Published in final edited form as:

Aging Ment Health. 2015 January ; 19(1): 32–45. doi:10.1080/13607863.2014.909383.

Development of a New Multidimensional Individual and Interpersonal Resilience Measure for Older Adults

A'verria Sirkin Martin^{1,2}, Brian Distelberg⁴, Barton W. Palmer^{1,2,5}, and Dilip V. Jeste^{1,2,3}

¹Stein Institute for Research on Aging, University of California, San Diego (UCSD)

²Department of Psychiatry, UCSD

³Department of Neurosciences, UCSD

⁴Loma Linda University, Department of Counseling and Family Sciences

⁵Veterans Affairs San Diego Health care System, San Diego, CA

Abstract

Objectives—Develop an empirically grounded measure that can be used to assess family and individual resilience in a population of older adults (aged 50-99).

Methods—Cross-sectional, self-report data from 1,006 older adults were analyzed in two steps. The total sample was split into two sub-samples and the first step identified the underlying latent structure through principal component Exploratory Factor Analysis (EFA). The second step utilized the second half of the sample to validate the derived latent structure through Confirmatory Factor Analysis (CFA).

Results—EFA produced an eight-factor structure that appeared clinically relevant for measuring the multidimensional nature of resilience. Factors included self-efficacy, access to social support network, optimism, perceived economic and social resources, spirituality and religiosity, relational accord, emotional expression and communication, and emotional regulation. CFA confirmed the eight-factor structure previously achieved with covariance between each of the factors. Based on these analyses we developed the Multidimensional Individual and Interpersonal Resilience Measure (MIIRM), a broad assessment of resilience for older adults.

Conclusion—This study highlights the multidimensional nature of resilience and introduces an individual and interpersonal resilience measure developed for older adults which is grounded in the individual and family resilience literature.

Corresponding Author: A'verria Sirkin Martin, Ph.D., Postdoctoral Research Fellow, Stein Institute for Research on Aging, Department of Psychiatry (0993), University of California, San Diego, 9500 Gilman Drive (0993), La Jolla, CA 92093-0993, (858) 246-0764, avmartin@ucsd.edu.

Brian J. Distelberg, Ph.D., Assistant Professor, Counseling and Family Sciences, Loma Linda University, 113 Griggs Hall, Loma Linda, CA 92350, (909) 558-4547 x47019, bdistelberg@llu.edu

Barton W. Palmer, Ph.D., Professor, Stein Institute for Research on Aging, Department of Psychiatry (0993), University of California, San Diego, 9500 Gilman Drive (0993), La Jolla, CA 92093-0993, (858) 246-0765, bpalmer@ucsd.edu

Dilip V. Jeste, M.D., Stein Institute for Research on Aging, Department of Psychiatry (0664), University of California, San Diego, 9500 Gilman Drive (0664), La Jolla, CA 92093-0664, (858) 534-4020, djeste@ucsd.edu

Keywords

Family resilience; individual resilience; successful aging; factor analysis; older adults

Introduction

Resilience is a broad construct that involves concepts of adjustment and adaptation both in individuals and in families. Individual resilience has been defined as an individual's capacity to maintain stability, endure, and recover in light of negative life events (McMurray, Connolly, Preston-Shoot, & Wigley, 2008; Waugh, Fredrickson, & Taylor, 2008). Family resilience, however, considers the family system as a whole, and its ability to adapt, adjust, recover, and strengthen when it has encountered challenges or adverse events that have the power to damage the success of the functional unit (Masten & Obradovic, 2006; H. McCubbin, McCubbin, Thompson, Han, & Allen, 1997; Walsh, 2002). Individual resilience has frequently been cited as a critical construct in the aging literature (e.g., Harris, 2008; Jeste et al., 2013; Lamond et al., 2008) and there are currently a number of well-developed individual resilience measures (see Campbell-Sills & Stein, 2007). Presently, there is minimal literature connecting the concept of family resilience to aging (Walsh, 2012) and no empirically developed measure to quantify this valuable construct in a population of older adults (Ungar, 2011). Without a quality measurement tool, the role of family resilience in the aging process will remain elusive and under leveraged.

It is critical during a time of increased life expectancy, which brings challenges economically, socially and medically, that attention is given to the construct of resilience, and its association with aging successfully at the family and individual level (Fiocco & Yaffe, 2010; Jeste et al., 2013). Older adults frequently experience concentrated non-normative and age-related changes such as declines in health and functioning, decreased mobility, diagnosis of chronic or terminal illness, death of spouse and/or friend, loss of social status, decreased financial security, retirement, changes in residence, and social ageism (Aldwin & Igarashi, 2012; Smith & Hayslip, 2012). These adversities range from daily challenges to catastrophic experiences that directly impact one's ability to age successfully and impact the entire family system. For example, illness or disability in one member can cause multigenerational issues and undue stress on the entire family system (Cook, Cohler, Pickett, & Beeler, 1997). Consequently, having the ability to understand aging through both family and individual resilience lenses provides a holistic perspective for conceptualizing the transitions, adaptations, and recovery processes experienced by families and individuals as they age.

Background

Individual Resilience

The main objective of early research on resilience was to ascertain the susceptibility and protective factors that assist in reducing the negative long term effects of difficult life experiences and detect what underline processes were associated with these protective factors (Luthar, Sawyer, & Brown, 2007). Specific to individual resilience and aging, the

construct of resilience has generated a great deal of interest for gerontology researchers and theorists. Particularly the focus on positive states of mental health that contribute to successful cognitive, emotional, and subjective aging (i.e., self-rated successful aging, Jeste, Depp, & Vahia, 2010). In addition, resilience has been significantly associated with various characteristics of successful aging such as improved health, social involvement, and a positive outlook, regardless of income (Wagnild, 2003), as well as higher life satisfaction in spite of physical disability (Lamond et al., 2008). While the construct of individual resilience has most frequently been applied to childhood, comparable concepts have been considered in the aging literature, in that, both childhood and aging literature has increasingly recognized that resilience is not simply an attribute of the individual, but a process that occurs over time within various contexts (Aldwin & Igarashi, 2012; Harris, 2008). In contrast to literature on children and young adults, older adults have accumulated life experiences that serve as a potential reservoir of protective factors to be used to successfully cope with the adversities experienced at the latter stages of life (Allen, Haley, Harris, Fowler, & Pruthi, 2011).

While there is vast literature regarding protective factors of individual resilience, (see Table 1; Benzie & Mychasiuk, 2009; Bhana & Bachoo, 2011) three protective factors of individual resilience are salient within the aging literature (self-efficacy, optimism, and emotional regulation). Self-efficacy is frequently cited as a protective factor for individual resilience and is associated with an individual's ability to attain their goals or make meaning of adversity regardless of the various situations they encounter (Benzies & Mychasiuk, 2009; Bhana & Bachoo, 2011; Secombe, 2002). Positive outlook or optimism is closely related to one's belief systems and positive self-concept; symbolizing the ability to remain hopeful and optimistic regardless of circumstance (Benzies & Mychasiuk, 2009; Bhana & Bachoo, 2011; Black & Lobo, 2008). Emotional regulation is connected to individual internal processing or locus of control (Benzies & Mychasiuk, 2009; Bhana & Bachoo, 2011). Individuals who possess these three protective factors; self-efficacy, optimism and/or a strong belief system, and emotional regulation are considered more likely to be resilient when faced with life's difficulties.

The majority of resilience researchers have studied "protective factors" for resilience (i.e., Benzie & Mychasiuk, 2009; Black & Lobo, 2008). While resilience researchers with a family systems background understand resilience as a process and term resilience constructs as "processes" (e.g., Walsh, 1996; Walsh, 2012). For that reason, we believe that the term "protective factors and/or processes contributing to individual and family resilience" accurately encompasses the different camps of resilience.

Family Resilience

Over time the focus on resilience has broadened from individual resilience to include the concept of family resilience as a key indicator of successful adaptation (Black & Lobo, 2008; Nichols, 2013). Family resilience models assist in seeing family strengths in contrast to deficiencies (Hawley & DeHaan, 1996) and allows the clinician and the researcher to consider how families remain healthy and functional in the context of multiple influences, potential traumatic events, and collective transitions (Bonanno, Westphal, & Mancini, 2012;

Walsh, 2012). This family view of resilience has the potential to fortify both the family and individual as they navigate the aging process.

Literature on family resilience has included foundations in crisis and stress research (M. McCubbin & McCubbin, 1996), and has also been conceptualized developmentally considering standard life-cycle transitions and multigenerational influences (Walsh, 2002). From a family resilience perspective family functioning is understood from a multigenerational perspective that considers how families manage predictable normative life transitions and unpredictable disruptive events. Within the literature a number of protective factors and/or processes contributing to family resilience have emerged including, family communication, belief systems—including spirituality, flexibility, family accord, family time and routines--and social support (Benzies & Mychasiuk, 2009; Black & Lobo, 2008; M. McCubbin & McCubbin, 1996; Walsh, 2002). Families who demonstrate higher levels of each of these protective factors/and or processes are thought to be more resilient and better able to navigate normative and difficult life transitions. In contrast, older adults who report higher levels of interpersonal conflict and criticism in their close relationships (i.e., spouse, children, close friends) report higher degrees of depression and premature mortality (Moos, Schutte, Brennan, & Moos, 2005).

As with individual resilience, the literature for family resilience is quite vast and numerous and similarly protective factors and/or processes have been attributed to families thriving in the face of adversity. For this study we focus on a few factors that are crucial in consideration of aging. First, access to support network is connected to the belief in a close personal network to provide both tangible and emotional support when needed (Benzies & Mychasiuk, 2009; Walsh, 2003). Similarly, perceived economic and social resources appears to embody one's belief in the amount of resources they have both financially and in their collective community. Additionally, finances have a large impact on the family system, and loneliness speaks to the notion of the social capital a person experiences, which is often dependent on the amount of close relationships one believes that they have (Benzies & Mychasiuk, 2009; Walsh, 2003). Relational accord represents reduced amounts of difficulty and strain that can be experienced when family and/or close friends put high demands or pressure on a member and is in line with the notion of family cohesion and accord found in the family resilience literature. In that, families that have warm, cohesive interactions have higher levels of resilience (Benzies & Mychasiuk, 2009). Emotional expression and communication characterizes the relational manner in which people interact, consideration of other people's feelings, and ability to relate to one another (Black & Lobo, 2008; Walsh, 2003). Families who have higher relational accord and open emotional expression and communication are considered more resilient. From the point of view of the family resilience literature, spirituality and religion provide multigenerational stability, as well as purpose, meaning and a sense of connection to something outside of oneself (Walsh, 2006, 2009). In addition, spirituality and religiosity join individuals and families with shared faith communities that have the ability to provide support (Black & Lobo, 2008; Walsh, 2006).

Measuring Resilience

In a recent review of resilience assessment tools, Windle, Bennett, and Noyes (2011) found that while three of the fifteen resilience assessments reviewed offered strong measurement qualities (Connor-Davidson Resilience Scale, the Resilience Scale for Adults and the Brief Resilience Scale), two of the assessments only measured resilience at the individual level (Connor-Davidson Resilience Scale and the Brief Resilience Scale), and the other incorporated multiple levels of analysis but only a few concepts from each (Resilience Scale for Adults). More importantly, none of the measures were developed and normed specifically for older adults. To address this need, we reviewed the extant literature that conceptualizes the foundational protective factors and/or processes contributing to individual and family resilience (e.g., Benzie & Mychasiuk, 2009; Black & Lobo, 2008; Werner, 2000; Windle, Markland, & Woods, 2008) and included all available variables that appeared indicative of the specific resilience protective factors and/or processes (e.g., self-efficacy, family cohesion) in our analyses. Referring to the resilience literature as a guide for how family and individual resilience is conceptualized, the objective of this investigation is the development of an empirically grounded measure that can be used to assess family and individual resilience in a population of older adults.

Methods

Successful Aging Evaluation (SAGE) Study Population

The Successful Aging Evaluation (SAGE) study is an investigation that utilized a structured multi-cohort design to measure age differences as well as age changes in a population of community-dwelling older adults. Participants were English speaking men and women, living in San Diego County, between the ages of 50 and 99, who were capable of providing informed consent and physically and mentally able to participate in survey measurements. This was a community representative sample of older adults. Participants were excluded if they had a diagnosis of dementia, resided in a nursing home, required daily skilled nursing care, had a terminal diagnosis or were currently receiving hospice care. Accordingly, participants reported a number of health conditions. For example, participants reported a current or previous diagnosis of arthritis (41.3%), diabetes (13.7%), high blood pressure (55.6%), osteoporosis (16%), and cancer (28.5%).

Based on *a priori* estimates, the recruitment for the SAGE sample was stratified and weighted (to account for anticipated differential attrition) by age group; enrollment targets were 200 for ages 50 to 59, 200 for ages 60 to 69, 250 for ages 70 to 79, 325 for ages 80 to 89, and 325 for ages 90 and above. The sample used in the SAGE study was recruited using list assisted random digit dialing (for additional recruitment information see Jeste et al., 2013). This investigation uses cross-sectional data from the baseline year of this study.

A total of 1,006 older adults completed the mail-in survey and provided sufficient information to be considered for inclusion in these analyses. Respondents had a mean age of 77.3 years ($SD = 12.2$, range=51–99 years), and 48.6% were women. The sample was 80.7% Caucasian, 11.7% Latino, and 7.6% of other or unknown ethnicities. The majority of respondents were presently married or living in a marriage-like relationship (51.1%) or

widowed (31.5%); 16.7% were divorced/separated or never married. With respect to highest level of education, 51.4% completed high school or some college, 15.4% were college graduates, 28.4% had a post-graduate professional degree; 4.2% did not complete high school. Family income ranged from <\$10,000/year to >\$150,000/year; 8.4% reported under \$19,999/year, 26.7% reported between \$20,000-\$49,000/year, 16.2% reported between \$50,000-\$74,999/year, 10% reporting between \$75,000- \$99,000/year, and 21.5% reporting above \$100,000/year. The majority of participants (58.5%) reported 1 and 3 major life events in the previous year as reported on the Life Events Scale (cite), 23.7% reported no stressful life events, and the remaining 17.8% of participants reported between 4 and 8 major life events. Table 1 provides additional information regarding demographic comparisons between young-old (Y-O; 50-74) versus old-old (O-O; 75-99) participants.

Measures

The SAGE study's baseline mail-in survey included 47 pages of questions related to general medical conditions, health behaviors, social, physical and mental activities, and general outlook on life. Participants were instructed to "mark the answers that reflect [their] own experience on each of the questions." Each of the individual measures also had additional instructions. For example, the 10-item Connor-Davidson Resilience Scale (CDRISC; Campbell-Sills & Stein, 2007) instructs respondent to "please answer the following questions related to your outlook on life," compared with the Emotional Support Scale (ESS; Seeman, Berkman, Blazer, & Rowe, 1994) that begins each question with "how often do your spouse, children, close friends and/or relatives..." The following scales and measures were included as part of this report: the Brief Multi-Dimensional Measure of Religiousness/Spirituality (BMMRS; Fetzer Institute, 1999), the 10-item version of the CDRISC (Campbell-Sills & Stein, 2007), the ESS (Seeman et al., 1994), the Life Orientation Test – Revised (LOT-R; Scheier, Carver, & Bridges, 1994), the MacArthur Ladder Scale of subjective socioeconomic status (Adler, Epel, Castellazzo, & Ickovics, 2000), the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983), and the Three-Dimensional Wisdom Scale (3-D Wisdom; Ardelt, 2003). Items from these scales and measures were used for the subsequent analyses.

Table 2 provides a summary of the most commonly cited protective factors and/or processes contributing to resilience, which informed our selection of variables for analysis. Using a team approach, we (first author (ASM), second author (BJD), and graduate students) reviewed all of the available measures/variables included in the original [SPECIFIC NAME DELETED FOR BLINDED REVIEW] mail-in survey based on the literature that conceptualizes the foundational protective factors and/or processes contributing to individual and family resilience (e.g., Benzie & Mychasiuk, 2009; Black & Lobo, 2008; Werner, 2000). Together we identified and agreed upon 25 appropriate variables for inclusion in our analyses that appeared indicative of protective factor and/or process related to individual and family resilience. While the selection of appropriate variables was rooted in the individual and family resilience literature, because of the individual language of the questions, as well as the fact that we collected this data from only one person in the family unit we have termed these concepts as individual and interpersonal resilience moving forward.

Analyses

Data were evaluated prior to analyses to detect any univariate or multivariate limitations (Tabachnick & Fidell, 2007) including assumptions of independences, normality as well as linearity. The most frequent violation was a lack of normal distribution and items with a skewness or kurtosis score greater or less than ± 2 were removed. The data were also evaluated for missing data patterns and missing data were evaluated for missing at random and missing systematically (Cohen, Cohen, West & Aiken, 2003). One hundred eighty four individuals (18%) were missing data on at least one of the 25 variables included in the analyses. The missing and non-missing groups were compared across demographic variables (i.e., age, gender, ethnicity, income, work status, alcohol use, smoking use) and no significant differences were found between these groups.

Prior to analysis the total dataset ($N = 1,006$) was randomly divided into two equal datasets: one half was used for the Exploratory Factor Analysis (EFA; $n = 503$) and one half for the subsequent Confirmatory Factor Analysis (CFA; $n = 503$). Descriptive statistics were run on both datasets to ensure their uniformity. Through independent sample t-test comparisons, no significant differences in demographics were found between the datasets. Based on the resilience literature (Benzies & Mychasiuk, 2009; Walsh, 2003), we theorized that the underlying latent factors would share common variance and, therefore, the factorial dimensions of the items would be intercorrelated. Due to this assumption a principal component analysis with an oblique (promax) rotation was performed. Initial analysis employed the Kaiser's Rule as well as suppressing small communalities (less than .4) and small coefficients (less than .4). Following the initial analysis the factors were extracted again with an orthogonal rotation (varimax) and the same extraction criteria. To test the concurrent validity of the resulting measure, we calculated the bivariate correlation (Pearson's r) with the CDRISC -10 item version (Campbell-Sills & Stein, 2007) as another measure of resilience. Because the CDRISC was developed as an individual resilience measure, it was hypothesized that the CDRISC would be highly correlated with the individual resilience items but not the interpersonal resilience items. CFA was then employed using EQS 6.2 (Bentler, 2006) to confirm the model found in the EFA, as well as test a test order factor level and to test for factorial invariance between the Y-O vs. O-O groups.

Results

Exploratory Factor Analysis

Based on the analysis conducted, eight factors were extracted in the initial model, which explained 58.6% of the variance in the data. In order to enhance the factor structure, items were examined and removed based on their utility and factorability. The initial analysis revealed two variables that failed to load uniquely on a single factor and an additional variable had a lower loading which only loaded on a factor which was later determined to be insufficient conceptually. These three variables were removed and an exploratory factor analysis using the previously outlined parameters was conducted on the remaining 22 variables. The Kaiser-Mayer-Olkin (KMO) was .68, and the Bartlett test for sphericity was significant at $p < .01$, which suggested appropriateness for factor analytic procedures with

these items. Again, eight factors were extracted in this subsequent analysis, which accounted for 62.3% of the variance. Communalities on the items were all strong (above .45) and all items loaded above .61 on their respective factors. The intercorrelations between the eight factors using oblique rotation was low, ranging from .02 to .28, suggesting that there was not strong intercorrelations between the factors. Given the low intercorrelations, the factors were extracted again with an orthogonal rotation (varimax), whereby an identical factor solution was obtained. This final exploratory factor analysis was run twice, once with the missing data removed listwise and again with the missing data replaced with mean imputation to assure that there was no difference between groups because of missing data; no significant differences were found. The structured factor loadings, eigenvalues, percentage of variance explained, and internal consistency (reliability) estimate (Cronbach's α) are presented in Table 3.

Due to this multidimensional structure we labeled the subscales to correspond to the frequently cited protective factors and/or processes contributing to family and individual resilience found in Table 2 (e.g., self-efficacy, social support network). Based on this analysis process we labeled the factors: (1) Self-Efficacy, (2) Access to Social Support Network, (3) Optimism, (4) Perceived Economic and Social Resources, (5) Spirituality and Religiosity, (6) Relational Accord, (7) Emotional Expression and Communication, (8) Emotional Regulation. Below we briefly provide a conceptual definition of each factor.

Self-efficacy—The first factor achieved an eigenvalue of 3.45, explaining 15.8% of the variance and consisting of three items closely related to an individual's ability to attain their goals or make meaning of adversity regardless of the various situations they encounter (Windle et al., 2008).

Access to support network—The second factor, access to support network, achieved an eigenvalue of 2.14, explaining 9.7% of the variance and consisting of four items connected to an individual's confidence in their personal network to provide them with both tangible and emotional support (Benzies & Mychasiuk, 2009; Walsh, 2003).

Optimism—The third factor achieved an eigenvalue of 1.63, explaining 7.4% of the variance and consisting of three items that were labeled optimism symbolizing the ability to remain hopeful and optimistic regardless of circumstance (Benzies & Mychasiuk, 2009; Bhana & Bachoo, 2011).

Perceived economic and social resources—The fourth factor, perceived economic and social resources, achieved an eigenvalue of 1.58, explaining 7.2% of the variance with three items. This factor appeared to embody one's belief in the amount of resources they have both financially and in their collective community (Benzies & Mychasiuk, 2009; Walsh, 2003).

Spirituality and religiosity—The fifth factor achieved an eigenvalue of 1.51, explaining 6.9% of the variance and consisting of two items named spirituality and religiosity related to a person's belief in a higher power, deeper meaning and/or a connectedness with a larger reality.

Relational accord—The sixth factor, relational accord, achieved an eigenvalue of 1.24, explaining 5.7% of the variance and consisting of two items representing the difficulty and strain that can be experienced when family and/or close friends put high demands or pressure on a member (Benzies & Mychasiuk, 2009).

Emotional expression and communication—The seventh factor achieved an eigenvalue of 1.11, explaining 5.0% of the variance and consisting of three items labeled emotional expression and communication characterized by the relational manner in which people interact, consideration of other people's feelings, and ability to relate to one another (Black & Lobo, 2008; Walsh, 2003).

Emotional regulation—The eighth factor, emotional regulation, achieved an eigenvalue of 1.0, explaining 4.6% of the variance and consisting of two items related to individual internal processing while problem solving (Benzies & Mychasiuk, 2009).

We evaluated the resulting factor structure and determined that the identified factors measured eight multidimensional features of individual and interpersonal resilience. We therefore tilted this assessment the Multidimensional Individual and Interpersonal Resilience Measure (MIIRM). Table 4 reports the mean standard deviations for the eight realized factors from the EFA, as well as total resilience score. Table 4 also provides between group comparisons, specifically, age (Y-O vs. O-O), gender, ethnicity, marital status, and education. From this table it is important to note that there were between group differences on five of the factors between the Y-O and O-O, but not on the total score. In addition, there were between group differences on three or more of the factors for each of the other demographic variables. Total resilience score differences were found for gender, marital status (between never married and married individuals) and education (between some college and post-baccalaureate individuals). Therefore, females report higher levels of resilience, as do individuals who are married and highly educated.

Concurrent and Discriminant Validity

To determine whether the proposed MIIRM measured conceptually similar protective factors and/or processes contributing to resilience as another validated measure we compared the scales within the MIIRM to the 10 item version of the CDRISC. Three items from the CDRISC are included in the MIIRM, all items load on one factor (self-efficacy). The bivariate correlation between the total scale score for the MIIRM and the CDRISC was $r = .648, p < .001$. When comparing the individual MIIRM subscales to the CDRISC we found that the strongest correlations tended to be for the individual resilience dimensions (self-efficacy (.89), optimism (.39) and emotional regulation (.26)), while the smallest correlations were for the interpersonal resilience dimensions (access to support network (.09), perceived economic and social resources (.13), spirituality and religiosity (-.13), relational accord (-.19), emotional expression and communication (.33)). This suggested that at the individual level, the MIIRM and CDRISC share common latent measurement, but the MIIRM adds measurement at the interpersonal levels of resilience.

Confirmatory Factor Analysis

After obtaining the eight-factor structure through the EFA procedures outlined above, we tested the derived latent factors in a deductive approach to determine if the factors from the inductive process of EFA could be deductive supported in the second half of the sample ($n = 503$). More specifically we tested the second half the data with a CFA process to determine if the same eight factor solution could be replicated in the second half of the data. This phase began by simply constraining the data to the eight-factor solution found in the EFA. It then progressed through modification steps, and finally a series of second order models were applied to test the assumption that the eight latent factors from the EFA analysis could be regressed onto a second order factor of resilience. This was tested first with a one factor, second order model and then a covaried two factor (individual and interpersonal) second order factor model. Conceptually this nested model process tested whether the MIIRM worked better as a multidimensional assessment with eight interdependent factors, ranging from individual to interpersonal constructs of resilience, or whether the eight factors were better explained as aggregated subscales within a larger latent factor of either Resilience (one factor) or Individual and Interpersonal Resilience (two factors). We used a nested modeling process to identify the most parsimonious as well as tenable solution to the model (e.g., model 3 nested in model 2, model 2 nested in model 1). A tau equivalent χ^2 test and Akaike's Information Criterion (AIC) were used to determine the tenability of additional constraint.

The first model (Model 1a in Table 5) was created using the eight factors from the EFA phase. While there appeared to be low correlations between factors in the EFA model, all of the factors in this CFA model were allowed to covary. Fit statistics for model 1a suggested slight misspecification, with values showing adequate fit, ($\chi^2 = 394.4$, $df=181$): NNFI=.849, CFI=.882, RMSEA=.053 with a 90% CI between .046 | .060). To further explore the eight-factor structure model, 1b was developed with covariances added between error terms for variables V23 & V24, as well as V14 & V15, per the Lagrange Multiplier Test (LM test). The addition of covariance's, conceptually, appeared to be a good fit between advice and information (V23) from family members and help with daily tasks (V24) from family members, as the two items appear comparable and an increase in one would most likely cause an increase in the other. Similarly the subjective SES (MacArthur Ladder) question (V14) and satisfaction with finances (V15) have a close relationship; theoretically satisfaction with finances would, in all probability, have an interdependent relationship with how one would rate themselves on a social ladder based on income, education, and employment. With these imposed error covariances the model was fit again (model 1b). Fit statistics for model 1b suggested a good model of fit, ($\chi^2 = 378.9$, $df=179$): AIC=21.0, NNFI=.924, CFI=.941, RMSEA=.037 with a 90% CI between .032 | .042. Next we tested model 1c which constrained the factors to have no covarying relationship. Fit statistics for model 1c suggested considerable misspecification, with values showing an inadequate fit, ($\chi^2 = 663.1$, $df=207$): NNFI=.718, CFI=.747 RMSEA= .073 with a 90% CI between .067 | .079. As a result of the first order CFA models 1a, 1b, and 1c, it was determined that model 1b produced the best fit to the data.

We then tested the second order constraints, beginning with the first constraint (a one factor second order model in this case model 2a). Fit statistics for model 2a suggested a good model of fit, ($\chi^2 = 482.8$, $df = 198$): AIC=86.8, NNFI=.903, CFI=.917, RMSEA=.042 with a 90% CI between .037 | .047. We then tested a two factor (second order factor) with five factors for interpersonal resilience (access to support network, perceived economic and social resources, relational accord, spirituality and religiosity, and emotional expression and communication) and three factors for individual resilience (self-efficacy, optimism, and emotional regulation). In addition the two second order factors modeled a covariance between the factors fixed to 0. Fit statistics for this second order solution (model 3a) suggested an acceptable model of fit, ($\chi^2 = 475.8$, $df = 197$): NNFI=.819, CFI=.846, RMSEA=.058 with a 90% CI between .052 | .065. We also tested the same model with the second order factor covariance freed (model 3b). Fit statistics for model 3b suggested a good model of fit, ($\chi^2 = 482.7$, $df = 196$): AIC=90.7, NNFI=.901, CFI=.916, RMSEA=.042 with a 90% CI between .037 | .047.

Overall, models 1b, 2a and 3b produced acceptable fit. In consideration to nesting and model constraints, model 1b is the most tenable solution. In this case the constraint between the most freed model (model 1b) and the next most constrained model (model 2b) produced a significant χ^2 ($\chi^2 = 103.8$, $df = 19$, $p < 0.001$). Therefore Model 1b was considered the best fitting model and most appropriate representation of the data.

We then tested the factor structure by dividing the sample into Y-O and O-O groups and tested each of the previously run models on each of the two groups separately. Table 5 provides a model summary for each of the tested models in the total sample and Y-O and O-O groups. Similar to the models run on the entire sample we found a significant χ^2 between Model 1 and Model 3 in both groups—Y-O χ^2 ($\chi^2 = 57.5$, $df = 15$, $p < 0.001$) and O-O χ^2 ($\chi^2 = 43.5$, $df = 15$, $p < 0.001$), confirming that the factor structure is the same in both the Y-O and O-O groups and Model 1b as the best fitting model. Subsequently, we ran a factorial invariance to detect between group differences in the factor structure in the Y-O vs. O-O groups. We began with a freed model ($\chi^2 = 493.8$, $df = 358$): AIC= -222.2, NNFI=.92, CFI=.94, RMSEA=.036 with a 90% CI between .028 | .044, and then a model that constrained the loading to be equal between the Y-O and O-O samples ($\chi^2 = 502.3$, $df = 372$): AIC= -241.7, NNFI=.93, CFI=.94, RMSEA=.035 with a 90% CI between .026 | .042. We found a non-significant χ^2 ($\chi^2 = 8.5$, $df = 14$, $p > 0.05$) between the two models suggesting that the constrained model is the more tenable solution. Therefore the factor structure appears to be the same in the Y-O and O-O.

Figure 1 illustrates the significant pathways in Model 1b. Table 6 introduces the proposed MIIRM developed through these analyses.

Discussion

The major focus of this investigation was to develop an empirically grounded measure that can be used to assess family and individual resilience factors in a population of older adults. By first reviewing narrative systematic syntheses of the resilience literature, as well as empirical studies that were focused on the explanation of resilience, our final factor structure

has its foundation in published research that has indicated these specific protective factors and/or processes as fundamental to resilience. Due to the parameters of the data we have termed these concepts as individual and interpersonal resilience.

To summarize the results, we identified 22 items which form eight factors (Self Efficacy, Access to Support Network, Optimism, Perceived Economic and Social Resources, Spirituality and Religiosity, Relational Accord, Emotional Expression and Communication, Emotional Regulation). Given the eight factor structure of the MIIRM we also examined the reliability and concurrent validity of the MIIRM. In this case the MIIRM showed good reliability on the total score of all factors, as demonstrated by a good internal consistency (Cronbach's $\alpha = .72$). We also found that the MIIRM and a 10 item version of the CDRISC. Evaluations between the eight MIIRM subscales and the CDRISC showed a high correlation for the individual level scales and the low correlation with the interpersonal level scales suggesting that the MIIRM provides a more robust evaluation of resilience, in comparison to the CDRISC, as the MIIRM can also measure resilience at the interpersonal level.

We also tested the reliability of the factor structure with a CFA on the second half of the sample. This CFA process added clarity to the construct validity of the proposed MIIRM. In this case the best representation of the data allows for covariances between all eight of the factors. While we found adequate fit for both second order models (one factor for resilience or two factors for resilience) based on the fit statistics, model nesting suggests that the MIIRM is best represented as eight factors and not a second order structure. Therefore, as commonly noted in the literature, there is a lot of overlap, or interdependence, between not only the separate resilience factors but also between what can be considered an individual's resilience from what can be categorized as an interpersonal or relational construct of resilience. According to this study, and the solutions to the MIIRM, eight factors are paramount to understanding resilience. These eight factors range from what can be considered as individual factors to those that might be considered as interpersonal or relational levels of resilience. Additionally, given that these factors range on this individual to family continuum, trying to categorize factors as only individual or only interpersonal becomes challenging given the strong interdependence between the factors. Given this finding, resilience should be considered not only at the individual level, but also at the interpersonal level, as the interpersonal level is interdependent with the individual level, producing effects between individual and interpersonal factors but also providing unique and valuable information.

With the development of the MIIRM, there is the potential for growth in multi-disciplinary research from a family resilience perspective. The ability to recognize and pinpoint varying levels of interpersonal resilience has the potential to assist families in successfully facing non-normative and age-related challenges, such as traumatic losses and terminal health diagnoses, as well as normative declines in physical and cognitive functioning among older family members. This is the first step in the creation of a measurement tool for family and individual resilience that will benefit both future research and clinical practice. In general, such a measurement tool would have the ability to transform the way we understand aging to incorporate family level variables that contribute to maintaining healthy functioning and allow families to strengthen throughout their various developmental phases.

Future Implications

This study is the first to examine the structure, reliability and validity of the MIIRM. As such more steps are needed to further support the reliability and validity of this assessment. In short additional samples and populations should be assessed to determine if the same structure and reliability can be achieved in various populations. Also predictive validity studies would support the external validity of this assessment. In this case, researchers have consistently demonstrated the relationship between resilience and successful aging (Harris, 2008; Jeste et al., 2013; Lamond et al., 2008). Testing the MIIRM as a predictive factor in successful aging would be a significant step in demonstrating the external validity of this assessment.

In regards to the benefits of the MIIRM to the larger empirical study of aging, the MIIRM provides a useful and robust tool to broadly measure resilience across individual and interpersonal levels of resilience. Expanding future research to include both interpersonal and individual resilience provides a holistic perspective for understanding the role of the relationships during the various transitions involved in the aging process. Using the MIIRM in future research studies could allow researchers to begin to explain the relationship between a number of protective factors and/or processes that contribute to individual and interpersonal resilience and other domains of successful aging including cognitive health, psychological health, physical health, and self-rated successful aging (Jeste et al., 2013). The ability to understand the multifaceted aspects of successful aging using a multidimensional view of resilience can assist researchers in understanding how and why some families' age more successfully than others, as well as provide direction for the development of future, strength based interventions to be empirically tested.

Clinically, the use of the MIIRM has the potential to inform treatment with families through the many transitions of life (Black & Lobo, 2008; De Haan, Hawley, & Deal, 2002; Hooper, 2009). As families grow older they may face difficult circumstances (Figueiredo, Gabriel, Jácome, Cruz, & Marques, 2013; Friedrich, 2001). For example, aging is often accompanied by varying levels of disability or illness, which may prove difficult for all members of the family unit, some who may need to provide a system of care (Gottlieb & Wolfe, 2002; Mausbach et al., 2012). Using the MIIRM in a clinical setting, a clinician would be provided with information about a number of protective factors and/or processes related to individual and interpersonal resilience levels (i.e., access to support network, relational accord). When administered in multiple family members the clinician is equipped with broad information regarding eight domains for individual and interpersonal resilience. With this knowledge the clinician would have a strength-based road map for intervention. If a family scores high on relational accord, and low on access to support network and emotional expression and communication, the clinician has gained useful information about the family and can begin therapy by working on generating access and communication in the family. Clearly, individuals can experience new and ongoing stressors throughout their lifetime with physical health, finances, close relationships, and social resources, which can be mediated by cohesive social support and community resources (Moos, 2003). Consequently, gaining insight regarding access to support networks, perceived emotional and social resources, and

relational accord may assist individuals in overcoming life stressors, possibly decreasing rates of depression (Moos et al., 2005).

While we carefully selected the items to be representative of the factors in Table 1, we were accepting of original language used in the SAGE dataset. Due to the individual language of the items and the collection of the data from only one person we accordingly used the terms individual and interpersonal resilience. In a future report, multiple members from the family unit should be assessed using the MIIRM. In this case dyadic measures from the MIIRM can be evaluated and give greater understanding to the relational interdependence of resilience between spouses, parents-children and sibling relationships.

Lastly, some items might be biased toward a factor due to their similarity in scaling. For example, some items are scaled as 1-4 whereas others are scaled as 1-5. These scaling differences are reflected in the current MIIRM, but we do see value in future studies exploring the possibility of a common scaling system across all items, followed by a confirmation of the same factor structure. While the difference between the presented MIIRM and common scaling systems would be minimal in most cases, the reduction of the Ladder items and satisfaction with finances (items 12 and 13 in table 6) from the current 10-point scale to a five-point scale might produce more significant differences. It would also be valuable to conduct psychometric tests of the 22-item scale as an independent measure. That is, subject responses to the items were in the context of the larger parent scales from which the items were drawn. It is conceivable that there could be some order or other contextual effects from the other items on each scale that influence the pattern of responses on the 22 selected items. Empirical studies to establish basic psychometric properties such as test-retest reliability, internal consistency, and criterion validity would be helpful, particularly if conducted with the reconfigured scale as an independent unit.

Limitations

There were several limitations in this investigation that should be acknowledged. The SAGE sample consisted predominantly of Caucasian participants with high levels of education. In addition, because the SAGE study was conducted in San Diego County it is unclear if the same results would be generated in a sample of participants from other regions, specifically participants from outside of the United States (US). It should be noted that question 12 of the PRIM is worded directly in references to the U.S.; adaptation would be required for international use. Moreover, as our sample was derived solely a U.S. population, further investigation is needed to determine the generalizability of our findings to other nations and cultures. Additionally, it is important to note that this study was cross-sectional and data were based on self-report.

Based on the available data we did not include measures that were indicative of every protective factor and/or process listed in Table 1. For example, health related questions, such as current health status, stress from health, and access to health resources have been noted as resilience factors; although the [name deleted for blind review] survey did include assessment of health via the SF-36 (Ware Jr & Sherbourne, 1992), there were no public domain health-related items available for potential inclusion in the MIIRM. These may be

additional factors within a future adaptation of the MIIRM, or at the very least these factors should be considered in predictive validity studies for the MIIRM.

Within our analyses, negative factors did not correlate with the items on the MIIRM and therefore were not included. More practically speaking they were considered items with relative low communalities, and therefore did not make the inclusion criteria. It is possible that the inclusion of negative, or risk, factors becomes a formative relationship. And if so, additional assessments which focus on negative factors can be used in combination with the MIIRM, but do not seem to offer the necessary communalities which would suggest they do not correspond to the reflective characteristics of a psychometric tool such as the MIIRM.

It is important to note that the MIIRM is a brief assessment measure that provides a snapshot of eight previously noted factors of individual and interpersonal resilience. It is not a comprehensive measure of all protective factors and/or process that contribute to resilience. For this reason, there is not great depth of measurement within each specific factor, several subscales are comprised of only two items, but provides a rapid assessment of the respondent's general resilience levels. Accordingly, the MIIRM should be used to measure broadly across the eight realized factors and as a catalyst to decide what areas warrant further investigation clinically.

Conclusion

Because resilience has become a broad construct that involves several concepts of adaptation both during developmental processes and in the face of adversity it is an appropriate fit for working with older adults and their family members. While individual resilience has been an area of study for many years (Werner & Smith, 1982), interest in family resilience has emerged more recently (H. McCubbin et al., 1997; Walsh, 2003). To date there has not yet been a measurement tool that incorporates family and individual resilience in a population of older adults. This study assists in the advancement of a family resilience literature in connection with the notion of individual resilience by introducing the MIIRM, which highlights the multidimensionality of resilience across eight factors. Overall the findings of this investigation demonstrate that, while in need of further modifications and analyses, the MIIRM has considerable potential as a brief individual and interpersonal resilience measure for older adults that can be utilized in future research and eventual clinical application.

Acknowledgments

This work was supported, in part, by National Institutes of Health grants T32 MH019934, P30MH066248 and NCRS UL1RR031980, by the John A. Hartford Foundation, and by the Sam and Rose Stein Institute for Research on Aging. We also wish to acknowledge the special help with data management provided by Rebecca Daly.

References

- Adler NE, Epel ES, Castellazzo G, Ickovics JR. Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health psychology*. 2000; 19(6):586.10.1037/0278-6133.19.6.586 [PubMed: 11129362]
- Aldwin C, Igarashi H. An ecological model of resilience in late life. *Annual Review of Gerontology and Geriatrics*. 2012; 32(1):115–130.10.1891/0198-8794.32.115

- Allen, RS.; Haley, PP.; Harris, GM.; Fowler, SN.; Pruthi, R. Resilience: Definitions, ambiguities, and applications. In: Resnick, B.; Gwyther, L.; Roberto, K., editors. Resilience in aging: Concepts, research, and outcomes. New York: NY: Springer; 2011. p. 1-13.
- Ardelt M. Empirical assessment of a three-dimensional wisdom scale. *Research on Aging*. 2003; 25(3):275–324.10.1177/0164027503251764
- Bentler, PM. EQS 6 structural equations program manual. Encino, CA: Multivariate Software, Inc; 2006.
- Benzies K, Mychasiuk R. Fostering family resiliency: A review of the key protective factors. *Child & Family Social Work*. 2009; 14(1):103–114.10.1111/j.1365-2206.2008.00586.x
- Bhana A, Bachoo S. The determinants of family resilience among families in low-and middle-income contexts: A systematic literature review. *South African Journal of Psychology*. 2011; 41(2):131–139.10.1177/008124631104100202
- Black K, Lobo M. A conceptual review of family resilience factors. *Journal of Family Nursing*. 2008; 14(1):33–55.10.1177/1074840707312237 [PubMed: 18281642]
- Bonanno GA, Westphal M, Mancini AD. Loss, Trauma, and Resilience in Adulthood. *Annual Review of Gerontology and Geriatrics*. 2012; 32(1):189–210.10.1891/0198-8794.32.189
- Campbell-Sills L, Stein MB. Psychometric analysis and refinement of the connor–davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress*. 2007; 20(6):1019–1028.10.1002/jts.20271 [PubMed: 18157881]
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior*. 1983:385–396.10.2307/2136404 [PubMed: 6668417]
- Cook JA, Cohler BJ, Pickett SA, Beeler JA. Life-course and severe mental illness: Implications for caregiving within the family of later life. *Family Relations*. 1997:427–436. unavailable.
- De Haan L, Hawley DR, Deal JE. Operationalizing family resilience: A methodological strategy. *American Journal of Family Therapy*. 2002; 30(4):275–291.10.1080/01926180290033439
- Figueiredo D, Gabriel R, Jácome C, Cruz J, Marques A. Caring for relatives with chronic obstructive pulmonary disease: How does the disease severity impact on family carers? *Aging & Mental Health*(ahead-of-print). 2013:1–9.10.1080/13607863.2013.837146
- Fiocco AJ, Yaffe K. Defining successful aging: the importance of including cognitive function over time. *Archives of neurology*. 2010; 67(7):876.10.1001/archneurol.2010.130 [PubMed: 20625097]
- Friedrich, DD. Successful aging: Integrating contemporary ideas, research findings, and intervention strategies. Springfield, IL: Charles C Thomas Publisher; 2001.
- Gottlieb BH, Wolfe J. Coping with family caregiving to persons with dementia: a critical review. *Aging & Mental Health*. 2002; 6(4):325–342.10.1080/1360786021000006947 [PubMed: 12425767]
- Harris PB. Another wrinkle in the debate about successful aging: The undervalued concept of resilience and the lived experience of dementia. *The International Journal of Aging and Human Development*. 2008; 67(1):43–61.10.2190/AG.67.1.c
- Hawley DR, DeHaan L. Toward a definition of family resilience: Integrating life-span and family perspectives. *Family Process*. 1996; 35(3):283–298.10.1111/j.1545-5300.1996.00283.x [PubMed: 9111710]
- Hooper LM. Individual and family resilience: Definitions, re-search, and frameworks relevant for all counselors. *Alabama Counseling Association Journal*. 2009; 35(1):19–26. unavailable.
- Institute, F. Multidimensional measurement of religiousness/spirituality for use in health research: A report of the Fetzer Institute/National Institute on Aging Working Group. Kalamazoo, MI: John E. Fetzer Institute; 1999.
- Jeste DV, Depp CA, Vahia IV. Successful cognitive and emotional aging. *World Psychiatry*. 2010; 9(2):78–84.10.1002/j.2051-5545.2010.tb00277.x [PubMed: 20671889]
- Jeste DV, Savla GN, Thompson WK, Vahia IV, Glorioso DK, Martin AS, Depp CA, et al. Association between older age and more successful aging: Critical role of resilience and depression. *American Journal of Psychiatry*. 2013; 170(2):188–196.10.1176/appi.ajp.2012.12030386 [PubMed: 23223917]

- Lamond AJ, Depp CA, Allison M, Langer R, Reichstadt J, Moore DJ, Jeste DV, et al. Measurement and predictors of resilience among community-dwelling older women. *Journal of Psychiatric Research*. 2008; 43(2):148–154.10.1016/j.jpsychires.2008.03.007 [PubMed: 18455190]
- Luthar SS, Sawyer JA, Brown PJ. Conceptual issues in studies of resilience. *Annals of the New York Academy of Sciences*. 2007; 1094(1):105–115.10.1196/annals.1376.009 [PubMed: 17347344]
- Masten AS, Obradovic J. Competence and resilience in development. *Annals of the New York Academy of Sciences*. 2006; 1094(1):13–27.10.1196/annals.1376.003 [PubMed: 17347338]
- Mausbach BT, Roepke SK, Chattillion EA, Harmell AL, Moore R, Romero-Moreno R, Grant I, et al. Multiple mediators of the relations between caregiving stress and depressive symptoms. *Aging & Mental health*. 2012; 16(1):27–38.10.1080/13607863.2011.615738 [PubMed: 22224706]
- McCubbin H, McCubbin MA, Thompson AI, Han SY, Allen CT. Families under stress: What makes them resilient. *Journal of Family and Consumer Sciences*. 1997; 89:2–11. unavailable.
- McCubbin, M.; McCubbin, H. Resiliency in families: A conceptual model of family adjustment and adaptation in response to stress and crises. In: McCubbin, H.; Thompson, A.; McCubbin, M., editors. *Family assessment: Resiliency, coping and adaptation: Inventories for research and practice*. Madison, WI: University of Wisconsin System; 1996. p. 1-64.
- McMurray I, Connolly H, Preston-Shoot M, Wigley V. Constructing resilience: social workers' understandings and practice. *Health & Social Care in the Community*. 2008; 16(3):299–309.10.1111/j.1365-2524.2008.00778.x [PubMed: 18363698]
- Moos RH. Social contexts: Transcending their power and their fragility. *American Journal of Community Psychology*. 2003; 31(1-2):1–13.10.1023/A:1023041101850 [PubMed: 12741686]
- Moos RH, Schutte KK, Brennan PL, Moos BS. The interplay between life stressors and depressive symptoms among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2005; 60(4):P199–P206.10.1093/geronb/60.4.P199
- Nichols, WC. Roads to understanding family resilience: 1920s to the twenty-first century. In: Becvar, D., editor. *Handbook of family resilience*. New York, NY: Springer; 2013. p. 3-16.
- Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*. 1994; 67:1063–1063.10.1037/0022-3514.67.6.1063 [PubMed: 7815302]
- Secombe K. “Beating the odds” versus “changing the odds”: Poverty, resilience, and family policy. *Journal of Marriage and Family*. 2002; 64(2):384–394.10.1111/j.1741-3737.2002.00384.x
- Seeman TE, Berkman LF, Blazer D, Rowe JW. Social ties and support and neuroendocrine function: The MacArthur studies of successful aging. *Annals of Behavioral Medicine*. 1994 unavailable.
- Smith GC, Hayslip J. Resilience in adulthood and later life: What does it mean and where are we heading? *Annual Review of Gerontology and Geriatrics*. 2012; 32(1):1–28.10.1891/0198-8794.32.3
- Tabachnick, BG.; Fidell, L. *Using Multivariate Statistics*. 5. Boston, M.A.: Pearson Education, Inc; 2007.
- Ungar M. The social ecology of resilience: Addressing contextual and cultural ambiguity of a nascent construct. *American Journal of Orthopsychiatry*. 2011; 81(1):1–17.10.1111/j.1939-0025.2010.01067.x [PubMed: 21219271]
- Wagnild GM. Resilience and successful aging: Comparison among low and high income older adults. *Journal of Gerontological Nursing*. 2003; 29(12):42. unavailable. [PubMed: 14692243]
- Walsh F. The concept of family resilience: Crisis and challenge. *Family Process*. 1996; 35(3):261–281.10.1111/j.1545-5300.1996.00261.x [PubMed: 9111709]
- Walsh F. A family resilience framework: Innovative practice applications. *Family Relations*. 2002; 51(2):130–137.10.1111/j.1741-3729.2002.00130.x
- Walsh F. Family resilience: A framework for clinical practice. *Family Process*. 2003; 42(1):1–18.10.1111/j.1545-5300.2003.00001.x [PubMed: 12698595]
- Walsh, F. *Strengthening family resilience*. 2. New York, NY: Guilford Publication; 2006.
- Walsh, F. Religion, spirituality, and the family: Multifaith perspectives. In: Walsh, F., editor. *Spiritual resources in family therapy*. 2. New York, NY: Guilford Press; 2009. p. 3-30.

- Walsh F. Successful aging and family resilience. *Annual Review of Gerontology and Geriatrics*. 2012; 32(1):151–172.10.1891/0198-8794.32.153
- Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care*. 1992;473–483.10.1097/00005650-199206000-00002 [PubMed: 1593914]
- Waugh CE, Fredrickson BL, Taylor SF. Adapting to life's slings and arrows: Individual differences in resilience when recovering from an anticipated threat. *Journal of Research in Personality*. 2008; 42(4):1031–1046.10.1016/j.jrp.2008.02.005 [PubMed: 19649310]
- Werner, EE. Protective factors and individual resilience. In: Shonkoff, J.; Meisels, S., editors. *Handbook of early childhood intervention*. 2. New York: NY: Cambridge University Press; 2000. p. 115-132.
- Werner, EE.; Smith, RS. *Vulnerable, but invincible: A longitudinal study of resilient children and youth*. New York, NY: McGraw-Hill Book Company; 1982.
- Windle G, Bennett KM, Noyes J. A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes*. 2011; 9(8):1–18.10.1186/1477-7525-9-8 [PubMed: 21223594]
- Windle G, Markland DA, Woods RT. Examination of a theoretical model of psychological resilience in older age. *Aging and Mental Health*. 2008; 12(3):285–292.10.1080/13607860802120763 [PubMed: 18728940]

Figure 1.
Significant Pathways in First Order Confirmatory Factor Analysis

Table 1

Sociodemographics of the Young-Old and Old-Old SAGE Participants

Variables	All Participants	Young-Old (Y-O) Age 50-74 (n=365)	Old-Old (O-O) Age 75-99 (n=641)	t or χ^2	df	p
<u>Sociodemographic Characteristics</u>						
Age (in Years)	77.35 (12.2)	63.3 (6.6)	85.3 (5.7)			
Gender (% Female)	48.6%	49.0%	48.3%	0.07	1	.799
Ethnicity				6.98	5	.222
Caucasian	80.7%	77.7%	82.9%			
Hispanic	11.1%	13.2%	10.0%			
Other	8.2%	9.1%	7.1%			
Marital Status				134.30	5	<.001
Never Married	3.2%	6.0%	1.6%			
Divorced/Separated	13.4%	19.2%	10.2%			
Widowed	31.5%	10.1%	44.0%			
Married or Living in a marriage like relationship	51.9%	64.7%	43.6%			
Education				26.96	10	.003
High School	18.0%	16.7%	28.1%			
Some College	31.7%	32.3%	31.6%			
Post-baccalaureate	50.3%	50.9%	40.3%			

Note: Values represent means (and SDs) or proportions as appropriate.

Table 2

Frequently Cited Protective Factors and/or Processes Contributing to Individual and Family Resilience

Individual	Family
Achievement oriented ^f	Clarity ^e
Belief systems ^{a, b}	Family cohesion/connectedness/Family member accord ^{a, b, c, d, e}
Effective coping skills ^a	Family communication ^{c, e}
Emotional regulation ^{a, f}	Family of origin influences ^a
Increased education, skills and training ^{a, d, f}	Family structure ^a
Internal locus of control ^{a, b, f}	Family time/Shared recreation ^c
Positive self-concept ^f	Flexibility ^{c, e}
Self-efficacy ^a	Positive outlook ^{c, e}
Temperament ^{a, c, f}	Relational stability ^a
Health ^a	Routines and rituals ^c
	Social and Economic Resources (stable and adequate income and housing) ^{a, d, e}
	Social support/Support network ^{a, c, d, e}
	Transcendence and Spirituality ^{b, c, e}

^aBenzies and Mychasiuk (2008);^bBhana and Bachoo (2011);^cBlack and Lobo (2008);^dGarnezy (1985);^eWalsh (2003);^fWerner (2000)

Table 3

Factor loadings from a principal axis factor analysis ($N = 503$)

Items	α	M (SD)	Factor loading							
			1	2	3	4	5	6	7	8
Factor 1: Self-Efficacy	.79	9.70 (2.00)								
Deal with whatever comes my way	.69	3.20 (0.76)	.87							
Able to adapt to change	.64	3.23 (0.82)	.85							
Bounce back after hardship	.58	3.32 (0.74)	.78							
Factor 2: Access to Support Network	.67	8.84 (2.41)								
Advice or information	.55	1.66 (0.94)	.77							
Help with daily tasks	.49	1.88 (1.10)	.71							
Listen when you need to talk	.45	2.57 (0.67)	.70							
Loved and cared for	.43	2.76 (0.54)	.68							
Factor 3: Optimism	.58	11.45 (1.89)								
Expect more good things than bad	.38	3.99 (0.89)			.73					
Hopeful about my future	.44	4.01 (0.75)			.72					
Usually expect the best	.39	3.60 (0.79)			.67					
Factor 4: Perceived Economic and Social Resources	.55	9.83 (1.99)								
Ladder question	.44	3.80 (0.79)				.79				
Satisfaction with finances	.37	3.95 (0.99)				.73				
How often do you feel lonely	.25	2.10 (0.95)				.61				
Factor 5: Spirituality and Religiosity	.73	4.96 (1.76)								
Religious person	.59	2.30 (0.98)					.88			
Spiritual person	.59	2.59 (1.02)					.84			
Factor 6: Relational Accord	.58	4.44 (1.41)								
Too many demands on you	.40	2.28 (0.87)						.79		
Critical of what you do	.40	2.20 (0.78)						.75		
Factor 7: Emotional Expression and Communication	.39	9.95 (2.32)								
See things from another point of view	.19	3.17 (1.11)							.64	
Not comforted another	.28	3.69 (1.17)							.61	
When people talk, wish they would leave	.30	3.12 (1.19)							.61	

Items	Factor loading							
	α	$M(SD)$	1	2	3	4	5	6 7 8
Factor 8: Emotional Regulation	.43	7.88 (1.94)						
Consider all pieces of information	.34	4.05 (0.86)						.78
Before criticizing, imagine how I would feel	.34	3.82 (0.90)						.71
Total Items	.72	67.32 (7.29)						
Eigen value			3.45	2.14	1.63	1.58	1.51	1.24 1.11 1.00
% of Variance			15.84	9.72	7.38	7.20	6.90	5.66 5.03 4.55

All Factor Loadings > .40 are included boldface.,

* α = reliability of factors in larger scale and items within the subscale.

Table 4

Scale Benchmarks

Variables	Factor 1: Self-Efficacy	Factor 2: Access to Support Network	Factor 3: Optimism	Factor 4: Perceived Economic and Social Resources	Factor 5: Spirituality and Religiosity	Factor 6: Relational Accord	Factor 7: Emotional Expression and Communication	Factor 8: Emotional Regulation	Total Resilience Score
M (SD)	9.7 (2.0)	8.8 (2.5)	11.5 (1.9)	9.8 (2.0)	5.0 (1.8)	4.4 (1.4)	10.0 (2.4)	7.8 (1.5)	67.3 (7.6)
Age									
Young-Old (50-74)	9.7 (2.1)	8.7 (2.5) *	11.7 (2.0) *	9.6 (2.2) *	5.1 (1.7)	4.0 (1.5) *	10.3 (2.4) *	7.9 (1.5)	67.2 (8.5)
Old-Old (75-99)	9.7 (1.9)	9.0 (2.4) *	11.4 (1.8) *	9.9 (1.8) *	4.9 (1.8)	4.6 (1.3) *	9.8 (2.4) *	7.8 (1.5)	67.4 (7.0)
Gender									
Female	9.7 (2.0)	8.9 (2.4)	11.6 (2.0)	9.5 (1.0) *	5.3 (1.7) *	4.4 (1.5)	10.3 (2.4) *	7.9 (1.5)	67.9 (7.7) *
Male	9.7 (1.9)	8.8 (2.5)	11.4 (1.8)	10.2 (1.9) *	4.7 (1.8) *	4.3 (1.4)	9.73 (2.3) *	7.8 (1.5)	66.7 (7.5) *
Ethnicity									
Caucasian	9.8 (1.9) *	8.8 (2.4)	11.5 (1.9)	9.8 (1.9)	4.9 (1.8) *	4.5 (1.4) *	10.0 (2.4)	7.8 (1.5)	67.4 (7.5)
Hispanic	9.3 (2.4) *	8.8 (2.9)	11.6 (2.0)	9.6 (2.2)	5.4 (1.7) *	3.8 (1.7) *	10.2 (2.5)	7.7 (1.6)	66.8 (8.2)
Other	9.6 (1.9)	9.5 (2.5)	11.3 (1.9)	10.0 (2.0)	5.2 (1.8)	4.0 (1.5)	9.6 (2.5)	7.9 (1.5)	66.5 (7.8)
Marital Status									
Never Married	9.6 (1.9)	7.8 (2.7) *	11.6 (2.3)	8.5 (2.6) *	5.2 (1.5)	4.0 (1.6) *	9.8 (2.5) *	7.3 (1.5) *	63.8 (8.2) *
Divorced/Separated	9.4 (101)	7.9 (2.7) *	11.1 (2.2) *	9.0 (2.1)	5.1 (1.7)	4.1 (1.6) *	10.2 (2.4) *	7.8 (1.6) *	64.8 (8.8)
Widowed	9.7 (2.01)	8.8 (2.4)	11.5 (1.8)	9.4 (1.9)	5.2 (1.8)	4.7 (1.3) *	10.0 (2.3)	7.8 (1.5) *	67.5 (7.1)
Married or Living in a marriage like relationship	9.9 (1.9)	9.3 (2.3) *	11.6 (1.8) *	10.4 (1.8) *	4.8 (1.8)	4.2 (1.4)	10.0 (2.4)	7.9 (1.5)	68.1 (7.4) *
Education									
High School	9.4 (2.2) *	8.5 (2.6) *	11.4 (1.8)	9.4 (2.0)	5.1 (1.7)	4.6 (1.5)	9.7 (2.5) *	7.8 (1.5)	65.8 (7.1)
Some College	9.7 (2.1)	8.9 (2.5)	11.5 (2.0)	9.3 (2.0)	5.1 (1.7)	4.3 (1.5)	10.1 (2.4)	7.7 (1.5) *	66.7 (8.2) *
Post-baccalaureate	9.9 (1.7) *	9.1 (2.3) *	11.6 (1.9)	10.6 (1.6) *	4.8 (1.9)	4.3 (1.4)	10.3 (2.3) *	8.1 (1.4) *	69.0 (6.8) *

Between group comparisons by One Way ANOVA

* = between group/post hoc comparison significant difference with $p < 0.05$

Table 5

Model Summary

Model	Model fit – Complete Sample	Model fit – Young-Old (50-74)	Model fit – Old-Old (75-99)
1a All items and covariance's	$\chi^2(181)=394.4$ NNFI=.85 CFI=.88 RMSEA=.053 RMSEA 90% CI =.046–.060	$\chi^2(181)=306.0$ NNFI=.88 CFI=.90 RMSEA=.048 RMSEA 90% CI =.038–.056	$\chi^2(181)=366.1$ NNFI=.85 CFI=.89 RMSEA=.046 RMSEA 90% CI =.039–.053
1b Error variances added (14-15, 23-24)	$\chi^2(179)=378.9$ NNFI=.92 CFI=.94 RMSEA=.037 RMSEA 90% CI =.032–.042	$\chi^2(179)=251.8$ NNFI=.93 CFI=.94 RMSEA=.036 RMSEA 90% CI =.025–.046	$\chi^2(179)=256.4$ NNFI=.94 CFI=.95 RMSEA=.031 RMSEA 90% CI =.021–.038
1c All items – covariance's removed	$\chi^2(207)=663.1$ NNFI=.72 CFI=.75 RMSEA=.073 RMSEA 90% CI =.067–.079	$\chi^2(207)=608.8$ NNFI=.65 CFI=.69 RMSEA=.080 RMSEA 90% CI =.072–.087	$\chi^2(207)=555.5$ NNFI=.76 CFI=.78 RMSEA=.059 RMSEA 90% CI =.053–.065
2a Second order—one factor	$\chi^2(198)=482.8$ NNFI=.90 CFI=.92 RMSEA=.042 RMSEA 90% CI =.037–.047	$\chi^2(198)=309.9$ NNFI=.90 CFI=.91 RMSEA=.043 RMSEA 90% CI =.033–.052	$\chi^2(198)=304.5$ NNFI=.92 CFI=.93 RMSEA=.034 RMSEA 90% CI =.026–.041
3a Second order – two factor – no covariance	$\chi^2(197)=475.8$ NNFI=.82 CFI=.85 RMSEA=.058 RMSEA 90% CI =.052–.065	$\chi^2(197)=408.4$ NNFI=.81 CFI=.84 RMSEA=.059 RMSEA 90% CI =.051–.067	$\chi^2(197)=396.5$ NNFI=.86 CFI=.88 RMSEA=.046 RMSEA 90% CI =.039–.052
3b Second order – two factor – with covariance	$\chi^2(196)=482.7$ NNFI=.90 CFI=.92 RMSEA=.042 RMSEA 90% CI =.037–.047	$\chi^2(196)=309.29$ NNFI=.90 CFI=.91 RMSEA=.043 RMSEA 90% CI =.037–.052	$\chi^2(196)=299.9$ NNFI=.92 CFI=.94 RMSEA=.033 RMSEA 90% CI =.026–.041

Table 6
The Multidimensional Individual and Interpersonal Resilience Measure (MIIRM)

For each question below, please mark one box with your answer.

	Not True At All	Rarely True	Sometimes True	Often True	True Nearly All The Time
1. I can deal with whatever comes my way.	☐	☐	☐	☐	☐
2. I am able to adapt to change.	☐	☐	☐	☐	☐
3. I tend to bounce back after illness or hardship.	☐	☐	☐	☐	☐
4. 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.	☐	☐	☐	☐	☐
5. Before criticizing somebody, I try to imagine how they would feel if I were in their place.	☐	☐	☐	☐	☐
6. I sometimes find it difficult to see things from another person's point of view.	☐	☐	☐	☐	☐
7. I often have not comforted another when he or she needed it.	☐	☐	☐	☐	☐
8. Sometimes when people are talking to me, I find myself wishing that they would leave.	☐	☐	☐	☐	☐
9. Overall, I expect more good things to happen to me than bad.	☐	☐	☐	☐	☐
10. I'm always hopeful about my future.	☐	☐	☐	☐	☐
11. In unclear times, I usually expect the best.	☐	☐	☐	☐	☐

12. Where do you think you stand at this time in your life, relative to other people in the United States? (People who score 10 have the most money, the most education and the most respected jobs. The higher you are, the closer you are to the people at the top).

1 ← 2 ← 3 ← 4 ← 5 ← 6 ← 7 ← 8 ← 9 ← 10
 Lowest Highest

13. In general, how satisfied are you with your finances?

1 ← 2 ← 3 ← 4 ← 5 ← 6 ← 7 ← 8 ← 9 ← 10
 Not at all Satisfied Very Satisfied

	Never	A Little of the Time	Sometimes	Frequently
14. How often do you feel lonely?	☐	☐	☐	☐
15. How often do your spouse, children, close friends and/or relatives give you advice or information about medical, financial, or family problems?	☐	☐	☐	☐
16. How often do your spouse, children, close friends and/or relatives help with daily tasks like shopping giving you a ride or helping you with household tasks?	☐	☐	☐	☐
17. How often are your spouse, children, close friends and/or relatives willing to listen when you need to talk about your worries or problems?	☐	☐	☐	☐
18. How often do your spouse, children, close friends and/or relatives make you feel loved and cared for?	☐	☐	☐	☐

	Never	A Little of the Time	Sometimes	Frequently
19. How often do your spouse, children, close friends make too many demands on you?	☐	☐	☐	☐
20. How often are your spouse, children, close friends and/or relatives critical of what you do?	☐	☐	☐	☐
21. To what extent do you consider yourself a religious person?	☐	☐	☐	☐
22. To what extent do you consider yourself a spiritual person?	☐	☐	☐	☐

MIIRM Scoring Instructions - A total score can be calculated by adding up all of the items. Higher scores indicate higher levels of resilience and lower scores indicate lower levels of resilience (Items 6, 7, 8, 14, 19, and 20 are reversed scored). Self-Efficacy (Items 1, 2, and 3), Emotional Regulation (Items 4 and 5), Optimism (Items 9, 10, 11) Emotional expression and communication (Items 6, 7, and 8 – all