

COGNITIVE MECHANISMS OF WISE REASONING ACROSS THE ADULT LIFESPAN

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Abstract

Investigations have begun to unpack the cognitive architecture of wisdom, yet, controversies remain, including disparate notions of the role of memory. There is no agreed upon definition of wisdom; however, there is consensus that wisdom involves expert knowledge grounded in life experience, suggesting memory is integral to wisdom. We predicted that though wisdom remains stable, the cognitive mechanisms may differ with age—wisdom and memory would be positively associated, with episodic memory contributing more in young. We administered measures of general and personal wisdom to young and old, and measures of episodic and semantic memory. Three crucial findings emerged. First, the importance of making a priori distinctions between personal and general wisdom is highlighted. Second, while general wisdom remains stable, personal wisdom is augmented with increasing age. Finally, episodic and semantic memory were positive predictors of personal wisdom, and the effect of episodic memory was more robust in young adults.

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Introduction

The attainment of wisdom has long been considered an ideal endpoint of human development and wise reasoning is considered to be a central feature of successful aging (Ardelt, 2004; Glück & Bluck, 2011). The idea of attaining a ‘wise-era’ in late life closely aligns with early, staged theories of human psychosocial development (Erikson, 1959). These theories posit that lifespan development proceeds in distinct stages, marked by specific cognitive achievements. Among the most influential of these theories, Erik Erikson’s human development model (1959) is comprised of eight distinct stages. One’s ability to successfully advance through each stage is associated with the acquisition of various basic virtues including hope, will, purpose, competency, fidelity, love, care, and finally, wisdom. Culmination occurs around age 65, when the eighth, or ‘integrity versus despair’, stage takes place. At this life stage, Erikson argued that wisdom can be attained, providing one with the capacity to reflect on past experiences, achieve a sense of closure, and accept the finiteness of life (Erikson, 1959).

While early developmental theorists understood wisdom as a primarily reflective capacity, a growing body of research has emerged in the intervening decades to suggest that the attainment of wisdom is a much broader developmental construct. These models suggest that wise reasoning encompasses both reflective and prospective abilities, knowledge of oneself and others, and an appreciation for the vagaries of life (Staudinger & Glück, 2011). Further, these models do not consider wise reasoning to be the sole provenance of older adulthood. In fact, the vast majority of wisdom-related research has been conducted in young, with comparatively few studies investigating the development of wisdom and how wise reasoning changes across the lifespan. In this context, the overarching goal of the current thesis is to begin to bridge this gap, from the early developmental theories of wisdom as ‘reflection and closure’, to the more recent

conceptualizations of wisdom as a complex set of cognitive capacities that may shift over the full continuum of adult human development. I begin with a brief introduction into the study of wisdom, with emphasis on lifespan development. Next, I review how wisdom has been operationally defined and assessed as a psychological construct, before turning to a discussion of what is currently known about the cognitive correlates of wise reasoning, and how these may shift with advancing age. In the final section of the Introduction, I will identify the key knowledge gaps and outline how the current study aims to advance our understanding of the cognitive correlates of wise reasoning in younger and older adults.

Studying Wisdom: Philosophical Discourse to Psychological Inquiry

As the baby boomers, the largest generation in human history, move towards old age, investigations centered on successful aging have become pervasive in the psychological and gerontological research literature. Evidence from these studies is of increasing value to guide interventions fostering well-being across the lifespan, including the pursuit or realization of wisdom. Historically, academic inquiry surrounding wisdom has been principally confined to the realm of philosophy, with many disciplines considering the construct too ephemeral to investigate empirically (Staudinger & Glück, 2011). At the core of philosophical conceptualizations of wisdom is the notion of an optimal, or utopian, integration of mind and virtue, and the simultaneous assimilation of knowledge and character (Baltes & Kunzmann, 2003). As we shall see below, traces of these philosophical characterizations of wisdom as a balance between the acquisition of personal knowledge and its application to serve an extra-personal (e.g. societal) good, can be found in modern psychological inquiries into wisdom. Indeed, this distinction between personal knowledge and more general knowledge of the world around us has become an important dichotomy within psychological studies of wisdom.

Over the past three decades wisdom research has gained increasing prominence in psychology. In 1990, approximately 50 published reports specifically investigated wisdom. This number has risen five-fold to over 250 studies per year in the second decade of the new millennium. Much of the work to date has focused on the definition, operationalization and measurement of wisdom in young, although more recent research has begun to investigate how (or even if) wise reasoning changes across the lifespan (e.g., Baltes & Staudinger, 1993; Glück & Bluck, 2011). An emergent line of inquiry originating from the psychological study of wisdom involves identifying the psychological and cognitive factors associated with wise reasoning.

Investigations into the psychological correlates of wisdom have begun to associate the construct with certain self-enhancing personality features including openness (Staudinger et al., 1998; Kramer, 2000; Staudinger & Pasupathi, 2003; Wink & Staudinger, 2015), creativity (Baltes & Staudinger, 2000; Assman, 1994), self-efficacy (Krause & Hayward, 2015), and moral reasoning (Sternberg, 1985; Pasupathi & Staudinger, 2001). However, the extant literature suggests that studies investigating the psychological correlates of wisdom have yet to converge on a unified interpretation of the underlying cognitive mechanisms associated with wise reasoning (Clayton, 1982; Sternberg, 1998; Staudinger, Lopez, & Baltes, 1997; Staudinger & Pasupathi, 2003; Pasupathi, Staudinger, & Baltes, 2001) and memory (Moraitou & Efklides, 2012; Böhmig-Krumhaar, Staudinger, & Baltes, 2002).

Definitions of Wisdom

Wisdom is an enormously rich and complex construct comprising insights, heuristics, and skills that may be manifest across all life contexts (Glück & Bluck, 2011). Thus, achieving consensus in operationalizing wisdom has proven to be a central challenge. Researchers have approached the study of wisdom from two general perspectives: implicit (i.e., folk conceptions of

wisdom) and explicit theoretical approaches (hypothesis-driven, empirical studies) (Staudinger & Glück, 2011). Although there is no one common definition of wisdom, several themes have gained prominence.

As discussed briefly above, one of the earliest definitions of wisdom applied a developmental lens, suggesting that it is an aspect of human development only realized in late adulthood (e.g., Erikson, 1959). Specifically, wisdom was seen as an ideal endpoint in the development of human psychological capacity (Erikson, 1959; Ryff & Heincke, 1983). A second theme emphasized the role of cognition in wisdom (Glück & Bluck, 2011). Theorists who approached the study of wisdom from this perspective defined the construct as an expanded form of intelligence and cognitive-emotional expertise in the ‘fundamental pragmatics of life’ (Sternberg, 1998; Baltes & Staudinger, 2000). The fundamental pragmatics of life comprise deep insights and sound judgment about the human condition (Baltes & Staudinger, 1993). These wise insights are considered essential for the efficient planning, managing, and overall understanding of the challenges inherent in everyday life (Staudinger & Glück, 2011). Consistent with the philosophical ideas surrounding wisdom, cognition-focused theories also emphasized the separation of self- versus other- knowledge and the importance of integrated, dialectical thinking. Here, the assimilation of opposing perspectives (self versus other) and different modes of knowing (personal versus world knowledge) was considered fundamental to the expression of wisdom (Kramer, 2000; Baltes & Kunzmann, 2003).

Other lines of psychological inquiry into the construct of wisdom endorse an integrative perspective (Glück & Bluck, 2011). These approaches argue that wisdom is best defined in terms of specific (or a mosaic of) personality features. Studies falling under this general theme characterize wisdom as a fusion of personality traits categorized into cognitive (knowledge about

the human condition), reflective (ability to adopt multiple perspectives), and affective dimensions (empathic attitudes toward others) (Ardelt, 2004). These theories also suggest that the capacity to extend beyond the self to consider oneself as a part of a constantly shifting ecosystem of social, cultural, and economic factors (i.e., self-transcendence) is an essential feature of wisdom (Levenson, Jennings, Aldwin, & Shiraishi, 2005). Despite the lack of a universally accepted definition of wisdom, there is consensus that it is a multifaceted, multidimensional construct, defined according to the philosophical and theoretical orientation of the researcher (e.g. Ardelt, 2003). It is widely accepted in the field that wisdom cannot be reduced to one single mechanism, and that there exists a cluster of components that intersect to form a more holistic phenomenon (Webster, 2003). In line with this notion, in the current study, I assume an integrative definition of wisdom as emergent from interactions among multiple cognitive and psychological factors. This model is discussed in greater detail later in the Introduction.

Measurements of Wisdom

Given the breadth of operational definitions, developing reliable and standardized measures of wisdom has proven challenging. A number of wisdom assessments have gained considerable prominence in the field and these may be broadly categorized into ‘self-report’ or ‘performance-based’ instruments. Self-report measures primarily consist of questionnaires that require individuals to conduct self-assessments along specific dimensions presumed to reflect wisdom-related knowledge or wise reasoning. Common self-report measures include: the Self-Assessed Wisdom Scale (SAWS) (Webster, 2003), the Three-Dimensional Wisdom Scale (3DWS) (Ardelt, 2003), the Adult Self-Transcendence Inventory (ASTI) (Levenson et al., 2005), and the Wise Thinking and Acting Questionnaire (WITHAQ) (Moraitou & Efklides, 2012).

Performance-based measures require participants to solve specific problem-sets, which are often scenario-based and purportedly tap elements of wise reasoning, involving multi-step and multidimensional problem-solving strategies (Glück et al., 2013). Examples of performance-based measures of wisdom include: the Berlin Wisdom Paradigm (BWP) (Baltes & Staudinger, 2000), the Bremen Wisdom Paradigm (Mickler & Staudinger, 2008), and the tacit-knowledge approach (Sternberg, 1998). More recently, a hybrid approach to wisdom assessment has emerged, combining self-report and performance-based methodologies (Brienza, Kung, Santos, Bobocel, & Grossman, 2017).

Consistent with the earliest philosophical perspectives, wisdom is increasingly viewed as a dichotomous cognitive construct, comprising both personal and general knowledge stores. Personal wisdom constitutes one's insight into themselves and is analogous to the first-person perspective. In contrast, general wisdom refers to one's insight into life in general from an observer's point of view, analogous to a third-person perspective (Staudinger, 2013). For example, how well a person is able to confront a personal challenge or life uncertainty would provide a measure of their personal wisdom. Alternatively, an assessment of the advice provided to others confronting similar challenges would provide a measure of general wisdom. While most psychological studies of wisdom do not explicitly differentiate these features, researchers often place implicit emphasis on measuring personal or general wisdom (Staudinger, 2013).

Researchers who emphasize personal wisdom typically ground their work within the domain of personality research and personality development. Studies investigating personal wisdom begin from the assumption that wisdom is best characterized as a personality characteristic. Through this lens, researchers assess the degree to which one possesses self-insight, life management skills, and effective coping behaviours (Staudinger, 2013).

Methodologies adopted by such studies typically describe wisdom as the mature personality, or the ideal endpoint of personality growth (Helson & Srivastava, 2001). In this context, personal wisdom is often probed using self-report instruments (e.g., Self-Assessed Wisdom Scale, Three-Dimensional Wisdom Scale). In contrast, research investigating general wisdom conceptualizes wisdom as a theoretical attribute that materializes in response to certain personality traits (Baltes, Smith, & Staudinger, 1992; Sternberg, 1998). From this perspective, wisdom is assessed as the degree to which an individual demonstrates valid life insights and advice-giving concerning the problems of others (Staudinger, 2013). General wisdom is typically gauged using measures that assess wisdom-related performance (e.g., Berlin Wisdom Paradigm) on tasks purported to require wise reasoning. Having briefly reviewed the various approaches to defining and measuring wisdom as a psychological construct, in the next section I review the current state of psychological inquiry into wisdom, including its life course development as well as the personality traits, and cognitive skills that have been associated with wise reasoning.

Development of Wisdom Across the Adult Lifespan

Lay conceptions of wise individuals suggest that wisdom is often associated with old age (Clayton & Birren, 1980; Orwoll & Perlmutter, 1990). In implicit studies of wisdom, in which laypeople are asked to nominate individuals who they deem as wise; most nominees tend to be individuals aged 60 years or older (Baltes et al., 1995; Denney et al., 1995; Jason et al., 2001; Maercker, Böhmig-Krumhaar, & Staudinger, 1998; Orwoll & Perlmutter, 1990). Consistent with these findings, wisdom was one of only two positive traits that laypeople described as positive and specific to old age (Heckhausen et al., 1989). In contrast, lay studies have also designated old age as neither necessary nor sufficient for the realization of wisdom. The majority of laypeople recognize and acknowledge that not everyone becomes wiser as they age, and that

younger adults can also possess wisdom (Staudinger & Glück, 2011). These findings reflect a belief among the general population (at least in Western societies) that wisdom increases as a function of experience with the trials and tribulations of life. As these life experiences typically follow a cumulative age-related trajectory, most people implicitly associate wisdom with increasing age (Staudinger & Glück, 2011). However, results of the empirical investigations of the relationship between age and wisdom suggest that wisdom may not be a function of age, but rather remains stable across the lifespan.

Psychological wisdom theorists have speculated that the dynamic between personal and general life insights is fundamental to the realization of wisdom, alluding to a correlation between chronological age and wisdom-related performance. These theorists have proposed that the development of wisdom is a dynamic process in which affective, cognitive, and motivational resources develop interactively through reflection on experience (Staudinger & Glück, 2011). To empirically investigate the relation between age and wisdom, various studies have been conducted using the Berlin Wisdom Paradigm (BWP) as an objective measure of wisdom-related performance. This performance-based measure of wisdom (described in-depth in the Methods section below) is recognized as the most systematically researched tool to assess general wisdom (i.e., providing insights from an observer's perspective). Using this tool, several studies examining the relationship between age and wisdom among adults aged 20 to 89 ($n = 533$) on the BWP did not observe a reliable correlation (Staudinger & Baltes, 1996), although above age 80, a weak negative relationship between wisdom-related performance emerged. Further, investigations centred on the relationship between age and wisdom-related performance have indicated that individuals over age 60 are as well represented in the top 20% of wisdom performers as younger adults (Baltes et al., 1995; Staudinger, 1989; Staudinger, Smith, & Baltes,

1992). This effect was only mediated by occupational expertise where, for example, older clinical psychologists were among the top 20% of performers on the BWP (Smith, Staudinger, & Baltes, 1994; Staudinger et al., 1992). This suggests that individuals who are exposed to more wisdom-related knowledge and training in their professional careers may experience wisdom-enhancing effects (Smith et al., 1994).

Personality and Lifestyle Correlates of Wisdom

In recent years, there has been an increase in empirical research investigating the underlying psychological correlates of wisdom. Taking into account the aforementioned definitional and measurement challenges, it is perhaps not surprising that research investigating the psychological correlates of wisdom has produced variable results. Within the domain of personal wisdom, the personality trait of ‘openness’ has been most reliably associated with wisdom (Staudinger et al., 1997; Staudinger, Maciel, Smith, & Baltes, 1998; Kramer, 2000; Staudinger & Pasupathi, 2003; Wink & Staudinger, 2015). In addition to openness, other personality features have been positively associated with wisdom including: creativity (Baltes & Staudinger, 2000; Assman, 1994), orientation towards the needs of others (Kunzmann & Baltes, 2003; Webster, 2010; Wink & Staudinger, 2015), maturity, extraversion, positive leadership styles (Mumford, Todd, Higgs, & McIntosh, 2017), and an appreciation for the meaning of life (Ardelt, 2003).

Wise reasoning has also been reliably and positively associated with self-enhancing personality aspects including self-efficacy (Krause & Hayward, 2015), hope (Krause & Hayward, 2015; Moraitou & Efklides, 2013), ego-integrity (Webster, 2010), and a progressive cognitive style (Staudinger et al., 1997). Wisdom has also been positively associated with affect regulation (Kunzmann & Baltes, 2003; Kramer, 2000) as well as affective experiences including

serenity (Baltes, & Webster, 2011; Bergsma & Ardel, 2012; Etezadi & Pushkar, 2013; Moraitou & Efklides, 2013), positive life outlook (Taylor et al., 2011; Bergsma & Ardel, 2012; Etezadi & Pushkar, 2013; Moraitou & Efklides, 2013), and greater subjective well-being, particularly towards the end of life (Ardelt, 1997; Ardel, 2016; Ardel & Edwards, 2016; Grossman et al., 2013; Krause, 2016). Additionally, emerging evidence suggests that aspects of wise reasoning accrue over the lifespan, and that these gains may be mediated by experience. Examples of developmental influences on the realization of wisdom include: early life exposure to contexts promoting openness (Staudinger & Pasupathi, 2003) as well as personal life choices such as, education (Ardelt, 2010), occupation (Smith et al., 1994), and the maintenance of important social ties (Staudinger & Baltes, 1996; Glück & Bluck, 2011).

Cognitive and Intellectual Correlates of Wisdom

Common perceptions of wisdom postulate that wisdom may be closely associated with morality-based reasoning, judgment, and decision-making (Sternberg, 1985). Extant research has provided support for these ideas, reporting positive associations between wisdom-related knowledge and moral reasoning (Pasupathi, Staudinger, & Baltes, 2001; Staudinger & Pasupathi, 2003). Indeed, there is evidence that strength in one domain may facilitate the acquisition of the other (Pasupathi & Staudinger, 2001; Staudinger & Pasupathi, 2003). Further, several studies have associated wise reasoning with the capacity to move beyond the 'here and now' (i.e., prospection) both to reflect upon one's actions (self-reflection, Weststrate & Glück, 2017) as well as to seek and integrate the perspectives of others (Glück & Bluck, 2011; Grossman & Kross, 2014; Kross & Grossman, 2012; Staudinger & Baltes, 1996). Recently, one study has provided preliminary evidence for a positive relation between executive function and wisdom-related judgments (Grossman, Sahdra, & Ciarrochi, 2016).

Layperson's conceptions of wisdom commonly cite intelligence as a core characteristic (Jason, Reichler, King, Madsen, Camacho, & Marchese, 2001), yet there is little empirical evidence derived from explicit theories of wisdom to support this association. In fact, conflicting evidence exists in the field regarding the relationship between intelligence and wisdom. Some researchers suggest that wisdom is distinct from intelligence (Clayton, 1982) and is more closely associated with dimensions of personality (Staudinger et al., 1998). At the other end of the spectrum, Sternberg's Balance Theory of Wisdom (1998) argues that wisdom is a special case of practical intelligence, suggesting that wisdom and intelligence are not independent constructs. Yet other theorists postulate that a fusion of intellectual and personality characteristics is more strongly associated with higher scores on wisdom tasks than either of these facets alone (Staudinger et al., 1998), especially in adult populations (Staudinger & Pasupathi, 2003). Indeed, age may mediate the relationship between intelligence and wisdom. One early study reported that in young adults, individual differences in crystallized and fluid intelligence were significant predictors of wisdom-related knowledge, as measured by the Berlin Wisdom Paradigm. This association was not observed in middle-aged or older adult cohorts (Pasupathi et al., 2001). Further, it has been demonstrated that performance on measures that elicit the 'pragmatics of the mind' (e.g., crystallized knowledge) is strongly correlated with wisdom-related performance, suggesting that wisdom may be more closely associated with crystallized versus fluid intellectual abilities (Staudinger et al., 1998).

The capacity to draw upon life experiences is considered to be a hallmark of wise reasoning (Ardelt, 2004; Baltes & Staudinger, 2000; Bangen, Meeks & Jeste, 2013; Glück & Bluck, 2011). These findings implicate memory functioning as a foundational cognitive construct associated with wisdom. Yet, only two empirical studies have directly explored this

relationship. In one study, young, middle-aged, and older adult participants completed a self-report measure of wisdom (WITHAQ) and a measure of episodic and prospective memory in everyday contexts (The Rivermead Behavioural Memory Test) (Moraitou & Efklides, 2012). A significant negative relationship was observed between practical wisdom (the integration of reasoning with universal values and morality to serve the common good) and episodic memory ability (Moraitou & Efklides, 2012). The researchers concluded adults (especially older adults) tend to compensate for everyday episodic (i.e., detailed) memory issues by relying on more semantic or crystallized knowledge of oneself and the world in order to ‘wisely’ manage life dilemmas (Moraitou & Efklides, 2012). Further, a negative relationship between increasing age and integrated dialectical thinking was noted. Dialectical thinking is posited to be one of the core components of wisdom, involving the assimilation of various modes of knowledge in conflict resolution (i.e., adopting multiple perspectives) (Moraitou & Efklides, 2012). Here, an inverse relationship alludes to the significance of working memory capacity in wise reasoning. Dialectical thinking presupposes robust working memory capacity to amalgamate seemingly opposing information to arrive at a wise decision (Moraitou & Efklides, 2012)—an ability that is compromised by declining cognitive resources in old age (Cohen & Conway, 2008). Importantly, this study provided the first evidence that the cognitive correlates, at least within the domain of memory, may change from younger to older adulthood, a hypothesis I explore in more detail in my thesis research.

In another study investigating the impact of memory on wise reasoning, memory strategies were used to activate wisdom-related knowledge, specifically value-relativism. Value-relativism refers to the awareness of the relativity of idiosyncratic or cultural values and life goals, and it is considered one of the five pillars of wise reasoning (Böhmgig-Krumhaar et al.,

2002; Staudinger & Baltes, 1994). Participants were taught to use a classic memory-enhancing strategy (Method of Loci; Maguire, Valentine Wilding, & Kapur, 2003) wherein they were instructed to envision sitting on a cloud while mentalizing about the cultures of various countries as they flew over them. Persons trained in this strategy subsequently demonstrated better wisdom-related performance on an assessment of value-relativism, suggesting memory training approaches may be used to enhance wise reasoning (Böhmig- Krumhaar et al., 2002).

Summary and Research Question

The extant literature provides a broad framework for understanding the psychological and cognitive correlates of wisdom. Indeed, several common themes emerge with respect to the relationship between psychological and cognitive functioning and the development, enhancement, or realization of wisdom. While these unifying themes suggest that there is nascent empirical evidence characterizing the nature of wisdom as a psychological construct, identifying factors that promote (or impede) the development of wisdom across the lifespan remains an active area of inquiry, and controversies remain. Perspectives on the role of intelligence in wisdom range from considering these to be a unitary construct (e.g. Sternberg, 1998) to suggesting that they are independent capacities that interact across the lifespan (Clayton, 1982; Staudinger et al., 1998; Staudinger & Pasupathi, 2003). Similarly, the role of memory in wise reasoning remains controversial, with evidence that episodic memory and wisdom are negatively (Moraitou & Efklides, 2012) and positively (Böhmig-Krumhaar et al., 2002) correlated.

Further, in the context of cognitive aging, these associations may change as the architecture of cognition shifts from greater fluid, or cognitive control capacity in young to an increasing dependence on more crystallized, or semantic cognition in later life (Park et al., 2002). Extrapolating from the conclusions of Moraitou and Efklides (2012), it is possible that these

different forms of cognitive ability may support wise reasoning from young to older adulthood. For example, episodic memory ability, associated with controlled or fluid cognitive ability, was inversely correlated with wisdom in their study. In contrast, semantics, or crystallized knowledge appeared to support more everyday memory functioning. This raises the intriguing possibility that the changing architecture of cognition across the adult lifespan may lead to a shift in the cognitive foundation of wise reasoning with increasing age. Given the importance of prior knowledge to wise reasoning (Ardelt, 2004; Baltes & Staudinger, 2000; Bangen et al., 2013; Glück & Bluck, 2011), older adults, who possess a larger repertoire of stored knowledge, may draw from this resource to support wise reasoning, in the context of declining control abilities. To address this question, here I investigate the cognitive architecture associated with wise reasoning across the adult lifespan. Specifically, building from the earlier findings of Moraitou and Efklides (2012), I will explore the contributions of episodic memory, known to rely on fluid cognitive abilities, and semantic, or more crystallized knowledge, to wisdom in younger and older adults.

Current Study

As discussed above, wisdom is a multi-dimensional construct. It is the ability to make well-informed decisions while accounting for life's uncertainties and the inherent limits of knowledge (cognitive component), taking on multiple perspectives (reflective component), and exhibiting compassion for others (affective component) (Ardelt, 1998). For my thesis research, I focus on the cognitive domain, in which wisdom is commonly attributed to having an expert knowledge system for dealing with the fundamental pragmatics of life, grounded in life experience (Ardelt, 2004; Baltes & Staudinger, 2000; Glück & Bluck, 2011). This definition implicates memory, or the ability to reflect upon past experience to guide future action, as a

critical component of wise reasoning. To investigate this possibility, the present study administered a comprehensive battery of wisdom and cognitive measures to younger and older adults. The overarching goal of the study was to examine the relationship between wisdom, age, and cognitive functioning, with a particular focus on the contribution of memory processes.

Study Rationale. Contrary to the common adage that ‘older is wiser’, research has provided evidence that wisdom remains relatively stable across the adult lifespan (Staudinger & Glück, 2011); however, as semantic memory is preserved relative to episodic recall in older adulthood (Park et al., 2002; Verhaeghen & Cerella, 2002; Levine et al., 2002; Craik & Bialystok, 2006), wisdom may depend more on crystallized, semantic knowledge representations than more fluid or episodic memory processes in old age. There is some evidence for such a shift in the architecture of complex cognition in the domain of decision-making (Li, Baldassi, Johnson, & Weber, 2013) and autobiographical recollection (Spreng et al., 2018), where older adults rely to a greater extent on crystallized, or semantic knowledge in the context of declining fluid abilities. Here, I will explore whether the increasing semanticization of cognition in older adulthood (Spreng & Turner, in review) is reflected in the cognitive architecture of wisdom. To address this research question, I will investigate three hypotheses: (i) Consistent with previous reports (e.g. Staudinger & Glück, 2011), general wisdom, as measured by performance on the Berlin Wisdom Paradigm, will remain stable across the adult lifespan. As a secondary hypothesis, we predict, based on implicit theories of wisdom, older adults will score higher than younger adults on personal wisdom, measured as performance on the self-report Self-Assessed Wisdom and Three-Dimensional Wisdom Scales. (ii) Based on the postulated role for self-reflection and life experience in wisdom (Ardelt, 2004; Baltes & Staudinger, 2000; Glück & Bluck, 2011), memory ability, both episodic and semantic, will be positively associated with

wisdom for both younger and older adults. (iii) Consistent with the semanticization of cognition hypothesis (Spreng & Turner, in review) wisdom will be positively correlated with episodic memory for younger adults and semantic memory for older adults.

Methods

Participants

Data for the study were collected at two research sites: York University, Toronto, Canada and Cornell University, Ithaca, New York, U.S.A. A total of 93 neurologically and psychologically healthy younger ($n = 58$, $M_{age} = 22.02$) and older adults ($n = 35$, $M_{age} = 67.94$) were included in the study (see Table 1 for participant details). All participants were English speaking, right-handed, and had no current or past history of unmaintained physical health issues, mental health problems, or substance abuse. All participants provided informed consent in writing and were compensated monetarily for their participation, approved by the research ethics boards at York and Cornell University.

Measures

The assessment protocol included measures of wisdom (Berlin Wisdom Paradigm, Self-Assessed Wisdom Scale, Three-Dimensional Wisdom Scale) as well as standardized and experimental cognitive assessments (See Table 3). These measures are described below.

Wisdom. Wisdom was measured by analyzing scores on a performance-based measure (the Berlin Wisdom Paradigm; Baltes & Staudinger, 2000) and two self-report measures of wisdom: The Three-Dimensional Wisdom Scale (Ardelt, 2003) and the Self-Assessed Wisdom Scale (Webster, 2003). As the BWP is the most widely-used and empirically studied wisdom measure; we use performance on this instrument as our primary outcome measure. In the

following section we provide a brief summary of the development of the BWP and describe the administration and scoring protocol in detail.

The Berlin Wisdom Paradigm.

Background. Wisdom has long been considered the ideal endpoint of human development according to developmental psychologists (e.g., Baltes, 1984; Clayton & Birren, 1980; Erikson, 1959; Hall, 1922; Sternberg, 1990). The Berlin Wisdom Paradigm was developed as a means of facilitating the empirical analysis of wisdom and wisdom-related knowledge. In order to establish a theoretical framework to underlie the BWP, Staudinger, Smith, and Baltes (1994) began with the dictionary definition of wisdom, in which it is defined as, “sound judgment and advice in important and uncertain matters of life.” From this definition they operationalized wisdom as “expert-level performance in the fundamental pragmatics of life,” (Baltes & Staudinger, Smith, & Baltes, 1994, p. 9). The ‘fundamental pragmatics of life’ is defined as insight into the quintessential aspects of the human condition and human life (e.g., the finiteness of life, the influence of culture on the individual). From this, they identified five criteria to be applied in the assessment of the quality and quantity of wisdom, based on three primary theories: philosophical-historical analysis of wisdom literature (e.g., Rice, 1958; Kekes, 1983; Oelmüller, 1989; Assman, 1991), lifespan developmental psychology (e.g., Baltes, 1987; Lerner, 1986), cognitive psychology and theories of expertise (e.g., Glaser, 1986; Salthouse, 1991; Ericsson & Smith, 1991). In this context, wisdom is conceptualized as a domain comprising knowledge and insight with regards to lifespan development (both self and other), human nature, social relationships, intergenerational relationships, life goals, life tasks, idiosyncratic and cultural differences across life trajectories, and the uncertainties of life (Staudinger, Smith, & Baltes, 1994).

Staudinger and colleagues (1994) identified three areas of investigation postulated to access one's knowledge about the fundamental pragmatics of life: Life planning, life management, and life review; of which two are included in the BWP manual. Based on their integrative theoretical framework, five principal themes emerged, leading to the establishment of five specific criteria used to assess wisdom-related knowledge: (i) rich factual knowledge about the fundamental pragmatics of life, (ii) rich procedural knowledge about dealing with the fundamental pragmatics of life, (iii) lifespan contextualism: understanding of life contexts and their temporal (developmental) relations, (iv) value-relativism: knowledge about the differences in values and life goals, and (v) uncertainty: knowledge about the relative uncertainty of life and its management (Baltes & Smith, 1990; Baltes & Staudinger, 1993). A response is considered wise when it receives high scores on all five criteria (i.e., ≥ 5 in each domain per task, ≥ 100 overall). Scores from each domain are combined to create a final composite score of general wisdom.

The Adapted-Berlin. In the most recent version of the Berlin Wisdom Paradigm, wisdom-related knowledge is accessed by requiring subjects to 'think aloud' (Ericsson and Simon, 1984). Thinking aloud entails conveying to the administrator all thoughts that go through one's mind. During the BWP, participants are presented with hypothetical vignettes about challenging and uncertain life problems that are intentionally ill-defined and characterized by multiple solutions. They are not required to discuss their own life when engaging in the main task; however, it is to be expected that one's own experiences will at least partly influence responses. Participants are asked to use the 'think aloud' approach as they work through the issues presented in each vignette.

There are two types of tasks included in the BWP: (i) life planning and (ii) life review. During life planning tasks, participants must make a decision regarding a fictitious person's future. A prominent theme present across all problems is that of the dynamic between work and family. This was implemented based on the suggestion by Berger, Berger, & Kellner (1973) that this theme is manifest in the majority of life plans in western society. A second dimension of life-planning involves solving problems related to more specific events (e.g., sickness, divorce). For the life review task, the life of a fictitious person is described and participants are asked to think aloud about the life review of this person. This entails the reconstruction of possible life events and their chronology, whilst providing evaluations and explanations about the fictitious person's life. The problems are framed from the perspective of three different age groups: young, middle-aged, and old. Administrators provide participants with the problem relevant to their age cohort. The life review is centred on a sporadic meeting with a long-time friend whose life path has been dramatically different from that of the fictitious main character.

Administration. Throughout the course of the interview, the administrator follows a standardized manual containing a script and explanations. Administrators are trained prior to data collection and take part in a mock administration. In Staudinger, Smith, and Baltes' (1994) manual, there are three practice tasks aimed at familiarizing participants with the concept of thinking aloud: the task of multiplying 24 and 36, naming 20 animals, and retracing the route from one's home to the test site. The interview then proceeds with one to two practice problems for each of the main tasks (i.e., life planning and life review). *Life planning.* Participants are asked to think aloud while they plan a) a very special dinner for eight people and b) a move to another city. The intention of these practice problems is to provide participants with the chance to practice planning in general, and specifically, planning for a fictitious person. *Life review.*

Participants are asked to think aloud while reflecting on: a) a vacation spot, b) clothing store, and/or c) a car dealership frequented by a fictitious person. *Main task.* Once the practice for both life planning and life review are complete, the administrator proceeds to the main task. The main task begins with three life planning problems followed by one life review problem (see Appendix A). The tasks are devised so that there are two different options for the fictitious character to ponder. Options are given as a means of motivating participants to explore the task from different perspectives and to give all participants equal leeway in their decision-making. Test duration lasts between thirty-minutes to an hour as there are no time limitations imposed. During pilot testing, all participants followed verbal instructions to ‘think aloud’ following an example provided by the examiner. To optimize assessment time and avoid participant fatigue, for the main trial, the thinking aloud practice was only administered if it was clear that the participant was not following instructions. The interview began with the practice problems and there were no further deviations from the original protocol as outlined in the Staudinger, Smith, and Baltes (1994) manual.

Protocol scoring. The interviews were audio recorded and were later transcribed into text format by a panel of trained research assistants. The transcribed protocols were scored on the basis of the five criteria outlined in Table 2. Rich factual and rich procedural knowledge are considered essential for one’s knowledge to be characterized as “wisdom-related”, as derived from general notions of expert systems of knowledge (e.g., Anderson, 1987). While these criteria are necessary, they are not sufficient to characterize responses as ‘wise’. Based on lifespan development theory (Baltes, 1987), each transcribed protocol is also scored on three additional, meta-level criteria: lifespan contextualism, value-relativism, and uncertainty.

Training of raters. Two cohorts of healthy adults were recruited and trained to form the panel of raters: (i) five older adults (*Age* = 70.20, *female* (*n*) = 5) and seven younger adults (*Age* = 25.47, *females* (*n*) = 5). All raters were English speaking and neurologically healthy. Raters were recruited at York University campus and the surrounding community via flyers, online advertisements, and York University research participant pools. Each rater participated in two separate training sessions (general training and specific training) before being approved to begin the scoring process. All training took place at York University or via Skype if the rater preferred not to travel to campus. Raters were blind to the construct of interest (i.e., wisdom) as well as the age of the respondent.

General training. Raters began with general training, which serves as an introduction to evaluating texts according to the assessment protocol. During this session, raters are taught to become familiar with common scoring errors and biases, and to become accustomed to scoring protocols according to the seven-point scale being used for the purposes of our study. Further, raters learn about and practice the evaluation of a text with regards to a complex, pre-established criterion, and to evaluate stimuli in comparison to an ideal rather than in rank order (see Appendix B for general training materials). On average, general training lasted between two and three hours.

Specific training. Once general training was complete, raters underwent a specific training session. In this session, raters gained a thorough understanding of the criteria necessary for a low and high rating. Each rater was assigned one wisdom criterion at random, without any knowledge of the other four criteria. The session began with an explanation and discussion of the assigned criterion until consensus on the meaning of the concept was reached by the rater and the trainer. Trainees were then introduced to one of the main tasks included in the study. The

assigned criterion was applied to the posed problem with the goal of devising an ideal response for that particular problem. The trainer followed highly standardized instructions to guide the discussion. Finally, raters scored practice protocols taken from a pilot study (Staudinger et al., 1994). The training session is complete when the raters' scores on the practice protocols align with the standards set by the project (calibration) (see Appendix C for practice protocols used). (Staudinger et al., 1994).

Task administration. Upon completion of training, raters were provided with electronic versions of the transcripts that could be scored at home at their own convenience, or in the lab if preferred. The aim was for each rater to complete a minimum of 100 transcripts, with the option of rating an additional 100. Raters received the transcripts in bundles of 25 at four different time-points. Each rater was given a suggested time frame of two weeks to complete the rating of each bundle, which took approximately six to eight hours in total. Total scoring time per rater was approximately 24-32 hours, over eight weeks. One younger adult and one older adult were assigned to each criterion variable. This protocol was implemented due to past research that has indicated that amongst laypeople, younger and older adults tend to show some variation in their perceptions of wisdom (Glück & Bluck, 2011). Raters were blind as to the age of the participant being evaluated.

The Self-Assessed Wisdom Scale (SAWS). The SAWS is a self-report instrument that assesses wisdom across five domains that are believed to be characteristic of a wise individual including: emotional regulation, critical life experiences, reflectiveness/reminiscence, openness to experience, and humour (Webster, 2003). It is a 40-item questionnaire that employs a six-point Likert scale ranging from 'strongly disagree' to 'strongly agree', for a maximum raw score of 240. The scale is comprised of eight items per domain (i.e., emotional regulation, experience,

reflectiveness, openness, and humour). Scores from each domain are combined to provide a composite score of personal wisdom. Emotional regulation ($\alpha = .71$) refers to an impeccable sensitivity to the infinite distinctions, subtleties, and complexities of human affect. It constitutes the ability to recognize, embrace, and express emotions in an effective manner. The domain of experience ($\alpha = .82$) is based on the premise that wisdom emerges during the more difficult aspects of everyday existence. Through this lens, the effective resolution of critical problems, adaptive coping in stressful environments, and successful negotiation of crucial transitions are hallmarks of wisdom. Reflectiveness/reminiscence ($\alpha = .88$) is a domain of wisdom that is characteristic of evaluative reflection of one's past and present, through which individuals have the opportunity to identify personal strengths and weakness. Openness to experience ($\alpha = .72$) constitutes receptiveness toward alternate perspectives, information, and solutions. Research has indicated that openness is one of the most powerful predictors of wisdom-related performance (Staudinger, et al., 1997). The final dimension of wisdom according to Webster (2003), is humour ($\alpha = .84$). It is suggested that a wise person can recognize, enjoy, and utilize humour in a diverse range of contexts for a variety of purposes (see Appendix D for full instrument).

The Three-Dimensional Wisdom Scale. The 3DWS is a self-report tool used to measure wisdom. The 3DWS is comprised of 39 items, rated on a five-point Likert scale (1= strongly agree, 5= strongly disagree), for a maximum raw score of 195. This includes 14 cognitive dimension items ($\alpha = .74$), 12 reflective ($\alpha = .77$), and 13 affective items ($\alpha = .61$) (Ardelt, 2003). Scores from each dimension are combined to provide a composite score of personal wisdom. Wisdom is operationalized as a single latent variable with three indicators: cognitive, reflective, and affective components (Ardelt, 2003). The cognitive domain of wisdom is one's ability to understand life. In this sense, wisdom is defined as an individual's competence in

comprehending the significance and underlying meaning of phenomena, especially in the context of interpersonal and personal affairs (e.g., understanding the positive and negative component of human nature, the basic limits of knowledge, and the uncertainties of life). The reflective dimension of wisdom constitutes engaging in reflective thinking. This domain is characteristic of individuals who refrain from subjectivity by viewing phenomena and events from multiple perspectives. Finally, the affective dimension of wisdom is comprised of positive emotions and behaviour toward others (e.g., feelings of sympathy or compassion), in the absence of negative or indifferent emotions and behaviour toward others. Through this operationalization, wisdom is perceived to be a personality characteristic as opposed to a performance-based skill (Ardelt, 2003) (see Appendix E for full instrument).

Memory. Six memory assessments were collected as part of the assessment protocol including standardized laboratory measures of episodic and semantic memory, as well as an experimental measure of episodic autobiographical recall.

Episodic memory. Scores on each measure of episodic memory listed below were z-scored (within sample) for inclusion in statistical models. Z-scores were calculated by applying the standard formula to raw scores for each measure in R Studio—(i) the difference between the observed value and the sample mean were tabulated (ii) the value produced in (i) was divided by the sample standard deviation.

Picture Sequence Memory Test (PST). The Picture Sequence Memory Test is a performance-based measure developed for the assessment of visual episodic memory. Participants are presented with increasingly lengthy series of illustrated objects and activities that are displayed in a particular order on the computer screen. Respondents are asked to recall the sequence of pictures that is demonstrated over two learning trials. The sequence length varies

from 6-18 pictures, depending on the respondent's age. Participants are given credit for each adjacent pair of pictures (i.e., if pictures in locations seven and eight are placed in that order and adjacent to each other anywhere on the screen, one point is awarded) they correctly place, up to the maximum value for the sequence, which is one less than the sequence length. For example, if there are 18 pictures in the sequence, the maximum score is 17, since that is the number of adjacent pairs of pictures that exist) (Gershon et al., 2013).

Verbal Paired Associates (VPA). This instrument is a subtest from the Wechsler Memory Scale-IV, used to assess verbal episodic memory performance. Participants are asked to study and subsequently repeat word pairs under both free recall and recognition conditions (Wechsler, 2009).

National Institutes of Health (NIH) Toolbox Auditory Verbal Learning Test (REY). The REY is a supplemental measure of verbal episodic memory from the NIH Toolbox Cognition Domain. Participants are presented with a list of 15 unrelated words via audio recording over three consecutive trials. Following each trial, the participant is asked to recall as many of the words as they can and an individual's score is equal to the total number of words recalled across all three trials (Gershon et al., 2013).

Semantic memory.

Shipley-2 Vocabulary. The Shipley-2 Vocabulary subtest is a measure of crystallized abilities (i.e., semantic memory). Participants are asked to choose a definition that most closely aligns with a target word (Shipley, Gruber, Martin, & Klein, 2009). Raw scores were z-scored within sample for inclusion in statistical models.

Experimental measures of episodic and semantic memory.

The Survey of Autobiographical Memory (SAM). The Survey of Autobiographical Memory is a self-report measure that implements a five-point Likert scale to measure multiple dimensions of memory (naturalistic episodic, autobiographical, semantic, and spatial memory) and future thinking. The 102 item questionnaire is comprised of 42 episodic, 24 semantic, 20 spatial, and 16 future items (Palombo et al., 2013). Raw scores were z-scored within sample for inclusion in statistical models.

The Autobiographical Interview (AI). The Autobiographical Interview is a performance-based measure that assesses episodic and non-episodic aspects of autobiographical memory (i.e., recollected episodes from one's life that are comprised of episodic and semantic memories). Spontaneous autobiographical memories are collected over five life periods for older adults—early childhood (up to age 11), teenage years (ages 11-18), early adulthood (ages 18-30), middle adulthood (ages 30-55), and one from the past year. Younger adults provide descriptions of personally significant events from three life periods (early childhood, teenage years, and the past year). Participants are asked to describe these memories, or events, in as much detail as possible (Levine et al., 2002).

During the interview, participants were directed to recall an event that occurred at a specific time and place. The administrator probed participants' recall for each event at three levels: (i) free recall, (ii) general probe (comprehension of instructions and general questions to elicit event details), and (iii) specific probe (directed questions aimed at eliciting further event details). Each memory recalled was assessed cumulatively across the free recall and general probe conditions before proceeding to the specific probe stage for each individual memory. Interviews were audio recorded and anonymized to be transcribed into text format at a later date.

Transcripts were double-checked for accuracy before autobiographical event word count for the free recall and general probe conditions were computed. Raters were blind to the study hypotheses and were not explicitly informed about participants' group membership.

All raters took part in a comprehensive, full-day training session focused on event identification and the scoring of internal and external details, as per the training protocol outlined by Levine and colleagues (2002). All training and scoring took place at Cornell University. Each memory was scored by two independent raters. The panel of raters comprised a group of research assistants and graduate students. Transcripts were segmented into discrete informational units, which raters classified as 'internal' (episodic) if they were associated with the target event, were specific to time and place, and portrayed a sense of episodic re-experiencing (Levine et al., 2002). In contrast, details were labeled 'external' (semantic) if they were comprised of factual information, extended to events that did not require recollection of a specific time and place, or were details irrelevant to the main event.. Inter-rater reliability was .90 for internal details and .93 for external details. In a repeated measures 2x2 ANOVA, there was a significant age x detail interaction— older adult memories contained significantly more external details and significant fewer internal details than their younger adult counterparts. Further, longer narratives of event descriptions resulted in more details overall. For this reason, the total number of internal and external detail scores were standardized by total word count to arrive upon internal (episodic) and external (semantic) detail density scores, which served as the primary metric for AI performance in our full sample.

Results

Correlations Among Wisdom Measures

A Pearson product-moment correlation coefficient was computed to assess the relationship amongst the three wisdom measures: Self-Assessed Wisdom Scale, Three Dimensional Wisdom Scale, and the Berlin Wisdom Paradigm. There was a significant and moderate positive correlation between the SAWS and 3DWS, $r = .51, p < .001$ (Table 4). No significant relationships were observed between either self-report instrument and the BWP (SAWS, $r = .01, p = .95$; 3DWS, $r = .11, p = .29$).

Hypothesis 1: Does Wisdom Change With Age?

An independent samples t-test was conducted to investigate the effect of age on wisdom scores. Consistent with predictions for personal wisdom, there was a significant effect of age on SAWS scores, $t(91) = -4.16, p < .001$ and 3DWS scores, $t(91) = -2.06, p = .04$ (Figures 1 and 2), suggesting that self-assessments of wisdom were higher for older versus younger adults. Again consistent the primary prediction, no significant effect of age was observed for performance on the BWP (Table 5).

Hypothesis 2: Is Wisdom Correlated With Memory Functioning?

Hierarchical regression was performed on the data from the full participant sample to explore memory and age associations. Education and sex were used as covariates in each of the following hierarchical linear regression models (stage 1). Wisdom scores were then regressed onto an aggregate of episodic memory ability scores (stage 2), followed by the inclusion of an aggregate of semantic memory ability scores (stage 3). The results of each hierarchical

regression model are presented below. (For the full correlation matrices see Supplementary Tables in Appendix F).

Self-Assessed Wisdom Scale. The proportion of variance in SAWS scores explained by education, sex, and episodic memory ability was 32%. The addition of episodic memory ability to the model produced a significant change of 29% in R^2 , $F(5, 85) = 7.52$, $p < .001$, indicating that episodic memory ability explains a significantly greater proportion of variance in SAWS scores than education and sex alone. Moreover, at this stage of the regression model, three individual measures of episodic memory ability demonstrated significant relationships with SAWS wisdom scores. SAM episodic memory scores emerged as a significant positive predictor of SAWS scores, $B = 6.18$, $p = .01$. In contrast, PST scores demonstrated a negative association with SAWS scores, $B = -8.37$, $p < .001$, as did internal density scores on the autobiographical interview ($B = -215.89$, $p < .05$). It is worth noting that the relatively high internal/external density coefficients may be explained in part due to the fact that the density scores exist on a scale of 0 to 1; hence, a one-point increase in these scores (as implied by the relation between partial regression slopes and the dependent variable in question) is substantial and often exceeds density scale limits. Neither R^2 nor the change in R^2 for the model including semantic memory were significant; however, PST scores persisted as a negative predictor of SAWS scores at this stage, $B = -7.87$, $p = .01$. See Tables 6 and 10 for the full regression model and the ANOVA for model comparisons.

Three-Dimensional Wisdom Scale. The proportion of variance explained by the model was significant at all three stages. Stage one of the model indicated that the covariates (i.e., education, sex) were significant predictors of 3DWS scores, $R^2 = .09$, $F(2, 90) = 4.58$, $p = .01$. The proportion of variance in 3DWS scores explained by education, sex, and episodic memory

ability was 20%, and it was also significant, $F(7, 85) = 3.01, p = .01$. At this stage of the model, SAM episodic memory scores were also a significant positive predictor, with an estimated 5.19 point increase in 3DWS scores per one-point increase in SAM z-scores ($p = .01$). Upon inclusion of semantic memory ability into the model, R^2 maintained significance, $R^2 = .24, F(10, 82) = 2.65, p = .01$, suggesting that education, sex, episodic, and semantic memory ability explain a significant proportion of variance in 3DWS scores. Further, at levels one and two of the model, education emerged as a significant positive predictor of 3DWS scores ($B = 2.60, p < .001$; $B = 2.06, p < .05$, providing some evidence for the idea that 3DWS scores increase with higher education. See Table 6 for the full regression model.

Berlin Wisdom Paradigm. R^2 was not significant for any of the models and the change in R^2 was not significant for any of the model comparisons; however, at the third level of the model, the estimated partial regression slope for Shipley-2 Vocabulary scores was $B = .59$ and the effect was significant, $p < .05$ (Table 7). BWP performance was parsed to yield scores for each of the five areas of the BWP (i.e., rich procedural, rich factual, lifespan contextualism, uncertainty, value-relativism) as a means of probing any domain-specific associations with memory ability that may have impacted wisdom-related performance. In the specific domain of ‘uncertainty’, upon inclusion of semantic memory ability into the model, Shipley-2 Vocabulary scores were a significant positive predictor of BWP performance, $B = 1.15, p < .05$. This effect was also observed at the third level of the regression model in the ‘lifespan contextualism’ domain, $B = 1.17, p = .05$ (Table 7).

Summary. Regression analyses were conducted to investigate whether memory was associated with wisdom across the full sample. Episodic memory emerged as a significant and positive predictor of self-reported personal wisdom, explaining a significantly greater proportion

of variance in SAWS scores than the covariates alone. Several individual measures demonstrated significant relationships with SAWS scores. SAM episodic memory scores (self-reported episodic memory ability) were a positive predictor of personal wisdom; however, two other episodic memory measures (PST (visual episodic memory), Internal Density Composite from the AI (autobiographical memory)) emerged as negative predictors of SAWS scores. In line with these results, the relation between memory ability and personal wisdom was validated further upon examination of 3DWS scores. Here, both episodic and semantic memory ability aggregates were positive predictors of personal wisdom, and SAM episodic memory scores demonstrated a positive relationship with 3DWS. Further, education and sex also explained a significant proportion of variance in 3DWS scores when taken together. In particular, education emerged as a robust predictor of 3DWS scores at stage one and two of the model, but this effect was eradicated once semantic memory ability was considered. When considering BWP total scores, there was minimal evidence to suggest an effect of memory on general wisdom. One individual measure of semantic abilities (Shipley-2 Vocabulary subtest—verbal semantic ability) proved to be a positive predictor of BWP scores, and this effect was maintained in the specific domains of ‘uncertainty’ and ‘lifespan contextualism’.

Hypothesis 3: Does the Architecture of Wisdom Change With Age?

Younger Adults. Hierarchical regression was used to test the hypothesis that episodic memory would be positively associated with wisdom in younger adults. Education and sex were used as covariates in each of the following linear regression models (stage 1). Wisdom scores were then regressed onto an aggregate of episodic memory ability scores (stage 2), followed by the inclusion of an aggregate of semantic memory ability scores (stage 3). The results of each hierarchical regression model are presented in turn.

Self-Assessed Wisdom Scale. The proportion of variance in SAWS scores explained by education, sex, and episodic memory ability was 26%. The addition of episodic memory ability scores to the model produced a significant change of 26% in R^2 , $F(5, 50) = 3.71$, $p = .001$, indicating that episodic memory ability explains a significantly greater proportion of variance in SAWS scores than education and sex alone. Further, within this model, certain individual measures of episodic memory ability demonstrated significant relationships with SAWS wisdom scores. The estimated partial regression slope for SAM episodic memory scores was $B = 6.72$ ($p = < .05$), indicating that a one-point increase above the mean of SAM episodic memory scores predicts a 6.72 point increase in SAWS scores. Further, the regression model demonstrated a negative and significant relationship between PST scores and SAWS wisdom scores. Here, each one point increase in PST scores predicts a 9.11 decline in SAWS scores ($B = -9.11$, $p = < .05$).

R^2 for the model including semantic memory ability was 37%, and it was significant, $p = .01$; suggesting that when taken together, education, sex, episodic, and semantic memory ability explain a significant proportion of variance in SAWS scores. However, the change of 11% in R^2 gained from adding semantic memory was not significant. This finding suggests that semantic memory ability does not significantly explain the variance in SAWS scores over and above education, sex, and episodic memory ability. Two individual measures also emerged as significant predictors of SAWS scores. As in stage two of the model, PST scores persisted as a negative predictor of SAWS scores ($B = -7.85$, $p = < .05$). Moreover, SAM semantic memory scores were positively associated with SAWS scores ($B = 7.32$, $p = < .05$). See Tables 8 and 10 for the full regression model and the ANOVA for model comparisons.

Three-Dimensional Wisdom Scale. Upon inclusion of episodic memory ability to the model, R^2 increased by 18%, and this change was significant, $F(5, 50) = 2.48$, $p = .05$. This

finding provides evidence that episodic memory ability explains a significant proportion of variance in 3DWS scores, over and above the covariates (i.e., education, sex). Although the change in R^2 was not significant once semantic memory ability was included in the model, the proportion of variance explained by this model was 34% and it was significant ($p < .05$), suggesting that when taken together, education, sex, and memory ability are significant predictors of 3DWS scores.

Further, two individual measures demonstrated a positive relationship with 3DWS scores. Upon inclusion of episodic memory ability to the model, a significant partial regression slope was observed for SAM episodic memory scores ($B = 6.06, p < .05$), implying a positive association between episodic memory and 3DWS scores. Once semantic memory ability was added to the model, the effect was no longer significant; however, SAM semantic memory scores emerged as a significant positive predictor of 3DWS scores ($B = 7.20, p < .05$). See Tables 8 and 10 for the full regression model and the ANOVA for model comparisons

Berlin Wisdom Paradigm. Regression of BWP scores onto the covariates, episodic, and semantic memory ability did not yield a significant R^2 or change in R^2 at any of the three stages of the model for young adults. Upon examination of individual domains, significant effects in two areas were observed. Dummy coding was used to ascribe females as the reference group in our sample. In the domain of ‘rich factual knowledge’, sex was found to be a significant predictor of BWP scores once episodic memory ability was included in the model, with an estimated 3.30 point increase in BWP scores for male participants, $p < .05$. This positive effect persisted at stage three of the model ($B = 3.14, p < .05$). Further, at this stage, in the domain of ‘uncertainty’, verbal semantic memory ability (quantified by scores on the Shipley-2 Vocabulary) had a positive effect on BWP scores ($B = 1.20$), and it was significant, $p = .05$

(Table 9). There were no significant findings in each of the other three BWP domains (i.e., rich procedural, lifespan contextualism, value-relativism).

Summary. Both episodic and semantic memory ability were significant predictors of self-reported wise reasoning (SAWS, 3DWS) in younger adults. Parsing the episodic and semantic memory aggregates into their individual measures indicated that particular measures were significant predictors of SAWS scores. Specifically, SAM episodic memory scores demonstrated a positive significant relationship with personal wisdom, while PST (verbal episodic memory) and SAM semantic memory scores predicted a decline in SAWS score. Further, two individual measures of memory ability (REY (auditory episodic memory), SAM semantic memory scores (self-reported semantic memory ability)) were positively correlated with personal wisdom scores on the 3DWS. In contrast, there were no significant relationships observed between episodic and semantic memory ability and performance-based wisdom (measured by total score on the BWP); however, upon analysis of BWP scores from its respective five domains, significant predictors were observed in two domains. In the ‘rich factual’ domain, a relation between sex and performance occurred, in which being of the male sex emerged as a significant positive predictor of ‘rich factual’ abilities. In the ‘uncertainty’ domain, semantic memory ability (Shipley-2 Vocabulary subtest—verbal semantic ability) also had a significant positive effect on BWP performance.

Older adults. Hierarchical regression was conducted to investigate the hypothesis that semantic memory ability is a significant predictor of wisdom in older adult cohorts. Education and sex were used as covariates in each of the following hierarchical linear regression models (stage 1). Wisdom scores were then regressed onto an aggregate of episodic memory ability

scores (stage 2), followed by the inclusion of an aggregate of semantic memory scores (stage 3). The results of each hierarchical regression model are presented below.

Self-Assessed Wisdom Scale and Three-Dimensional Wisdom Scale. The regression models did not produce any significant R^2 or change in R for either instrument²; however, once semantic memory ability was included in the model, one individual measure of episodic memory ability proved to be a significant predictor of SAWS scores. Specifically, internal density scores on the AI were negatively associated with SAWS scores ($B = -600.02, p = < .05$). See Table 8.

Berlin Wisdom Paradigm. R^2 and the change in R^2 was not significant at any stage of the regression model; however, one of the five BWP domains demonstrated significant associations with memory ability. In the ‘lifespan contextualism’ domain, episodic memory ability proved to be a significant positive predictor of BWP (Table 9). REY scores predicted an increase in BWP ‘lifespan contextualism’ scores at stage two ($B = 2.54, p = .05$) and stage three ($B = 4.54, p = .01$) of the regression model.

Summary. One individual measure of episodic memory ability (Internal Density score of the AI—autobiographical memory) demonstrated a negative association with SAWS scores; however, results of the analyses on an older adult cohort did not yield any significant predictors of personal wisdom when memory ability was considered as an aggregate. Similarly, memory ability did not appear to have any robust effect on general wisdom, with the exception of one individual measure of episodic memory (REY—auditory episodic memory), which emerged as a significant positive predictor of performance in the ‘lifespan contextualism’ domain of general wisdom. While there is no evidence to suggest an association between memory and personal wisdom in older adults, there is some indication of an indirect positive effect of episodic memory

ability on general wisdom, as measured by the BWP. Neither form of wisdom appears to be influenced by semantic memory ability in old age.

Discussion

Since the transcendence of wisdom research from the philosophical to the psychological realm, investigations have largely focused on the definition and measurement of wisdom, and its developmental trajectory. In recent years, there has been a striking increase in research focused on exploring the psychological and cognitive correlates of wisdom. Several common themes have emerged in the literature that have begun to lay the groundwork for bolstering our understanding of the relationship between psychological and cognitive functioning and wisdom, yet pertinent gaps in the extant literature remain. This study aimed to expand our knowledge of the cognitive mechanisms underlying wisdom and potential changes with age. Specifically, we aimed to test the hypotheses that wisdom (i) remains stable with increasing age (ii) is associated with memory functioning and (iii) draws upon different forms of memory (i.e., episodic and semantic) for young versus older adults. The results of our study indicate that while general wisdom remains relatively stable with age, gains in self-reported personal wisdom occur with increasing age, and are associated with episodic and semantic memory across the adult lifespan. Further, the effect of memory on personal wisdom is more pronounced in younger adults, especially when considering episodic memory functioning, consistent with our hypotheses. No relationship between memory ability (i.e., episodic and semantic) and general wisdom was observed.

Age-Related Differences in Wisdom

In cognition research, the juxtaposition of preserved knowledge (crystallized abilities) with declines in the necessary skills required to apply this knowledge (fluid abilities) is well

documented (Craik & Bialystok, 2006, Park et al., 2002). Accordingly, despite prevailing lay conceptions, which attribute old age to increasing wisdom (Heckhausen et al., 1989; Clayton & Birren, 1990; Orwoll & Perlmutter, 1990; Baltes et al., 1995; Denney et al., 1995; Maercker et al., 1998; Jason et al., 2001), it is widely accepted by psychological wisdom theorists that wisdom remains relatively stable across the adult lifespan. However, of the five studies that have directly tested age-effects on wisdom, all assessed general wisdom (as measured by the BWP).

Though personal and general wisdom are considered to be integral components of the overall construct of wisdom (Staudinger, 2013), it appears that the presence of one is neither necessary nor sufficient for the manifestation of the other, as evidenced by weak correlations between measures of personal and general wisdom in our study. For example, an individual can be considered wise in the context of the problems of others, however, that same person may not be wise with regard to their own life problems. Interestingly, we did not identify any significant effect of age on general wisdom (BWP scores). However, the positive relationship between increasing age and wisdom held true on each of the self-report measures of personal wisdom (i.e., SAWS, 3DWS). Older adults scored significantly higher than their younger adult counterparts on both the SAWS and 3DWS. The disparate effect of age on wisdom-related performance measures of general (i.e., BWP) versus personal wisdom (i.e., SAWS, 3DWS), offers additional evidence for the importance of distinguishing between these two forms of wisdom in aging research. Each form of wisdom appears to follow a unique developmental trajectory across the adult lifespan, with personal wisdom accruing more so in older than younger adulthood, and general wisdom remaining relatively stable, consistent with previous reports (Staudinger, 1989; Baltes et al., 1995; Staudinger et al., 1992; Staudinger & Baltes, 1996).

It is substantially more challenging to effectively acquire insight into one's own life than it is to obtain insight into the difficulties faced by others (Carver & Scheier, 1998; Karoly, 1993). In fact, providing participants with cues to adopt a distanced perspective when reasoning about personally relevant issues has been shown to augment wise reasoning (Kross & Grossman, 2012), suggesting general wisdom may be used to enhance one's expression of personal wisdom. Further research has noted that individuals tend to offer 'wiser' responses when reasoning about others' problems (general wisdom) as opposed to their own problems (personal wisdom) (Grossman & Kross, 2014). Consistent with the results of our study, theorists have proposed that the attainment and manifestation of general wisdom is less arduous, and therefore may be better preserved (i.e. more stable) over the course of aging as cognitive resources decline (Staudinger, 2013). Yet this explanation fails to account for the age-related increase in self-reported personal wisdom. While we are unable to test this directly here, this finding may be associated with a common feature of cognitive aging known as the 'positivity' bias (Mather and Carstensen, 2005). This suggests that older adults attend to, and subsequently remember, more positively- than negatively- valenced information. As such, older adults may report more positive perceptions of their wisdom-related knowledge than their younger counterparts. However, as positivity bias and wise reasoning are not necessarily orthogonal, this doesn't preclude the possibility that greater personal wisdom, as reported here, is a true feature of older adulthood.

Wisdom and Memory Functioning

The present study aimed to probe the underlying mechanisms that may contribute to the realization of wisdom. There exists considerable consensus in the field of psychological wisdom inquiry that one of the hallmarks of wisdom is the acquisition of an expert knowledge system. This expert system, one that is principally grounded in life experience, assists with navigating the

fundamental pragmatics of life (Sternberg, 1998; Ardelt, 2004; Baltes & Staudinger, 2000; Glück & Bluck, 2011). Given this hypothesized contribution of life experience to the development of wisdom, understanding the relation between memory and wisdom may help to elucidate our understanding of the cognitive determinants of wisdom. Notably, we identified only two empirical studies to date that have directly explored this relationship, and the results were equivocal (Böhmig- Krumhaar et al., 2002; Moraitou & Efklides, 2012).

We investigated the contribution of specific memory processes to wise reasoning across the adult lifespan. Specifically, we explored episodic (i.e., re-experiencing one's personal past) and semantic (i.e., stored knowledge representations) memory contributions to wisdom performance for younger and older adults. Put simply, we asked whether wise reasoning depended on rich episodic re-experiencing of past personal experience or more semanticized knowledge of oneself and the world. When younger and older participants are considered together, both episodic and semantic memory ability were positive predictors of wisdom. However, this effect was confined to the measures of personal wisdom assessed by self-report. It appears that greater episodic and semantic memory ability positively impacts one's self-assessment of wisdom, irrespective of age.

In contrast, we failed to observe an association between these memory abilities and general wisdom for either age cohort, although there was marginal evidence for an association with verbal semantic memory ability. Two individual BWP domains also demonstrated positive associations with verbal semantic memory ability, including: one's knowledge of the unpredictability of life and the fact that the future cannot be controlled or predicted with certainty ('uncertainty'), and one's ability to employ contextualistic thinking ('lifespan contextualism'). However, each of the five domains that comprise the BWP operationalization of

general wisdom cannot be considered as sufficient for wisdom when considered in isolation. Indeed, in order for general wisdom to be realized, all five areas must be satisfied (Baltes & Staudinger, 2000). As such, significant findings in individual domains are more indicative of associations between memory and components of wisdom-related knowledge, rather than the comprehensive construct of general wisdom per se.

Age-cohort differences in the cognitive architecture of wisdom. There is a large body of literature supporting the idea of a shift in the mechanisms underlying cognition across the lifespan (Park et al., 2002; Spreng & Turner, in review). This led to the hypothesis that the cognitive architecture underlying wisdom-related performance may differ between younger and older adults. With age, semantic memory (general knowledge about oneself and the world) remains stable, while episodic recall (detailed recollections of specific past events) declines (Craik & Bialystok, 2006; Park et al., 2002); suggesting that wisdom in younger adults may be more reliably correlated with episodic versus semantic memory ability, while the opposite pattern would be observed in older adults.

Consistent with predictions, episodic memory ability was positively associated with personal wisdom in younger adults. Further, on one measure of personal wisdom (i.e., 3DWS), increasing semantic memory ability was also related to gains in personal wisdom, though semantic ability in this case did not explain a significant proportion of variance in personal wisdom over and above episodic memory ability. In contrast, there was no evidence to suggest a similar pattern in older adults—neither episodic nor semantic memory was reliably associated with personal wisdom in this cohort. This may be an indication that younger adults have a greater propensity for reliance on past personal experiences when engaging in effective wise reasoning about personal events. Older adults do not appear to exploit episodic memory to the

extent seen in younger adults in order to employ personal wisdom, likely due to the inherent shift toward crystallized capacities when engaging in goal-directed behaviour in older adulthood (Li et al., 2013; Spreng et al., 2018; Spreng & Turner, in review). In contrast, neither episodic nor semantic memory ability were robust predictors of general wisdom scores (measured by the BWP) in either age cohort.

Taken together, the results suggest that personal wisdom and general wisdom are two distinct manifestations of wisdom, that materialize in response to different contextual demands (i.e., self-insight versus other-insight) and are ontogenetically, and mechanistically different. Given the identification of age-cohort differences in personal wisdom, it is perhaps unsurprising that younger and older adults appear to recruit different memory processes to engage in wise reasoning for personal contexts. Although there is some indication that memory ability in general (i.e., episodic and semantic) may enhance the realization of personal wisdom across the adult lifespan, when analyzed as separate cohorts, the results suggest that younger adults were more reliant than older adults on recollections of their personal past when engaging in wise reasoning in personal contexts. However, no such associations were observed for older adults despite higher performance. This raises the intriguing question of how older adults engage memory processes to reflect upon their personal wisdom. While we failed to support our hypothesis that these participants would employ more semantic memory processes, it is important to note that our measures of this memory domain were restricted to word knowledge and semantic autobiographical memory. It is possible that other forms of semantic memory (e.g. general world knowledge), not measured here, may be important for expression of personal wisdom in older adulthood.

Interestingly, we observed little to no relation between memory ability and general wisdom in young and older adults. Indeed, a modest effect of semantic memory ability existed when examining younger and older adults as a unified adult cohort. Notably, specific domains of general wisdom were associated with memory ability. These findings illustrate the multifaceted, multidimensional nature of general wisdom. It is a complex construct comprising different parts that may be manipulated independently to ultimately influence the overall outcome measure (i.e., general wisdom). Here, we assume that there is no robust relation between memory ability and general wisdom as a whole. However, specific components of general wisdom (i.e., uncertainty and lifespan contextualism) are positively associated with increasing memory ability; hence, consistent with previous reports (i.e., Böhmig- Krumhaar et al., 2002), memory enhancing strategies may in fact bolster overall wisdom-related performance through improvement in certain general wisdom-related domains.

Limitations

A key limitation in the current study is the potential that our statistical models may be underpowered to detect more subtle wisdom and cognitive associations within the two age cohorts. As described in the methods, two of our primary measures (Berlin Wisdom Paradigm and Autobiographical Interview) presented considerable challenges with respect to data collection and scoring, limiting sample sizes for the current project. However, efforts to increase the sample sizes are ongoing in the laboratory and incorporating these new data into our analyses is a critical future direction.

A second potential limitation involves the rating process for the Berlin Wisdom Paradigm. This measure entails a standardized rating process, which requires raters to undergo a rigorous training process (see “Methods”). Each transcript was rated by one younger and one

older adult to explore potential age-based discrepancies in ratings. Past research utilizing the BWP did not systematically include raters from different age cohorts (i.e., younger versus older adults) in the study design. However, findings from implicit studies of lay conceptions of wisdom indicate discrepancies in younger and older adults' conceptions of wisdom (Glück & Bluck, 2011). Despite the standardized training of all raters, agreement amongst raters was low in each of the five dimensions of the BWP. Curiously, in our sample of raters, older adults rated all participants on average significantly higher than younger adult raters. Though this effect was not significant when evaluating ratings assigned to older adult participants (Appendix G), it was consistent in younger adult cohorts (Appendix H) and when young and older adult participants were considered together (Appendix I; see Appendix J for interrater reliability coefficients). These results suggest that older adults tend to provide more positive wisdom ratings, consistent with the idea of a 'positivity bias' described above (Mather & Cartensen, 2005). For this reason, in future research with the BWP, it may be necessary to analyze older and younger adult ratings independently, recognizing the inherent risk of re-introducing age-related biases in BWP scores. While beyond the scope of the current project, an alternative approach may be to derive a measure of positivity bias and control for this in the statistical models. This latter suggestion would also help to disentangle positivity bias from personal wisdom as assessed by the self-report scales.

Future Directions

These findings highlight the importance of distinguishing between personal and general wisdom in psychological wisdom research. The results of the present study indicate that in evaluating the relationship between wisdom and age, one must consider both personal and general wisdom. Conclusions drawn about the relationship between age and wisdom in the field

have been principally based on general wisdom, as measured by wisdom-related performance. There have been no investigations centred on exploring age effects with respect to personal wisdom. While preliminary, the results of this study offer a novel perspective on the ontogenesis of wisdom. Further, they caution that future research carefully consider differences in personal and general wisdom when investigating the impact of age on wise reasoning.

Across the adult lifespan, episodic and semantic memory ability appear to be associated with gains in personal wisdom. While significant progress has been made in understanding the psychological and cognitive correlates of wisdom, psychological wisdom inquiry is still in its infancy. To pursue a more translational research agenda, leading to the development of wisdom-enhancing strategies, it is imperative that we continue to promote a more mechanistic understanding of wisdom, including both behavioral and neural markers. If successful, this next generation of wisdom research holds enormous promise for the development of novel interventions to promote and foster wise reasoning across the full arc of human development.

Conclusion

The precise cognitive architecture of wisdom remains undefined; however, this study is the first to provide empirical evidence for a relationship between memory and personal wisdom. Episodic and semantic memory abilities are independently associated with wisdom across the adult lifespan, and this association is most robust for episodic memory in young versus older adults. The findings encourage a reconceptualization of the relationship between wisdom and increasing age. Extant literature has provided evidence for a null relationship between general wisdom and age; yet, no investigations have examined the association of age with personal wisdom. Here, we outline that while general wisdom remains relatively stable with age, perceptions of one's personal wisdom are enhanced in later life. These findings serve to highlight

the importance of distinguishing between personal and general wisdom when conducting wisdom research, and suggest that the underlying mechanisms of wisdom may vary with age.

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Table 1

Participant details

	Older Adults (<i>n</i> = 35)		Younger Adults (<i>n</i> = 58)		Total (<i>n</i> = 93)	
	Mean	SD	Mean	SD	Mean	SD
Age in years	67.94	5.21	22.02	3.33	39.30	22.74
Education in years	16.86	2.52	15.21	1.99	15.83	2.33
Males	11		25		36	
Females	24		33		57	

Table 2
Domains of the Berlin Wisdom Paradigm

<u>Domain</u>	<u>Definition</u>
<u>Wisdom-Related Criteria</u>	
(i) 'Rich Factual' Knowledge About the Fundamental Pragmatics of Life	<p>General knowledge about human nature and life conditions (e.g., motives, emotions, mortality, human conduct).</p> <p>Specific knowledge about particular life events (e.g., accidents, job interviews) and the typical age-related occurrence of such events.</p>
(ii) 'Rich Procedural' Knowledge About the Fundamental Pragmatics of Life	Knowledge about procedures (i.e., heuristics and strategies) for dealing with the management and interpretation of life matters with regard to the past, present, and future.
<u>Meta-Level Criteria</u>	
(iii) 'Lifespan Contextualism' : Understanding of Life Contexts and Their Temporal (Developmental) Relations	People and events are not considered in isolation, rather, the various temporal (i.e., past, present, future) and thematic (e.g., family, friends, work) contexts of one's life are considered.
(iv) 'Value-Relativism' : Knowledge About the Differences in Values and Life Goals	<p>The awareness of the relativity of individual or cultural values and life goals.</p> <p>The ability to distance oneself from personal values and consider alternative perspectives.</p>
(v) Knowledge About the Relative 'Uncertainty' of Life and Its Management	<p>Knowledge that life is relatively unpredictable, and that life decisions, interpretations, and plans, will never be free from uncertainties.</p> <p>Insight that one never has access to all of the information and possible interventions to settle all life dilemmas beyond doubt, and that therefore, the future cannot be fully predicted or controlled.</p>

Table 3
Table of Measures and Associated Domains

Domain	Measure	Reference	Page #
WISDOM			
<u>General wisdom</u>	The Berlin Wisdom Paradigm (BWP)	Staudinger, Smith, & Baltes, 1994	18
<u>Personal wisdom</u>	The Self-Assessed Wisdom Scale (SAWS)	Webster, 2003	23
	The Three-Dimensional Wisdom Scale (3DWS)	Ardelt, 2003	24
MEMORY			
<u>Episodic memory</u>			
Visual episodic	National Institutes of Health (NIH) Toolbox Picture Sequence Memory Test (PST)	Gershon et al., 2013	25
Verbal episodic	Verbal Paired Associates (VPA)	Wechsler, 2009	25
	National Institutes of Health (NIH) Toolbox Auditory Verbal Learning Test (REY)	Gershon et al., 2013	25
<u>Semantic memory</u>			
Verbal semantic ability	Shipley- 2 Vocabulary	Shipley, Gruber, Martin, & Klein, 2009	26
<u>Experimental measures of episodic and semantic memory</u>			
Self-reported episodic and semantic ability	The Survey of Autobiographical Memory (SAM)	Palombo et al., 2013	26
Autobiographical memory	The Autobiographical Interview (AI)	Levine, Svoboda, Hay, Wincour, & Moscovitch, 2002	26

Table 4

Correlation matrix for wisdom measures

	SAWS	3DWS	Berlin
SAWS	1.00	.51*	-.01
3DWS	.51*	1.00	.11
Berlin	-.01	.11	1.00

Table 5

Means of younger and older adult participants on three measures of wisdom: the Self-Assessed Wisdom Scale (SAWS), the Three-Dimensional Wisdom Scale (3DWS), and the Berlin Wisdom Paradigm (BWP)

	SAWS		3DWS		BWP	
	Younger Adults	Older Adults	Younger Adults	Older Adults	Younger Adults	Older Adults
Mean	175.57	196.14	135.43	144.06	83.09	80.34
SD	23.48	22.43	19.38	20.00	19.58	19.51
Range	111-227	151-230	94-179	73-180	49-132	47-120
<i>t</i>	-4.16		-2.06		.69	
<i>p</i>	< .001***		.04*		.49	

Table 6

Hierarchical regression results of the Self-Assessed Wisdom Scale and Three-Dimensional Wisdom Scale on episodic and semantic memory ability aggregates in total sample

	SAWS				3DWS			
	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>
<u>Model 1</u>								
Education	1.88	1.11	1.68	.10	2.60	.86	3.03	< .001*
Sex	-.98	5.31	-.18	.85	-.18	4.09	-.04	.97
<u>Model 2</u>								
Education	.82	1.01	.81	.42	2.06	.88	2.34	.02*
Sex	-2.58	4.72	-.55	.59	-.52	4.09	-.13	.90
SAM Episodic	6.18	2.38	2.60	.01**	5.19	2.06	2.53	.01**
VPA I Total Word Recall	3.93	3.05	1.29	.20	1.65	2.64	.63	.53
REY	-3.93	3.12	-1.26	.21	-1.41	2.70	-.52	.60
PST	-8.37	2.71	-3.09	< .001***	-.20	2.35	-.09	.93
Internal Density Score (AI)	-215.89	102.33	-2.11	.04*	-155.07	88.56	-1.75	.08
<u>Model 3</u>								
Education	.41	1.04	.40	.69	1.66	.91	1.83	.07
Sex	-4.85	4.81	-1.01	.32	-2.71	4.18	-.65	.52
SAM Episodic	3.80	2.64	1.44	.15	3.29	2.30	1.43	.16
VPA I Total Word Recall	3.36	3.03	1.11	.27	1.09	2.64	.41	.68
REY	-4.62	3.17	-1.46	.15	-1.98	2.76	-.72	.47
PST	-7.87	2.82	-2.79	.01**	-.29	2.46	-.12	.91
Internal Density Score	-236.59	127.27	-1.86	.07	-204.97	110.70	-1.85	.07
Shipley Vocabulary	3.60	2.40	1.50	.14	1.85	2.09	.89	.38
SAM Semantic	4.53	2.61	1.73	.09	4.14	2.27	1.82	.07
External Density Score (AI)	-146.69	230.58	-.64	.53	-193.11	200.55	-.96	.34

Note: 3DWS: R^2 for Model 1 = .09, $F(2, 90) = 4.58, p = .01**$; R^2 for Model 2 = .20, $F(7, 85) = 3.01, p = .01**$; R^2 for Model 3 = .24, $F(10, 82) = 2.65, p = .01**$

Table 7

Hierarchical regression results of the Berlin Wisdom Paradigm, 'Uncertainty', and 'Lifespan' domains of the BWP on episodic and semantic memory ability aggregates in total sample

	Berlin				Uncertainty				Lifespan			
	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>
<u>Model 1</u>												
Education	.29	.88	.33	.74	.14	.19	.75	.46	.05	.23	.21	.83
Sex	4.00	4.18	.96	.34	.05	.89	.06	.95	1.52	1.11	1.37	.18
<u>Model 2</u>												
Education	.36	.93	.39	.70	.17	.20	.84	.41	.05	.24	.22	.83
Sex	4.72	4.32	1.09	.28	.20	.93	.22	.83	1.55	1.13	1.37	.18
SAM Episodic	2.84	2.17	1.31	.19	.34	.47	.73	.47	.86	.57	1.51	.13
VPA I Total Word Recall	.43	2.79	.15	.88	.19	.60	.32	.75	-.50	.73	-.69	.49
REY	2.16	2.85	.76	.45	-.29	.62	-.47	.64	1.43	.75	1.92	.06
PST	2.48	2.48	1.00	.32	.70	.54	1.31	.19	.48	.65	.74	.46
Internal Density Score (AI)	-48.57	93.59	-.52	.61	5.54	20.20	.27	.78	-7.89	24.56	-.32	.75
<u>Model 3</u>												
Education	.30	.96	.31	.76	.14	.20	.70	.49	.05	.25	.18	.86
Sex	4.40	4.41	1.00	.32	.01	.94	.01	.99	1.46	1.16	1.26	-.21
SAM Episodic	1.60	2.42	.66	.51	-.09	.52	-.18	.86	.50	.64	.79	.43
VPA I Total Word Recall	.37	2.78	.13	.90	.17	.59	.28	.78	-.51	.73	-.69	.49
REY	1.70	2.91	.59	.56	-.38	.62	-.62	.54	1.36	.76	1.77	.08
PST	4.07	2.59	1.57	.12	1.05	.55	-.18	.86	.87	.68	1.27	.21
Internal Density Score	20.59	116.83	.18	.86	21.09	24.87	.85	.40	11.61	30.73	.38	.71
Shipley Vocabulary	4.81	2.20	2.18	.03*	1.15	.47	2.45	.02*	1.17	.58	2.02	.05*
SAM Semantic	1.01	2.40	.42	.67	.55	.51	1.08	.28	.35	.63	.56	.58
External Density Score (AI)	92.19	211.67	.44	.66	19.85	45.05	.44	.66	31.11	55.67	.56	.58

Table 8

Hierarchical regression results of the Self-Assessed Wisdom Scale and the Three-Dimensional Wisdom Scale on episodic and semantic memory ability aggregates in a younger and older adult cohort.

	SAWS				3DWS				SAWS			
	Younger Adults								Older Adults			
	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>
<u>Model 1</u>												
Education	.80	1.59	.51	.62	1.76	1.29	1.36	.18	.35	1.61	.22	.83
Sex	4.21	6.32	.67	.51	-2.79	5.15	-.54	.59	-3.70	8.64	-.43	.67
<u>Model 2</u>												
Education	1.50	1.48	1.01	.32	2.03	1.25	1.63	.11	-.21	1.73	-.12	.91
Sex	.07	6.25	.01	.99	-4.57	5.31	-.86	.39	-3.75	10.90	-.34	.73
SAM Episodic	6.72	3.13	2.15	.04*	6.06	2.66	2.28	.03*	4.82	4.36	1.11	.28
VPA I Total Word Recall	5.05	3.83	1.32	0.19	3.54	3.26	1.09	.28	-.06	6.68	-.01	.99
REY	-5.70	3.96	-1.44	0.16	-5.46	3.37	-1.62	.11	1.01	6.64	.15	.88
PST	-9.11	3.74	-2.44	.02*	-.56	3.18	-.18	.86	-2.71	6.00	-.45	.66
Internal Density Score (AI)	-114.18	135.68	-.84	.40	-190.19	115.37	-1.65	-.11	-449.07	221.90	-2.02	.05
<u>Model 3</u>												
Education	1.73	1.53	1.13	.26	2.19	1.30	1.69	.10	-1.20	2.11	-.57	.58
Sex	-3.17	6.08	-.52	-.60	-7.26	5.17	-1.41	.17	-3.32	11.43	-.29	.77
SAM Episodic	1.56	3.58	.43	.67	1.40	3.04	.46	.65	5.16	4.64	1.11	.28
VPA I Total Word Recall	4.93	3.67	1.34	.19	3.52	3.11	1.13	.26	.15	6.93	.02	.98
REY	-6.67	3.95	-1.69	.10	-5.77	3.35	-1.72	.09	-.25	7.23	-.03	.97
PST	-7.85	3.71	-2.12	.04*	.09	3.15	.03	.98	-2.29	6.35	-.36	.72
Internal Density Score	-72.45	151.96	-.48	.64	-171.29	129.05	-1.33	.19	-600.02	276.70	-2.17	.04*
Shipley Vocabulary	4.53	2.91	1.56	.13	2.66	2.57	1.08	.29	.08	5.43	.02	.99
SAM Semantic	7.32	3.43	2.13	.04*	7.20	2.92	2.37	.02*	1.82	4.84	.38	.71
External Density Score (AI)	41.88	366.23	.11	.91	-15.17	211.02	-.05	.96	-421.00	407.09	-1.03	.31

Note:

Younger Adults:

SAWS: R^2 for Model 1 = .01, $F(2, 55) = .32$, $p = .73$; R^2 for Model 2 = .26, $F(7, 50) = 2.53$, $p = .02*$; R^2 for Model 3 = .37, $F(10, 47) = 2.72$, $p = .01**$.

3DWS: R^2 for Model 1 = .04, $F(2, 55) = 1.15$, $p = .32$; R^2 for Model 2 = 0.22, $F(7, 50) = 1.98$, $p = .08$; R^2 for Model 3 = .34, $F(10, 47) = 2.31$, $p = .03*$.

Table 9

Hierarchical regression results of the 'Uncertainty', 'Rich Factual', and 'Lifespan Contextualism' domains of the BWP on episodic and semantic memory ability aggregates in a younger and older adult cohort

	Younger Adults								Older Adults			
	Uncertainty				Rich Factual				Lifespan			
	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>
<u>Model 1</u>												
Education	.22	.27	.80	.43	.00	.34	.00	1.00	.38	.41	.91	.37
Sex	1.13	1.08	1.05	.30	2.59	1.35	1.92	.06	.66	2.22	.30	.77
<u>Model 2</u>												
Education	.18	.29	.64	.53	.02	.34	.06	.96	-.05	.44	-.12	.91
Sex	1.13	1.21	.93	.35	3.30	1.46	2.26	.03*	2.16	2.79	.77	.45
SAM Episodic	.52	.61	.85	.40	1.23	.73	1.69	.10	1.17	1.11	1.05	.30
VPA I Total Word Recall	-.24	.74	-.33	.74	1.07	.90	1.19	.24	-1.08	1.71	-.63	.53
REY	-.34	.77	-.44	.66	.00	.93	.00	1.00	3.54	1.70	2.08	.05*
PST	.37	.73	.52	.61	1.00	.87	1.14	.26	1.94	1.53	1.27	.22
Internal Density Score (AI)	2.17	26.33	.08	.93	-11.00	31.71	-.35	.73	-22.04	56.71	-.39	.70
<u>Model 3</u>												
Education	.27	.30	.88	.38	-.06	.37	.15	.88	-.11	.50	-.21	.83
Sex	.91	1.22	.75	.46	3.14	1.47	2.14	.04*	2.60	2.72	.96	.35
SAM Episodic	.42	.72	.59	.56	1.36	.87	1.57	.12	1.09	1.10	.98	.34
VPA I Total Word Recall	-.31	.73	-.42	.67	.98	.89	1.10	.28	-1.09	1.65	-.66	.51
REY	-.81	.79	-1.02	.31	-.55	.96	-.57	.57	4.54	1.72	2.64	.01**
PST	.78	.74	1.05	.30	1.46	.90	1.63	.11	1.31	1.51	.87	.39
Internal Density Score	21.94	30.38	.72	.47	4.43	36.78	.12	.90	33.58	65.80	.51	.61
Shipley Vocabulary	1.20	.58	2.06	.05*	1.32	.70	1.88	.07	2.33	1.29	1.80	.08
SAM Semantic	-.34	.69	-.49	.62	-.76	.83	-.92	.36	.84	1.15	.73	.47
External Density Score (AI)	63.18	73.22	.86	.39	40.26	88.66	.45	.65	1116.37	96.81	1.20	.24

Table 10
ANOVA summary table for significant model comparisons

	Total Sample				Younger Adults				
		SAWS			SAWS			3DWS	
		Model 2	Model 3		Model 2	Model 3		Model 2	Model 3
<i>Res df</i>	90	85	82	55	50	47	55	50	47
<i>SSE</i>	55996	39214	36592	31066	23202	19904	20556	16776	14356
<i>df</i>		5	3		5	3		5	3
<i>SS</i>		16782.40	2621.70		7863.60	3297.90		3780.50	2420.50
<i>F</i>		7.52	1.96		3.71	2.60		2.48	2.64
<i>p</i>		< .001**	.13		.01**	.06		.05*	.06

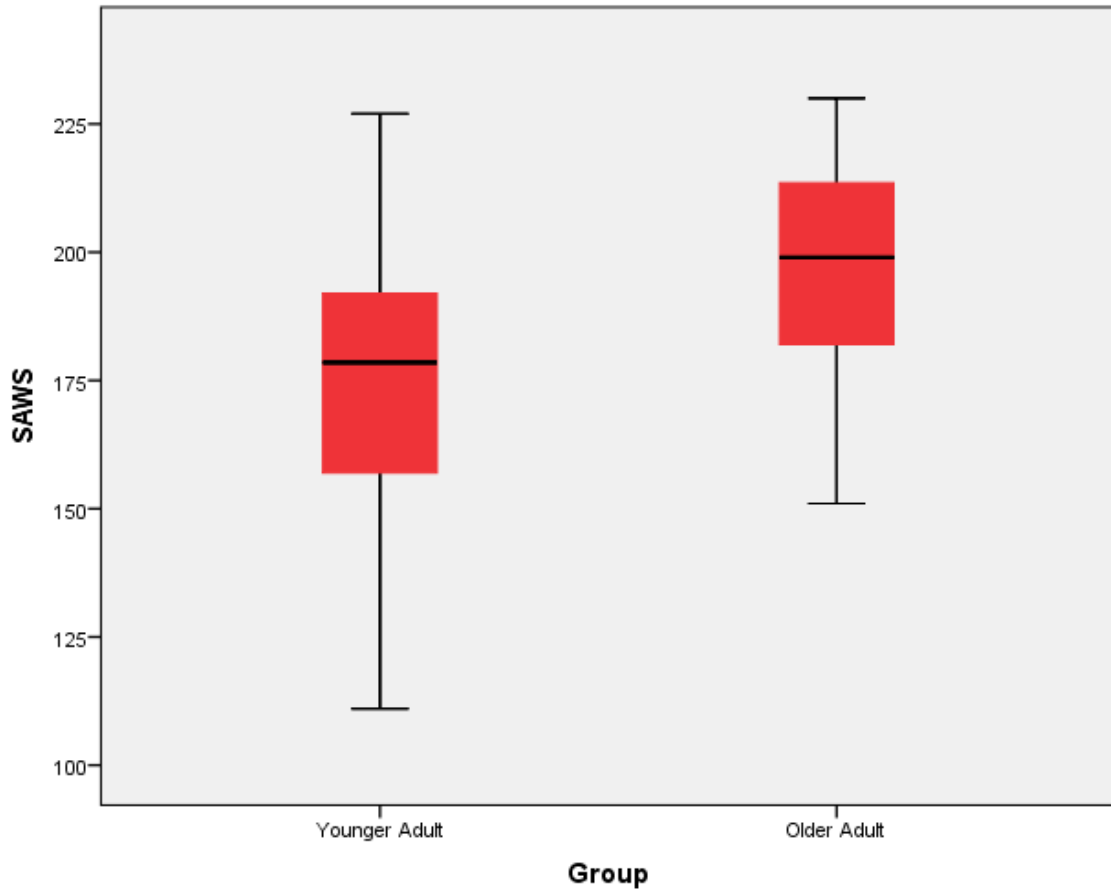


Figure 1. Means of younger and older adult participants on the Self-Assessed Wisdom Scale.

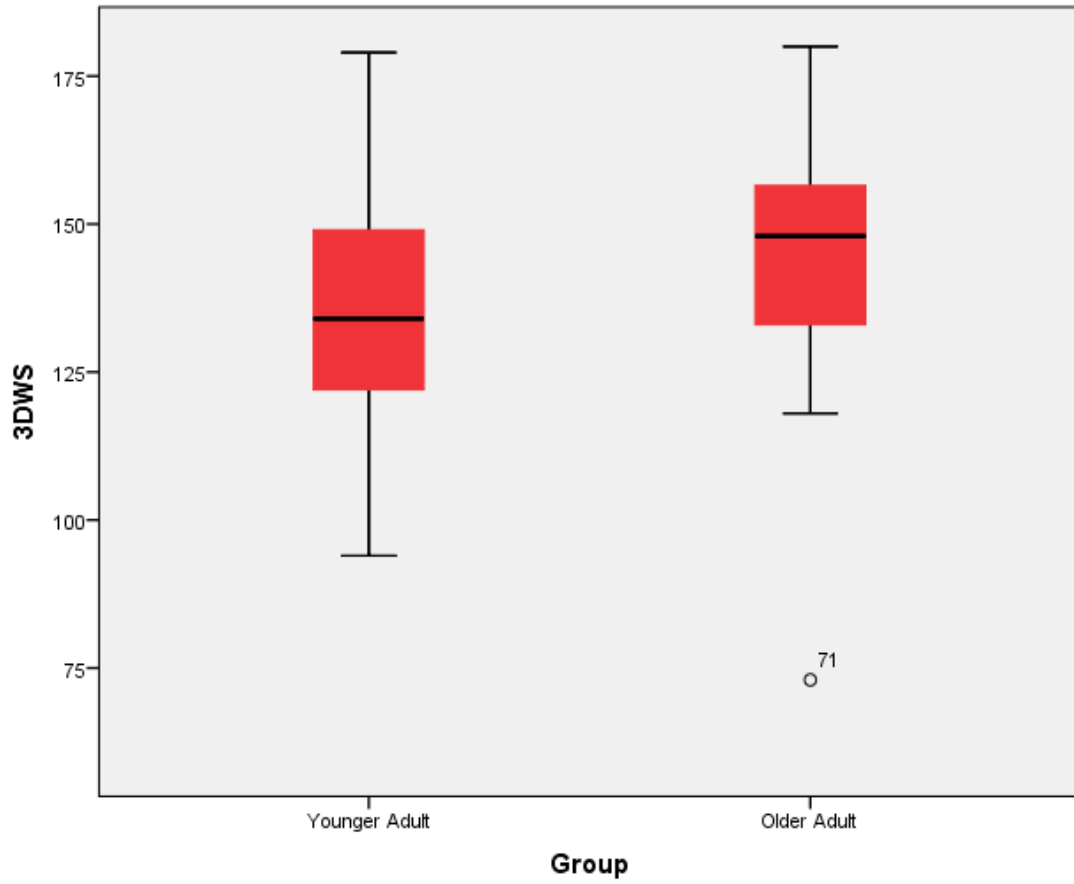


Figure 2. Means of younger and older adult participants on the Three-Dimensional Wisdom Scale.

Appendix A

Berlin Wisdom Paradigm: Life Planning and Life Review Tasks

Life Planning TasksLife Planning Task 1: Work-Family (Age-Based)

JOYCE, A 60-YEAR-OLD WIDOW, RECENTLY COMPLETED A DEGREE IN BUSINESS MANAGEMENT AND OPENED HER OWN BUSINESS. SHE HAS BEEN LOOKING FORWARD TO THIS NEW CHALLENGE. SHE HAS JUST HEARD THAT HER SON HAS BEEN LEFT WITH TWO SMALL CHILDREN TO CARE FOR.

JOYCE IS CONSIDERING THE FOLLOWING OPTIONS: SHE CAN PLAN TO GIVE UP HER BUSINESS AND LIVE WITH HER SON, OR SHE CAN PLAN TO ARRANGE FOR FINANCIAL ASSISTANCE FOR HER SON TO COVER CHILD-CARE COSTS.

WHAT SHOULD JOYCE DO AND CONSIDER IN MAKING HER PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

-----OR-----

MICHAEL, A 28-YEAR-OLD MECHANIC WITH TWO PRESCHOOL-AGED CHILDREN, HAS JUST LEARNED THAT THE FACTORY IN WHICH HE IS WORKING WILL CLOSE IN THREE MONTHS. AT PRESENT, THERE IS NO POSSIBILITY FOR FURTHER EMPLOYMENT IN THIS AREA. HIS WIFE RECENTLY RETURNED TO HER WELL-PAYING NURSING CAREER.

MICHAEL IS CONSIDERING THE FOLLOWING OPTIONS: HE CAN PLAN TO MOVE TO ANOTHER CITY TO SEEK EMPLOYMENT, OR HE CAN PLAN TO TAKE ON FULL RESPONSIBILITY FOR THE CHILD-CARE AND HOUSEHOLD TASKS.

WHAT SHOULD MICHAEL DO AND CONSIDER IN MAKING HIS PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

Life Planning Task 2: Sickness (Gender-Based)

MARY WAS DIAGNOSED WITH CANCER. THE DOCTORS TOLD HER THAT SHE HAS BUT ONE YEAR TO LIVE. MARY IS NOW THINKING ABOUT WHAT SHE SHOULD DO. AMONG OTHER OPTIONS, SHE CAN TRY, AS MUCH AS POSSIBLE, TO CONTINUE LIVING THE WAY SHE HAS BEEN, OR SHE CAN MAKE A DRASTIC CHANGE IN HER LIFE.

WHAT SHOULD MARY DO AND CONSIDER IN MAKING HER PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

-----OR-----

MARK WAS DIAGNOSED WITH CANCER. THE DOCTORS HAVE TOLD HIM THAT HE HAS BUT ONE YEAR TO LIVE. MARK IS NOW THINKING ABOUT WHAT HE SHOULD DO. AMONG OTHER OPTIONS, HE CAN TRY, AS MUCH AS POSSIBLE, TO CONTINUE LIVING THE WAY HE HAS BEEN, OR HE CAN MAKE A DRASTIC CHANGE IN HIS LIFE.

WHAT SHOULD MARK DO AND CONSIDER IN MAKING HIS PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

Life Planning Task 3: Inheritance (Gender-Based)

RUTH RECENTLY FOUND OUT THAT SHE WAS TO BE GIVEN A CONSIDERABLE INHERITANCE. AFTER CELEBRATING, SHE IS THINKING ABOUT WHAT TO DO. AMONG OTHER POSSIBILITIES, SHE CAN INVEST THE MONEY AND CONTINUE LIVING THE WAY SHE HAS BEEN, OR SHE CAN MAKE A DRASTIC CHANGE IN HER LIFE.

WHAT SHOULD RUTH DO AND CONSIDER IN MAKING HER PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

-----OR-----

STEVE RECENTLY FOUND OUT THAT HE WAS TO BE GIVEN A CONSIDERABLE INHERITANCE. AFTER CELEBRATING, HE IS THINKING ABOUT WHAT TO DO. AMONG OTHER POSSIBILITIES, HE CAN INVEST THE MONEY AND CONTINUE LIVING THE WAY HE HAS BEEN, OR HE CAN MAKE A DRASTIC CHANGE IN HIS LIFE.

WHAT SHOULD STEVE DO AND CONSIDER IN MAKING HIS PLANS? WHAT ADDITIONAL INFORMATION IS NEEDED?

Life Review Task (Age-Based)

A YOUNG WOMAN DECIDED TO CONCENTRATE ON HER FAMILY AND NOT TO TAKE UP A PROFESSION; SHE MARRIED AND HAD CHILDREN. ONE DAY SHE MEETS AN OLD FRIEND WHOM SHE HAD NOT SEEN FOR A LONG TIME. THIS FRIEND ONCE HAD DECIDED TO CONCENTRATE ON HER CAREER, RATHER THAN STARTING A FAMILY. PRESENTLY, SHE IS ON HER WAY TO BECOMING A SUCCESSFUL PROFESSIONAL. THE MEETING PROMPTS THE YOUNG WOMAN TO REVIEW THE LIFE SHE HAS LED SO FAR.

WHAT MIGHT SUCH A LIFE REVIEW LOOK LIKE? WHICH ASPECTS OF HER LIFE MIGHT SHE RECALL (DECISIONS, PROBLEMS, SOLUTIONS, IMPORTANT PEOPLE, FEELINGS, HELPFUL EVENTS, OBSTACLES)? HOW MIGHT SHE REFLECT ON THE MOTIVES FOR HER ACTIONS?

HOW MIGHT SHE EVALUATE HER LIFE IN RETROSPECT? DID SHE ATTAIN WHAT SHE HAD AIMED FOR?

-----OR-----

AN ELDERLY WOMAN HAD DECIDED IN HER YOUTH TO CONCENTRATE ON HER FAMILY AND NOT TO TAKE UP A PROFESSION. HER CHILDREN LEFT HOME SEVERAL YEARS AGO. ONE DAY SHE MEETS AN OLD FRIEND, WHOM SHE HAD NOT SEEN FOR A LONG TIME. THIS FRIEND ONCE HAD DECIDED TO CONCENTRATE ON HER CAREER, RATHER THAN STARTING A FAMILY. SHE RETIRED SEVERAL YEARS AGO. THE MEETING PROMPTS THE WOMAN TO REVIEW THE LIFE SHE HAS LED SO FAR.

WHAT MIGHT SUCH A LIFE REVIEW LOOK LIKE? WHICH ASPECTS OF HER LIFE MIGHT SHE RECALL (DECISIONS, PROBLEMS, SOLUTIONS, IMPORTANT PEOPLE, FEELINGS, HELPFUL EVENTS, OBSTACLES)? HOW MIGHT SHE REFLECT ON THE MOTIVES FOR HER ACTIONS?

HOW MIGHT SHE EVALUATE HER LIFE IN RETROSPECT? DID SHE ATTAIN WHAT SHE HAD AIMED FOR?

Appendix B

Berlin Wisdom Paradigm: Materials Used During ‘General Training’ of Raters

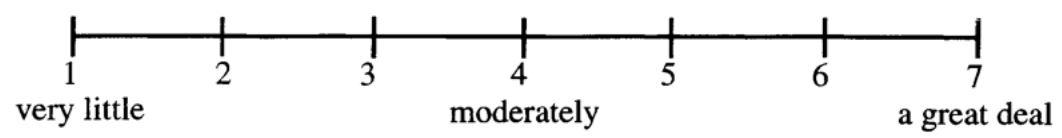
PART 1:

Training for the Use of a 7-Point Scale

Imagine the type of vehicle that could be best used to transport heavy cargo over a long distance.

To what extent do each of the vehicles listed below match your image of such a vehicle?

Give each vehicle a number from 1 (very little) to 7 (a great deal) on the scale below.



Vehicle	Rating
VW Käfer (Beetle)	
Bicycle	
LKW (Semi-trailer)	
Sports car	
Transport (Van)	
Motorcycle	
4-door family sedan	

PART 2:

Training for the Rating of Texts and for Rating in Comparison to an Ideal

“There are four fairytales in this folder which you are to evaluate according to the following criteria:

1) Quality of a fairytale

Fairytales usually are stories involving **supernatural powers** and **heroes** who are faced with **a number of tests of courage**. Also, the plots almost always lead up to **a happy ending**.

Good fairytales differentiate themselves from average fairytales in that they are **interesting and suspenseful** and that they deal **with important life aspects** in an unobtrusive manner. To what extent would you say the following fairytales correspond to this definition?

2) Extent of fantastic elements

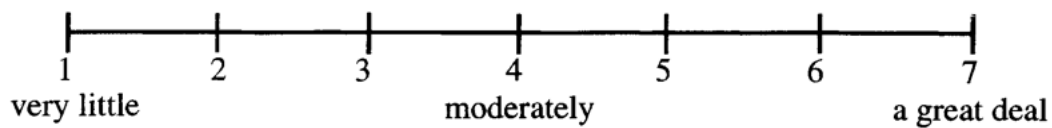
In fairytales reality is portrayed in a **fantastic manner and fantastic events are to be viewed as reality. The laws of physics and logic** no longer have any meaning and people and animals have **supernatural powers**.

Fairytales differ in how many fantastic elements are included. To what extent are fantastic elements included in the following fairytales?

Evaluation

Please evaluate the following four texts in regard to the two above mentioned criteria. Please try to create an ideal in your mind of a good fairytale (criterion 1) and a fairytale incorporating fantastic elements (criterion 2), based on the definitions of the criteria, and relate this to the individual texts.

Give each fairytale a number from 1 (very little) to 7 (a great deal) on the scale below.



Fairytale	Quality of Fairytale	Fantastic Elements
#1		
#2		
#3		
#4		

Text 1

There once was a king who had a very beautiful daughter. Unfortunately, she was so proud and arrogant that she felt no man was good enough for her, not even Prince Valiant, who was a very rich and kind man. The old king became weary of his daughter's stubborn behaviour and decided to marry her to the first person who knocked on his door.

And, indeed, when a peddler came by several days later, the king offered him his daughter's hand in marriage. No matter how much the princess complained, she had to marry the peddler and live with him in his tiny cottage and do all of the house work. Now she regretted that she hadn't married rich Prince Valiant.

After a while her husband said to her, "Wife, it is time we start earning some money. The Prince is looking for a new maid, and if you work there you will get your meals for free. I will start peddling again." So now the princess was a maid and had to do peasant's work.

One day, the Prince decided to marry and had a grand celebration. The poor princess stood in the doorway to watch the festivities. When she saw all the splendor and magnificence, she thought about her fate and cursed her pride and arrogance, which were the cause of her present humble situation.

When the Prince entered the room, she recognized that it was the kind Prince Valiant, whose marriage offer she had once so haughtily declined. When he saw the beautiful woman standing in the doorway, he asked her to dance with him and led her into the middle of the ballroom. The people laughed when they saw her in her dirty tattered rags. She was very ashamed, but the Prince kindly said, "Don't be afraid, Prince Valiant and the peddler are one and the same person. I disguised myself for your sake, because I wanted to tame your pride and punish your arrogance." The Princess wept and said, "I was so unkind, I don't deserve to be your wife." But the Prince replied, "That is all in the past. Now, it is time for us to celebrate our wedding!" Her father and all of the people of the court came to enjoy the happy event, and everyone lived happily ever after.

Text 2

Once upon a time, a farmer was plowing his fields, when, all of a sudden, the horns on the oxen's heads started to grow. By the time he wanted to go home, the horns were so huge that the oxen's head couldn't fit through the gate. Luckily, a butcher happened to be passing by, and the farmer decided to give him the oxen. The two men made a deal: the farmer would bring the butcher a sack of corn, and in return, he would receive a coin for every single kernel. What a good deal!

So, the farmer went home to get the sack of corn. While he was carrying it to the butcher's store, one of the kernels fell out—one less coin for the farmer.

On his way home, when the farmer reached the spot where the kernel had fallen out, a huge tree had grown which touched the sky. The farmer thought to himself, "Well, this is an opportunity you can't let pass. Why not look and see what the angels are doing up there?" So, he climbed up the trunk and saw that the angels were threshing wheat.

As he was watching them, he noticed that the tree on which he was standing started to shake. Looking down to find out what was going on, he saw that someone was trying to chop it down. "It would be very bad, indeed, to fall off," the farmer thought to himself, and in his distress, he decided to tie a rope from the chaff of the wheat, which was lying around in heaps. He also grasped a hatchet and a flail which were lying around up there in the sky. He climbed down the rope and happened to let himself down right into a deep hole in the earth - needless to say, he was happy to have the hatchet. So, he hacked steps into the side of the hole and climbed out. He decided to take the flail with him as a token so that no one could raise any doubts about his story.

Text 3

Once upon a time, there was a little boy and a little girl who were brother and sister, and they loved each other dearly. They lived together with their evil stepmother. One day the little boy saw that the evil stepmother was secretly cooking a soup to poison the children.

The little boy decided he and his little sister should leave as soon as possible. They dressed quickly and left. When their stepmother noticed they were gone, she sent out three servants to look for them and bring them back.

The children were sitting at the edge of the woods. When they saw the servants approaching, the brother said to the sister, "If you do not leave me, then I will not leave you." The sister said, "I shall not leave you. Not ever." Then the brother said, "You turn yourself into a rose bush and I will turn myself into a rose." The three servants did not see the children and returned home empty-handed. The stepmother scolded them and decided to look for the children herself.

The two children saw her coming and the brother said to the sister, "If you do not leave me, then I will not leave you." The sister replied, "I shall not leave you. Not ever." Then the brother said, "You turn yourself into a pond, and I will turn myself into a duck." When the stepmother saw the pond, she tried to catch the duck, but the duck was too quick. He pulled her into the pond with his bill and the old witch drowned. The children went home and lived happily ever after.

Text 4

There once was a poor widow who had an only daughter. Her name was Sarah. One day, Sarah noticed a small box on the cupboard shelf. "I wonder what is in the box?" she thought to herself.

At that moment, the widow came in and said to Sarah, "I am going to the market to buy you something. Do you see the box over there? Don't touch it, Sarah! Be a good girl."

"Of course, Mother. I promise not to touch the box," Sarah replied, and thus assured, the widow left for the market.

Sarah dusted and cleaned the cottage. When she was finished, she had nothing else to do and was overcome by curiosity. She looked at the little box, looked away, and then looked back at it again. How she wished she knew what was in it!

"Why did mother tell me not to open it?" she asked herself. "I really would like to know what is in it. Jewelry? Money? I must find out." Sarah took the little box from the cupboard. How pretty it was! Finally, she opened it and a small puff of smoke rose into the air. Higher and higher it climbed and slowly turned into a great dark cloud.

When the widow returned home, Sarah was not to be found anywhere. Her mother called and called her name, but she didn't get an answer. Then she remembered the small box. She ran to the cupboard, but the box was gone. Right away, she understood what had happened. Sarah had broken her promise; she had opened the little box.

Ever since then, there are sometimes dark clouds up in the sky, and if one looks carefully, one can recognize a human figure. Those are the clouds that were locked in the little box, and people say, that the human figure is the girl who broke her promise.

Appendix C

Berlin Wisdom Paradigm: Practice Protocols Used to Calibrate Ratings During ‘Specific Training’ of Raters

Practice Protocol 1 (Low scoring response: 1-2 points)

Well, I mean, Joyce should do exactly what she had planned to do, namely, to open her business, where she could be successful, or she might fail, it all depends. And her son, I don't know, could hire a babysitter or perhaps send the children to a nursery school or something like that. In any case, Joyce should by no means move in with her son and take care of the children. I think that would be absolutely wrong, because I believe it is just a question of time. The son doesn't seem too old, 60 years old, well; the son might be in his thirties. If his wife died, he will certainly remarry or have another partner, who might move in or so, in any case he will have his own life, and any possible arrangement, such as his mother living with him and taking care of the children, while he is at work, will be certainly just a question of time, of a year, or two years, and then she will have to face the same decision, what to do, and by then she has missed her chance to build up something on her own. For this reason, I think that, well, she can perhaps help her son financially, if she can afford it and he is in need, but otherwise I think there should be an absolute separation. And I do not need any additional information, nor do I have anything else to say, because I made up my mind and don't see any reason to change it. In this type of life situation people behave very differently. You can't discuss all kinds of reactions. I think one has to make a decision and then stick to it. If you try to consider everything it eventually drives you crazy.

Well, I must say that, upon reading the text, I immediately realized the whole background, and I think it is tremendously positive that this woman completed her studies at that age. She wanted to open her own business. Perhaps some kind of management consultancy, which have become quite frequent in industry lately. It would be an interesting job with a lot of people and contacts and she would be independent. She would travel around a lot, just imagine, how exciting this must be for an older widow.

But I have no doubts that she should contribute to the cost of child care, for it is likely that she can afford it, and it would be a great pity if she didn't accept this challenge. Besides, taking care of the children herself might not be in their best interest, somebody else could do that just as well. Even though, of course, a grandmother is a very dear and warm person. But perhaps a younger woman would be equally competent. All this came to my mind while reading the text, and therefore, as far as I am concerned, the question is settled.

Practice Protocol 2 (Moderate scoring response: 3-4 points)

Well, it would be important to know whether she has enough money and savings to help her son or if she makes enough money with her business to support her son financially. Basically, the situation seems clear to me, she would do her son a greater favour if she did not move in with him and take over his responsibilities, that would certainly be very nice and convenient for a while, but that would most likely mean giving up her business completely and not being able to continue her job later. If she did that for a longer period, this certainly wouldn't be to the advantage of her son or the children.

For her son it would undoubtedly be better if he could find another partner. That would be the most reasonable solution. But most likely she loves her grandchildren and also her son, and well, personally, I would be in a conflict, because I would consider it a wonderful challenge to take care of young children, as long as I am still strong and healthy. Not in the sense of taking care of the son and having conflicts with him, but I would love taking care of the children, and then it depends on the past life experiences of this 60 year old woman. If it is the first time that she opened up her own business, after having completed her studies, this is a big deal, and if it is the first time that she is completely independent then this is very important for her and she ought to continue. On the other hand, she has achieved a lot and might say, "Well, I completed my studies, opened up a business, I have achieved a great deal, I am independent and I can afford to renounce and to dedicate myself to a human cause, after all, children are more important". But then of course, she should know that sooner or later she might be superfluous, perhaps, after two or three years, the man meets another woman who will join the household, and even if the house is big and she has her own apartment, she might feel useless and perhaps - not necessarily - conflicts might come up and then she might have to leave and would be alone, yes. If she had continued her business, she would have found satisfaction and contact with other people, but essentially, she would have been alone, too. Therefore, I do not know if one should miss the chance to take care of two children, if one likes to do that. But this is something very personal, one has to like it. If one doesn't like it, it doesn't make sense to sacrifice oneself, then it is really more reasonable to support him financially, so that he can find someone to take care of the children. And this is possible, if one has the financial means and looks around, then someone can be found who takes proper care of the children.

Therefore, it depends on the person, on her preferences, whether she prefers to develop her own business or to spend her time with children, children of her own family. And when she knows this, then they can decide, even though this will certainly not be an easy decision, because she knows very well, it might be only for a short time, but still, one did do something, an investment into children, which I consider very important.

One should also know whether she depends on this business financially, but probably not, if she has founded her own business, then she had to invest money which she could probably get back with a certain loss, which would provide for a financial basis. If she is a widow, then she is entitled to a widow's pension, therefore, she could decide independent of financial considerations. She should do what she likes most.

Practice Protocol 3 (High scoring response: 5-7 points)

1. Is he the only child? 2. Is the son able to remarry and to have a second relationship? Or is he himself, through appropriate means - hired help or with a new partner - able to care for the children. This is important. But the most important is, does the son want to? Since he has such an ambitious and diligent mother, does the son want to be together with her and does the son want the children to be brought up by the mother?

Does the mother still have energy, at age 60, still want to care for the children? One does not know whether Joyce is going to keep her health. If she herself would fall ill for a longer period of time, someone else would have to be found to look after the children. Is there the possibility for her to not only support the children financially, but also to take them into her home? Won't there immediately be confusion, when Joyce wants to take the children into her home? Because she has built up her own life, in which a family with small children does not fit in. She also could have a new partner in life, who then should be asked, too. It is unpredictable what their daily life would look like. It might be unbearable or could also run smoothly. And one's own business is always something distracting when taking care of small children. I would actually like to know how young the children are. Well, I can imagine that very intelligent and business-minded women are definitely capable of raising small children until about ten years old, in addition to running a business. Is it an open business or is it an independent office floor which she has? She also cannot tell how her business will fair financially. A business is always combined with a risk. So, if she has a degree in business, then she probably is involved in office work in which there is enough time, perhaps, to look after the children. But is the 60- year-old, independent woman still compatible with the son, perhaps the two have grown too far apart from one another?

This cannot be predicted with certainty. That is why she should try it out first for one to two weeks, and then decide whether living together and caring for the children is a possibility for her. The daughter-in-law probably is not dead, but there has been a divorce or a permanent separation. But it could be that the son would like to start another relationship. At his age, there is a large likelihood that he will not stay alone forever. And if he also has the children, then he probably is less at fault for the separation and has a positive attitude towards family and child rearing, because otherwise the son wouldn't have gotten the children? And if there remains enough time, which depends also on his professional situation, the help probably is not needed to such an extent, that the independent Mrs. Joyce has to do the whole child rearing, she could share it with her son. Or they could look for and find hired help.

But whether she has these interests at all, or whether taking care of the family was always important for her, is a deciding factor in whether she is willing to take over looking after the children. Women from this generation used to be family oriented, today this has changed. Today, a large number of young women work. Even if I think that Joyce should fulfill her duty as a grandmother, I think that she also has the right to finally follow her own goals and interests. One must consider that other people are working in her business, which she, as an employer, is committed to. Yes, through little changes in one area in life many conflicts can quickly arise in other areas in life and the harmony is gone. A solution is only possible by setting priorities. Joyce

should set these up according to her own goals and motives. And, there, I see Joyce's professional interest as standing in the foreground, because it really is unusual that at 60 years, one goes back to studying and begins one's professional career, instead of enjoying life in retirement.

She also didn't intervene much in the fate of her son, so who knows if she will do it in the future? And her son perhaps doesn't trust her much. I find this woman to be not very family oriented, otherwise she would have also made more advances to the daughter in-law. Her life course will be geared to the preservation of professional and business oriented interests. Perhaps she even was the cause of the separation? That the daughter-in-law said that, well I can't, regardless of everything, live here with this 60-year-old, very courageous and diligent mother? There are some character traits which are unpleasant indeed. Well, I see more separation and distancing from the family, than I actually want to see. The intelligence and capability of a person are not enough to take care of two small children. This takes very very much. One just has to ask both how they feel about one another. And, if possible, how the children feel about their grandmother. And since the daughter in-law probably did not die, but instead left her husband alone, I do not think that this woman is the type of person to help her husband now, especially in regard to the children.

Maybe Joyce could help her son by paying for a house keeper. Because she is thinking about her son's current problem, according to the exercise, she also is willing to help, but probably not as a substitute for the mother. She could advise her son in choosing a house keeper and nanny, since she once was a mother herself maybe she knows better than her son what demands this person must fulfill in the household, and maybe she also made some of her own experiences in her business with hiring people, that is making contracts. That would at least be a temporary solution until new aspects come about, if the son meets another woman, the daughter in-law comes back, because it is not certain that the wife will not come back (maybe it is a temporary situation) or his professional things will change or Joyce's situation might change.

Appendix D

The Self-Assessed Wisdom Scale (Webster, 2003)

Please rate all of the following statements using the scale below:

Strongly Disagree

Moderately Disagree

Slightly Disagree

Slightly Agree

Moderately Agree

Strongly Agree

1. I have overcome many painful events in my life
2. It is easy for me to adjust my emotions to the situation at hand
3. I often think about connections between my past and present
4. I can chuckle at personal embarrassments
5. I like to read books which challenge me to think differently about issues
6. I have had to make many important life decisions
7. Emotions do not overwhelm me when I make personal decisions
8. I often think about my personal past
9. There can be amusing elements even in very difficult life situations
10. I enjoy listening to a variety of musical styles besides my favorite kind
11. I have dealt with a great many different kinds of people during my lifetime
12. I am “tuned” in to my own emotions
13. I reminisce quite frequently
14. I try and find a humorous side when coping with a major life transition
15. I enjoy sampling a wide variety of different ethnic foods
16. I have experienced many moral dilemmas
17. I am very good at reading my emotional states
18. Reviewing my past helps me gain perspective on current concerns
19. I am easily aroused to laughter
20. I often look for new things to try

21. I have seen much of the negative side of life (e.g., dishonesty, hypocrisy)
22. I can freely express my emotions without feeling like I might lost control
23. I often recall earlier times in my life to see how I've changed since then
24. At this point in my life, I find it easy to laugh at my mistakes
25. Controversial works of art play an important and valuable role in society
26. I have lived through many difficult life transitions
27. I am good at identifying subtle emotions within myself
28. Recalling my earlier days helps me gain insight into important life matters
29. I often use humor to put others at ease
30. I like being around persons whose views are strongly different than mine
31. I've personally discovered that "you can't always tell a book from its cover"
32. I can regulate my emotions when the situation calls for it
33. I often find memories of my past can be important coping resources
34. Now I find that I can really appreciate life's little ironies
35. I'm very curious about other religious and/or philosophical belief systems
36. I've learned valuable life lessons from others
37. It seems I have a talent for reading other people's emotions
38. Reliving past accomplishments in my memory increases my confidence for today
39. I can make fun of myself to comfort others
40. I've often wondered about life and what lies beyond

Appendix E

The Three-Dimensional Wisdom Scale (Ardelt, 2003)

How strongly do you agree with the following statements? Rate each response from 1 (strongly agree) to 5 (strongly disagree).

1. Ignorance is bliss
2. It is better not to know too much about things that cannot be changed
3. In this complicated world of ours, the only way we can know what's going on is to rely on leaders or experts who can be trusted
4. There is only one right way to do anything
5. A person either knows the answer to a question or he/she doesn't
6. You can classify almost all people as either honest or crooked
7. People are either good or bad
8. Life is basically the same most of the time
9. A problem has little attraction for me if I don't think it has a solution
10. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something
11. I prefer just to let things happen rather than try to understand why they turned out that way
12. Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me
13. I am hesitant about making decisions after thinking about them
14. I often do not understand people's behavior
15. Things often go wrong for me by no fault of my own
16. I would feel much better if my present circumstances changed
17. I try to look at everybody's side of a disagreement before I make a decision
18. When I'm upset at someone, I usually try to "put myself in his or her shoes" for a while
19. I always try to look at all sides of a problem
20. Before criticizing somebody, I try to imagine how I would feel if I were in their place

21. I sometimes find it difficult to see things from another person's point of view
22. When I am confused by a problem, one of the first things I do is survey the situation and consider all the relevant pieces of information
23. Sometimes I get so charged up emotionally that I am unable to consider many ways of dealing with my problem
24. When I look back on what has happened to me, I can't help feeling resentful
25. When I look back on what's happened to me, I feel cheated
26. I either get very angry or very depressed if things go wrong
27. I am annoyed with unhappy people who just feel sorry for themselves
28. People make too much of the feelings and sensitivity of animals
29. There are some people I know I would never like
30. I can be comfortable with all kinds of people
31. It's not really my problem if others are in trouble and need help
32. Sometime I don't feel very sorry for other people when they are having problems
33. Sometimes I feel a real compassion for everyone
34. I often have not comforted another when he or she needed it
35. I don't like to get involved in listening to another person's troubles
36. There are certain people whom I dislike so much that I am inwardly pleased when they are caught and punished for something they have done
37. Sometimes when people are talking to me, I find myself wishing they would leave
38. I'm easily irritated by people who argue with me
39. If I see people in need, I try to help them one way or another

Appendix F

Correlation Matrices of Wisdom and Memory in a Full, Young, and Older Adult Sample

Legend

***= .001 level

**= .01 level

*= .05 level

Wisdom Measures

SAWS: Self-Assessed Wisdom Scale
3DWS: Three-Dimensional Wisdom Scale
Berlin: Berlin Wisdom Paradigm (BWP)
RichP: Rich Procedural Knowledge domain of the BWP
RichF: Rich Factual Knowledge domain of the BWP
Uncer: Uncertainty domain of the BWP
Life: Lifespan Contextualism domain of the BWP
VR: Value-Relativism domain of the BWP

Episodic Memory Measures

SAMe: Survey of Autobiographical Memory (Episodic Memory Score)
PST: Picture Sequence Memory Test
REY: Auditory Verbal Learning Test
VPA: Verbal Paired Associates
IntDens: Autobiographical Interview (Internal Density Score)
IntCount: Autobiographical Interview (Internal Details Raw Score)
IntProportion: Autobiographical Interview (Proportion of Internal Details)

Semantic Memory

SAMs: Survey of Autobiographical Memory (Semantic Memory Score)
Shipley: Shipley- 2 Vocabulary
ExtDens: Autobiographical Interview (External Density Score)
ExtCount: Autobiographical Interview (External Details Raw Score)
ExtProportion: Autobiographical Interview (Proportion of External Details)

Supplementary Table 1
Bivariate Correlations of Wisdom and Memory Measures in the Full Sample

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.28**	-4.24**	-3.89**	-.21*	-.32**	-.05	-.35***	.24*	.32**	.28**	.28**	.35***
3DWS	.30**	-.11	-.21*	-.13	-.22*	.05	-.16	.29**	.20	.29**	.11	.23*
Berlin	.12	.15	.11	.07	.02	.18	.04	.14	.20	-.04	.17	-.04
RichP	.09	.23*	.16	.16	.07	.17	.11	.12	.12	-.11	.08	-.11
RichF	.20	.02	-.02	-.04	-.15	.20	-.15	.15	.22*	.11	.35**	.15
Uncer	.11	.15	.02	.06	.07	.15	.08	.18	.20	-.03	.07	-.08
Life	.11	.16	.19	.04	.05	.08	.06	.15	.18	-.06	.09	-.06
VR	-.02	.09	.12	.09	.09	.18	.08	-.03	.10	-.08	.12	-.08

Supplementary Table 1.1
P-values of Bivariate Correlations of Wisdom and Memory Measures in the Full Sample

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	< .01	< .01	< .01	.05	< .01	.67	.001	< .05	< .01	< .01	< .01	.001
3DWS	< .01	.31	.05	.20	< .05	.62	.12	< .01	.06	< .01	.32	< .05
Berlin	.24	.14	.29	.53	.84	.08	.72	.19	.06	.72	.10	.72
RichP	.39	< .05	.13	.14	.53	.11	.30	.26	.27	.30	.46	.30
RichF	.06	.83	.83	.69	.16	.06	.16	.17	< .05	.29	< .01	.16
Uncer	.31	.16	.86	.60	.54	.14	.47	.08	.05	.73	.50	.47
Life	.29	.13	.07	.74	.64	.44	.55	.16	.08	.57	.37	.55
VR	.85	.37	.24	.39	.42	.08	.43	.77	.32	.43	.27	.43

Supplemental Table 2

Partial Correlations of Wisdom and Memory Measures Controlling for Age in the Full Sample

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.26**	-.22*	-.16	.07	-.11	.06	-.11	.30**	.21*	.01	.14	.11
3DWS	.28**	.06	-.07	.01	-.11	.11	-.01	.32	.13	-.06	.15	.01
Berlin	.13	.14	.08	.02	-.03	.17	-.02	.13	.23*	.01	.22*	.02
RichP	.11	.17	.07	.07	-.03	.14	.003	.11	.18	-.01	.15	-.003
RichF	.19	.13	.08	.04	-.10	.23*	-.09	.16	.20	.04	.33**	.08
Uncer	.12	.11	-.06	-.002	.02	.14	.02	.18	.24*	.03	.12	-.02
Life	.13	.11	.15	-.04	-.02	.06	-.01	.14	.23*	.02	.15	.01
VR	-.01	.05	.08	.04	.04	.16	.03	-.04	.14	-.03	.16	-.03

Supplementary Table 2.1

P-values of Partial Correlations of Wisdom and Memory Measures in the Full Sample

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.01	< .05	.13	.52	.31	.60	.30	< .01	< .05	.91	.19	.30
3DWS	.01	.61	.50	.92	.28	.30	.90	< .01	.21	.58	.16	.90
Berlin	.21	.20	.45	.82	.81	.11	.89	.20	.03	.90	< .05	.89
RichP	.29	.11	.52	.51	.78	.20	.98	.30	.09	.96	.14	.98
RichF	.08	.23	.48	.70	.36	< .05	.41	.14	.06	.70	< .01	.41
Uncer	.26	.28	.60	.99	.88	.19	.85	.09	< .05	.78	.27	.85
Life	.23	.30	.15	.69	.88	.59	.90	.19	< .05	.87	.16	.90
VR	.93	.67	.44	.68	.70	.12	.77	.72	.18	.77	.12	.77

Supplementary Table 3

Bivariate Correlations of Wisdom and Memory Measures in a Younger Adult Cohort

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.30*	-.34**	-.25	.10	.00	.14	-.04	.40**	.29*	-.02	.13	.04
3DWS	.29*	-.01	-.21	.08	-.11	.09	-.02	.40**	.16	-.01	.05	.02
Berlin	.15	.05	-.01	-.02	.00	.15	.03	.08	.24	.00	.07	-.03
RichP	.14	.09	.03	.02	.00	.14	.04	.09	.17	-.01	.07	-.04
RichF	.22	.07	-.01	.10	-.06	.15	-.06	.08	.27*	.05	.18	.06
Uncer	.13	.03	-.09	-.10	.00	.16	.01	.07	.25	.03	.09	-.01
Life	.13	.02	.08	-.06	.03	.02	.12	.11	.23	-.07	-.12	-.12
VR	-.02	.02	-.08	-.09	.07	.19	.04	-.04	.08	.01	.10	-.04

Supplementary Table 3.1

P-values of Bivariate Correlations of Wisdom and Memory Measures in a Younger Adult Cohort

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	< .05	.01	.06	.46	.98	.29	.77	< .01	< .05	.90	.35	.77
3DWS	< .05	.96	.11	.53	.43	.52	.89	< .01	.23	.96	.74	.89
Berlin	.27	.69	.95	.89	.99	.27	.80	.55	.07	.10	.59	.80
RichP	.31	.53	.85	.87	.98	.30	.78	.52	.20	.97	.61	.78
RichF	.10	.59	.95	.45	.67	.26	.68	.54	.04	.73	.18	.68
Uncer	.33	.85	.49	.47	.98	.23	.97	.61	.06	.85	.48	.97
Life	.32	.89	.55	.63	.86	.87	.36	.40	.09	.59	.37	.36
VR	.88	.91	.56	.50	.62	.16	.75	.78	.54	.97	.45	.75

Supplementary Table 4

Bivariate Correlations of Wisdom and Memory Measures in an Older Adult Cohort

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.24	-.03	-.08	-.07	-.40*	-.14	-.27	.10	.06	.10	.19	.27
3DWS	.29	.13	.09	-.16	-.18	.13	-.06	.17	.11	-.08	.29	.06
Berlin	.10	.21	.24	.10	-.07	.21	-.07	.22	.23	.03	.38*	.07
RichP	.05	.39*	.18	.19	-.09	.14	-.04	.17	.20	-.01	.29	.04
RichF	.15	.26	.22	-.06	-.18	.38*	-.13	.27	.01	.03	.53**	.13
Uncer	.09	.29	.01	.15	.05	.10	.05	.34*	.25	.03	.14	-.05
Life	.11	.27	.26	-.01	-.08	.11	-.15	.18	.25	.10	.39*	.15
VR	-.01	.10	.30	.22	.01	.14	.03	-.03	.25	-.07	.21	-.03

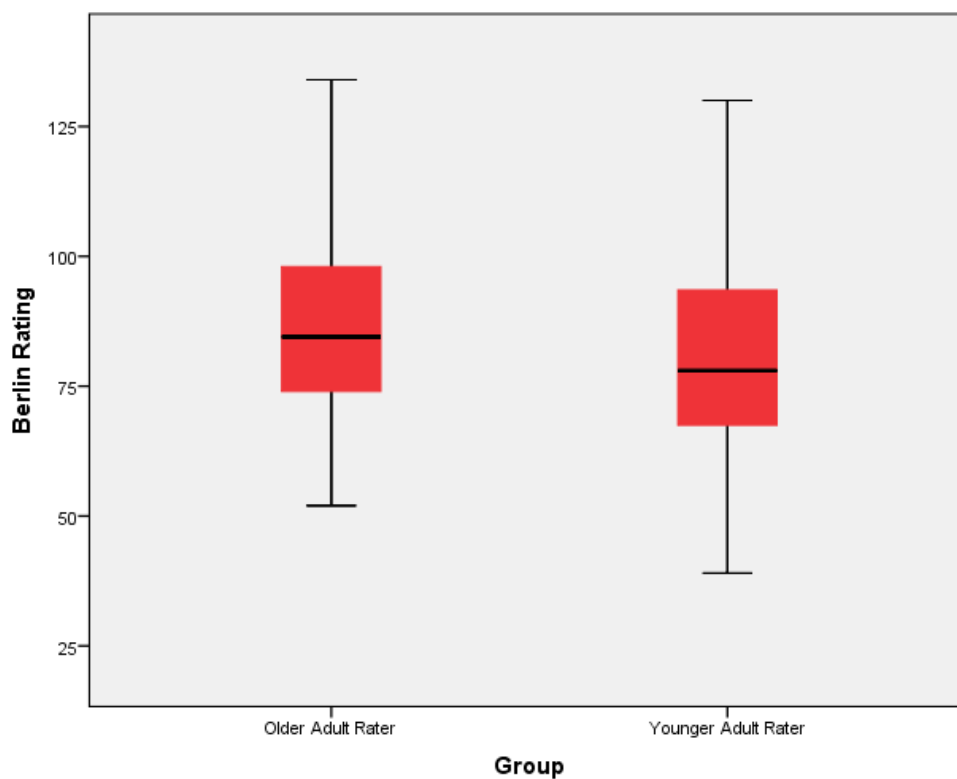
Supplementary Table 4.1

P-values of Bivariate Correlations of Wisdom and Memory Measures in an Older Adult Cohort

	Episodic Memory							Semantic Memory				
	SAMe	PST	REY	VPA	IntDens	IntCount	IntProportion	SAMs	Shipley	ExtDens	ExtCount	ExtProportion
SAWS	.18	.87	.65	.71	< .05	.42	.12	.59	.75	.59	.28	.12
3DWS	.09	.47	.63	.36	.29	.47	.75	.33	.53	.66	.10	.75
Berlin	.57	.07	.17	.56	.68	.23	.69	.20	.19	.88	< .05	.69
RichP	.77	< .05	.30	.27	.61	.41	.80	.34	.26	.95	.09	.80
xRichF	.39	.13	.21	.72	.30	< .05	.46	.11	.96	.86	< .01	.46
Uncer	.59	.09	.94	.40	.78	.56	.80	< .05	.16	.87	.43	.80
Life	.53	.12	.13	.97	.64	.52	.38	.31	.14	.56	< .05	.38
VR	.97	.55	.08	.21	.94	.42	.87	.85	.15	.68	.22	.87

Appendix G

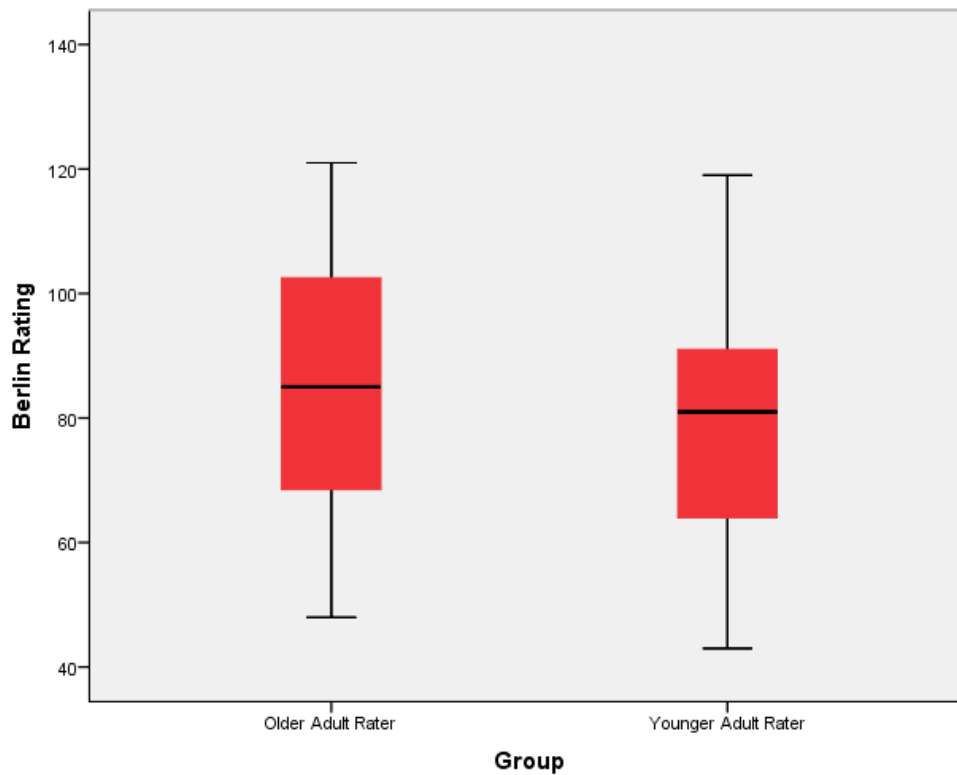
Figure of Means of Older and Younger Adult Raters on the Berlin Wisdom Paradigm Ratings of Older Adult Participants



Note: An independent-samples t-test was conducted to examine the effect of rater's age on Berlin wisdom ratings of older adult participants. There was not a significant effect of age on ratings assigned to the transcripts of older adult participants, $t(68) = 1.14, p = .26$

Appendix H

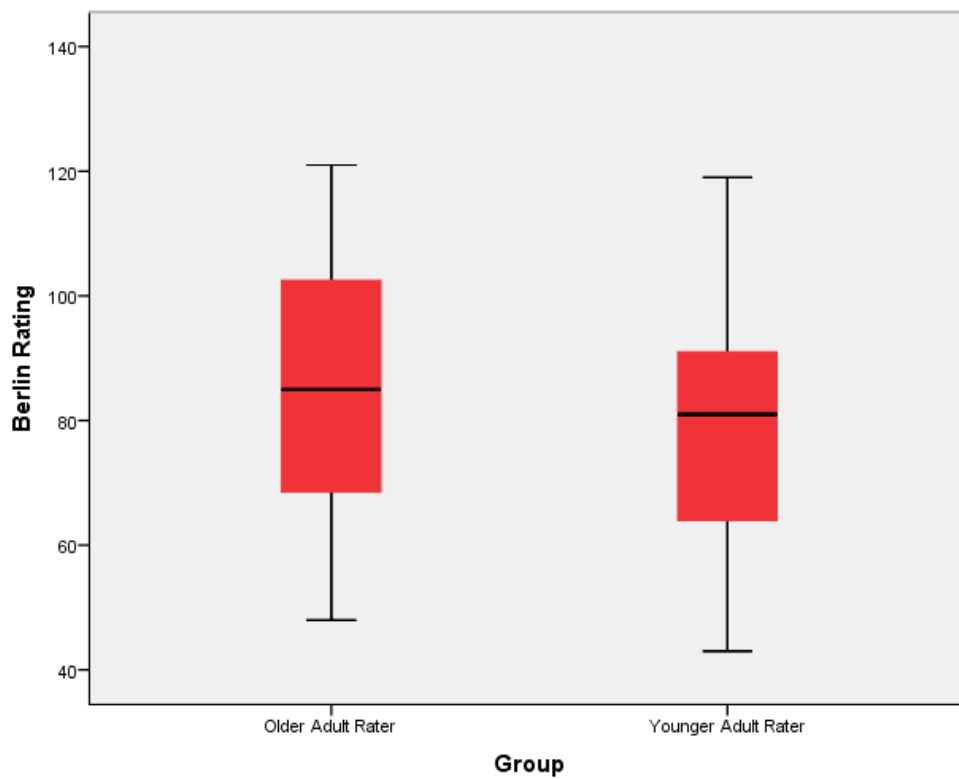
Figure of Means of Older and Younger Adult Raters on the Berlin Wisdom Paradigm Ratings of Younger Adult Participants



Note: An independent-samples t-test was conducted to examine the effect of rater's age on Berlin wisdom ratings of younger adult participants. There was a significant effect of age on ratings assigned to the transcripts of older adult participants, $t(115) = 2.10$ $p < .05$. Older adult raters scored transcripts higher than younger adults.

Appendix I

Figure of Means of Older and Younger Adult Raters on the Berlin Wisdom Paradigm Ratings of All Participants



Note: An independent-samples t-test was conducted to examine the effect of rater's age on Berlin wisdom ratings of all participants. There was a significant effect of age on ratings assigned to the transcripts of all participants, $t(184) = 2.35$ $p < .05$. Older adult raters scored transcripts higher than younger adults.

Appendix J

Table of Interrater Reliability Amongst Independent Pairs of Raters on the Berlin Wisdom

Paradigm

Raters	Criterion Variable	k	$p(k)$	Strength of Agreement	Mean Difference
2720022 & 2710021	Rich Procedural	.06	.05*	poor	1.74
2720022 & 2710023	Rich Procedural	.05	.05*	poor	3.97
2710010 & 2720019	Rich Factual	.02	.49	poor	3.61
270017 & 2720018	Lifespan	-.03	.29	poor	5.44
2710015 & 2720024	Uncertainty	.03	.20	poor	2.89
2710007 & 2720016	Value-Relativism	-.01	.97	poor	3.68
2720016 & 2710008	Value-Relativism	.07	.07	poor	2.36

Note: k = Cohen's Kappa Coefficient