

DEVELOPMENT AND VALIDATION OF THE MEMORY IMPACT QUESTIONNAIRE

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Abstract

Many healthy older adults experience age-related memory changes that can impact complex activities of everyday living. Whereas qualitative interviews have been useful in gaining insight into the experience of older adults who are facing memory difficulties, there is a need for reliable and valid measures that quantify the impact of normal memory changes in daily living. The primary objective of this study was to develop and validate a new instrument, the Memory Impact Questionnaire (MIQ). Exploratory factor analysis revealed three themes within item scores. These themes include (a) Negative Emotion, (b) Lifestyle, and (c) Coping. Among a group of 100 older adults, analyses revealed adequate internal consistency among subscale items as well as convergent and divergent validity of the three scales in relation to other questionnaires. Although exploratory factor analyses suggest support for the factor structure proposed to underlie item responses, a larger sample size is required before latent factors can be accurately determined through confirmatory factor analysis. With an aging population, it is increasingly important to develop tools that can help capture the experience of older adults in order to increase our understanding and improve support programs for this population. This study outlines the psychometric properties of an initial version of the MIQ, with recommendations to improve it through further research.

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Development and Validation of the Memory Impact Questionnaire

Memory and Aging

Memory changes in aging are well recognized in research and popular culture, yet aging actually has differential effects on different types of memory. Tulving (1995) offered a schema of five major types of memory that include procedural memory, perceptual representation systems, semantic memory, working memory, and episodic memory. *Procedural memory* is an action system that mediates the ability to perform motor tasks. Motor performance declines with aging, but the memory for a procedural task is generally preserved with aging (Churchill, Stanis, Press, Kushelev, & Greenough, 2003; Daselaar, Rombouts, Veltman, Raaijmakers, & Jonker, 2003). *Perceptual representational systems* permit rapid identification of previously encountered stimuli. This system does not require effortful remembering and is largely maintained during aging, though some age-related decreases in priming due to reduced awareness and response competition have been reported (Geraci & Barnhardt, 2010; Geraci, Hamilton, & Guillory, 2015). *Semantic memory* refers to general knowledge, and this type of memory is well preserved in healthy aging (Kennedy et al., 2015; Verhaeghen, 2003), though older adults do display naming difficulties due to reduced lexical access (Facal, Juncos-Rabadán, Guardia-Olmos, & Pereiro, 2016). *Working memory* refers to the ability to hold and manipulate information in the mind. This memory system does show age-related decreases, particularly in the ability to manipulate information. *Episodic memory* refers to memory for remembering events and experiences that have happened to us personally and is strongly implicated in aging (Luo & Craik, 2008). Thus, of the five memory systems outlined by Tulving, procedural, perceptual representation, and semantic memory are generally age-invariant, whereas working memory and episodic memory show age-related declines.

This paper reviews the literature on age-related memory changes in different memory systems, including working memory, episodic memory and prospective memory. It further outlines research investigating age-related memory changes in everyday life and the functional impact these changes can have. I then describe the development and validation of a new questionnaire designed to measure the impact of normal age-related memory decline on everyday functioning.

Working Memory in Normal Aging

Working memory holds both auditory information, through the phonological loop, and visual information, through the visuospatial sketchpad. Attentional control to these systems is modulated through frontal-subcortical circuits. In normal aging, this attentional control is thought to decline, resulting in reductions in working memory (Kirova, Bays, & Lagalwar, 2015). A common laboratory task that assesses working memory is the N-back task which requires participants to respond when a stimulus is presented that is the same as the one presented n trials previously where n is a pre-specified number. Older adults show decreased performance in a variety of abilities required by this task, including information maintenance, updating of temporal order, and filtering irrelevant contextual information (Dobbs & Rule, 1989; Foos, 1989; Schmiedek, Li, & Lindenberger, 2009). Similar age-related working memory decreases, due to reduced attentional modulation and inability to suppress irrelevant stimuli, have been reported with other paradigms (Carp, Gmeindl, & Reuter-Lorenz, 2010; Gazzaley et al., 2008; Gazzaley, Cooney, Rissman, & D'Esposito, 2005; Mitchell, Johnson, Higgins, & Johnson, 2010). Older adults also show reliable, large age-related decreases in reading span, listening span, and operation span (Bopp & Verhaeghen, 2005). On the other hand, simple short-term memory tasks such as digit span or few items list recall do not show differences with aging

(Zacks, Hasher, & Li, 2000). Recently, neuroimaging studies have been conducted to investigate the neural changes associated with age-related decreases in working memory. These imaging studies demonstrate that during working memory tasks, older adults show greater activation of prefrontal cortex, parietal regions, and entorhinal cortex as compared to younger adults, suggesting a need to recruit neural resources at lower loads (Kirova et al., 2015; Schneider-Garces et al., 2010).

Episodic Memory in Normal Aging

A further subtype within episodic memory is autobiographical memory, which is one's memory for past life events. This type of memory plays an important role in identity formation and shows characteristic changes with aging (Levine, 2004). When compared to younger adults, older adults are less likely to report episodic details and instead focus on semantic recall (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002). Notably, this effect is mostly displayed in the recall of recent memories with few age-related changes in the reporting of remote memories (Haist, Bowden Gore, & Mao, 2001). In fact, aging adults tend to focus on early adulthood experiences when prompted for autobiographical recollections (Schroots, van Dijkum, & Assink, 2004). Experimental researchers often measure episodic memory in a lab setting using an intertrial technique in which study items are presented over multiple trials and recall is assessed after each trial. In such laboratory tasks, older adults show an initial recall deficit, as well as slower word acquisition over subsequent trials (Almond & Morrison, 2014). In addition, older adults show difficulty with free recall of previously presented information compared to younger adults, though recall does improve when cues are provided (Tromp, Dufour, Lithfous, Pebayle, & Després, 2015). This difference in performance for free versus cued delayed recall suggests difficulties with memory retrieval rather than encoding.

Older adults also show significant reductions in remembering source information for episodic memories (Cansino, 2009). Another distinction within episodic memory is item versus associative memory. Item memory involves remembering single items, whereas associative memory involves binding two or more items together. Recognition of items is largely unchanged in aging, but associative memory shows significant age-related declines. Old and Naveh-Benjamin (2008) conducted a meta-analysis reviewing 90 studies that reported an age-related associative decrease in memory for source, context, temporal order, spatial locations and item pairings for both verbal and nonverbal material. Overall, research indicates that there is considerable memory decreases in tasks that require retrieval of specific events located in time and context of experienced events (Kempe, Kalicinski, & Memmert, 2015). Age-related changes have also been noted in the functional neural correlates of episodic autobiographical memory, specifically in the function of the hippocampus. Reductions in episodic memory have been linked to age-associated loss of hippocampal volume and alterations to hippocampal activation patterns when recalling episodic memories (Piefke & Fink, 2005).

Prospective Memory in Normal Aging

In addition to the five types of memory outlined previously, another type of memory that shows age-related decline is *prospective memory*, or one's memory for future intentions. Prospective memory tasks can be subdivided into time-based tasks, which require an individual to complete a certain task at a particular time, such as taking medication at 7:00, 12:00, and 6:00, and event-based tasks, which require a behavioral action prompted by an external cue, such as taking medication with meals. Older adults are impaired in both time-based and event-based prospective memory tasks when conducted in a laboratory setting (West, Jakubek, & Wymbs, 2002). Older adults report thinking about the prospective memory task less, suggesting that they

underperform due to an inability to keep the intention of carrying out the prospective memory task at a state of higher activation (Henry, MacLeod, Phillips, & Crawford, 2004). Conversely, older adults tend to perform as well or better than younger counterparts in time-based prospective memory tasks that are carried out in naturalistic settings, perhaps due to greater use of memory strategies (Kempe et al., 2015).

Theoretical Models of Aging

Several theoretical models have been proposed to explain the pattern of memory changes observed in older adults. One such model, known as the *processing resources model*, suggests that attentional resources available for cognitive processes decline with age. This limited ability of processing resources then results in a restriction on the quality of memory operations. This theory originated from experimental research that indicated greater age-related memory reductions in situations that required increased attentional resources. The importance of environmental support in memory in older adults is well established and is supported by findings showing that older adults perform better on memory tasks when external cues are provided (Craik & McDowd, 1987; Lindenberger & Mayr, 2014). In addition, older adults show greater memory decreases in novel situations that require self-initiated processing than familiar situations (Park & Gutchess, 2000). Research on false memories suggests that older adults are more susceptible to remembering information that is related to presented material but was itself never presented, perhaps because they rely on gist-based processing instead of focusing on details (Aizpurua, Garcia-Bajos, & Migueles, 2011; Koutstaal et al., 2003; Norman & Schacter, 1997). Furthermore, imaging studies show that when accessing memories, younger adults show unilateral activation of hippocampus and prefrontal cortex, whereas older adults show bilateral activation (Cabeza, 2002). This bilateral activation is thought to be a compensatory mechanism

designed to improve performance by increasing mental resources. Taken together, this research suggests that older adults struggle to perform tasks that require greater processing resources and in some cases rely on compensatory mechanisms for performance.

Another theory, known as the *inhibitory theory*, suggests that age-related memory decreases stem from an inability to filter out irrelevant stimuli (Hasher & Zacks, 1988). According to this theory, inhibition is necessary to inactivate off-goal-path thoughts and thus allow efficient memory processing (Hasher & Zacks, 1988). This theory is supported by research that shows that older adults have difficulty dealing with interference and distractions and are more prone to memory intrusions (Luo & Craik, 2008). Furthermore, several noncognitive factors have been proposed to explain lower memory performance in older adults, including lower motivation, different performance goals, reduced memory self-efficacy, and greater test anxiety (Park & Festini, 2016).

Memory in Everyday Life

Although laboratory tests of memory ability provide important insight into age-related memory decline, it is equally important to study memory in a real-life context. First, laboratory measures of memory changes do not always correspond to performance failures in everyday life. Verhaeghen, Martin, and Sędek (2012) found that despite displaying age-related memory reductions in long term memory, everyday life performance was stable in older adults. This dissociation between memory performance in the laboratory versus everyday life suggests that memory use in day-to-day living comprises nuanced abilities and compensatory techniques (Kempe et al., 2015). In addition, everyday activities may influence memory processes. Previous research indicates that memory performance is affected by motor activities (Rose, Myerson, Sommers, & Hale, 2009; Schaefer, Lövdén, Wieckhorst, & Lindenberger, 2010), suggesting that

an everyday life environment that often combines motor and cognitive tasks may influence memory performance. Lastly, studying memory changes in an ecologically relevant manner allows researchers to develop translational interventions that are meaningful for older adults. As such, a full understanding of age-related memory decline must include direct assessment of memory changes experienced by older adults in everyday life.

Subjective memory complaints are quite common in older adults, with prevalence rates ranging from 27 to 43% (Reid & MacLulich, 2006). In fact, older adults rate memory complaints as the most problematic cognitive complaint they experience due to aging (Newson & Kemps, 2006). Considering the importance that older adults place on memory changes, it is crucial to understand the type and frequency of subjective memory complaints reported by these adults. Osher, Flegal, and Lustig (2013) investigated the types of memory error most often reported by older adults in daily life using the Everyday Memory Questionnaire. They found that healthy older adults often made errors in the verbal domain, including tip-of-the-tongue errors, forgetting recently learned names, and other recently learned verbal information. Other common errors included forgetting what a recently read sentence was about and forgetting the location of items, such as one's keys. This is consistent with earlier research that identified errors in remembering the names of new people, remembering where one placed objects, managing medication, recalling events that occurred in the recent past, and remembering why one walked into a room as common types of everyday memory failures made by older adults (Farias et al., 2006; Smith, Della Sala, Logie, & Maylor, 2000).

These everyday memory errors can have important consequences for older adults. Several groups have reported an association between subjective memory complaints and poor quality of life, dissatisfaction and reduced feelings of well-being (Maki et al., 2014; Mol et al., 2007;

Montejo, Montenegro, Fernandez, & Maestu, 2011; Montejo, Montenegro, Fernández, & Maestú, 2012). Memory complaints can disrupt daily living in older adults, thus causing psychological distress which further exacerbates memory problems (Zuniga, Mackenzie, Kramer, & McAuley, 2016). In addition, memory complaints can have a negative impact on positive health behaviors. Hutchens et al. (2013) reported a reciprocal relationship between control beliefs and memory performance; specifically, memory difficulties were associated with a reduced sense of control, which in turn decreased the likelihood of strategy use that could improve performance on memory tasks. Memory complaints may also affect how old one feels, or one's subjective age, which is an important predictor of psychological well-being and positive health characteristics. Hughes, Geraci, and De Forrest (2013) found that older adults who held negative perceptions of their memory ability were more likely to report a higher subjective age, suggesting reduced psychological well-being. There is also extensive research that points toward a connection between memory complaints and depression and anxiety symptoms (Comijs, Deeg, Dik, Twisk, & Jonker, 2002; Jorm et al., 2004).

Although these studies have explored the impact of memory change on quality of life, health outcomes, and other psychological factors, there is a dearth of research investigating the impact of memory changes in day-to-day living. Recently, Parikh, Troyer, Maione, and Murphy (2015) conducted a qualitative study investigating the impact of memory changes on older adults with normal memory changes and older adults with amnesic mild cognitive impairment. They found that even mild memory changes can have a meaningful impact on several aspects of daily living, which speaks to the importance of memory in maintaining personal identity. The study authors noted that memory changes in older adults can often prompt significant emotional reactions, including social embarrassment and frustration. This is supported by earlier work with

clinical populations that describes emotional responses to memory failures, including diminished self-confidence, fear of embarrassment, frustration with self, and feelings of irritation or anger towards others (Frank et al., 2006; Joosten-Weyn Banningh, Vernooij-Dassen, Rikkert, & Teunisse, 2008). In the Parikh et al. (2015) study, qualitative analysis revealed four major themes that were impacted by age-related memory changes: (a) changes in feelings and views about the self, (b) changes in social interactions and relationships, (c) changes in work and leisure activities, and (d) deliberate increases in compensatory behaviors.

The Current Study

The current study uses the findings from earlier qualitative work to inform the development of a psychological measure to quantitatively assess the impact of memory changes on everyday living. Developing a quantitative tool for measuring impact of memory change can help clinicians or researchers to better understand the experience of older adults. This in turn is crucial for tailoring memory intervention programs to target the specific needs of older adults experiencing age-related memory complaints.

In this study, we develop and validate an instrument titled the *Memory Impact Questionnaire* (MIQ). Specifically, we assess the psychometric properties of this measure, including analyses of factor structure, reliability, convergent validity, and discriminant validity. We intend for the finalized questionnaire to provide scaled scores for responses in each of the four domains that were identified as being impacted by age-related memory changes in the Parikh et al. (2015) qualitative study.

Methods

Participants

Community-dwelling older adults, between the ages of 55 and 90, were recruited for participation in this study. Recruitment occurred through a variety of sources, including flyers in and around York University, Baycrest Health Sciences Center, and community areas, recruitment emails through the York University Retirees Association, online postings, as well as through databases for research volunteers. Participants of the Memory and Aging Program offered through Baycrest Health Sciences Center and York University were also approached for participation in this study. All participants were assessed for possible memory impairments using the modified version (Welsh, Breitner, & Magruder-Habib, 1993) of the Telephone Interview for Cognitive Status (TICS-m; Brandt, Spencer, & Folstein, 1988). Potential participants were excluded from this study if they did not meet the age criteria or they lacked fluency in written or spoken English. Participants had the option of completing the questionnaires online or using a paper version. Online questionnaires did not need to be completed in one continuous session, as long as participants did not exit the program. Not all participants who initially expressed an interest completed the study. Analysis of results took place once 100 participants had submitted their responses.

Memory Impact Questionnaire (MIQ)

Construction of the MIQ was based on responses obtained in the qualitative interviews of healthy older adults conducted by Parikh and colleagues (2015). We first generated 84 items to measure aspects of the four domains identified by Parikh et al. (2015). These domains include (a) changes in feelings and views about the self, (b) changes in relationships and social interactions, (c) changes in work and leisure activities, and (d) deliberate increases in compensatory behaviours. Items from the four domains were intermixed and presented as a single scale with

instructions for respondents to rate their level of agreement with each statement on a 5-point scale anchored by *Strongly Disagree* at one end and *Strongly Agree* at the other.

Older adults experiencing memory changes report both positive and negative effects of these changes. As such, the proposed scale contained items that reflect both positive and negative changes in lifestyle due to memory alterations. For example, an individual experiencing memory changes may become more informed about current memory research, which would be a positive impact. Alternatively, individuals with memory changes may develop negative self-perceptions and increased self-criticism, which would be a negative impact. To ensure consensus on the affective valence of each item, eight psychology students and eight professionals who work with older adults (all psychologists or social workers) were asked to rate each item on a 5-point scale, anchored by *Quite Negative* and *Quite Positive*, assuming that the item was true (i.e., “If you agreed with this statement, indicate how positive or negative it would be for you”). For the majority of items, there was strong agreement among raters regarding the valence of the item. However, nine items were identified for which the directionality was unclear. Where possible, these items were reworded to improve clarity. For example, one item stated, “I rely on others to help me with my memory.” This may be viewed as positive that someone has social support available or negative in that there was a need for support in the first place. As such, this item was reworded to “Because of my memory changes, I have to depend more on others,” which had a clear negative valence. Four items were deleted because they could not be clarified without significantly altering the underlying meaning. This left 80 items, of which 27 were positive and 51 were negative. In order to correct for the disproportionate ratio of negative items, 4 negative items were reworded as positive items. For example, one item stated, “Because of my memory changes, I don’t feel like the same person I was before.” This was reworded to, “Despite my

memory changes, I still feel like the same person I was before.” In this stage, two additional items were deemed to be redundant and thus were deleted. We then administered the MIQ to 10 healthy older adults in order to receive feedback about the acceptability of the items. Based on feedback from these participants, we revised our Likert scale anchors. In the initial version, the ratings were: *Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree*. However, participants indicated that they had trouble rating the difference between agreeing (or disagreeing) with an item and strongly agreeing (or disagreeing) with it. Therefore, we revised the rating scale to *Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, Agree*.

After the revision of items described above, the Memory Impact Questionnaire consisted of 78 items with a 60:40 distribution of negative ($n = 47$) and positive ($n = 31$) items. The distribution of items across the four target domains was as follows: (a) Changes in Feeling and Views about the Self domain = 26 items; (b) Changes in Relationships and Social Interactions = 25 items; (c) Changes in Work and Leisure Activities = 13 items; (d) Deliberate Increases in Compensatory Behaviour = 14 items. These respective domains were named Self, Relationships, Activities, and Compensation. Figure 1 provides a summary of the stages of development of the MIQ, from creation of the initial pool of items to the final version that was used in the study.

All negative items were assigned a score from 1 (Disagree) to 5 (Agree). Positive items were reverse-coded such that scores ranged from 1 (Agree) to 5 (Disagree). In addition, there were five items on which respondents could indicate that “this statement does not apply to me.” For example, one item stated “Because of my memory changes, I’m involved in less demanding activities at work.” A respondent who was no longer working would have the option of indicating that this statement did not apply. In this case, these items were assigned a score of 0.

All such items related to the Change in Work and Leisure Activities domain. A subscale score was calculated by summing the item score for all items corresponding to that subscale. A total score was also calculated by summing scores on all items. A higher score on the MIQ indicates greater negative impact of memory changes.

Other Measures

Other validated self-report measures of memory and mood were included in this study in order to determine convergent and discriminant validity of the four domains of the MIQ. The Contentment subscale of the Multifactorial Memory Questionnaire (MMQ; Troyer & Rich, 2002) was used as a measure of memory-related affect, and along with the Levels of Self-Criticism Scale (Thompson & Zuroff, 2004), was expected to be related to the Self domain of the MIQ. The Contentment subscale of the MMQ consists of 18 items that assess how respondents feel about their memory. High scores on this measure indicate greater contentment with their memory abilities. The Levels of Self-Criticism Scale consists of 22 items assessing self-criticism. Higher scores on this measure suggest greater self-criticism. The Toronto Empathy Questionnaire (Spreng, McKinnon, Mar, & Levine, 2009) and the UCLA Loneliness scale (Russell, 1996) are measures of relating to others and were expected to be related to the Relationships domain of the MIQ. The Toronto Empathy Questionnaire is 16-item measure and high scores on this measure indicate greater empathy towards others. The UCLA Loneliness scale is a 20-item measure, with higher scores indicating greater loneliness. The Ability subscale of the MMQ and the Victoria Longitudinal Study Activities Questionnaire (Jopp & Hertzog, 2010) are measures of subjective memory ability and participation in leisure activities and were expected to be related to the Activities domain. The Ability subscale of the MMQ is 20 items that assess the frequency of memory mistakes with higher scores indicating less memory

mistakes. The VLS Activity Questionnaire is a 61-item questionnaire that assesses frequency of participation in leisure activities with higher scores indicating greater participation in leisure activities. The Strategy subscale of the MMQ and the Strategy subscale of the Metamemory In Adulthood questionnaire (Dixon & Hultsch, 1983) measure memory strategy use and should be related to the Compensation domain of the MIQ. The Strategy subscale of the MMQ is 19 item questionnaire that assesses the frequency of strategy use with higher scores indicating greater strategy use. Similarly, the Strategy subscale of the Metamemory in Adulthood questionnaire assesses frequency of strategy use with 17 items. Higher scores on this measure suggest greater strategy use. The Morningness-Eveningness Questionnaire (Horne & Östberg, 1976) assesses circadian rhythm type and along with the Internal Cognitive Experiencing Scale (Kohn & Annis, 1975), which assesses novelty seeking, was used to assess discriminant validity of the MIQ. The Morningness-Eveningness Questionnaire consists of 19 items with high scores indicating a morning type and low scores indicating an evening type. The Internal Cognitive Experiencing Scale consists of 20 items with higher scores indicating greater novelty seeking.

Procedure

All participants who expressed an interest in this study were contacted for a telephone interview. In this interview, participants were provided with a detailed description of the study and what they would be required to do. In addition, a demographic questionnaire and the TICS-m were administered. Participants who preferred to complete the study at home were mailed a copy of the remaining study materials. Participants who preferred to complete the study online were emailed a link to the questionnaires with the relevant instructions. Participants were also given the option of completing a paper version of the study in person at York University or Baycrest Health Sciences Centre.

Questionnaires and tests were presented in a fixed order as follows: MIQ, Levels of Self-Criticism Scale, Morningness-Eveningness Questionnaire, Victoria Longitudinal Study Activities Questionnaire, Metamemory In Adulthood-Strategy, Toronto Empathy Questionnaire, UCLA Loneliness Scale, Internal Cognitive Experiencing Scale, and the Multifactorial Memory Questionnaire. These questionnaires took 45 minutes to an hour to complete.

Statistical Analysis

In order to determine convergent and discriminant validity, Pearson correlations were calculated between responses from the respective questionnaires. In addition, a principal components analysis (PCA) was used to determine the factor structure underlying the questionnaire. We also conducted a confirmatory factor analyses based on the results from the PCA. We developed normative data for the observed scores on the MIQ.

Results

Participant Demographics

The sample consisted of 100 older adults, ranging from 56 to 90 years of age ($M = 71.1$, $SD = 8.0$). The sample was 64% female and 36% male. Most participants completed the online version of questionnaires ($n = 76$), with some choosing to complete the paper version ($n = 24$). The education in years completed by participants ranged from 8 to 20 years ($M = 15.9$, $SD = 2.6$). Table 1 provides a summary of the demographic characteristics of the sample.

Exploratory Factor Analysis

Model 1

We performed a principle components analysis with varimax rotation using the responses on the 78 items from all 100 participants. We forced the solution to four components based on the four target domains intended during item construction. Eigenvalues of the four components

ranged from 2.9 to 17.1. The factor analysis revealed 14 items that had high loadings (greater than .25; Widaman & Grimm, 2014) on more than one component. These items were eliminated from subsequent analyses, for a total of 64 retained items. Overall, this model accounted for 41% of the total score variance.

The first component had 21 items with high loadings, ranging from .28 to .82, and a mean loading of .60. This component had an eigenvalue of 17.1 and accounted for the most variance in the observed scores. We categorized all the items in this component by the theoretical domain that they corresponded to (see Table 2). Fourteen of the 21 items (67%) corresponded to the Self domain, four items (19%) corresponded to the Relationships domain, and three items (14%) corresponded to the Activities domain. Examination of the individual items indicated that, overall, they reflect negative self-perceptions and perceived judgment by others; therefore, this component was interpreted as a Negative Emotion component. Five items did not seem conceptually related to the theme of the component and were therefore eliminated.

The second component had 9 items with loadings ranging from .48 to .76, a mean loading of .61, and an eigenvalue of 4.0. This component consisted of 5 items (56%) that corresponded to the Relationships domain and 4 items (44%) that corresponded to the Activities domain. These items did not seem to fall under a unique theme and instead related to a variety of changes to social relationships and activities.

The third component had 8 items with loadings ranging from .38 to .55, with a mean loading of .48 and a total eigenvalue of 2.9. This component consisted of 4 items (50%) corresponding to the Activities domain, 2 items (25%) corresponding to the Relationships domain, and 2 items (25%) corresponding to the Self domain. The items in this component also related to a variety of changes in social relationships and activities. Due to the seemingly high

correspondence between items on this component and items on the previous component, we examined the intercorrelation between the two components and found that it was significant and medium in size, $r(98) = .48, p < .001$. Taken together, items from these two components reflect the impact of memory changes on social relationships, work, and leisure activities. We therefore created a combined group of items that we interpreted as a Lifestyle component. Two items were not conceptually related to the interpretation of this component and were thus eliminated from subsequent analyses.

The fourth component had 26 items with loadings ranging from .37 to .79, a mean loading of .53, and a total eigenvalue of 8. This component consisted of 12 items (46%) corresponding to the Compensation domain, 7 items (27%) corresponding to the Self domain, and 7 items (27%) corresponding to the Relationships domain. Overall, these items reflect acceptance of memory changes and increased strategy use to compensate for memory changes, which we interpreted as a Coping component. One item was not conceptually related to the interpretation of this component and was therefore excluded from subsequent analyses.

Model 2

Based on the results from our initial analysis, we performed a principle components analysis on the 56 responses that were retained and recategorized from their initial domain mapping. In this case, we forced the solution to three components. We used a direct oblimin rotation, as previous analysis had indicated correlations between our components, suggesting that these factors are not orthogonal. Eigenvalues of the three components ranged from 3.6 to 12.6. The factor analysis revealed 8 items that had high loadings on more than one component. These items were eliminated from subsequent analyses, for a total of 48 items. Overall, this model

accounted for 41% of the total score variance (which is the same amount accounted for by the four factors yielded by the initial exploratory PCA conducted on the original pool of 78 items).

The first component had 15 items with high loadings, ranging from .38 to .81, and a mean loading of .65. This component had an eigenvalue of 12.6 and accounted for the most variance in the observed scores. All the items in this component corresponded to the theme of Negative Emotion that was identified through previous analysis. The second component had 13 items with high loadings, ranging from .38 to .75, and a mean loading of .58. This component had an eigenvalue of 3.6. All items in this component corresponded to the overall theme of Lifestyle. The third component had 20 items with high loadings, ranging from .34 to .80, with a mean loading of .58. This component had an eigenvalue of 7. Most of the items in this component corresponded to the items under the overall theme of Coping. However, one item in this component had been categorized as a Lifestyle item (i.e., “I make a point of getting involved in hobbies and past-times in order to maintain my memory.”). Considering that it conceptually relates to the theme of coping, we recategorized it as belonging to this component. Table 3 categorizes the items in each component by their corresponding themes.

To summarize, PCA analysis of Model 2 resulted in the identification of three components: Negative Emotion (n = 15 items), Lifestyle (n = 13), and Coping (n = 20). A subscale score was calculated for each of the components by summing the scores obtained on the respective items. In addition, a total score was calculated by summing all 48 items, with higher scores indicating higher impact of memory changes. Pearson correlations calculated between the three scales indicate significant, medium-sized relations between scores on the Negative Emotion subscale and the other two scales, such that greater negative emotion was associated with greater lifestyle changes (reductions in leisure, work, or social activities) and decreased use of coping,

such as compensatory strategy use. Scores on the Coping and Lifestyle subscales were not intercorrelated. Medium to large correlations were observed between each subscale and total score on the MIQ (see Table 4). Figure 2 provides a summary of the item revision process undertaken during exploratory factor analysis and the final version of the questionnaire used in subsequent analyses.

Confirmatory Factor Analysis

The factor structure extracted in the exploratory factor analysis was then assessed using confirmatory factor analyses. We tested a model with items loading onto the three scales that emerged through the exploratory factor analyses. The fit statistics for the model are presented in Table 5. Overall, these indices suggest that the model had poor fit. The model's chi square is large, which indicates a large difference between observed and expected covariance matrices. In addition, the comparative fit index (CFI) value, which analyzes the model fit by examining the discrepancy between the data and the proposed model, is less than .9, which indicates a poor model fit. Finally, the root mean square error of approximation (RMSEA) value is higher than .06, which suggests a moderate fit between the hypothesized model and the population covariance matrix when adjusting for sample size inadequacies.

Construct Validity Measures

In addition to the MIQ, we administered other self-report questionnaires to assess the construct validity of our measure. For each of the four target subscales from Model 1, two questionnaires were selected that were hypothesized to converge with these domains. However exploratory factor analyses revealed three distinct themes in item responses. As such, we reassigned the additional measures to the three domains that emerged in Model 2. Here we explore the relationships between those reassigned related measures and the final subscales of

the MIQ (see Table 6). Due to the large number of correlations being conducted, we used an alpha level of .01 for all statistical tests to avoid a Type I error.

The Negative Emotion scale includes items that assess negative self-perceptions due to memory changes and was therefore expected to correlate with other measures of memory-related affect, as well as subjective memory ability. Indeed, there was a significant, medium-sized, correlation between this subscale and the Levels of Self-Criticism scale. Responses on this subscale of the MIQ were also inversely correlated with the MMQ-Contentment scale and the MMQ-Ability scale, as expected. The Lifestyle scale assesses the impact of memory changes in social relationships and work and leisure activities. As such, it was expected to correlate with the UCLA Loneliness Scale and the Victoria Longitudinal Study Activity Questionnaire. Because revision of items from this subscale led to the deletion of questions relating to empathizing with the experience of others, we no longer expected scores on this domain to correlate with the Toronto Empathy Questionnaire. As expected, correlations between this subscale and the UCLA Loneliness Scale were significant and medium in size. Contrary to expectations, the Lifestyle subscale was not correlated to the Victoria Longitudinal Study Activity Questionnaire. Furthermore, correlations were noted between the Lifestyle subscale and nontarget measures. There were small correlations between this scale and the MMQ-Contentment and Ability subscales. Also, there was a medium correlation between the Lifestyle scale and the Levels of Self-Criticism Scale. The Coping subscale explores the use of strategies in order to compensate for memory changes, as well as acceptance towards these changes. As such, it was expected to correlate with other measures of memory strategy use, which was indeed the case for both the Metamemory in Adulthood-Strategy scale and the MMQ-Strategy subscale. In order to test divergent validity of the MIQ, we examined the correlations between observed scores on this

measure and scores on self-report questionnaires that were selected a priori to be unrelated to the effect of memory changes on everyday life. As expected, the total score on the MIQ was unrelated to scores on both the Morningness-Eveningness Questionnaire and the Internal Cognitive Experiencing Scale. Individual MIQ subscale scores were also unrelated to scores on the divergent measures.

Reliability

We examined internal consistency using Cronbach's alpha on data from all participants. These analyses indicated reliable scores on the Negative Emotion ($\alpha = .93$), the Lifestyle ($\alpha = .79$) and the Coping ($\alpha = .89$) subscales. This indicates that 79-93% of the squared total within-test score variance was due to true score variance rather than item content heterogeneity.

Relation of MIQ to Demographic Variables and Mental Status

Total scores on the MIQ were not significantly correlated with age, $r(98) = -.16, p = .108$, or education, $r(98) = .05, p = .634$. A t-test indicated that total scores on the MIQ were not affected by sex, $t(98) = .61, p = .437$. In addition, total scores on the MIQ were not significantly related to mental status, as measured by the TICS-m, $r(98) = -.21, p = .037$.

Normative Data

Scores on the TICS-m demonstrated that all individuals in this sample were not demented, with 96 participants in the normal range (scores above 30) and 4 participants in the questionable range (scores between 25-29). As such, we developed normative data for the MIQ based on performance of all 100 participants. Means, standard deviations and percentiles of the observed MIQ scores, by subscale, are reported in Table 7.

Discussion

This study describes the development and validation of the Memory Impact Questionnaire. We demonstrate good reliability and convergent and divergent validity of this scale. In addition, we provide evidence for the factor structure underlying empirical data through exploratory factor analyses.

Identification of Novel Themes Relating to the Impact of Memory Changes

Based on previous research that conducted qualitative interviews of older adults experiencing memory changes (Parikh et al., 2015), we developed a 78-item questionnaire designed to capture the effect of age-related memory changes in day to day living. These items spanned the distinct domains that emerged from qualitative data, including changes in views of the self, changes in relationships and social interactions, change in work and leisure activities, and deliberate increases in compensatory behaviours. These items were then administered to an independent sample of similar older adults.

Exploratory factor analyses conducted on responses from this sample revealed three themes that share similarities and differences with the four themes proposed initially based on qualitative interviews. These newly obtained themes included (a) Negative Emotion, (b) Lifestyle, and (c) Coping. The Negative Emotion theme included items that related to negative perceptions of the self as well as perceived negative judgments from others. Qualitative data had previously outlined the impact of memory changes on view of the self, which encompassed positive and negative emotional experiences and self-evaluations. However, our results suggest that in addition to self-evaluations, perceived judgment of others also fits within the same construct. These changes in how one is viewed by other people were originally thought to relate to a separate domain focusing on changes in relationships. Moreover, our results indicate that positive and negative views of the self in response to memory changes actually cluster into

separate factors. In contrast, we had thought that the impact of memory changes on one's feelings and self-perceptions would be represented by a single factor. Taken together, the inclusion of items representing negative but not positive self-perceptions as well as perceived negative appraisals by family and friends of one's memory changes, led us to interpret and hence label the resultant factor as Negative Emotion. The emergence of this theme from item responses suggests that age-related memory changes may impact sense of identity in older adults, based on both their own changing feelings towards themselves and perceived negative evaluations by those around them.

The second theme that was identified from our analysis consisted of items that measured changes in lifestyle due to age-related memory changes. This consisted of both changes in social interactions and relationships, as well as changes in work and leisure activities. The qualitative study by Parikh et al. (2015) suggested that these changes would be represented by two distinct factors. Indeed, two factors were obtained, but they contained items spanning the different target domains and were therefore uninterpretable. Further inspection of the items on those two factors suggested that they could be combined into a more general or omnibus lifestyle factor which encompasses social relationships, work, volunteer and leisure activities. In fact, in retrospect, it is not surprising that these items clustered onto a single factor, as there is a social component to many leisure activities. Additionally, many relationships are formed through participation in common activities (i.e. forming friendships due to shared hobbies). Even work activities may require some social interactions with colleagues. The interplay between relationships and activities may have been particularly pronounced in our sample because it consisted primarily of older adults who were retired. These adults would not feel an impact of memory changes on work activities, however due to age-related memory changes, their leisure activities may be

impacted. As leisure activities are often a channel for social interactions, this in turn would affect any friendships or relationships built around those activities.

The third theme that was identified from our analysis consisted of items related to coping with memory changes. This includes employing strategies (such as writing things down) to compensate for decreases in memory ability. However, unexpectedly, it also included attitude changes to help cope with memory decreases, specifically practicing acceptance and forgiveness. As noted above, we had expected both positive and negative items to be represented in a single factor describing feelings about the self, as this was what the qualitative study conducted by Parikh et al. (2015) suggested. However, our analysis suggests that positive items actually group into a separate distinct factor. This factor can be thought of as reactions to the negative impact of memory changes. One may intuitively expect individuals, who experience a meaningful impact of age-related memory changes, to countervail these changes. We expected this compensation to occur at the level of addressing decreased memory performance through strategy use. However, if we view this counterbalance from a more global perspective, it makes sense that individuals would not only compensate for decreased memory performance but would also attempt to countervail the negative emotionality (i.e. embarrassment and shame) associated with age-related memory changes through the adoption of a more positive attitude (i.e. acceptance and forgiveness). Considering this broader approach, it makes sense that items that address changes in attitudes group together with memory strategy use to capsulize coping responses to age-related memory changes.

Construct Validity of the MIQ Subscales

Overall, the subscales of the MIQ were related to other similar psychological constructs. One notable exception to this is the lack of relation between the MIQ Lifestyle subscale and the

VLS Activity Questionnaire which measures participation in leisure activities. This may be because the Lifestyle subscale features various items relating to social interactions and relationships, as well as participation in both work and leisure activities. As such, the final scale consisted of only four items that specifically covered participation in leisure activities. The Toronto Empathy Questionnaire was originally included as a proposed convergent validity measure for the intended Relationship scale. However, the target social relationship items did not fall on a single factor in the initial exploratory factor analysis. Instead, the “social” items were distributed across three of the resultant factors. Specifically, the items that looked at increased empathy towards others who made memory mistakes due to one’s own experiences with age-related memory changes, showed high loadings on multiple components and were therefore not included in subsequent analyses. As such, the Toronto Empathy Questionnaire was not used for convergent validity with any of subscales derived in Model 2. Furthermore, small to moderate correlations were noted between the Lifestyle subscale and measures of memory-related affect. Although this relationship was not originally hypothesized, it makes sense that individuals who report greater negative impact of memory changes to their lifestyle would report less contentment with memory ability and greater self-criticism. As expected, the subscales of the MIQ were not related to measures of novelty-seeking and circadian rhythm types, thus demonstrating the divergent validity of this scale.

Subscales of the MIQ

To summarize, our analysis led to the formation of three subscales of the MIQ: (a) Negative Emotion, (b) Lifestyle, and (c) Coping. These subscales assess distinct impacts of age-related memory changes. Specifically, the respective subscales measure the emotional impact of memory changes, a lifestyle impact on relationships and activities, and a response to those

impacts (high or low coping). Each subscale correlates with other related psychological constructs demonstrating the validity of our established themes.

Clinical Applications of the New Questionnaire

The MIQ is unique in that it enables one to quantify the experiences of older adults with memory changes across life domains. This measure is relatively short (48 items across 3 subscales) which when combined with its usefulness in capturing the experience of older adults with normal age-related memory changes should increase its utility in a clinical setting. First, this scale may provide complementary information for clinical diagnosis. For example, individuals with mild cognitive impairment may report greater impact of memory changes than healthy older adults. Additionally, subjective memory complaints in older adults have been linked to mood disorders, such as depression and anxiety. This measure would allow health care providers to efficiently distinguish individuals who report greater negative impact of memory changes which could then prompt investigation for other commonly associated health conditions, including mood disorders. This scale may also be useful for memory intervention programs. It could be administered as a pre and post measure to determine the effectiveness of the intervention. For example, the Memory and Aging Program at Baycrest Health Sciences Center teaches memory strategies; therefore, scores on the Coping subscale should improve following this intervention. In addition, this program features a psychoeducational component which instructs participants on what to expect with age-related memory changes and teaches stress-inoculation techniques. Both of these aspects may reduce the negative emotions associated with memory changes and thus could be detected by the Negative Emotion subscale of the MIQ.

Limitations and Future Directions

Although the sample size used in this study was minimally adequate for exploratory factor analyses, the MIQ should be investigated with a larger sample size in order to accurately determine model fit with confirmatory factor analyses. One of the fit indices reported in this study (RMSEA) accounts for sample size issues and this index suggested a moderate fit of the proposed model with the variables in the data set. As such, this study should be expanded with a larger sample size in order to confirm the underlying factor structure of item responses. In addition, the MIQ should be validated with additional populations or samples. The participants in our sample were highly educated and this is not representative of the general population. It is possible that education moderates the negative impact of memory changes. For example, individuals with access to greater education may be more likely to seek out health resources, such as memory interventions, and therefore may not be as impacted by memory changes. Similarly, this questionnaire should be validated in working older adults as they may report a greater impact of memory changes on their work-related activities. Finally, future studies should address whether impact of memory changes is strongly related to important outcomes, such as mental health and successful aging.

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Table 1
Demographic Characteristics of Sample

Age	
Mean	71.1
(SD)	(8.0)
Range	56-90
Education	
Mean	15.9
(SD)	(2.6)
Range	8-20
TICS-m Score	
Mean	38.2
(SD)	(4.7)
Range	25-48
Gender (F:M)	64:36
Employment (%)	
Full Time	18%
Part Time	9%
Retired	73%
Marital Status (%)	
Married/Life Partner	68%
Divorced/Separated	11%
Single/Never Married	11%
Widowed	10%

Table 2

Distribution of MIQ Items within PCA Components – Model 1

	Self	Relationships	Activities	Compensation	Total
Component 1	14	4	3	0	21
Component 2	0	5	3	1	9
Component 3	2	2	4	0	8
Component 4	7	7	0	12	26

This table categorizes the number of items from each component revealed by the PCA conducted on Model 1 by the domains they correspond to.

Table 3

Distribution of MIQ Items within PCA Components – Model 2

	Negative Emotion	Lifestyle	Coping	Total
Component 1	15	0	0	15
Component 2	0	13	0	13
Component 3	0	1	19	20

This table categorizes the number of items from each component revealed by the PCA conducted on Model 2 by the themes they correspond to.

Table 4

Intercorrelation between scales of the MIQ

	Negative Emotion	Lifestyle	Coping	Total
Negative Emotion	1			
Lifestyle	.44**	1		
Coping	-.36**	-.19	1	
Total	.61**	.53**	.46**	1

**Correlation is significant at the .001 level

Table 5

Fit indices for confirmatory factor analysis

Fit Index Type	Index Value
χ^2	2631
<i>Df</i>	1481
<i>RMSEA</i>	.089
<i>CFI</i>	.602

Table 6

Intercorrelations between Subscales of the MIQ and Convergent and Divergent Validity Measures

	Negative Emotion	Lifestyle	Coping	Total
Levels of Self-Criticism	.43**	.31*	.05	.46**
MMQ_Contentment	-.67**	-.28*	.23	-.40**
MMQ_Ability	-.45**	-.27*	.09	-.36**
Toronto Empathy Questionnaire	.04	.08	-.05	.02
UCLA Loneliness Scale	.19	.38**	.16	.40**
VLS Activity Questionnaire	.09	-.10	-.17	-.10
Metamemory in Adulthood_Strategy	.17	.07	-.38**	-.15
MMQ_Strategy	.19	.19	-.35**	-.07
Morningness Eveningness Questionnaire	.06	.17	-.09	.03
Internal Cognitive Experiencing Scale	-.10	-.14	-.07	-.17

**Correlation is significant at the .001 level

*Correlation is significant at the .01 level

Table 7
Observed Scores on the MIQ subscales

	Negative Emotion (n = 15)	Lifestyle (n = 13)	Coping (n = 20)
Mean	31.3	18.0	52.0
Std. Deviation	13.5	6.5	14.6
Range	15-68	[†] 11-42	22-96
Percentiles			
1	15	11	22
5	15	12	32.1
16	17	13	39.2
25	19.3	13	42
50	28.5	15.5	49.5
75	41.5	20	60.8
84	47.8	24.8	64
95	56	32.9	82.9
99	68	42	96

[†]The Lifestyle subscale consisted of 2 items where respondents who indicate that the statement did not apply to them. In this case, a score of zero would be assigned to that item. As such the lowest possible score on this subscale is 11 instead of 13.

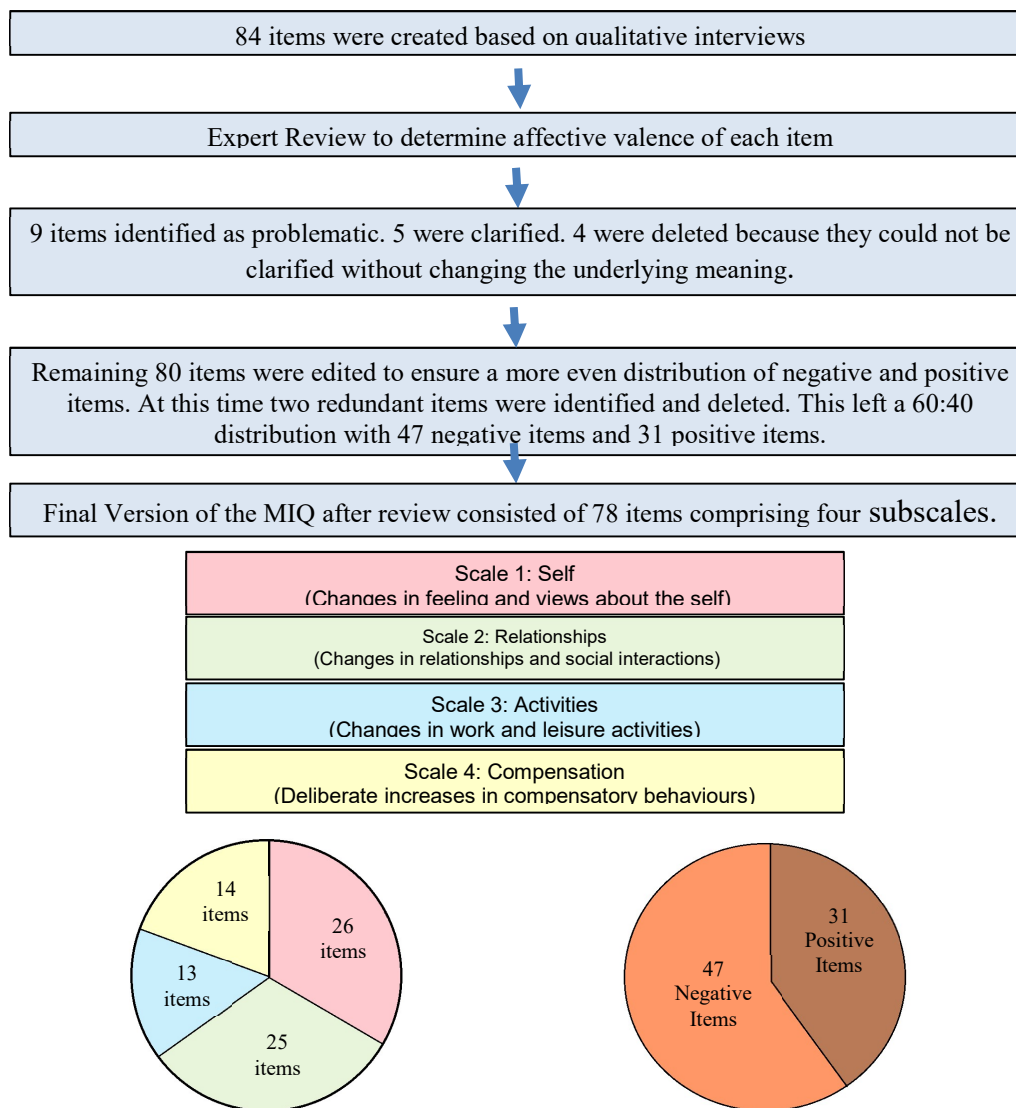


Figure 1: Development of the Memory Impact Questionnaire

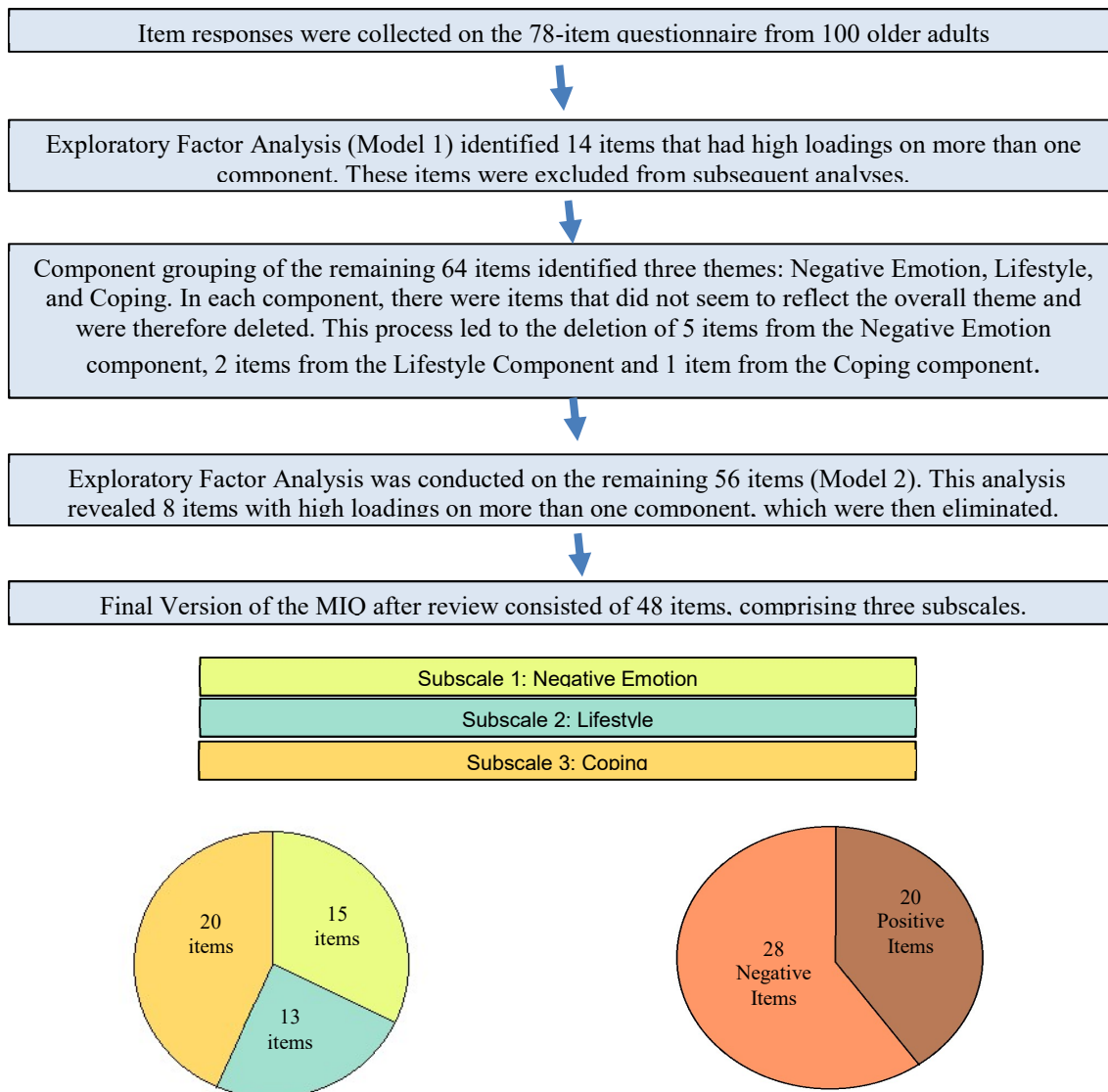


Figure 2: Item Revision Process

Appendix A: Demographic Questionnaire

1. What is your name? _____
2. What is a phone number that you can be reached at? _____
3. What is an email address that you can be reached at? _____
4. Please indicate your sex: Female Male
5. What is your month and year of birth? Month _____ Year _____
6. What is your first language? _____
If not English, when did you learn English? _____
7. What is the highest level of education you have completed?
 - Grade 8 or less Grade 9 to 11
 - Completed High School/GED Some College (attended but not completed)
 - Completed 2-year College/Technical School after High School. Degree earned,
Please specify: : _____
 - Completed 4-year University. Degree earned,
Please specify: _____
 - Post-Graduate Degree (e.g. MA, MBA, MD, PhD).
Please specify: : _____
6. What is your current employment status (check all that apply):
 - Full time Part time Homemaker
 - Unemployed On Leave On Disability
 - Retired Other (please specify): _____
7. What is your current marital status?
 - Married/Life Partner Widowed
 - Divorced/Separated Other (please specify): _____

Single/Never Married

8. Have you ever been diagnosed with one of the following conditions?

Stroke

Transient Ischemic Attack

Insulin Dependent Diabetes

Cancer (treated with chemotherapy)

If yes, indicate date of final treatment _____

Psychiatric Hospitalization (eg. Depression, anxiety)

Epilepsy

Brain tumor/ Brain Surgery

Learning Disability

Dementia

Head Injury with Loss of Consciousness

Appendix B: The Modified Telephone Interview for Cognitive Status

ID number: _____ Date: _____ Examiner: _____

Directions for examiner: Be sure distractions are minimal (no television or radio, no pens or pencils in reach). Ask full question, and query if incomplete on items 1 to 3. Single repetitions are permitted, except for items 5 and 8. For items with instructions DO NOT RECORD, use a check mark to indicate a correct response and an X to indicate an incorrect response, but do not record the participant's response.

Instruction	Scoring criteria	Score
1. Please tell me your full name. DO NOT RECORD	1 point each for first and last name	/2
2. Without looking at a calendar or anything else, tell me today's date. Date: Month: Year: Day of week: Season:	1 point for each part	/5
3. Where are you right now? House number: DO NOT RECORD Street: DO NOT RECORD City: Province: Postal code: DO NOT RECORD	1 point for each part	
4. <i>What is your age?</i> <i>What is your phone number?</i> DO NOT RECORD	1 point for each italicized item	/2
5. Count backwards from 20 to 1.	2 points if completely correct on 1st trial; 1 point if correct on second trial	/2
6. I'm going to read you a list of 10 words. Listen carefully and when I'm done, tell me as many words as you can, in any order. Ready? Cabin Theatre Pipe Watch Elephant Whip Chest Pillow Silk Giant	1 point for each correct response; no penalty for repetitions or intrusions	/10

7. 100 minus 7 equals what? And 7 from that? etc. 93, 86, 79, 72, 65	1 point for each correct subtraction; stop after 5	/5
8. What do people usually use to cut paper? How many things are in a dozen? What do you call the prickly green plant that grows in the dessert? What animal does wool come from?	1 point for “scissors” or “shears” 1 point for “12” 1 point for “cactus” 1 point for “sheep” or “lamb”	/4
9. Say this: No ifs, ands, or buts. Say this: Methodist Episcopal.	1 point for complete repetition on first trial; repeat item only if poorly presented	/2
10. Who is the prime minister of Canada right now? Who is the premier of Ontario?	1 point for each item (need both first and last name); <i>1 point each for first and last</i>	/4
11. With your finger, tap 5 times on the part of the phone you speak into.	2 points if 5 taps are heard; 1 point if subject taps more or less than 5 times	/2
12. I’m going to give you a word, and I want you to give me its opposite. For example, the opposite of hot is cold. What is the opposite of “west”? What is the opposite of “generous”?	1 point for “east” 1 point for “selfish,” “greedy,” “stingy,” “tight,” “cheap,” “mean,” or other good antonym	/2
13. <i>I read a list of words to you earlier. Tell me as many of those words as you can remember</i> <i>Cabin Theatre</i> <i>Pipe Watch</i> <i>Elephant Whip</i> <i>Chest Pillow</i> <i>Silk Giant</i>	<i>1 point for each word correctly recalled.</i>	/10
Total score - original TICS		/41
<i>Total score - modified TICS</i>		<i>/50</i>

Appendix C: Levels of Self-Criticism Scale (LOSC)

Please rate how well each item describes you.

1	2	3	4	5	6	7
Strongly Agree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree

Items	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1. I am very irritable when I have failed.	1	2	3	4	5	6	7
2. I have a nagging sense of inferiority.	1	2	3	4	5	6	7
3. I am very frustrated with myself when I don't meet the standards I have for myself.	1	2	3	4	5	6	7
4. I am usually uncomfortable in social situations where I don't know what to expect.	1	2	3	4	5	6	7
5. I often get very angry with myself when I fail.	1	2	3	4	5	6	7
6. I don't spend much time worrying about what other people will think of me. (R)	1	2	3	4	5	6	7
7. I get very upset when I fail.	1	2	3	4	5	6	7
8. If you are open with other people about your weaknesses, they are likely to still respect you. (R)	1	2	3	4	5	6	7
9. Failure is a very painful experience for me.	1	2	3	4	5	6	7
10. I often worry that other people will find out what I'm really like and be upset with me.	1	2	3	4	5	6	7
11. I don't often worry about the possibility of failure. (R)	1	2	3	4	5	6	7

12. I am confident that most of the people I care about will accept me for who I am. (R)	1	2	3	4	5	6	7
13. When I don't succeed, I find myself wondering how worthwhile I am.	1	2	3	4	5	6	7
14. If you give people the benefit of the doubt, they are likely to take advantage of you.	1	2	3	4	5	6	7
15. I feel like a failure when I don't do as well as I would like.	1	2	3	4	5	6	7
16. I am usually comfortable with people asking me about myself. (R)	1	2	3	4	5	6	7
17. If I fail in one area, it reflects poorly on me as a person.	1	2	3	4	5	6	7
18. I fear that if people get to know me too well, they will not respect me.	1	2	3	4	5	6	7
19. I frequently compare myself with my goals and ideals.	1	2	3	4	5	6	7
20. I seldom feel ashamed of myself. (R)	1	2	3	4	5	6	7
21. Being open and honest is usually the best way to keep others' respect. (R)	1	2	3	4	5	6	7
22. There are times that it is necessary to be somewhat dishonest in order to get what you want.	1	2	3	4	5	6	7

Appendix D: Toronto Empathy Questionnaire

Below is a list of statements. Please read each statement carefully and rate how frequently you feel or act in the manner described. Circle your answer on the response form. There are no right or wrong answers or trick questions. Please answer each question as honestly as you can.

		Never	Rarely	Sometimes	Often	Always
1.	When someone else is feeling excited, I tend to get excited too	0	1	2	3	4
2.	Other people's misfortunes do not disturb me a great deal	0	1	2	3	4
3.	It upsets me to see someone being treated disrespectfully	0	1	2	3	4
4.	I remain unaffected when someone close to me is happy	0	1	2	3	4
5.	I enjoy making other people feel better	0	1	2	3	4
6.	I have tender, concerned feelings for people less fortunate than me	0	1	2	3	4
7.	When a friend starts to talk about his/her problems, I try to steer the conversation towards something else	0	1	2	3	4
8.	I can tell when others are sad even when they do not say anything	0	1	2	3	4
9.	I find that I am "in tune" with other people's moods	0	1	2	3	4
10.	I do not feel sympathy for people who cause their own serious illnesses	0	1	2	3	4
11.	I become irritated when someone cries	0	1	2	3	4
12.	I am not really interested in how other people feel	0	1	2	3	4
13.	I get a strong urge to help when I see someone who is upset	0	1	2	3	4
14.	When I see someone being treated unfairly, I do not feel very much pity for them	0	1	2	3	4
15.	I find it silly for people to cry out of happiness	0	1	2	3	4
16.	When I see someone being taken advantage of, I feel kind of protective towards him/her	0	1	2	3	4

Appendix E: UCLA Loneliness Scale

		Never	Rarely	Sometimes	Often
1.	How often do you feel that you are 'in tune' with people around you?	1	2	3	4
2.	How often do you feel that you lack companionship?	1	2	3	4
3.	How often do you feel that there is no one you can turn to?	1	2	3	4
4.	How often do you feel alone?	1	2	3	4
5.	How often do you feel part of a group of friends?	1	2	3	4
6.	How often do you feel that you have a lot in common with the people around you?	1	2	3	4
7.	How often do you feel that you are no longer close to anyone?	1	2	3	4
8.	How often do you feel that your interests and ideas are not shared by those around you?	1	2	3	4
9.	How often do you feel outgoing and friendly?	1	2	3	4
10.	How often do you feel close to people?	1	2	3	4
11.	How often do you feel left out?	1	2	3	4
12.	How often do you feel that your relationships with others are not meaningful?	1	2	3	4
13.	How often do you feel that no one really knows you well?	1	2	3	4
14.	How often do you feel isolated from others?	1	2	3	4
15.	How often do you feel that you can find companionship when you want it?	1	2	3	4
16.	How often do you feel that people really understand you?	1	2	3	4
17.	How often do you feel shy?	1	2	3	4
18.	How often do you feel that people are around you but not with you?	1	2	3	4
19.	How often do you feel that there are people you can talk to?	1	2	3	4
20.	How often do you feel that there are people you are turn to?	1	2	3	4

Appendix F: Morningness-Eveningness Questionnaire

Instructions:

- Please read each question very carefully before answering.
- Please answer each question as honestly as possible.
- Answer ALL questions.
- Each question should be answered independently of others. Do NOT go back and check your answers.

1. What time would you get up if you were entirely free to plan your day?

5:00 – 6:30 AM	5
6:30 – 7:45 AM	4
7:45 – 9:45 AM	3
9:45 – 11:00 AM	2
11:00 AM – 12 NOON	1
12 NOON – 5:00 AM	0

2. What time would you go to bed if you were entirely free to plan your evening?

8:00 – 9:00 PM	5
9:00 – 10:15 PM	4
10:15 PM – 12:30 AM	3
12:30 – 1:45 AM	2
1:45 – 3:00 AM	1
3:00 AM – 8:00 PM	0

3. If there is a specific time at which you have to get up in the morning, to what extent do you depend on being woken up by an alarm clock?

Not at all dependent	4
Slightly dependent	3
Fairly dependent	2
Very dependent	1

4. How easy do you find it to get up in the morning (when you are not woken up unexpectedly)?

Not at all easy	1
Not very easy	2
Fairly easy	3
Very easy	4

5. How alert do you feel during the first half hour after you wake up in the morning?

Not at all alert	1
Slightly alert	2
Fairly alert	3
Very alert	4

6. How hungry do you feel during the first half-hour after you wake up in the morning?

Not at all hungry	1
Slightly hungry	2
Fairly hungry	3
Very hungry	4

7. During the first half-hour after you wake up in the morning, how tired do you feel?

Very tired	1
Fairly tired	2
Fairly refreshed	3
Very refreshed	4

8. If you have no commitments the next day, what time would you go to bed compared to your usual bedtime?

Seldom or never later	4
Less than one hour later	3
1-2 hours later	2
More than two hours later	1

9. You have decided to engage in some physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 7:00 – 8:00 am. Bearing in mind nothing but your own internal “clock”, how do you think you would perform?

Would be in good form	4
Would be in reasonable form	3
Would find it difficult	2
Would find it very difficult	1

10. At what time of day do you feel you become tired as a result of need for sleep?

8:00 – 9:00 PM	5
9:00 – 10:15 PM	4
10:15 PM – 12:45 AM	3
12:45 – 2:00 AM	2
2:00 – 3:00 AM	1

- 11. You want to be at your peak performance for a test that you know is going to be mentally exhausting and will last for two hours. You are entirely free to plan your day. Considering only your own internal “clock”, which ONE of the four testing times would you choose?**

8:00 AM – 10:00 AM	4
11:00 AM – 1:00 PM	3
3:00 PM – 5:00 PM	2
7:00 PM – 9:00 PM	1

- 12. If you got into bed at 11:00 PM, how tired would you be?**

Not at all tired	1
A little tired	2
Fairly tired	3
Very tired	4

- 13. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following are you most likely to do?**

Will wake up at usual time, but will NOT fall back	4
Will wake up at usual time and will doze thereafter	3
Will wake up at usual time but will fall asleep again	2
Will NOT wake up until later than usual	1

- 14. One night you have to remain awake between 4:00 – 6:00 AM in order to carry out a night watch. You have no commitments the next day. Which ONE of the alternatives will suite you best?**

Would NOT go to bed until watch was over	1
Would take a nap before and sleep after	2
Would take a good sleep before and nap after	3
Would sleep only before watch	4

- 15. You have to do two hours of hard physical work. You are entirely free to plan your day and considering only your own internal “clock” which ONE of the following time would you choose?**

8:00 AM – 10:00 AM	4
11:00 AM – 1:00 PM	3
3:00 PM – 5:00 PM	2
7:00 PM – 9:00 PM	1

- 16. You have decided to engage in hard physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 10:00 – 11:00 PM. Bearing in mind nothing else but your own internal “clock” how well do you think you would perform?**

Would be in good form	1
Would be in reasonable form	2
Would find it difficult	3
Would find it very difficult	4

- 17. Suppose that you can choose your own work hours. Assume that you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results). Which FIVE CONSECUTIVE HOURS would you select?**

5 hours starting between 4:00 AM and 8:00 AM	5
5 hours starting between 8:00 AM and 9:00 AM	4
5 hours starting between 9:00 AM and 2:00 PM	3
5 hours starting between 2:00 PM and 5:00 PM	2
5 hours starting between 5:00 PM and 4:00 AM	1

- 18. At what time of the day do you think that you reach your “feeling best” peak?**

5:00 – 8:00 AM	5
8:00 – 10:00 AM	4
10:00 AM – 5:00 PM	3
5:00 – 10:00 PM	2
10:00 PM – 5:00 AM	1

- 19. One hears about “morning” and “evening” types of people. Which ONE of these types do you consider yourself to be?**

Definitely a “morning” type	6
Rather more a “morning” than an “evening” type	4
Rather more an “evening” than a “morning” type	2
Definitely an “evening” type	0

Appendix G: Multifactorial Memory Questionnaire

Contentment

How I feel about my memory

Below are statements about feelings that people may have about their memory. Read each statement and decide whether you agree. Think about how you have been feeling over the past *two weeks*. Then, place a check in the appropriate column.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1 I am generally pleased with my memory ability.					
2 There is something seriously wrong with my memory.					
3 If something is important, I will probably remember it.					
4 When I forget something, I fear that I may have a serious memory problem, like Alzheimer's disease.					
5 My memory is worse than most other people my age.					
6 I have confidence in my ability to remember things.					
7 I feel unhappy when I think about my memory ability.					
8 I worry that others will notice that my memory is not very good.					
9 When I have trouble remembering something, I'm not too hard on myself.					
10 I am concerned about my memory.					
11 My memory is really going downhill lately.					
12 I am generally satisfied with my memory ability.					
13 I don't get upset when I have trouble remembering something.					
14 I worry that I will forget something important.					

15 I am embarrassed about my memory ability.					
16 I get annoyed or irritated with myself when I am forgetful.					
17 My memory is good for my age.					
18 I worry about my memory ability.					

Ability

Memory Mistakes

Below is a list of common memory mistakes that people make. Decide how often you have done each one in the *last two weeks*, then place a check mark in the appropriate column.

	All the time	Often	Sometimes	Rarely	Never
1 Forget to pay a bill on time.					
2 Misplace something you use daily, like your keys or glasses.					
3 Have trouble remembering a telephone number you just looked up.					
4 Not recall the name of someone you just met.					
5 Leave something behind when you meant to bring it with you.					
6 Forget an appointment.					
7 Forget what you were just about to do; for example, walk into a room and forget what you went there to do.					
8 Forget to run an errand.					
9 In conversation, have difficulty coming up with a specific word that you want.					
10 Have trouble remembering details from a newspaper or magazine article you read earlier that day.					
11 Forget to take medication.					
12 Not recall the name of someone you have known for some time.					
13 Forget to pass on a message.					
14 Forget what you were going to say in conversation.					
15 Forget a birthday or anniversary that you used to know well.					
16 Forget a telephone number you use frequently.					

17 Retell a story or joke to the same person because you forgot that you had already told him or her.					
18 Misplace something that you put away a few days ago.					
19 Forget to buy something you intended to buy.					
20 Forget details about a recent conversation.					

Strategies

Memory Strategies

People often use different tricks or strategies to help them remember things. Several strategies are listed below. Decide how often you used each one in the *last two weeks*. Then, place a check mark in the appropriate column.

	All the time	Often	Sometimes	Rarely	Never
1 Use a timer or alarm to remind you when to do something.					
2 Ask someone to help you remember something or to remind you to do something.					
3 Create a rhyme out of what you want to remember.					
4 In your mind, create a visual image of something you want to remember, like a name and a face.					
5 Write things on a calendar, such as appointments or things you need to do.					
6 Go through the alphabet one letter at a time to see if it sparks a memory for a name or word.					
7 Organize information you want to remember; for example, organize your grocery list according to food groups.					
8 Say something out loud in order to remember it, such as a telephone number you just looked up.					
9 Use a routine to remember important things, like checking that you have your wallet and keys when you leave home.					
10 Make a list, such as a grocery list or a list of things to do.					
11 Mentally elaborate on something you want to remember; for example, focus on a lot of the details.					
12 Put something in a prominent place to remind you to do something, like putting your umbrella by the front door so that you will remember to take it with you.					

13 Repeat something to yourself at increasingly longer and longer intervals so that you will remember it.					
14 Create a story to link together information you want to remember.					
15 Write down in a notebook things that you want to remember.					
16 Create an acronym out of the first letters in a list of things to remember, such as carrots, apples, and bread (cab).					
17 Intentionally concentrate hard on something so that you will remember it.					
18 Write a note or reminder for yourself (other than on a calendar or in a notebook).					
19 Mentally retrace your steps in order to remember something, such as the location of a misplaced item.					

Appendix H: Internal Cognitive Experiencing Scale

Instructions: Listen on the following pages are series of statements that might describe things you might do or experiences you might have. To the right of each statement please indicate by checking the column under the heading Like or Dislike, whether you think you would like or dislike the activity described by the statement. Work rapidly and give your first impression.

Item	Like	Dislike
1. Thinking about why people behave the way they do		
2. Knowing why politicians act the way they do		
3. Trying to figure out the meaning of unusual statements		
4. Thinking a lot about a new idea		
5. Thinking of different ways to explain the same thing		
6. Thinking about unusual events or happenings		
7. Figuring out the shortest distance from one city to another		
8. Analyzing my own dreams		
9. Figuring out why I did something		
10. Analyzing my own feelings and reactions		
11. Thinking about ideas that contradict each other		
12. Listening to a lecture or talk that makes me think afterwards		
13. Reading books on subjects that stimulate me to think		
14. Seeing movies after which I think about something differently		
15. Discussing unusual ideas		
16. Reading articles in the newspaper that provoke my thought		
17. Thinking about why the world is in the shape it is		
18. Analyzing a theory to see if it is a good one		
19. Figuring out why some event happened the way it did		
20. Starting off with a new idea and seeing the new ones suggested by the original one		

I engage in exercise activities (for example, sailing, fishing, or backpacking)									
I engage in recreational sports (for example tennis, bowling or golf)									
I do aerobics (for example, cardiovascular, fitness training, workout)									
I do flexibility training (for example, stretching, yoga, tai chi)									
I do weight lifting, strength training, or calisthenics									
I work crossword puzzles, acrostics or anagrams									
I play card games (for example, Pinochle or Bridge)									
I do jigsaw puzzles									
I play board games (for example, chess or checkers)									
I play knowledge games (for example, Trivial Pursuit)									
I play word games (for example, Scrabble)									
I read newspapers									
I read books or magazine for leisure									
I read books or magazine as part of my job, career or formal education									
I go to the library									
I watch news programs on television									
I watch documentary or educational programs on television									
I watch game shows on television (for example, Wheel of Fortune or Jeopardy)									
I watch comedy, or adventure programs on television									
I write a letter (for example, to a friend, relative, business etc.)									

Appendix J: Metamemory in Adulthood Questionnaire

Strategy Dimension

Instructions: Different people use their memory in different ways in their everyday lives. In this questionnaire, we would like you to tell us how you use your memory. There are no right or wrong answers to these questions because people are different. Please take your time and answer each of these questions to the best of your ability. Each question is followed by five choices. Place a cross in the appropriate box to indicate your choice. Mark only one box for each statement.

	Never	Rarely	Sometimes	Often	Always
Do you keep a list or otherwise note important dates, such as birthdays and anniversaries?					
When you are looking for something you have recently misplaced, do you try to retrace your steps in order to locate it?					
When you have not finished reading a book or magazine, do you somehow note the place where you have stopped?					
Do you think about the day's activities at the beginning of the day so you can remember what you are supposed to do?					
Do you post reminders of things you need to do in a prominent place, such as on bulletin boards or note boards?					
Do you routinely keep things in a familiar spot so you won't forget them when you need to locate them?					
When you want to take something with you, do you leave it in an obvious, prominent place, such as putting your suitcase in front of the door?					
When you have trouble remembering something, do you try to remember something similar in order to help you remember?					
Do you consciously attempt to reconstruct the day's events in order to remember something?					
Do you try to relate something you want to remember to something else hoping that this will increase the likelihood of your remembering later?					
Do you try to concentrate hard on something you want to remember?					

Do you make mental images or pictures to help you remember?					
Do you mentally repeat something you are to remember?					
Do you ask other people to remind you of something?					
Do you write yourself reminder notes?					
Do you write appointments on a calendar to help you remember them?					
Do you write shopping lists?					

Appendix K: Memory Impact Questionnaire

The items included in the final version of the Memory Impact Questionnaire are as follows. Component loadings are presented in parantheses.

Subscale 1: Negative Emotion

- 5. My memory changes make me feel scared. (.72)
- 8. My memory changes make me feel embarrassed. (.81)
- 15. My memory changes make me feel less capable. (.74)
- 17. Because of my memory changes, my family is less patient with me. (.39)
- 25. My memory changes make me feel less adequate. (.81)
- 26. My memory changes make me feel less confident in myself. (.81)
- 29. My memory changes make me feel upset. (.77)
- 32. Sometimes my memory changes make me feel stupid. (.68)
- 39. My memory changes make me feel like I am fragile. (.54)
- 41. Because of my memory changes, I am not as valued by others for my thoughts and opinions. (.54)
- 42. My memory changes cause me stress. (.78)
- 47. Because of my memory changes, other people get frustrated with me. (.46)
- 49. Because of my memory changes, I doubt myself more than I used to. (.69)
- 51. My memory changes really bother me. (.61)
- 67. My memory changes make me worry about how I would get by if my memory were to get worse in the future. (.48)

Subscale 2: Lifestyle

- 2. Because of my memory changes, I sometimes feel left out of relationships. (.40)
- 10. Because of my memory changes, I don't get out for social occasions as often as in the past. (.75)
- 19. Because of my memory changes, I am less likely to be involved in my previous volunteer activities. (.38)
- 35. Because of my memory changes, I tend to avoid being in the company of other people. (.64)
- 38. Because of my memory changes, I don't try to learn how to use new technologies. (.42)
- 43. Because of my memory changes, I am less involved in activities at my church, temple, or mosque. (.38)
- 50. Because of my memory changes, I am less likely to get involved in my favourite hobbies and past-times. (.73)
- 53. At times I am left out of decision-making because of my memory changes. (.61)
- 54. Because of my memory changes, I don't feel as close to my friends and family. (.75)
- 56. Because of my memory changes, I am less likely to sign up for formal educational courses. (.48)
- 62. Because of my memory changes, I am less likely to try to create new friendships. (.69)
- 68. Because of my memory changes, I spend less time on my usual hobbies and past-times. (.59)
- 75. Because of my memory changes, I tend to avoid being in the company of other people. (.75)

Subscale 3: Coping

1. I make a point of doing things to make up for my memory changes. (.39)
3. When I make memory mistakes, I tell myself, "We're all in the same boat." (.45)
12. When I make memory mistakes, I tell myself, "I can use a new strategy to get it next time." (.55)
16. I sign up for classes in order to maintain my memory. (.34)
21. I can count on my family members as memory partners. (.56)
24. The things that I do to make up for my memory changes help me remember things better. (.73)
28. To maintain my memory, I do crossword or Sudoku puzzles regularly. (.38)
30. Because of my memory changes, I make a point of trying to remember things that are most important to me. (.52)
34. When I'm unsure about details, I can still participate in conversations by speaking in general terms. (.47)
36. My life is easier because of the things that I do to make up for my memory changes. (.61)
37. Because of my memory changes, I try to be more organized. (.73)
40. Because of my memory changes, I find it helpful to write things down. (.64)
44. Because of my memory changes, I use routines more often. (.37)
48. I've come to the point where I can now laugh about my memory changes. (.70)
52. Because of my memory changes, I make a point of exercising my brain. (.68)
55. I don't get annoyed when other people remind me about things. (.47)
57. I make a point of getting involved in hobbies and past-times in order to maintain my memory. (.38)
63. When I make memory mistakes, other people comfort me. (.45)
69. I've learned to adapt to my memory changes. (.80)
73. My friends and family have been supportive regarding my memory changes. (.66)

Deleted Items

4. Because of my memory changes, I need reminders to use memory strategies.
6. Because of my memory changes, I have developed an interest in current memory research.
7. Because of my memory changes, I feel like I don't have as much of a say in things that give me purpose for living.
9. When I make memory mistakes, I tell myself, "No big deal, that's life."
11. Because of my memory changes, it takes me longer to do the things I used to do.
13. My memory changes don't make me feel disappointed.
14. Because of my memory changes, I don't contact old friends for fear of forgetting details about them.
18. At times I am left out of discussions because of my memory changes.
20. To maintain my memory, I read a lot.
22. Because of my memory changes, I am sometimes afraid that people will laugh at me.
23. Because of my memory changes, I'm not as involved in what is happening when I'm in the company of others.

27. Because of my memory changes, I find that I am late more often due to the time I spend re-checking, retracing my steps, searching for things, or going back to get items I've left behind.
31. Because of my memory changes, I am less likely to be involved in my previous work activities.
33. Because of my memory changes, I feel for other people when they make memory mistakes.
45. I have learned to accept my memory changes.
46. Because of my memory changes, I have to depend more on others.
58. Because of my memory changes, I can't read the same types of materials that I used to.
60. To maintain my memory, I make a point of socializing.
61. Despite my memory changes, I still feel like the same person I was before.
64. My memory changes make me feel confused.
65. Because of my memory changes, I am less likely to get involved in conversations with people for fear that I might repeat myself, forget their names, or forget details.
66. Because of my memory changes, I have a greater appreciation for what my family members do for me.
70. Despite my memory changes, I still read as much as I used to.
71. My memory changes have resulted in health problems due to forgetting to take medications or supplements.
72. Because of my memory changes, I am less likely to try to improve my work-related skills in a formal way like seeking certification.
74. I forgive myself when I make memory mistakes.
76. Changes in my ability to come up with words make it more difficult for me to communicate with others.
77. Because of my memory changes, I am involved in less demanding activities at work.
78. My memory changes cause me to waste time, for example, when I have to re-check things, retrace my steps, search for things, or go back to get items I've left behind.

Appendix L: Telephone Interview Script

[Ask to speak to the person who e-mailed about the study.]

Hello. I am calling you about the Memory Research study.

My name is Komal, and I'm one of the investigators involved in this study. Thank you so much for your interest. The purpose of this phone call is to see if you are interested in participating once you know more about the study and to see if you are eligible for it. After I tell you a bit more about the study, I'd like to give you a brief cognitive test over the phone, as well as a demographic questionnaire. The entire call should take about 10-15 minutes. Is this a good time to go over the study and to ask you some cognitive questions?

If NO: That's fine. I can call back another time. When would be a good time to reach you?

If YES: Great. Let me tell you a bit about the study.

First of all, the research team includes myself, my supervisor, Dr. Jill Rich, who is a professor at York University, and Dr. Angela Troyer, a neuropsychologist at Baycrest.

Our research team explores different aspects of memory functioning in older adults. We have developed a questionnaire to measure the ways in which memory changes affect individual people. In order to validate our new questionnaire, we will compare responses on it to responses on previously established measures.

If you decide to participate in the study, you will be asked to complete a series of questionnaires related to memory, the impact of memory changes in your everyday life, personality factors, and lifestyle factors. The questionnaires should take you 30 to 40 minutes to complete.

There are no known physical risks associated with the study. Some participants may find it tiring to complete all of the questionnaires. You do not have to complete all measures in one sitting and can take as much time as needed to do so.

While there is no direct benefit to participating in this study, your involvement will further research in the field of memory. Information gathered from this study may inform future interventions and will aid researchers in furthering our understanding of the impact memory changes can have on older adults. You also have a chance to win 1 of 4 prizes of \$50, which will be drawn at random from a list of participant numbers.

If you are interested in proceeding, I have a few questions to determine your eligibility with this program.

If NO, Thank you for your time. If you have any other questions for me regarding this study or your involvement, please let me know.

If YES,

Great. Now I'm going to conduct a cognitive screening and get some general background information from you. Everything you tell me will be confidential. Besides myself, only Drs. Rich and Troyer will have access to your responses.

If the individual agrees, proceed with m-TICS.

If TICS score is < 31 , say:

I really appreciate your taking the time to answer my questions and your interest in our research. Based on your responses, you are not eligible for this study. If you want more information about this, I will ask Dr. Rich to contact you. Thank you.

If TICS ≥ 31 , proceed with recruitment:

Now, I just have some demographic questions to ask you.

Proceed with Demographics Questionnaire.

If inclusion criteria is not met,

I really appreciate your taking the time to answer my questions and your interest in our research. Based on your responses, you are not eligible for this study. If you want more information about this, I will ask Dr. Rich to contact you. Thank you.

If inclusion criteria is met,

Great, it looks like you are eligible for this research study. For your convenience, we have two options for completing this study. You can complete it on site at York University, on site at Baycrest, or I can mail you the questionnaires and you can complete it at home and mail the materials back to us when you are done.

If participant chooses on-site option, **Okay, sure. Is there a day and time that would be most convenient for you to come in?**

If participant chooses mail-in option, **Okay, sure. Can I get your mailing address so that I can send you the test materials? This, in addition, to all of your other information will be kept completely confidential. In addition to the test materials, I will also be sending you a consent form that outlines this study in detail. Should you have any questions about this form, please feel free to contact me at [REDACTED], or email me at [REDACTED].**

Thanks for your interest in our research study.