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## Health-Related Quality of Life in Community-Dwelling Older Whites and African Americans

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### Abstract

**Objective**—This study assesses structural and functional characteristics of Short Form-36 Health Survey (SF-36) domains using community-based samples of older Whites and African Americans. Although the eight domains of the SF-36 have by convention been collapsed into two summary categories—physical health and mental health—the authors examine a three-factor model including physical health, mental health, and general well-being. They hypothesized that the general well-being factor would be a mediator between physical and mental health in both groups.

**Method**—Analyses using structural equation modeling provide support for the approach.

**Results**—In both White and African American samples, the three-factor model demonstrated a better fit than the two-factor model. Also, in both groups, general well-being mediated the relationship between physical health and mental health.

**Discussion**—Findings suggest that general well-being serves as an intervening step between physical and mental health in both White and African American older adults.

### Keywords

SF-36; health-related quality of life; African Americans

Accurate and efficient assessment of health status and quality of life has long been the goal of researchers and clinicians, with the bulk of attention being paid to self-report inventories. The Medical Outcomes Study (MOS) Short Form-36 Health Survey, widely known as SF-36 (Ware & Sherbourne, 1992), is one of most widely used tools for this purpose. Reflecting the World Health Organization (WHO, 1947) perspective that the concept of health encompasses a variety of physical, social, and mental components, the SF-36 covers eight dimensions: physical functioning (PF), role functioning related to physical health problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role functioning related to emotional problems (RE), and mental health (MH). Because of its brevity, comprehensiveness, and acceptable psychometric properties, the SF-36 has been used in diverse populations across different age groups and medical conditions (e.g., Brazier et al., 1992; Garratt, Ruta, Abdalla, Buckingham, & Russell, 1993; Jenkinson, Coulter, & Wright, 1993; McHorney, Ware, & Raczek, 1993).

Despite the popularity of the SF-36, relatively little information is available regarding its use with racial/ethnic minority older populations (Johnson et al., 1995; Peek, Ray, Patel,

Stoebner-May, & Ottenbacher, 2004; Wolinsky & Stump, 1996), including African Americans. In one of the few exceptions, Wolinsky, Miller, Andresen, Malmstrom, and Miller (2004) reported that the SF-36 is valid and reliable in a sample of African Americans, but their sample was limited to persons of middle age. Other studies using the SF-36 in African Americans have tended to focus on clinical populations (e.g., Croog et al., 1990; Johnson et al., 1995; Powe et al., 2007), and information on the use of SF-36 with nonclinical African American older adults is scarce. Furthermore, there is a paucity of information regarding whether the structure and function of the SF-36 is similar between African Americans and Whites (Wolinsky & Stump, 1996). To help fill these gaps in the literature, the present study examines structural and functional differences and similarities in the SF-36 using community samples of older Whites and African Americans.

Structurally, the SF-36 contains 35 items used to create eight domains and one additional item on health changes over the past year that is not included in any of the domains. Among the eight domains, the first four scales (PF, RP, BP, and GH) are usually summarized as the Physical Component Score and the latter four scales (VT, SF, RE, and MH) as the Mental Component Score (Ware, Kosinski, & Dewey, 2000). However, studies have consistently reported that GH and VT have substantial overlaps with both physical and mental health dimensions (e.g., McHorney et al., 1993; Ware & Sherbourne, 1992; Wolinsky et al., 2004). In one 10-country study using structural equation modeling (SEM), Keller and colleagues (1998) identified GH and VT as a third factor and interpreted it as “general well-being.” A later study conducted with a Greek sample also confirmed that separation of the third factor improved model fit (Anagnostopoulos, Niakas, & Pappa, 2005), but the implications and role of this factor for U.S. samples remain unclear, especially across racial/ethnic groups. In this article, we hypothesize that the three-factor model will provide a better fit with data than does the two-factor model for both older Whites and African Americans and, furthermore, that the general well-being factor will play the role of mediator between physical and mental health constructs.

An individual’s subjective feeling of “being healthy” or “being vital and alive,” which represents a general sense of well-being, is important in pursuing everyday activities and enjoying life. Studies have shown that health perception and vitality are highly correlated with various physical and mental health indicators (Kahana et al., 1995; Nix, Ryan, Manly, & Deci, 1999) and that positive health perception and vitality are beneficial in lowering distress and enhancing well-being (Kahana et al., 1995; Kasser & Ryan, 1999; Martin, Rott, Kerns, Poon, & Johnson, 2000; Nix et al., 1999). In addition, a line of literature suggests that the links between physical and mental health are mediated by the subjective perception of health (e.g., Jang, Poon, & Martin, 2004; Kahana et al., 1995; Martin et al., 2000). That is, adverse physical health status not only directly erodes mental well-being but also might exert an indirect effect by priming people to harbor negative self-evaluation of health (Jang et al., 2004; Kahana et al., 1995; Martin et al., 2000). No such effect has been reported with vitality, and even less attention has been paid to the combined effect of vitality and general health perception. Given their strong link to health constructs, health perception and vitality were hypothesized to mediate the effect of physical health on mental health. Examination of the intervening role of general well-being may help scholars better understand the underlying dynamics of physical and mental health and shed light on intervention strategies

for positive adaptation to physical health changes and promotion of mental well-being in later years.

Based on the above review, the research questions guiding the present study were the following:

1. Does the three-factor model (physical health, general well-being, and mental health) fit better than the two-factor model (physical health and mental health) in the community samples of older Whites and African Americans?
2. Does general well-being function as a mediator in the relation between physical and mental health in the community samples of older Whites and African Americans?

## Method

### Data Sets

The samples for the present analyses came from two methodologically standardized studies of White and African American older adults. The White sample came from the Charlotte County Healthy Aging Study (CCHAS), and the African American sample was from the Hillsborough Elder African American Life Study (HEALS). Participants were recruited from randomly selected blocks of two U.S. census tracts each in Charlotte and Hillsborough Counties, Florida. The samples included community-dwelling individuals between the ages of 60 to 84. More detailed information on the studies and sampling procedures can be found elsewhere (e.g., Borenstein et al., 2006; Jang, Borenstein, Chiriboga, & Mortimer, 2005; Webb, 2001).

Among the 808 CCHAS and 424 HEALS individuals who were contacted, 466 (57.7%) CCHAS participants and 255 (60.1%) HEALS participants agreed to be interviewed. Individuals whose race was identified as non-White in the CCHAS and those who had missing information on any of the SF-36 items in both datasets were excluded from the present study, leaving 425 for analysis in the White sample and 255 in the African American sample.

It should be emphasized that the two samples were significantly different from a sociodemographic perspective. The average age of the White sample was 73.0 ( $SD = 6.22$ ), and that of the African American sample was 71.6 ( $SD = 6.94$ ); this difference was statistically significant ( $t = 2.68, p < .05$ ). Both samples had comparable gender distributions (49.8% female in Whites and 56.1% female in African Americans;  $\chi^2 = 2.59, p > .05$ ), but the percentage of individuals who were married was greater in the White sample (77.9%) than in the African American sample (52.5%;  $\chi^2 = 48.6, p < .001$ ). A significant mean difference was observed ( $t = 17.7, p < .001$ ) in the years of education completed by Whites ( $M = 13.9, SD = 2.99$ ) and African Americans ( $M = 9.73, SD = 17.7$ ). The differences observed in the two samples mirror the underlying sociodemographic differences manifest at state and federal levels, where older African Americans exhibit lower educational attainment and are less likely than Whites to be married (e.g., Ferraro & Farmer, 1996).

## Measures

The items contained in the SF-36 represent eight domains: PF (10 items), RP (4 items), BP (2 items), GH (5 items), VT (4 items), SF (2 items), RE (3 items), and MH (5 items). PF items ask individuals whether their health limits such activities as lifting or carrying groceries and bathing or dressing with a response format of *limited a lot* to *not limited at all*. Items for RP ask whether they have problems, such as cutting down the amount of time they spent on activities and accomplished less than they would like, as a result of physical health with a yes–no format. BP is measured by asking the amount of pain they had during the past 4 weeks (*none* to *very severe*) and the extent of interference in activities caused by pain (*not at all* to *extremely*). Items for GH include a widely used single item of self-rating of health with a response format ranging from *excellent* to *poor* and four items (e.g., “I seem to get sick a little easier than other people”; “I expect my health to get worse”) with a response format ranging from *definitely true* to *definitely false*. Items for VT include how much of the time they felt full of pep, had a lot of energy, felt worn out, and felt tired during the past 4 weeks with a response format ranging from *all of the time* to *none of the time*. Items for SF ask the extent of interference in social activities caused by physical health or emotional problems (*not at all* to *extremely*) and the amount of time that physical health or emotional problems interfered with social activities (*all of the time* to *none of the time*). Items for RE ask whether they have problems, such as cutting down the amount of time they spent on activities and accomplished less than they would like, as a result of emotional problems (e.g., feeling depressed or anxious) with a yes–no format. Examples for the items in MH include whether a participant has been felt calm and peaceful or been a very nervous person during the past 4 weeks, with a response format ranging from *all of the time* to *none of the time*. Using the SF-36 scoring method (Ware et al., 2000), each domain score was standardized to have a range of 0 to 100, with higher scores indicating better health.

## Analytic Approach

After ensuring that the SF-36 has a high internal reliability in both Whites and African Americans, SEM was utilized to test measurement models and structural models. Because of its capability of assessing measurement errors, handling multiple indicators, and providing fit indices of the entire model, SEM has been highly recommended as the preferred method for model testing (e.g., Bentler, 1995; Frazier, Tix, & Barron, 2004).

The analysis was initiated with the two-factor model, where a latent variable for physical health is represented by PF, RP, BP, and GH and another latent variable, mental health, is indexed with VT, SF, RE, and MH. Subsequently, the three-factor model, where GH and VT were distinguished to form a third latent construct, general well-being, was tested. Model fit was compared between the two-factor model and the three-factor model.

When the superior fit of the three-factor model over the two-factor model was confirmed, we proceeded to test the structural model by adding predictive paths among three latent constructs. First, we tested a mediation model (a triangular model with the presence of general well-being in the causal pathway between physical and mental health) and then constrained paths between physical health and general well-being and between general well-being and mental health to be zero (including only a direct path between physical health and

mental health). To support our hypothesis, the mediation model would have to demonstrate a better fit than the direct effect model and the regression coefficient of physical health on mental health would have to be reduced with the presence of the potential mediator, general well-being (Baron & Kenny, 1986; Frazier et al., 2004).

All SEM analyses were conducted using EQS for Windows Version 6.0 (Bentler, 1995). Standardized maximum likelihood estimations were used. Model fit was evaluated with chi-square statistics. A nonsignificant chi-square is generally regarded as an indication of a good fit. However, because this criterion is overly strict and sensitive to sample size, we used multiple fit indices. Following Hu and Bentler's (1998) recommendation, comparative fit index (CFI) and standardized root mean square residual (SRMR) values are reported. By convention, CFI values exceeding .95 and SRMR values less than .08 signify good model fit. In determining a better fitting model, we use the chi-square difference between the nested models of interest.

## Results

### Psychometric Properties and Descriptive Information of the SF-36

Internal consistency of the eight domains of the SF-36 in both White and African American samples was acceptable to excellent. With the exception of the SF domain in the African American sample ( $\alpha = .69$ ), all Cronbach's alpha values exceeded .70, a minimum acceptable level of reliability.

In a comparison of means, African Americans were shown to have better scores in the three physical domains (PF, RP, and BP) than Whites, whereas the scores of the domains representing the new third factor (GH and VT) were greater in Whites. No statistical difference was found in domains representing the mental health factor (SF, RE, and MH). Psychometric properties and descriptive information of the eight domains of the SF-36 are summarized in Table 1.

Reflecting the community-dwelling nonclinical nature of the samples, the distributions of the scores were skewed. To approximate a normal distribution, we conducted a square root transformation, and the transformed scores were used for SEM analyses.

### Intercorrelations Among Eight Domains of the SF-36

Correlations among domains of the SF-36 were calculated in each group. As shown in Table 2, domains of the SF-36 were positively associated at a significant level, with an exception for the relation between VT and RE in African Americans. Interitem correlations averaged .39 in the White sample, with a range of .12 to .60, and .48 in the African American sample, with a range of .11 to .71.

### Measurement Models

Measurement models were calculated for the two competing models (two-factor model and three-factor model). The first model included two latent constructs (with observed variables in parentheses): physical health (PF, RP, BP, and GH) and mental health (VT, SF, RE, and MH). The second model had three latent variables: physical health (PF, RP, and BP), general

well-being (GH and VT), and mental health (SF, RE, and MH). Separate analyses were conducted for each racial group.

An initial test of the two-factor model resulted in reasonable indices of fit for both Whites,  $\chi^2(19, N = 452) = 219.2, p < .001$ ; CFI = .84, SRMR = .07, and African Americans,  $\chi^2(19, N = 255) = 132.0, p < .001$ ; CFI = .89, SRMR = .07. The three-factor model subsequently tested yielded better fit indices for both Whites,  $\chi^2(17, N = 452) = 125.4, p < .001$ ; CFI = .92, SRMR = .05, and African Americans,  $\chi^2(17, N = 255) = 111.0, p < .001$ ; CFI = .91, SRMR = .06. The overall results suggest that the three-factor model is superior to the two-factor model in both Whites and African Americans.

In the three-factor model, all factor loadings of the observed variables were significant in each group, suggesting that the latent variables were well represented by their respective observed indicators. In addition, the three latent variables were significantly interrelated: physical health and mental health ( $r_{\text{Whites}} = .62, r_{\text{African Americans}} = .77, p \text{ values} < .05$ ), physical health and general well-being ( $r_{\text{Whites}} = .90, r_{\text{African Americans}} = .83, p \text{ values} < .05$ ), and general well-being and mental health ( $r_{\text{Whites}} = .69, r_{\text{African Americans}} = .76, p \text{ values} < .05$ ).

### Structural Models

The structural model of mediation was tested to assess whether the effect of physical health on mental health is mediated by general well-being. We began by testing a mediation model which posits a triangular relation among constructs. Then, we constrained the paths between physical health and general well-being and between general well-being and mental health to be zero. Fit indices and standardized regression coefficients of the models were compared to determine whether mediation model works better than the direct effect model in each group.

The overall fit of the mediation model was good,  $\chi^2(14, N = 452) = 125.4, p < .001$ ; CFI = .91, SRMR = .06, for Whites and  $\chi^2(14, N = 255) = 111.0, p < .001$ ; CFI = .90, SRMR = .06, for African Americans. When the paths between physical health and general well-being and between general well-being and mental health were constrained to be zero, the model fit became poorer,  $\chi^2(16, N = 452) = 435.7, p < .001$ ; CFI = .67, SRMR = .24, for Whites and,  $\chi^2(16, N = 255) = 273.5, p < .001$ ; CFI = .74, SRMR = .26, for African Americans. The significant difference in the chi-square values between the mediation model and the direct effect model in both Whites,  $\chi^2(2, N = 452) = 310.3, p < .001$ , and African Americans,  $\chi^2(2, N = 255) = 162.5, p < .001$ , confirms that the mediation model was a better fit for the data in both samples. It is notable that the association of physical health with mental health in the mediation model (standardized regression coefficient = .00,  $p > .05$  for Whites; .47,  $p < .05$  for African Americans) was reduced in comparison to that in the direct effect model (standardized regression coefficient = .76,  $p < .05$  for Whites; .65,  $p < .05$  for African Americans). Figure 1 summarizes the mediation models for Whites and African Americans.

### Discussion

The present study assessed structural and functional characteristics of domains in the SF-36 using community-based samples of older Whites and African Americans. Although the 8



domains of the SF-36 have been conventionally summarized into physical and mental health components (Ware et al., 2000), the uniqueness of the present study is its conceptualization of a three-factor model that provided a better fit across both study samples: physical health (PF, RP, BP), mental health (SF, RE, MH), and general well-being (VT and GH). In extending to a three-factor model, we also hypothesized that general well-being would serve as a mediator between physical and mental health. Analyses using SEM provided supportive evidence for our proposed hypotheses.

Psychometric properties of the SF-36 were good in both White and African American older adults. All domains of the SF-36, except for SF in African Americans, showed internal reliability coefficients greater than .70. Other studies with African American samples have also demonstrated similarly high levels of internal consistency (e.g., Johnson et al., 1995; Wolinsky et al., 2004). It is interesting to note that both Johnson and colleagues (1995) and Wolinsky and colleagues (2004) also reported a comparatively lower level of internal consistency in the SF domain. Further research exploring the individual items of the SF will be necessary to explain why it has such a low reliability among African Americans.

In mean level analyses, African Americans showed higher scores in the domains representing physical health but had lower scores in the domains representing general well-being. No statistical difference was found in the domains for mental health. All domains were highly interrelated in both groups. In general, the levels of interitem correlation were stronger in African Americans.

The role of the third factor studied in this article was of particular interest. Because numerous studies have reported that two domains, GH and VT, are cross-loaded in both physical and mental health (e.g., McHorney et al., 1993; Ware & Sherbourne, 1992; Wolinsky et al., 2004), it has been suggested to separate them as a third factor naming general well-being (e.g., Keller et al., 1998). A few studies have reported that the three-factor model has a better model fit than the conventional two-factor model (e.g., Anagnostopoulos et al., 2005; Keller et al., 1998), and a similar finding was observed in the present samples of older Whites and African Americans. Compared to the two-factor model, the three-factor model showed an improvement in multiple fit indices, and this finding held for both Whites and African Americans.

Although confirmation of the three-factor model across both samples was an important finding, central to the present investigation was an examination of the potential mediating role of general well-being in the linkages between physical and mental health. Our conceptualization was based on the facts that GH and VT are highly related to both physical and mental dimensions of health (e.g., McHorney et al., 1993; Ware & Sherbourne, 1992; Wolinsky et al., 2004) and that the mediating role of GH in health research has been well-established (e.g., Jang et al., 2004; Kahana et al., 1995; Martin et al., 2000). To our knowledge, examination of functional dynamics within the domains of SF-36, especially in diverse racial groups, has not been conducted.

Our analyses have provided evidence in support of the hypothesis that general well-being serves as an intervening step between physical and mental health. Support for the hypothesis

was found for both White and African American older adults. In both groups, the mediation model exhibited a better model fit than the direct effect model. Also, the significant association between physical health and mental health constructs either became nonsignificant or decreased when general well-being was introduced into the model. Meeting the criteria for mediations (e.g., Baron & Kenny, 1986; Frazier et al., 2004), our findings indicate that the effect of physical health on mental health is mediated through general well-being. It is notable that the same pattern of mediation exists for both older Whites and African Americans. Although the intervening role of health perceptions between physical and mental health has been previously reported (e.g., Jang et al., 2004; Kahana et al., 1995; Martin et al., 2000), our findings showed that vitality along with health perceptions represents general well-being and plays its role as a mediator.

The mediation model of general well-being identified in the present analysis offers insights for interventions to promote physical and mental health in diverse older populations. Our findings suggest that even under limited physical health conditions, the mental health of older adults can be maintained or enhanced by a robust sense of general well-being such as optimistic beliefs and positive attitudes toward health and feelings of vitality. Because the consequences of physical health on mental health are mediated by general well-being, interventions may do well by targeting the latter construct. By fostering positive perceptions of personal health and sense of vitality, older individuals may be protected from the negative emotional consequences of physical health problems in later years of life. Educational and psychosocial intervention programs to enhance general well-being are expected to bring mental health benefits to older adults faced with health-related challenges.

Some limitations to the present study need to be noted. Because of the use of geographically defined samples and a cross-sectional study design, we cannot generalize the findings to the national level or draw causal inferences. Given the nature of the samples, the findings are only suggestive and await further investigation. Future studies should also include more representative samples, diverse racial/ethnic groups, objective health indicators, and longitudinal follow-ups to advance the assessment of the dynamics of physical and mental health in a multicultural context.

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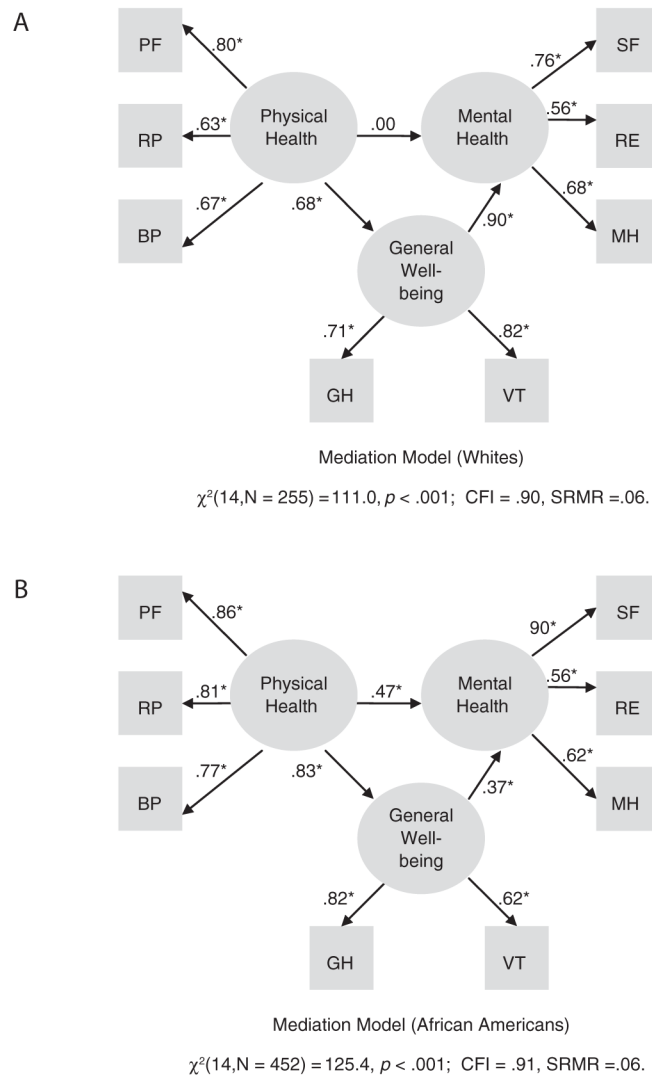
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**Figure 1. Mediation Models for Whites (A) and African Americans (B)**

Note: PF = physical function; RP = role physical; BP = bodily pain; GH = general health perception; VT = vitality; SF = social functioning; RE = role emotional; MH = mental health; CFI = comparative fit index; SRMR = standardized root mean square residual.

\* $p < .05$ .

**Table 1**  
Psychometric Properties and Descriptive Information of the Eight Domains of the Short Form-36 Health Survey

Domain	Whites			African Americans			<i>t</i>
	<i>α</i>	<i>M</i>	<i>SD</i>	<i>α</i>	<i>M</i>	<i>SD</i>	
Physical function (10 items)	.91	77.3	23.6	.92	84.9	19.6	-4.33***
Role physical (4 items)	.86	78.4	34.0	.83	84.1	29.4	-2.21*
Bodily pain (2 items)	.87	72.6	23.5	.87	79.3	19.4	-3.85***
General health perception (5 items)	.76	74.2	18.3	.83	60.4	17.1	9.87***
Vitality (4 items)	.85	64.7	19.9	.70	54.6	14.5	7.11***
Social functioning (2 items)	.82	90.0	20.1	.69	91.9	15.5	-1.21
Role emotional (3 items)	.85	94.6	19.8	.81	94.1	19.9	0.32
Mental health (5 items)	.79	83.2	14.1	.76	82.6	11.4	0.58

\*  $p < .05$ .

\*\*\*  $p < .001$ .

Table 2

Correlations Among Eight Domains of the Short Form-36 Health Survey for older Whites and African Americans

	PF	RP	BP	GH	VT	SF	RE	MH
Physical function (PF)								
Whites	—							
African Americans	—							
Role physical (RP)								
Whites	.56***	—						
African Americans	.71***	—						
Bodily pain (BP)								
Whites	.51***	.49***	—					
African Americans	.65***	.66***	—					
General health perception (GH)								
Whites	.58***	.37***	.40***	—				
African Americans	.62***	.47***	.56***	—				
Vitality (VT)								
Whites	.60***	.48***	.48***	.59***	—			
African Americans	.44***	.35***	.34***	.53***	—			
Social functioning (SF)								
Whites	.35***	.48***	.40***	.32***	.43***	—		
African Americans	.60***	.63***	.64***	.52***	.45***	—		
Role emotional (RE)								
Whites	.19***	.21***	.12*	.20***	.28***	.47***	—	
African Americans	.30***	.31***	.35***	.32***	.11	.51***	—	
Mental health (MH)								
Whites	.28***	.22***	.28***	.39***	.45***	.47***	.49***	—
African Americans	.42***	.37***	.39***	.52***	.53***	.55***	.40***	—

\*  $p < .05$ .\*\*  $p < .01$ .

.100 > *p*  
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