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Characterizing Fatigue: The Effects of Ethnicity and Acculturation

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Abstract

It is unknown if fatigue measures like the Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF; Stein, Jacobsen, Blanchard, & Thors, 2004) appropriately describe fatigue in Hispanics or if acculturation plays a role in fatigue. This study compared fatigue in community samples of Hispanics and Anglos. The MFSI-SF and pertinent questionnaires were administered to adults in San Diego County via telephone survey. Some differences in fatigue were observed in initial comparisons between Hispanics and Anglos, including when acculturation was considered. When age and education were controlled, Hispanics reported less general fatigue than Anglos, regardless of acculturation status, $p = < .01$. Exploratory factor analyses indicate that the MFSI-SF general-fatigue subscale was problematic for Hispanics. Implications, limitations, and future directions are discussed.

Keywords

fatigue; ethnicity; acculturation; Hispanics

Fatigue as a construct is relatively understudied and new in psychology. Although there is no universal definition of fatigue (Anderson & Hacker, 2008; Gupta, Lis, & Grutsch, 2007), the National Institutes of Health's Patient-Reported Outcomes Measurement Information System (PROMIS) network adopted the definition of fatigue as "an overwhelming, debilitating, and sustained sense of exhaustion that decreases one's ability to carry out daily activities, including the ability to work effectively and to function at one's usual level in family or social roles" (Garcia et al., 2007, p. 5109). Fatigue is often resistant to improvement despite rest (Dimsdale, Ancoli-Israel, Ayalon, Elsmore, & Gruen, 2007). Fatigue can be an insidious experience and is negatively correlated with overall quality of life (e.g., Ahlberg, Ekman, & Gaston-Johansson, 2005; Fernandes, Stone, Andrews, Morgan, & Sharma, 2006; Gupta et al., 2007).

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Conflict of Interest Statement
The authors have no conflict of interest to disclose.

Appropriate inventories are needed to assess and understand fatigue accurately in order to implement effective symptom management and improve fatigued patients' functioning. Fatigue is almost entirely subjective, making the use of self-report methods essential (Stone, Richards, & Hardy, 1998). Some inventories, particularly earlier questionnaires, are brief, unidimensional measures that do not take into account the complex nature of fatigue or were specifically created for use in one population, such as cancer patients (e.g., Krupp, Alvarez, Larocca, & Scheinberg, 1988; Krupp, Larocca, Muir-Nash, & Steinberg, 1989; Lee, Hicks, & Nino-Murcia, 1990; Mendoza et al., 1999; Nail & Winningham, 1995; Okuyama et al., 2000; Rhoten, 1982; Wu, Wyrwich, & McSweeney, 2004). Other questionnaires that have been developed are multidimensional and have provided thoughtful insights on the varieties of the fatigue experience (Chalder et al., 1993; Hann et al., 1998; Kogi, Saito, & Mitsuhashi, 1970; Piper et al., 1989; Schwartz, Jandorf, & Krupp, 1993; Smets, Garssen, Bonke, & de Haes, 1995; Stein, Martin, Hann, & Jacobsen, 1998). These inventories, however, may need more research to clarify psychometric properties and factor structures. Moreover, these inventories may be challenging for respondents and treatment providers because of length, the lack of a meaningful total score to facilitate diagnosis, or because of questionable relevance to a specific clinical population. A valid, reliable, and empirically-supported instrument that allows for measurement of the multiple facets of fatigue in diverse populations would be a valuable contribution to the research and medical communities. The short form of the Multidimensional Fatigue Symptom Inventory (MFSI-SF, Stein, Jacobsen, Blanchard, & Thors, 2004) has begun to make such a contribution.

The MFSI-SF is a 30-item, abbreviated form of the original Multidimensional Fatigue Symptom Inventory (MFSI, Stein et al., 1998) composed of five subscales: general fatigue, emotional fatigue, vigor, mental fatigue, and physical fatigue. The MFSI-SF has demonstrated good reliability and validity, and confirmatory factor analyses support its subscales (Stein et al., 2004). Although the MFSI-SF was validated on cancer patients, the instructions do not refer to a specific disease or disorder; hence it has the potential to be useful in other populations. Indeed, the MFSI-SF has been utilized in studies of caregivers (Roepke et al., 2009), ethnic discrimination (Thomas, Bardwell, Ancoli-Israel, & Dimsdale, 2006), and sleep apnea (Tomfohr, Ancoli-Israel, Loredo, & Dimsdale, 2011). It is still unknown, however, if the MFSI-SF is a relevant and adequate assessment of fatigue in ethnically-diverse populations. Like several other fatigue inventories, the sample used to standardize the MFSI-SF was predominantly Anglo. The MFSI-SF is promising as a general measure of fatigue; however, questions remain regarding its reliability for the various ethnic groups in the United States (US).

The need for a suitable fatigue assessment is particularly salient for Hispanics living in the US. Hispanics comprise the largest US ethnic-minority group, with the proportion of Hispanics in the US projected to rise to 29% of the population by 2050 (Passel & Cohn, 2008). The growing population of Hispanics in the US makes it imperative that researchers and health-care providers understand the prevalence and the manifestation of fatigue as experienced among Hispanics. Research has been mixed as to whether or not rates of fatigue in Hispanics are higher than in other ethnic groups. Data from one community sample indicate that Hispanics are more fatigued than Anglos and have higher prevalence rates of chronic fatigue syndrome than do Anglos and African Americans (Jason et al., 1999; Song, Jason, & Taylor, 1999). Torres-Harding, Jason, and Taylor (2002), however, found that ethnicity does not predict fatigue severity among Hispanics, Anglos, and African Americans with chronic fatigue; in a more recent study of a multiethnic sample of elder adults, Hispanics were proportionately represented in participants categorized as struggling with anergia, or lack of energy (Cheng, Gurland, & Maurer, 2008). In addition, health problems such as fatigue often are affected by cultural perceptions about mind and body (Klonoff & Landrine, 1994; Torres-Harding, Jason, & Taylor, 2002). For example, Hispanics with

chronic fatigue report more physical symptoms are less likely to attribute their fatigue to physical factors than are African Americans or Anglos with chronic fatigue (Torres-Harding et al., 2002). Additionally, the use an acceptance coping-style among Hispanics with chronic fatigue is predictive of greater fatigue but less physical impairment; this pattern of prediction was not observed among other ethnic groups or in those using other coping styles, such as turning to religion (Njoku, Jason, & Torres-Harding, 2005).

Acculturation may well affect how fatigue is experienced among Hispanics Acculturation is a dynamic process by which a minority person adopts the majority's values and behaviors (Gordon, 1964). Acculturation thus refers to individual-level change and is different from person to person (Gibson, 2001). Acculturation to the US-lifestyle cannot be presumed by generational status and time spent within the United States, as many enclaves of Hispanic subgroups are present in the US which facilitate preservation of Hispanic culture and traditions (Schwartz, Pantin, Prado, Sullivan, & Szapocznik, 2006). It is possible that the perspectives and phenomenological experiences of highly-acculturated Hispanics are more akin to that of Anglos than to that of less-acculturated Hispanics. Therefore, it is crucial to incorporate the concept of acculturation when evaluating the appropriateness of any fatigue inventory for use with Hispanics. It is likely that acculturation impacts the similarities and differences in the fatigue experience between Hispanics and Anglos.

Some research has emerged pertaining to acculturation, fatigue, and Hispanics. Torres-Harding, Mason-Shutter, and Jason (2008) used language status as an indicator of acculturation and found that English-speaking Hispanics reported more fatigue than did Spanish-speaking Hispanics, particularly with regards to physical fatigue. Torres-Harding et al. suggest that English-speaking Hispanics may need to navigate between two cultures more so than do Spanish-speaking Hispanics, rendering English-speaking Hispanics more vulnerable to the stress of discrimination and associated poor-health outcomes. The authors further posit that Spanish-speaking Hispanics may be more participatory in their culture of origin, which may have protective factors. Torres-Harding et al. also note that language status is not a rigorous indicator of acculturation. Chimata, Jason, Taylor, and Torres-Harding (2006) used scores from the Acculturation Rating Scale for Mexican Americans-II (ARSMA-II; Cuellar, Arnold, & Maldonado, 1995) to assign Hispanic and African American participants to one of three acculturation statuses: assimilated, bicultural, and separated. There was no significant main effect for acculturation status on fatigue severity experienced by participants, and no significant relationship between fatigue severity experienced by participants. However, Chimata et al. did not analyze data from the Hispanic and African American subgroups separately, and they acknowledge that it is possible that the effects of these two groups' cultures and histories were lost in combining the two groups together. More research is warranted about fatigue and acculturation that uses a comprehensive measure of acculturation and is focused specifically on Hispanics.

It should also be noted that relatively little work has accumulated examining the structures of fatigue on which inventories are based, especially work that has included Hispanic participants. One exception is the research of Katerndahl, Amodei, Larme, and Palmer (2002), who found that the Energy/Fatigue subscale of the Medical Outcomes Study Short Form-36 (SF-36; Ware & Sherbourne, 1992) demonstrated adequate internal consistency but poor construct validity in a sample of English-speaking Hispanic adults from a primary-care setting. As a result, it is unclear if commonly-used inventories are appropriate conceptualizations of fatigue among Hispanics, especially of differing acculturation status.

The purpose of this exploratory study was to examine fatigue according to acculturation status and to evaluate the factor structure of the MFSI-SF in a Hispanic community sample. A community sample was utilized for two reasons. First, it is important to establish baseline

levels of fatigue in Hispanics which researchers and health-care providers can use for comparison with clinical samples. Second, ethnic minorities who are of lower socioeconomic statuses (SES) often do not have access to health care thus are excluded from research samples drawn from medical settings (Richman, Flaherty, & Rospenda, 1994). Anglos were chosen as a comparison group because the MFSI-SF was originally standardized in this ethnic group. We hypothesized that Hispanic participants' MFSI-SF scores would be significantly higher than those of Anglo participants. Based on the findings of Torres-Harding et al. (2008), it was also hypothesized that MFSI-SF scores would be significantly higher among highly-acculturated Hispanics than for less-acculturated Hispanics. Additionally, it was hypothesized that the MFSI-SF factor structure extracted from Hispanic respondents would show some differences from the original model.

Method

Participants

This study was approved by the Human Research Protection Program at the University of California, San Diego. Three hundred and thirty-four adults (≥18 years old) were recruited from June 2009 to September 2009 in San Diego County using random digit dialing as part of the Sleep Health and Knowledge in US Hispanics Study (Principal Investigator: Jose Loredo), a large population-based survey. Participants were eligible if they were able to participate in a telephone survey in English or Spanish and self-identified as Hispanics of Mexican descent or Anglo. No one was excluded on the basis of health status except for the hearing impaired.

Instruments

Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF)—The MFSI-SF consists of five subscales: General Fatigue (sample item: "I feel tired"), Physical Fatigue (sample item: "My muscles ache"), Mental Fatigue, (sample item: "I have trouble remembering things"), Emotional Fatigue (sample item: "I feel upset"), and Vigor (sample item: "I feel cheerful"). Participants provide their level of agreement to items on a 5-point Likert-type scale, with "0" indicating "not at all" and "4" indicating "extremely." Scores for each subscale are summed. Higher scores signify higher levels of fatigue for all subscales except the Vigor subscale. The Cronbach's alphas for the original sample were .87 – .96 (Stein et al., 2004). For this study, Cronbach's alphas for the subscales were calculated for each ethnic group. The Cronbach's alphas for less-acculturated Hispanic participants were as follows: General = .85; Physical = .83; Mental = .85; Emotional = .93; and Vigor = .82. The Cronbach's alphas for highly-acculturated Hispanic participants were as follows: General = .89; Physical = .85; Mental = .84; Emotional = .92; and Vigor = .86. The Cronbach's alphas for Anglo participants were as follows: General = .94; Physical = .81; Mental = .85; Emotional = .91; and Vigor = .89.

Short Acculturation Scale for Hispanics (SASH)—Hispanic participants were administered the SASH. The SASH is a 12-item assessment of the level of acculturation to mainstream-US culture (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-STABLE, 1987). The SASH is comprised of three subscales: Language Use (sample item: "In general, what language do you speak?"), Media (sample item: "In what language are the T.V. programs you usually watch?"), and Ethnic Social Relations (sample item: "Your close friends are…"). Participants indicate their responses to each statement on a 5-point Likert-type scale, with "1" signifying "only Spanish" ("All Latinos/Hispanics" for Ethnic Social Relations subscale) and "5" signifying "only English" ("All Americans/Anglo Americans" for Ethnic Social Relations subscale). Higher scores indicate higher levels of acculturation. Mean scores were calculated for all Hispanic participants. Participants whose scores were

equal to or less than 2.99 were placed into the “less-acculturated” group, and participants whose scores were greater than 2.99 were placed into the “highly-acculturated” group per established cut-offs (Marin et al., 1987). The SASH was developed for Hispanic samples and has good validity and reliability, with Cronbach’s alphas that range between .78 and .90 for the subscales and .92 for total scores (Marin et al., 1987). Cronbach’s alphas for the current sample were .87 for less-acculturated Hispanic participants and .71 for highly-acculturated Hispanic participants.

Procedure

Data were collected via a telephone survey. The survey was administered by trained, culturally competent interviewers utilizing a computer-assisted telephone interview program at California Survey Research Services Inc. in Van Nuys, CA. Zip codes with higher concentrations of Mexican Americans were oversampled to adjust for the racial/ethnic distribution of the San Diego County population. A computerized randomizing procedure was used to choose a single adult participant from each participating household. The informed-consent document described the study as an investigation of sleep habits and health and was read to the individual in the household chosen in the random-selection procedure. Participants provided verbal consent to participate. The interviewer proceeded to use a script to read all questions and response options to each participant. Participation in the study lasted approximately 30–40 minutes, and participants were mailed $25 for their participation.

Statistical Analyses

Descriptive statistics were performed for demographic data and for each instrument. Two one-way multivariate analyses of variance (MANOVAs) were conducted to determine differences between the two ethnic groups (Hispanic, Anglo) and then among the two Hispanic subgroups (less-acculturated, highly acculturated) and Anglo participants on MFSI-SF subscale scores (vigor, physical, emotional, mental, and general). A multivariate analysis of covariance (MANCOVA) was conducted to incorporate related variables as covariates into the examination of differences among less-acculturated Hispanic participants, highly-acculturated Hispanic participants, and Anglo participants on MFSI-SF subscale scores. Principal Axis Factoring (PAF) with promax rotation was used to examine the factor structure of the MFSI-SF in Anglo and Hispanic participants. Alpha was set at .05 and was adjusted to .02 using the Bonferroni method to correct for multiple comparisons. SPSS (version 19) statistical package was used for all data analyses.

Results

All participants self-identified as either Hispanic of Mexican descent (47.3%, n = 158) or Anglo (52.7%, n = 176). With respect to survey administration, 54.4% (n = 86) of Hispanics chose to participate in Spanish and 45.6% (n = 72) chose to participate in English. All Anglo participants participated in the study in English. Table 1 presents demographic information for Hispanic and Anglo participants. Of note, the Hispanic group was younger (M = 41.16 years, SD = 16.14) than the Anglo group (M = 58.70, SD = 16.85). Additionally, there were discrepancies in the educational attainment between the two groups. For example, only 12% of Hispanic participants had graduated from college whereas 24.4% of Anglo participants had graduated from college.

Table 2 presents the sample’s means and standard deviations for each instrument.

Fatigue Differences between Hispanics and Anglos

Significant differences were found using MANOVA between Hispanic and Anglo participants, Wilks' $\Lambda = .87$, $F(5, 328) = 10.12$, $p = .01$, $\eta^2 = .13$. Analyses of variance (ANOVAs) were used for each dependent variable as follow-up tests to the MANOVA. A significant difference was observed for the general fatigue subscale, with Hispanic participants reporting less general fatigue ($M = 5.61$, $SD = 5.06$) than Anglo participants ($M = 7.28$, $SD = 5.90$), $F(1, 332) = 7.62$, $p = < .01$, $\eta^2 = .02$. No other significant differences were found. Table 3 displays the results of this MANOVA for the two ethnic groups.

Fatigue Differences between Less-Acculturated Hispanics, Highly-Acculturated Hispanics, and Anglos

Because acculturation may greatly influence ethnic differences, another MANOVA was employed to contrast fatigue levels among less-acculturated Hispanics, highly-acculturated Hispanics, and Anglos. The MANOVA revealed significant differences among less-acculturated Hispanic participants, highly-acculturated Hispanic participants, and Anglo participants, Wilks' $\Lambda = .76$, $F(10, 654) = 9.44$, $p = < .01$, $\eta^2 = .13$. ANOVAs were conducted for each dependent variable as follow-up tests for this MANOVA. Three of the ANOVAs revealed significant differences: the physical fatigue subscale, $F(2, 331) = 7.63$, $p = < .01$, $\eta^2 = .04$, the mental fatigue subscale, $F(2, 331) = 5.09$, $p = < .01$, $\eta^2 = .03$, and the emotional fatigue subscale, $F(2, 331) = 6.43$, $p = < .01$, $\eta^2 = .04$. Post hoc analyses to the univariate ANOVAs involved pairwise comparisons among the three groups. Less-acculturated Hispanic participants reported significantly more physical fatigue ($M = 5.82$, $SD = 4.82$) than did highly-acculturated Hispanic participants ($M = 3.11$, $SD = 4.54$) and Anglo participants ($M = 4.02$, $SD = 4.44$). Additionally, less-acculturated Hispanic participants reported significantly more mental fatigue ($M = 6.02$, $SD = 4.76$) than did Anglo participants ($M = 4.22$, $SD = 4.12$); less-acculturated Hispanic participants also reported significantly more emotional fatigue ($M = 6.28$, $SD = 5.68$) than did Anglo participants ($M = 4.02$, $SD = 4.58$). See Table 4 for the results of this MANOVA for less-acculturated Hispanic participants, highly-acculturated Hispanic participants, and Anglo participants.

Fatigue Analyses Controlling for Age and Education

Because fatigue complaints can readily be influenced by age and education, the above analyses were re-run using MANCOVA with age and education as covariates. The model was significant, Wilks' $\Lambda = .87$, $F(10, 650) = 4.85$, $p = < .01$, $\eta^2 = .07$. Table 5 presents the results of this MANCOVA. Follow-up ANOVAs indicated that there was a significant difference on general fatigue, $F(2, 329) = 6.279$, $p = < .01$, $\eta^2 = .037$. A one-way analysis of covariance (ANCOVA) was conducted contrasting MFSI-SF general fatigue scores among the three groups while controlling for age and education. The ANCOVA was significant, $F(2, 329) = 4.90$, $p = < .01$, $\eta^2 = .03$. Anglo participants had the highest adjusted general fatigue score ($M = 7.68$), followed by highly-acculturated Hispanic participants ($M = 5.27$), and then less-acculturated Hispanic participants ($M = 5.10$). Follow-up tests evaluated pairwise differences among the adjusted means. The adjusted means of less-acculturated and highly-acculturated Hispanic participants were significantly lower than those of Anglo participants. There was no significant difference between the adjusted means of the less-acculturated and highly-acculturated Hispanic participants.

Factor Analysis

Initial examination of Cronbach's alpha internal consistency for the MFSI-SF subscales (6 items each) indicated that the scale was sufficient for use with both the Hispanic and Anglo groups ($\alpha > .80$). However, when examining univariate and multivariate analyses by

Hispanic acculturation group and accounting for participants' age and education, discrepancies between the two groups on the MFSI-SF surfaced. Because of the small sample size of both groups and the novelty of telephone administration of the MFSI-SF, exploratory factor analyses were conducted with the Hispanic and Anglo samples separately.

For the Anglo sample (n = 171), 5 components were identified that accounted for 67.6% of the variance in the data. The first factor (Eigenvalue = 12.23, 40.8% of the variance) included all items from the original Emotion subscale, as well as 1 item ("My head feels heavy") from the Physical subscale. Factor 2 (Eigenvalue = 2.58, 8.6%) included all items from the General subscale and Factor 3 (Eigenvalue = 2.45, 8.2%) included all items from the Vigor subscale. Factor 4 (Eigenvalue = 1.73, 5.8%) included 5 of the 6 items on the original Physical subscale and Factor 5 (Eigenvalue = 1.29, 4.3%) included 4 of 6 items on the Mental subscale. Two items ("I am confused" and "I am unable to concentrate") had high cross-loadings on two subscales (the Emotional and Mental subscales), therefore did not clearly load on either factor. However, 27 of the 30 items on the MFSI loaded on the previously-validated subscales for the measure with the Anglo sample.

For the Hispanic sample (n = 154), 5 components accounted for 63.9% of the variance. The first factor (Eigenvalue = 12.02, 40.1% of the variance) included 9 items in total from the Physical (5 items) and General (4 items) subscales. Factor 2 (Eigenvalue = 2.47, 8.2%) included all items on the Emotional subscale and 1 Mental subscale item ("I am confused"). Factor 3 (Eigenvalue = 1.93, 6.5%) included all 6 Vigor items. Factor 4 (Eigenvalue = 1.50, 5.0%) included 5 Mental items and 1 Physical item ("My head feels heavy") and Factor 5 (Eigenvalue = 1.25, 4.2%) included only 2 General subscale items ("I am pooped" and "I am worn out"). Therefore, while the Vigor, Mental, and Emotional subscales were mostly maintained, the General and Physical subscales were not differentiated with the Hispanic sample.

Discussion

The purpose of this study was to examine fatigue in adults who self-identify as Hispanic of Mexican descent, and to evaluate the utility of the MFSI-SF for this population. Initial analyses demonstrated some differences in fatigue levels between Hispanic and Anglo participants and among less-acculturated Hispanics, highly-acculturated Hispanics, and Anglos. However, when participants' education and age were considered, the only significant differences were that Anglo participants experienced more general fatigue than less-acculturated and highly-acculturated Hispanic participants. Overall, less-acculturated and highly-acculturated Hispanics reported similar rates of various types of fatigue and shared more similarities with Anglo participants than differences. Further, the original MFSI-SF subscales demonstrated adequate reliabilities within the Anglo group and the less-acculturated and highly-acculturated Hispanic subgroups. The results of an exploratory factor analysis within the Anglo group bore much resemblance to the original MFSI-SF model. The results of an exploratory factor analysis within the Hispanic group, however, were less consistent with the original MFSI-SF model, particularly with regard to the general fatigue subscale.

The results of the comparisons between the two ethnic groups as wholes were unexpected. Previous investigations of fatigue and ethnic disparities in the community found that Hispanics report higher levels of fatigue than Anglos (Jason et al., 1999; Song et al., 1999). In studies of elder adults or adults with chronic fatigue, comparable levels of fatigue frequency or severity were observed between Hispanics and Anglos (Cheng et al., 2008; Torres-Harding et al., 2002). There are several possible reasons for the discrepancy between the present study's findings and that of past research. It might be that certain types of fatigue

are experienced more so by one ethnic group than another; hence a multidimensional measure of fatigue like the MFSI-SF would be useful for cross-cultural comparisons. It also might be that the effects of ethnicity are superseded in circumstances that either render humans more vulnerable to fatigue (older age) or that are defined by the presence of fatigue (chronic fatigue; Chimata, Jason, Taylor, &Torres-Harding, 2006). Another consideration is that other fatigue research that included Hispanic participants did not take into account the Hispanic culture with which their participants self-identify during recruitment or data analyses. The present study recruited Hispanics of Mexican descent only, and it is possible that this study's results differ from past research because of this focus. A fourth possibility is that further improvement in fatigue assessment is needed because fatigue is more complex than previously thought. For example, there appears to be a lack of a direct relationship between fatigue severity and level of physical disability in Hispanics. Njoku, Jason, and Torres-Harding (2005) found that Hispanics with chronic fatigue who use an acceptance coping-style experience greater fatigue but less physical impairment. However, Njoku et al. (2005) used SF-36 composite scores to assess disability that included subscales with little construct validity in English-speaking Hispanics (Katerndahl, Amodei, Larme, & Palmer, 2002). If the pattern obtained by Njoku et al. is confirmed in future research with other instruments, then fatigue questionnaires that combine items that assess severity and items that assess disability into total fatigue scores may cloud fatigue assessment in Hispanics and make it difficult to determine true ethnic disparities or similarities in the fatigue experience. A second example of the complexity of fatigue is the present study's discovery that the MFSI-SF general fatigue subscale did not hold up well among Hispanics, thus the finding that Anglo participants reported significantly higher rates of general fatigue than did less-acculturated and highly-acculturated Hispanic participants might be due to general fatigue not being a distinct construct to Hispanics.

It was further surprising that levels of fatigue remained consistent in Hispanics irrespective of acculturation status when age and education were controlled. Before controlling for age and education, less-acculturated Hispanics reported significantly more physical fatigue than highly-acculturated Hispanics. This is the opposite of the results of Torres-Harding et al. (2008), who uncovered that language status (English-speaking) as well as age predicted higher levels of physical fatigue among Hispanic adults with chronic fatigue; Torres-Harding and colleagues also acknowledge that language is not a thorough indication of acculturation. Other research has found that acculturation and an orientation toward US-culture are associated with more health problems and psychological distress in Hispanics (e.g., Cuellar, Bastida, & Braccio, 2004; Gorman, Read, & Krueger, 2010; Torres, 2010), although this might be due to recent immigrants' lack of knowledge about their health conditions (Gorman et al., 2010). Perhaps this study's finding that Anglos experience more general fatigue can be attributed to this phenomenon. Without controlling for age and education, less-acculturated Hispanic participants reported more physical, mental, and emotional fatigue than Anglo participants. However the mean age for the Hispanic group was approximately 17 years younger than the Anglo group. It might be that young adulthood and middle age are associated with particular fatigue-provoking circumstances for less-acculturated Hispanics in the US. In regards to education, vocational opportunities (or lack thereof) might explain how inclusion of education affected fatigue patterns. Of note, there were profound differences in education level across the ethnic groups. For instance, 36.1% of the Hispanic group had not completed high school in comparison to 2.3% of the Anglo group. Given the enormous disparities in education, it is crucial that psychological inventories assessing fatigue take into consideration such disparities in education. Perhaps questions about age and education should be standard items on fatigue inventories and different cut-offs developed per age and/or education group.

It is encouraging that reliabilities for the original MFSI-SF subscales were sufficient and that most of the MFSI-SF factor structure was maintained in the Anglo and Hispanic groups. There was substantial agreement between the original MFSI-SF subscales and the factor loadings from the Anglo group. The vigor and emotional-fatigue subscales held up well within the Hispanic group, and most of the items on the original mental-fatigue subscale loaded together. There was a noticeable breakdown of the general-fatigue subscale within the Hispanic group, though, with most of its items loading with the items on the original physical-fatigue subscale or else not loading on any factor at all. These results offer some support for use of the MFSI-SF in both Anglo and Hispanic adults to assess fatigue. The slight variations obtained from the factor loadings in the Anglo group might be might be due to this study's use of a community sample. The differences may imply that some of the MFSI-SF items are potentially illness-specific. The factor structure from the Hispanic group's data was even more discrepant from the original model and indicate that there are nuances to the fatigue experience for Hispanics that remain to be understood above and beyond the differences that might be attributed to how a community sample was utilized, particularly the relevance of general fatigue as an independent concept. It might be that there are not strong distinctions between general fatigue and physical fatigue in Hispanic adults. It is also a possibility that the wording of the MFSI-SF items does not capture these distinctions. Also, it is important to consider that a fatigue questionnaire's sufficient reliability in Hispanic adults does not indicate construct validity (Katerndahl, Amodei, Larme, & Palmer, 2002). More research is needed to understand the experience of fatigue in Hispanic adults and caution is warranted when administering fatigue inventories to individuals who self-identify with ethnic groups that are not among those in which the inventories were standardized.

The methodology utilized for this study has advantages and disadvantages. This study is one of a handful of studies that have investigated fatigue and fatigue assessment in Hispanic adults, and one of even fewer studies that included participants without specific conditions or statuses (e.g., chronic fatigue, elderly). The specific focus on Hispanics of Mexican descent reduces variation within the Hispanic sample. The use of a community sample allows for establishment of baselines and for possible inclusion of participants who do not seek or have access to health care and are not available for samples drawn from medical settings (Richman et al., 1994). Limitations of this study include characteristics of the sample and methodology. Participants were residents of San Diego County who self-identified as Anglo or Hispanic of Mexican descent. More research is needed to determine if the study's results can be generalized to residents of other areas and/or to people who self-identify with other Hispanic cultures. The focus on a nonclinical sample has its drawbacks, too. It is unclear if the pattern of results reflects the experience of patients with physical or mental disorders known to be associated with fatigue. Because there were no exclusions based on health status, it is uncertain as to what degree the present sample is actually a non-clinical sample. Additionally, the sample size (n = 158 Hispanics) restricted the power of many of the statistical analyses and precluded confirmatory factor analyses. Although previous studies of fatigue (Nisenbaum, Reyes, Mawle, & Reeves, 1998; Steele et al., 1998) collected data via telephone successfully, the use of telephones to collect data by definition limits the sample to people who own telephones. Given the differences in education observed between Hispanic and Anglo participants, it is possible that the pattern of results was obtained because of poorer understanding of the wording or content of the MFSI-SF in the Hispanic group. Correspondingly, in light of Hispanic values of *personalismo* (trusting individuals known personally) and *confianza* (taking time to develop trusting relationships, e.g., Wasserman, Bender, & Lee, 2007), Hispanic participants might have felt less comfortable responding to questions over the phone because they did not know the research interviewer administering the survey. Future research should address the aforementioned

limitations and include further exploration of the role of acculturation in the fatigue experience.

The perception of fatigue is a process in which there is an awareness of a symptom and the assessment of the symptom's meaning (Ahlberg et al. 2005, Dodd et al., 2001). It would be valuable to study how levels of acculturation to the US-culture influence this self-appraisal process for people who self-identify as Hispanic and how clinicians can appropriately take acculturation into account when working with Hispanic patients. Future research should include into analyses other variables that appear to impact the fatigue experience, such as gender (Cheng et al, 2008; Jason et al., 1999; Song et al., 1999), language, parental status, marital status, and homemaker status (Torres-Harding et al., 2002; 2008). Future research should also examine these phenomena and compare and contrast them within Hispanic cultures, as there is significant diversity among these cultures. Given the size of the Hispanic population in the US and the fact that fatigue is an important symptom, continued research on fatigue within Hispanic adults is important.

This study showed that the MFSI-SF is generally adequate to assess fatigue in Hispanics of Mexican descent. Hispanics perceived less general fatigue than Anglos after controlling for age and education, although the general-fatigue subscale did not hold up well by itself among Hispanics in an exploratory factor analysis. There may be alternative words or statements that are better suited to describe fatigue in Hispanic adults than those found in the MFSI-SF; these words or statements might differ depending on acculturation. Our findings emphasize the importance of including age and education when assessing subjective fatigue in Hispanics, and that researchers and practitioners should be careful using a standardized measure for an individual from a group lacking validation data.

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Table 1

Demographic Frequencies for Hispanic and Anglo Participants

Demographic	Hispanics (n = 158)				Anglos (n = 176)			
	n	%	M	SD	n	%	M	SD
Women	109	69.0	--	--	109	61.9	--	--
Men	49	31.0	--	--	67	38.1	--	--
Age (years)	--	--	41.16	16.14	--	--	58.70	16.85
Education								
Professional school	8	5.1	--	--	49	27.8	--	--
4-year college/university	19	12.0	--	--	43	24.4	--	--
Some college	28	17.7	--	--	54	30.7	--	--
High school/technical school/GED	46	29.1	--	--	26	14.8	--	--
Less than high school graduate	57	36.1	--	--	4	2.3	--	--

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Table 2

Means (and Standard Deviations) of SASH and MFSI-SF Subscale Scores by Ethnicity and Acculturation

Scale	Anglos (n = 176)	Hispanics (n = 158)	Less-Acculturated Hispanics (n = 92)	Highly-Acculturated Hispanics (n = 66)
MFSI-SF				
Physical	4.02 (4.44)[c]	4.68 (4.88)	5.82 (4.82)[b,d]	3.11 (4.54)[c]
Mental	4.23 (4.12)[c]	5.41 (4.77)	6.02 (4.77)[b]	4.56 (4.69)
Emotional	4.02 (4.58)[c]	5.38 (5.71)	6.28 (5.68)[b]	4.12 (5.54)
General	7.28 (5.90)[a]	5.61 (5.06)[b]	5.45 (4.70)	5.85 (5.55)
Vigor	13.75 (5.55)	13.16 (5.33)	12.24 (4.75)	14.44 (5.86)
SASH	--	--	1.84 (.54)	3.72 (.59)

Note. MFSI-SF = Multidimensional Fatigue Symptom Inventory- Short Form; SASH = Short Acculturation Scale for Hispanics.

[a] $p < .02$ compared to Hispanics.

[b] $p < .02$ compared to Anglos.

[c] $p < .02$ compared to less-acculturated Hispanics.

[d] $p < .02$ compared to highly-acculturated Hispanics.

Table 3

MANOVA for MFSI-SF Subscale Scores for Hispanic and Anglo Participants

MFSI-SF Scale	F	*p*	η^2
Physical	1.68	.20	.01
Mental	5.92	.02	.02
Emotional	5.84	.02	.02
General	7.62	.01	.02
Vigor	0.98	.32	< .01

Note. MFSI-SF = Multidimensional Fatigue Symptom Inventory- Short Form.

Table 4

MANOVA for MFSI-SF Subscale Scores for Less Acculturated Hispanic, Highly-Acculturated Hispanic, and Anglo Participants

MFSI-SF Scale	F	*p*	η^2
Physical	7.63	>.01	.04
Mental	5.09	>.01	.03
Emotional	6.43	>.01	.04
General	3.90	.02	.02
Vigor	3.68	.03	.02

Note. MFSI-SF = Multidimensional Fatigue Symptom Inventory- Short Form.

Table 5

MANCOVA for MFSI-SF Subscale Scores for Hispanic and Anglo Participants

MFSI-SF Scale	F	*p*	η^2
Physical	3.91	.02	.02
Mental	1.02	.36	.01
Emotional	2.71	.07	.02
General	4.90	.01	.03
Vigor	2.36	.10	.01

Note. MFSI-SF = Multidimensional Fatigue Symptom Inventory- Short Form; covariates included were age and education.