employed. For coding the focus group content related to efficacy for dance tasks, including dance task features and demand characteristics, and scheduling barriers to dance participation, data was primarily coded semantically, with codes describing the original data (Braun et al., 2016). Further analysis such as constructing concepts for coping efficacy for barriers to dance participation required examination of latent codes and concepts to understand the underlying ideas and patterns. Focus group numbers and initials have been used as identifiers to preserve the anonymity of focus group participants.

Further considerations for scale development

Dance tasks present impediments to performance relative to skill level, motor and cognitive abilities, and related previous experiences (Rodrigues Krause et al., 2018). Guttman Scaling, a method of item development where a series of items capture progressive levels of an attribute, is an approach that worked particularly well for aspects of dancing that involve graduated challenges. For example, efficacy for learning a simple dance, learning a complicated dance, or learning a complicated dance quickly. Bandura emphasises that efficacy must be estimated against task demands as efficacy appraisals reflect an individual's belief that they can achieve a task and efficacy beliefs change as task demands increase (2006). This graduation should allow greater discrimination between respondents at different levels of dance confidence and experience, and avoid ceiling effects.

Item wording and response format

When composing items, item clarity was prioritised: Minimising reading difficulty level with brief sentences of either short words or common longer words; avoiding

double barrelled items with more than one idea per sentence (although expert review revealed more of these sentences than we intended); and avoiding conditional statements or ambiguous statements with more than one proposal or interpretation. We accepted DeVellis (2017) recommendation to include only positively framed items (as opposed to a mix of positive and negative worded items). This approach is particularly suited to shorter scales, in line with our intentions. DeVellis also encourages item redundancy, creating items which reflect the same phenomenon in different ways. There was overlap in phenomena covered by the Guttman scaled items, and some redundancy within and between dance efficacy concepts.

Regarding the measurement format, the stem from the original dance efficacy item set was used. The original Likert scale response categories of 1:5 representing 'not at all confident' to 'extremely confident' were expanded to allow greater discrimination, particularly between respondents with stronger dance efficacy. In the new response format, respondents will indicate confidence on a scale from 0 (Not confident at all) to 10 (Completely confident). These simplified response categories were informed by exercise efficacy scales including the MESES (Rodgers & Sullivan, 2001) and the Motor Efficacy Scale (Potter et al., 2009). Items related to time frames – time to learn dances, time between sessions, scheduled dance sessions per week/month over a number of years – were estimated from focus group data, personal experience and adapted from other efficacy scales, with feedback anticipated from expert reviewers.

Item generation

The dance efficacy items were developed using both inductive and deductive methods. To ensure strong face validity, where possible, individual items were composed with words and phrases used by older adult dance program participant to describe their dance experiences. Some items were developed deductively by adopting or adapting questions from existing relevant scales. All initial items generated for the dance efficacy scale were statements. For each item, we recorded a unique code, a scale, an explanation of the statement, a description of the source for the item, and any issues evident. Table 8 displays three exemplar items with all development and source information.

Table 8. Exemplar item development and source information

<i>Item code</i>	2:C	
<i>Item statement</i>	Learn a complicated new dance within a short time	
<i>Item scale</i>	10-point scale (0 = Not confident at all; 10 = Completely confident)	
<i>Explanation</i>	Time pressure in a learning task increases difficulty and the stress associated with the task. Attempting to learn a difficult dance quickly should differentiate older people by perceived skill and confidence.	
<i>Source</i>	How was the item generated? Adapted: Potter (2009); Motor efficacy scale & focus groups	Original source items: Motor efficacy scale: I expect to be able to <i>learn</i> new movements <i>within a short time</i> “The period of <i>time</i> we spent on each step was too <i>short</i> ” 5G. “I enjoyed learning the steps as long as I wasn’t pushed too hard. Get confused...” 5D. “We did the swing waltz this morning and, boy, was that <i>complicated</i> ” 9S.
<i>Item code</i>	6:B	
<i>Item statement</i>	Enjoy dancing even if I can’t dance the way I used to when I was younger	
<i>Item scale</i>	10-point scale (1 = Not confident at all; 10 = Completely confident)	
<i>Explanation</i>	This item orientates dance ability in the context of aging and coping with age-related changes in ability for dancing.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Participants talked about being confronted by and having to accept that they were not able to dance the way they could when they were younger: “I can’t do the mad dancing <i>I used to</i> ” 2JO. “I expected to waltz out onto the floor like I did 50 years ago and someone said ‘well, that just doesn’t happen, you know’ obviously no. I found the first week really hard” 6M. “The years have caught up with me” 9S.
<i>Item code</i>	0:E	
<i>Item statement</i>	I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional	
<i>Item scale</i>	5-point scale: None at all; Beginner; Intermediate; Advanced; Professional	
<i>Explanation</i>	Respondents place themselves in a category according to perceived level of experience with dance, and specifically dance training from complete novice to professional.	
<i>Source</i>	How was the item generated? Adopted: Rose (2020); Gold-DSI	Modifications? None

STAGE 1: Results of dance program focus group analysis, dance efficacy concept and item generation

Definition and operationalisation of dance efficacy

The working definition of the construct of dance self efficacy in older adults was: *An older person's perceived ability to participate in organised social dance in the near future.* This definition was adapted from Potter and colleagues (2009) work on the motor efficacy scale for older adults and simplifies Bandura's original statement. Like efficacy for exercise, dance efficacy is conceptualised as a dual construct (Maddux, 1995; Rodgers & Sullivan, 2001), separating task efficacy for performing or engaging with core dance tasks and coping efficacy for barriers and impediments to dance participation, including scheduling challenges.

The scale intends to capture efficacy for dance in older people at all levels of dance experience and refers to participation at whatever level of dance expertise a person has currently attained. Organised social dance programs refer to regularly scheduled and organised dance lessons and sessions not including freestyle dancing at clubs and parties. We use the phrase 'social dance' to differentiate from dance performed alone, without the face to face or virtual live presence of an instructor or class with no opportunities for social interaction, such as exergaming or dancing along at home to a previously filmed dance class. The scale refers to near future dance participation to avoid immediate scheduling issues. Elements specific to dance program design and delivery such as public performances, the influence of the dance teacher, program delivery mode, and perceived program safety have been deliberately excluded so as to maintain scale applicability and universality, although these elements may still affect dance efficacy.

Dance efficacy concept/subscale construction

Eight concepts were constructed through analysis, grouped broadly under the three factors of self efficacy for exercise – task efficacy, and coping efficacy for barriers and scheduling. Table 9 displays descriptions and operationalisation of all dance efficacy concepts.

Table 9. Dance efficacy concepts, description of the concept and concept operationalisation

Concept	Description	Operationalisation
Task-based dance efficacy		
<i>CONCEPT 1: Confidence for performing dance movements & structured dances</i>	Capability to execute a range of dance movements and movements sequences involving motor co-ordination and control, balance, flexibility, and speed with varied dance task demands <i>Motor efficacy, falls efficacy, exercise task efficacy</i>	Postural and movement control for a range of moves; balance challenges; fast movements; dancing without support; executing unfamiliar movements
<i>CONCEPT 2: Perceived cognitive ability for dance tasks: Learning capacity, memory and executive control</i>	Capability to learn and recall sequences of dance movements with varied task demands, applied cognitive abilities including immediate, delayed and longer-term recall, and executive control of attentional resources. <i>Memory efficacy, motor efficacy, exercise task efficacy</i>	Learning basic and complicated dances; learning more than one dance in a single session; learning under time pressure; memory for steps and sequences; following instructions; practicing complicated dances
<i>CONCEPT 3: Confidence for dance engagement</i>	Capability and enthusiasm to engage with creative, aesthetic, and artistic elements of dance participation including improvisation, dance making, and playfulness. <i>Social efficacy, openness to experience</i>	Trying new dance styles; improvisation and movement creation; personal dance expression and uninhibited dancing; motivation to improve dance skills
<i>CONCEPT 4: Perceived physical and mental endurance for dance</i>	Capability for the physical endurance, stamina and fitness requirements of dancing, dancing to improve aerobic fitness and coping with functional limitations to dance <i>Exercise task and coping efficacy, motor efficacy</i>	Physical effort, stamina and exertion related to dancing, both perceived subjective effort and high intensity dancing; managing dance tasks that are unsuitable for the respondent
Coping efficacy for barriers to social dancing		
<i>CONCEPT 5: Perceived confidence for dancing in social contexts</i>	Capability for social and interactive dance participation including dancing with groups, with strangers, and coping with aspects of the social context that may impede participation and increase feelings of self-consciousness and discomfort. <i>Social efficacy, extraversion</i>	Dancing with strangers, with a group, with people who are different in a way that may present a challenge; dancing with people watching and worrying about being subject to negative judgements
<i>CONCEPT 6: Overcoming psychological and emotional barriers to enjoy dancing</i>	Capability to enjoy dancing by regulating thought processes and negative emotions in the face of challenges and aspects of social dancing that may be frustrating, embarrassing and disheartening <i>Self-regulatory efficacy, coping efficacy for exercise (barriers)</i>	Enjoy dancing despite changes in capability for dance, and coping with demanding tasks and lack of performance success
<i>CONCEPT 7: Overcoming mental barriers to dance (self-regulation)</i>	Perceived ability to cope with internal mental impediments, often transient, that can adversely affect regular dance program participation and attendance <i>Self-regulatory efficacy, coping efficacy for exercise (barriers)</i>	Doing dance sessions when tired, unmotivated, stress, anxious and down or depressed.
Coping efficacy for scheduling regular dance sessions		
<i>CONCEPT 8: Overcoming scheduling barriers to regular dance participation</i>	Perceived ability to find time for, commit to and prioritise regular dance session attendance under normal and difficult circumstances <i>Scheduling efficacy for exercise</i>	Scheduling dance sessions once per week on most weeks in everyday circumstances and when busy, with visitors arrive, and when making appointments

Task-based efficacy for dance

Broadly, self efficacy for the task of dancing in older age is represented by four main concepts. First, capability for executing dance movements and sequenced movements, predominantly focused on motor skill and neuromuscular co ordination. Second, capability for cognitive aspects of dance participation including attentional control, and memory for sequenced movement. Third, capability and willingness to engage with the artistic, aesthetic, and creative aspects of dancing. Fourth, endurance for dance as an exercise activity. This dimension of dance efficacy is sensitive to task demand. Terms frequently used by focus group participants to describe dance tasks and movement sequences in the ballroom and folk programs were ‘steps’ and ‘dances’. Participants referred to dance sequences as simple or basic, and complex or complicated.

CONCEPT 1 – Confidence for performing dance movements and structured dance sequences

The first dance efficacy concept concerns an older person’s perceived capability for executing both individual movements and sequenced movements typically found in dance sessions for older adults. Moving at speed and performing difficult, unfamiliar movements were task components repeatedly associated with increased demand by focus group participants:

F1: When the legs have to move pretty quickly, that’s when you have a problem.

T7: Some of [the dance class] was far too fast. I just found it too difficult.

9S: We learnt basic steps like the jazz waltz and cha cha and the jive to the proper music so it was sort of basic dancing.

S9: We did the swing waltz this morning and boy was that complicated

J2: [I was] struggling to do the steps on some of the dances.

Aspects of dancing that elicited balance challenges, particularly dancing without support or “direction changes” (L6), were highlighted variously as necessary,

insufficiently difficult, and a substantial barrier to participation, suggesting personal factors impact task demand appraisals:

P1: We did too many ... dances holding hands. If we let go hands, it would really test the balance.

JE2: I found it interesting that we started off holding hands. By the end we were dancing independently in lines. We can do this without holding hands!

IS10: From my point of view, I need to hold hands with somebody for stability.

Other task aspects raised by older adult dancers was dancing with upright posture, and co ordinating movements to music. Further challenges to functional mobility, neuro muscular control, and balance typical to senior dance sessions were identified, largely from falls, motor, and exercise efficacy scales: Stretching, bending, and reaching movements, movement control, and fear of falling, reproducing accurate body positions, and executing novel movements. Table 10 displays the set of items for task based dance efficacy concept 1.

Table 10. Items generated for task-based self-efficacy concept 1: Confidence for performing dance movements and structured dance sequences

Confidence for performing dance movements and structured dance sequences
Keep up with the tempo (original item)
Do stretching, bending, and reaching dance movements
Perform dances with turns and changes in direction
Dance in time with the music
Dance with good posture and body position
Dance with good control of my movements
Perform dances with fast movements and steps
Perform complicated dance movements that I have not practiced before
Dance on my own, without a partner, and not be afraid of falling
Perform a dance with cross-over steps and turns and not be afraid of falling

CONCEPT 2 – Perceived cognitive ability for dance tasks: Learning capacity, memory and executive control

The second dance efficacy concept concerns an older person's perceived cognitive capacity for common dance tasks, including learning capacity and memory for dance sequences under differently demanding conditions, and attentional executive control to follow instructions. Dance program participant comments on learning movement phrases included recognition of increased difficulty when differentiating dances with shared features and learning preferences:

M9: The exercise and learning something new. Mentally stimulating learning new steps.

G5: There were so many different dances, I confused one with another.

D5: I enjoyed learning the steps as long as I wasn't pushed too hard. Get confused...

A5: The period of time we spent on each step was too short. I would have preferred less steps and more time on each step. I think it was a bit of a memory...

K2: Quite a lot of time is spent [at program start] going over the steps.

Remembering dances, particularly over the longer term (week to week) was a regularly cited test:

JO4: Definitely challenging to remember the steps

A5: Our memory is not as good as it used to be so I had trouble in remembering the steps from week to week.

IN1: There were too many dances to remember. Sometimes we didn't do any dances for a few weeks, and then of course, we had forgotten them in the meantime.

M9: It [the dance program] was good for your remembering training, your memory training as well.

The attentional control and mental effort involved in dance participation was also emphasised:

L10: What's tiring, I think, is using at least three senses: You're looking, you're listening, you're moving. You're following instructions. It's half an hour of really intense...

M2: We were concentrating all the time.

Levels of task demand were identified for learning several dances in the same session, learning under time pressure and longer term dance sequence recall. Motor task learning and following directions to complete exercise also features in the motor efficacy and exercise efficacy scales. Table 11 displays the set of items for task based dance efficacy concept 2.

Table 11. Items generated for task-based self-efficacy concept 2: Perceived cognitive ability for dance tasks

Perceived cognitive ability for dance tasks: Learning capacity, memory, and executive control
Learn a simple dance with a basic step pattern that repeats many times
Learn three new dances in the same dance lesson/session
Learn a complicated new dance within a short time
Remember the steps (original item)
Remember a dance if I had learnt it a week ago
Follow instructions from the dance teacher or leader
Practice a complicated dance until I got it right

CONCEPT 3 – Confidence for dance engagement

The third dance efficacy concept relates to perceived capability for and willingness to engage with artistic, aesthetic, and creative aspects of dancing including improvisation, dance making, and openness to new dance experiences. Focus group participants had different tolerance for unfamiliar dance sequences, styles, and adaptations:

G5: I would have a try at anything [different dance styles].

T10: [Older adults may be] just self conscious about trying new types of dance.

S6: [If the program had been folk dancing] I wouldn't have come. I don't like folk dancing. [and trying a variety of styles in class?] I wouldn't have liked it.

9C: I think the [modified ballroom] dancing we had was a little bit off putting for people. It wasn't to me real dancing, but it was more like exercise.

Other participants commented on their various preferences and confidence for structured or unstructured 'free' dancing:

C1: If somebody is used to dancing we would make up the dances as you go. You know the steps, but you make up what you do, and on the process it's that experimenting where I really just think ... free.

J6: [The dance program] was too structured. You couldn't ... go off and do your little... You don't do the set steps... You go off and you deviate on your own. That's part of the fun of it!

L10: [Free dancing] does mean that in a lot of social situations, as long as you're willing to get up off your feet, have a go, you don't actually have to know how to do some particular dance... For a lot of modern dancing there doesn't have to be a right and wrong way to do it.

Some older people also described their desire to work to improve their dance skills.

Table 12 displays the set of items for task based dance efficacy concept 3.

Table 12. Items generated for task-based self-efficacy concept 3: Confidence for dance engagement

Confidence for dance engagement
Try a style of dancing that is new to me
Enjoy doing dances that are different from how I remember
Enjoy dancing freely, with no set steps
Feel free to dance the way I want to
Make up my own dance moves
Improve my dancing

CONCEPT 4 – Perceived physical and mental endurance for dance

The final task based dance efficacy concept relates to perceived capability for dance as an exercise task, particularly the physical and mental endurance associated with dancing. Senior dance program participants reflected on their expectations of how physically strenuous they were expecting the dance program to be:

T7: It was a concern about the dancing [before the program start] of course and how vigorous it was.

IN1: People ... haven't done any exercise for years and they are a bit worried [about] starting.

JE3: Speaking to people outside the village and I mention a dancing class, they look very alarmed.

Older people also had different experiences of the physical intensity and challenge of the program.

C9: it was strenuous towards the end and I don't think it would have suited a lot of the ladies

I8: [the dance teacher] certainly got the heartbeat going on some of the dancing.

J10: We haven't got the stamina

JO3: There were some fast [dances] but we were never worn out.

M8: It was a bit tiring but we didn't mind it.

T10: A very good workout.

Some reported muscle soreness, pain, and tiredness with dancing, with some adaptation through repeated practice:

K2: Towards the end of dancing ahh, I would find the following day my legs felt like telegraph poles, she really pushed us along, oh you know it was good for us! Towards the end it was very good exercise.

G3: As the classes went on, I found the [intensity] level dropped and I think that was just purely a matter of me being more physically conditioned to doing that. I didn't find it as hard. I wasn't getting as breathless and I wasn't getting as sore.

Many program participants also reflected on their confidence to dance within their own physical functional and fitness capacity:

K2: We realised that if you are feeling tired or strained you could sit down for a little while. You were not compelled to dance all the time.

A10: Everybody has a huge range of physical ability and disability and everybody does what they can do.

J3: But you adapted [the movements you couldn't do]. You were able to figure it out, if you had to turn you would turn your body. You could still do [the moves] and then adapt it to your disabilities. It didn't stop you from doing it.

Perceived endurance for dancing also mirrored endurance for general exercise in older age, which features in exercise efficacy scales. The set of items for task based dance efficacy concept 3 is reported in Table 13.

Table 13. Items generated for task-based self-efficacy concept 4: Perceived mental and physical endurance for dance

Perceived mental and physical endurance for dance
Overcome the physical effort involved (<i>original item</i>)
Have the stamina to dance for exercise or a workout
Keep dancing when I am hot and breathless and my heart is beating faster
Keep dancing when it is physically tiring
Make the effort to build up my fitness by dancing
Adapt, change, or avoid dance movements that are uncomfortable for me

Coping efficacy for barriers to social dancing

Coping self efficacy for barriers to social dancing in later life is represented by three main concepts. First, capability for dancing in a social context, including social situations typical to senior dance sessions that could be experienced as intimidating or confronting. Second, capability to overcome cognitive barriers to enjoying dancing such as perfectionism or perceived poor performance. Third, capability to overcome issues of self regulation characteristic of participation in any organised group physical activity which included tiredness, lack of motivation or stress. Efficacy for coping with barriers to dance participation appears less sensitive to task demand than task based efficacy for dance, although some social situations were perceived as potential more difficult or threatening to self, such as approaching dancing with a new group of more experienced dancers compared to dancing with similarly skilled peers.

CONCEPT 5 – Perceived confidence for dancing in social contexts

The fifth dance efficacy concept represents capability for dancing in an interactive social context, including potential challenges to confidence such as dancing with people with more dance experience or better motor skills, and coping with perceived negative judgement from peers. The benefits and difficulties of participating in group dance classes with people of varying abilities was discussed frequently by dance program participants. Some older adults found dancing with experienced peers inspiring, helpful for cueing memory, and fun, and some more experienced dancers also enjoyed coaching their peers:

J6: Having a [mixture of abilities] was good. I watched [a couple] if I didn't, couldn't remember the steps. They were our experts.

M2: [Dancers with more experience] were not off putting at all, they were quite amazing.

J3: We thought we could help some of the new ones [dancers] and it's never enough for me. I just want to be there all the time! I just love it so much.

Some novice senior dancers, however found they couldn't cope with the pace of learning and the difficulty of the dance sequences. A few went so far as to say that dancing with more skilled people compromised their enjoyment of the sessions:

D5: There were others in the group that were really used to the dancing ... 'hey this is great let's go for it'. Too fast for me... You'd get say an [experienced dancer] in the group who is just so used to dancing, she wanted to swing you everywhere and that ruined it for me. I couldn't be there to be a great dancer. I didn't think that's what we were there for.

C9: [One participant] pushed us because she wanted to learn dances faster than for a retirement home.

Other dancers expressed generally low efficacy for dancing in groups, particularly groups with more capable peers and established groups:

JO4: [As a beginner] Because there is nothing worse than going into a class where people have been doing it. You feel inferior.

JE3: I just wanted to dance for so many years. When I no longer had a husband I felt I was able to. First one I went to had ballroom dancing there but they were most unwelcoming so I came home very disappointed.

GW4: Music and dancing did bring me out, but yes, I was very extremely shy.

Confidence for dancing in a social context overlapped with perceived social efficacy for group activities, self efficacy for perceived judgement from others when managing new technology tasks in public and enjoying group exercise from exercise efficacy scales. The set of items for barriers dance efficacy concept 5 is reported in Table 14.

Table 14. Items generated for self-efficacy for coping with barriers to dance concept 5: Perceived confidence for dancing in social contexts

Perceived confidence for dancing in social contexts
Enjoy dancing with a partner I do not know (original item)
Actively participate in group dance activities
Enjoy dancing in a group
Enjoy dancing with people who have more dance experience than me
Enjoy dancing with people who are younger than me
Enjoy dancing when people are watching me
Not worry about looking silly or foolish when I am dancing
Not worry that people might watch and judge me when I am dancing

CONCEPT 6 – Overcoming psychological and emotional barriers to enjoy dancing

Concept 6 is concerned with capacity to regulating thought processes, emotions, and negative self talk to cope with perceived dance participation related issues such as with not performing according to your own personal expectations. The older adult focus group participants spoke extensively about loss of confidence with aging, and how that affected participation in skilled group activities, particularly in men:

P1: People give up things because they lose their confidence.

C1: A lot of people 'grow old safely'... losing confidence and stop doing new things...

JO4: [Men] are shyer than the ladies I think, the fellas doing things, a number of them say I've come to the village to retire.

C1: Men are brought up in a culture to keep a stiff upper lip. "I haven't got a problem. I'm perfect", and what they do [when they can't do something], they go 'thump'.

A few participants commented that they had to dance differently as older adults, and some found this confronting or potentially embarrassing:

JO2: I can't do the mad dancing I used to.

S9: I expected to waltz out onto the floor like I did 50 years ago, and someone said 'well, that just doesn't happen, you know', obviously no. I found the first week was really hard... The years have caught up with me, so I'm finding it...

P1: I was flying all over the place, it bounced like this and you can't help it, your muscles start to [go]. People don't know what it is like to be old.

Participants also recounted incidents where they believed older people had left the program due after negative reactions to aspects of their dance capability:

MB6: I think [Participant X] felt awkward. I don't think his memory is too good.

L6: There was one [dance program participant] who felt that he was making a mess of it and didn't want to keep coming.

D5: Quite a few who started dropped out because they couldn't keep up with it.

Participants describe negative emotional reactions to difficult dance tasks such as performing and recalling dance sequences. We also found that some dancers had similar perfectionist tendencies reported by Coogan and colleagues (2021) as a psychological barrier to dance participation:

S6: When we first started, I couldn't remember anything [the steps/dances]. You remember how I used to get angry. But I remembered everything by the last.

J6: I was struggling at times. Struggling to remember the steps. The old memory was playing tricks.

M9: Sometimes you got tensed up, but I know I totally lost when she started to teach the waltz, you know that rise and...

J3: Well [making mistakes] did worry me because if you're on the wrong foot, you'd get out of time and then you're not able to do the next move. You know, it's very logical and I get upset if I get out of step because then you're not ready for your next step. I'm not good with quick flicks. I like to start right and finish right. High expectations.

Some older adults negatively appraised their own dance capability, but this didn't necessarily compromise their enjoyment of dancing. Indeed, there was a great deal of evidence from the focus groups of older adults persevering in the face of challenges, and enjoying the experience:

G5: I love dancing, but I can't do it. I'm not a dancer.

J6: I just couldn't get it!

K2: I've enjoyed the effort put forward by some of the dancers who didn't know their left foot from their right foot but tried and tried and tried hard.

T10: We tried. The older ones who couldn't really manage it, and they were really wanting to do it and they did try.

The importance of social support for overcoming psychological and emotional barriers to dance participation was particularly emphasised by the older participants:

UN2: It matters ... you enjoy the social side of it because then you relax and you don't feel an idiot when you do something wrong.

M2: We made lots of mistakes and I laughed a lot.

E1: [making mistakes is] only human. It's fun you know, we all laugh.

A10: Everybody is very tolerant and not competitive

N3: I really appreciate the compassionate tolerance [of the dance group] because my husband was always going left when he should have gone right but everyone laughed about it and I always meant to thank each one of the group for being so thoughtful.

The psychological and emotional barriers dance self efficacy concept was drawn entirely from the focus group data and does not appear in any other exercise or social self efficacy instruments. Although self efficacy is a construct that relates only to capability judgements for an activity, rather than capability judgements to enjoy doing an activity, we believed enjoyment is so central to older adult dance participation and program adherence that this item wording merited testing against expert opinion.

Table 15 displays the dance efficacy items for concept 6.

Table 15. Items generated for self-efficacy for coping with barriers to dance concept 6: Overcoming psychological and emotional barriers to enjoy dancing

Overcoming psychological and emotional barriers to enjoy dancing
Enjoy doing the classes (original item)
Enjoy dancing even if I can't dance the way I used to when I was younger
Stay positive (not get frustrated) when I make mistakes
Enjoy dancing when I can't get the moves right
Enjoy dancing even when I find it difficult
Enjoy dancing when I can't remember the steps
Enjoy dancing when I feel I am not dancing very well

CONCEPT 7 – Overcoming mental barriers to dance (self-regulation)

The final dance efficacy barriers concept concerns self regulatory capacity to cope with physical and affective states that can adversely affect regular dance program participation and attendance, which mirror barriers to participation in any exercise activities. These barriers were identified through a review of exercise efficacy scales and, despite being the primary target of most exercise efficacy instruments, featured minimally in the dance program focus groups. Older adults described the dance classes as tiring but did not indicate that tiredness was a barrier. Some participants mentioned lack of motivation for ongoing dance sessions, but it was also not clear the degree to which this affected overall attendance:

C9: Sometimes I'd think I couldn't be bothered going.

J6: [Some people] dropped off just because they lost interest

The item set generated for this concept is displayed in Table 16.

Table 16. Items generated for self-efficacy for coping with barriers to dance concept 7: Overcoming mental berries to dance (self-regulation)

Overcoming mental barriers to dance (self-regulation)
Do dance lessons/sessions when I feel tired
Do dance lessons/sessions when I have no energy
Do dance lessons/sessions when I am not motivated
Do dance lessons/sessions when I feel stressed and/or anxious
Do dance lessons/sessions when I feel down or depressed

Coping efficacy for scheduling regular dance sessions

CONCEPT 8 – Overcoming scheduling barriers to regular dance participation

Coping with barriers to regular dance participation scheduling are the same as issues concerning the scheduling of any organised group exercise activity in older age and features in most exercise efficacy scales. Specifically, the focus group participants, who attended dance sessions twice a week as part of the dance program, described challenges with prioritising regular dance sessions:

E8: Somehow or other, we're old and retirement and all the rest of it, but we still have many commitments.

E6: People seem to think that because we are older, got nothing to do, practically all of us, and I haven't been here that long, there's lots of things going on, going out, some days every day of the week.

M8: You have to find the time to make it [dance class].

MB6: I've got too much that I do outside and it does take up a lot of time.

Some participants appreciated the routine of having two weekly sessions, while others had problems keeping to the sessions:

E1: I found it a tremendous commitment.

?5: It was a bit of an effort. [Class] was on twice a week and I found that a bit much.

F1: Some people backed out because ... they had to give too much up. You have to be really determined that's what you want to do.

S9: You got the benefit. I think we got the benefit having it 2 days a week.

J10: [Going to the dance class] becomes part of your routine, and it's nice to have.

L6: [Dancing] is your regular activity.

Older adults also explained their difficulties attending dance classes due to age related competing scheduling commitments and responsibilities including caring responsibilities:

JO3: I had to cancel things [to get to two classes per week]

H5: I mean there's family. If I had a choice between family and the dancing, of course family.

C9: I don't really want to be tied down because I'm restricted with my husband, but I need to do something.

All3: Caring for unwell family members. Caring responsibilities.

S6: We used to have dropouts, because of medical appointments, holidays, other challenges.

The set of items for dance efficacy concept 8 is reported in Table 17.

Table 17. Items generated for scheduling efficacy for regular dance sessions concept 8: Overcoming scheduling barriers to regular dance participation

Overcoming scheduling barriers to regular dance participation
Find time for one regular dance lesson/session per week
Schedule a regular dance lesson/session on most weeks
Commit to one regular dance lesson/session per week
Commit to dancing regularly once a week even when I am busy
Commit to going to a regular dance lesson/session once a week even when I have family or friends visiting
Prioritise a regular weekly dance lesson/session when making other appointments

Validation items: Dance experience and perceived relative ability

Study 1 clearly indicated that prior dance experience and current dance practice influenced dance efficacy beliefs in older adults, in line with self efficacy theory. Perceived dance ability relative to peers also featured in the focus group discussions, and can be conceptualised as an aspect of dance ‘identity’ (e.g. G5: *I love dancing, but I can't do it. I'm not a dancer*).

Several items from external sources were included alongside the dance efficacy items to validate dance efficacy against dance experience and perceived dance ability relative to peers. These items were adopted or minimally adapted from existing tools or studies. Two binary items that featured in the validation Study 1 measuring recent dance experience and current dance practice (yes/no) were incorporated (Study 1; Merom, Grunseit, et al., 2016; Merom, Mathieu, et al., 2016). The final validation item has participants classify their level of dance experience in one of five categories. This item was adopted directly from the GOLD DSI (Rose et al., 2020).

Of the two items determining perceived dance ability relative to peers, the first was adopted from the Lovatt dance confidence study (2011). The second item was adapted from the motor efficacy scale (Potter et al., 2009), with the activity of ‘dancing’ replacing ‘sports or other leisure activities’. The full statement reads ‘I feel I am good at *dancing* compared to most others my age and gender’ and requires a rating of agreement. We also included a single statement that reflects dance motivation confidence that... ‘I can improve my dancing’ for an additional potential validation item, and in the context of appraising willingness for engagement with dance.

STAGE 2: Expert review and scale construction

Expert review aims and procedures

The results of Stage 1 yielded a total of 55 items over eight dance efficacy concepts. To minimise participant burden, ease administration, maximise likelihood of researchers choosing to prioritise the dance efficacy instrument in research surveys, and to preserve the utility of the tool for dance program instructors, we aimed for a relatively brief final scale. The number of items included in previous self efficacy and related scales range from 9 items to as long as 39 items. The main aim of the expert review was, therefore, to reduce items without compromising the integrity and appropriateness of dance self efficacy scale.

Preparation of the expert review documentation was guided by a summary of approaches to conducting expert review from Elangovan and Sundaravel (2021). Expert reviewers were provided with background information on self efficacy as a theoretical construct, justification for scale development in the context of dance and health research for older adults, and a description of the process of item generation. The documents outlined the role of expert reviewer, the procedure for review and provided the following key questions:

1. Is the domain of dance efficacy in older adults accurately and well defined, and sufficiently sampled?
2. How relevant is each item to the concept of dance efficacy for organised social dance in older adults for the purposes of measurement?
3. Will responses to these items reflect meaningful differences in dance efficacy across the older adult population and predict an individual's ability to engage and participate in social dance programs?
4. Is each item: 1) appropriate; 2) accurate; and 3) interpretable? The items should be clear, concise, and easy to understand.

Expert reviewers were supplied with the working definition of dance self efficacy, with the source of the definition and a description of how the concept was operationalised. Individual dance efficacy items were listed by concept. Reviewers were asked to score items 'essential', 'modify' or 'remove' according to appropriateness, accuracy, and

interpretability, offering comments where relevant. Two sets of expert review documents were prepared (Appendix II) for academic reviewers and dance educators (with less formally 'academic' language for the background section). Supplementary materials defining each dance efficacy concept and development and source information for all items was also available upon request (Appendix III).

Expert Reviewers

Ten reviewers were selected to represent a broad range of expertise, experience, and perspectives, and included academic researchers, health professionals and dance educators, often spanning more than one of these categories. A single reviewer declined. The reviewers had expertise in dance and dance education, psychology, self efficacy, and motivation theory, aging and health, physical activity and lifestyle behaviours, athletic training, occupational therapy, and physiology and motor control. All four dance educators were experienced developing and delivering dance programs for older adults, and three of the four were also academic researchers. Most of the academic and health professionals had specific expertise in dance and health and had conducted research trials in this area, and some had developed or adapted psychometric instruments.

Analytical method

Data analysis of the expert review responses again followed recommendations by DeVellis (2017) and the topic overview by Elangovan & Sundaravel (2021). Item ratings of 'essential', 'modify' and 'remove' were allocated a score of 3, 2, and 1 respectively. An average rating score for each item was calculated, with standard deviations to assess response consistency. We removed the lowest rated items for each concept, although we decided against stipulating a cutoff score for item removal. Some reviewers were unfamiliar with scale construction principles, self efficacy theory, and factors that predict physical activity and leisure activity participation in older adults more generally. Additionally, items recommended for modification by many reviewers were not rated again in their revised form. We therefore reserved the final decision to retain or reject modified items, again in line with DeVellis (2017). We

aimed to remove around half of the original 60 items. All feedback, general and item specific, was collated. Items were edited, reworked or removed as necessary. Original items, item rating scores, the review outcome (accept, modify, remove) and the final version of included items, and all expert reviewer feedback is available in Appendix IV.

Results of expert review and scale preparation

Updated definition of dance efficacy

Following advice from reviewers, for conceptual precision we reverted to Bandura's original wording for the dance self efficacy definition (Bandura, 1997). Additionally, reviewers pointed out incongruence between the working definition of dance efficacy, which refers to self efficacy to be able participate in social dance, and the scale stem, which references confidence 'when dancing'. In response, the stem was simplified, and the specification 'when dancing' was removed, and the current version was modelled on the MESES (Rodgers & Sullivan, 2001). The dance efficacy items, however, still measure both confidence to participate in organised social dance (e.g., I can schedule a weekly dance session) and confidence when dancing (e.g., I can dance in time with the music). Consequently, the definition was updated to reflect the actions required. The final definition of dance efficacy:

A person's beliefs in their capabilities to organise and execute the courses of action required to participate in, and when participating in, organised social dance in the near future.

Final dance efficacy item set

Overall, the dance efficacy items were well received, and expert judgement agreed that the items expressed points of concern, issues, and challenges to older adults' social dance participation. The dance efficacy item set of 55 items was condensed to 31 items through analysis of expert opinion: 17 items remained with modifications, and 14 items remained with major modifications and 24 items were

removed. Following an excellent reviewer suggestion to use the active voice throughout, we revised all items to begin with judgements of capability, generally 'I can' statements. For example, 'remember the steps' became 'I can remember dance steps'. This approach aligns with Bandura's recommendations for self efficacy scale development (Bandura, 2006). The modifications converted most items from subordinate clauses or complex sentences to simple sentences with one independent clause. Standalone statements are easier to comprehend and participants no longer need to refer to the stem to understand each item, reducing cognitive burden for future respondents. Updating the items to include 'I can' statements was the sum change made to 17 of the final 31 items.

In response to reviewer advice, more substantial modifications were applied to the other 14 items included in the final scale. This process did require us to select which feedback to incorporate, as reviewers often did not suggest the same revisions. Generally, the modifications removed ambiguity: The items were revised to be more specific with improved interpretability. Clarifications included references to complicated dances 'with many different steps', specifying that movements would apply to 'the whole body', considering dance session attendance when making 'plans' as well as appointments, and remembering a 'full' dance. Other revisions improved the generalisability of the statements. For example, the item for efficacy for dancing alone, without a partner, was updated to efficacy for 'dancing on my own, without holding on to anything' which applies more broadly to non partnered dancing. The statement referring to stamina to dance for exercise or a workout was revised to 'I have the stamina to dance for a whole session', which is more inclusive of people who would not necessarily participate in dance for the purposes of exercising.

Appraisals of positive and negative emotional states potentially realised through dancing such as capacity to enjoy dancing or fear of falling were largely removed in response to reviewer feedback that self efficacy concerns confidence for the task, not expectations of emotions that occur during task performance. For example, appraisals about capability for performing dance tasks without being afraid of falling were revised to capability judgements about not 'losing balance'. Most of the statements regarding capacity for dance enjoyment were removed from the confidence for dance in a social context efficacy concept, but we did retain two statements that

referred to not being ‘worried about looking silly when dancing’ and ‘worried about what other people think of my dancing’. These items were identified by reviewers with expert knowledge of self efficacy theory as measuring social dance efficacy without capturing similar psychological constructs. We also kept three items from the overcoming psychological and emotional barriers to dance efficacy concept, referring to capability to cope with impediments to enjoy dancing. The items were well rated by reviewers, the topic featured heavily in the older adult focus groups, and there is substantial experimental evidence that enjoyment of a physical activity promotes adherence (Zubala et al., 2017). Some exercise efficacy scales also include items that enquire whether or not people would exercise if they did not enjoy it or it was not fun (McAuley & Blissmer, 2000; Resnick & Jenkins, 2000).

Through expert review response analysis, 24 items were discarded. Item scores within concepts were analysed separately, but some concepts were scored more relevant by reviewers than others overall. Removing poorly scored item by concept retained the integrity of the dance efficacy concepts, informed by the theory driven analysis of the older adult dance participant focus group data and given the pre determined objective to represent task, barriers, and scheduling efficacy for dance. We further decided to keep several lower rated items to preserve Guttman scaled item sets, content that was well represented in the older adult focus group findings, and content related to exercise efficacy. Following reviewer directions, all items referring to correct or incorrect ways of dancing were discarded, for example good posture and getting dance moves right. Other pertinent observations from reviewers that guided our overall decision making included advice to limit the degree of item variability within each concept, and to retain the more general dance efficacy items, despite all items appearing relevant.

In addition to the final 31 dance efficacy items, 4 validity items assessing dance experience and perceived ability for dance relative to peers were retained. Table 18 lists all items included for expert review, item rating scores, and the final item set brought forward for the next stage of scale development. All revisions to the final item are highlighted in bold.

Table 18. Dance efficacy items for expert review listed by concept, the expert reviewer average ratings (with standard deviation (SD)), unique codes and final retained items, with all modifications in bold

ORIGINAL STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing

0-10 confidence scale: 0 = Not confident; 10 = Very confident

UPDATED STEM: Whether or not you have danced before, how confident are you that you can do the following

0-10 confidence scale: 0 = Not confident at all; 10 = Completely confident

Original items	M (SD)	Code	Final items
CONCEPT 1: Confidence for performing dance movements & structured dance sequences			
Keep up with the tempo	2.3 (.87)	-	-
Do stretching, bending and reaching dance movements	2.6 (.71)	1:A	I can stretch, bend and reach with my whole body when I am dancing
Perform dances with turns and changes in direction	2.7 (.5)	1:B	I can dance with turns and changes in direction
Dance in time with the music	2.6 (.74)	1:C	I can dance in time with the music
Dance with good posture and body position	2.4 (.92)	-	-
Dance with good control of my movements	2.1 (.9)	-	-
Perform dances with fast movements and steps	2.5 (7.6)	1:D	I can dance fast movements and steps
Perform complicated dance movements that I have not practiced before	1.9 (.93)	-	-
Dance on my own, without a partner, and not be afraid of falling	2.6 (.53)	1:F	I can dance on my own without holding on to anything and not lose my balance
Perform a dance with cross-over steps and turns and not be afraid of falling	2.2 (.67)	-	-
CONCEPT 2: Perceived cognitive ability for dance tasks: Learning capacity, memory, and executive control			
Learn a simple dance with a basic step pattern that repeats many times	2.5 (.93)	2:A	I can learn a simple dance with a basic step pattern that repeats many times
Learn three new dances in the same dance lesson/session	2.0 (.87)	-	-
Learn a complicated new dance within a short time	2.3 (.87)	2:B	I can learn a complicated dance with many different steps
Remember the steps	2.6 (.74)	2:C	I can remember dance steps

Remember a dance if I had learnt it a week ago	2.4 (.88)	2:D	I can remember a full dance I learned a week ago
Follow instructions from the dance teacher or leader	2.8 (.71)	2:E	I can follow instructions from the dance teacher or leader
Practice a complicated dance until I got it right	2.1 (.64)	-	-

CONCEPT 3: Confidence for dance engagement

Try a style of dancing that is new to me	3.0 (.00)	3:A	I can try a style of dancing that is new to me
Enjoy doing dances that are different from how I remember	2.1 (.99)	-	-
Enjoy dancing freely, with no set steps	2.4 (.92)	-	-
Feel free to dance the way I want to	2.3 (.89)	-	-
Make up my own dance moves	2.6 (.71)	3:B	I can make up my own dance moves
Improve my dancing	2.8 (.71)	3:C	I can improve my dancing

CONCEPT 4: Perceived physical and mental endurance for dance

Overcome the physical effort involved	2.1 (.78)	4:A	I can cope with the physical effort involved in dancing
Have the stamina to dance for exercise or a workout	2.3 (.71)	4:B	I have the stamina to dance for a whole session
Keep dancing when I am hot and breathless and my heart is beating faster	2.1 (.86)	-	-
Keep dancing when it is physically tiring	2.1 (.99)	4:C	I can keep dancing when it is physically tiring
Make the effort to build up my fitness by dancing	2.1 (.84)	--	--
Adapt, change, or avoid dance movements that are uncomfortable for me	2.1 (.84)	-	-

CONCEPT 5: Perceived confidence for dancing in social contexts

Enjoy dancing with a partner I do not know	2.7 (.50)	5:A	I can dance with a partner I do not know
Actively participate in group dance activities	2.8 (.38)	5:B	I can actively participate in group dance activities
Enjoy dancing in a group	2.4 (.88)	-	-
Enjoy dancing with people who have more dance experience than me	2.9 (.38)	5:C	I can dance with people who have more dance experience than me
Enjoy dancing with people who are younger than me	2.6 (.79)	-	-

Enjoy dancing when people are watching me	2.7 (.71)	5:D	I can dance when people are watching me
Not worry about looking silly or foolish when I am dancing	2.4 (.88)	5:E	I am not worried about looking silly or foolish when I am dancing
Not worry that people might watch and judge me when I am dancing	2.3 (.87)	5:F	I am not worried about what other people think of my dancing
CONCEPT 6: Overcoming psychological and emotional barriers to enjoy dancing			
Enjoy doing the classes	2.0 (1.0)	-	-
Enjoy dancing even if I can't dance the way I used to when I was younger	2.9 (.35)	6:A	I can enjoy dancing even if I can't dance the way I used to when I was younger
Stay positive (not get frustrated) when I make mistakes	2.4 (.92)	6:B	I can enjoy dancing even when I make mistakes
Enjoy dancing when I can't get the moves right	2.0 (1.0)	-	-
Enjoy dancing even when I find it difficult	2.6 (.79)	-	-
Enjoy dancing when I can't remember the steps	2.4 (.78)	-	-
Enjoy dancing when I feel I am not dancing very well	2.7 (.49)	6:C	I can enjoy dancing even if I feel I am not dancing very well
CONCEPT 7: Overcoming mental barriers to dance (self-regulation)			
Do dance lessons/sessions when I feel tired	2.8 (.71)	7:A	I can do a group dance session when I am feeling tired
Do dance lessons/sessions when I have no energy	1.8 (.89)	-	-
Do dance lessons/sessions when I am not motivated	2.7 (.71)	-	-
Do dance lessons/sessions when I feel stressed and/or anxious	3.0 (0)	7:B	I can do a group dance session when I am feeling stressed
Do dance lessons/sessions when I feel down or depressed	2.9 (.35)	7:C	I can do a group dance session when I am feeling down or depressed
CONCEPT 8: Overcoming scheduling barriers to regular dance participation			
Find time for one regular dance lesson/session per week	2.5 (.92)	-	-
Schedule a regular dance lesson/session on most weeks	2.8 (.71)	8:A	I can schedule a regular dance session on most weeks
Commit to one regular dance lesson/session per week	2.1 (.99)	-	-
Commit to dancing regularly once a week even when I am busy	2.5 (.76)	8:B	I can commit to dancing regularly even when I am busy

Commit to going to a regular dance lesson/session once a week even when I have family or friends visiting 2.0 (1.0) - -

Prioritise a regular weekly dance lesson/session when making other appointments 2.7 (.76) 8:C I can prioritise a regular weekly dance session when making other **plans and** appointments

VALIDATION ITEMS: Dance experience and perceived relative ability

Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month in the last 10 years? **(binary - yes/no)** 2.5 (.76) 0:A Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) **once per week on most weeks at any time over the last 5 years?**

Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month? **(binary - yes/no)** 3.0 (0) 0:B Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) **once per week on most weeks?**

Imagine you are at a party where other people, and you, are dancing. Compared to the average person of your own age and gender how good a dancer do you think you are? (0-10; Terrible to excellent) 1.9 (.84) - -

I feel I am good at dancing compared to most others my age and gender **(0-10; Strongly disagree to strongly agree)** 2.3 (.95) 0:C I feel I am good at dancing compared to most others my age and gender

I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional **(5-point scale)** 3.0 (0) 0:D I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional

Study 2: Discussion

Study 2 presents an original exploration of dance efficacy in older adults, further developing the construct established in Study 1. The results demonstrate that dance efficacy is a psychological factor that is likely to influence dance program participation and is also related to physical, cognitive, and psychosocial parameters affecting individual capability for dance. Overall, the secondary deductive qualitative analysis of older adult dance participant focus groups found strong support for variability in efficacy for a range of dance tasks, variability in perceived dance task demand, and variability in coping efficacy for barriers to dance participation including scheduling. This analysis, alongside a comprehensive and wide ranging literature review, provided an unusually rich foundation for dance efficacy concept construction and item generation. Dance efficacy construct definition, concepts and items were then substantively refined and enhanced through the expert review process and analysis of expert opinion.

Congruence with Study 1 outcomes and exercise efficacy literature

Study 2 results indicate that the original items reviewed in Study 1 do capture dance task demands and barriers to participation, though some factors were more central than others. *Remembering steps* and coping with the *physical effort* of dancing were frequently described challenges. *Enjoying the dance classes* and cognitive barriers to enjoyment were also common themes. *Remembering directions*, either spatial or instructional, and *keeping up with the tempo* were mentioned as dance tasks, but rarely. *Partner dancing* with a stranger didn't specifically appear as a barrier to participation in the focus group responses, but this social task fits broadly into the category of social dance factors that some older adults found daunting. The Study 1 items did not represent efficacy for dance engagement, overcoming mental barriers to dance (self regulation), and overcoming scheduling barriers to regular dance participation. The original items were evenly distributed across the remaining dance efficacy concept categories.

Analysis of the focus group data also supported the main findings from Study 1. Focus groups described older program participants, less mobile, with poorer physical, cognitive, and motor abilities as less confident dancers who tended to struggle to join in with the dance sessions. The discussions also identified these participants as most unsure of themselves during dance sessions and most likely to leave the program. The confident dancers tended to be the most experienced dancers who were typically also engaged in a wide range of other ongoing social and physical activities. On both an individual and group level, participants frequently described improved dance skill and confidence for dance through concerted practice and effort. The central importance of the increased social support, social engagement, and collective playfulness and enjoyment to facilitate coping with barriers and impediments to skill acquisition and performance success was a dominant feature of the focus group discussions. This closely reflects the literature suggesting that improved efficacy for exercise activities through increased social support promotes adherence.

Strengths and Limitations

Dance efficacy item and concept generation and scale reduction involved comprehensive tool development processes including analysis of participant experiences, previous efficacy tools, and expert opinion. However, we acknowledge some limitations to our scale development approach. The sample of older adult focus group participants which underpinned dance efficacy concept and item construction included no current novice dancers and were all aged care residents. The participants therefore did not represent the experiences, capabilities, and dance efficacy appraisals of people without dance experience, older people living independently in the community or still working, and had few older adults under 70yrs. The participant responses also primarily concerned their immediate experiences of a ballroom and folk dance program which only partially translates to experiences of other dance programs and genres of dance.

We recognise that a variety of researcher driven decisions were not informed by consensus. This includes the change to the active voice ('I can' item statements) the updated dance efficacy definition, stem, and item wording modifications. One of the

strengths of our review process was the diverse backgrounds and expertise represented among the expert reviewers which included academic researchers with and without dance expertise as well as dance educators. This diversity also presented many different and sometimes opposing opinions. While the standard expert review is not intended to be iterative and the sources we used to inform our expert review process did not recommend more than one review round (Boateng et al., 2018; DeVellis, 2017), returning the modified items for second review may have been beneficial in light of the variety of reviewer feedback. We did consider a Delphi study for expert review but felt it unnecessary given item generation was primarily based on the directly reported experiences of older adult dance program participants. Finally, some order effects were also identified for items presented for expert review, such that the first iteration of items with shared content (such as tiredness as a barrier to dancing) was generally scored more favourably than subsequent items. Future expert reviews should randomise items within concepts or categories.

Overall discussion

Contribution to the field of dance for health in older age

There are several unique and essential facets to the two studies presented in this thesis. A novel aspect of Study 1 was the measurement of dance efficacy in older adults, establishing good criterion and construct validity, reasonable known groups validity (with variations across studies), strong predictive validity, and preliminary evidence of responsiveness to change. Perceived dance efficacy at program start was associated with a range of physical, motor, cognitive and psychosocial factors expected to influence dance participation. This association indicates that efficacy for dance may be a robust proxy for factors that impact dance capability. Importantly, dance efficacy was also negatively related to dance program attendance: Older people with low dance efficacy at baseline went on to attend fewer dance sessions, and people with low attendance experienced decreased dance efficacy. It is clear that self efficacy for dance in older adult program participants is a central factor to consider if we want to better understand dance intervention needs and dance intervention effects.

The deductive analysis of dance program participant focus group discussions presented a wide range of dance efficacy and dance task appraisals to further explore the dance efficacy validity constructs initially established in Study 1. These results help illuminate the relationship between dance participation, dance efficacy, and personal and social factors that affect dancing experiences. What was particularly striking was the variety of perspectives and the differences in the reactions and capability judgements among the focus group attendees for the same dance program. It will be important for researchers designing future dance and health studies to make informed decisions about how to better manage the range in dance capability, dance experience, and dance efficacy to better accommodate the needs and abilities of their participants, even if they seem to share key characteristics such as all being aged care residents. It may also be advisable to enact strategies in the early and later stages of the program to

monitor program acceptability, accessibility, differential attrition, as well as dance efficacy.

Furthermore, the Study 2 qualitative results are, to the best of our knowledge, among the first indications in the dance for health literature of negative, adverse reactions among older people to dance program participation in later life. While many participants were able to cope with the challenges presented by the dance sessions, some evidently were not. Accounting for the physical safety of older dancers is already a priority for dance researchers and instructors. Designing psychologically and culturally safe dance programs for health promotion programs that are both challenging and inclusive should be a key topic focus in future dance and health research.

Future direction

To complete the dance efficacy scale for older adults, following best practice in scale development and validation, there are several phases beyond item generation and expert evaluation (Boateng et al., 2018; DeVellis, 2017). First, the items are pre tested for measurement validity, relevance, and interpretability by the target population through cognitive interviewing. The scale items taken forwards are then administered to a representative sample of 200-300 older adults for development, and ideally again on a second, independent sample as part of cross sectional, longitudinal, or experimental study or studies. This data is then employed for item reduction analysis, including assessments of item difficulty, item discrimination, and inter item and item total correlations, followed by extraction of factors to determine the number of domains that fit the observed data. This completes the scale development phase.

The scale is then evaluated. Tests of dimensionality are conducted to assess whether the hypothetical latent structure fits the items across the independent samples or at different time points. Tests of reliability establish internal consistency and whether responding is consistent when repeated. Tests of criterion and construct validity ensure the scale measures dance efficacy in older adults as intended. The final dance efficacy scale will be freely available to dance educators and researchers. To minimise administrative burden and encourage use in community settings, we also

aim to develop an easy to use app to with the final items which automatically calculates dance efficacy total scores with relative score indicators and cut offs. We suggest future research focuses on formally developing a dance efficacy scale for older adults and measuring the impact of dance efficacy on both program attendance and as a mediator of dance participation on health outcomes.

Conclusion

In conclusion, the findings of this thesis shed new light on how one of the most consistent determinants of physical activity behavior in older age self efficacy might operate in the context of social dance program participation. We intend to complete the dance efficacy scale for older adults imminently and recommend in the interim including the preliminary dance efficacy items in future dance intervention trials for older adults as a research tool.

A better understanding of dance self efficacy in older adults would inform and advance dance and health research in several key areas by providing a) improved dance program evaluation; b) data that can be used to refine and individualise dance program design, including the potential introduction of targeted support and efficacy boosting strategies for participants with low dance efficacy, c) a simple approach to pre program screening or streaming for dance capability without extensive testing; and d) a more nuanced understanding of the impact of individual factors that may affect participation in dance programs and the associated health outcomes. Supporting dance participation and enthusiastic engagement with dance programs is integral to realising dance related health gains.

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Appendix I: Original dance efficacy items

Table 19 presents the dance questions as they appeared in the surveys for the two control trials of dance programs for older adults, developed by Professor Dafna Merom.

Table 19. Original dance efficacy item set with stem survey instructions

<i>Whether or not you have danced before, please rate how confident you feel that you can do each of the following when dancing:</i>					
	Not at all confident	Not very confident	Moderately confident	Very confident	Extremely confident
Keep up with the tempo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remember the steps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remember directions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enjoy doing it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overcome the physical effort involved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enjoy dancing with a partner you don't know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix II: Expert Review documentation

Cover letter: Academic researcher

As an academic and professional expert, we request your assistance in reviewing a set of items designed to measure dance self efficacy in older adults. The items were developed by Martha Waugh, a postgraduate student in psychology at Western Sydney University with a background in dance performance and education, and Professor Dafna Merom, an epidemiologist specialising in dance and physical activity in public health.

The development of the questions and documents for expert review followed best practice. The attached document provides background, instructions for expert review, a formal definition of dance efficacy and the items for evaluation. In order not to burden your time, we opted to include only the necessary details for you to understand the context of this research and the resources used. If you are interested in learning more about the development of the dance efficacy concepts and items, we would be very happy to provide the longer document.

We believe it will not take more than 30 minutes for you to review the items and provide the feedback. We ask for a response within 4 weeks, if possible. Please also let us know if you cannot review the items. In this case, we would be grateful if you could propose other experts who would be a good fit.

We appreciate your time and consideration,
Martha Waugh & Dafna Merom

Cover letter: Professional expert dance educators

As an expert dance educator, we request your assistance in reviewing a set of questions designed to measure dance self efficacy confidence for dance in older adults. The items were developed by Martha Waugh, a postgraduate student in psychology at Western Sydney University with a background in dance performance and education, and Professor Dafna Merom, an epidemiologist specialising in dance and physical activity in public health.

The attached document provides background, instructions for expert review, a formal definition of dance efficacy and the questions for evaluation. In order not to burden your time, we opted to include only the necessary details for you to understand the context of this research and the resources used. If you are interested in learning more about the development of the dance efficacy concepts and items, we would be very happy to provide the longer document.

We believe it will not take more than 30 minutes for you to review the items and provide the feedback. We ask for a response within 4 weeks, if possible. Please also let us know if you cannot review the items. In this case, we would be grateful if you could propose other dance educators who would be a good fit.

We appreciate your time and consideration

Martha Waugh & Dafna Merom

Older adults Dance Efficacy Scale (DES-o): Expert review

NOT FOR DISTRIBUTION

Martha Waugh

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Background: Dance efficacy

The potential for dance participation to support physical and cognitive health and mental wellbeing in older people has inspired a proliferation of dance and health research and specialised dance program development over the last decade. However, we have limited understanding of individual differences in capacity for dance program participation among older adults. Self efficacy, or situation specific confidence, is a psychological factor that has been shown to be a strong predictor of engagement with and adherence to an activity. Exercise efficacy in particular is linked to exercise adherence and a range of individual factors that influence exercise participation including functional limitations, physical abilities (McAuley, Szabo, et al., 2011), and psychosocial wellbeing (Miller et al., 2019). Successful exercise programs also improve domain specific exercise efficacy (Higgins et al., 2014; McAuley, Mailey, et al., 2011).

In two large scale dance efficacy trials we piloted six task based dance self efficacy items for older adults living in the community (Merom, Grunseit, et al., 2016) and aged care (Merom, Mathieu, et al., 2016). Efficacy for the task of dancing was weaker in older participants, those with less dance experience, poorer cognitive and physical abilities, insufficiently active, poorer mental health, and with a reduced social network (upcoming publication). At this stage, we are broadening this initial tool to capture other efficacy constructs relevant to the activity of social dancing including motor efficacy, memory efficacy, efficacy for specific skill acquisition, and social efficacy. To address the unique experiences and challenges of older adult dance participants, the current scale is developed for non clinical adults ≥ 65 yrs.

How were the dance efficacy items developed?

The items presented for expert evaluation were developed using inductive and deductive methods. The 'concepts' of dance efficacy were developed through thematic analysis of 10 focus groups of older adult social dance program participants (n = 60) conducted as part of a large scale efficacy trial of a ballroom dance program for falls prevention (Merom, Mathieu, et al., 2016). To ensure strong face validity, individual items were composed from words and phrases used by the older adult dance participants when describing their dance experiences. Other items were developed

deductively by adopting or adapting questions from existing relevant scales and indicators through a literature review and professional dance education experience.

The preparation of these documents for expert review was guided by a summary of approaches outlined by Elangovan and Sundaravel (2021). Information concerning contemporary methods for formal scale development that will direct the development of the Dance Efficacy Scale for Older Adults can be found in an excellent article on the process by Boateng et al. (2018).

Future directions: Dance efficacy scale for older adults

The final dance efficacy scale for older adults will be brief (we are aiming for 15 items) and freely available as a research tool and an easy to use app for dance educators.

Your role as expert reviewer

We request that you help to face validate the dance efficacy items and the domain of dance efficacy applied to older adult social dance program participants. Please read through the dance efficacy definition and score all the items using the 3 point scale (essential, modify or remove) including comments where necessary. Supplementary material is available upon request (full definition of dance efficacy concepts, item development, and technical details).

Key questions

1. Is the domain of dance efficacy in older adults accurately and well defined, and sufficiently sampled?
 - How relevant is each item to the concept of dance efficacy for organised social dance in older adults for the purposes of measurement? Will responses to these items reflect meaningful differences in dance efficacy across the older adult population, and predict an individual's ability to engage and participate in social dance programs?
 - Is each item: 1) appropriate; 2) accurate; and 3) interpretable? The items should be clear, concise, and easy to understand.

Dance efficacy in older adults: Definition

Definition: An older person's perceived ability to participate in organised social dance in the near future

Source of the definition/concept: Self-efficacy refers "to beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1997). Like efficacy for exercise, dance efficacy is conceptualised as a dual construct (Maddux, 1995; Rodgers & Sullivan, 2001), separating task efficacy for performing or engaging with the basic core components of social dance programs and coping efficacy for overcoming barriers to dance participation, including scheduling challenges. Item and concept construction was informed by the Perceived Motor Efficacy Scale factors (Potter et al., 2009). Core components of social dance participation and related challenges were identified from the focus group responses and researcher observation.

Description/Operationalisation of the concept: Task efficacy for dance includes learning, performing, and engaging with and dance in a social context. Barriers make the task of dancing difficult and may include tackling relatively difficult dance tasks and overcoming potential physical and mental barriers such as tiredness, stress, frustration, embarrassment, physical exertion, as well as barriers to committing to regular dance sessions. Level of dance experience/expertise will also be measured.

The target population for this scale is non-clinical older adults ≥ 65 yrs. The items/scale intends to capture efficacy for dance in older people at all levels of dance experience and refers to participation at whatever level of dance expertise a person has currently attained. Organised social dance programs refer to regularly scheduled and organised dance lessons and sessions not including freestyle dancing at clubs and parties. The scale refers to near future dance participation to avoid immediate scheduling issues. Elements specific to dance program design and delivery such as public performances, the influence of the dance teacher, program delivery mode, and perceived program safety have been deliberately excluded so as to maintain scale applicability and universality, although these elements may still affect dance efficacy.

General reviewer comments

Reviewer comments about the items/construct of dance efficacy/ concepts/ scale:

Dance efficacy items

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing: (10 point scale: Not Confident – Very Confident)

Dance Efficacy Items (Not confident – Very confident)		Reviewer response: Appropriate? Accurate? Interpretable?			Reviewer comments
CODE	ITEM	Essential	Modify	Remove	Reviewer comments
eg:A	TEST A	yes			Brief comments
eg:B	TEST B		Yes		This wording or phrase would be better.
CONCEPT 1: Perceived ability to perform dance movements & structured dances					
1:A	Keep up with the tempo				
1:B	Do stretching, bending and reaching dance movements				
1:C	Perform dances with turns and changes in direction				
1:D	Dance in time with the music				
1:E	Dance with good posture and body position				
1:F	Dance with good control of my movements				
1:G	Perform dances with fast movements and steps				
1:H	Perform complicated dance movements that I have not practiced before				
1:J	Dance on my own, without a partner, and not be afraid of falling				

1:K Perform a dance with cross-over steps and turns and not be afraid of falling

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 2: Perceived ability to learn, practice, and recall (remember) dance sequences

2:A	Learn a simple dance with a basic step pattern that repeats many times				
2:B	Learn three new dances in the same dance lesson/session				
2:C	Learn a complicated new dance within a short time				
2:D	Remember the steps				
2:E	Remember a dance if I had learnt it a week ago				
2:F	Follow instructions from the dance teacher or leader				
2:G	Practice a complicated dance until I got it right				

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 3: Confidence for dance engagement

3:A	Try a style of dancing that is new to me				
3:B	Enjoy doing dances that are different from how I remember				
3:C	Enjoy dancing freely, with no set steps				
3:D	Feel free to dance the way I want to				
3:E	Make up my own dance moves				

3:F Improve my dancing

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 4: Perceived physical endurance for dance

4:A Overcome the physical effort involved

4:B Have the stamina to dance for exercise or a workout

4:C Keep dancing when I am hot and breathless and my heart is beating faster

4:D Keep dancing when it is physically tiring

4:E Make the effort to build up my fitness by dancing

4:F Adapt, change, or avoid dance movements that are uncomfortable for me

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 5: Perceived confidence for dancing in social contexts

5:A Enjoy dancing with a partner I do not know

5:B Actively participate in group dance activities

5:C Enjoy dancing in a group

5:D Enjoy dancing with people who have more dance experience than me

5:E Enjoy dancing with people who are younger than me

5:F Enjoy dancing when people are watching me

5:G Not worry about looking silly or foolish when I am dancing

5:H Not worry that people might watch and judge me when I am dancing

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 6: Overcoming mental barriers to dance

6:A Enjoy doing the classes

6:B Enjoy dancing even if I can't dance the way I used to when I was younger

6:C Stay positive (not get frustrated) when I make mistakes

6:D Enjoy dancing when I can't get the moves right

6:E Enjoy dancing even when I find it difficult

6:F Enjoy dancing when I can't remember the steps

6:G Enjoy dancing when I feel I am not dancing very well

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 7: Overcoming personal barriers to dance

7:A Do dance lessons/sessions when I feel tired

7:B Do dance lessons/sessions when I have no energy

7:C Do dance lessons/sessions when I am not motivated

7:D Do dance lessons/sessions when I feel stressed and/or anxious

7:E Do dance lessons/sessions when I feel down or depressed

CODE	ITEM	Essential	Modify	Remove	Reviewer comments
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CONCEPT 8: Overcoming scheduling barriers to regular dance participation

8:A Find time for one regular dance lesson/session per week

8:B Schedule a regular dance lesson/session on most weeks

8:C Commit to one regular dance lesson/session per week

8:D Commit to dancing regularly once a week even when I am busy

8:E Commit to going to a regular dance lesson/session once a week even when I have family or friends visiting

8:F Prioritise a regular weekly dance lesson/session when making other appointments

Dance experience and perceived relative ability items

Dance experience and ability		Reviewer response: Appropriate? Accurate? Interpretable?			Reviewer comments
CODE	ITEM	Essential	Modify	Not essential	Reviewer comments
0:A	Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month in the last 10 years? (yes/no)				
0:B	Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month? (yes/no)				
0:C	Imagine you are at a party where other people, and you, are dancing. Compared to the average person of your own age and gender how good a dancer do you think you are? (Terrible to excellent)				
0:D	I feel I am good at dancing compared to most others my age and gender (Strongly disagree to strongly agree)				
0:E	I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional				

Appendix III: Expert Review Supplementary Materials

Dance efficacy concepts and individual items

Concept 1: Perceived ability to perform dance movements & sequences
Definition: Motor efficacy for the choreographed or improvised dance movements and sequences of dance movements that typically feature in dance lessons or sessions for older adults.
Source of the definition / concept: This concept was predominately informed by the Motor Efficacy scale (Potter et al., 2009) factors 'Perceived physical flexibility', 'Perceived ability to perform precise movements' and 'Perceived motor ability relative to same aged peers' and 'Perceived ability in novel motor contexts'. We also incorporated elements from the Falls Efficacy Scale (FES-I; Yardley et al., 2005) for balance related movement efficacy and the task efficacy factor of the Multidimensional Exercise Self-Efficacy Scale (MESES; Rodgers & Sullivan, 2001).
Description of the concept: This concept refers to efficacy for the basic motor components of social dance participation including movement control and range and postural control, co-ordination of movements to music, executing potentially fast sequences of movements, performing movements that may test balance, and performing unfamiliar movements. Responses may reflect subjective and objective physiological function, physical limitations, and balance.
How is it being adopted? (Operational Definition): items directly refer to types of dance movements and sequences, and situations in dance classes likely to reflect perceived ability for dance movements and sequences.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	1:A	
<i>Item statement</i>	**Keep up with the tempo	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	The synchronisation of steps to music and the ability to maintain co-ordination and pace with tempo increases both draw on motor efficacy and skills acquisition which can improve with practice	
<i>Source</i>	How was the item generated? Developed: Merom (2016) & Merom, Mathieu (2016)	How was it developed? Expert opinion and pilot dance program observation.
<i>Issues</i>		

<i>Item code</i>	1:B	
<i>Item statement</i>	Do stretching, bending and reaching dance movements	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived functional flexibility and mobility as it relates to common dance movements, as well as efficacy for balance while dancing.	
<i>Source</i>	How was the item generated?	Original items: SRAHP: Do stretching exercises (confidence)

	Adapted: Becker (SRAHP; (1993) Potter (2009) & Yardley (FES-I; 2005)	Motor efficacy scale: I feel I am good at activities such as bending down to reach for something (agreement) FES-I: Reaching up or bending down (concern about falling when..)
<i>Issues</i>	Potentially lacks detail about the degree of stretching/bending/reaching	

<i>Item code</i>	1:C	
<i>Item statement</i>	Perform dances with turns and changes in direction	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assess perceived ability to cope with turning and direction changes that typically feature in structured dances and partner dancing. May provide balance challenges.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Developed from focus group responses explaining that the turns and direction changes tested co-ordination and balance: “...one went this way and then all of a sudden had to go that way, and there was a change in direction ... to train the mind so as to make rapid turns which occurs if one trips and falls” 6L.
<i>Issues</i>		

<i>Item code</i>	1:D	
<i>Item statement</i>	Dance in time with the music	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	The synchronisation of steps and movements to music is a primary element of structured dance programs.	
<i>Source</i>	How was the item generated? Developed: Researchers	How was it developed? Expert opinion and pilot dance program observation.
<i>Issues</i>		

<i>Item code</i>	1:E	
<i>Item statement</i>	Dance with good posture and body position	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Structured dance classes generally work towards being able to support the body well while dancing (good postural support) and to work on positioning the body accurately in space (body position). Good postural support is associated with better balance, gait and functional ability in older adults. Also draws on ability to dance with proper technique and placement.	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Rodgers & Sullivan (2001)	How was it developed? Mentioned several times in focus groups as a goal when dancing. E.g. “Standing up straight, balance” 9M. “The normal ballroom dancing... Your posture was good” 9B. MESES: ...complete your exercise using proper technique
<i>Issues</i>		

<i>Item code</i>	1:F	
<i>Item statement</i>	Dance with good control of my movements	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	

<i>Explanation</i>	Captures perceived ability to perform movements with control, which is a core component of both choreographed and improvised dancing. Moving with control is a skill which can be developed through practice and is likely to improve with increased strength, balance and co-ordination ability.	
<i>Source</i>	How was the item generated? Developed: Potter (2009)	Original source items: Motor efficacy scale: I feel confident at adjusting movements to improve their accuracy or efficiency Motor efficacy scale: I expect to be able to shift smoothly from one movement to another
<i>Issues</i>		

<i>Item code</i>	1:G	
<i>Item statement</i>	Perform dances with fast movements and steps	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Increasing the pace of movements and dances is often used to increase challenge in senior dance classes. Can provide balance, co-ordination, and memory challenges. Should differentiate skilled and less skilled dancers.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Frequently mentioned as a difficult aspect of dancing. "Some of [the dance class] was far too fast" 7T. "When the legs have to move pretty quickly, that's when you have a bit of a problem" 1F
<i>Issues</i>		

<i>Item code</i>	1:H	
<i>Item statement</i>	Perform complicated dance movements that I have not practised before	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Provides an estimate of confidence in attempting to perform complicated movements where the challenge is relative to the prior dance experience of the individual. Confident dancers are likely to be more comfortable with tackling novel and difficult dance moves.	
<i>Source</i>	How was the item generated? Adapted: Potter (2009)	Original source items: Motor efficacy scale: I find it more difficult to perform more complex movements if I have not practiced them before*
<i>Issues</i>		

<i>Item code</i>	1:J	
<i>Item statement</i>	Dance on my own, without a partner, and not be afraid of falling	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses falls efficacy in a dance context, specifically the ability to dance alone without holding on to a partner which is a known challenge for people with poor balance and fear of falls.	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Resnick &	How was it developed? SEES: Confidence to exercise if... 10. You were afraid the exercise would make you fall. "I need to hold hands with somebody for stability" 10IS.

	Jenkins (SEES; 2000):	“[After dancing without a partner to test balance] some people would not come if they would have to be on their own in a dance, because they feel uneasy” 1IN.
Issues		

Item code	1:K	
Item statement	Perform a dance with cross-over steps and turns and not be afraid of falling	
Item Scale	10-point scale (0 = Not confident; 10 = Very confident)	
Explanation	Assesses falls efficacy in a challenging dance context, performing a task (turning and cross-over steps where one foot steps across the other, which challenges balance	
Source	How was the item generated? Developed: Focus group responses & Potter (2009)	How was it developed? Motor efficacy scale – I will rarely attempt to master a tricky action* & I rarely avoid certain movements in case I fall. “If you got us moving too quickly, one of us might have taken a tumble” 9S. “[I started the dance program] to try and ahh work on the fear of falling. That was my biggest worry” 7T.
Issues	‘Cross-over steps’ may not be interpretable	

Concept 2: Perceived ability to learn, practice, and recall (remember) dance sequences
Definition: Learning and memory efficacy for simple and complex dance sequences and perceived ability to follow instructions from dance teachers/leaders.
Source of the definition / concept: This concept was informed by basic psychological memory and learning theory, subjective memory efficacy scales (McDonough et al., 2020), dance program focus group responses and the WSU dance and health team’s experience designing and delivering dance programs for older adults.
Description of the concept: This concept reflects learning with and without time pressures, efficacy for dance skill acquisition and short-term and longer-term memory for dance sequences. The concept reflects cognitive challenges of dance participation that are likely to be relevant for improving cognitive function. Responses here may reflect perceived and objective cognitive abilities.
How is it being adopted? (Operational Definition): Items directly refer to learning, memory, and skilled development tasks that feature in in typical dance programs for older adults, as well as situations that some older people may feel challenge their memory and learning capacity for dance.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

Item code	2:A	
Item statement	Learn a simple dance with a basic step pattern that repeats many times	
Item Scale	10-point scale (0 = Not confident; 10 = Very confident)	
Explanation	Assesses perceived ability to learn a basic dance sequence and defines what is meant by a simple dance.	
Source	How was the item generated?	How was it developed?

	Developed: Focus group responses	“If they’d just concentrate on one dance and let us get the basics of that right” 5G. “I would have preferred less steps and more time on each step” 5A. “We learnt basic steps like the jazz waltz and cha cha ... basic dancing” 9S.
<i>Issues</i>	Or ‘repeats frequently’ or ‘with many repeats’?	

<i>Item code</i>	2:B	
<i>Item statement</i>	Learn three new dances in the same dance lesson/session	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Addresses the challenges of learning several new dances in the same session, which dance program participants described as difficult and confusing, and which differentiated skilled and less skilled dancers.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Commonly described challenge. “There were too many dances to remember” 1IN. “If we did one [dance per week] and concentrate on it [that would be better]” 4JO. 4G replied “But that doesn’t suit everybody. There are different levels.”
<i>Issues</i>	May be difficult for novice dancers to know this might be challenging for some	

<i>Item code</i>	2:C	
<i>Item statement</i>	Learn a complicated new dance within a short time	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Time pressure in a learning task increases difficulty and stress. Attempting to learn a difficult dance quickly should differentiate people by perceived skill and confidence.	
<i>Source</i>	How was the item generated? Adapted: Potter (2009) & focus groups	Original source items: Motor efficacy scale: I expect to be able to learn new movements within a short time “The period of time we spent on each step was too short” 5G. “I enjoyed learning the steps as long as I wasn’t pushed too hard. Get confused...” 5D.
<i>Issues</i>		

<i>Item code</i>	2:D	
<i>Item statement</i>	**Remember the dance steps	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Most structured dance sessions have an expectation for the dance participants to become familiar with and remember dance sequences. Draws on memory efficacy and skills acquisition for dance movement sequences.	
<i>Source</i>	How was the item generated? Developed: Merom (2016) & Merom, Mathieu (2016) & McDonough (2020) & focus groups	<i>How was it developed?</i> Included in the original t-bDSE item set. Metamemory in adulthood: I am good at remembering conversations/recipes/ content of news articles. Commonly described challenge. “Definitely challenging to remember the steps” 4JO. “I was struggling at times. Struggling to remember the steps” 2J.
<i>Issues</i>		

<i>Item code</i>	2:E
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<i>Item statement</i>	Remember a dance if I had learnt it a week ago	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived long-term memory and recall for a dance sequence, involving memory efficacy for dance sequences. Remembering and recalling (or becoming familiar with) dances lesson to lesson is a basic component of structured dance programs.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Commonly described challenge. "Our memory is not as good as it used to be so I had trouble remembering the steps from week to week" 5A. "I wouldn't remember the steps from one week to the next" 9C.
<i>Issues</i>		

<i>Item code</i>	2:F	
<i>Item statement</i>	Follow instructions from the dance teacher or leader	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Draws on perceived ability to understand and implement directions in a dance session. Dance program participants described this as effortful concentration, requiring attentional control.	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Rodgers and Sullivan (MESES: 2001)	How was it developed? Participants described following instructions as effortful. "You're following instructions, it's half an hour of really intense..." 10L. MESES: Follow directions to complete exercise (confidence)
<i>Issues</i>		

<i>Item code</i>	2:G	
<i>Item statement</i>	Practice a complicated dance until I got it right	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived patience and perseverance for achieving a complex movement task.	
<i>Source</i>	How was the item generated? Adapted: Potter (2009) and focus groups	Original source items: Motor efficacy scale: I believe I can learn most movements if I set my mind to it "We did the swing waltz this morning and boy that was complicated" 9S. "Just watching people trying to come to grips with learning the steps" 2K.
<i>Issues</i>	This may be more about perseverance than efficacy, but people with higher efficacy for an activity tend to persevere longer.	

Concept 3: Confidence for dance engagement
Definition: Openness to engage with different styles and genres of dance, approaches to dance such as improvisation, creating and experimenting with dance, and confidence for personal dance style and improving dance ability.
Source of the definition / concept: Dance program focus group responses and the WSU dance and health team's experience designing and delivering dance programs for older adults.

Description of the concept: This concept reflects the degree to which individuals are willing to engage with many different aspects of dance including trying dance styles and movement approaches that are unfamiliar to them, and dance in a way that pleases them. The concept also refers to performing familiar dances that have been modified for older adults, and the motivation to improve their dance skills. Responses may be informed by openness to experience, and social efficacy.

How is it being adopted? (Operational Definition): Items refer to prospective dance experiences that are new to the survey respondent, as well as confidence for improvisation, movement creation, motivation to improve dance skills, and perceived efficacy for personal dance expression.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	3:A	
<i>Item statement</i>	Try a style of dancing that is new to me	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Openness to trying different dance styles and ways of moving, and to try unfamiliar types of dancing should be associated with general confidence of dance. The degree of willingness to try new dance genres varied substantially among focus group participants, and while some were relaxed and open to the idea, others rejected it outright.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Participants varied in their enthusiasm for trying different styles of dancing. "I would have a try at anything [dance styles]" 5G. "I danced different styles" 6S. "Ballroom gives people confidence because they've all done it... some level of familiarity" 7T. "[If the classes had been folk dance] I wouldn't have come" 6S.
<i>Issues</i>		

<i>Item code</i>	3:B	
<i>Item statement</i>	Enjoy doing dances that are different from how I remember	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Dance programs for older adults are often adapted and modified to be safe for older adults with functional limitations and poorer balance (e.g. different holds, slower turns, slower footwork, modified cross and backwards steps). Performing familiar classic dances that have been modified for safety was frequently described as off-putting, confusing and frustrating.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Modified ballroom dancing was not well received by some participants: "I didn't like that it was different. It wasn't what I was used to and you had to remember the changes in it" 9B. "It was very modified. Very modified steps" 9M.
<i>Issues</i>		

<i>Item code</i>	3:C	
<i>Item statement</i>	Enjoy dancing freely, with no set steps	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	

<i>Explanation</i>	Assesses efficacy for improvising and experimenting with dance steps. May be more challenging for people who like performing a set task but find it hard to 'freestyle' or move spontaneously with or without a partner.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Some dance program participants wanted more opportunity to freestyle: "You don't do the set steps. You go off and you deviate on your own. That's part of the fun of it!" 6J. "You know the steps but you make up what you do, and on the process it's that experimenting where I really just think ... free" 1C. "[The dance program] wasn't as flowing as [everyday dancing]" 9M.
<i>Issues</i>		

<i>Item code</i>	3:D	
<i>Item statement</i>	Feel free to dance the way I want to	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Explores a person's perception of their confidence to make choices about how they dance and how to interpret structured dances and use dance as personal expression, particularly in a social context.	
<i>Source</i>	How was the item generated? Developed: Researchers and focus groups	How was it developed? Researcher teaching experience & focus groups. Older adults compared structured dance to modern dance practices in clubs: "For a lot of modern dancing there doesn't have to be a right and wrong way to do it" 10L We extended this to reflect confidence to make choices about how you want to dance.
<i>Issues</i>		

<i>Item code</i>	3:E	
<i>Item statement</i>	Make up my own dance moves	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Generating dance movements for creative tasks or improvisation is a feature of many creative dance programs and is something that older adults can initially feel self-conscious and awkward about doing. Confidence is generally built through collective positive experiences and reassurance.	
<i>Source</i>	How was the item generated? Developed: Researchers	How was it developed? Professional dance education experience and observation of dance programs featuring creative tasks and improvisation
<i>Problems/issues/suggestions</i>		

<i>Item code</i>	3:F	
<i>Item statement</i>	Improve my dancing	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Item captures variability in attitudes to acquiring new dance skills. Some dancers will want to actively work on their dance skills and some are resistant to any perceived pressure to improve.	
<i>Source</i>	How was the item generated?	How was it developed? Focus group responses highlighted different attitudes to developing skills for

	Developed: Researchers and focus groups	dance: “I want to improve. I wanted to be better” 5G. “We were much better by the end. A notable improvement” 6L. “My only challenge would be to get better” 5GL. “If they were wanting me to become a great, a good dancer and so on I think that would spoil it and I’d have to say no” 5D.
<i>Problems/issues/suggestions</i>	Potentially is more relevant to motivation and psychological needs (SDT- need for competence) rather than self-efficacy.	

Concept 4: Perceived physical endurance for dance
Definition: Physical endurance and fitness for dance and dancing with age-related functional limitations.
Source of the definition/concept: This concept was informed by a range of exercise and motor efficacy scales including the Motor Efficacy scale (Potter et al., 2009) factors ‘Perceived physical endurance’, Bandura’s Exercise Self Efficacy Scale (ESE, 2006), and the Self-Efficacy for Exercise Scale (SEES; Resnick & Jenkins, 2000), as well as dance program focus group responses and McAuley and colleagues review of self-efficacy, functional performance and functional limitations (2011).
Description of the concept: Perceived physical endurance for dance reflects perceived physically intensity social dance participation and subjective ability to cope with the physical effort involved. The concept also reflects willingness for physical exertion while dancing, dancing for exercise, and confidence for self-management in class. Responses are likely to reflect physical fitness, general exercise behaviour, and current health status.
How is it being adopted? (Operational Definition): Items directly refer to physical effort, stamina and exertion associated with social dancing, dancing for fitness and managing physical functional issues and disabilities in dance class.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	4:A	
<i>Item statement</i>	**Overcome the physical effort involved	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived capacity to overcome the physical effort involved in dancing refers to health status, fitness levels, and mental resilience, all influence exercise efficacy. Poor health is a major barrier for exercise and improving health fitness is a major motivation to exercise.	
<i>Source</i>	How was the item generated? Developed: Merom (2016) & Merom, Mathieu (2016)	How was it developed? Expert opinion and pilot dance program observation. Focus groups: “It was a concern about the dancing [before the program started] and how vigorous it was” 7T.
<i>Problems/issues/suggestions</i>		

<i>Item code</i>	4:B
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<i>Item statement</i>	Have the stamina to dance for exercise or a workout	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Captures perceived ability to engage in, and fitness for moderate-high intensity dance, which affords greater health benefits than light intensity exercise.	
<i>Source</i>	How was the item generated? Developed: Potter (2009) & focus groups	Original source items: Motor efficacy scale: I consider myself to have good physical stamina “A very good workout” 10T. “We haven’t got the stamina” 10J. “I was just so happy with the exercise part of it” 6S. “People... haven’t done any exercise for years and they are a bit worried about starting” 1IN.
<i>Problems/issues/suggestions</i>	Not everyone wants to dance for exercise and are free to choose not to.	

<i>Item code</i>	4:C	
<i>Item statement</i>	Keep dancing when I am hot and breathless and my heart is beating faster	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Describes physiological responses to episodes of exercise that may be uncomfortable and undesirable for some older adults. However, exercising towards maximum capacity to challenge the body sufficiently is required to induce improvements in physiological parameters relevant to health improvements and should be encouraged. Also is an indicator of poor health and exercise efficacy.	
<i>Source</i>	How was the item generated? Developed: Bandura (ESE; 2006) & focus groups	Original source items: ESE: [perform exercise] when I feel physical discomfort when I exercise Focus groups: “After the dancing, we were all pretty hot... They were hot and bothered after that” 1F. “As the classes went on... I wasn’t getting so breathless” 3G. “[The dance classes] certainly got the heartbeat going” 8I.
<i>Problems/issues/suggestions</i>	Not everyone wants to dance for exercise and are free to choose not to. Breathless may be better described as ‘out of breath’ or ‘breathing hard’	

<i>Item code</i>	4:D	
<i>Item statement</i>	Keep dancing when it is physically tiring	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived capacity to overcome physical tiredness when dancing. Will tap into exercise efficacy, perceived fitness and mental resilience.	
<i>Source</i>	How was the item generated? Adapted: Resnick and Jenkins (SEES:	Original source items: SEES: [exercise regularly if] You felt tired during or after exercise Focus groups: “It was a bit tiring, but we didn’t mind it” 8M. “With all the

	2000) & focus groups	movement that you had, when I went home, I was really tired” 4M. “I did find it tiring” 6J. “It’s surprising how tired you get. It does have an effect.” 10T.
<i>Problems/issues/suggestions</i>		

<i>Item code</i>	4:E	
<i>Item statement</i>	Make the effort to build up my physical fitness by dancing	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Captures perceived ability improve levels of fitness through dancing. Improved capacity for dance over time was referred to regularly and with pride in the accomplishment of developing fitness for dance over time thorough repeated effort and commitment.	
<i>Source</i>	How was the item generated? Developed: Researchers and focus groups	How was it developed? Focus groups: “The fitness I thought was important [to joining the program]” 10IS. “As the classes went on, I found the [intensity] level dropped and I think it was purely a matter of me being more physically conditioned to doing that” 3G.
<i>Problems/issues/suggestions</i>	One older adult pointed out that motivation to dance for seniors is not to get fit, but to socialise. This was contradicted by others, but is still a consideration because you don’t need to feel that you must build up fitness by dancing in order to be confident about social dancing.	

<i>Item code</i>	4:F	
<i>Item statement</i>	Adapt, change or avoid dance movements that are uncomfortable for me	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Captures the perceived ability to self-manage during dance sessions, and the confidence to dance at a level that is suitable with respect to current ability.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Older adults explained that they managed their own participation: “Most of the people ... understood their own limitations” 2J. “You learn what movements not to do” 3G. “You adapted [the movements you couldn't do]. You were able to figure it out, if you had to turn you would turn your body. You could still do [the moves] and then adapt it to your disabilities” 2J.
<i>Problems/issues/suggestions</i>		

Concept 5: Perceived confidence for dancing in social contexts
Definition: Confidence for the social and interactive aspects of dance program participation
Source of the definition /concept: This concept was informed predominately by dance program focus group responses and the WSU dance and health team’s experience designing and

delivering dance programs for older adults, but also by the Perceived Social Self-Efficacy Scale (PSSE; Smith & Betz, 2000).

Description of the concept: Confidence for the social aspects of dance participation reflects subjective ability to enjoy dancing in a group including diverse groups in terms of dance experience and age. The concept also refers to how comfortable people are dancing with strangers, being watched while they dance, and potentially feeling self-conscious about their dance ability or how they dance. Responses may reflect degree of extraversion and social efficacy.

How is it being adopted? (Operational Definition): The items refer to social aspects of dance participation such as dancing in a group, dancing with strangers, and being watched, often framed as ability to enjoy dancing under these circumstances. Some items also ask participants whether they are worried about things dance program participants may feel self-conscious about, such as looking silly or being judged.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	5:A	
<i>Item statement</i>	**Enjoy dancing with a partner I do not know	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	This item relates to several features fairly unique to dance including comfort with being in close physical contact with strangers and co-operation to co-ordinate movement with another person, tapping into social efficacy. While positively framed, this item challenges the respondent to consider an aspect of dance participation which may compromise their social experience and impact motivation to participate.	
<i>Source</i>	How was the item generated? Developed: Merom (2016) & Merom, Mathieu (2016)	How was it developed? Expert opinion and pilot dance program observation.
<i>Problems/issues/suggestions</i>		

<i>Item code</i>	5:B	
<i>Item statement</i>	Actively participate in group dance activities	
<i>Item Scale</i>	10-point scale (0 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to be an active participant in a general group dance activity.	
<i>Source</i>	How was the item generated? Adapted: Smith & Betz (PSSES; 2000)	Modifications: Added 'dance' to original item – 'Actively participate in group activities'.
<i>Problems/issues/suggestions</i>		

<i>Item code</i>	5:C	
<i>Item statement</i>	Enjoy dancing in a group	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses the degree to which a participant believes they will enjoy dancing in a group. Enjoyment (prospective or realised) is	

	a key component that drives motivation to start and adhere to an exercise activity (Ryan et al., 1997) including dance programs for older adults (Coogan et al., 2021).	
<i>Source</i>	How was the item generated? Adapted: Becker (SRAHP; 1993) & focus groups	Modifications: Many exercise self-efficacy scales include an item assessing perceived ability to continue regular exercise when a person does not enjoy it. E.g. SRAHP: [How well can you] Find ways to exercise that I enjoy Focus groups regularly referred to the enjoyment of group dancing: “I didn’t realise the camaraderie of dancing” 2K. “We had a lot of fun” 9P.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	5:D	
<i>Item statement</i>	Enjoy dancing with people who have more dance experience than me	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses willingness and confidence to dance with other people with more dance experience. This theme featured prominently in discussions with older adult dance program participants, and respondents varied substantially in their enthusiasm for dancing with more experienced dancers.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Some described dancing with more experienced dancers as helpful and inspiring while others found it intimidating and challenging: “There is nothing worse than going into a class where people have been doing it. You feel inferior” 4JO. Having a [mixture of abilities] was helpful and everybody got better as the weeks went on” 6S. “there were others in the group that were really used to dancing... Too fast for me” 5D. “There were frustrations. Everyone was at different stages” 4GL.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	5:E	
<i>Item statement</i>	Enjoy dancing with people younger than me	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses willingness and confidence to dance with younger people.	
<i>Source</i>	How was the item generated?	How was it developed?

	Developed: Researchers	Researcher reflected on their own experience as an older adult dancer in a class with a wide age range.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	5:F	
<i>Item statement</i>	Enjoy dancing when people are watching me	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	The degree to which older people are comfortable being watched while they are dancing is likely to reflect several factors including extraversion, social efficacy, perceived dance ability and the degree of self-consciousness regarding performing tasks including learning, skill acquisition, and motor performance while being around other people.	
<i>Source</i>	How was the item generated? Developed: Rose (Gold-DSI; 2020) & Steelman (TARS; 2019) & Focus groups	Modifications: Gold-DSI: I like dancing in front of people TARS: I worry that people will watch and judge me. Focus groups: “[Older adults may be] just self-conscious] about dancing” 10T. “These self-conscious men who say ‘no I don’t want to dance’” 10H.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	5:G	
<i>Item statement</i>	Not worry about looking silly or foolish when I am dancing	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	This captures a person’s anxiety about failing, making mistakes, or not being competent at dancing in public, or doing something in a dance class that they find embarrassing.	
<i>Source</i>	How was the item generated? Developed: Rose (Gold-DSI; 2020) & Steelman (TARS; 2019) & Focus groups	Modifications: Gold-DSI: I find dancing really embarrassing TARS: I worry I will look silly or foolish [while doing the task] Focus groups: “There was one [dance program participant] who felt that he was making a mess of it and didn’t want to keep coming” 6L.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	5:H	
<i>Item statement</i>	Not worry that people might watch and judge me when I am dancing	

<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Examines both the degree to which older people are comfortable being watched while they are dancing and anxiety about being judged while performing a range of tasks in public.	
<i>Source</i>	How was the item generated? Developed: Rose (Gold-DSI; 2020) & Steelman (TARS; 2019) & Focus groups	Modifications: Gold-DSI: I find dancing really embarrassing TARS: I worry that people will watch and judge me. Focus groups: '[Older adults may be] just self-conscious] about dancing" 10T. "These self-conscious men who say 'no I don't want to dance'" 10H.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

Concept 6: Overcoming mental barriers to dance
Definition: Dance-related resilience or overcoming mental barriers to enjoy social dance engagement such as tendencies towards perfectionism, coping with making mistakes, and not performing in line with personal expectations.
Source of the definition / concept: This concept was informed by dance program focus group responses and the WSU dance and health team's experience designing and delivering dance programs for older adults. We also drew on other qualitative research on experiences of dance participation such as Coogan and colleagues paper outlining motivations and determinants of engagement in a social dance program for older adults (Coogan et al., 2021).
Description of the concept: Dance resilience concerns the ability to enjoy dancing in the face of personal challenges. These challenges may include not being able to perform as well as the person would have liked, and coping with functional, cognitive and perceived dance performance limitations.
How is it being adopted? (Operational Definition): Items refer to aspects of the experience of social dancing that may be frustrating, embarrassing, disheartening, and challenging to cope with.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	6:A	
<i>Item statement</i>	**Enjoy doing the classes	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Enjoyment (prospective or realised) is a key component that drives motivation to start and adhere to an exercise activity (Ryan et al., 1997) including dance programs for older adults (Coogan et al., 2021).	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various) & Merom	Original source items: Many exercise self-efficacy scales include an item assessing perceived ability to continue regular exercise when a person does not enjoy it. For example, BARSE: I believe I could exercise [regularly] if ... it

	(2016) & Merom, Mathieu (2016)	was not fun or enjoyable. SEE: Confidence for [regular] exercise if ... You did not enjoy it.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	6:B	
<i>Item statement</i>	Enjoy dancing even if I can't dance the way I used to when I was younger	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	This item orientates dance ability in the context of aging, and coping with age-related changes in ability for dancing.	
<i>Source</i>	How was the item generated? Developed: Focus group responses	How was it developed? Participants talked about being confronted by and having to accept that they were not able to dance the way they could when they were younger: "I can't do the mad dancing I used to" 2JO. "I expected to waltz out onto the floor like I did 50 years ago and someone said 'well, that just doesn't happen, you know' obviously no. I found the first week really hard" 6M. "The years have caught up with me" 9S.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	6:C	
<i>Item statement</i>	Stay positive (not get frustrated) when I make mistakes	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Every dancer makes mistakes in dance lessons, and the ability to be patient with yourself and not get too frustrated when you can't get something right or can't master a particular move is key to enjoying and moving forward in class. Staying positive about your ability to master an activity reflects efficacy for that activity (Bandura, 1997).	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Researchers	How was it developed? Participants talked about the challenge of acquiring dance skills: "When we first started, I couldn't remember anything [of the steps/dances]. You remember how I used to get angry? But I remembered everything by the last" 6S. "We made a lot of mistakes and we laughed a lot" 2M. "[Forgetting the steps] was annoying" 2J. Also, personal dance and education experience of the researchers
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	

<i>Problems/issues/suggestions</i>	
<i>Remarks by reviewer</i>	

<i>Item code</i>	6:D	
<i>Item statement</i>	Enjoy dancing when I can't get the moves right	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived ability to enjoy social dancing when a person is not able to execute part of the task of dancing, which may be frustrating or embarrassing, independent of skill level.	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Researchers	How was it developed? Participants talked about how they faced and coped with challenges in dance classes: "I just couldn't get it" 6J. "I thought it was fantastic. I couldn't quite get some of it" 9P. "If they'd just concentrate on one dance and let us get the basics of that right, and then move on to another one" 5G.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	6:E	
<i>Item statement</i>	Enjoy dancing even when I find it difficult	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived ability to enjoy social dancing when a person is finding the classes challenging in some way that is personal to the individual, independent of skill level.	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Researchers	How was it developed? Participants talked about how they faced and coped with challenges in dance classes: "If something was difficult I would just, you know. Some would sit down a little bit more than others" 6J. "Some of it was far too fast. I just found it too difficult" 7T.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	6:F	
<i>Item statement</i>	Enjoy dancing when I can't remember the steps	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived ability to enjoy social dancing when a person is not able to remember dance sequences, which may be frustrating or embarrassing, independent of skill level.	
<i>Source</i>	How was the item generated?	How was it developed? Participants talked about how they faced and coped with challenges in dance classes: "I was struggling at times.

	Developed: Focus group responses & Researchers	Struggling to remember the steps” 2J. “Definitely challenging to remember the steps” 4JO
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	6:G	
<i>Item statement</i>	Enjoy dancing when I feel I am not dancing very well	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Assesses perceived ability to enjoy social dancing when a person believes they are not performing the task well, independent of skill level	
<i>Source</i>	How was the item generated? Developed: Focus group responses & Researchers	How was it developed? Participants talked about how they faced and coped with challenges in dance classes: “There was one [dance program participant] who felt that he was making a mess of it and didn’t want to keep coming” 6L. “I had a husband who didn’t dance very well, but we got around the floor and was very good and was something for me when you are able to progress” 4GW.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

Concept 7: Overcoming personal barriers to dance
Definition: Perceived ability to cope with individual factors, often transient and demotivating, that affect dance program participation
Source of the definition / concept: This concept is a dominant feature of most exercise efficacy scales, describing the ability to cope with barriers to completing regular exercise.
Description of the concept: Perceived ability to overcome transient or characteristic personal barriers to participating in organised social dance such as being tired, not being motivated, or feeling stressed, anxious or depressed.
How is it being adopted? (Operational Definition): Items refer to ability to do the dance lessons or sessions when feeling a certain way that may cause a person to decide not to attend.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	7:A
<i>Item statement</i>	Do dance lessons/sessions when I feel tired
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)

<i>Explanation</i>	Evaluates perceived ability to do the dance sessions despite feeling tired.	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various) & focus groups	Original source items: Many exercise self-efficacy scales include an item assessing perceived ability to continue regular exercise when a person is tired. For example, ESE: Can exercise ... when I am feeling tired. SEE: Confidence for [regular] exercise if ... You felt tired. Dance participants commented on tiredness before, during and after class: "A lot of that [finding class tiring] would depend on how you felt yourself on that particular day. I'm a bit tired today" 6S.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	7:B	
<i>Item statement</i>	Do dance lessons/sessions when I have no energy	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Evaluates perceived ability to do the dance sessions despite not feeling energetic	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various)	Original source items: Exercise self-efficacy scales include an item assessing perceived ability to continue regular exercise when a person has low/no energy. For example, MESES: Confident I can ... exercise when you lack energy.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	7:C	
<i>Item statement</i>	Do dance lessons/sessions when I am not motivated	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Evaluates perceived ability to do the dance sessions despite lacking motivation	
<i>Source</i>	How was the item generated? Developed: Focus groups & Researchers	Original source items: Some dance program participants struggled with motivation: "Sometimes I'd think I couldn't be bothered going" 9C. "[Some people] dropped off [doing the dance program] just because they lost interest" 6J. "I'm a bit lazy" 5G." "I was bored by the end of the program" 6J.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	

<i>Problems/issues/suggestions</i>	
<i>Remarks by reviewer</i>	

<i>Item code</i>	7:D	
<i>Item statement</i>	Do dance lessons/sessions when I feel stressed and/or anxious	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Evaluates perceived ability to do the dance sessions despite feeling stressed and/or anxious. Anxiety and stress tend to be barriers to social activities and exercise.	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various) & focus groups	Original source items: Exercise self-efficacy scales typically include an item assessing perceived ability to continue regular exercise when a person is stressed or anxious. ESE: [Can exercise] when I am feeling anxious. SEE: [Confidence to exercise regularly if] you felt stressed. Focus group participants talked about feeling of anxiety: “there’s much more anxiety when you’re older too. I get quite anxious about things” 1F.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	7:E	
<i>Item statement</i>	Do dance lessons/sessions when I feel down or depressed	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Evaluates perceived ability to do the dance sessions despite having a low mood or feeling depressed. Low mood or depression affects social efficacy and is a barrier to exercise.	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various)	Original source items: Exercise self-efficacy scales typically include an item assessing perceived ability to continue regular exercise when a person is depressed or low: ESE: [Can exercise] when I am feeling down or depressed. SEE: [Confidence to exercise regularly if] you felt depressed.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

Concept 8: Overcoming scheduling barriers to regular dance participation
Definition: Confidence for regularly including a dance lesson/session in a person’s schedule and managing other commitments to prioritise attending.
Source of the definition / concept: The concept appears as a factor in many exercise efficacy scales as a scheduling efficacy factor, including the Multidimensional Exercise Self-Efficacy Scale (MESES; Rodgers et al., 2008), Exercise Self-Efficacy Scale (ESE, Bandura,

2006), and the Self-Efficacy for Exercise scale (SEE; Resnick & Jenkins, 2000). The concept was also informed by focus group responses.

Description of the concept: This concept captures perceived ability to find time for, commit to and prioritise regular dance program attendance once per week on most weeks (excluding reasons for non-attendance such as holidays, illnesses, and caring responsibilities).

How is it being adopted? (Operational Definition): Items refer to ability to and willingness to fit dance into a person’s regular schedule and routine, as well as committing to dance under more challenging or inconvenient circumstances.

STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing:

<i>Item code</i>	8:A	
<i>Item statement</i>	Find time for one regular dance lesson/session per week	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to manage a personal schedule such that a person can fit in a regular dance class every week.	
<i>Source</i>	How was the item generated? Developed: Exercise efficacy scales (various) & focus groups	Original source items: Scheduling efficacy, finding time for exercise, features heavily in scales: ESE: [Can exercise] when I have other time commitments Focus group participants talked about time pressures for the dance program: “You have to make sure you have time for it because there are so many other things going on” 1IN. “You have to find the time to make it” 8M.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	Issues with the stem statement “when dancing”? Also the ability to find time may be confounded by whether or not a person wants to find time as well as if they could find the time.	
<i>Remarks by reviewer</i>		

<i>Item code</i>	8:B	
<i>Item statement</i>	Schedule a regular dance lesson/session on most weeks	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to manage a personal schedule such that you can schedule a regular once per week on most weeks (excluding holidays etc.).	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various) & focus groups	Original source items: Scheduling exercise items appear in most Exercise self-efficacy scales: MESES [Confidence to] arrange schedule to include regular exercise Focus group participants talked about scheduling pressures for the dance program: “How [dance class] fits in with other things” 8J. “I’ve got too much that I do outside and it does take up a lot of time” 6MB.

<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)
<i>Problems/issues/suggestions</i>	Issues with the stem statement “when dancing”?
<i>Remarks by reviewer</i>	

<i>Item code</i>	8:C	
<i>Item statement</i>	Commit to one regular dance lesson/session per week	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to commit to attending a weekly dance class.	
<i>Source</i>	How was the item generated? Developed: Exercise efficacy scales (various) & focus groups	Original source items: Perceived ability to commit to regular exercise appears in most exercise efficacy scales: ESE: [Can exercise] when I have other time commitments. Focus group participants frequently talked about how hard it was to commit to the dance program: “[2 classes per week] I found it a tremendous commitment” 1E. “Two days a week was quite a commitment really” 2J. “We are old and retirement and all the rest of it, but we still have many commitments” 8E.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	Issues with the stem statement “when dancing”?	
<i>Remarks by reviewer</i>		

<i>Item code</i>	8:D	
<i>Item statement</i>	Commit to dancing regularly even when I am busy	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to commit to attending a weekly dance class when a person is busy with other things, prioritising their own exercise and activities.	
<i>Source</i>	How was the item generated? Adapted: Exercise efficacy scales (various) & focus groups	Original source items: Committing to regular exercise despite being busy also appears regularly in exercise efficacy scales: SEE: [Confidence to exercise regularly if] you were too busy with other activities. Focus groups regularly mentioned being busy: “We’re all so busy when we’re retired!” 10A. “we are all busy. We all have a lot of things happening”3J.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	Issues with the stem statement “when dancing”?	
<i>Remarks by reviewer</i>		

<i>Item code</i>	8:E	
<i>Item statement</i>	Commit to going to a regular dance lesson/session even when I have family or friends visiting	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	

<i>Explanation</i>	Perceived ability to commit to attending a weekly dance class when a person has visitors, prioritising their own exercise and activities over friends and family obligations.	
<i>Source</i>	How was the item generated? Developed: Exercise efficacy scales (various) & focus groups	Original source items: Prioritising exercise when visitors are around is assessed by many exercise efficacy scales: ESE: [Can exercise] when visitors are present. Focus group participants described not going to dance classes when they had visitors: "If I had a choice between family and the dancing, of course family" 5H.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	Issues with the stem statement "when dancing"?	
<i>Remarks by reviewer</i>		

<i>Item code</i>	8:F	
<i>Item statement</i>	Prioritise a regular dance lesson/session when making other appointments	
<i>Item Scale</i>	10-point scale (1 = Not confident; 10 = Very confident)	
<i>Explanation</i>	Perceived ability to prioritise attending a weekly dance class when making various appointments (personal or health related for example).	
<i>Source</i>	How was the item generated? Developed: Focus groups	Original source items: Dance program participants talked about scheduling clashes: "There is always an appointment or thing they've got on their calendar" 6MB. :We used to have drop outs because of medical appointments, holidays, other challenges" 6S. "Some people have to go to the doctor or specialist once a month, or I go to the physio. Older people have things on in the morning for their health" 1IN.
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	Issues with the stem statement "when dancing"?	
<i>Remarks by reviewer</i>		

Dance experience and perceived relative ability

Concept 9: Dance experience & ability relative to same aged peers
Definition: Recent past dance experience, current dance practice and perceived freestyle dance confidence relative to same aged and gender peers
Source of the definition /concept: This concept was informed by the Motor Efficacy scale (Potter et al., 2009) factor 'Motor ability relative to same aged peers', the Goldsmith Dance Sophistication Index (Rose et al., 2020), and a study on confidence for dance ability for different ages and genders by Lovatt (2011).
Description of the concept: Past dance experience and current dance practice account for recent dance exposure. Perceived dance confidence for 'freestyle' dance ability relative to

others the same age/gender is an indicator of generalised confidence in social dancing ability and competence.

How is it being adopted? (Operational Definition): Past dance experience is measured by past (10yrs previous) and current attendance at social dance sessions and lessons at least once per month, or classification of experience level. Perceived relative ability is framed relative to peers of the same age and gender.

<i>Item code</i>	0:A	
<i>Item statement</i>	Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month in the last 10 years?	
<i>Item Scale</i>	Binary (yes/no)	
<i>Explanation</i>	Past experience of regular structured dance sessions including social dancing and dance lessons (excluding free dancing at parties) will influence dance ability. Restricted time frame ensures similar levels of physical and cognitive functioning while omitting early life dance experiences which are less relevant to current dance abilities.	
<i>Source</i>	How was the item generated? Adapted: Merom, 2016 & Merom, Mathieu, 2016	Modifications if adapted? Edited for brevity
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	0:B	
<i>Item statement</i>	Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month?	
<i>Item Scale</i>	Binary (yes/no)	
<i>Explanation</i>	Current regular dance practice is likely to support dance confidence, dance ability, predict dance program adherence and may have conferred dance-related health benefits.	
<i>Source</i>	How was the item generated? Adapted: Merom, 2016 & Merom, Mathieu, 2016	Modifications if adapted? Edited for clarity and brevity
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	0:C	
<i>Item statement</i>	Imagine you are at a party where other people, and you, are dancing. Compared to the average person of your own age and gender how good a dancer do you think you are?	
<i>Item Scale</i>	10-point scale (1 = Terrible; 5 = Average; 10 = Excellent)	
<i>Explanation</i>	Developed as an indicator of how someone feels about their own 'freestyle' dance ability relative to peers of the same age and gender	

<i>Source</i>	How was the item generated? Adopted: Lovatt (2011)	Modifications? Scale changed from 7-point to 10-point
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	0:D	
<i>Item statement</i>	I feel I am good at dancing compared to most others my age and gender	
<i>Item Scale</i>	10-point scale (1 = Strongly disagree; 10 = Strongly agree)	
<i>Explanation</i>	Simplified version of 0:C. 'Sex' changed to gender to reflect inclusive gender terminology. Should differentiate more and less confident dancers.	
<i>Source</i>	How was the item generated? Adapted: Potter et al. (2009)	Original item? 'I feel I am good at sports or other leisure activities compared to most others my age/sex'
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>		
<i>Remarks by reviewer</i>		

<i>Item code</i>	0:E	
<i>Item statement</i>	I would classify my level of experience with dancing as:	
<i>Item Scale</i>	None at all; Beginner; Intermediate; Advanced; Professional	
<i>Explanation</i>	Respondents place themselves in a category according to perceived level of experience with dance from novice to professional.	
<i>Source</i>	How was the item generated? Adopted: Rose (Gold-DSI; 2020)	Modifications? None
<i>Evaluation</i>	Essential / Not Essential / Modify (delete/highlight as required)	
<i>Problems/issues/suggestions</i>	May be a more efficient way of establishing dance experience than asking about regular or current attendance at dance sessions.	
<i>Remarks by reviewer</i>		

Appendix IV: Expert review feedback

Reviewer comments: Dance efficacy definition & stem

EQ: For conceptual precision, I would be tempted to use the original language from the Bandura definition of self-efficacy in your definition. E.g., an older person's beliefs in one's capabilities to organise and execute the courses of action required *to participate in organised social dance in the near future*.

The stem for the items below refer to being able to do the following when dancing. So this is about self-efficacy when dancing, not self-efficacy to actually be able to participate. The stem and the definition need to be more in sync I think. Should the definition change to reflect actions required when participating in, rather than to participate in?

LFL: [STEM] Is this how confident they can that they can do these, or how confident they are when doing these movements? I know subtly different, but I find this hard to understand

General reviewer comments

RWa: Suggest to remove inferences to "right or wrong", or wording that may bias responses by inciting expectations of performance of particular movements or steps, e.g. "turns", "good posture".

In relation to balance, there are enough references to balance/stability, with a few suggestions for modifications to items in Concept 1 described below.

Could add items on perception of endurance/stamina to complete a whole dance session/lesson. Currently, only a couple of questions (4:A & 4:B) about stamina/endurance, but these contains ambiguity in wording and meaning.

Could add questions about level of intensity of the dance session/movements/steps (i.e. perceived ability to engage in dance of light, moderate, vigorous intensity)

RWh: I think in general all the items are relevant and worded well. My main thought is that the items vary quite a lot within each concept. That's not to say that's a problem, but in terms of which are essential and which to remove within a construct, it's hard to say whether tempo, turns, or steps are most important in terms of ability to perform dance. If there were a lot of overlap in the comments, it would be easy to see which items load best in the analysis step, but I anticipate it may be hard to choose which items you retain if they have similar stats because the wording is so specific that you may get very different results if concept 1 is based on music or turns for example. Makes me wonder if the more general comments are the better ones even though almost all of the below items I think are relevant.

Only other general overall comment is that the items focusing on enjoy rather than capability, in general, may be the least self-efficacy ones.

AAH: As I read through I saw many items that have been expressed as points of concern for older dancers I have worked with so I believe that the collection of concepts, generally, are addressing important factors for older people's dance efficacy.

A concept that wasn't explicitly mentioned is balance. Older dancers often mention concerns with balance getting the way of their ability to do well in classes (I have mostly taught ballet with older adults). I encourage the researchers to consider the inclusion of a balance-specific item, should balance be an important factor for achieving the movements in social dance activities.

There are several items relating to physical capabilities that I feel aren't universal. These are statements such as continuing to dance while tired or breathless, which would be unsafe from some older people. For the scale to be universal, it will require items that take into consideration the diversity of older people's physical capabilities.

JB: The definition and concepts noted above regarding dance efficacy for older adults seem appropriate and well explained. Perhaps consideration could also be given to additional potential barriers to older adults participating in dance, such as self-confidence, motivations and willingness to try new experiences or new ways of moving.

JA: Good description

Consider a combination of qualitative and quantitative

Clinician (Practitioner) and Patient (Self) Reported Outcomes – CRO and PROs

CG: Thanks for asking for my feedback. I think it important to know how older adults feel about dance. I have filled in some comments and my general notes are below. Good luck with the research.

I think there is also a stigma in dance – particularly the men – and I feel perhaps some questions about this may be important to understand disengagement.

- “Do you think dance is exercise - comment”
- “ Is there anything/What is it that stops you from attending a dance class and/or dancing in a social setting”
- “how is a dance class different from an exercise class?”
- Would you attend an exercise class set to music - but not called a dance class?

Perhaps also a few questions about if they DO attend a dance class or dance socially, does this make them feel uplifted?

Does it improve their mood?

Is it the social aspect of the class? Or the physical that you think make you feel energised?

Eg) Section 7: I think add a question about “if you manage to attend a class when feeling down, does this improve your mood”. This is an important discovery.

Dance efficacy items/concepts

ORIGINAL STEM: Whether or not you have danced before, please rate how confident you feel that you can do the following when dancing: (10 point scale: Not Confident – Very Confident)

UPDATED STEM: Whether or not you have danced before, how confident are you that you can... (0-10 confidence scale: 0 = Not confident at all – Completely confident)

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
1	CONCEPT 1: Perceived ability to perform dance movements & structured dances	n/a		Confidence for performing dance movements and structured dance sequences
JA: Self?				
1:A	Keep up with the tempo	2.3 (.87)	Remove	
CG: Maybe add 'at most times' at the end				
JA: Music? Steps? – consider word 'comfortable'				
RWh: Would people who have not danced before know what tempo is?				
JB: Perhaps re-word to sound less 'competitive', e.g., 'Move at varying speeds'				
1:B	Do stretching, bending and reaching dance movements	2.6 (.71)	Modify	I can stretch, bend and reach with my whole body when I am dancing
JA: Upper or lower body or whole body?				
AAH: These concepts have not been raised as points of concern or impacting on confidence for dancers I have worked with.				
LFL: Remove 'do'				
JB: consider 'bending, extending and releasing dance movements' or similar.				
1:C	Perform dances with turns and changes in direction	2.7 (.5)	Modify	I can dance with turns and changes in direction
CG: Add something about the speed of turns/direction changes				
RWa: Remove "turns", as "changes in direction" includes turns. Perhaps add "confidently" at the beginning of this to obtain information of perceived balance/stability and fear of falling.				
LFL: 'Dances with turns...' etc				
JB: Possibly use 'movements' or 'dance sequences' rather than 'dances'.				
1:D	Dance in time with the music	2.6 (.74)	Accept	I can dance in time with the music
JA: Combine with 1:A				
1:E	Dance with good posture and body position	2.4 (.92)	Remove	
RWa: Remove good				
JA: How is good defined? Self?				
LFL: I'm not sure an older person would know what this means				
JB: Consideration could be given to how this would be defined. What would an older adult learner understand by 'good posture and body position', particularly if a new learner?				
1:F	Dance with good control of my movements	2.1 (.9)	Remove	
CG: Add co-ordination as well as control				
RWa: Remove good				

JA: 'My' the voice changes – I like the active voice – consider using ... Can I ... at the start of the entire section - how is this diff from 1E?

JB: Consider defining 'good control of my movements' – this could be interpreted a number of different ways.

1:G	Perform dances with fast movements and steps	2.5 (7.6)	Modify	I can dance fast movements and steps
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RWa: 1:A incorporates this and do not necessarily need to move fast to dance or feel like you're moving fast to dance

JB: Perhaps 'dance sequences'

1:H	Perform complicated dance movements that I have not practiced before	1.9 (.93)	Remove	
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JA: Combine with 1:G

EC: I am not sure that this item is as relevant. I personally would omit it. The other items are about being able to perform actions that may be impaired by lower levels of physical functioning. This one is about something else. I would say it may be affected by the level of dance experience. This to me is more about ability to learn.

LFL: Complicated movements that are new to me

JB: Being asked to comment on one's confidence in performing 'complicated dance movements that I have not practiced before' could be quite intimidating for some older adults. Perhaps remove 'complicated'

1:J	Dance on my own, without a partner, and not be afraid of falling	2.6 (.53)	Modify	I can dance on my own without holding on to anything and not lose my balance
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RWa: Is another person the only option for balance assistance? Suggest change to, "Dance on my own, without a partner or assistive device, and not be afraid of falling"

EQ: This is a convoluted item, due to the and in the middle, and it appears to cover several points. Change to 'not to fall when dancing alone without a partner'? I think remove the word afraid, as self-efficacy is about the confidence for the task, not expectations of emotions I might feel during the task

LFL: This might need to be separate question? Person might be dancing with a partner and be worried about falling too?

RWh: These two make me wonder whether they might not load onto concept 1 the same as items A to H because of the added falls component. I appreciate that fear of falling is an aspect of dance self-efficacy for this population but the next step will be interesting and I wonder whether the falls part is crucial or whether someone reporting low to items A-H because of a fear of falling is sufficient.

JB: Perhaps consider replacing 'not be afraid of falling' with 'feeling confident in keeping my balance'

1:K	Perform a dance with cross-over steps and turns and not be afraid of falling	2.2 (.67)	Remove	
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RWa: Change "turns", to "changes in direction". "Turns" could be perceived as an intimidatingly high expectation.

EC: I am just not sure whether all respondents will understand the term "cross-over steps"

AAH: I don't believe this item is universal, as cross-over steps are unsafe movements for some dancers (particularly those who have hip replacements).

EQ: As above, would change to 'not fall when dancing cross steps'. Also to note, someone who has never danced probably wouldn't know what cross steps are

LFL: Same as above... if not why not ask if they are afraid of falling with fast movements and steps etc?

RWh: These two make me wonder whether they might not load onto concept 1 the same as items A to H because of the added falls component. I appreciate that fear of falling is an aspect of dance self-efficacy for this population but the next step will be interesting and I wonder whether the falls part is crucial or whether someone reporting low to items A-H because of a fear of falling is sufficient

JB: Consider 'dance sequences' and 'feeling confident in keeping my balance'.

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
2	CONCEPT 2: Perceived ability to learn, practice, and recall (remember) dance sequences	-		Perceived cognitive ability for dance tasks: Learning capacity, memory and executive control
2:A	Learn a simple dance with a basic step pattern that repeats many times	2.5 (.93)	Accept	I can learn a simple dance with a basic step pattern that repeats many times
AAH: This phrasing suggests confidence in physical endurance rather than confidence in cognitive processes				
RWa I think the specific reference to certain moves or patterns makes the item a bit more in line with concept 1 with less of a focus on the ability to learn.				
2:B	Learn three new dances in the same dance lesson/session	2.0 (.87)	Remove	
CG: Depends on length and complexity of dances				
JA: Describe what a dance means – learning a 1 min routine, 2 min routine or some more ? dance step or dance?				
EQ: A novice would find that hard to answer as would have no idea what is involved with learning one, let alone 3.				
LFL: Very subjective				
JB: Consider 'learn more than one new dance in the same dance lesson/session'. Learning three new dances in one lesson may seem a lot to some people.				
2:C	Learn a complicated new dance within a short time	2.3 (.87)	Modify	I can learn a complicated dance with many different steps
CG: Qualify a "short time" – a month? An hour session??				
JA: Clarify what short time means? 1 session, 1 week, 1 month?				
AAH: This is likely to be extremely challenging for novice dancers.				
LFL: Very subjective				
JB: Expecting older adults to learn a complicated new dance within a short time seems rather unreasonable. This question could prompt people to answer negatively. Alternative language could be considered				
2:D	Remember the steps	2.6 (.74)	Modify	I can remember dance steps
JA: How many?				
2:E	Remember a dance if I had learnt it a week ago	2.4 (.88)	Modify	I can remember a full dance I learned a week ago
CG: Again, dependant on the complexity of the dance				
2:F	Follow instructions from the dance teacher or leader	2.8 (.71)	Modify	I can follow instructions from the dance teacher or leader
2:G	Practice a complicated dance until I got it right	2.1 (.64)	Remove	
CG: They may never get it 'right' so perhaps "until I felt confident"				
RWa: Change to "Practice a new dance until I could do it". Remove concept of right and wrong.				
JA: In studio or home? Or does it matter?				
EC: This is more about persistence (motivation) than learning. All the other items are about learning and recall.				
AAH: This item is unclear to me. Do you mean practicing alone, with other dancers or with the whole class and teacher? Practicing at home?				
JB: Having the words 'complicated' and 'until I get it right' in the question may prompt people to answer negatively. Possible alternative language could be 'persevere in practising a dance sequence'				

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
3	Confidence for dance engagement			
LFL: I'm not sure I understand what you're trying to measure in this construct				
3:A	Try a style of dancing that is new to me	3.0 (00)	Modify	I can try a style of dancing that is new to me
3:B	Enjoy doing dances that are different from how I remember	2.1 (.99)	Remove	
JA: Not sure what this is getting to ? Memory – how long ago? Mental memory or physical memory ? EQ: This and the next one seem to be about being confident about what one would feel (enjoyment) not confident about being able to engage.				
3:C	Enjoy dancing freely, with no set steps	2.4 (.92)	Remove	
EQ: I think it would be difficult to feel confident about this without knowing if it was the norm in the class RWARD: Perhaps "Dance freely with no steps"				
3:D	Feel free to dance the way I want to	2.3 (.89)	Remove	
CG: Add - :With no inhibitions" JA: How different from 3C EQ: I think it would be difficult to feel confident about this without knowing if it was the norm in the class				
3:E	Make up my own dance moves	2.6 (.71)	Modify	I can make up my own dance moves
CG: You may like to qualify this by adding in a social setting ie) wedding/party RWH: Could seem like an intimidating expectation AAH: This reads the clearest for me of the items regarding free movement				
3:F	Improve my dancing	2.8 (.71)	Modify	I can improve my dancing
EC: Does not fit the other items. It is about motivation to learn				
CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
4	Perceived physical endurance for dance			Perceived physical and mental endurance for dance
4:A	Overcome the physical effort involved	2.1 (.78)	Modify	I can cope with the physical effort involved in dancing
CG: Not sure what this means? RWH: Not sure what is being asked here. Good to include items on physical effort and perceived intensity of physical activity, but this needs rephrasing. JA: Consider simpler word for overcome EC: This is more about physical <u>and mental</u> endurance EQ: Overcome sounds a bit negative, as though it is automatically a barrier. Exert might be more neutral LFL: Kinda assumes that there is physical effort when this might not apply to everyone JB: Perhaps reconsider 'overcome', as it could be perceived that the physical effort is something negative to 'push through'. Alternative language could be considered, such as 'manage and enjoy the physical effort involved'				
4:B	Have the stamina to dance for exercise or a workout	2.3 (.71)	Modify	I have the stamina to dance for a whole session
CG: Qualify timeline – for an hours class? Half hour? RWH: Not sure what is being asked here. Does this mean stamina to dance for a whole session/lesson? EC: This is truly an item that measures physical endurance				

AAH: I don't believe this item is universal. This wording assumes that one should dance for exercise, which isn't necessarily the case for every dancer.

EQ: Or have the stamina to keep up? unsure why this one is specific to exercise or working out

RWa: I wouldn't necessarily say remove to 4A but I think this is better than 4A

4:C	Keep dancing when I am hot and breathless and my heart is beating faster	2.1 (.86)	Remove
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JA: Use Breathing hard? not breathless? Fast and not faster?

AAH: I don't believe this item is universal. This wording assumes that one should continue to dance in these circumstances, which isn't necessarily the case for older dancers.

EQ: Would avoid the double-barrelled nature of the item (ie remove the and)

JB: Being 'hot' and 'breathless' could be construed to be a little frightening. Alternative language could be 'Keep dancing when my breathing, body temperature and heart rate are slightly raised'

4:D	Keep dancing when it is physically tiring	2.1 (.99)	Modify	I can keep dancing when it is physically tiring
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JA: How diff from 4C?

EC: This is more about physical and mental endurance

AAH: I don't believe this item is universal. This wording assumes that one should continue to dance in these circumstances, which isn't necessarily the case for older dancers.

JB: Perhaps 'Keep dancing when I am finding it physically tiring, then rest during scheduled breaks' or similar?

4:E	Make the effort to build up my fitness by dancing	2.1 (.84)	Remove
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CG: Perhaps "persevere" rather than 'make the effort'.

JA: Add word endurance?

EC: This is more about physical and mental endurance

AAH: I don't believe this item is universal. It assumes that one should build their fitness through dancing, which isn't necessarily the case for all dancers.

EQ: Is this referring to doing things outside of dance to increase fitness? I found it a bit ambiguous.

RWa: This one may bring in a bit of PA or exercise intention rather than purely self efficacy as you could have dance self efficacy but have no intention of improving fitness

JB: 'Utilise dance as a means to build up my fitness to benefit my health'. 'Make the effort' could be construed as being lazy if you don't!

4:F	Adapt, change, or avoid dance movements that are uncomfortable for me	2.1 (.84)	Remove
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CG: This is an important one!

RWh: Change "avoid" to "limit"

JA: There are 3 verbs here – so hard to say a combined answer – avoid = negative mode i.e., do NOT want to do, whereas Adapt=positive mode i.e. OK will change – Suggest split into separate

EQ: I might feel confident I could avoid, but not adapt movements, so item currently doesn't work IMO

EC: This does not fit the construct. It is more about adaptation to individual conditions rather than endurance.

RWa: This might bring in more dance knowledge than endurance self-efficacy as to whether someone knows other dance steps

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
5	<i>Perceived confidence for dancing in social contexts</i>			

5:A	Enjoy dancing with a partner I do not know	2.7 (.50)	Modify	I can dance with a partner I do not know
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CG: Meeting new people, so this helps understand how they interact and feel comfortable with 'strangers'

JA: Why is this important to know in this context?

EQ: This one and others in this subscale -- am querying reference to the feeling rather than the doing.

RWh: "Dance with a partner I don't know"

5:B	Actively participate in group dance activities	2.8 (.38)	Accept	I can actively participate in group dance activities
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5:C	Enjoy dancing in a group	2.4 (.88)	Remove	
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CG: Social aspect --very important in a dance context.

RWh: I think there's a difference between being confident in actively participate in a group and enjoying dancing in a group, also it's hard to line up the confident to not confident scale with items starting with enjoy, am I confident I can dance in a group or confident I would enjoy dancing in a group. Not saying remove all enjoyment, just cautious whether than word changes what you're measuring slightly.

5:D	Enjoy dancing with people who have more dance experience than me	2.9 (.38)	Modify	I can dance with people who have more dance experience than me
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CG: Being able to learn from those more experienced

JA: Why not a Q with less experience too.... May offer information about peer-peer

5:E	Enjoy dancing with people who are younger than me	2.6 (.79)	Remove	
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CG: Can make you feel buoyed and younger.

JA: Why not older also? See same logic as 5D

AAH: Being with 'people like me' has created safety for dancers I have worked with. I imagine that considering dancing with 'people unlike me' (younger, more experienced) could be a very good indicator of efficacy

5:F	Enjoy dancing when people are watching me	2.7 (.71)	Modify	I can dance when people are watching me
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AAH: Being watched puts fear in the eyes of many dancers I've worked with

RWhite: "dance even when other people are watching me"

5:G	Not worry about looking silly or foolish when I am dancing	2.4 (.88)	Modify	I am not worried about looking silly or foolish when I am dancing
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CG: This relates to the question about 'when people are watching'

RWh: I like this one. I think it achieves the items above it but in a more true self efficacy way without bringing in other similar psychological constructs.

JB: This question may give the impression that someone would look silly or foolish when dancing. Consider re-wording

5:H	Not worry that people might watch and judge me when I am dancing	2.3 (.87)	Modify	I am not worried about what other people think of my dancing
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CG: This is a big one. I think this stops A LOT of people from participating. Perhaps expend this topic or add another question.

RWa: Change to "Not worry about other people's perception of my dancing"

JA: Consider combining with 5F

RWh: Yes good, but overlaps with 5G a bit

JB: 5F covers being watched and 'judge me' may prompt a negative response.

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
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6	Overcoming mental barriers to dance			Overcoming psychological and emotional barriers to enjoy dancing
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ES: This is a different construct (general enjoyment rather than overcoming mental barriers

EQ: What is the barrier being overcome?

RWh: Not sure this one is tied to a mental barrier, more general enjoyment only

6:A Enjoy doing the classes 2.0 (1.0) Remove

LFL: Assumes people are doing the classes

6:B Enjoy dancing even if I can't dance the way I used to when I was younger 2.9 (.35) Modify I can enjoy dancing even if I can't dance the way I used to when I was younger

EQ: Item seems a bit complex. Would it be better to have a different stem, e.g., I would continue to engage in dance when... and then the items are the barriers?

RWh: Continue dancing even if...Or, dance even if... Same for all of concept 6 maybe.

6:C Stay positive (not get frustrated) when I make mistakes 2.4 (.92) Modify I can enjoy dancing even when I make mistakes

RWa: Can be captured by 6:E

EQ: I like this one but don't think it is good practice to have text in brackets in the item

6:D Enjoy dancing when I can't get the moves right 2.0 (1.0) Remove

CG: Same as above question?

RWa: Remove concept of right or wrong. Can be captured by 6:G

JB: Alternative language could be 'Enjoy dancing even if I find the movements challenging at times'.

6:E Enjoy dancing even when I find it difficult 2.6 (.79) Remove

6:F Enjoy dancing when I can't remember the steps 2.4 (.78) Remove

CG: I think this question depends on the time line. If you've been going for three months and still not remember – or is it just a couple of weeks?

RWa: Can be captured by 6:G

JB: 'Enjoy dancing even if I find remembering the steps challenging at times'

6:G Enjoy dancing when I feel I am not dancing very well 2.7 (.49) Modify I can enjoy dancing even if I feel I am not dancing very well

RWa: Modify to "Enjoy dancing even if I feel I am not dancing very well".

JB: Replace 'when' with 'if'.

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
7	Overcoming personal barriers to dance			Overcoming mental barriers to dance (self-regulation)
	RWh: I think all of these items are good and connected to self efficacy, just wonder how you distinguish a mental barrier from a personal one. I'd say anxiety, stress, and depression are mental barriers, but the above concept is more learning and memory focused. I wonder if concept 6 is more cognitive barriers			
7:A	Do dance lessons/sessions when I feel tired	2.8 (.71)	Modify	I can do a group dance session when I am feeling tired
	AHA: I don't believe this item is universal. This wording assumes that one should dance in these circumstances, which isn't necessarily the case for older dancers			
7:B	Do dance lessons/sessions when I have no energy	1.8 (.89)	Remove	
	CG: Combine the two questions tired and no energy. One in the same for me			
	RWA: Duplication of 7:A			
	JA: How diff from 7A			
	EC: This is a bit like the previous item. You could remove it. or change it to "Do dance lessons/sessions even when I do not feel well".			
	AHA: I don't believe this item is universal. This wording assumes that one should dance in these circumstances, which isn't necessarily the case for older dancers			
	JB: 'Do dance lessons/sessions when I have low energy level'			
7:C	Do dance lessons/sessions when I am not motivated	2.7 (.71)	Modify	I can do a group dance session when I am not motivated
	CG: Could be a marker for depression –lack of motivation. It's a big question!			

RWa: 7:A, 7:D and 7:E can unpack aspects of “motivation” further, and Concept 6 provides information on enjoyment (which also influences motivation).

JB: ‘Do dance lessons/sessions when my motivation level is low’

7:D	Do dance lessons/sessions when I feel stressed and/or anxious	3.0 (0)	Modify	I can do a group dance session when I am feeling stressed
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JA: Suggest stay away from / - pick or separate Qs

7:E	Do dance lessons/sessions when I feel down or depressed	2.9 (.35)	Modify	I can do a group dance session when I am feeling down or depressed
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CG: Section 7: I think add a question about “if you manage to attend a class when feeling down, does this improve your mood”. This is an important discovery.

CODE	ORIGINAL ITEM/CONCEPT	M (SD)	Decision	FINAL ITEM/CONCEPT
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8	<i>Overcoming scheduling barriers to regular dance participation</i>			
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LFL: This construct which is more about logistics doesn’t to me seem to align with the others as well.

8:A	Find time for one regular dance lesson/session per week	2.5 (.92)	Remove	
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RWa: 8:B & 8:C can capture this

RWh: Just thinking the wording of this one isn’t in reference to a barrier. Not certain if that’s an issue to remove or not

8:B	Schedule a regular dance lesson/session on most weeks	2.8 (.71)	Modify	I can schedule a regular dance session on most weeks
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8:C	Commit to one regular dance lesson/session per week	2.1 (.99)	Remove	
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RWa: Modify to “Commit to attending one regular dance lesson/session per week”

EC: I think this is overlapping with 8:A. You could use 8:A of this one ...

8:D	Commit to dancing regularly once a week even when I am busy	2.5 (.76)	Modify	I can commit to dancing regularly even when I am busy
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CG: “even when I’m busy”

RWa: Duplication from 8:C

AHA: Perhaps rephrase as: Dance regularly once a week even when I am busy

EQ: I don’t think you need ‘even’

8:E	Commit to going to a regular dance lesson/session once a week even when I have family or friends visiting	2.0 (1.0)	Remove	
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RWa: Duplication from 8:C

JB: This question may perhaps cause people to feel uncomfortable. For older adults, time spent with family and friends is precious, so it may seem unreasonable for there to be an expectation of still attending dance class if there are visitors to the home.

8:F	Prioritise a regular weekly dance lesson/session when making other appointments	2.7 (.76)	Modify	I can prioritise a regular weekly dance session when making other plans and appointments
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CG: This should be put as 8:B or 8:C. This question really covers the above one. Particularly about family/friends visiting.

Validation items: Dance experience and perceived relative ability

CODE	ORIGINAL ITEM	M (SD)	Decision	Scale	FINAL ITEM/CONCEPT
0:A	Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month in the last 10 years?	2.5 (.76)	Modify	Binary (Yes/No)	Have you regularly attended social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) once per week on most weeks in the last 5 years?

RWa: Reduce duration to "5 years"

JA: 10 years is a long time – why so long ? also what do you want to know – i.e., are they regularly dancing?

EQ: Would that frequency be considered regular?

LFL: I don't understand how this set of items is meant to be scored or how it might fit with the others.

0:B	Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) at least once per month? (yes/no)	3.0 (0)	Modify	Binary (Yes/No)	Are you currently attending social dancing sessions (ballroom, line dancing, tango etc.) or dance lessons (ballet, Zumba, modern, tap etc.) once per week on most weeks?
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0:C	Imagine you are at a party where other people, and you, are dancing. Compared to the average person of your own age and gender how good a dancer do you think you are? (Terrible to excellent)	1.9 (.84)	Remove		
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CG: This is a hard one to know how to respond as this is totally subjective (as we know) and they might think they are great but the reality may be vastly different. I know it's about them and their perception...

JA: How many grades here from Terrible to Excellent?

EC: You need to give a scale. Is this a 5-point or 10-point scale? You may use 0:D and drop this one. It measures the same thing (in my view).

JB: Consider alternative language, for example: 'Compared to the average person of your own age and gender, how confident in your dance capability are you? (Low confidence to very confident). In my view 'how good a dancer do you think you are' could result in a lower evaluation level, as people generally may not wish to be seen to be 'bragging'. Also, having the word 'terrible' in there at all seems very negative!

0:D	I feel I am good at dancing compared to most others my age and gender	2.3 (.95)	Accept	0 -10 scale (Strongly disagree - strongly agree)	I feel I am good at dancing compared to most others my age and gender
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CG: Same as above question worded differently??

JA: Same as 0:C how many grades

EC: You need to give a scale. Is this a 5-point scale?

AHA: This is a clearer expression of the idea above.

JB: Perhaps consider alternative wording 'I feel confident when dancing'. Respondents cannot actually *know* how they would rate themselves as a dancer compared to most others of their age and gender, because they cannot *know* 'most' others to be able to judge this.

0:E	I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional	3.0 (0)	Accept	5 levels	I would classify my level of experience with dancing as: None at all; Beginner; Intermediate; Advanced; Professional
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CG: This should move to 0:C

JA: Overall, I would etc.

JB: None at all; Beginner; Some regular dance experience; Considerable regular dance experience; Advanced training in dance; Professional level