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THE ASSOCIATION OF RESILIENCE WITH MENTAL AND PHYSICAL HEALTH AMONG OLDER AMERICAN INDIANS: THE NATIVE ELDER CARE STUDY

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Abstract

We examined the association of resilience with measures of mental and physical health in a sample of older American Indians (AIs). A validated scale measuring resilience was administered to 185 noninstitutionalized AIs aged ≥55 years. Unadjusted analyses revealed that higher levels of resilience were associated with lower levels of depressive symptomatology and chronic pain, and with higher levels of mental and physical health. Resilience remained significantly associated with depressive symptomatology after controlling for demographic and other health measures. Our findings suggest that resilience among older AIs has important implications for some aspects of mental and physical health.

INTRODUCTION

Psychosocial factors have an important role in promoting and maintaining positive health outcomes (Zautra, Hall, & Murray, 2010). One such factor is resilience, the ability to adapt in the face of adversity (Ong, Bergeman, Bisconti, & Wallace, 2006). Resilience is viewed as a multidimensional construct, yet it is typically operationalized as a set of psychosocial behavioral qualities that enable one to thrive in spite of stressful events (Connor & Davidson, 2003; Davydov, Stewart, Ritchie, & Chaudieu, 2010; Luthar, Cicchetti, & Becker, 2000). Theoretical models posit that greater resilience buffers the negative effects of adverse events and conditions on both mental and physical health (Franco et al., 2009; Tugade, Fredrickson, & Feldman Barrett, 2004; Van Breda, 2001).

Resilience has been identified as one of many factors contributing to successful aging, which refers to how older adults achieve and maintain a sense of well-being despite age-related challenges (Young, Frick, & Phelan, 2009). Previous studies with older adults have used a number of constructed psychometric scales to capture resilience, including the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003), the Hardy-Gill Resilience Scale (Hardy, Concato, & Gill, 2004), and the Resilience Scale (Wagnild & Young, 1993). These studies have shown resilience to be positively correlated with greater social engagement, higher optimism, stronger grip strength, and functional independence

(Hardy et al., 2004; Lamond et al., 2009; Wagnild, 2003; Wells, 2009). Conversely, resilience has been found to be negatively correlated with a range of poor mental and physical health conditions, such as increased depressive symptomatology, post-traumatic stress disorder, and physical disability (Burns & Anstey, 2010; Connor, Davidson, & Lee, 2003; Hardy et al., 2004; Mehta et al., 2008). Therefore, examining the role of resilience among older adults may provide important insight about the pathways by which they can achieve better mental and physical health.

Assessing resilience in different racial and ethnic populations is important, as group members often share distinct cultural practices and beliefs that, in turn, affect internal (psychological) and external (social and physical) resources (Ungar, 2010). With respect to American Indians (AIs), resilience may be particularly important for several reasons. AIs have suffered from generations of historical trauma due to a legacy of extermination and loss of culture (Brave Heart & DeBruyn, 1998). Many AI tribal communities have substantial rates of poverty, domestic violence, and suicide (Centers for Disease Control and Prevention, 2010; Macartney, Bishaw, & Fontenot, 2013; Perry, 2004). Older AIs have the highest prevalence of functional disability (Goins, Moss, Buchwald, & Guralnik, 2007) and high prevalence rates of poor mental and physical health compared to other racial and ethnic groups (Indian Health Service, 2012). Furthermore, AIs born today have a life expectancy 5.5 years less than all other U.S. race populations combined (Indian Health Service, 2012).

To date, only two studies have examined resilience among older AIs (Goins, Gregg, & Fiske, 2012; Grandbois & Sanders, 2009) and no studies have examined the association of resilience with mental and physical health in this population. Given the range of challenges currently experienced by AIs and our limited understanding of resilience with respect to their health, our objective was to examine the association of resilience with mental and physical health in a sample of older AIs. We hypothesized that higher levels of resilience would be positively associated with better mental and physical health.

METHODS

Study Population and Data Collection

Data for this research were collected as part of the Native Elder Care Study, a cross-sectional study of older members of a federally recognized AI tribe residing in the rural Southeast (Goins, Garroutte, Leading Fox, Geiger, & Manson, 2011). Data were collected from July 2006 to August 2008 using in-person interviewer-administered surveys to gather information on functional ability, mental and physical health, personal assistance needs, health care use, and psychosocial resources. Inclusion criteria for this study included being an enrolled tribal member, aged ≥ 55 years, a resident in the tribal service area, and noninstitutionalized at the time of the study, and having demonstrated adequate cognitive ability. A lower age criterion than usual was used because research suggests that health declines with age more rapidly in AIs than in other racial groups (Hayward & Heron, 1999). In addition, many AI communities, including the tribe participating in this study, consider elders to be those aged ≥ 55 years.

Tribal enrollment records indicated that 1,430 persons were potentially eligible for this study on the basis of residential location and age. To ensure equal representation across the range of ages, an age-stratified random sample was taken of 680 tribal members using the tribal enrollment records from three age groups: 55–64, 65–74, and ≥75 years. Randomly selected persons were recruited by an interviewer via telephone call or home visit to participate in the study. Of the 680 potentially eligible persons in the sample, 47 could not be located, 78 declined participation, and 50 were found to be ineligible. For the main study, interviews were administered to the remaining 505 recruited participants. Interviewers also asked a

random sample of the 505 participants to join in a substudy that involved answering additional questions, including the resilience measure reported here. Of the 191 participants asked to join the substudy, two declined, yielding a total of 189 substudy participants. All participants received a $20 gift card for completing the main study and an additional $10 gift card for completing the substudy interview. The tribe's Institutional Review Board, tribal council, and tribal elder council, and the West Virginia University Institutional Review Board, approved the project. The Oregon State University Institutional Review Board approved the secondary data analyses.

Measures

Demographic Characteristics—Age, sex, and marital status were measured by self-report.

Resilience—The 10-item abbreviated version (Campbell-Sills & Stein, 2007) of the CD-RISC (Connor & Davidson, 2003) was our independent variable of interest. The original scale was developed as a self-reported measure of successful stress-coping ability (Connor & Davidson, 2003), and was based on a conceptual model of resilience as the successful adaptation to disruptive events (Richardson, 2002; Richardson, Neiger, Jensen, & Kumpfer, 1990). The abbreviated version of the CD-RISC (see Table 1) was selected because it has demonstrated better psychometric properties than the full version in our sample, with a more stable factor structure, good internal consistency, and convergent and divergent validity (Goins et al., 2012). The 10 items were scored on a 5-point response scale (0 = *not true at all* to 4 = *true most of the time*). To score this measure, items were summed to create a count scale with a range from 0 to 40.

Mental Health—We used two measures of mental health, including the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) and the mental health component of the SF-8 Health Survey (MCS-8; Ware, Koskinksi, Dewey, & Gandek, 2001). These measures were selected based on the theoretical linkages of chronic or acute stress to neuronal mechanisms, which thereby alter overall mental health (Davydov et al., 2010).

The CES-D contains 20 items describing the frequency of conditions within the last week, using a 4-point scale (0 = *rarely or none of the time* to 3 = *most or all of the time*). Three items indicating positive symptoms were reverse coded. Scoring of this measure included summing the item responses to obtain a range from 0 to 60, with higher scores indicative of greater depressive symptomatology. Scores were analyzed as a binary variable using the standard cutoff score of 16 to reflect a clinically significant level of depressive symptomatology (Radloff, 1977). has previously been validated in older AIs (Chapleski, Lamphere, Kaczynski, Lichtenberg, & Dwyer, 1997).

The MSC-8 is based on eight items indicating how frequently mental and physical health problems interfered with respondents' usual functional and social activities during the past week, with specific mental health weights applied to each item. The result is a composite norm-based weighted score, with higher scores indicative of better mental health (Ware et al., 2001). This measure was analyzed as a continuous variable. The SF-12 scale, a longer version of the SF-8, has been found to be valid among other AI adults (Edwards et al., 2012).

Physical Health—We used the SF-8 physical health component (PCS-8; Ware et al., 2001) and the Chronic Pain Grade scale (Von Korff, Ormel, Keefe, & Dworkin, 1992) to assess physical health. These measures were selected based on theorized mechanisms by

which the collective impact of chronic strain weakens physiological functioning, thereby increasing vulnerability to physical disability, disease, and injury (Davydov et al., 2010).

Like the MCS-8, the PCS-8 is based on eight items indicating how frequently mental and physical health problems interfered with respondents' usual functional and social activities during the past week, with specific physical health weights applied to each item. This scale was treated as a continuous measure, with higher scores representing better physical health (Ware et al., 2001).

The Chronic Pain Grade scale is a composite measure consisting of six items that capture the severity of chronic pain and its impact on daily physical and social functioning (Von Korff et al., 1992). Three items measuring pain intensity have a response scale from 0 to 10, with higher scores indicative of higher chronic pain intensity. Two items measuring pain-related disability have a response scale from 0 to 10, with higher scores reflective of the extent to which chronic pain contributes to greater disability. Thus, the three chronic pain intensity items and the two disability items were averaged separately. The last item asks "About how many days in the last 6 months, have you been kept from your usual activities because of physical pain?" This item was scored on a scale from 0 to 180 days. We generated an overall composite scale based on the Guttman scaling method, in which chronic pain was classified into five categories with the following scheme: 1) The mean chronic pain intensity scale was coded as low (< 5) and high (5–10) intensity; 2) Disability days were coded as 0 points = 0–6 days, 1 point = 7–14 days, 2 points = 15–30 days, and 3 points = ≥31 days; and 3) Disability score values generated 0 points = 0–2, 1 point = 3–4, 2 points = 4–5, or 3 points = 7–10.

We then converted disability days and disability scoring to an overall count variable with a range from 0 to 6. The overall composite scale was then coded in the following fashion: Grade 0 indicated no chronic pain (e.g., all items = 0), Grade 1 = low disability/low-intensity chronic pain, Grade 2 = low disability/high-intensity chronic pain, Grade 3 = high disability-moderately limiting (3–4 disability points) regardless of chronic pain intensity, and Grade 4 = high disability-severely limiting (5–6 disability points) regardless of chronic pain intensity.

Statistical Analyses

We used descriptive statistics to examine sample characteristics and scores on the abbreviated CD-RISC measure. Chi-square tests were used to assess the prevalence of low, medium, and high resilience scores by demographic characteristics, depressive symptomatology, and chronic pain. We used the Kruskal Wallis test to generate mean composite scores and corresponding standard deviations (*SD*) for the MCS-8 and PCS-8 by low, medium, and high resilience. We then estimated the variance inflation factor to test for multicollinearity among the independent variables; the variance inflation factor values were low, indicating that multicollinearity did not present as a serious computational issue.

For the four mental and physical health measures, we estimated a series of nested regression models. Specifically, we used logistic regression logistic regression models for chronic pain, and Poisson regression models for the MCS-8 and the PCS-8. The series of nested regression models progressed from an unadjusted bivariate association model of resilience with each of the mental and physical health measures, followed by a model that adjusted for the demographic characteristics, then a model that adjusted for the demographic characteristics and physical health measures, and finally a fully adjusted model. We excluded four participants from the analyses because they did not provide any responses to the CD-RISC. There were no significant differences with respect to physical health measures for those participants who did not have CD-RISC data compared to those who did.

We used multivariate normal imputation (Lee & Carlin, 2010) for those who had missing data on the CD-RISC and correlated measures. Of the measures included, 5% of cases had missing data on the MCS-8 and PCS-8; no missing cases were observed for depressive symptomatology and chronic pain. All analyses were conducted with Stata version 12 (Stata Statistical Software, 2007).

RESULTS

Table 2 presents descriptive statistics for the demographic and mental and physical health characteristics of our sample by low, medium, or high resilience. Twenty-five percent of respondents reported low resilience, 41% reported medium resilience, and 34% reported high resilience. The mean age of the respondents was 68.7 ± 10.4 years (data not shown) with the majority of the sample being female (69%) and unmarried (54%). The mean MCS-8 score was 51.1 (*SD* = 10.3, range = 16.5–66.7). Most respondents (87%) had a CES-D score of < 16. The mean PCS-8 score was 44.9 (*SD* = 11.1, range = 15.6–59.3). Of the chronic pain grade categories, 20% were pain free, 40% were low disability/low intensity, 17% were low disability/high intensity, 10% as high disability-moderately limiting, and 14% as high disability-severely limiting. Resilience level did not significantly differ by age, sex, or marital status. Low levels of resilience were associated with lower MCS-8 scores ($p < 0.001$), the presence of clinically significant depressive symptomatology ($p < 0.001$), lower PCS-8 scores ($p < 0.01$), and higher chronic pain grades ($p < 0.01$).

Table 3 presents unadjusted and adjusted odds ratios and 95% confidence intervals (CIs) for the nested regression models examining the association of resilience with depressive symptomatology and chronic pain and the beta coefficients and standard errors for the nested regression models examining the association of resilience with the MCS-8 and PCS-8. Results from the bivariate regression analyses (Model 1) showed statistically significant associations of resilience with all of the mental and physical health measures, which remained significant after controlling for demographic characteristics (Model 2). After controlling for the physical health measures (Model 3), the association of resilience with the PCS-8 was attenuated; significant associations remained between resilience and depressive symptomatology and the MCS-8, and marginally so for chronic pain. Results from the fully adjusted regression analyses (Model 4) showed that resilience remained independently associated only with depressive symptomatology. Specifically, those with higher levels of resilience, compared to those with low resilience, had significantly decreased odds of clinically significant depressive symptomatology (OR = 0.88, 95% CI [0.81, 0.96]).

DISCUSSION

This study examined the association of resilience with mental and physical health among older AIs, a population known to have persistent and disproportionate health disparities compared to other U.S. racial and ethnic populations. We expected that higher resilience would be associated with better mental and physical health, thereby representing a significant health among older adults. Our study results demonstrated significant of resilience with better mental and physical health. High levels of resilience were significantly associated with lower depressive symptomatology, as found in previous studies (Hardy et al., 2004; Mehta et al., 2008). Even after controlling for demographic characteristics and other mental and physical health measures, this association remained robust.

Research has provided evidence for the link among stress, emotional regulation, and mental health (Sojo Monson & Guarino, 2010). However, there is limited evidence that delineates how resilience impacts the stress-emotion-mental health relationship. Ong and colleagues

(2006) have demonstrated that resilience moderates the effect of daily stress on negative emotion, and accounts for a substantial proportion of the variance in daily stress resistance. Based on their findings, they concluded that, compared to those with lower resilience, those with higher resilience were more likely to experience positive emotions and less likely to have difficulty regulating negative emotions. In this context, it is not surprising that we found a significant and depressive symptomatology, or that depressive symptomatology attenuated the association of resilience with the MCS-8.

We found weak evidence of the relationship of resilience with the PCS-8 and with chronic pain. Although our unadjusted and demographic adjusted models showed significant associations of greater resilience with better physical health and lower chronic pain, the addition of the other physical health measures in the model attenuated these relationships. These findings are not surprising in that physical health measures are likely to be more correlated with each other than with mental health measures.

However, it is interesting to note that chronic pain was a significant but not the CES-D. This finding may suggest an important distinction between negative emotion and depressive symptomatology, and may offer support for the role of emotion in responding to chronic pain-induced stress. In fact, findings from a longitudinal study among older adults have shown that positive emotion mediates the relationship of stressors with resilience (Ong et al., 2006).

None of our demographic characteristics demonstrated a significant resilience, although we found a substantially higher proportion of men with higher resilience levels compared to women. Indeed, Boardman and colleagues (2008) demonstrated in a twin study that, despite equal odds of developing positive affect (i.e., feelings of happiness, satisfaction, peacefulness, etc.), after controlling for a large number of social and interpersonal stressors, remaining levels of positive affect indicated stronger inheritable resilience among men compared with women.

Our findings point to important areas for further inquiry. Studies are needed to test whether resilience is dependent upon the presence of positive emotions and whether resilience remains a critical moderator of the development of mental health issues among older adults suffering from more severe disabling conditions. As with chronic pain management studies (Gatchel, 2004), resilience research could contribute a wealth of needed scientific data by adopting a biopsychosocial perspective (Davydov et al., 2010). This perspective allows researchers to operationalize and examine resilience factors at the biological level (i.e., immune system functioning), the psychological level (i.e., emotional resilience), and the social level (i.e., family and community resilience).

This study has several limitations that deserve acknowledgement. First, the data are cross-sectional, prohibiting us from assessing direction of causality. Although we treated resilience as the independent variable in our analyses, we were unable to determine the direction of these associations. It could be theorized that adverse mental or physical health conditions lead to higher resilience. Indeed, a literature review on adjustment to chronic conditions suggests a similar theoretical framework of stress and coping inherent in the emergence of resilience (Stanton, Revenson, & Tennen, 2007). It is also plausible that health processes and outcomes are occurring in a synchronic fashion with resilience. Second, we did not assess social support or other psychosocial measures that may have supportive roles in promoting resilience, as other researchers indicate (Davydov et al., 2010). Third, we were unable to assess the relative role of prescription medication use to manage either depression or chronic pain. Use of such medications could have affected results from this study by reducing the probability of finding significant measures. Fourth, these findings are specific

other older AIs, as large variations in health and health risk exist among AI cultures (Levin, Welch, Bell, & Casper, 2002; Welty et al., 2002). Lastly, the construct of resilience has been measured in various ways across biological, psychological, and socio-environmental domains (Davydov et al., 2010). Our measure is most representative of the psychological domain whereas respondents provided their own self-evaluation of their resilience and, therefore, a subjective view of their successful coping abilities.

Determining the role that resilience may have in mental and physical health in older adults holds potential to guide health promotion and disease prevention efforts. For example, recent evidence suggests that resilience training may improve disease management behaviors for persons with type 2 diabetes (Bradshaw et al., 2007; Steinhardt, Mamerow, Brown, & Jolly, 2009). Evidence suggests that resilience is an important component of successful aging, but further investigation is needed to understand the mechanisms and circumstances by which this may be true among older adults.

Future studies can help us to better understand the internal and external resources needed to increase the likelihood of developing greater resilience, as well as the impact of resilience on different mental and physical health outcomes, quality of life, and longevity. Sturgeon and Zautra (2010) suggest that equal attention should be given to social-environmental resources as is given to internal resources, because social environments can help foster resilience. Such efforts could apply the broader biopsychosocial perspective for resilience research that has recently emerged (Davydov et al., 2010). This framework has the capacity to affect greater positive health outcomes among disadvantaged populations, such as AIs, where community-level resources may be equally important as individual-level resources, if not more so. Such an approach could provide an opportunity to narrow the mental and physical health disparities gap experienced by older AIs.

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Table 1

Items from the Abbreviated CD-RISC[a] Measure

Respondents noted the frequency with which they experienced each item during the past month, with the following response options: Not true at all, Rarely true, Sometimes true, Often true, or True most of the time	
1	Able to adapt to change
2	Can deal with whatever comes
3	See the humorous side of things
4	Coping with stress strengthens
5	Tend to bounce back after illness or hardship
6	You can achieve your goals
7	Under pressure, focus and think clearly
8	Not easily discouraged by failure
9	Think of self as strong person
10	Can handle unpleasant feelings

[a]CD-RISC = The Conner-Davidson Resilience Scale

Table 2

Sample Demographic, Mental Health, and Physical Health Characteristics

	Total Sample *N* = 185	**High *n* = 63 (34%)**	**Medium *n* = 76 (41%)**	**Low *n* = 46 (25%)**	***p* Value[a]**
Demographics					
Age, *n* (%)					0.44
55–64 years	80 (43.2%)	25 (39.7%)	33 (43.4%)	22 (47.8%)	
65–74 years	54 (29.2%)	23 (36.5%)	22 (29.0%)	9 (19.6%)	
≥ 75 years	51 (27.6%)	15 (23.8%)	21 (27.6%)	15 (32.6%)	
Sex, *n* (%)					0.61
Female	128 (69.2%)	41 (65.1%)	53 (69.7%)	34 (73.9%)	
Male	57 (30.8%)	22 (34.9%)	23 (30.3%)	12 (26.1%)	
Marital Status, *n* (%)					0.49
Married/Life Partner	86 (46.5%)	30 (47.6%)	38 (50.0%)	18 (39.1%)	
Unmarried	99 (53.5%)	33 (52.4%)	38 (50.0%)	28 (60.9%)	
Mental Health					
MCS-8 Mental Health, mean (*SD*)	51.1 (10.3)	54.4 (7.1)	51.5 (9.3)	45.6 (13.1)	<0.001
CES-D[b], *n* (%)					<0.001
≥ 16 symptoms (high)	25 (13.5%)	1 (1.6%)	8 (10.5%)	16 (34.8%)	
< 16 symptoms (low)	160 (86.5%)	62 (98.4%)	68 (89.5%)	30 (65.2%)	
Physical Health					
PCS-8 Physical Health, mean (*SD*)	44.9 (11.1)	48.2 (10.6)	44.7 (10.4)	40.4 (11.6)	<0.01
Chronic Pain Grade, *n* (%)					<0.01
0 (pain free)	37 (20.0%)	18 (28.6%)	11 (14.5%)	8 (17.4%)	
1 (low disability/low intensity	73 (39.5%)	29 (46.0%)	31 (40.8%)	13 (28.3%)	
2 (low disability/high intensity)	32 (17.3%)	8 (12.7%)	14 (18.4%)	10 (21.7%)	
3 (high disability-moderately limiting)	18 (9.7%)	4 (6.4%)	12 (15.8%)	2 (4.4%)	
4 (high disability-severely limiting)	25 (13.5%)	4 (6.4%)	8 (10.5%)	13 (28.3%)	

[a] *p* values generated from chi-square tests for categorical variables and Kruskal Wallis tests for continuous variables.

[b] CES-D = Centers for Epidemiologic Studies Depression Scale

Table 3

Multivariate Models Estimating Correlations of Resilience with Mental and Physical Health (N = 185)

	Model 1: Unadjusted associations	Model 2: Demographic adjusted	Model 3: Adjusted for physical health measures	Model 4: Fully adjusted models
	Odds Ratio (95% Confidence Interval)			
CES-D[a]				
Resilience	0.87 (0.81, 0.93)***	0.85 (0.78, 0.94)***	0.87 (0.79, 0.96)**	0.88 (0.81, 0.96)**
PCS-8			1.00 (0.94, 1.08)	1.01 (0.94, 1.09)
Chronic Pain			1.56 (0.91, 2.69)	0.98 (0.57, 1.66)
MCS-8				0.89 (0.84, 0.94)***
Chronic Pain				
Resilience	0.93 (0.89, 0.98)**	0.93 (0.89, 0.97)**	0.96 (0.92, 1.00)‡	0.98 (0.94, 1.03)
PCS-8			0.85 (0.82, 0.88)***	0.86 (0.83, 0.89)***
MCS-8				0.95 (0.91, 0.98)**
CES-D				1.20 (0.47, 3.08)
	Beta Coefficient (Standard Error)			
MCS-8				
Resilience	0.01 (0.003)***	0.01 (0.003)***	0.01 (0.002)**	0.00 (0.002)
PCS-8			0.00 (0.002)	0.00 (0.002)
Chronic Pain			−0.06 (0.019)**	−0.04 (0.017)**
CES-D				−0.25 (0.058)***
	Beta Coefficient (Standard Error)			
PCS-8				
Resilience	0.01 (0.003)***	0.01 (0.003)***	0.01 (0.003)	0.00 (0.003)
Chronic Pain			−0.14 (0.014)***	−0.14 (0.016)***
MCS-8				0.00 (0.002)
CES-D				0.02 (0.053)

[a]CES-D = Centers for Epidemiologic Studies Depression Scale

‡ $p < 0.10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$