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Development of a 12-Item Abbreviated Three-Dimensional Wisdom Scale (3D-WS-12): Item Selection and Psychometric Properties

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Abstract

Wisdom has been reported to be associated with better mental health and quality of life among older adults. Over the past decades, there has been considerable growth in empirical research on wisdom, including the development of standardized measures. The 39-item Three-Dimensional Wisdom Scale (3D-WS) is a useful assessment tool, given its rigorous development and good psychometric properties. However, the measure's length can prohibit use. In this article, we used a sample of 1,546 community-dwelling adults aged 21 to 100 years (M = 66 years) from the Successful AGing Evaluation (SAGE) study to develop an abbreviated 12-item version of the 3D-WS: the 3D-WS-12. Balancing concerns for measurement precision, internal structure, and content validity, factor analytic methods and expert judgment were used to identify a subset of 12-items for the 3D-WS-12. Results suggest that the 3D-WS-12 can provide efficient and valid assessments of Wisdom within the context of epidemiological surveys.

Keywords

wisdom, compassion, aging, psychometric, factor analysis

Personal wisdom is reported to be associated with better quality of life among older adults (Ardelt, 1997, 2000; Jeste & Oswald, 2014) and may have important implications for individuals, the health care system, and society. Among other positive associations, wisdom correlates with better physical health (Ardelt, 2000), mental health (Ardelt, 2003; Jeste et al., 2013; Roháriková, Špajdel, Cviková, & Jagla, 2013; Webster, Westerhof, & Bohlmeijer, 2014), happiness (Bergsma & Ardelt, 2012; Etezadi & Pushkar, 2013; Zacher, McKenna, & Rooney, 2013), life satisfaction (Ardelt, 1997, 2000; Ferrari, Kahn, Benayon, & Nero, 2011; Le, 2011), mastery (Ardelt, 2003; Etezadi & Pushkar, 2013), and resilience (Jeste et al., 2013). Wisdom is thought to be a multidimensional characteristic with the whole being greater than the sum of its parts. An important component of wisdom relates to prosocial values and behavior, suggesting that wisdom is a useful construct not only for the individual but also serves the common good (Baltes & Staudinger, 2000). Wisdom is not simply a conglomeration of personality traits but it serves a purpose and is exhibited through behavior and social interaction. Wisdom is considered to be beneficial for individuals, others, and society at large, given that an important component of wisdom involves promoting the well-being of others and because empirical evidence suggests that wisdom is related to improved quality of life and better quality of relationships (Ardelt, 1997, 2000).

Due in part to increasing longevity and promotion of successful aging, there has been growing interest and research attention focused on wisdom (Jeste et al., 2010; Jeste & Harris, 2010; Meeks & Jeste, 2009), including the development of standardized measures (see Bangen, Meeks, & Jeste, 2013). The Three-Dimensional Wisdom Scale (3D-WS) is a self-administered measure of wisdom that was developed for use in large, standardized surveys of older adults (Ardelt, 2003). Ardelt argued that it would be difficult to assess wisdom directly; however, wisdom could be measured indirectly through observed indicators of the latent construct. Although most existing definitions of wisdom included cognitive and reflective dimensions, the affective (compassionate) element of wisdom was often ignored. Based in part on the seminal work by Clayton and Birren (1980), Ardelt (2003) conceptualized wisdom as a latent variable integrating cognitive, reflective, and affective dimensions. This definition is compatible with most modern and ancient conceptualizations

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(Blanchard-Fields & Norris, 1995; Jeste & Vahia, 2008; Levitt, 1999; Sternberg, 1990).

The cognitive wisdom dimension involves the ability to understand life and the deeper meaning of events as they relate to intrapersonal and interpersonal matters (Ardelt, 2000, 2003). Ardelt (2003) argued that the reflective dimension of wisdom is essential for the development of the cognitive dimension, given that a deeper understanding of life is possible only if individuals engage in reflective thinking. The development of self-awareness and insight diminishes an individual's self-centeredness, subjectivity, and projections and facilitates understanding. The affective dimension—now referred to as the compassionate wisdom dimension—involves positive feelings and behaviors toward others and the absence of indifferent or negative feelings and behavior. Wisdom—as the integration of all three dimensions—is conceptualized as a developmental personality quality rather than an inherited trait or a short-lived state (Ardelt, 2003).

Acknowledging the multidimensional nature of wisdom, Ardelt (2003) selected 3D-WS items from a developmental pool combining items from several existing scales and associated content domains with new items. To be included in the final measure, items needed to demonstrate adequate response variance, minimal skew and kurtosis, low correlations with social desirability, and strong positive interitem correlations. The final subscales evidenced adequate reliability and validity (Ardelt, 2003). Although the scale was developed in a sample of older adults, it has been used in a wide range of groups, including children, adolescents, young, and middle-aged adults, and across different cultural groups (Ardelt, 2010; Bang & Montgomery, 2013; Beaumont, 2011; Bergsma & Ardelt, 2012; Ferrari, Kahn, Benayon, & Nero, 2011).

Measurement of wisdom has not gained widespread attention. There are likely several reasons. First, existing wisdom measures (e.g., Ardelt, 2003; Webster, 2007) are lengthy by the standards of mental health practice and research. Brevity in mental health assessment is especially important when assessing populations that might have difficulty sustaining attention (e.g., individuals with cognitive impairment) or are susceptible to fatigue (e.g., individuals with medical problems). Second, although the concept is ubiquitous, there is no agreed-upon definition of wisdom and few empirical measures of the construct have been developed (see Bangen, Meeks, & Jeste, 2013). The 3D-WS assesses three domains of wisdom, and the Self-Assessed Wisdom Scale (SAWS; Webster, 2003), another measure of the construct, assesses five (critical life experiences, reminiscence/life reflection, openness to experiences, emotional regulation, and humor). Although there are circumstances in which researchers and clinicians may choose to focus on separate domains of wisdom, a marker of the general construct (see Ardelt, 2011; Taylor, Bates, & Webster, 2011, for a discussion of common elements) may be all that is required. Third, despite early evidence supporting the validity of wisdom scores, establishing wisdom as an independent construct requires repeated, widespread inclusion of wisdom measures in studies that allow for more rigorous psychometric evaluations (e.g., multitrait–multimethod approach).

To encourage use, we wanted to develop a version of the 3D-WS that (a) could be administered quickly within the context of epidemiological surveys assessing several constructs or within clinical settings where time is limited, (b) minimized administration burden for use when assessing populations that might have difficulty sustaining attention or are susceptible to fatigue, and (c) focused on the higher order construct of wisdom as opposed to domains.

Method

Participants

Participants were 1,546 community-dwelling adults from the Successful AGing Evaluation (SAGE; Jeste et al., 2013) study. SAGE recruitment involved oversampling middle-aged and older adults using a modified version of random-digit dialing and allowed no more than one participant to be recruited from each household (Jeste et al., 2013). The average age of participants was 66 years ($SD = 21$; range = 21-100 years) and 51% were male. Approximately 1% of participants reported obtaining no education or education through grade school alone, 2% some high school but no degree, 11% a high school diploma or GED, 5% vocational training, 31% some college or an associate degree, 19% a bachelor's degree or equivalent, 9% some postgraduate or professional school, 14% a master's degree, and 7% a doctorate. In terms of race and ethnicity, 76% of participants identified as Caucasian, 1% as African American, 14% as Hispanic, 7% as Asian, less than 1% as Native American, less than 1% as Native Hawaiian/Pacific Islander, and 1% as other. The study was approved by the University of California, San Diego, Human Research Protections Program.

Measures

The 3D-WS (Ardelt, 2003) includes 39 items: 14 for the Cognitive dimension (c1 through c14), 12 for the Reflective dimension (r1 through r12), and 13 for the Affective dimension (a1 through a13). Items (Table 1) are self-rated using five ordered categorical response options (1 = *strongly agree* or *definitely true of myself* through 5 = *strongly disagree* or *not true of myself*). Five items from the Reflective dimension and three items from the Affective dimension are reverse-scored ("r" indicates reverse scoring). Ardelt (2003) reported reliability (alpha) values of .78, .75, and .74 for the 3D-WS Cognitive, Reflective, and Affective dimensions, respectively. In the current sample, the respective alpha values were .79, .77, and .72.

Table 1. Three-Dimensional Wisdom Scale (3D-WS) Cognitive, Reflective, and Affective Items.

	Cognitive Dimension of Wisdom
c1	Ignorance is bliss.
c2	It is better not to know too much about things that cannot be changed.
c3	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.
c4	There is only one right way to do anything.
c5	A person either knows the answer to a question or he or she does not.
c6	You can classify almost all people as either honest or crooked.
c7	People are either good or bad.
c8	Life is basically the same most of the time.
c9	**A problem has little attraction for me if I don't think it has a solution.**
c10	**I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.**
c11	**I prefer just to let things happen rather than try to understand why they turned out that way.**
c12	Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me.
c13	**I am hesitant about making important decisions after thinking about them.**
c14	I often do not understand people's behavior.
	Reflective Dimension of Wisdom
r1	Things often go wrong for me by no fault of my own.
r2	I would feel much better if my present circumstances changed.
r3r	I try to look at everybody's side of a disagreement before I make a decision (reversed).
r4r	When I'm upset at someone, I usually try to "put myself in his or her shoes" for a while (reversed).
r5r	I always try to look at all sides of a problem (reversed).
r6r	Before criticizing somebody, I try to imagine how I would feel if I were in their place (reversed).
r7	I sometimes find it difficult to see things from another person's point of view.
r8r	**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 (reversed).**
r9	**Sometimes I get so charged up emotionally that I am unable to consider many ways of dealing with my problems.**
r10	**When I look back on what has happened to me, I can't help feeling resentful.**
r11	When I look back on what's happened to me, I feel cheated.
r12	**I either get very angry or depressed if things go wrong.**
	Affective (Compassionate) Dimension of Wisdom
a1	I am annoyed by unhappy people who just feel sorry for themselves.
a2	People make too much of the feelings and sensitivity of animals.
a3	There are some people I know I would never like.
a4r	**I can be comfortable with all kinds of people (reversed).**
a5	It's not really my problem if others are in trouble and need help.
a6	Sometimes I don't feel very sorry for other people when they are having problems.
a7r	**Sometimes I feel a real compassion for everyone (reversed).**
a8	I often have not comforted another when he or she needed it.
a9	**I don't like to get involved in listening to another person's troubles.**
a10	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.
a11	Sometimes when people are talking to me, I find myself wishing that they would leave.
a12	**I'm easily irritated by people who argue with me.**
a13r	If I see people in need, I try to help them one way or another (reversed)

Note. Items in boldface were chosen for the 12-Item Abbreviated Three-Dimensional Wisdom Scale (3D-WS-12). Response options range from 1 = *strongly agree* or *definitely true of myself* through 5 = *strongly disagree* or *not true of myself*.

The study also included the following measures of mental health and general well-being: the Cognitive Failures Questionnaire (Broadbent, Cooper, FitzGerald, & Parkes, 1982)—a 25-item self-report measure of mistakes due to cognitive lapses (e.g., forgetting appointments); the Brief Symptom Inventory Anxiety Scale (Derogatis, 1993)—a 6-item self-report screening measure of symptoms of anxiety; the Patient Health Questionnaire Depression Module (Kroenke, Spitzer, & Williams, 2001)—a 9-item self-report screening measure of symptoms of depression; the Medical Outcomes Study 36-Item Short-Form Health Survey Mental Component (Ware & Sherbourne, 1992)—a composite of self-report scales of mental health; self-ratings of successful aging—a single-item rating of successful aging developed and used in the SAGE study; the Personal Mastery Scale (Pearlin & Schooler, 1978) —a 4-item self-report measure of mastery (e.g., ability to accomplish goals); the abbreviated Connor–Davidson Resilience Scale (Campbell-Sills & Stein, 2007) —a 10-item self-report measure of resilience (e.g., the ability to use humor to cope with stressful situations); the CES-D (Center for Epidemiologic Studies–Depression scale) Happiness Scale (Fowler, 2008)—a 4-item subscale from the CES-D, a self-report measure of depression, that is specific to happiness; and the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985)—a 5-item self-report measure of global life satisfaction (e.g., not wanting to change anything).

Measurement Models

Ardelt (2003) confirmed a 3D-WS measurement model in which Cognitive, Reflective, and Affective dimensions were indicators of a higher order Wisdom factor. However, this model has yet to be fit to item-level 3D-WS data. Analyses of item data can produce methodological artifacts when subdomains of similar content are not accounted for. In previous work (Ardelt, 2011), three content subdomains were identified for the Cognitive dimension: ability and willingness to understand a situation or phenomenon thoroughly (c1, c2, c3, c10, c11, c12, and c14), acknowledgment of ambiguity, complexity, and uncertainty in life (c4, c5, c6, c7, c8, and c9), and ability to make important decisions despite life's unpredictability and uncertainties (c13); two content subdomains were identified for the reflective dimension: absence of subjectivity and projections (r1, r2, r10, r11, and r12) and ability and willingness to look at phenomena and events from different perspectives (r3r, r4r, r5r, r6r, r7, r8r, and r9); and three content subdomains were identified for the affective (compassionate) dimension: presence of positive and caring emotions toward others (a4r and a7r), absence of indifferent or negative emotions toward others (a1, a2, a3, a6, a10, a11, and a12), and motivation to nurture the well-being of others (a5, a8, a9, and a13r).

We compared three latent variable models fitted to 3D-WS item data. The first model was a higher order factor model that included a higher order Wisdom factor as well as lower order Cognitive, Reflective, and Affective factors. The second model was identical to the first except that we freed residual covariances between items within the same content subdomains. The third model was a bifactor (or direct hierarchical) model. Bifactor models assume that each item measures two orthogonal factors: a general factor and a specific factor. Thus, all Cognitive dimension items indicated an orthogonal Cognitive factor and an orthogonal Wisdom factor, all Reflective dimension items indicated an orthogonal Reflective factor and an orthogonal Wisdom factor, and all Affective dimension items indicated an orthogonal Affective factor and an orthogonal Wisdom factor.

Analyses

We evaluated the fit of measurement models and selected items for an abbreviated 3D-WS using methods from confirmatory factor analysis (CFA; Brown, 2006). To determine which measurement model best fitted the 3D-WS item data we began by fitting higher order, higher order with freed residuals, and bifactor models to a training data set. We then selected items for an abbreviated 3D-WS using parameter estimates (factor loadings) from the best fitting model. Finally, we refitted the best fitting factor model to the newly developed short form in a validation data set in order to cross-validate the measurement approach. The training and validation data sets were created by first stratifying the sample by age, gender, and race, and then randomly assigning participants within each stratum to either the training data set or the validation data set.

Items for the abbreviated 3D-WS were chosen primarily based on their indicator strength (i.e., factor loadings). This approach, as opposed to using item response theory methods, was chosen due to the complexity of the measurement model, the polytomous item response format (which better approximates a continuous scale than does a dichotomous item response format), and because factor loadings (discrimination parameters) typically dominate item selection. Parameters were estimated using the *lavaan* package for R (Rosseel, 2012) with a robust weighted least squares estimator and fit indices based on the Satorra–Bentler scaled χ^2 test statistic. Model fit was evaluated using root mean square error of approximation (RMSEA), Tucker–Lewis index (TLI), and comparative fit index (CFI) values. CFI and TLI values ≥.95 indicate good fit and values ≥.90 indicate acceptable fit; RMSEA values ≤.06 indicate good fit and values ≤.08 indicate acceptable fit (Brown, 2006).

Sources of variance composing total scores for the abbreviated 3D-WS were also determined. Specifically, we calculated the percentage of variance in observed total

Table 2. Confirmatory Factor Analysis Model Fit Statistics.

		Fit statistics				
Model	*N*	χ^2	*df*	CFI	TLI	RMSEA
Higher order	775	8,581.47	701	.808	.797	.121
Higher order with freed residuals	775	3,111.75	604	.939	.925	.074
Bifactor	775	4,792.72	663	.899	.888	.090

Note. CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation.

scores uniquely explained by higher order Wisdom, lower order Cognitive, Reflective, and Affective factors, and error. To do so, we first performed a Schmid–Leiman transformation of the higher order CFA parameters (see Brown, 2006) and then used methods described by Reise, Moore, and Haviland (2010) to determine the degree to which total scores were explained by each factor. The amount of variance in total scores explained by the general factor is a CFA-based index of precision known as omega hierarchical (ω_h).

To further evaluate reliability, we computed coefficient alpha (Haynes, Smith, & Hunsley, 2011) for 3D-WS and abbreviated 3D-WS Wisdom total scores using the psych package for *R* (Revelle, 2011). Reliability coefficients were calculated for the complete sample as well as separately in younger (<65 years) and older (≥65 years) adults. Because we assumed that the higher order Wisdom factor is indicated by lower order Cognitive, Reflective, and Affective factors, reliability was estimated using the three subscale total scores. Item-level reliabilities capitalize on all sources of common variance on multidimensional scales, not just the higher order construct of interest. Thus, subscale-based reliabilities tend to be smaller than item-based reliabilities. Yet the former provide a more accurate assessment of measurement precision when higher order constructs are the targets of interest (Gignac, 2014). For comparison, we also provide the item-level reliability estimates. Firm rules for determining acceptable reliability are generally not recommended; however, values of .60 and greater or .70 and greater have been considered adequate (Clark & Watson, 1995; Haynes et al., 2011), depending on the number of indicators and context of assessment. Invariably, abbreviated scale scores are less reliable than their full-length counterparts (e.g., Almeida & Almeida, 1999).

To determine how well the abbreviated 3D-WS scales approximated their full-length counterparts, we computed Pearson correlation coefficients between 3D-WS and abbreviated 3D-WS subscale and total scores. Cross-measure correlations were corrected for item overlap by removing items chosen for the abbreviated version of the scale from the full-length version before computing correlations between corresponding full-length and abbreviated total and subscale scores. We also correlated full-length and abbreviated 3D-WS total scores with mental health and well-being constructs known to be associated with wisdom. We wanted to confirm that 3D-WS and 3D-WS-12 total scores were similarly associated with better mental health and well-being (i.e., negative correlations with Cognitive Failures Questionnaire, Brief Symptom Inventory Anxiety Scale, and Patient Health Questionnaire Depression Module scores, and positive correlations with Medical Outcomes Study 36-Item Short-Form Health Survey Mental Component, self-ratings of successful aging, Personal Mastery Scale, Connor-Davidson Resilience Scale, CES-D Happiness Scale, and Satisfaction with Life Scale scores). Given the research focus of the SAGE study, we also explored associations between Wisdom total scores and age on both the 3D-WS and abbreviated 3D-WS. Specifically, we compared models with linear, quadratic, and cubic terms using polynomial regression.

Results

CFA model fit statistics are reported in Table 2. The results suggest that the higher order model with freed residuals fitted the data better than either the higher order model without freed residuals or the bifactor model. The higher order model with freed residuals had the lowest CFI, TLI, and RMSEA values, and was the only model to consistently provide acceptable fit based on these criteria. Parameter estimates (standardized loadings) for this model are reported in Figure 1.

After experimenting with different combinations of items for an abbreviated 3D-WS, we found that 12 items adequately balanced concerns for reliability, internal structure, and content representativeness.[1] To select these items, we began by retaining those with the highest loading within each of the eight content subdomains (c9, c10, c13, r9, r12, a4r, a9, and a12). The final four (c11, r8r, r10, and a7r) were chosen to balance the number of items drawn from each of the three primary Wisdom domains and to optimize content representativeness. The abbreviated 3D-WS is hereafter referred to as the 3D-WS-12.

Keeping in mind that negation of items implies greater wisdom (except for reverse-scored items), the chosen 3D-WS-12 Cognitive subscale items were c10—"I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something"; c11—"I prefer just to let things happen rather than try to understand

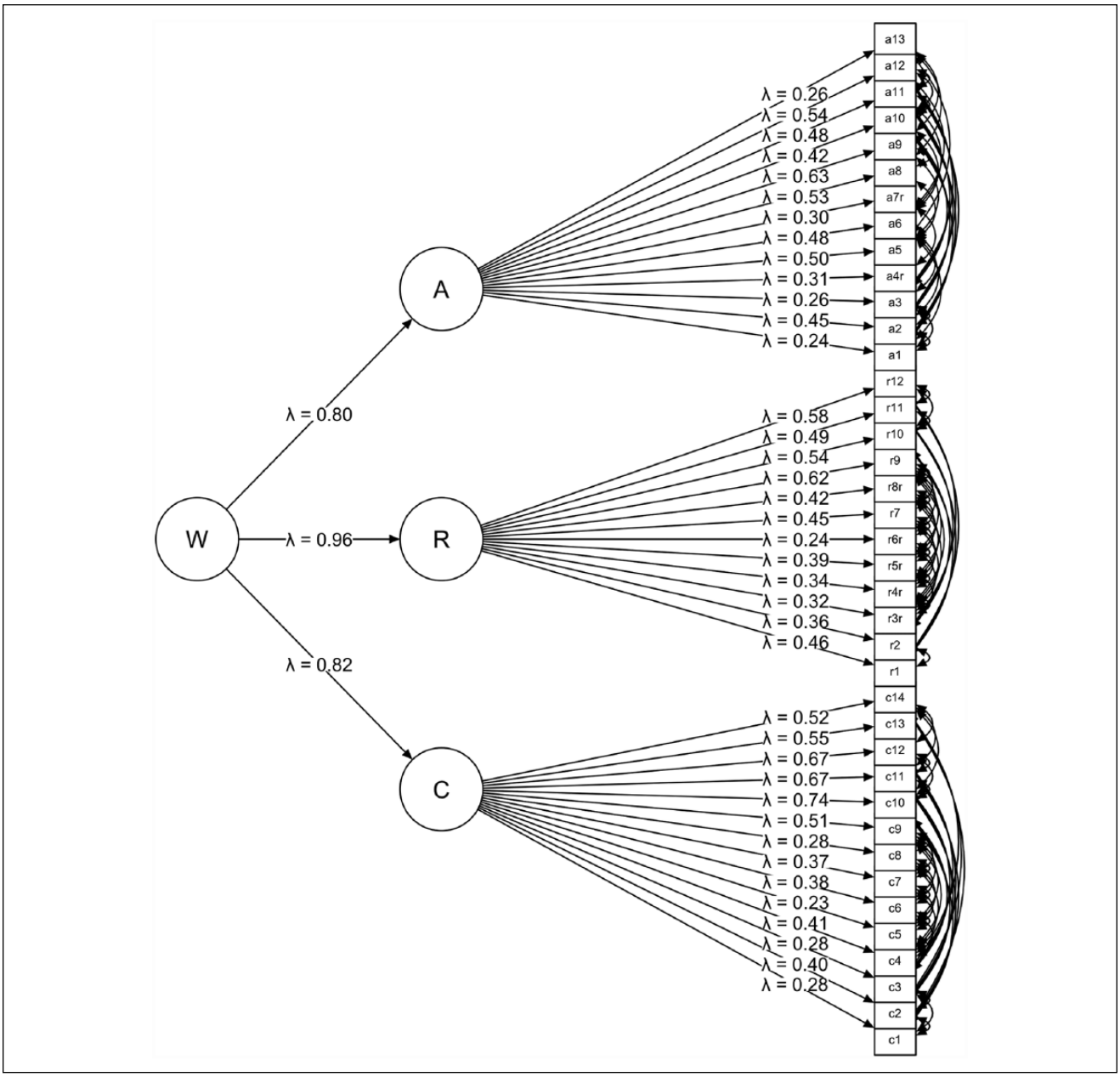

Figure 1. 3D-WS higher order measurement model with freed residuals including estimates of standardized factor loadings.
Note. 3D-WS = Three-Dimensional Wisdom Scale. W = Wisdom factor; C = Cognitive factor; R = Reflective factor; A = Affective factor. Model fitted in the training data set (*N* = 775).

why they turned out that way" reflecting the ability and willingness to understand a situation or phenomenon thoroughly; c9—"A problem has little attraction for me if I don't think it has a solution" indicating acknowledgment of ambiguity, complexity, and uncertainty in life; and c13—"I am hesitant about making important decisions after thinking about them" indicating the ability to make important decisions despite life's unpredictability and uncertainties. For the Reflective subscale, the chosen items were r10—"When I look back on what has happened to me, I can't help feeling resentful"; r12—"I either get very angry or depressed if things go wrong" suggesting absence of subjectivity and projections; r8r—"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 (reversed)"; and r9—"Sometimes I get so charged up emotionally that I am unable to consider many ways of dealing with my problems" indicating the ability and willingness to look at phenomena and events from different perspectives. For the Affective subscale, the chosen items were a4r—"I can be

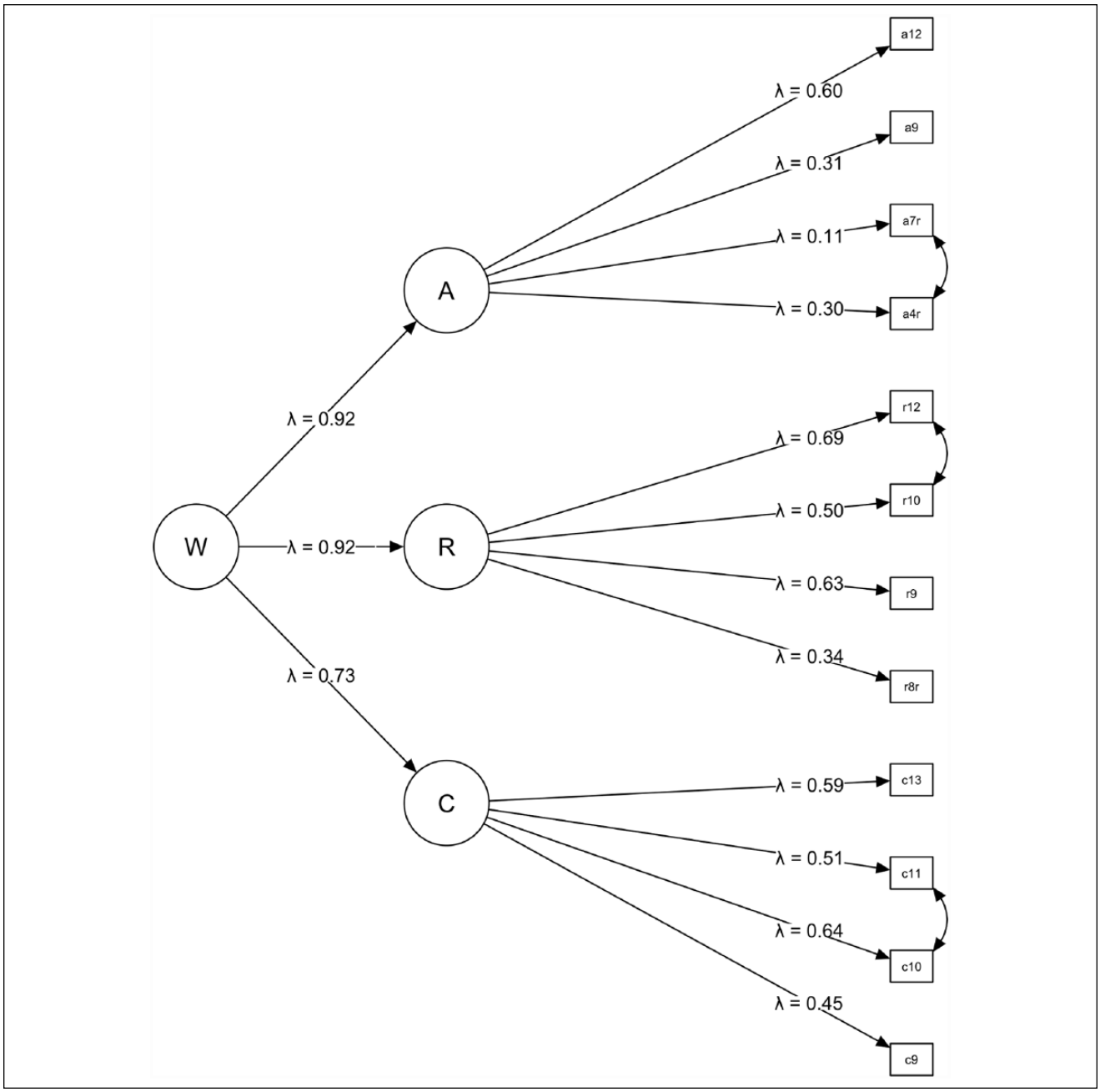

Figure 2. 3D-WS-12 higher order measurement model with freed residuals including estimates of standardized factor loadings.
Note. 3D-WS-12 = 12-Item Abbreviated Three-Dimensional Wisdom Scale. W = Wisdom factor; C = Cognitive factor; R = Reflective factor; A = Affective factor. Model fitted in the validation data set (N = 771). The residual path between r8r and r9 was not included in the model for the sake of identification.

comfortable with all kinds of people (reversed)"; a7r—"Sometimes I feel a real compassion for everyone (reversed)" indicating the presence of positive and caring emotions toward others; a12—"I'm easily irritated by people who argue with me" indicating absence of indifferent or negative emotions toward others; and a9—"I don't like to get involved in listening to another person's troubles" reflecting motivation to nurture the well-being of others.

We next fitted the higher order factor model with freed residuals to the 3D-WS-12 in the validation data set. The model provided adequate fit for the data: $\chi^2(48) = 182.22$, CFI = .937, TLI = .913, RMSEA = .060. Parameter estimates (standardized loadings) for this model are reported in Figure 2. Figure 3 shows the percentage of variance in 3D-WS-12 total scores explained by general Wisdom, specific Cognitive, Reflective, and Affective factors, and

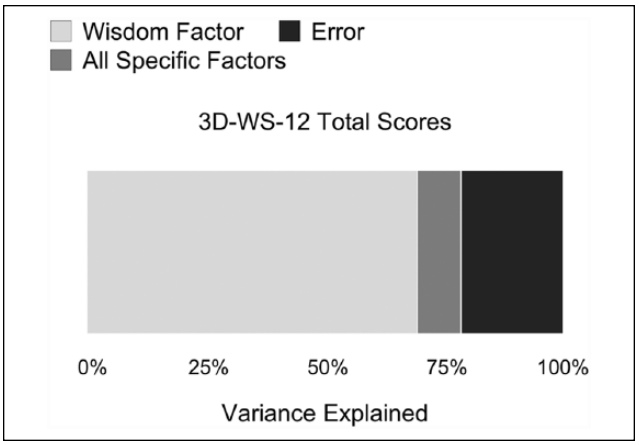

Figure 3. Variance in 3D-WS-12 total scores explained by general Wisdom, the combination of all specific Cognitive, Reflective, and Affective factors, and error.
Note. 3D-WS-12 = Abbreviated Three-Dimensional Wisdom Scale.

random error. It can be seen that total scores are heavily dominated by the general Wisdom factor. Specifically, whereas Wisdom explained 69% of variance in 3D-WS-12 total scores (i.e., $\omega_h = .69$), the combination of all specific factors only explained 9%.

Table 3 reports α coefficients for 3D-WS and 3D-WS-12 Wisdom total scores. Coefficients were calculated for the complete sample as well as separately in participants younger than 65 years and in those aged 65 years or older. Reliability estimates using subscales as indicators fall within the range of .69 to .70 for the 3D-WS and .62 to .64 for the 3D-WS-12. Reliability estimates using items as indicators consistently equal .86 for the 3D-WS and fall within the range of .73 to .74 for the 3D-WS-12. 3D-WS-12 total scores are less reliable than 3D-WS total scores, an inevitable trade-off of using fewer items. That is, using fewer items to compute 3D-WS-12 subscale scores results in increased error variance, decreased correlations between subscales (see Table 4), and decreased reliability in estimating higher order Wisdom. However, given that the scale's length was cut by two thirds, the drop in reliability in moving from the 3D-WS to the 3D-WS-12 is comparatively small. There is also little evidence that 3D-WS and 3D-WS-12 scores meaningfully differ in terms of reliability between younger and older adults.

Table 4 reports correlations between 3D-WS and 3D-WS-12 total and subscale scores. The correlation between 3D-WS and 3D-WS-12 Wisdom total scores, corrected for item overlap, was very high ($r = .70$). The correlations of the three dimensions of the 3D-WS with their respective counterparts in the 3D-WS-12, also corrected for item overlap, remained high, ranging from .52 to .57.

Table 5 reports correlations between 3D-WS and 3D-WS-12 total scores and mental health and well-being constructs known to be associated with wisdom. Consistent with prior theory, total scores from both scales have negative correlations with Cognitive Failures Questionnaire, Brief Symptom Inventory Anxiety Scale, and Patient Health Questionnaire Depression Module scores, as well as positive correlations with Medical Outcomes Study 36-Item Short-Form Health Survey Mental Component, self-ratings of successful aging, Personal Mastery Scale, Connor–Davidson Resilience Scale, CES-D Happiness Scale, and Satisfaction with Life Scale scores.

For both the 3D-WS and the 3D-WS-12, models that regressed standardized Wisdom total scores onto age using linear and quadratic terms outperformed models that only included linear terms (both $p < .001$). Models that additionally included cubic terms did not significantly outperform models that only included linear and quadratic terms. Predicted standardized Wisdom total scores by age, along with 50% prediction intervals, are shown for both versions of the 3D-WS in Figure 4. Results for the 3D-WS ($b_{.linear} = 0.0308$, $p < .001$; and $b_{.quadratic} = -0.0003$, $p < .001$; $R^2 = .03$) and the 3D-WS-12 ($b_{.linear} = 0.0348$, $p < .001$; and $b_{.quadratic} = -0.0003$, $p < .001$; $R^2 = .02$) both suggest that Wisdom increases along with age until reaching a maximum in the early to mid-50s (age 51 for the 3D-WS and age 56 for the 3D-WS-12) and then decreases.

Discussion

Items for a newly developed 3D-WS-12 were chosen balancing concerns for reliability, internal structure, and content representativeness. Overall, results suggest that the 3D-WS-12 can provide efficient, reliable, and valid assessment of Wisdom. The 3D-WS-12 meets our aims to develop a scale that can be administered quickly within the context of epidemiological surveys, minimizes administration burden, and focuses on the higher order construct of wisdom.

In developing the 3D-WS-12, we recognized that brevity would come at the expense of precision. With respect to direct comparisons of the 3D-WS and 3D-WS-12 Wisdom total scores (Table 3), the former maintain superior reliability. That 3D-WS-12 total scores have worse reliability is a consequence of reducing the original scale's length. However, at less than a third of the 3D-WS's total items, the 3D-WS-12 maintains moderate precision while minimizing test burden and fatigue. Reliability estimates for Wisdom total scores on the 3D-WS and the 3D-WS-12 are generally on the low end of acceptable precision (though perhaps not for screening scales [see Almeida & Almeida, 1999]). This reflects, in part, our goal to measure the higher order construct of Wisdom. Reliability coefficients based on the three subscales were lower than reliability coefficients based on the 39 (or 12) items. In fact, subscale based reliability estimates for both the 3D-WS and 3D-WS-12 might be considered robust given that they are derived from just three

Table 3. Reliability Estimates for Measures of Wisdom Using the Full-Length (3D-WS) or Abbreviated (3D-WS-12) Three-Dimensional Wisdom Scales.

	3D-WS			3D-WS-12		
	Full	Older	Younger	Full	Older	Younger
N	1,546	865	681	1,546	865	681
α items	.86	.86	.86	.73	.73	.74
α subscales	.69	.70	.69	.63	.64	.62

Note. Full = all age groups; Younger = aged 64 years and younger; Older = aged 65 years and older; α items = total score alpha coefficient computed using items as indicators; α subscales = total score alpha coefficient computed using subscales as indicators.

Table 4. Correlations Among Full-Length (3D-WS) and Abbreviated (3D-WS-12) Three-Dimensional Wisdom Scale Scores.

	3D-WS				3D-WS-12			
Scale	Total	Cognitive	Reflective	Affective	Total	Cognitive	Reflective	Affective
3D-WS								
Total	1.00							
Cognitive	.80	1.00						
Reflective	.79	.43	1.00					
Affective	.77	.38	.47	1.00				
3D-WS-12								
Total	.70	.49	.59	.50	1.00			
Cognitive	.54	.52	.35	.31	.80	1.00		
Reflective	.52	.29	.57	.33	.78	.42	1.00	
Affective	.54	.28	.43	.53	.67	.32	.32	1.00

Note. Correlations between 3D-WS and 3D-WS-12 total and subscale scales are corrected for item overlap.

Table 5. Correlations [95% Confidence Intervals] Among Full-Length (3D-WS) and Abbreviated (3D-WS-12) Three-Dimensional Wisdom Scale Total Scores and Other Relevant Measures.

Scale	3D-WS total	3D-WS-12 total
Cognitive Failures Questionnaire	–0.31 [–0.36, –0.26]	–0.38 [–0.43, –0.33]
Brief Symptom Inventory Anxiety Scale	–0.27 [–0.31, –0.22]	–0.34 [–0.38, –0.29]
Patient Health Questionnaire Depression Module	–0.32 [–0.37, –0.28]	–0.37 [–0.42, –0.33]
SF-36 Mental Component Score	0.26 [0.22, 0.31]	0.35 [0.31, 0.40]
Self-Rating of Successful Aging	0.24 [0.19, 0.28]	0.27 [0.22, 0.31]
Personal Mastery Scale	0.51 [0.47, 0.55]	0.52 [0.48, 0.55]
Connor-Davidson Resilience Scale (10-item)	0.48 [0.44, 0.52]	0.55 [0.51, 0.59]
CES-D Happiness Scale Total	0.35 [0.31, 0.39]	0.38 [0.33, 0.42]
Satisfaction with Life Scale	0.30 [0.26, 0.35]	0.33 [0.29, 0.38]

indicators. Future studies might consider whether combining additional lower order domains of wisdom improves precision in measurements of the higher order construct.

Test users should avoid direct interpretation of 3D-WS-12 dimension scores (i.e., Cognitive, Reflective, or Affective subscales) as stand-alone measures. These scores are likely to be highly unreliable. However, the dimensions may be useful for exploratory analyses and hypothesis generation. 3D-WS-12 total scores were heavily dominated by the general Wisdom factor (see Figure 3). Approximately 69% of 3D-WS-12 total score variance was due to Wisdom, approximately 9% was due to all specific factors, and approximately 21% was due to error. The results suggest that 3D-WS-12 total scores primarily reflect general Wisdom rather than variance uniquely associated with Cognitive, Reflective, and Affective dimensions of the 3D-WS-12.

The 3D-WS and 3D-WS-12 have similar content representativeness. Endorsement of Cognitive items (i.e., non-wisdom) would suggest an individual prone to narrow or rigid thinking. Endorsement of Reflective items would

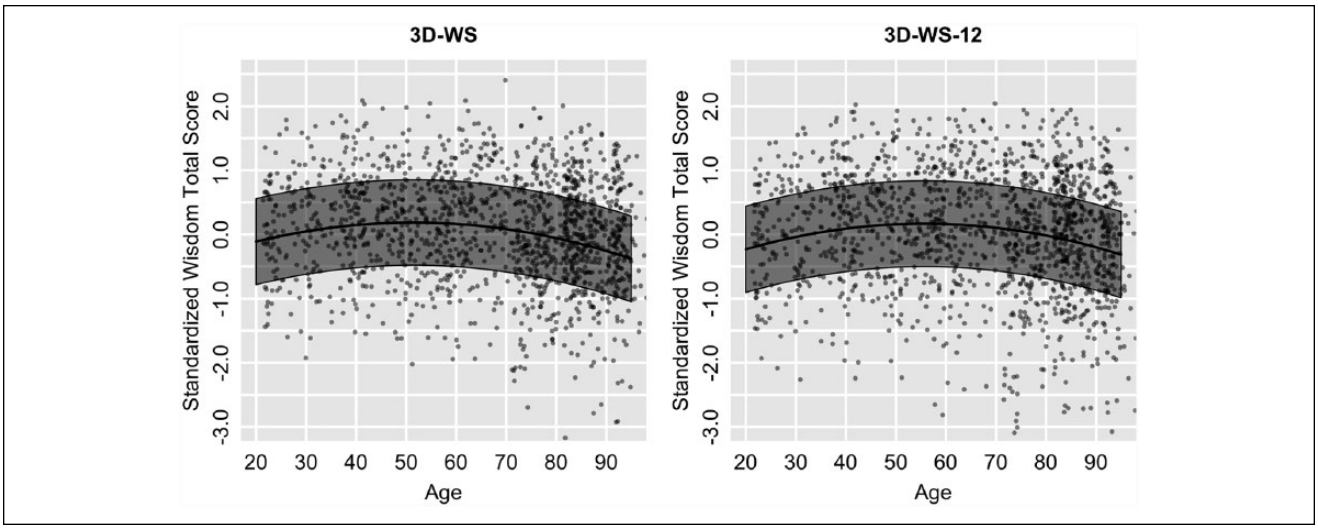

Figure 4. Predicted values (solid black lines) with 50% prediction intervals (shaded regions) for standardized Three-Dimensional Wisdom Scale (3D-WS) and 3D-WS total scores regressed onto age.

suggest the absence of perspective taking and the presence of subjectivity and projections. Affective items capture noncompassionate and nonaltruistic thoughts and behaviors toward others. Further supporting the validity of the newly developed abbreviated form, 3D-WS and 3D-WS-12 total scores were highly correlated, demonstrated similar and expected associations with measures of mental health and general well-being (e.g., Ardelt, 1997, 2000, 2003; Bergsma & Ardelt, 2012; Jeste et al., 2013; Le, 2011; Roháriková et al., 2013; Webster et al., 2014; Zacher et al., 2013), and demonstrated an expected association with age (Webster et al., 2014; Worthy, Gorlick, Pacheco, Schnyer, & Maddox, 2011). Although these analyses cannot confirm the ultimate construct validity of the 3D-WS-12 as a measure of wisdom, they do suggest that the same construct is being measured by the abbreviated and full-length versions of the scale. Interestingly, we found that wisdom increased with age until reaching a maximum in the early to mid-50s and then decreases. Webster et al. (2014) also found a nonlinear association using a different measure of wisdom.

Limitations of the present study include that the results have not been validated in a new sample and that item selection was based on confirmation of an existing theory that was not directly tested against alternative models of wisdom (e.g., Taylor et al., 2011). Latent variable psychometric techniques, such as CFA, are most useful when based on well-established models with strong theoretical properties. To the extent that the model used in the current study is incorrect or incomplete, interpretations of parameters may be incorrect. Glück et al. (2013) compared several models and measures of wisdom, and one study directly compared the 3D-WS with the SAWS (Taylor et al., 2011). Unlike the 3D-WS, which was designed to assess the cognitive, reflective, and compassionate (affective) dimensions of wisdom in older adults, the SAWS was developed to assess wisdom across the adult age span and designed to measure five components of wisdom that were identified by an extensive literature review and then factor analyzed (emotional regulation, humor, critical life experiences, reminiscence and life reflection, and openness to experience). When comparing the 3D-WS and SAWS, Taylor et al. (2011) found that the 3D-WS was associated with social desirability. However, Ardelt (2003) also examined this relationship and found no association between the scale and social desirability. Furthermore, Ardelt (2011) argued that components included in the SAWS may measure predictors and consequences of wisdom rather than wisdom itself. The 3D-WS and SAWS demonstrated an association that was medium in magnitude ($r = .33$), suggesting that the two measures share a common feature, but are assessing somewhat different aspects of wisdom (Taylor et al., 2011). In particular, the 3D-WS is positively correlated with the openness, emotional regulation, and humor subscales of the SAWS but not with the critical life experiences and reminiscence/life reflection subscales (Ardelt, 2011; Glück et al., 2013). Future studies may want to consider alternative or broader conceptualizations of wisdom in scale development and refinement (see Jeste et al., 2010; Jeste & Vahia, 2008). Finally, the sample was relatively homogeneous in terms of ethnicity and education, which may limit the generalizability of results.[2] However, the sample was randomly recruited, large, had a wide age range, and came from community-based adults, which, presumably, improved parameter estimation and item selection by drawing from a sample with heterogeneous levels of wisdom.

Like many existing measures designed to assess wisdom, the 3D-WS and 3D-WS-12 are based on self-report. Wisdom and its subcomponents could hypothetically be assessed

using self-report, informant-based, or performance-based measures, although each method has its strengths and weaknesses. Self-report measures may be practical and relatively simple to administer but may not best capture certain aspects of wisdom. For instance, given that a subcomponent of wisdom involves acknowledgment of uncertainty and limits, including the limits of one's own knowledge, a wiser individual may score lower than a less wise person on measures asking them to reflect on items related to their own level of wisdom. This is the reason why many of the items of the 3D-WS are worded negatively, so that endorsement reflects an absence of wisdom. Informant-based measures also have limitations as well, including the biases of the individual completing the instrument. Approaches based on multiple methods of assessment—ideally to include behavioral measures—are optimal when measuring constructs that are intrinsically positive. Measurements acquired over long periods of time, as might be obtained through ambulatory assessment methods, would also likely improve validity.

The 3D-WS-12 might prove useful in assessing populations that have difficulty sustaining attention (e.g., individuals with cognitive impairment) or are susceptible to fatigue (e.g., individuals with medical problems), epidemiological surveys that measure several constructs, and clinical settings where time is limited. We hope that by creating an abbreviated scale, researchers will be encouraged to include the 3D-WS-12 in their work, which will help establish the scale's validity and practical value in mental health research and practice.

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Notes

1. We also considered a nine-item version of the 3D-WS with three items per subscale. However, the nine-item version's reliability and content representativeness was felt to be inadequate.
2. A measurement invariance study of 3D-WS-12 items was conducted to determine whether loadings, thresholds, and unique variances could be constrained between different groups based on education and race. The results (see Supplementary Material, available at http://asm.sagepub.com/content/by/supplemental-data) suggest that there is no strong evidence of noninvariant loadings, thresholds, and unique variances associated with education or race.

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