Subjective memory complaints and difficulty performing activities of daily living among older women in Australia

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Fig. 1 Models of difficulties in ADL, IADL and memory.

Fig. 2. Parallel process model of difficulty in ADL and memory difficulties.

Fig. 3 Parallel process model of difficulty in IADL and memory difficulties.

Table 1. Characteristics of participants

Table 2. Estimates of LGM on difficulties in ADL and IADL performance and memory difficulties, respectively

Abstract

Introduction: Increased age and cognitive decline have been linked to difficulties with activities of daily living (ADL) and instrumental activities of daily living (IADL). Cognitive decline can often be signalled by complaints about one's cognition, such as memory. With older Australians living longer, there is an increasing proportion of the population at risk of declined performance in daily tasks. The aim of this study was to identify if subjective memory complaints in later life among older women predict changes in independence in performing ADL and IADL.

Methods: Data were from 3,721 women born 1921-26, who completed Surveys 4-6 of the Australian Longitudinal Study on Women's Health. Memory complaints, and difficulties on activities of daily living were measured at each survey, using the Memory Complaint Questionnaire and 16 questions regarding specific activities of daily living. Latent growth modelling examined correlations between initial scores on each measure, changes in measures, and the association between memory complaints and changes in ADL and IADL.

Results: There was a significant association between baseline scores for subjective memory difficulty and baseline ADL and IADL scores. Initial memory difficulty was also associated with increase in ADL and IADL difficulty.

Conclusions: Subjective memory complaints may be a risk factor for decline in performance on activities of daily living. Attention to these concerns may be important in identifying functional decline in older age.

Keywords: Memory, longitudinal studies, activities of daily living, women's health, cognitive dysfunction

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Activities of daily living (ADL) comprise a vital part of everyday life. Basic ADLs encompass those tasks seen as essential for self-care, such as grooming and bathing, while more complex ADL, often termed instrumental activities of daily living (IADL), include activities that maintain independence in one's environment and/or community, such as shopping and managing personal finances.

Performance of ADL and IADL is a key indicator of an individual's ability to live independently, with difficulties in ADL/IADL tasks for older adults commonly indicating a need for in-home services or the transition to supported care (Dunlop et al., 2014). Community-living individuals who begin experiencing difficulty with walking outside and performing heavy housework are seen to be at higher risk of requiring in-home services (Finlayson, Mallinson, & Barbosa, 2005).

Functional decline involves progression from difficulty with physical activities into functional limitation and disability, including difficulties with ADL and IADL tasks. As older Australian's are living longer, more people are at risk of experiencing difficulty with daily tasks (den Ouden et al., 2013). Increased age is strongly associated with a decreased performance of ADLs, IADLs and reduced gait speed, as well as a decline in mental health, cognition, and health-related quality of life (Diehr, Thielke, Newman, Hirsch, & Tracy, 2013). A four-year longitudinal study of 149 oldest-old adults (aged >85) found that age, disease level, and physical and cognitive functioning all predicted patterns in disability status; most significantly, physical and cognitive factors predicted later transition from having no disability to becoming disabled over two and four-year follow-up periods (Fauth, Zarit, Malmberg, & Johansson, 2007).

As for age and physical factors, cognition has an important role in functional decline and difficulties performing ADL/IADL tasks. In a longitudinal study of community dwelling older adults (*n*=516), those with marked cognitive decline were found to have the greatest deterioration in ADL performance. This impact was found to occur rapidly, without the gradual reduction in physical function observed with more physical health issues (Nikolova, Demers, & Béland, 2009).In particular, memory difficulties may have a role in increased difficulties with ADL and IADL in older adults, with difficulty in IADL possibly preceding or heralding the onset of dementia. In a five-year study of 1,283 older adults in France, dependence in transportation, medication management, ability to handle finances and operating a telephone strongly predicted the risk of being diagnosed with dementia within three years (Barberger-Gateau, Fabrigoule, Helmer, Rouch, & Dartigues, 1999). Another five-year study found there was a similar and significant decline in episodic memory and ability to perform daily living activities, such as household tasks and coping with small sums of money (Tomaszewski Farias et al., 2009). Given this association, difficulty with everyday tasks is considered a marker for the diagnosis of dementia, with reduction in IADL abilities proposed for inclusion in the diagnostic criteria for mild cognitive impairment (Reppermund et al., 2013).

Subjective memory complaints are increasingly recognised as markers for future cognitive impairment and decline, with evidence suggesting such complaints are a precursor to mild cognitive impairment (Mitchell, Beaumont, Ferguson, Yadegarfar, & Stubbs, 2014; Reisberg & Gauthier, 2008; Reisberg, Schulman, Torossian, Leng, & Zhu, 2010; Shirooka et al., 2018; Szanton et al., 2011). A recent meta-analysis of 28 studies found older adults with subjective memory complaints, but no objective memory issues, were twice as likely to develop dementia than those without memory complaints over an average of 4.8 years follow-up period (Mitchell et al., 2014). Over a mean period of 7 years, Reisberg et al. (2010)

found healthy participants with subjective cognitive impairment declined more rapidly in memory assessments than those without. Memory complaints have also been associated with an increased risk of stroke in older adults (Sajjad et al., 2015). Both self- and informant-reported memory complaints can be associated with increased risk of cognitive impairment and decline (Szanton et al., 2011). This relationship has been observed in Australian community-dwelling adults, with data from the Australian Imaging Biomarkers and Lifestyle Study of Aging (Buckley et al., 2013). Subjective memory complaints were more severe in patients with mild cognitive impairment and investigators aimed to determine if future cognitive impairment can be predicted at the next follow-up (Buckley et al., 2013). As recent research shows that subjective memory may have a novel contribution to later cognitive decline in otherwise healthy older adults and is recognised as a risk factor alongside objective assessment, there is merit in investigating memory in terms of subjective complaints (Buckley et al., 2013; Mitchell et al., 2014; Reisberg & Gauthier, 2008; Reisberg et al., 2010; Shirooka et al., 2018; Szanton et al., 2011).

While research notes that subjective memory complaints are associated with increased risk of objective cognitive decline, there is little research investigating how this phenomenon might impact the everyday activities of older adults. Shirooka et al. (2018) found a positive association between subjective cognitive decline and falls in community-dwelling older adults. This suggests that older adults with memory complaints may experience a decline in their ability to conduct daily tasks safely and efficiently, thus increasing the risk for falls, injury and functional impairment.

Identifying key factors that may predict increased ADL/IADL difficulties and dependence in later life is critical. As subjective memory complaints are acknowledged as a risk for cognitive decline and possible functional impairment, it is possible older adults may experience increased ADL/IADL difficulties. As such, it may be important for health

professionals working with older patients, such as occupational therapists, to be aware of memory complaints as a risk for further functional and cognitive decline. Older adults with memory complaints engage in low rates of help-seeking, in-part attributed to perceptions of their memory issues compared to their peers and the belief their issues don't require treatment (Hurt, Burns, Brown, & Barrowclough, 2012). A population-based study of adults aged 40 to 79 years in Germany reported that one fifth of participants have or wanted to consult a professional about their memory problems (Luck et al., 2018). Health professionals will be the point of contact for older adults with memory complaints. How these memory complaints may increase risk for limitations in daily living is important for occupational therapists working with clients to assess risk and functional limitations, and strengthen factors that promote resilience.

Gender differences in ADL difficulties may also be an important factor when considering risk. Gender differences in ADL difficulty have been identified as an important public health issue(Idland, Pettersen, Avlund, & Bergland, 2013).A large body of research has identified that women in general experience greater functional limitations than men (Merrill, Seeman, Kasl, & Berkman, 1997; Rohlfsen & Kronenfeld, 2014). As women account for 65 per cent of the oldest-old age group in Australia, this presents large percentage of the population at possible risk for ADL difficulties and functional decline.

As most previous studies have focused on physical factors that predict decline in physical function, we particularly sought to identify subjective memory complaints, as early markers of subsequent functional decline. This study seeks to identify if subjective memory complaints in later life predict independence in performing ADL and IADL tasks for women.

Method

Data were from the 1921-26 cohort of the Australian Longitudinal Study on Women's Health (ALSWH), which is designed to assess changes in physical and mental health, use of

health services, health behaviours and risk factors, time use (i.e., role engagement), socio-demographic factors, and experiences of key life stages and events. Ethical approval was obtained from the Human Research Ethics Committees [de-identified] and informed consent obtained from participants at each survey. The survey was conducted in 1996 (Survey 1), with follow-up surveys occurring every three years thereafter (Surveys 2-6). ALSWH is funded by the Australian federal Department of Health and is conducted jointly by The University of Newcastle and The University of Queensland.

Participants

Participants aged 70-75 years were recruited in 1996 through Medicare Australia (the universal health insurer). Sampling was random, and stratified with women in rural and remote areas sampled at twice the rate of urban dwelling women to allow statistical comparisons between city and country-based women.

Selected women were invited to participate in the study, with 12,432 women returning Survey 1 (response rate 36%). Comparison of aggregate Medicare data for respondents and non-respondents suggested small differences in health care use. On comparison to census data, participants were deemed to be 'reasonably representative' of the general population, though a level of overrepresentation of women with tertiary education and underrepresentation of some immigrant groups were identified (Brown et al., 1999).

Cohort numbers have decreased over time due to death and non-death attrition with 4,055 (32.6%) of the 12,432 initial respondents completing Survey 6. This attrition was accounted for by 5,250 (42.3%) dead, 5.1% withdrawn as too frail, 11.4% otherwise withdrawn, and 10.4% lost to follow up. A separate study of this cohort evaluated the effect of death and non-death participant losses, finding that differences between the cohort and national population changed only slightly, with losses due to death affecting both the study cohort and the population (Brilleman, Pachana, & Dobson, 2010). In total, there were 6,911

participants at wave 4, 5,522 at wave 5, and 4,055 at wave 6. Additional information, including published papers from the study, can be found on their website (https://www.alswh.org.au/).

Instruments

Demographic and health information

A range of demographic data was collected, including marital status, living arrangement, areas of residence, and management of income. Health conditions were self-reported from a list of 18 common conditions including diabetes, stroke, heart disease, asthma and arthritis.

Activities of Daily Living

In surveys 1 to 4 respondents were asked: "Do you regularly NEED help with daily tasks because of long-term illness, disability or frailty?" with response options of yes or no. The question was originally sourced from the 1993 Australian Bureau of Statistics survey on Disability, Ageing and Carers. From Survey 4, respondents were also asked 16 questions regarding need for help with specific activities of daily living that were derived from a 1989 epidemiological study (Gill, Robison, & Tinetti, 1998). As these are the items of interest to the current study, only data from Survey 4 onwards were included. Eight basic ADL questions including grooming, eating, bathing or taking a shower. An additional eight questions assessed 'complex ADLs' or IADLs, including shopping, managing money and meal preparation. Respondents were asked about difficulty experienced with each activity, with responses of 'no', 'some' and 'unable to do', as well as if they have required help from another person to complete the tasks, with responses of 'yes' or 'no'. Scoring is generated based on three levels; no difficulty (and therefore no help), difficulty but no help required, and difficulty and help required. Summary ADL and IADL scores were then calculated, ranging from 0-16.

MAC-Q

The Memory Complaint Questionnaire (MAC-Q) is brief six-item questionnaire that measures age-related memory difficulty (Crook, Feher, & Larrabee, 1992). Items ask respondents to compare their current memory abilities to those experienced at age twenty, thus determining subjective change relative to their individual baseline. Five of the items relate to common age-related memory issues (recalling names, phone numbers), with the final item assessing general memory difficulty. Responses are recorded on a 5-point Likert scale from 'much better now' to 'much poorer now'. The MAC-Q has been evaluated as having good concurrent validity (r =.41, p<.001) with a well-validated long-form memory questionnaire and satisfactory internal consistency (Cronbach's α=.57) and test-retest reliability (.67) (Crook et al., 1992).

Data Analysis

Latent growth modelling (LGM) was used for examining the impact of memory complaints in performing activities in daily life over time (Kline, 2016). LGM helps examine the trajectory of individual's development on the difficulties in memory complaints and performance in activities in daily lives. In addition, it allows consideration of variations between individuals in the *rate of change* in addition to the overall change.

Two stages of analysis were conducted with Mplus (Muthén & Muthén, 2014). In the first step, we used LGM to examine changes over time in three domains: 1) difficulty in performing ADL tasks, 2) difficulty in performing IADL tasks, and 3) memory complaints. In addition, we examined if the changes over time were linear. To determine change over time and linearity, we estimated two latent growth factors – the intercept (i.e., initial level) and the slope (i.e., rate of change) – based on the individual change in each domain assessed at three waves repeatedly. The latent growth factors allow determining the average rate of change and individual variation around that change over time. Fig. 1 depicts changes in the three domains

over the passage of time. Rectangles represent the assessment results in each domain at three waves and circles represent latent growth factors. Factor loadings of the initial levels were fixed to 1 as the intercept should be a constant for any individual over time. Factor loadings of the slopes were fixed to 0, 1, and 2 in the fourth, fifth and sixth waves of the longitudinal study as the slope is determined by the latter two repeated assessment.

In the second step, associations between memory complaints and difficulty in performing ADL or IADL tasks were analysed using LGM with parallel process models. A parallel process model allows for the investigation of bi-directional influences of the intercept and the slope from the two domains: 1) memory complaints vs. difficulty in performing ADL tasks, and 2) memory complaints vs. difficulty in performing IADL tasks. Cross-domain paths from intercept terms to slope terms test whether participants' starting point in one domain influences the rate of change in the other domain. An additional feature of the parallel process model is that it examines the relationship between how two domains change over time (i.e., the covariance between the two slope terms).

Model fit was assessed using a variety of fit indices, including Chi-square test, Tucker–Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardised Root Mean Square Residual (SRMR). A non-significant Chi-square indicates a good model fit. However, it is difficult to get a non-significant Chi-square with samples sizes greater than 200. CFI and TLI values above 0.95 suggest good fit. RMSEA and SRMR values below 0.08 indicate acceptable fit.

Results

Data from the cohort of older women who participated in the ALSWH survey over the last three waves (Surveys 4 to 6) was included in this study (N=4,055). Only these waves were included as questions regarding needing help with specific activities of daily living were asked from Survey 4 onwards. The participants whose surveys were completed by a carer

using the carer's own judgement in any of the three waves were excluded (N=334), given that the responses may not truly depict the difficulties experienced by the participants. Thus, the final sample of the study included 3,721 participants. Table 1 summarises participant characteristics across the three waves.

Changes in difficulties in performing ADL and IADL and memory complaints over time

Table 1 shows the scores of difficulties in performing ADL and IADL tasks and memory complaints of women on Surveys 4-6. Higher mean ADL and IADL scores found in the study were consistent with the scores of women having some forms of activity limitation related to musculoskeletal or cardiovascular conditions. Before examining the changes over time using LGM, we compared the scores at Survey 4 for people who responded to the survey (completed by either themselves or a carer) at wave 4 and dropped at wave 6, with Survey 4 scores for those who were still participating at wave 6. No significant differences were found in difficulties in performing ADL (1.2 ±2.7 vs. 1.2 ±2.7; t=-0.44, p=0.66), difficulties in performing IADL (2.8 ±3.5 vs. 2.9 ±3.5; t=-0.90, p=0.37) and memory complaints (25.6 ±0.8 vs. 25.5 ±4.3; t=0.47, p=0.64), indicating that the potential for bias due to participant loss is small.

Overall, the linear models for the three domains fit the data adequately (see Table 2). The mean slopes of the ADL and IADL domains were significant, suggesting that on average, difficulties in performing ADL and IADL tasks increased over time. Although, there was no significant change in scores for memory complaints over the three surveys, there was significant variance in the intercept and slope terms of the three domains. This indicates that there was significant variability in participants' initial levels of difficulties in performing ADL and IADL tasks, and levels of memory complaints, as well as significant variance in the rate at which their levels of difficulties increased over time. This significant variability in the slope indicates there are participants who experienced increased memory complaints over

time. The positive covariance between the intercept and slope in terms of difficulty in performing ADL tasks was statistically significant, indicating that participants who started with more difficulties in performing ADL tasks were more likely to have steeper increase in difficulty over time. Conversely, the covariance between the intercept and slope terms of difficulty in performing IADL tasks was not significant, suggesting that participants who started with more difficulties in performing IADL tasks did not have a steeper increase in difficulty over time. The significant negative covariance between the intercept and slope in memory complaints means that participants who initially had higher levels of memory complaints at baseline were less likely to have a sharp increase in memory complaints over time. This may indicate ceiling effects for this measure. Paths for the three models are displayed in Fig. 1.

Associations between changes in difficulty in performing ADL tasks and memory complaints

The parallel process model conducted to examine associations between the change in difficulty in performing ADL tasks and memory complaints over time had acceptable fit to the data (Chi-square=71.41, df=7, p<0.01; CFI=0.99; TLI=0.98; RMSEA=0.05; SRMR=0.02). There was a significant association between initial levels of difficulty in ADL and memory complaints (β=0.48, SE=0.0.15, p<0.01), indicating that participants who started with higher levels of memory complaints also had significantly higher levels of difficulty in performing ADL tasks. Furthermore, change (slope) of memory complaints was significantly positively associated with change (slope) in ADL difficulty over time (β=0.15, SE=0.06, p<0.01). In addition, initial levels of memory complaints positively predicted changes in ADL difficulty over time (β=0.02, SE=0.01, p<0.05), suggesting that participants who reported greater memory complaints initially tended to have a higher rate of increase in difficulty in performing ADL tasks, compared with those women who reported lower levels

of memory complaints. This can be interpreted as a significant increase in difficulties in performing ADL tasks (from Survey 4 to 6) for more memory complaints at Survey 4. All regression paths for this model are shown in Fig. 2.

Associations between changes in difficulty in IADL and memory complaints

The parallel process model was conducted to examine associations between the change difficulty in performing IADL tasks and memory complaints over time had acceptable fit to the data (Chi-square=67.73, df=7, p<0.01; CFI=0.99; TLI=0.98; RMSEA=0.05; SRMR=0.01). A significant association between initial levels of memory complaints and difficulty in IADL (β=1.15, SE=0.20, p<0.01) was found. This suggests that participants who started with higher levels of memory complaints also had significantly higher levels of difficulty in performing IADL tasks. Change (slope) of memory complaints was significantly positively associated with change (slope) in IADL difficulty over time (β=0.33, SE=0.06, p<0.01). In addition, initial levels of memory complaints positively predicted changes in IADL difficulty over time (β=0.03, SE=0.01, p<0.01). This suggests that participants who reported greater memory complaints initially tended to have a higher rate of increase in difficulty in performing IADL tasks, compared with those women who reported lower levels of memory complaints. This can be interpreted as a significant increase in difficulties in performing IADL tasks for more memory complaints. All regression paths for this model are shown in Fig. 3.

Discussion

This study newly identifies how the trajectory of decline in reported ADL and IADL performance can be predicted by the severity of subjective memory complaints of older women. The longitudinal data collected from the surveys showed that women who reported greater memory complaints in their 70s, experienced a sharper increase in need for assistance to complete both ADL and IADL tasks in later life.

The results align with other findings to confirm that over time, older women experience increased difficulties with ADL and IADL tasks (den Ouden et al., 2013; Diehr et al., 2013), and with a previous study using the ALSWH cohort data, showing greater decline in ADL and IADL tasks over time associated with cardiovascular conditions and neurological/mental health conditions (Jackson et al., 2015). Findings of the current study also align with previous research focusing on cognitive factors relating to ADL performance, such as Tomaszewski Farias et al. (2009), who found a significant decline in memory and ADL performance, such as carrying out household tasks and coping with sums of money for people with dementia.

While aligning with the results of previous research, the current study makes a novel contribution by investigating this phenomenon in a general population of older women, rather than those with dementia as seen by Tomaszewski Farias et al. (2009). Previous research has found a relationship between memory complaints and cognitive decline in cognitively-sound adults over time, but not how complaints may relate to functional difficulties. The current study identifies that subjective memory complaints are associated with a difficulty with ADL/IADL in a general population. Understanding this association may help to identify risk of further decline and provide the needed support for older women experiencing ADL difficulty.

There was, however, a noticeable difference in the trajectory rates observed in our study compared to another study that also concluded that cognitive difficulties are associated with increased difficulties with ADL and IADL tasks (Nikolova et al., 2009). The differences in rate are likely due to the current study investigating the participants over a longer period of time and in to more advanced ages, and potentially due to questions about memory complaint rather than more direct measures of cognitive performance. It is valuable to note from this

study, women who reported more difficulties with memory experienced a sharper decline in performing both ADL and IADL tasks over time.

Although the self-reported measure of memory decline used was not a rigorous measure of cognitive impairment, findings regarding subjective memory complaints and ADL decline align with recent research identifying memory complaints as a risk factor for cognitive and functional decline (Mitchell et al., 2014; Reisberg & Gauthier, 2008; Reisberg et al., 2010; Shirooka et al., 2018; Szanton et al., 2011). These kinds of everyday memory problems are typical of what people commonly report to health professionals. Moreover, from a health promotion point of view, people may more readily identify with 'memory problems' rather than seek or receive a diagnosis for dementia. Investigating memory decline in terms of self-reported problems or complaints can be beneficial for practice. Older adults are often discouraged seeking help for memory complaints by comparison to their peers or beliefs about the severity of their complaints (Hurt et al., 2012; Luck et al., 2018). From a health promotion perspective, people may be more likely to identify with 'memory problems' than seek treatment for dementia. These kinds of everyday memory complaints are typical of what people may commonly report to health professionals. Understanding that memory complaints may relate to decline in ADL performance may help occupational therapists identify early risk factors of functional limitations (Mitchell et al., 2014; Reisberg & Gauthier, 2008; Reisberg et al., 2010; Shirooka et al., 2018; Sarah L. Szanton et al., 2011).

The significance of the findings points to the need to take these memory complaints seriously and to focus on the impact on activities of daily living. Even where cognitive decline may not be able to be averted, attention to daily activities may mitigate the impact on the person's functional capacities. This approach is consistent with the current health focus on maintenance of functional capacities through prevention of decline, reablement, and functional supports.

Community programs focusing on function and environment for older people with complex needs have demonstrated improved function, reduced depression and improved motivation to participate in activity (Szanton et al., In press; Szanton et al., 2011). Although the low income population studied by Szanton et al. (2011) is not directly comparable to an Australian population, findings show early intervention focusing on physical training can improve function, reduce frailty and falls risk, and reduce difficulties with completing ADL tasks. Dyadic interventions, being multi-component programs that work with the person with dementia and the carer, are also important when there is significant impairment (Laver, Dyer, Whitehead, Clemson, & Crotty, 2016). A systematic review of such interventions demonstrated the effectiveness of occupational therapy programs that increase independence in activities of daily living and improve quality of life (Laver et al., 2017). Effective interventions included those that involved environmental assessment, problem solving strategies, carer education and interactive carer skills training (Laver et al., 2017).

Occupational therapy programs should also consider cognitive factors impacting performance of ADL and IADL. Such interventions should not only focus on memory, as memory decline cannot often be averted, but focus on maintaining function despite ongoing cognitive issues. Cognitive risk factors can be incorporated into the elements of enablement programs found to be effective, such as environmental assessments, carer education and skills training (Laver et al., 2017). Increasing support for both physical and cognitive limitations relating to ADL and IADL may further increase the independence and improved quality of life seen within these programs.

An unexpected finding from this study is that women who experienced greater difficulties with ADL tasks at an earlier age (70's to early 80's) were found to experience a more precipitous decline with ADL tasks over time. However, the severity of difficulties performing IADL tasks were not found to influence the rate of decline of IADL tasks over

time, rather were reflective of a steady decline consistent with an ageing population. This was true, except for those with memory loss at baseline who experienced a higher rate of loss of IADL. Loss of performance of ADLs are more related to body function, impairment and mobility and influenced by underlying pathology, whereas the more complex IADL's require higher levels of cognition and demand higher levels of functional cognitive capacity (Wesson, Clemson, Brodaty, & Reppermund, 2016). This reflects fundamental differences of ADL and IADLs and different underlying processes and therefore the changes in these are likely to differ at different stages of ageing.

Limitations

The results of this study cannot be generalized to the male population given that the survey data obtained from the ALSWH cohort was complete by women only. Even though attrition must be considered as a potential limitation, attrition rates have shown to be constant and predictable across waves for the ALSWH cohort data (Gitlin, Winter, Dennis, Hodgson, & Hauck, 2010). Considerations must be made for potential sample bias with certain subpopulations and the difficulties they may have experienced with the questionnaire based nature of the survey. Women who did not speak English as their first language may be considered to be an under-represented group as they were under-represented among the initial respondents and were more likely to withdraw.

Further, caution must be used when interpreting the results of the current study due to limitations using self-report measures given this study was investigating participants with memory decline. Although subjective memory complaints can be indicative of objective memory decline, it is plausible that some participants may not have reported a true reflection of their difficulties due to a lack of insight. Presence of a possible ceiling effect in the MAC-Q presents another limitation. This suggests the measure used may not accurately capture variability of higher memory complaints in the sample. Additionally, the exclusion of surveys

completed by a carer on behalf of a participant may have altered the characteristics of the participants and the scores of difficulties for ADL and IADL tasks.

Conclusions

In summary, the present study confirms previous findings (den Ouden et al., 2013; Diehr et al., 2013; Rohlfsen & Kronenfeld, 2014) that women continue to be at great risk of needing assistance to complete ADL and IADL tasks over time. Moreover, older women who report greater levels of memory complaints are more likely to have a faster rate of decline in function compared to women who report fewer memory complaints. Interventions should not just focus on memory, but have a focus on function as enablement programs have shown that function can be maintained despite ongoing cognitive problems.

Key points for Occupational Therapy

- Subjective memory complaints are associated with greater difficulties with activities of daily living for older women
- Greater levels of subjective memory complaints were associated with faster decline in activities of daily living, compared to those with lower levels of memory complaints
- Health professionals should take note of memory complaints from older adult patients to identify a potential risk factor for functional limitation and increased dependence

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References

Barberger-Gateau, P., Fabrigoule, C., Helmer, C., Rouch, I., & Dartigues, J.-F. (1999). Functional Impairment in Instrumental Activities of Daily Living: An Early Clinical Sign of Dementia? *Journal of the American Geriatrics Society, 47*(4), 456-462. doi:10.1111/j.1532-5415.1999.tb07239.x

Brilleman, S. L., Pachana, N. A., & Dobson, A. J. (2010). The impact of attrition on the representativeness of cohort studies of older people. *BMC Medical Research Methodology, 10*(1), 1-9. doi:10.1186/1471-2288-10-71

Brown, W. J., Bryson, L., Byles, J. E., Dobson, A. J., Lee, C., Mishra, G., & Schofield, M. (1999). Women's Health Australia: recruitment for a national longitudinal cohort study. *Women & health, 28*(1), 23-40.

Buckley, R., Saling, M., Ames, D., Rowe, C., Lautenschlager, N., Macaulay, S., . . . Ellis, K. (2013). Factors affecting subjective memory complaints in the AIBL aging study: Biomarkers, memory, affect and age. *International Psychogeriatics, 25*(8), 1307-1315. doi:10.1017/S1041610213000665

Crook, T. H., Feher, E. P., & Larrabee, G. J. (1992). Assessment of memory complaint in age-associated memory impairment: the MAC-Q. *International psychogeriatrics / IPA, 4*(2), 165.

den Ouden, M. E. M., Schuurmans, M. J., Brand, J. S., Arts, I. E. M. A., Mueller-Schotte, S., & van der Schouw, Y. T. (2013). Physical functioning is related to both an impaired physical ability and ADL disability: A ten year follow-up study in middle-aged and older persons. *Maturitas, 74*(1), 89-94. doi:http://dx.doi.org/10.1016/j.maturitas.2012.10.011

Diehr, P. H., Thielke, S. M., Newman, A. B., Hirsch, C., & Tracy, R. (2013). Decline in Health for Older Adults: Five-Year Change in 13 Key Measures of Standardized

Health. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 68*(9), 1059-1067. doi:10.1093/gerona/glt038

Dunlop, D., Song, J., Arnston, E., Semanik, P., Lee, J., Chang, R., & Hootman, J. M. (2014). Sedentary Time in U.S. Older Adults Associated With Disability in Activities of Daily Living Independent of Physical Activity. *Journal of physical activity & health*. doi:10.1123/jpah.2013-0311

Fauth, E., Zarit, S., Malmberg, B., & Johansson, B. (2007). Physical, Cognitive, and Psychosocial Variables From the Disablement Process Model Predict Patterns of Independence and the Transition Into Disability for the Oldest-Old. *The Gerontologist, 47*(5), 613-624.

Finlayson, M., Mallinson, T., & Barbosa, V. M. (2005). Activities of daily living (ADL) and instrumental activities of daily living (IADL) items were stable over time in a longitudinal study on aging. *Journal of Clinical Epidemiology, 58*(4), 338-349. doi:10.1016/j.jclinepi.2004.10.008

Gill, T. M., Robison, J. T., & Tinetti, M. E. (1998). Difficulty and dependence: Two components of the disability continuum among community-living older persons. *Annals of Internal Medicine, 128*(2), 96-101.

Gitlin, L. N., Winter, L., Dennis, M. P., Hodgson, N., & Hauck, W. W. (2010). A biobehavioral home-based intervention and the well-being of patients with dementia and their caregivers: the COPE randomized trial. *Jama, 304*(9), 983-991.

Hurt, C. S., Burns, A., Brown, R. G., & Barrowclough, C. (2012). Why don't older adults with subjective memory complaints seek help? *International Journal of Geriatric Psychiatry, 27*(4), 394-400. doi:10.1002/gps.2731

Idland, G., Pettersen, R., Avlund, K., & Bergland, A. (2013). Physical performance as long-term predictor of onset of activities of daily living (ADL) disability: A 9-year

longitudinal study among community-dwelling older women. *Archives of Gerontology and Geriatrics, 56*(3), 501-506. doi:http://dx.doi.org/10.1016/j.archger.2012.12.005

Jackson, C. A., Jones, M., Tooth, L., Mishra, G. D., Byles, J., & Dobson, A. (2015). Multimorbidity patterns are differentially associated with functional ability and decline in a longitudinal cohort of older women. *44*(5), 810-816. doi:10.1093/ageing/afv095

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

Laver, K., Cumming, R., Dyer, S., Agar, M., Anstey, K. J., Beattie, E., . . . Crotty, M. (2017). Evidence-based occupational therapy for people with dementia and their families: What clinical practice guidelines tell us and implications for practice. *Australian occupational therapy journal, 64*(1), 3-10.

Laver, K., Dyer, S., Whitehead, C., Clemson, L., & Crotty, M. (2016). Interventions to delay functional decline in people with dementia: a systematic review of systematic reviews. *BMJ open, 6*(4), e010767.

Luck, T., Roehr, S., Rodriguez, F., Schroeter, M., Witte, A., Hinz, A., . . . Riedel-Heller, S. (2018). Memory-related subjective cognitive symptoms in the adult population: Prevalence and associated factors- results of the LIFE-Adult study. *BMC Psychology, 6*. doi:10.1186/s40359-018-0236-1

Merrill, S., Seeman, T., Kasl, S., & Berkman, L. (1997). Gender differences in the comparison of self-reported disability and performance measures. *The Journals of Gerontology, 52a*(1), M19-26.

Mitchell, A. J., Beaumont, H., Ferguson, D., Yadegarfar, M., & Stubbs, B. (2014). Risk of dementia and mild cognitive impairment in older people with subjective memory

complaints: Meta-analysis. *Acta Psychiatrica Scandinavia, 130*(6), 439-451. doi:10.1111/acps.12336

Muthén, L. K., & Muthén, B. (2014). *Mplus user's guide*. Los Angeles, CA: Muthén & Muthén.

Nikolova, R., Demers, L., & Béland, F. (2009). Trajectories of cognitive decline and functional status in the frail older adults. *Archives of Gerontology and Geriatrics, 48*(1), 28-34. doi:http://dx.doi.org/10.1016/j.archger.2007.09.007

Reisberg, B., & Gauthier, S. (2008). Current evidence for subjective cognitive impairment (SCI) as the pre-mild cognitive impairment (MCI) stage of subsequently manifest Alzheimer's disease. *International Psychogeriatics, 20*(1), 1-16. doi:10.1017/S1041610207006412

Reisberg, B., Schulman, M. B., Torossian, C., Leng, L., & Zhu, W. (2010). Outcome over seven years of healthy adults with and without subjective cognitive impairment. *Alzheimer's and Dementia: The Journal of the Alzheimer's Associations, 6*(1), 11-24. doi:10.1016/j.jalz.2009.10.002

Reppermund, S., Brodaty, H., Crawford, J. D., Kochan, N. A., Draper, B., Slavin, M. J., . . . Trollor, P. S. (2013). Impairment in instrumental activities of daily living with high cognitive demand is an early marker of mild cognitive impairment:The Sydney memory and ageing study. *Psychological Medicine, 43*(11), 2437-2445. doi:10.1017/S003329171200308X

Rohlfsen, L. S., & Kronenfeld, J. J. (2014). Gender Differences in Functional Health: Latent Curve Analysis Assessing Differential Exposure. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. doi:10.1093/geronb/gbu021

Sajjad, A., Mirza, S. S., Portegies, M., Bos, M. J., Hofman, A., Koudstaal, P. J., . . . Ikram, M. A. (2015). Subjective memory complaints and the risk of stroke. *Stroke, 46*(1), 170-175. doi:10.1161/STROKEAHA.114.006616

Shirooka, H., Nishiguchi, S., Fukutani, N., Tashiro, Y., Nozaki, Y., & Aoyama, T. (2018). Subjective cogntive decline and fall risk in community-dwelling older adults with or without objective cognitive decline. *Aging Clinical and Experimental Reserch, 30*(5), 457-462. doi:10.1007/s40520-017-0799-3

Szanton, S. L., Alfonso, N., Leff, B. A., Guralnik, J., Wolff, J. L., Stockwell, I., . . . Bishai, D. (In press). Medicaid cost savings of CAPABLE, a person-directed program for low-income older adults with disability. *Journal of the American Geriatrics Society*.

Szanton, S. L., Thorpe, R. J., Boyd, C., Tanner, E. K., Leff, B., Agree, . . . Weiss, C. O. (2011). Community aging in place, advancing better living for elders: A bio-behavioral-environmental intervention to improve function and health-related quality of life in disabled older adults. *Journal of the American Geriatrics Society, 59*(12), 2314-2320.

Tomaszewski Farias, S., Cahn-Weiner, D. A., Harvey, D. J., Reed, B. R., Mungas, D., Kramer, J. H., & Chui, H. (2009). Longitudinal changes in memory and executive functioning are associated with longitudinal change in instrumental activities of daily living in older adults. *The Clinical Neuropsychologist, 23*(3), 446-461.

Wesson, J., Clemson, L., Brodaty, H., & Reppermund, S. (2016). Estimating functional cognition in older adults using observational assessments of task performance in complex everyday activities: A systematic review and evaluation of measurement properties. *Neuroscience & Biobehavioral Reviews, 68*, 335-360.

Table 1. Characteristics of Participants (N=3,721)

Variables	Wave 4	Wave 5	Wave 6
Age (years)	M=81.2	M=84.2	M=87.1
	SD=1.4	SD=1.5	SD=1.4
	R=77-85	R=80-88	R=83-92
Major health conditions (%)			
High blood pressure	56.2	57.5	59.3
Osteoarthritis	28.5	29.6	32.8
Osteoporosis	22.1	25.2	23.4
Diabetes	11.3	11.5	12.2
Angina	11.3	10.3	10.7
Heart attack	4.9	4.7	5.1
Stroke	3.9	4.5	4.1
Parkinson's disease	Not investigated	1.0	0.7
Alzheimer's Disease or Dementia	1.0	1.7	1.7
Depression	7.1	7.5	6.9
Anxiety	5.8	6.1	5.8
None of these	7.1	7.4	5.2
Marital status (%)			
Married	35.8	28.8	21.5
De facto (in a relationship)	0.4	0.4	0.2
Widowed	56.8	63.6	71.4
Separated	0.9	0.7	0.6
Divorced	3.0	3.0	3.3
Never married	2.7	2.7	2.6
Living arrangement (%)			
Alone	54.0	59.9	63.5
Spouse or partner	35.5	28.3	20.5
Own children	6.3	6.9	7.8
Other family members	4.1	3.4	4.7
Non-family members	2.2	2.1	3.4
Areas of residence (%)			
Urban	44.3	45.0	44.7
Rural	53.3	52.4	48.8
Remote	2.4	2.1	1.9
Manage on income (%)			
Impossible	0.6	0.8	0.5
Difficult always	4.8	3.8	2.8
Difficult sometimes	15.0	13.2	10.5
Not too bad	50.4	47.5	48.1
Easy	27.8	33.4	37.1
Difficulty in ADL[a]	M=0.9	M=1.1	M=1.8
	SD=2.2	SD=2.3	SD=3.2
Difficulty in IADL[a]	M=2.2	M=2.9	M=4.3
	SD=2.9	SD=3.2	SD=4.0
Memory difficulties[a]	M=25.4	M=25.2	M=25.5
	SD=4.1	SD=4.3	SD=4.4

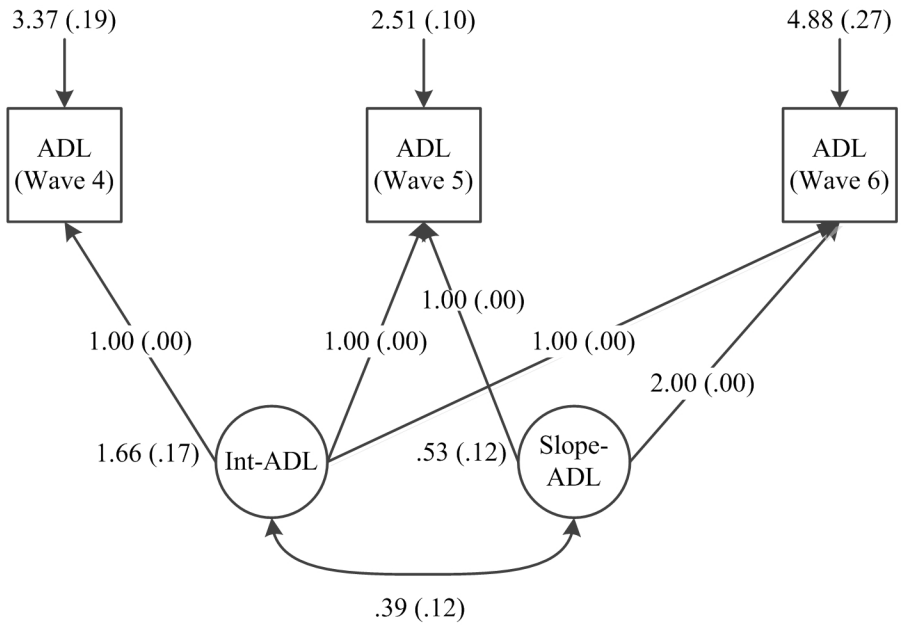
Note. M: mean; SD: standard deviation; R: range; [a]Higher mean values are indicative of greater difficulty in performing ADL and IADL tasks and more memory difficulties.

Table 2. Estimates of LGM on difficulties in ADL and IADL performance and memory difficulties, respectively

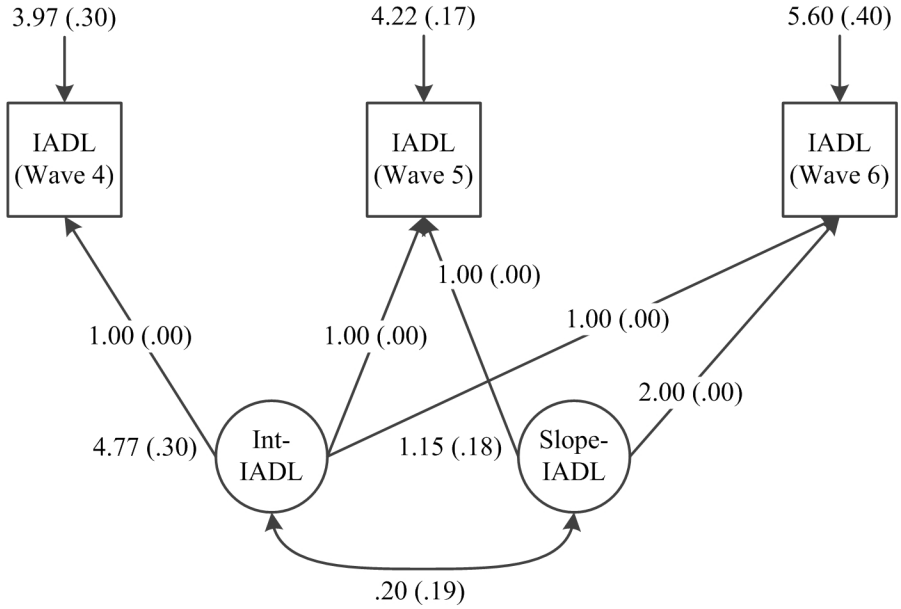
Domains	Intercept				Slope				Covariance between intercept and slope		Model fit index					
	Mean		Variance		Mean		Variance									
	β (SE)	*p*	β (SE)	*p*	β (SE)	*p*	β (SE)	*p*	β (SE)	*p*	Chi-square (*df*)	*p*	CFI	TLI	RMSEA	SRMR
Difficulty in ADL	0.82 (0.04)	<0.01*	1.66 (0.17)	<0.01*	0.44 (0.03)	<0.01*	0.53 (0.12)	<0.01*	0.39 (0.12)	<0.01*	37.25 (1)	0.01*	0.98	0.93	0.099	0.025
Difficulty in IADL	2.14 (0.05)	<0.01*	4.77 (0.30)	<0.01*	1.02 (0.03)	<0.01*	1.15 (0.17)	<0.01*	0.19 (0.18)	0.29	33.60 (1)	<0.01*	0.99	0.96	0.094	0.021
Memory difficulties	25.30 (0.07)	<0.01*	13.22 (0.51)	<0.01*	0.05 (0.03)	0.15	1.32 (0.21)	< 0.01*	-0.95 (0.25)	<0.01*	19.13 (1)	0.01*	0.99	0.99	0.070	0.013

Note. SE: Standard error; CFI: Comparative Fit Index; TLI: Tucker–Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardised Root Mean Square Residual; * $p < 0.05$

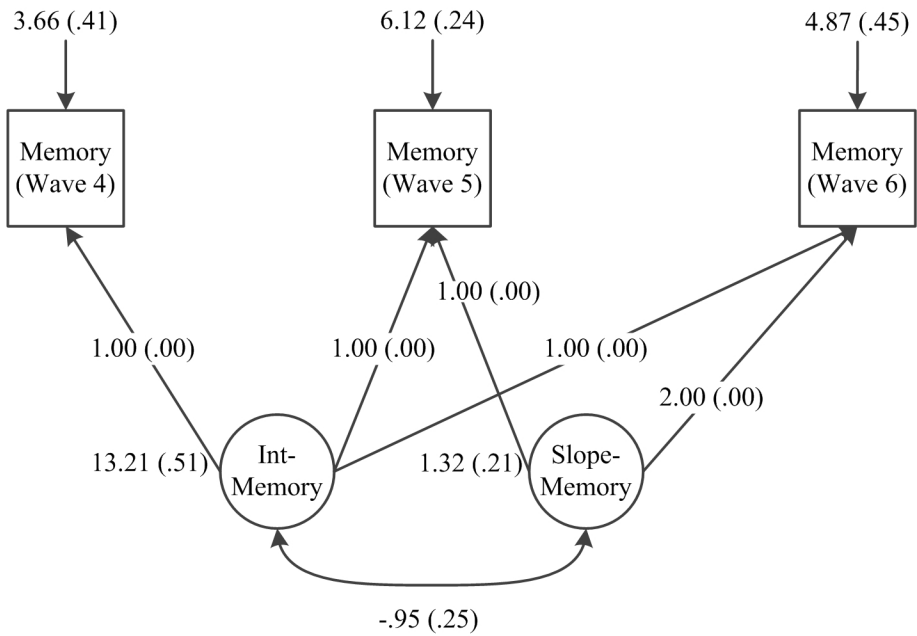
a) Model of difficulties in ADL

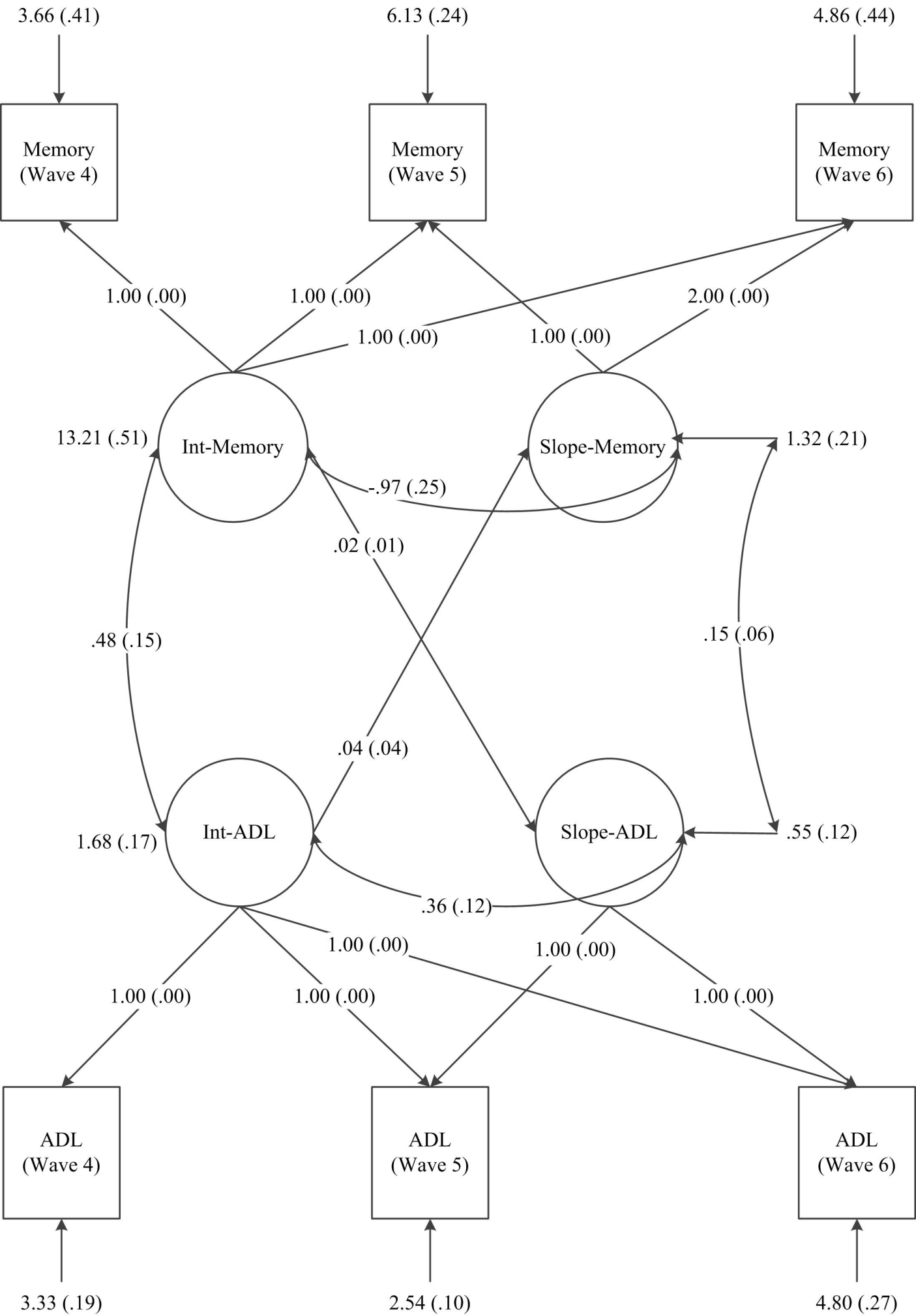


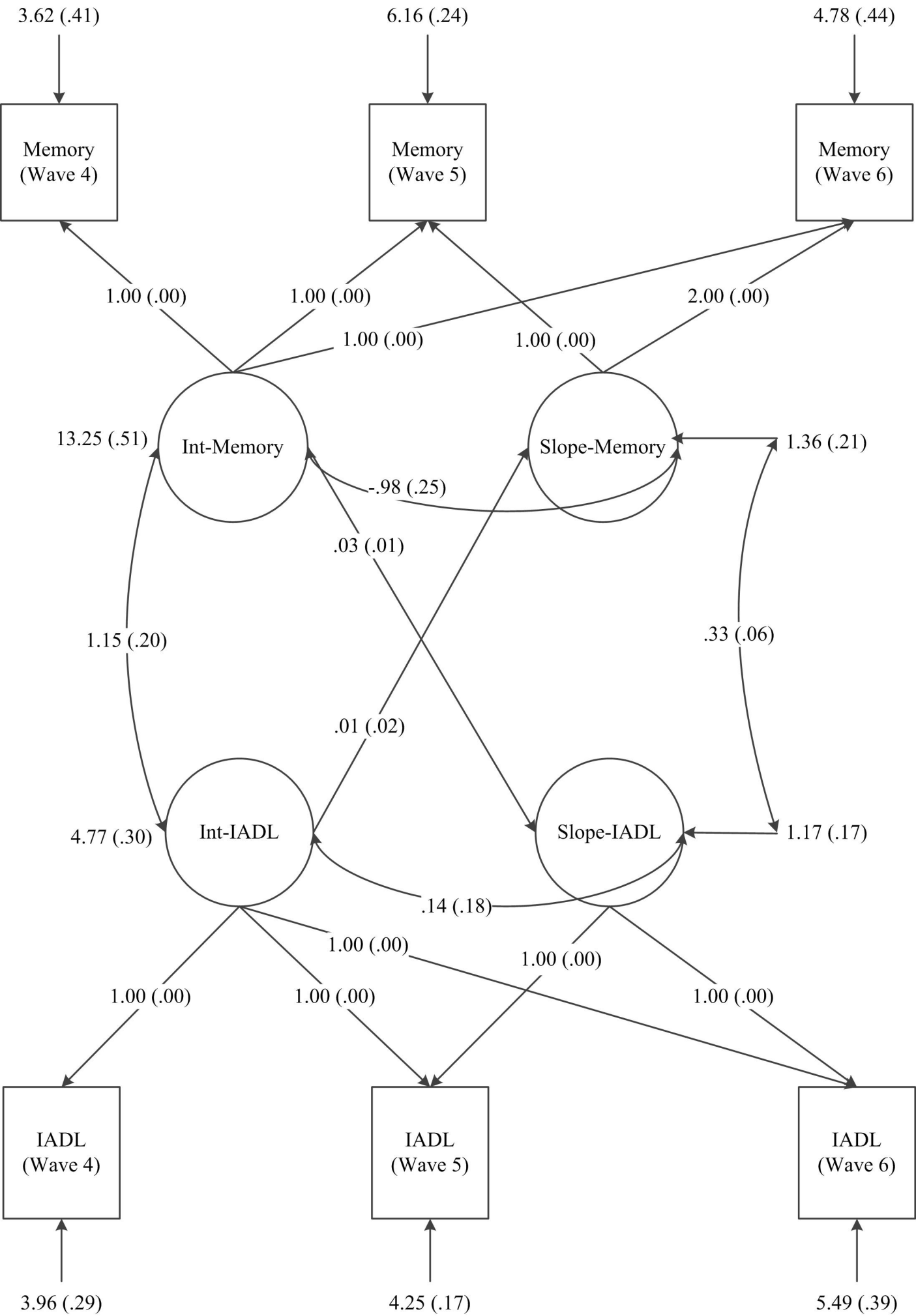
b) Model of difficulties in IADL



c) Model of memory difficulties




3.66 (.41)
6.13 (.24)
4.86 (.44)
Memory (Wave 4)
Memory (Wave 5)
Memory (Wave 6)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
2.00 (.00)
13.21 (.51)
Int-Memory
Slope-Memory
1.32 (.21)
-.97 (.25)
.02 (.01)
.48 (.15)
.15 (.06)
.04 (.04)
1.68 (.17)
Int-ADL
Slope-ADL
.55 (.12)
.36 (.12)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
ADL (Wave 4)
ADL (Wave 5)
ADL (Wave 6)
3.33 (.19)
2.54 (.10)
4.80 (.27)


3.62 (.41)
6.16 (.24)
4.78 (.44)
Memory (Wave 4)
Memory (Wave 5)
Memory (Wave 6)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
2.00 (.00)
13.25 (.51)
Int-Memory
Slope-Memory
1.36 (.21)
-.98 (.25)
.03 (.01)
1.15 (.20)
.33 (.06)
.01 (.02)
4.77 (.30)
Int-IADL
Slope-IADL
1.17 (.17)
.14 (.18)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
1.00 (.00)
IADL (Wave 4)
IADL (Wave 5)
IADL (Wave 6)
3.96 (.29)
4.25 (.17)
5.49 (.39)