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## Hostility and quality of life among Hispanics/Latinos in the HCHS/SOL Sociocultural Ancillary Study

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### Abstract

**Objective**—The purpose of this study was to determine if hostility is associated with physical and mental health-related quality of life (QoL) in U.S. Hispanics/Latinos after accounting for depression and anxiety.

**Methods**—Analyses included 5,313 adults (62% women, 18–75 years) who completed the ancillary sociocultural assessment of the Hispanic Community Health Study/Study of Latinos. Participants completed the Center for Epidemiological Studies Depression Scale, Spielberger Trait Anxiety Scale, Spielberger Trait Anger Scale, Cook-Medley Hostility cynicism subscale, and Short Form Health Survey. In a structural regression model, associations of hostility with mental and physical QoL were examined.

**Results**—In a model adjusting for age, sex, disease burden, income, education and years in the U.S., hostility was related to worse mental QoL, and was marginally associated with worse physical QoL. However, when adjusting for the influence of depression and anxiety, greater hostility was associated with better mental QoL, and was not associated with physical QoL.

**Conclusions**—Results indicate observed associations between hostility and QoL are confounded by symptoms of anxiety and depression, and suggest hostility is independently associated with better mental QoL in this population. Findings also highlight the importance of differentiating shared and unique associations of specific emotions with health outcomes.

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**Compliance with Ethical Standards.** Authors declare that they have no conflict of interest. All procedures, including the informed consent process, were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

## Keywords

Hostility; Anger; Negative affect; Quality of life; Hispanic/Latino

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## Introduction

Hostility, characterized by aggressive behavior, angry affect, and an attitude of cynicism and mistrust, is associated with poorer mental and physical health. Hostility has been linked to elevated risk of disease (Chida & Steptoe, 2009; Miller, Smith, Turner, Gujjarro, & Hallet, 1996), death (Miller et al., 1996) and mental illness (Posternak & Zimmerman, 2002; Stewart, Fitzgerald, & Kamarck, 2010). Theoretical models suggest these associations are related to the experience of excessive stressors coupled with limited coping resources or protective factors in hostile individuals (Smith, 1992; Smith & Christensen, 1992). A number of mechanisms including poor coping styles (Vandervoort, 2006), heightened physiological reactivity to stressors (al'Absi & Bongard, 2006; Hardy & Smith, 1988), poor health behavior engagement (Everson et al., 1997; Scherwitz et al., 1992) and difficulties with interpersonal relationships (Hardy & Smith, 1988; Smith, Glazer, Ruiz, & Gallo, 2004) may contribute to the increased vulnerability to mental and physical illness associated with heightened hostility. Researchers have also suggested the experience of negative emotions, like hostility, may contribute to detrimental effects of social stressors on health in ethnic minority groups through these mechanisms (Brondolo et al., 2011; Gibbons et al., 2010; Gibbons et al., 2014; Hart & Hope, 2004).

The above hypotheses have received support from prior research conducted among Hispanics/Latinos. For example, results of a prospective study indicated hostility is related to heightened interpersonal conflict, poorer health behaviors, and increased somatic symptoms of depression among Mexican Americans (Miller, Markides, Chiriboga, & Ray, 1995). Greater hostility has also been shown to be related to increased inflammation in Mexican American women (Shivpuri et al., 2011). Understanding relationships between emotions and health may be particularly important among Hispanics/Latinos who face a number of unique social stressors and constitute the largest ethnic minority group in the US (French & Chavez, 2010; Gallo et al., 2014).

The overall association between hostility and health may be confounded by the more general trait, negative affectivity. Negative affectivity refers to a disposition to experience aversive emotional states, including anger, depression, and anxiety (Watson & Clark, 1984). As such, individuals high in negative affectivity have a tendency to report greater distress, discomfort, and dissatisfaction (Watson & Clark, 1984; Watson & Pennebaker, 1989). This confounding between negative affectivity and somatic complaints may contribute to an overestimation of the relationships between individual emotions and health outcomes (Costa & McCrae, 1987; Watson & Pennebaker, 1989) as observed estimates may reflect the shared influence of negative affectivity on health rather than the unique contribution of a specific emotion (Suls & Bunde, 2005).

A significant proportion of variance in hostility scores is accounted for by negative affectivity (Han, Weed, Calhoun, & Butcher, 1995). This overlap may result in an inflation

of estimated associations between hostility and the risk and protective factors thought to function as explanatory variables in the association between hostility and health (Hart & Hope, 2004). Indeed, negative affectivity and hostility are thought to influence disease risk through similar mechanisms. However, although negative emotions tend to overlap, they possess distinctive qualities that differentiate experiences (Clark, Beck, & Stewart, 1990; Keller et al., 2000; Watson et al., 1995). For example, cognitive (Lerner & Tiedens, 2006) and motivational attributes (Carver & Harmon-Jones, 2009; Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009) unique to hostility serve to distinguish the construct from depression and anxiety. Previous studies suggest that in contrast to fear and sadness, feelings of anger are associated with approach motivation (Carver & Harmon-Jones, 2009; Harmon-Jones et al., 2009). While hostility likely impacts health via mechanisms shared with depression, anxiety, and other traits associated with negative affect, distinctive features of hostility may independently related to health outcomes (Kubzansky, Cole, Kawachi, Vokonas, & Sparrow, 2006). These unique associations may only be demonstrable in statistical models that adequately control for the conceptual overlap among hostility and other negative emotions as the study of individual negative emotions in isolation may obscure or misrepresent associations with outcomes of interest.

Health-related quality of life (QoL) is a subjective component of health that represents an individual's perception of his or her physical, social and emotional functioning and well-being and is an important predictor of health care utilization (DeSalvo, Fan, McDonnell, & Fihn, 2005; Dominick, Ahern, Gold, & Heller, 2002) and mortality (Brown, Thompson, Zack, Arnold, & Barile, 2013; DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Dominick et al., 2002; Idler & Benyamini, 1997; Li et al., 2011; Murray, Brett, Starr, & Deary, 2011). Studies have demonstrated associations between a number of psychosocial factors and QoL (Hawkes et al., 2013; Julkunen & Ahlstrom, 2006; Low & Molzahn, 2007; Wang, Sereika, Styn, & Burke, 2013) including negative affectivity (Kressin, Spiro, & Skinner, 2000) and hostility (Julkunen & Ahlstrom, 2006; Kivimäki et al., 2002), as well as depression (Taylor, Sander, Taylor, & Baker, 2011; Yamout et al., 2013) and anxiety (Taylor et al., 2011; Volz et al., 2011). However, relationships between hostility and QoL in the U.S. Hispanic/Latino population have not been described. Additionally, little is known about the conceptual overlap among negative emotions or shared versus unique associations between hostility and health in this population. Increased understanding of these relationships is particularly relevant in efforts to maintain or improve health outcomes among U.S. Hispanics/Latinos who may be especially vulnerable to psychosocial risk factors (Gallo et al., 2014).

The purpose of this study was to determine if hostility is uniquely associated with mental and physical QoL in Hispanic/Latino men and women in the U.S., after controlling for symptoms of depression and anxiety and covariance among depression, anxiety and hostility. We adjusted for expected covariation among depression, anxiety and hostility, due to negative affectivity, using a latent variable approach. We then examined the association between the residual variance within hostility and quality of life outcomes in a structural regression model. We hypothesized inverse bivariate associations between hostility and QoL outcomes would be partially attenuated after adjusting for depression and anxiety.

## Methods

### Participants and Study Design

The Hispanic Community Health Study / Study of Latinos (HCHS/SOL) is a community based prospective cohort study of 16,415 self-identified Hispanic/Latino adults aged 18–74 at the time of screening. The goal of the HCHS/SOL is to identify factors related to the prevalence and development of disease in Hispanic/Latino populations, and quantify all-cause mortality, cardiovascular disease, and pulmonary disease over time. Participants were randomly selected using a two-stage probability sample from households in four U.S. field centers (Bronx, NY; Chicago, IL; Miami, FL; San Diego, CA), with the goal of achieving a sample broadly representative of the Hispanic/Latino populations living in communities surrounding each field center. Individuals who were unable to complete study questionnaires in English or Spanish, were unable to attend the clinic examination, or had plans to move within 6 months were excluded.

The HCHS/SOL was conducted under the oversight of institutional review boards at the coordinating center institution and each field center. All participants provided informed consent prior to data collection. Participants underwent a comprehensive baseline examination, including physiological, behavioral and sociodemographic assessments. Additional details related to sample design, cohort selection and study implementation have been previously described (Lavange et al., 2010; Sorlie et al., 2010). The HCHS/SOL Sociocultural Ancillary Study aims to identify sociocultural and psychosocial risk and protective factors for health in Hispanics/Latinos. Participants were eligible if they completed the parent study examination, agreed to being contacted for future research, and were willing to attend a separate field center visit within 9 months of their baseline examination. The Sociocultural Ancillary Study subsample was broadly representative of the entire HCHS/SOL cohort with the exception of lower participation among higher SES strata. Of the 6,246 parent study participants contacted, 5,313 agreed to participate in the ancillary study and 88% of participants completed the sociocultural assessment within 6 months of the clinical baseline examination (Gallo et al., 2014). The sociocultural assessment battery was administered by bilingual research assistants during a 1–2 hour interview in English (19%) or Spanish (81%) according to participant preference. Additional information related to the Sociocultural Ancillary Study design and procedures is described elsewhere (Gallo et al., 2014).

### Measures

Demographic information, including age, sex, income, education, years in the US, medical history, and QoL measures were collected during the clinical baseline examination as part of the HCHS/SOL parent study. Psychosocial measures (anger, cynicism, depression, and anxiety) were administered during the sociocultural assessment. Measures not previously available in Spanish were translated using forward and back translation with reconciliation (Maneesriwongul & Dixon, 2004). All psychosocial measures demonstrated structural invariance across English and Spanish-speaking respondents (Gallo et al., 2014), suggesting these measures assess the same constructs in both groups (Dimitrov, 2010).

**Disease burden**—As there is no universally accepted measure of objective health status, data from the medical history questionnaire was used to provide an estimate of overall disease burden. This item was calculated by summing the number of self-reported diagnoses including diabetes, liver disease, kidney disease, cancer, sleep disorders, migraines, and cardiovascular and respiratory diseases. Disease burden was entered as a continuous covariate in all structural regression analyses. Additional models treating the variable as a categorical covariate yielded similar results (*data not shown*).

**Quality of life (QoL)**—The 12-item Short Form Health Survey (SF-12) (Gandek et al., 1998) was developed to assess QoL large-scale health studies. The SF-12 provides mental and physical component summary scores and has demonstrated validity and reliability in diverse populations (Cheak-Zamora, Wyrwich, & McBride, 2009; Ware, Kosinski, & Keller, 1996). Scores were transformed according to QualityMetrics (Ware, Kosinski, & Dewey, 2000) instructions and standardized in order to compare to population norms.

**Depressive symptoms**—Depressive symptoms were measured using the Center for Epidemiological Studies of Depression Scale –10 (CES-D-10) (Irwin, Artin, & Oxman, 1999), a brief, self-report questionnaire that assesses depressive symptoms experienced by the respondent during the past week. Possible scores for the CES-D-10 range from 0 – 30. Cronbach’s alpha for this measure was .82 for participants responding in both English and Spanish, indicating good internal consistency in this cohort.

**Anxiety**—A 10-item version of the Spielberger Trait Anxiety Scale (STAI) (Spielberger, Gorsuch, & Lushene, 1970) was used to assess the tendency to feel apprehension, tension, nervousness, and worry. Possible scores range from 0 to 40 with higher scores indicating greater anxiety proneness. This measure showed good internal consistency in this sample with Cronbach’s alpha of .92 and .94 for English and Spanish versions, respectively.

**Anger**—A 10-item version of the Spielberger Trait Anger Scale (STANG) (Spielberger, 1988) was used to assess the frequency and degree of the experience of anger, the affective component of hostility. Possible scores range from 0 – 40. Cronbach’s alpha was .87 and .85 for English and Spanish versions, respectively.

**Cynicism**—The 13-item Cook-Medley cynicism subscale (CMc) (Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989) was used to assess cognitive patterns associated with hostility, characterized by negative beliefs and mistrust of others. A Cronbach’s alpha of .82 and .77 for English and Spanish versions respectively indicated good internal consistency. Possible scores on this measure range from 0 – 13 with greater scores indicating more cynical attitudes.

## Statistical Analyses

All analyses were performed using SAS 9.3 software (SAS Institute, Cary, NC) and Mplus version 6.12 (Muthén & Muthén, 2010). Reported values are weighted to account for sampling design, stratification, and differential nonresponse, and calibrated according to 2010 Census characteristics for the target communities by age, sex, and Hispanic

background. Data were examined for normality and outliers. Means and standard deviations for baseline values of study variables by sex, and bivariate correlations among study variables, were calculated.

A measurement model specifying two correlated latent constructs: “Hostility” and “Depression and Anxiety” was tested. “Hostility” was conceptualized as an unobserved construct accounting for shared variance among affective and cognitive components of hostility, cynicism and anger (Martin, Watson, & Wan, 2000; Suls & Bunde, 2005). Indicators for the “Hostility” construct were STANG and CMC total scores. Previous research suggests correlations among depression and anxiety constructs are stronger compared to correlations of either with hostility (Friedman & Booth-Kewley, 1987; Suls & Bunde, 2005). Therefore, a latent “depression and anxiety” construct was specified with CES-D-10 and STAI total scores serving as observed indicators. Studies have also shown that measures of anxiety, depression, and hostility load onto a common dimension of negative affectivity (Bleil, Gianaros, Jennings, Flory, & Manuck, 2008; Crawford & Henry, 2004). Therefore, to account for the shared influence of negative affectivity, a correlation was specified between “Hostility” and “Depression and Anxiety” constructs. Model fit was evaluated according to the following criteria: comparative fit index (CFI)  $.95$ , and root mean square error of approximation (RMSEA)  $< .06$  and standard root mean square residual (SRMR)  $< .08$  (Schreiber, Nora, Stage, Barlow, & King, 2006).

Next, structural regression models were specified to evaluate the relationships between “Hostility” and mental QoL and physical QoL. Associations are reported as unstandardized regression coefficients (bs). We first examined the association between “Hostility” and QoL adjusting for age, sex, income, education, years in the US and chronic disease burden. Path coefficients indicate the extent to which shared variance among anger and cynicism measures (or “Hostility”) relates to mental and physical QoL. We then examined this association while also adjusting for the latent variable “Depression and Anxiety” (See Figure 1). This estimate reflects the extent to which the “Hostility” construct relates to QoL after removing variance shared with “Depression and Anxiety”. Williams and Anderson (1994) proposed a similar model using latent variables to account for method effects associated with negative affectivity (Williams & Anderson, 1994). In all models, age and disease burden were mean centered to aid interpretation. We used the Satorra-Bentler scaled chi-squared difference test to examine the influence of gender and language preference on hypothesized relationships. Associations between hostility and QoL outcomes did not vary as a function of participant sex or language preference (*data not shown*). An alpha level of  $.05$  was used to indicate statistical significance for all analyses. Data were assumed to be missing at random and full information maximum likelihood was used to estimate parameters.

## Results

Table 1 displays weighted sample characteristics by sex [Table 1 near here]. Table 2 displays bivariate correlations (Pearson’s  $r$ ) among study variables. As expected, depressive symptoms, anxiety, anger and cynicism were all positively correlated with each other,  $ps < .001$ , as well as with self-reported disease burden,  $ps < .001$ . Additionally, both mental and physical QoL were negatively related to depression, anxiety, anger and cynicism total scores,

as well as to disease burden,  $p$ s < .001. These results indicate that individuals who reported experiencing more symptoms of depression, anxiety, anger, and cynical attitudes reported worse subjective physical and mental health-related functioning [Table 2 near here].

The measurement model specifying 2 latent factors: “Depression and Anxiety” and “Hostility” demonstrated good fit of the data, CFI = 1.00, RMSEA = <.001, 90% C.I. [<.001 - <.001], SRMR < .001. All standardized factor loadings were statistically significant and greater than 0.4 indicating a significant proportion of variability observed among indicators was related to underlying, unobserved constructs “Depression and Anxiety” and “Hostility”. There was a significant positive correlation between “Depression and Anxiety” and “Hostility”,  $r = .78$ ,  $SE = .025$ ,  $p < .001$ , suggesting a higher order factor, such as negative affectivity, may account for shared variability among depression, anxiety, anger and cynicism. The measurement model accounted for 49.9% of the variance observed in STANG total scores, 19.8% of the variance in CMc total scores, 60.9% of the variance in CES-D-10 scores, and 80.1% in STAI total scores ( $p$ s < .001).

Results of structural regression modeling are presented in Table 3 [Table 3 near here]. In a model adjusting for age, sex, disease burden, income, education and years in the US, “Hostility” was related to worse mental QoL ( $b = -0.761$ ,  $SE = .23$ ,  $p < .001$ ) and was marginally associated with worse physical QoL ( $b = -0.135$ ,  $SE = .07$ ,  $p = .064$ ). However, when adjusting for the influence of “Depression and Anxiety”, greater “Hostility” was related to *better* mental QoL ( $b = 0.649$ ,  $SE = .25$ ,  $p = .008$ ), and was not associated with physical QoL ( $b = 0.084$ ,  $SE = .15$ ,  $p = .59$ ) [Figure 1 near here]. Analyses completed with anger and cynicism as separate, individual predictors of mental and physical QoL yielded a similar pattern of results (*data not shown*). In contrast, “Depression and Anxiety” was related to worse mental QoL ( $b = -1.564$ ,  $SE = .17$ ,  $p < .001$ ) in the fully adjusted model, but was not associated with physical QoL ( $b = -0.144$ ,  $SE = .12$ ,  $p = .216$ ). Overall, this model accounted for 34.2% and 24.8% of the variance in mental and physical QoL scores, respectively.

## Discussion

This study aimed to further elucidate relationships between hostility and health by examining the association between hostility and QoL before and after adjusting for the confounding influence of negative affect. Results indicate that hostility is uniquely and positively related to mental QoL and is not associated with physical QoL in this sample of U.S. Hispanic/Latino adults after accounting for the influence of negative affect. Maintenance of psychological well-being may be especially important within this population as researchers have hypothesized that ethnic health disparities are partially attributable to the experience of psychological distress (Myers, 2009), and that hostility, specifically, may play an instrumental role in the health of ethnic minority populations (Brondolo et al., 2011). Further, self-rated mental health is a robust predictor of mortality independent of physical health status (Myint et al., 2007). Previous research indicates individuals who report greater levels of hostility may be more likely to experience stressors, exhibit greater reactivity to stressors, or have limited resources to cope with stressors resulting in a relative imbalance of health risk and protective factors and a heightened vulnerability to illness (Hart & Hope,

2004; Smith & Ruiz, 2002). Our findings suggest hostility is related to poorer health-related physical and mental functioning only inasmuch as it is related to increased depression and anxiety symptoms. After accounting for the considerable influence of depression and anxiety, individuals reporting greater hostility reported no differences in physical-health related functioning and *better* mental health-related functioning.

While hostility was related to worse physical QoL in unadjusted analyses, we did not observe an independent association between hostility and physical QoL after adjusting for anxiety and depression. This would suggest associations between hostility and physical functioning are not uniquely related to hostility but are instead accounted for by common variance shared among hostility, depression, and anxiety constructs. In previous studies examining the association of hostility with general health, hostility predicted lower self-rated health among women (Kivimäki et al., 2002) and hypertensive patients (Julkunen & Ahlstrom, 2006); however, these effects were shown to be attributable to decreased “sense of coherence”, a construct closely related to negative affect that represents perceived comprehensibility, manageability, and meaningfulness of life events (Kravetz, Drory, & Florian, 1993). Similarly, other studies have identified negative affect, or general distress, as the common psychological factor accounting for the association between hostility and impaired cardiac function (Bleil, Gianaros, Jennings, Flory, & Manuck, 2008) and incident CHD (Kubzansky et al., 2006). These studies support the notion that associations between hostility and negative health outcomes may, in fact, be attributable to the confounding influence of negative affect. Together with previous results, results of the present study suggest that future analyses examining associations between hostility and health outcomes should adjust for the considerable influence of negative affect in addition to other covariates.

Previous studies have highlighted negative associations between hostility and mental health (Ahmed, Kingston, DiGiuseppe, Bradford, & Seto, 2012; Miller et al., 1995; Posternak & Zimmerman, 2002; Stewart et al., 2010). For example, results of prior studies indicate symptoms of anger and aggression are common among mentally ill patients (Posternak & Zimmerman, 2002). There is also evidence that hostility predicts future increases in depressive symptoms and may serve as a maintenance factor in depressive disorders (Stewart et al., 2010). However, our findings suggest these associations may be attributable to the confounding influence of negative affectivity and suggest a protective association between hostility and mental health in Hispanic/Latino adults. These findings indicate that hostility has unique, positive associations with mental health-related functioning independent of those negative associations that are shared with depression and anxiety.

Characteristics that distinguish hostility from other negative emotions may account for the unexpected results obtained here. Studies have demonstrated that in contrast to depression and anxiety, hostility is associated with approach activation (Carver & Harmon-Jones, 2009; Lerner & Tiedens, 2006), as well as optimism, increased perceptions of control and greater motivation to act (Lerner & Tiedens, 2006). Further, according to interpersonal theory, expressions of hostility most closely related to depression and anxiety are characterized by submissiveness and isolation, as opposed to assertive or aggressive action (Gallo & Smith, 1999; Smith, Traupman, Uchino, & Berg, 2010). Therefore, among individuals reporting greater levels of hostility without corresponding increases in anxiety and depression, greater



levels of self-reported mental health-related QoL may be reflective of increased optimism, self-esteem or assertiveness. There is also evidence that relationships between hostility and mental health outcomes vary as a function of emotional expression. For example, prior studies have shown that distinct patterns of anger expression relate to the prevalence of mental illness diagnoses among hostile individuals (Ahmed et al., 2012; Kopper & Epperson, 1996). Similarly, other studies have shown that mode of expression can influence physical health parameters. For example, while constructive anger verbal behavior is associated with lower blood pressure (Davidson, MacGregor, Stuhr, Dixon, & MacLean, 2000), destructive anger expression is associated with increased risk of coronary heart disease (Davidson & Mostofsky, 2010). Therefore, an additional explanation for the present findings may be that hostility in the absence of depression and anxiety is more likely to be expressed constructively.

The potential influence of Hispanic/Latino cultural values and beliefs on the present results merits consideration (Marin & Marin, 1991). The potentially protective features of hostility described above may be highlighted within Hispanic/Latino cultures where values such as *simpatia* and fatalism cultivate passivity, avoidance of confrontation, and a decreased sense of control among individuals identifying with these groups (Marin & Marin, 1991). Additionally, the experience and expression of various negative emotional states may be altered in the context of culturally influenced beliefs (Matsumoto, 1993), and/or culturally bound syndromes such as *ataque de nervios* (or “attack of nerves”) which has been linked to fear or intolerance of negative emotions and their associated somatic symptoms among Caribbean Latinos (Hinton, Lewis-Fernández, & Pollack, 2009). As intersections between culture and emotion are inherently complex, additional studies are needed to determine whether results obtained here are unique to the U.S. Hispanic/Latino population.

A major strength of this analysis was the use of a statistical model that allowed adjustment for the considerable overlap present among negative emotions, as well as the evaluation of independent associations between hostility and mental and physical QoL. This study did not include a direct measure of negative affect, which was conceptualized here as an unobserved construct accounting for shared variance among depressive symptoms, anxiety and cynicism and anger (Watson & Clark, 1984). While we were able to support the hypothesis that relationships between hostility and health-related QoL are confounded by negative affect, further conclusions as to the nature of this confounding effect or as to the direction of these effects could not be drawn due to the availability of only one wave of data. These results are also limited by our reliance on brief, self-report instruments for the measurement of complex psychological constructs as well as lack of adjustment for a number of demographic characteristics that may impact quality of life. Finally, our latent hostility construct did not include measures of anger expression or aggressive behavior. This may have affected results as individual components of hostility may have differential associations with health outcomes (Dujovne & Houston, 1991; Richards, Hof, & Alvarenga, 2000) as well as with depression and anxiety (Smith et al., 2010). Further, variations in anger expression tendencies have been shown to relate to mental (Ahmed et al., 2012; Kopper & Epperson, 1996) and physical health outcomes (Davidson et al., 2000; Davidson & Mostofsky, 2010).

These findings indicate that the relationship between hostility and QoL is confounded by co-varying symptoms of anxiety and depression and again highlight the importance of differentiating shared and unique associations between emotions and health outcomes. An additional strength of the present study is the inclusion of a large, diverse sample of Hispanics/Latinos. Previous research describing hostility in Hispanics/Latinos has been limited to Mexican American samples (Miller et al., 1995; Shivpuri et al., 2011). While the present results are generalizable to Hispanic/Latino adults in the target communities, future studies should examine these associations in other populations as previous research has shown that social effects (Adam & Shirako, 2013) and health correlates of emotions may vary as a function of ethnic background (Williams, Steptoe, Chambers, & Kooner, 2011). Additional studies are also needed to clarify directionality, as well as examine specific mechanisms that may explain associations between hostility and health-related quality of life.

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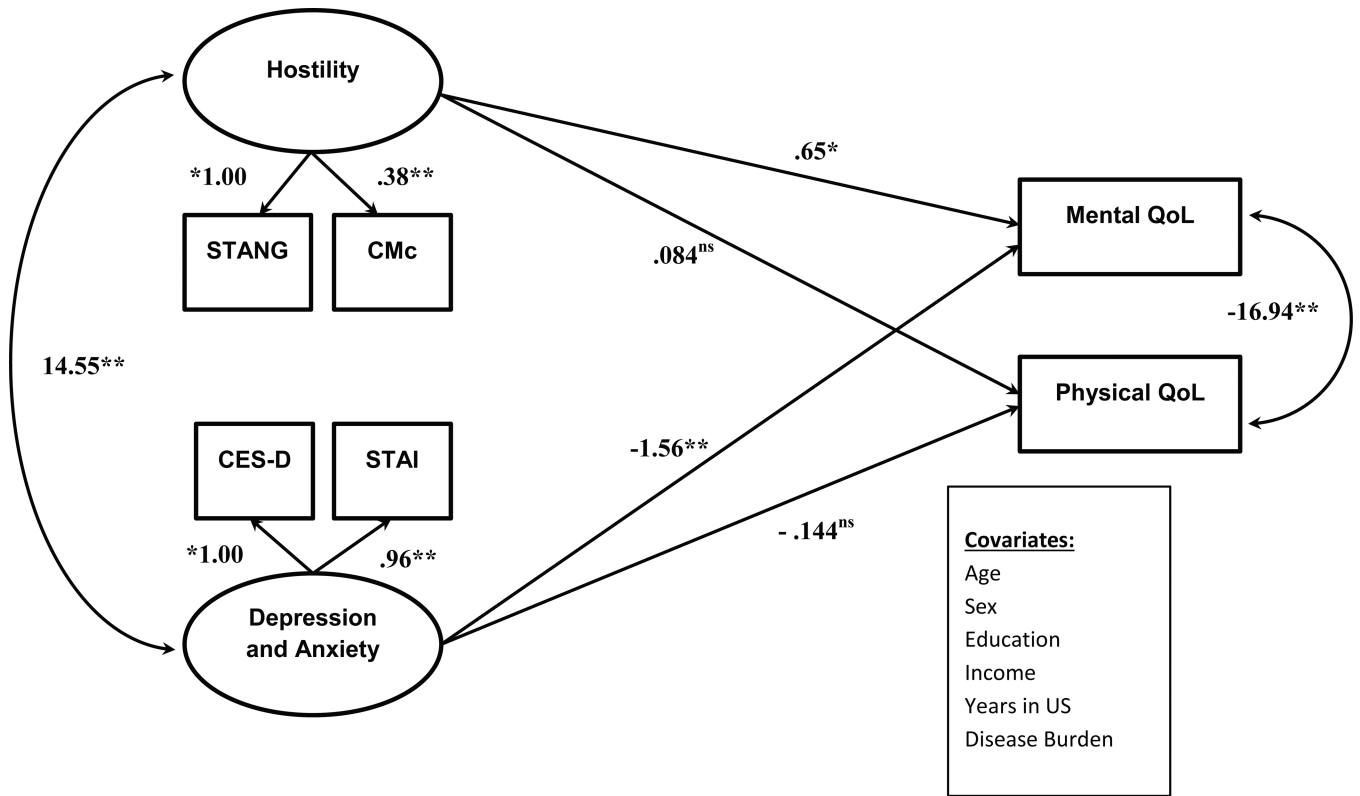
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**Figure 1.** Final model displaying unstandardized path coefficients for hypothesized associations. All associations are adjusted for covariates age, sex, education, income, years in the US and disease burden. \* indicates  $p < .01$ ; \*\* indicates  $p < .001$ . Abbreviations: *CES-D-10* – 10 item Center for Epidemiological Studies of Depression Scale; *CMc*– Cook-Medley cynicism scale; *STANG*– Spielberger Trait Anger Scale; *STAI*– Spielberger Trait Anxiety Scale; *QoL* – health-related quality of life.

**Table 1**Sample characteristics<sup>a</sup>

Variable (Range)	Men M (SE)  n (%)	Women M (SE)  n (%)	Total M (SE)   n (%)	n missing
N	2,014	3,299	5,313	
Age (18–74)	45.8 (0.32)	47.2 (0.23)	46.6 (0.19)	0
Born in US	424 (21.1 %)	540 (16.4 %)	964 (18.2 %)	11
Years in US	20.0 (0.35)	18.9 (0.26)	19.3 (.21)	975
Education ( 10 years)	698 (34.7%)	1,225 (37.2%)	1,923 (36.3%)	9
(11–12 years)	596 (29.6%)	787 (23.9%)	1,383 (26.1%)	
(13+ years)	719 (35.7%)	1,279 (38.9%)	1,998 (37.7%)	
Income (< \$30,000)	1,295 (64.3%)	2,345 (71.1%)	3,640 (68.5%)	0
( 30,000)	643 (31.9%)	736 (22.3%)	1,379 (26.0%)	
(missing)	76 (3.8%)	218 (6.6%)	294 (5.5%)	
Disease Burden (0–22)	2.2 (0.05)	2.8 (0.04)	2.6 (0.03)	2
Center for Epidemiological Studies of Depression Scale-10 (0–30)	7.1 (0.12)	8.3 (0.11)	7.8 (0.08)	41
Cook Medley Cynicism Scale (0–13)	8.6 (0.07)	8.0 (0.06)	8.3 (0.05)	41
Spielberger Trait Anger Scale (0–40)	16.9 (0.12)	16.8 (0.09)	16.8 (0.07)	38
Spielberger Trait Anxiety Scale (0–40)	17.1 (0.11)	18.2 (0.10)	17.8 (0.07)	40
Mental Quality of Life (0–100)	50.9 (0.24)	46.8 (0.21)	48.3 (0.16)	42
Physical Quality of Life (0–100)	49.6 (0.22)	48.0 (0.18)	48.6 (0.14)	42

<sup>a</sup>Statistics are unweighted count (n) and sample design weighted percent (%), mean and standard error (SE). Weights are based on sampling design, stratification, and differential nonresponse, and calibrated according to 2010 census characteristics for the target communities by age, sex, and background.



Table 2

Bivariate correlations among study variables

	CES-D-10	Cynicism	STANG	STAI	Mental QoL
CES-D-10	-				
Cynicism	.258	-			
STANG	.443	.305	-		
STAI	.699	.290	.496	-	
Mental QoL	-.449	-.112	-.239	-.449	-
Physical QoL	-.157	-.068	-.067	-.146	.058

Abbreviations: *CES-D-10* – 10 item Center for Epidemiological Studies of Depression Scale; *STANG* – Spielberger Trait Anger Scale; *STAI* – Spielberger Trait Anxiety Scale; *QoL* – Quality of life. All associations are statistically significant at  $p < .0001$ .

**Table 3**

Results of structural regression models

Model #	Predictor	Mental QoL			Physical QoL			
		Beta	SE	p-value	Beta	SE	p-value	
1	Hostility	-1.74	0.12	<.001	-0.14	0.07	.06	
	Age	0.01	0.03	.58	-0.05	0.02	<.001	
	Sex (Female)	-4.31	0.55	<.001	-0.16	0.35	.65	
	Disease	-0.98	0.14	<.001	-1.72	0.09	<.001	
	Education (11–12 years)	-0.76	0.75	.31	1.28	0.61	.035	
	Education (13+ years)	-0.76	0.65	.24	1.84	0.44	<.001	
	Income ( \$30,000)	1.67	0.56	.004	1.41	0.38	<.001	
	Income (missing)	1.67	1.03	.11	-0.55	0.65	.40	
	Years in US	-0.07	0.03	.031	-0.06	0.03	.013	
	2	Hostility	0.65	0.25	.008	0.08	0.15	.59
		Depression and Anxiety	-1.56	0.17	<.001	-0.14	0.12	.22
		Age	0.09	0.02	<.001	-0.05	0.02	.004
		Sex (Female)	-1.84	0.54	.001	0.07	0.35	.84
		Disease	-0.91	0.14	<.001	-1.72	0.09	<.001
Education (11–12 years)		0.34	0.64	.59	1.38	0.60	.022	
Education (13+ years)		0.18	0.54	.74	1.92	0.44	<.001	
Income ( \$30,000)		1.56	0.54	.004	1.40	0.37	<.001	
Income (missing)		1.70	0.93	.07	-0.55	0.64	.39	
Years in US		-0.05	0.03	.07	-0.06	0.03	.015	

Note: Reference group is men of average age with average disease burden, 0 years living in the US, less than high school education level and less than 30,000 annual household income.