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## Is spirituality a component of wisdom? Study of 1,786 adults using expanded San Diego Wisdom Scale (Jeste-Thomas Wisdom Index)

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## ABSTRACT

**Objective:** Wisdom has gained increasing interest among researchers as a personality trait relevant to well-being and mental health. We previously reported development of a new 24-item San Diego Wisdom Scale (SD-WISE), with good to excellent psychometric properties, comprised of six subscales: pro-social behaviors, emotional regulation, self-reflection (insight), tolerance for divergent values (acceptance of uncertainty), decisiveness, and social advising. There is controversy about whether spirituality is a marker of wisdom. The present cross-sectional study sought to address that question by developing a new SD-WISE subscale of spirituality and examining its associations with various relevant measures.

**Methods:** Data were collected from a national-level sample of 1,786 community-dwelling adults age 20–82 years, as part of an Amazon M-Turk cohort. Participants completed the 24-item SD-WISE along with several subscales of a commonly used Brief Multidimensional Measure of Religiousness/Spirituality, along with validated scales for well-being, resilience, happiness, depression, anxiety, loneliness, and social network.

**Results:** Using latent variable models, we developed a Spirituality subscale, which demonstrated acceptable psychometric properties including a unidimensional factor structure and good reliability. Spirituality correlated positively with age and was higher in women than in men. The expanded 28-item, 7-subscale SD-WISE total score (called the Jeste-Thomas Wisdom Index or JTWI) demonstrated acceptable psychometric properties. The Spirituality subscale was positively correlated with good mental health and well-being, and negatively correlated with poor mental health. However, compared to other components of wisdom, the Spirituality factor showed weaker (i.e., small-to-medium vs. medium-to-large) association with the SD-WISE higher-order Wisdom factor (JTWI).

**Conclusion:** Similar to other components as well as overall wisdom, spirituality is significantly associated with better mental health and well-being, and may add to the predictive utility of the total wisdom score. Spirituality is, however, a weaker contributor to overall wisdom than components like pro-social behaviors and emotional regulation. Longitudinal studies of larger and more diverse samples are needed to explore mediation effects of these constructs on well-being and health.

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## 1. Introduction

Wisdom has been discussed in humanities, specifically in religious and philosophical literature, since ancient times. However, it has been receiving increasing attention as a topic of scientific research during the past five decades (Ardelt, 2000; Clayton and Birren, 1980; Jeste and Lee, 2019; Smith and Baltes, 1990; Sternberg and Jordan, 2005). Wisdom is a holistic, multidimensional personality trait associated with greater well-being, satisfaction with life, and overall better health (Ardelt, 1997; Ardelt and Jeste, 2018; Etezadi and Pushkar, 2013; Grossmann et al., 2020; Jeste and Lee, 2019). Based on a review of empirically based definitions of wisdom published in peer-reviewed journals, we identified six most commonly included components of wisdom: (1) pro-social behaviors - e.g., empathy, compassion, altruism, and a sense of fairness, (2) emotional regulation, (3) self-reflection or insight, (4) value relativism or acceptance of divergent perspectives, (5) decisiveness or ability to make timely and effective decisions, and (6) general knowledge of life and social decision making. Separately, we found that definitions of wisdom over centuries and across cultural and geographic boundaries shared surprising similarities, suggesting a unique biological construct (Jeste and Vahia, 2008; Meeks and Jeste, 2009). The components listed above form the basis of a putative neurocircuitry model of wisdom involving prefrontal cortex and limbic striatum (Jeste and Lee, 2019).

We developed a new 24-item scale (San Diego Wisdom Scale or SD-WISE; Thomas, M.L. et al. (2019)), with six 4-item subscales, each assessing the above-mentioned content domains with postulated neurobiological basis. Results suggested that this scale successfully measured five of the six targeted domains. The sixth—general knowledge of life and social decision making, was only partially recovered—and based on item content, was instead labeled social advising. As hypothesized, the lower-order factors indicated a single higher-order wisdom factor, reflecting individual differences in overall wisdom. SD-WISE scores demonstrated good internal consistency reliability and good validity as indicated by their convergent and discriminant associations. The SD-WISE has since been translated into several languages and is being used in a number of ongoing clinical and neurobiological studies. A recent randomized controlled trial showed that a manualized behavioral group intervention in five senior housing communities in California, Illinois, and Arizona produced significant increase in SD-WISE total score as well as improvement on validated scales for resilience and perceived stress (Treichler et al., 2020).

Questions remain, however, as to whether the SD-WISE fully captures all the relevant domains of wisdom. In particular, there are uncertainties about spirituality as a component of wisdom. Spirituality has been defined in various ways. Spirituality was an integral component of wisdom in religious scriptures (Achenbaum and Orwoll, 1991; Jeste and Vahia, 2008), which sometimes referred to it as reformation in the image of God. However, spirituality is different from religiosity, which typically relates to organized or cultural systems of belief (Blazer and Meador, 2009). Modern definitions have considered spirituality as a subjective or psychological construct related to belief in the supernatural or a search for meaning in life. de Jager Meezenbroek et al. (2012) defined spirituality as striving for and experience of connection with oneself, connectedness with others and the nature, and connectedness with the transcendent; thus, connectedness is an essential element of spirituality.

We previously conducted a Delphi or Rand Panel study to examine if there was a consensus among 30 international wisdom experts on similarities and differences between wisdom and either intelligence or spirituality, using a survey questionnaire comprised of 53 statements related to those constructs (Jeste et al., 2010). According to the experts, wisdom differed from intelligence on 46 of these items, whereas wisdom differed from spirituality on 31 items. The items that were common to wisdom and spirituality included pro-social behaviors like compassion and altruism, humility, gratitude, self-compassion, mindfulness, reverence for nature, nonviolence, ethical conduct, calmness, life satisfaction,

and general sense of well-being. On the other hand, realism, value relativism, learning from experience, and acceptance of uncertainty were thought to be more characteristic of wisdom than spirituality, whereas a sense of higher power, connection with a wider universe, and nonattachment to the material world were believed to be characteristics of spirituality rather than of wisdom. In a later review of the literature on wisdom definitions, we found 23 definitions that included one or more components of wisdom (Bangen et al., 2013). While 21 of them included pro-social attitudes and behaviors, only 5 included spirituality. Thus, most researchers tend to define and operationalize wisdom in a more secular and broader fashion than spirituality (Baltes and Staudinger, 2000; Sternberg, 2003; Webster, 2003).

At the same time, there is considerable literature on spirituality that is not directly related to wisdom, but reports strong associations with greater well-being and mental health (Koenig et al., 2001). A spiritual orientation can help people to cope with the consequences of a serious disease, thereby enhancing personal wellness (de Jager Meezenbroek et al., 2012). Religious and/or spiritual commitment also provides a sense of meaning to life (Koenig, 2007). Thus, both wisdom as a whole and spirituality are associated with better mental health and well-being.

There is also a growing body of research on neurotheology or spiritual neuroscience that seeks to understand the neurobiology of spirituality (Comings, 2010; Miller et al., 2019; Newberg, 2018). Neuroimaging techniques including functional magnetic resonance imaging, single photon emission computed tomography, and positron emission tomography have shown that people who practice meditation or who pray regularly over many years exhibit greater activity and white matter integrity in the prefrontal lobe regions associated with attention and reward (Newberg, 2018). Miller et al. (2019) investigated neural correlates of personally meaningful spiritual experiences as compared with stressful and neutral-relaxing experiences. Reduced activity was observed during spiritual experiences in the left inferior parietal lobule, medial thalamus, and caudate, regions associated with sensory and emotional processing. Such studies face challenges for scientific methodology including determining the most appropriate objective neuroimaging and physiological parameters, and correlating them with subjective measures that help capture states of spiritual significance (Koenigs et al., 2007). Also, given other study limitations such as small sample sizes, no definitive conclusions about neurobiology of spirituality can be drawn at this time.

There is, however, impressive literature on interventions to enhance components of wisdom including spirituality. In a recent meta-analysis of randomized controlled trials (RCTs) to increase levels of individual components of wisdom, we found 57 studies that focused on pro-social behaviors, emotional regulation, and spirituality (Lee et al., 2020). The 15 RCTs on spirituality reported medium to large effect size increase in spirituality in people with physical or psychiatric illnesses, with several also finding improvement in well-being and mental health. Thus, both wisdom and spirituality seem to have similar desirable impact on health and behavior.

The goal of the present cross-sectional study was to develop a new subscale of spirituality and evaluate if and how that subscale relates to well-being and mental health as well as to the total score and previously identified subscale scores of the SD-WISE. We hypothesized that (1) the new Spirituality subscale score would correlate significantly with the existing 24-item 6-factor SD-WISE subscale and total scores, convergent and discriminant measures, and mental health and general well-being measures, (2) adding the new Spirituality subscale to the existing 6-factor SD-WISE would not negatively impact the measurement model, and (3) the Spirituality subscale would strongly load onto the higher-order Wisdom factor on the expanded 7-factor SD-WISE. This expanded total 28-item 7-factor SD-WISE score that includes the Spirituality subscale will be called Jeste-Thomas Wisdom Index (JTWI) to distinguish it from the original 24-item 6-factor SD-WISE total score, which has been in use in a number of completed and ongoing studies.

## 2. Methods

### 2.1. Design and sample

Participants included 2,093 people, aged 20–82 years, recruited and surveyed through the online crowdsourcing platform Amazon Mechanical Turk (AMT). AMT has been used in a number of large cross-sectional studies of various health measures (Buhmester et al., 2011; Litman et al., 2014; Mason and Suri, 2011; Nguyen et al., in press; Sprouse, 2011). Our Inclusion criteria were: 1)  $\geq 20$  years old, 2) English-speaking, 3) resident of the United States, and 4) M-Turk Human Intelligence Task (HIT) approval rating  $\geq 90\%$ , indicating that the respondent's previous HITs had been approved by requestors at least 90% of the time. AMT has been shown to produce high quality data; however, a small proportion of responses could be invalid due to inattentiveness or other reasons. Therefore, to further ensure data validity, we applied a data cleaning procedure to help identify and remove participants who provided impossible or highly implausible responses to specific survey questions, consistent with the methods employed in a number of published AMT studies by various investigators (Coppock, 2018; Hauser and Schwarz, 2015; Mortensen and Hughes, 2018; Nguyen et al., in press; Peer et al., 2013). Specifically, we excluded participants who 1) completed the survey in  $<390$  s ( $N = 297$ ), 2) reported a height and weight resulting in a BMI  $<16$  ( $N = 12$ ), 3) reported their height at  $<3$  feet or  $>7$  feet ( $n = 3$ ), and/or 4) reported living with  $\geq 20$  people in their household ( $n = 3$ ). Please note that these were not *a priori* exclusion criteria, but were used post-hoc on finding a small minority of surveys that included responses which were far beyond the reported range in this population and thus appeared to be extremely unlikely to be valid, based on other participants' responses. Thus, data were excluded from a total of 307 respondents, resulting in a final sample of 1,786 participants whose data were included in the current analysis.

The subjects' mean age was 46.3 years, with SD 14.6; 55% were women; 77% were Caucasian, 9% Hispanic/Latinx, 7% African American, 4% Asian American, and 3% belonged to another race/ethnicity. In terms of education, 44% subjects had a high school diploma, 41% had a bachelor's degree, and 14% had masters or doctorate. About half (51%) were married or cohabitating.

The study was approved by the UCSD Human Research Protections Program; with a waiver of signed consent under the provisions of 45 CFR 46.xxx for minimal risk survey research.

**Convergent and discriminant measures:** In addition to the socio-demographic characteristics and 24-item SD-WISE, the participants completed several subscales (Daily Spirituality Experiences, Values/Beliefs, Forgiveness, Overall Religiosity, and Meaning) of the Brief Multidimensional Measure of Religiousness/Spirituality or BMMRS (Fetzer Institute, 1999) as measures of convergent validity.

**Mental health and general well-being measures:** These included the PHQ-2 or 2-item Patient Health Questionnaire Depression Module (Kroenke et al., 2003), the Medical Outcomes Study 12-Item Short Form Health Survey or SF-12 Physical and Mental Components (Ware et al., 1996, 1998; Ware and Sherbourne, 1992), the 2-item Connor-Davidson Resilience Scale (Campbell-Sills and Stein, 2007), the Center for Epidemiologic Studies Depression Scale (CES-D) Happiness Factor (Fowler and Christakis, 2008), 2-item Generalized Anxiety Disorder Scale (GAD-2; Kroenke et al. (2007)), 4-item version of the UCLA Loneliness Scale (UCLA-4) for loneliness (Russell et al., 1980), Duke Social Interaction Subscale (Koenig et al., 1993), and Lubben Social Network Scale (Lubben et al., 2006).

### 2.2. Analyses

**Development of Spirituality Sub-Scale:** Candidate items were created by first reviewing 131 items from 6 commonly used spirituality scales: Multidimensional Inventory for Religious/Spiritual Well-Being (Unterhiner et al., 2012), Spirituality Questionnaire (Hardt et al., 2012),

Spirituality Index of Well-Being (Daaleman and Frey, 2004), Spirituality Assessment Scale (Howden, 1994), Spirituality Scale (Delaney, 2005), and Spiritual Transcendence Scale (Piedmont, 1999). From these, 18 items were selected for further consideration by consensus, based on content review. Additionally, we preferred items that did not use complex words and idiosyncratic jargon, double negatives, two questions as one, and leading or presumptive questions. Next, small edits were made to most items to simplify wording. Finally, items with significant content overlap were eliminated from consideration and a final set of 14 candidate items was chosen, based on group consensus (Table 1).

Latent variable models were used to select the final items. To begin, the sample of 1,786 participants was split into two, using the random sample function in SPSS, creating a training dataset ( $N = 890$ ) and a validation dataset ( $N = 896$ ). Beginning first with the training sample, we used the R psych package (Revelle, 2017) and parallel analysis to determine the number of latent factors measured by the 14 candidate items. We assumed factors would represent subdomains based on similar content (i.e., 'testlets'). Our goal was to avoid subdomains so that the Spirituality scale would be unidimensional. Therefore, using an exploratory Schmid-Leiman rotation, we fitted an exploratory bifactor solution to the data (Mulaik, 2009). Finally, from each subdomain (specific factor) within the bifactor solution, we chose one item for the final Spirituality subscale. Items were selected based on content validity, but with a preference toward larger factor loadings. Finally, using the R lavaan package (Rosseel, 2012), we fitted a confirmatory factor analysis (CFA) model to data from the selected items in order to confirm unidimensional factor structure (Brown, 2015). Parameters were fitted using maximum likelihood estimation with robust standard errors and a scaled test statistic (MLR). Model fit was based on comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA) statistics. CFI and TLI values of approximately 0.95 or greater and RMSEA values of approximately 0.06 and lower are typically considered excellent; CFI and TLI values above 0.90 and RMSEA values below 0.08 are considered adequate (Brown, 2015; Hu and Bentler, 1999). CFA was performed twice, using both the training sample and the validation sample. Final parameter estimates are for the full sample.

**Dimensionality of Wisdom Scale:** Next, we aimed to determine whether: (A) adding the new 4-item Spirituality subscale to the existing 6-factor SD-WISE negatively impacted model fit; and (B) the Spirituality subscale strongly loaded onto the higher-order Wisdom factor derived from the expanded 7-factor SD-WISE (JTWI). To address both these questions, we fitted CFA models to the data using the factor structure for the SD-WISE that was previously reported from an independent/nonoverlapping dataset (Thomas, M.Lee et al., 2019). That is, we attempted to replicate our original 6-factor higher-order model. In the

**Table 1**

List of 14 candidate items for spirituality subscale.

#	Item
sprtlty01	I believe in a higher power.
sprtlty02	My faith helps me cope with problems in my life.
<b>sprtlty03r</b>	<b>There is no existence of the soul after death. (reverse scored)</b>
sprtlty04	I have had experiences that made the purpose of life clear to me.
<b>sprtlty05</b>	<b>My spiritual belief gives me inner strength.</b>
sprtlty06r	I trust only observations and facts as a means of finding truth. (reverse scored)
sprtlty07	I believe there is a divine connection among all living beings.
sprtlty08r	Life has no meaning. (reverse scored)
sprtlty09r	I reject supernatural explanations for events. (reverse scored)
<b>sprtlty10</b>	<b>I feel that we are all connected on a higher level.</b>
sprtlty11	I think there is a larger plan to life.
sprtlty12	I believe that my life is intimately tied to all of humankind.
<b>sprtlty13r</b>	<b>There is no overall purpose to life. (reverse scored)</b>
sprtlty14	There is an order to the universe that transcends human knowledge.

Note: Bolded items were selected for the 4-item Spirituality subscale.

Scoring: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

model, SD-WISE items are indicators of the 6 aforementioned sub-factors, and all sub-factors are indicators of the general Wisdom factor. We compared model fit with and without the Spirituality factor, in order to determine whether adding the new subscale impacted model fit. Analyses were conducted both in the training dataset and in the validation dataset.

**Reliability:** We computed the internal consistency coefficient  $\alpha$ . Values of 0.70 and greater are generally considered acceptable (Haynes et al., 2011).

**Validity:** We examined correlations of the summed Spirituality item scores with SD-WISE subscale and total scores, BMMRS scores, and mental health and general well-being measures.

### 3. Results

**Spirituality Item Selection and Dimensionality:** The parallel analysis indicated that four factors should be retained (online Supplemental Fig. 1). Bifactor EFA loadings are presented in Supplemental Table 1. The four domain-specific factors comprised the following clusters of items listed in Table 1: Domain 1 – sprtly01, sprtly02, sprtly04, and sprtly05 (i.e., broadly related to belief and faith); Domain 2 – sprtly03r, sprtly04, sprtly06r, and sprtly09r (i.e., broadly related to metaphysical attitudes); Domain 3 – sprtly07, sprtly10, sprtly11, sprtly12, and sprtly14 (i.e., broadly related to connectedness); and Domain 4 – sprtly04, sprtly08r, and sprtly13r (i.e., broadly related to meaning and purpose). Using these results, we selected one item from each of the four domain-specific factors to create a four-item Spirituality subscale. Items were selected based on their loading onto the general spirituality factor (higher is better), diversity of response keying (we included 2 standard-coded items and 2 reverse-coded items), and content review (we selected items that were felt to most clearly represent the content validity of the four subdomains). The selected and non-selected items are shown in Table 1.

CFA indicated that a unidimensional model provided marginal fit for the 4-item Spirituality subscale in both the training dataset ( $\chi^2(2) = 22.367, p < .0001, CFI = 0.985, TLI = 0.956, RMSEA = 0.085$ ) and the validation dataset ( $\chi^2(2) = 34.596, p < .0001, CFI = 0.980, TLI = 0.940, RMSEA = 0.107$ ). However, model fit improved in both the training dataset ( $\chi^2(1) = 4.472, p = .034, CFI = 0.998, TLI = 0.987, RMSEA = 0.050$ ) and the validation dataset ( $\chi^2(1) = 6.997, p = .008, CFI = 0.995, TLI = 0.968, RMSEA = 0.072$ ) when we allowed the two reverse-coded items to correlate, suggesting the presence of a methods factor due to reverse coding.

**SD-WISE with Spirituality Model Fit:** Next, we fitted the previously validated 6-factor higher-order measurement model to the 24-item SD-

WISE data. Model fit was marginal to poor in the training dataset ( $\chi^2(246) = 1252.040, p < .0001, CFI = 0.858, TLI = 0.841, RMSEA = 0.058$ ). To improve the model fit, we added a methods factor that was designed to capture residual associations between all reverse-coded items (i.e., all reverse-coded items were allowed to load onto an orthogonal method factor). The model fit improved and was mostly acceptable after this adjustment ( $\chi^2(236) = 872.308, p < .0001, CFI = 0.912, TLI = 0.898, RMSEA = 0.047$ ). The model fit was similar after adding the Spirituality subscale and fitting a 7-factor higher-order measurement model to the 28-item SD-WISE data or JTWI ( $\chi^2(331) = 1188.230, p < .0001, CFI = 0.906, TLI = 0.893, RMSEA = 0.047$ ). This model also provided mostly acceptable fit in the validation dataset ( $\chi^2(331) = 1489.501, p < .0001, CFI = 0.878, TLI = 0.860, RMSEA = 0.054$ ).

Factor loadings for the 7-factor model fitted to the 28-item SD-WISE data (JTWI) combined from the training and validation datasets are shown in Fig. 1. As can be seen, the Spirituality subscale had the weakest factor loading onto Wisdom.

**Reliability:** The 4-item Spirituality subscale produced an  $\alpha$  coefficient of 0.74. The 7-subscale SD-WISE (JTWI) also produced an  $\alpha$  coefficient of 0.74. The 6-subscale SD-WISE produced an  $\alpha$  coefficient of 0.77.

**Demographic and Validity Correlations:** Table 2 presents demographic, health, and well-being correlations and Table 3 reports validity correlations. In Table 2, the Spirituality subscale has a medium-sized positive correlation with age, a medium-sized negative correlation with male sex, and no significant association with education. The scale also has small-to-medium-sized positive correlations with measures of positive mental health and well-being (CDRS-2, CES-D Happiness Scale, hopefulness, SF-12 Mental Component, Duke Social Interaction Subscale, and Lubben Social Network Scale) and has small-to-medium-sized negative correlations with measures of poor mental health (PHQ-2, GAD-2, and 4-item UCLA-Loneliness Scale). In Table 3, the Spirituality subscale has large correlations with all of the BMMRS subscales, which supports the convergent validity of the measure. Also, while the Spirituality subscale total score is significantly correlated with SD-WISE Total Score (JTWI), it produced the smallest correlation among the 7 subscales (i.e., medium versus large).

### 4. Discussion

The goal of the present study was to develop and validate a new subscale of spirituality and evaluate how it correlates with wisdom as measured by a previously validated 6-factor measure of wisdom (SD-WISE subscale and total scores). We also sought to assess how adding it

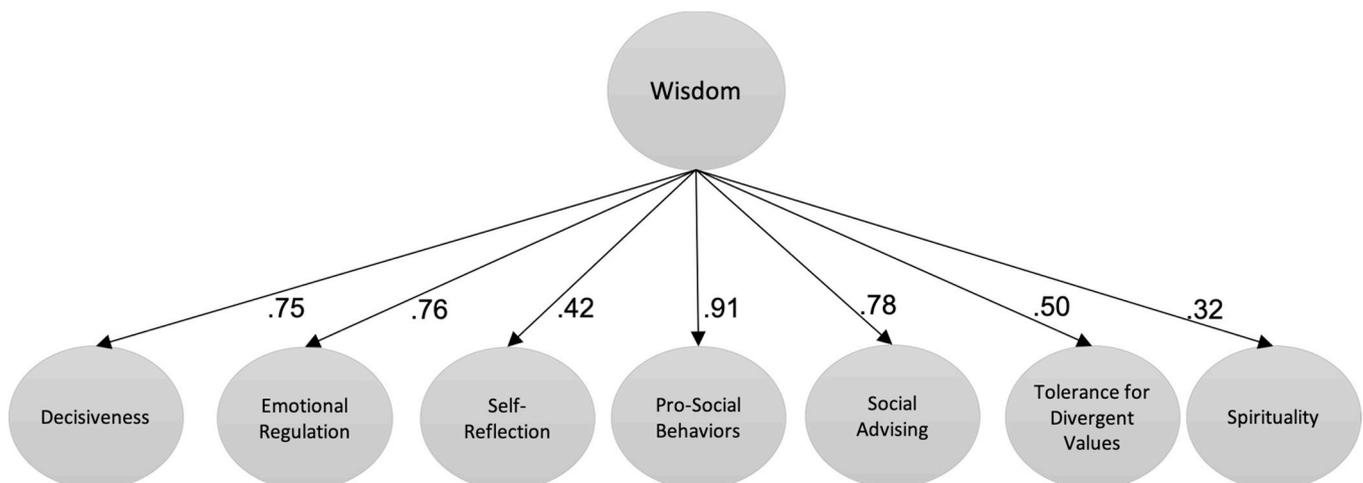


Fig. 1. Factor loadings between the general wisdom factor and the 7 subdomain factors.

**Table 2**  
Demographic, mental and physical health, and well being correlations<sup>a</sup> of SD-WISE scores.

	SD-WISE D		SD-WISE ER		SD-WISE SR		SD-WISE PSB		SD-WISE SA		SD-WISE TDV		SD-WISE SS		SD-WISE Total <sup>b</sup>	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
Age	0.213	<0.001	0.112	<0.001	-0.049	0.038	0.246	<0.001	0.047	0.045	0.014	0.544	0.270	<0.001	0.151	<0.001
Sex (Male)	0.021	0.375	0.082	<0.01	-0.037	0.122	-0.172	<0.001	-0.090	<0.001	-0.146	<0.001	-0.256	<0.001	-0.064	<0.01
Education	0.019	0.431	0.063	<0.01	0.032	0.176	-0.015	0.536	0.026	0.276	0.070	<0.01	-0.001	0.956	0.048	0.043
Depression (PHQ-2)	-0.458	<0.001	-0.532	<0.001	-0.126	<0.001	-0.413	<0.001	-0.267	<0.001	-0.117	<0.001	-0.224	<0.001	-0.488	<0.001
Resilience (CDRS-2)	0.491	<0.001	0.646	<0.001	0.189	<0.001	0.447	<0.001	0.419	<0.001	0.273	<0.001	0.239	<0.001	0.617	<0.001
Happiness (CES-DH)	0.477	<0.001	0.558	<0.001	0.125	<0.001	0.426	<0.001	0.372	<0.001	0.182	<0.001	0.317	<0.001	0.540	<0.001
Hopefulness (CES-D8)	0.398	<0.001	0.464	<0.001	0.108	<0.001	0.355	<0.001	0.318	<0.001	0.178	<0.001	0.320	<0.001	0.458	<0.001
Anxiety (GAD-2)	-0.486	<0.001	-0.582	<0.001	-0.058	0.014	-0.329	<0.001	-0.221	<0.001	-0.076	<0.01	-0.153	<0.001	-0.460	<0.001
Loneliness (UCLA-4)	-0.394	<0.001	-0.444	<0.001	-0.120	<0.001	-0.517	<0.001	-0.447	<0.001	-0.237	<0.001	-0.245	<0.001	-0.527	<0.001
Mental well-being (SF-12)	0.517	<0.001	0.605	<0.001	0.090	<0.001	0.414	<0.001	0.302	<0.001	0.122	<0.001	0.249	<0.001	0.527	<0.001
Physical well-being (SF-12)	0.052	0.030	0.101	<0.001	0.096	<0.001	0.056	0.017	0.058	0.014	0.055	<0.01	-0.101	<0.001	0.102	<0.001
Duke Social Interaction Subscale	0.188	<0.001	0.268	<0.001	0.024	0.312	0.283	<0.001	0.292	<0.001	0.186	<0.001	0.211	<0.001	0.300	<0.001
Lubben Social Network Scale	0.207	<0.001	0.290	<0.001	0.095	<0.001	0.368	<0.001	0.344	<0.001	0.226	<0.001	0.167	<0.001	0.365	<0.001

PHQ-2 = 2-item Patient Health Questionnaire Depression Module.

CDRS-2 = 2-item Connor-Davidson Resilience Scale.

CES-DH = Center for Epidemiologic Studies Depression Scale Happiness Factor.

CES-D8 = Center for Epidemiologic Studies Depression Scale Item #8 ("I felt hopeful about the future.").

GAD-2 = 2-item Generalized Anxiety Disorder Scale.

UCLA-4 = 4-item version of the UCLA Loneliness Scale.

SF-12 = Medical Outcomes Study 12-Item Short Form Health Survey.

SD-WISE = San Diego Wisdom Scale; D = Decisiveness; ER = Emotional Regulation; SR = Self-Reflection; PSB = Pro-Social Behaviors; SA = Social Advising; TDV = Tolerance for Divergent Values; SS = Spirituality.

<sup>a</sup> Pearson's Correlations.

<sup>b</sup> Jeste-Thomas Wisdom Index (Total 28-item, 7-component SD-WISE score).

**Table 3**  
Validity correlations<sup>b</sup>.

	SD-WISE D		SD-WISE ER		SD-WISE SR		SD-WISE PSB		SD-WISE SA		SD-WISE TDV		SD-WISE S		SD-WISE Total <sup>c</sup>	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
BMMRS Daily Spiritual Experiences <sup>a</sup>	-0.151	<0.001	-0.169	<0.001	-0.071	<0.01	-0.197	<0.001	-0.153	<0.001	-0.036	0.125	-0.728	<0.001	-0.192	<0.001
BMMRS Values/Beliefs <sup>a</sup>	-0.083	<0.001	-0.109	<0.001	-0.113	<0.001	-0.223	<0.001	-0.225	<0.001	-0.159	<0.001	-0.727	<0.001	-0.209	<0.001
BMMRS Forgiveness <sup>a</sup>	-0.191	<0.001	-0.218	<0.001	-0.074	<0.01	-0.244	<0.001	-0.205	<0.001	-0.084	<0.001	-0.733	<0.001	-0.249	<0.001
BMMRS Overall Religiosity <sup>a</sup>	-0.106	<0.001	-0.111	<0.001	-0.054	0.023	-0.185	<0.001	-0.163	<0.001	-0.039	0.101	-0.796	<0.001	-0.158	<0.001
BMMRS Meaning <sup>a</sup>	-0.148	<0.001	-0.176	<0.001	-0.08	<0.01	-0.208	<0.001	-0.236	<0.001	-0.09	<0.001	-0.787	<0.001	-0.226	<0.001
SD-WISE Decisiveness			0.611	<0.001	0.188	<0.001	0.481	<0.001	0.435	<0.001	0.180	<0.001	0.194	<0.001	0.750	<0.001
SD-WISE Emotional Regulation	0.611	<0.001			0.159	<0.001	0.464	<0.001	0.442	<0.001	0.276	<0.001	0.177	<0.001	0.757	<0.001
SD-WISE Self-Reflection (Insight)	0.188	<0.001	0.159	<0.001			0.332	<0.001	0.331	<0.001	0.361	<0.001	0.155	<0.001	0.540	<0.001
SD-WISE Pro-Social Behaviors	0.481	<0.001	0.464	<0.001	0.332	<0.001			0.512	<0.001	0.389	<0.001	0.294	<0.001	0.753	<0.001
SD-WISE Social Advising	0.435	<0.001	0.442	<0.001	0.331	<0.001	0.512	<0.001			0.382	<0.001	0.256	<0.001	0.733	<0.001
SD-WISE Tolerance for Divergent Values	0.180	<0.001	0.276	<0.001	0.361	<0.001	0.389	<0.001	0.382	<0.001			0.120	<0.001	0.584	<0.001
SD-WISE Spirituality	0.194	<0.001	0.177	<0.001	0.155	<0.001	0.294	<0.001	0.256	<0.001	0.120	<0.001			0.285	<0.001
SD-WISE Total Score	0.750	<0.001	0.757	<0.001	0.540	<0.001	0.753	<0.001	0.733	<0.001	0.584	<0.001	0.285	<0.001		

SD-WISE = San Diego Wisdom Scale; D = Decisiveness; ER = Emotional Regulation; SR = Self-Reflection; PSB = Pro-Social Behaviors; SA = Social Advising; TDV = Tolerance for Divergent Values; SS = Spirituality.

<sup>a</sup> Please note that higher scores on BMMRS subscales indicate lower religiosity or spirituality.

<sup>b</sup> Pearson's Correlations.

<sup>c</sup> Jeste-Thomas Wisdom Index (Total 28-item, 7-component SD-WISE score).

to the existing 6-factor SD-WISE impacts model fit, and whether it indicates (i.e., loads onto) the higher-order Wisdom factor. The findings were mixed. The Spirituality subscale was positively correlated with good mental health and well-being and negatively correlated with poor mental health. While adding Spirituality did not negatively impact overall model fit, compared to other subscales, the Spirituality subscale had a weaker association with Wisdom, and SD-WISE scores (JTWI) were less reliable when the Spirituality subscale was included with the measure. Thus, spirituality did relate to the measurement of the SD-WISE Wisdom factor (JTWI), but not as strongly as the other components of wisdom.

While spirituality seems to be a less central component of wisdom compared to others such as pro-social behaviors and emotional regulation, spirituality does make a significant contribution to the SD-WISE-defined overall wisdom score, and is also associated with various measures of mental and physical health. Therefore, some researchers may want to include the Spirituality subscale in their assessment of wisdom, as this may improve the predictive validity of the scale. Wisdom does not require religious faith but might benefit from a spirituality that is characterized by humility, gratitude, altruism, and compassionate love for others (Ardelt, 2008).

The finding of a small-to-medium size positive correlation between spirituality and age is consistent with a number of cross-sectional studies (Koenig et al., 2001; Lavretsky, 2010; Malone and Dadswell, 2018). Spirituality has been found to relieve stresses associated with physical and psychosocial adversities of later life. Similarly, our finding that women reported higher level of spirituality than men replicates the results of a number of other studies (Krentzman, 2017; Luna et al., 2019), although a few investigations did not find significant sex differences in this regard (Simpson et al., 2008). The observed sex differences in spirituality have been ascribed to biological, psychological, sociological, and developmental factors (Hood et al., 2009). They may also indicate gender differences in how men and women experience or verbally describe their spirituality. The associations of 7-factor total SD-WISE score (JTWI) with age and sex are considerably lower than those with spirituality. While several cross-sectional studies have reported higher levels of specific components of wisdom with age (Thomas et al., 2016), there are no longitudinal studies using a validated scale for wisdom. Similarly, whereas pro-social components like empathy and compassion are known to be greater in women than in men, there are no consistent sex differences in overall wisdom (Jeste et al., 2019).

In three other independent investigations of several hundred adults from different populations, we found a strong inverse correlation between SD-WISE total score and severity of loneliness as measured with widely used 20- or 4-item versions of the UCLA Loneliness Scale (Lee et al., 2019; Nguyen et al., 2020, in press; Jeste et al., in press). The component of wisdom with the strongest negative correlation with loneliness was pro-social behaviors such as compassion. Unfortunately, these studies did not include a measure of spirituality. The current study is the first one to include spirituality along with other wisdom components. There was a significant inverse correlation between loneliness and each component of wisdom. The association was medium sized for pro-social behaviors and small for spirituality. Loneliness is defined as subjective social isolation or subjective distress caused by perceived isolation (Jeste et al., 2020). A qualitative study suggested that compassionate relationship with other individuals may be associated with lower levels of loneliness (Morlett Paredes et al., 2020). If spirituality is defined as connectedness with oneself, with the nature, or with the transcendent (de Jager Meezenbroek et al., 2012), it makes conceptual sense that a spiritual person might be less prone to feelings of loneliness even when socially isolated. Thus, spirituality could help reduce subjective loneliness. Notably, the correlation between loneliness and the JTWI (Pearson's  $r = -0.527$ ) is higher than that with any individual component of wisdom.

In a recent meta-analysis of RCTs to enhance specific components of wisdom, there were 15 spirituality-focused trials in adults, including

people with serious and/or terminal medical illnesses or psychiatric illnesses such as opiate use disorders, depression, anxiety, or eating disorders (Lee et al., 2020). Ten interventions were conducted in group settings and two drew from specific religions (Buddhist teachings or Islamic traditions). Spirituality was hypothesized to reduce psychological suffering and improve quality of life. Altogether, the interventions had a statistically significant medium-to large-sized associations with spiritual outcomes. However, none of those studies included a measure of wisdom. While not all of the RCTs assessed well-being outcomes, several spirituality interventions reported improvements in depression and anxiety (Ando et al., 2010; Chan et al., 2012; Chochinov et al., 2011; Rickhi et al., 2011; Sankhe et al., 2017; Wachholtz and Pargament, 2005). A few studies reported improved suffering and distress (Ando et al., 2010; Breitbart et al., 2012; Brown et al., 2014; Richards et al., 2006), greater optimism and resilience (Brown et al., 2014; Chan et al., 2012), and fewer risk behaviors (bingeing, HIV risk behaviors) (Margolin et al., 2006; Richards et al., 2006) following the intervention.

Results of this study should be interpreted in light of several limitations. First, data were collected as part of a cross-sectional survey. Therefore, whether wisdom or spirituality would predict future changes in mental health and well-being is unknown. Longitudinal studies are needed to examine the predictive utility of the measures. Secondly, the SD-WISE as well as the Spirituality measure are based on self-report on an anonymous web-based survey. Although our prior work suggests that the SD-WISE is largely free from examinees' desire to present a favorable self-image (Thomas, M. Lee et al., 2019), the meaning of self-report is difficult to define based on a pattern of correlations alone. Objective measures of both wisdom and spirituality would be preferable, although validated and practical objective measures are not currently available. Thirdly, data came from English-speaking US residents who were predominantly non-Latinx Caucasians, and 99% had graduated from high school with some having higher education. Thus, the findings may not generalize to racial/ethnic minorities or people with less formal education. Finally, the use of MTurk may have introduced some limitations in our findings. For example, the model fit for the SD-WISE was marginal overall (Thomas, M. Lee et al., 2019); however, it improved when we accounted for reverse-coded item artifacts. Although such artifacts are not uncommon for personality measures (e.g., Zhang et al. (2016)), they may be exaggerated with the MTurk sample.

There is a need for longitudinal studies of large and diverse populations using validated measures of both wisdom and spirituality, such as the JTWI (expanded 28-item SD-WISE total score) along with subscale scores for each of the seven different components of wisdom, including spirituality. Other measures of mental and physical health are also necessary to examine possible mediation effects of wisdom components on wellness as well as loneliness. Both subjective spirituality and objective religious practices should be assessed, as well as gender differences in the experience and description of spirituality as it relates to wisdom and its positive correlates. Similarly, biological markers of brain functioning should be included as doing so would provide a better understanding of the neurobiology of spirituality. Finally, intervention studies to promote spirituality and other components of wisdom should examine longer-term effects of behavioral or biological interventions on physical and mental health.

#### Authors statement

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## Declaration of competing interest

The authors have no conflict of interest.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychires.2020.09.033>.

## References

- Achenbaum, W.A., Orwoll, L., 1991. Becoming wise: a psycho-gerontological interpretation of the book of job. *Int. J. Aging Hum. Dev.* 32 (1), 21–39.
- Ando, M., Morita, T., Akechi, T., Okamoto, T., 2010. Efficacy of short-term life-review interviews on the spiritual well-being of terminally ill cancer patients. *J. Pain Symptom Manag.* 39 (6), 993–1002.
- Ardelt, M., 1997. Wisdom and life satisfaction in old age. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 52B (1), P15–P27.
- Ardelt, M., 2000. Antecedents and effects of wisdom in old age: a longitudinal perspective on aging well. *Res. Aging* 22 (4), 360–394.
- Ardelt, M., 2008. Self-development through Selflessness: the Paradoxical Process of Growing Wiser, *Transcending Self-Interest: Psychological Explorations of the Quiet Ego*. American Psychological Association, pp. 221–233.
- Ardelt, M., Jeste, D.V., 2018. Wisdom and hard times: the ameliorating effect of wisdom on the negative association between adverse life events and well-being. *J. Gerontol. B Psychol. Sci. Soc. Sci.* 73 (8), 1374–1383.
- Baltes, P.B., Staudinger, U.M., 2000. Wisdom: a metaheuristic (pragmatic) to orchestrate mind and virtue toward excellence. *Am. Psychol.* 55 (1), 122–136.
- Bangen, K.J., Meeks, T.W., Jeste, D.V., 2013. Defining and assessing wisdom: a review of the literature. *Am. J. Geriatr. Psychiatr. : official journal of the American Association for Geriatric Psychiatry* 21 (12), 1254–1266.
- Blazer, D.G., Meador, K.G., 2009. The role of spirituality in health aging. In: Depp, C.A., Jeste, D.V. (Eds.), *Successful Cognitive and Emotional Aging*. American Psychiatric Publishing, Inc., Arlington, VA, pp. 73–86.
- Breitbart, W., Poppito, S., Rosenfeld, B., Vickers, A.J., Li, Y., Abbey, J., Olden, M., Pessin, H., Lichtenthal, W., Sjoberg, D., Cassileth, B.R., 2012. Pilot randomized controlled trial of individual meaning-centered psychotherapy for patients with advanced cancer. *J. Clin. Oncol.* 30 (12), 1304–1309.
- Brown, J., Hanson, J.E., Schmotzer, B., Webel, A.R., 2014. Spirituality and optimism: a holistic approach to component-based, self-management treatment for HIV. *J. Relig. Health* 53 (5), 1317–1328.
- Brown, T.A., 2015. *Confirmatory Factor Analysis for Applied Research*, second ed. The Guilford Press, New York, NY, US.
- Buhrmester, M., Kwang, T., Gosling, S.D., 2011. Amazon's mechanical Turk. *Perspect. Psychol. Sci.* 6 (1), 3–5.
- Campbell-Sills, L., Stein, M.B., 2007. Psychometric analysis and refinement of the connor-davidson resilience scale (CD-RISC): validation of a 10-item measure of resilience. *J. Trauma Stress* 20 (6), 1019–1028.
- Chan, C.H.Y., Chan, C.L.W., Ng, E.H.Y., Ho, P.C., Chan, T.H.Y., Lee, G.L., Hui, W.H.C., 2012. Incorporating spirituality in psychosocial group intervention for women undergoing in vitro fertilization: a prospective randomized controlled study. *Psychol. Psychother. Theor. Res. Pract.* 85 (4), 356–373.
- Chochinov, H.M., Kristjanson, L.J., Breitbart, W., McClement, S., Hack, T.F., Hassard, T., Harlos, M., 2011. Effect of dignity therapy on distress and end-of-life experience in terminally ill patients: a randomised controlled trial. *Lancet Oncol.* 12 (8), 753–762.
- Clayton, V.P., Birren, J.E., 1980. The development of wisdom across the life-span: a reexamination of an ancient topic. In: Baltes, P.B., Brim, O.G. (Eds.), *Life-span Development and Behavior*. Academic Press, New York, NY.
- Comings, D.E., 2010. The neurobiology, genetics and evolution of human spirituality: the central role of the temporal lobes. *NeuroQuantology* 8 (4).
- Coppock, A., 2018. Generalizing from survey experiments conducted on mechanical Turk: a replication approach. *Political Science Research and Methods* 7 (3), 613–628.
- Daaleman, T.P., Frey, B.B., 2004. The Spirituality Index of Well-Being: a new instrument for health-related quality-of-life research. *Ann. Fam. Med.* 2 (5), 499–503.
- de Jager Meezenbroek, E., Garssen, B., van den Berg, M., van Dierendonck, D., Visser, A., Schaufeli, W.B., 2012. Measuring spirituality as a universal human experience: a review of spirituality questionnaires. *J. Relig. Health* 51 (2), 336–354.
- Delaney, C., 2005. The spirituality scale. *J. Holist. Nurs.* 23 (2), 145–167.
- Etezadi, S., Pushkar, D., 2013. Why are wise people happier? An explanatory model of wisdom and emotional well-being in older adults. *J. Happiness Stud.: An Interdisciplinary Forum on Subjective Well-Being* 14 (3), 929–950.
- Fetzer, Institute, 1999. *Multidimensional Measurement of Religiousness/Spirituality for Use in Health Research*. Fetzer Institute, Bethesda, MD, pp. 1–95.
- Fowler, J.H., Christakis, N.A., 2008. Dynamic spread of happiness in a large social network: longitudinal analysis over 20 years in the Framingham Heart Study. *BMJ (Clinical research ed.)* 337 a2338–a2338.
- Grossmann, I., Weststrate, N.M., Ardelt, M., Brienza, J.P., Dong, M., Ferrari, M., Fournier, M.A., Hu, C.S., Nusbaum, H., Vervaeke, J., 2020. The Science of Wisdom in a Polarized World: Knowns and Unknowns. Center for Open Science.
- Hardt, J., Schultz, S., Xander, C., Becker, G., Dragan, M., 2012. The spirituality questionnaire: core dimensions of spirituality. *Psychology* 116–122, 03(01).
- Hauser, D.J., Schwarz, N., 2015. Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. *Behav. Res. Methods* 48 (1), 400–407.
- Haynes, S.N., Smith, G.T., Hunsley, J.D., 2011. *Scientific Foundations of Clinical Assessment*. Routledge/Taylor & Francis Group, New York, NY, US.
- Hood, R.W., Hill, P.C., Spilka, B., 2009. The psychology of religion. In: *An Empirical Approach*, fourth ed. Guilford Publications.
- Howden, J.W., 1994. *Development and Psychometric Characteristics of the Spirituality Assessment Scale*. Texas Women's University.
- Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.: A Multidisciplinary Journal* 6 (1), 1–55.
- Jeste, D., Di Somma, S., Lee, E.E., Nguyen, T.T., Scalcione, M., Biaggi, A., Daly, R., Liu, J., Tu, X.M., Ziedonis, D., Glorioso, D., Antonini, P., Brenner, D., (in press). Loneliness and Wisdom in Middle-Aged and Oldest-Old Adults: A Cross-Cultural Comparison between Cilentto, Italy and San Diego, USA.
- Jeste, D.V., Ardel, M., Blazer, D., Kraemer, H.C., Vaillant, G., Meeks, T.W., 2010. Expert consensus on characteristics of wisdom: a Delphi method study. *Gerontol.* 50 (5), 668–680.
- Jeste, D.V., Lee, E.E., 2019. The emerging empirical science of wisdom. *Harv. Rev. Psychiatr.* 27 (3), 127–140.
- Jeste, D.V., Lee, E.E., Cacioppo, S., 2020. Battling the modern behavioral epidemic of loneliness: suggestions for research and interventions. *JAMA Psychiatry*.
- Jeste, D.V., Lee, E.E., Cassidy, C., Caspari, R., Gagneux, P., Glorioso, D., Miller, B.L., Semendeferi, K., Vogler, C., Nusbaum, H., Blazer, D., 2019. The new science of practical wisdom. *Perspect. Biol. Med.* 62 (2), 216–236.
- Jeste, D.V., Vahia, I.V., 2008. Comparison of the conceptualization of wisdom in ancient Indian literature with modern views: focus on the Bhagavad Gita. *Psychiatry* 71 (3), 197–209.
- Koenig, H., McCullough, M., Larson, D., 2001. *Handbook of Religion and Health*. Oxford University Press.
- Koenig, H.G., 2007. Spirituality and pain: finding purpose, meaning and hope in the midst of suffering. In: Wong, P.T.P., Wong, L.C.J., McDonald, M.J., Klaasen, D.W. (Eds.), *The Positive Psychology of Meaning & Spirituality*. Selected Papers from Meaning Conferences INPM Press, Abbotsford, B.C. Canada.
- Koenig, H.G., Westlund, R.E., George, L.K., Hughes, D.C., Blazer, D.G., Hybels, C., 1993. Abbreviating the Duke Social Support Index for use in chronically ill elderly individuals. *Psychosomatics* 34 (1), 61–69.
- Koenigs, M., Young, L., Adolphs, R., Tranel, D., Cushman, F., Hauser, M., Damasio, A., 2007. Damage to the prefrontal cortex increases utilitarian moral judgements. *Nature* 446 (7138), 908–911.
- Krentzman, A.R., 2017. Longitudinal differences in spirituality and religiousness between men and women in treatment for alcohol use disorders. *Psycholog Relig Spiritual* 9 (Suppl. 1), S11–S21.
- Kroenke, K., Spitzer, R.L., Williams, J.B., 2003. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med. Care* 41 (11), 1284–1292.
- Kroenke, K., Spitzer, R.L., Williams, J.B.W., Monahan, P.O., Löwe, B., 2007. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann. Intern. Med.* 146 (5), 317.
- Lavretsky, H., 2010. Spirituality and aging. *Aging Health* 6 (6), 749–769.
- Lee, E.E., Bangen, K.J., Avanzino, J.A., Hou, B., Ramsey, M., Eglit, G., Liu, J., Tu, X.M., Paulus, M., Jeste, D.V., 2020. Outcomes of randomized clinical trials of interventions to enhance social, emotional, and spiritual components of wisdom: a systematic review and meta-analysis. *JAMA Psychiatry*.
- Lee, E.E., Depp, C., Palmer, B.W., Glorioso, D., Daly, R., Liu, J., Tu, X.M., Kim, H.C., Tarr, P., Yamada, Y., Jeste, D.V., 2019. High prevalence and adverse health effects of loneliness in community-dwelling adults across the lifespan: role of wisdom as a protective factor. *Int. Psychogeriatr.* 31 (10), 1447–1462.
- Litman, L., Robinson, J., Rosenzweig, C., 2014. The relationship between motivation, monetary compensation, and data quality among US- and India-based workers on Mechanical Turk. *Behav. Res. Methods* 47 (2), 519–528.
- Lubben, J., Blozik, E., Gillmann, G., Iliffe, S., von Renteln Kruse, W., Beck, J.C., Stuck, A. E., 2006. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *Gerontol.* 46 (4), 503–513.
- Luna, M.J., Ameli, R., Sinai, N., Cheringal, J., Panahi, S., Berger, A., 2019. Gender differences in psycho-social-spiritual healing. *J. Wom. Health* 28 (11), 1513–1521, 2002.
- Malone, J., Dadswell, A., 2018. The role of religion, spirituality and/or belief in positive ageing for older adults. *Geriatrics* 3 (2), 28.
- Margolin, A., Beitel, M., Schuman-Olivier, Z., Avants, S.K., 2006. A controlled study of a spirituality-focused intervention for increasing motivation for HIV prevention among drug users. *AIDS Educ. Prev.* 18 (4), 311–322.
- Mason, W., Suri, S., 2011. Conducting behavioral research on Amazon's Mechanical Turk. *Behav. Res. Methods* 44 (1), 1–23.
- Meeks, T.W., Jeste, D.V., 2009. Neurobiology of wisdom: a literature overview. *Arch. Gen. Psychiatr.* 66 (4), 355–365.
- Miller, L., Balodis, I.M., McClintock, C.H., Xu, J., Lacadie, C.M., Sinha, R., Potenza, M.N., 2019. Neural correlates of personalized spiritual experiences. *Cerebr. Cortex* 29 (6), 2331–2338.
- Morlett Paredes, A., Lee, E.E., Chik, L., Gupta, S., Palmer, B.W., Palinkas, L.A., Kim, H.C., Jeste, D.V., 2020. Qualitative study of loneliness in a senior housing community: the importance of wisdom and other coping strategies. *Aging Ment. Health* 1–8.
- Mortensen, K., Hughes, T.L., 2018. Comparing amazon's mechanical Turk platform to conventional data collection methods in the health and medical research literature. *J. Gen. Intern. Med.* 33 (4), 533–538.

- Mulaik, S.A., 2009. Foundations of Factor Analysis. Chapman and Hall/CRC.
- Newberg, A., 2018. Neurotheology: How Science Can Enlighten Us about Spiritual. Columbia University Press, New York Chichester, West Sussex.
- Nguyen, T.T., Lee, E.E., Daly, R.E., Wu, T.C., Tang, Y., Tu, X.M., Van Patten, R., Jeste, D., Palmer, B.W., 2020. Predictors of loneliness by age decade: study of psychological and environmental factors in 2,843 community-dwelling Americans aged 20-69 years. *J. Clin. Psychiatr.* (in press).
- Peer, E., Vosgerau, J., Acquisti, A., 2013. Reputation as a sufficient condition for data quality on Amazon Mechanical Turk. *Behav. Res. Methods* 46 (4), 1023–1031.
- Piedmont, R.L., 1999. Does spirituality represent the sixth factor of personality? Spiritual transcendence and the five-factor model. *J. Pers.* 67 (6), 985–1013.
- Revelle, W.R., 2017. Psych: Procedures for Personality and Psychological Research.
- Richards, P.S., Berrett, M.E., Hardman, R.K., Eggett, D.L., 2006. Comparative efficacy of spirituality, cognitive, and emotional support groups for treating eating disorder inpatients. *Eat. Disord.* 14 (5), 401–415.
- Rickhi, B., Moritz, S., Reesal, R., Xu, T.J., Paccagnan, P., Urbanska, B., Liu, M.F., Ewing, H., Toews, J., Gordon, J., Quan, H., 2011. A spirituality teaching Program for depression: a randomized controlled trial. *Int. J. Psychiatr. Med.* 42 (3), 315–329.
- Rosseel, Y., 2012. Lavaan: AnRPackage for structural equation modeling. *J. Stat. Software* 48 (2).
- Russell, D., Peplau, L.A., Cutrona, C.E., 1980. The revised UCLA Loneliness Scale: concurrent and discriminant validity evidence. *J. Pers. Soc. Psychol.* 39 (3), 472–480.
- Sankhe, A., Dalal, K., Save, D., Sarve, P., 2017. Evaluation of the effect of Spiritual care on patients with generalized anxiety and depression: a randomized controlled study. *Psychol. Health Med.* 22 (10), 1186–1191.
- Simpson, D.B., Cloud, D.S., Newman, J.L., Fuqua, D.R., 2008. Sex and gender differences in religiousness and spirituality. *J. Psychol. Theol.* 36 (1), 42–52.
- Smith, J., Baltes, P.B., 1990. Wisdom-related knowledge: age/cohort differences in response to life-planning problems. *Dev. Psychol.* 26 (3), 494–505.
- Sprouse, J., 2011. A validation of Amazon Mechanical Turk for the collection of acceptability judgments in linguistic theory. *Behav. Res. Methods* 43 (1), 155–167.
- Sternberg, R.J., 2003. *Wisdom, Intelligence, and Creativity Synthesized*. Cambridge University Press, New York, NY.
- Sternberg, R.J., Jordan, J., 2005. *A Handbook of Wisdom: Psychological Perspectives*. Cambridge University Press, New York.
- Thomas, M.L., Bangen, K.J., Palmer, B.W., Sirkin Martin, A., Avanzino, J.A., Depp, C.A., Glorioso, D., Daly, R.E., Jeste, D.V., 2019a. A new scale for assessing wisdom based on common domains and a neurobiological model: the San Diego Wisdom Scale (SD-WISE). *J. Psychiatr. Res.* 108, 40–47.
- Thomas, M.L., Kaufmann, C.N., Palmer, B.W., Depp, C.A., Martin, A.S., Glorioso, D.K., Thompson, W.K., Jeste, D.V., 2016. Paradoxical trend for improvement in mental health with aging: a community-based study of 1,546 adults aged 21-100 years. *J. Clin. Psychiatr.* 77 (8), e1019–e1025.
- Thomas, M.L., Martin, A.S., Eyler, L., Lee, E.E., Macagno, E., Devereaux, M., Chiong, W., Jeste, D.V., 2019b. Individual differences in level of wisdom are associated with brain activation during a moral decision-making task. *Brain Behav* 9 (6), e01302.
- Treichler, E.B.H., Glorioso, D., Lee, E.E., Wu, T.C., Tu, X.M., Daly, R., O'Brien, C., Smith, J.L., Jeste, D.V., 2020. A pragmatic trial of a group intervention in senior housing communities to increase resilience. *Int. Psychogeriatr.* 32 (2), 173–182.
- Unterrainer, H.-F., Nelson, O., Collicutt, J., Fink, A., 2012. The English version of the multidimensional inventory for religious/spiritual well-being (MI-RSWB-E): first results from British college students. *Religions* 3 (3), 588–599.
- Wachholtz, A.B., Pargament, K.I., 2005. Is spirituality a critical ingredient of meditation? Comparing the effects of spiritual meditation, secular meditation, and relaxation on spiritual, psychological, cardiac, and pain outcomes. *J. Behav. Med.* 28 (4), 369–384.
- Ware Jr., J.E., Sherbourne, C.D., 1992. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med. Care* 30 (6), 473–483.
- Ware, J.E., Kosinski, M., Keller, S.D., 1996. A 12-item short-form health survey. *Med. Care* 34 (3), 220–233.
- Ware, J.E., Kosinski, M., Keller, S.D., QualityMetric, I., New England Medical Center, H, Health Assessment, L, Lincoln, R.I., 1998. SF-12 : How to Score the SF-12 Physical and Mental Health Summary Scales. QualityMetric Inc. ; Health Assessment Lab, Boston, Mass.
- Webster, J.D., 2003. An exploratory analysis of a self-assessed wisdom scale. *J. Adult Dev.* 10 (1), 13–22.
- Zhang, X., Noor, R., Savalei, V., 2016. Examining the effect of reverse worded items on the factor structure of the need for cognition scale. *PLoS One* 11 (6), e0157795–e0157795.