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Psychosocial Factors Associated with Cognitive Function Among Middle-Aged and Older Hispanics/Latinos: The Hispanic Community Health Study/Study of Latinos and its Sociocultural Ancillary Study

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Abstract

Background: Evidence suggests that psychosocial factors are associated with cognitive health in older adults; however, associations of psychosocial factors with cognition remain largely unexamined in middle-aged and older Hispanics/Latinos.

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SUPPLEMENTARY MATERIAL

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Objective: To examine the cross-sectional associations of psychosocial factors with cognitive function among middle-aged and older Hispanics/Latinos living in the US.

Methods: Baseline (2008–2011) data from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study (n = 2,818; ages 45–74) were used to examine the associations of each psychosocial factor with global cognition (GC), verbal learning, verbal memory, verbal fluency, and processing speed independent of age, sex, education, Hispanic/Latino background, income, language, and depressive symptoms. Psychosocial variables included: intrapersonal factors (ethnic identity, optimism, and purpose in life), interpersonal factors (family cohesion, familism, social network embeddedness, and social support), and social stressors (perceived ethnic discrimination, loneliness, and subjective social status).

Results: In fully-adjusted models, purpose in life and social support were each positively associated with all five cognitive variables. Loneliness was negatively associated with GC, verbal learning, memory, and processing speed. Ethnic identity was positively and familism negatively associated with GC, verbal fluency, and processing speed. Family cohesion was positively associated with verbal learning.

Conclusion: These findings extend previous evidence from older, largely non-Hispanic White cohorts to show that higher purpose in life and social support are also strongly associated with cognitive health among middle-aged and older Hispanics/Latinos. We also highlight that intrapersonal factors, interpersonal factors, and social stressors have differential relationships with individual cognitive tests.

Keywords

Cognitive aging; cognitive function; Hispanics; Latinos; psychosocial factors

INTRODUCTION

Healthy cognitive function is important for preserving independence and maintaining health-related quality of life. The promotion of cognitive health among Hispanics/Latinos, one of the fastest growing populations of older adults living in the US [1], is a major public health concern. Emerging evidence among older adults suggests that psychosocial factors (i.e., psychological phenomena including intrapersonal factors, interpersonal factors, and stressors that are shaped by one's social environment) may play a role in cognitive function, regardless of individual-level sociodemographic factors and depressive symptoms [2]. For example, studies have shown significant associations of intrapersonal factors (e.g., purpose in life [3–6]), interpersonal factors (e.g., social networks [7, 8] and social support [9–13]), and stressors (e.g., loneliness [14–17]) with cognitive function among older non-Hispanic Whites and Blacks. However, less work has been done elucidating the associations of psychosocial factors with cognition in middle-aged and older Hispanics/Latinos.

Notably, the distinct sociocultural norms and collectivist values (i.e., belief that the group, not the individual, is the basic unit of society) of Hispanics/Latinos [18] along with their lived experiences as racial/ethnic minorities in the US, suggest that the associations of psychosocial factors with cognition may be different than those previously reported in other US populations. Certainly, previous research in Hispanics/Latinos has demonstrated

associations of culturally-relevant psychosocial factors such as higher ethnic identity (i.e., sense of belonging to an ethnic group), familism (i.e., degree of importance of family in one's life), and family cohesion (i.e., feelings of trust between family members) with better mental and physical health outcomes [19–23]. However, there is no consensus about the specific cultural factors that are more relevant to Hispanic/Latino health or resilience processes [24]. Moreover, such culturally-relevant psychosocial factors have not been examined within the context of brain-aging outcomes despite the role of social and cultural norms in shaping cognitive function [25].

The reserve capacity model

To address the knowledge gaps outlined above, the Reserve Capacity Model proposed by Gallo and Matthews [24, 26] served as our theoretical premise for focusing on a comprehensive array of intrapersonal factors, interpersonal factors, and stressors previously proposed to be relevant to Hispanic/Latino health. The Reserve Capacity Model was developed in light of debate on the existence of a "Hispanic Paradox," i.e., incongruent evidence showing that Hispanic/Latinos have better than expected health outcomes (mainly, lower burden of cardiovascular disease [CVD]) and higher life expectancy given their disproportionate exposure to adverse social circumstances (e.g., low socioeconomic status, immigration related stressors, and inadequate access to health care). Integrating concepts from the Lifespan Biopsychosocial Model of Health [27, 28] and cognitive aging literature [29], the Reserve Capacity Model posits a complex interplay of macro-level socioeconomic (e.g., policies and inequalities) and cultural (e.g., cultural norms and beliefs) factors hypothesized to shape psychosocial risk and resiliency processes which subsequently contribute to Hispanic/Latino health risk and outcomes (via direct and indirect pathways).

More specifically, in this theoretical model, psychosocial risk and resilience factors include reserve capacity resources (conceptualized as a "collection" of interpersonal and intrapersonal resources) and social stressors that connect macro-level structures to the health of Hispanics/Latinos. For example, Hispanics/Latinos may have high levels of reserve capacity such as self-perceived purpose in life and sense of optimism towards one's future that can promote health (known as a "promotive effect") or such reserve capacity may buffer, at least partially, the negative consequences of stressors (known as a "protective effect"). Furthermore, Hispanics/Latinos may experience a high burden of stressors (e.g., ethnic discrimination and social isolation) that directly and indirectly foster negative health outcomes. We postulate that the Reserve Capacity Model has applicability beyond CVD risk factors and could also be applied to the examination of cognitive health among Hispanics/Latinos. Therefore, to advance research in this area, the current study examines selected psychosocial factors from the Reserve Capacity Model; particularly, those factors that have been previously proposed and/or shown to be associated with cognitive function [2, 7, 28, 30–32]. Based on our guiding model, psychosocial factors were categorized *a priori* into three conceptual categories, all of which included culturally-relevant variables: 1) intrapersonal resources (i.e., ethnic identity, optimism, and purpose in life), 2) interpersonal resources (i.e., family cohesion, familism, social network embeddedness, and social support), and 3) social stressors (i.e., perceived ethnic discrimination, loneliness, and subjective social status).

Psychosocial factors and cognitive function

As mentioned above, there is a dearth of research on the relationship of psychosocial factors with cognitive function among Hispanics/Latinos—the second largest racial or ethnic population in the US after non-Hispanic Whites [33]. Of the intrapersonal factors, the relationship of purpose in life with cognition has generally received the most attention compared to optimism and ethnic identity. In samples of mostly non-Hispanic Whites, previous studies have reported strong associations of purpose in life with better memory, executive functioning, and global cognition in middle-aged and older adults [3]; reduced risk of mild cognitive impairment in older adults [4]; and lower self-reported cognitive decline in older adults [5]. Contrastingly, the few studies on the association between purpose in life and cognitive function among Hispanics/Latinos have yielded mixed results [2, 6]. One study showed that higher purpose in life was not associated with slower trajectories of cognitive decline among older Hispanics/Latinos [6]. While another study, surprisingly, found that higher purpose in life was associated with worse working memory in Hispanics [2]. Studies on optimism and cognition are scarce; a study showed that higher optimism is associated with lower cognitive impairment risk in a sample of older, mostly non-Hispanic Whites [34]. Finally, although theoretical work previously highlighted a potential association between ethnic identity and cognitive function [25], to the best of our knowledge, there are no studies on the association between ethnic identity and cognitive function. However, higher ethnic identity has been shown to contribute to higher self-esteem and psychological well-being among racial/ethnic minorities [35], thus, may be positively associated with cognitive function.

Of the interpersonal factors, the association between social support and cognitive function has received the most attention (compared to social network embeddedness, family cohesion, and familism) with studies generally finding a positive association between social support and cognitive function [9,12, 13]. A large body of work has similarly documented positive associations of social networks (including its quality or quantity) with cognitive function [36]; however, the use of different social network measures across studies limits comparisons and little is known about these associations among Hispanics/Latinos. Notably, the associations of family relations, including family cohesion and familism, with cognitive function remain largely unexamined. However, family cohesion may benefit cognition partly through higher support from and integration with family members [31]. Traditional Hispanic/Latino family values, often referred to as familism, has been proposed to function as a protective factor by providing social support and mitigating the adverse effects of stressors [37, 38]. Finally, in terms of psychosocial stressors, much work has documented the associations of higher perceived discrimination [39, 40] and greater loneliness [14–17] with worse cognitive function among older non-Hispanic White and Black samples. Contrastingly, little is known of the association between subjective social status and cognitive function in adults [41].

Present study

To start addressing gaps in the literature, we examined the cross-sectional associations of a comprehensive array of psychosocial factors with cognitive function in a large sample of middle-aged and older Hispanics/Latinos. We hypothesized that higher levels of

intrapersonal resources, interpersonal resources, and subjective social status, and lower levels of perceived ethnic discrimination and loneliness, would each be associated with better cognitive function adjusting for potential confounders identified from prior work [2, 42], i.e., sociodemographic factors and depressive symptoms. In secondary analyses, we investigated the associations of all psychosocial factor with each individual cognitive test adjusting for all covariates. Results of this study provide preliminary cross-sectional evidence of potentially modifiable psychosocial factors that may contribute to cognitive health in the rapidly growing US Hispanic/Latino population. An examination of these relationships can improve our understanding of the multiple contributors of cognitive function among middle-aged and older Hispanics/Latinos while providing a foundation for future prospective research.

METHODS

Study design and analytic sample

We used baseline (2008–2011) data from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a multi-center observational longitudinal study of 16,415 Hispanics/Latinos (aged 18–74 years at recruitment) living in four US urban areas (Bronx, NY; Chicago, IL; Miami, FL; and San Diego, CA) [43]. The baseline cohort includes participants who self-identified as having Cuban, Central American, Dominican, Mexican, Puerto Rican, South American, or other/more than one Hispanic/Latino background. The HCHS/SOL was designed to describe the prevalence and incidence of CVD and related chronic diseases among US Hispanics/Latinos. The sampling strategy and approach for the baseline study has been previously published [43, 44]. Sociodemographic factors, subjective social status, and cognitive function measures were obtained from the HC HS/SOL baseline study.

The Sociocultural Ancillary Study (2009–2010) is a cross-sectional study designed to examine associations of psychosocial factors with health outcomes among a subsample (n = 5,313) of the baseline HCHS/SOL cohort [19]. Briefly, participants who completed the baseline HCHS/SOL visit, consented to being contacted for future research, and were willing to attend a separate visit were eligible to participate [19]. Most of participants (88%) completed the sociocultural assessment within 6 months of the baseline exam (73% participation rate). Participants were representative of the baseline study with the exception of lower participation in some higher socioeconomic status strata. Trained, bilingual research assistants administered the surveys through face-to-face interviews conducted in the preferred language of the participant (English or Spanish). Psychosocial factors (except subjective social status) as well as depressive symptoms were obtained in the Sociocultural Ancillary Study [19]. Institutional Review Board approval was obtained from all study sites for all baseline study and Sociocultural Ancillary Study procedures and materials, and all participants provided written informed consent. The procedures involving experiments on human subjects were conducted in accordance with the 1975 Helsinki Declaration.

This current analysis focused on participants of the Sociocultural Ancillary Study who were eligible to complete the cognitive function module because they were aged 45 to 74 years at baseline. Of those 3,277 participants, we excluded 171 participants with self-reported heart attack or stroke because of potential confounding effects on cognitive function. Stroke [45]

and heart attack [46], and at times the medications used to treat them [47, 48], may negatively impact cognition; if we were to include these conditions and individuals using such medications in our analyses, results would be more difficult to interpret within the conceptual framework of psychosocial factors and cognition. We also excluded 175 participants with missing data on any of the psychosocial variables, 135 participants with missing data on any of the cognitive function variables, and 46 participants with missing data on any of the model covariates. The final analytic sample of this study was 2,818 participants. The excluded participants had similar age, sex, education, language preference, and Hispanic/Latino background distributions compared to those included in the analytic sample. Excluded participants did not differ from those included in our analytic sample in each of the individual cognitive tests. Moreover, the percentage of missing data of each variable of interest was lower than 5%; therefore, complete case analysis was deemed acceptable [49]. This approach aligns with previous research examining cognitive function in the HCHS/SOL cohort [50–52].

Study measures

Cognitive function—As previously described [42], three cognitive tests assessing outcomes associated with verbal learning and memory, and attention/executive functioning were employed. Tests were administered by trained interviewers (supervised by doctorate-level, licensed, clinical neuropsychologists) in the preferred language of the participant (English or Spanish). The Brief Spanish-English Verbal Learning Test (BSEVLT) [53, 54] was used to assess verbal learning and memory. A 15-item list (i.e., list A) was read in 3 consecutive learning trials, followed by a distractor list, and a memory trial to assess free-recall post-interference. Verbal learning is the sum of the items correctly recalled from list A across the 3 learning trials (range: 0–45) and memory is the sum of the number of items correctly recalled post-interference (range: 0–15). As previously recommended, we examined verbal learning and verbal memory scores separately; however, since they are sub-scores of the B-SEVLT test, these measures are highly correlated. An adapted version of the Word Fluency Test of the Multilingual Aphasia Examination [55, 56] was used to assess verbal fluency. Participants were asked to generate as many words as possible in 60 seconds that began with the letter *F* (first trial) and the letter *A* (second trial); the score is the sum of the correctly generated words across trials (range: 0–50). In the Word Fluency Test, the letter S was omitted since using S could be a source of language bias (because the letters S and C are often pronounced similarly in Spanish) [42]. The Digit Symbol Substitution Subtest of the Wechsler Adult Intelligence Scale-Revised [57] was used to assess mental processing speed. Participants were asked to write the corresponding symbol for each digit based on the provided key; the score is the sum of the correctly identified symbols in 90 seconds (range: 0–83). The B-SEVLT was originally developed for use in English and Spanish, while the Word Fluency Test and the Digit Symbol Substitution Subtest were translated from English to Spanish using forward and back translation [58]. To measure global cognitive function, a composite score was calculated as the average of the z-scores (i.e., [individual value – mean value] /SD) of the four individual tests (i.e., verbal learning, verbal memory, verbal fluency, and processing speed). Across all tests, higher scores were used to represent better cognitive function.

Psychosocial factors—Details on the psychosocial measures included in the HCHS/SOL Sociocultural Ancillary Study, which were used in the current study have been previously described [19]. Where possible, psychosocial measures were chosen based on prior research showing their adequate validity and reliability for use in Hispanics/Latinos and Spanish-speaking populations [19]. More specifically, the measures we used to assess perceived ethnic identity [59], family cohesion [60], familism [61], social support [62], perceived ethnic discrimination [63], loneliness [64], and subjective social status [65] have been previously validated for use among Hispanics/Latinos. If a measure was not available in Spanish, bilingual HCHS/SOL staff and investigators translated the measures, using forward and back translation [58]. Reconciliation was conducted by a committee composed of individuals from diverse Hispanic/Latino backgrounds to ensure semantic and conceptual equivalence across Hispanic/Latino groups. In our current sample, adequate reliability was found for all scales in both English (α = 0.75 to 0.87) and Spanish (α = 0.67 to 0.87) versions with the exception of optimism in both English (α = 0.60) and Spanish (α = 0.53). However, since the optimism scale consists of 6 items, lower estimates may be considered [66, 67]. Supplementary Table 1 includes reliability statistics (Cronbach's alpha) for English and Spanish versions.

As mentioned above, for the current analyses, psychosocial factors were selected based on previous theoretical and empirical work that supported their potential connection to cognitive function [2, 7, 28, 30–32]. Supplementary Table 1 includes the description of each psychosocial measure (i.e., sample items, response scale, and Cronbach's alpha for the current analytic sample). Psychosocial factors were categorized *a priori* into three conceptually relevant categories: intrapersonal resources, interpersonal resources, and social stressors. Across all psychosocial factors, higher scores correspond to higher levels of the underlying trait. Items were reversed coded as appropriate, so that a high value indicates the same type of response on every item.

Intrapersonal resources.: Perceived ethnic identity (i.e., sense of belonging based one's cultural heritage, background, and traditions [68]) was measured using the 12-item Ethnic Identity Subscale of the Scale of Ethnic Experiences (SEE) [59]. Optimism (i.e., one's general life orientation) was assessed using the 6-item Life Orientation Test-Revised (LOT-R) [69]. Purpose in life (i.e., degree in which one engages in activities that are motivational and meaningful) was measured using the 12-item Life Engagement Test (LET) [70].

Interpersonal resources.: Family cohesion (i.e., perceived presence of supportive and close relations with family members) was measured using the 18-item Family Cohesion Subscale of the Family Environment Scale (FES) [71]. Familism (i.e., a cultural value emphasizing the relative importance of supportive and close family relations) was measured using the 14-item Familism Scale [61], which has three subscales: family obligations (i.e., one's obligation to family), family support (i.e., perceived support from family), and family as referent (i.e., considering family as referent for decision making). Social network embeddedness (i.e., presence of social relations across various domains: family, friends, church/temple, school, work, neighbors, volunteering, and groups) was assessed using the Social Network Embeddedness Subscale of the Social Network Index [72]. Perceived social

support (i.e., perceived availability of appraisal, belonging, and tangible social support) was assessed using the Interpersonal Support Evaluation List (ISEL-12) [73].

Social stressors.: Perceived ethnic discrimination (i.e., perceived racism or discrimination based on the notion of race, culture, and/or ethnicity) was assessed with the 17-item Brief Perceived Ethnic Discrimination Questionnaire-Community Version (Brief PEDQ-CV) [63]. Loneliness (i.e., perceived social isolation) was assessed via the 3-item Revised University of California, Los Angeles (UCLA) Loneliness Scale [64]. Subjective social status was assessed using the MacArthur Scale of Subjective Social Status [74].

Study covariates

Covariates included self-reported age, sex, Hispanic/Latino background, education, annual household income, language preference for baseline examination (a commonly used proxy measure of acculturation), and depressive symptoms. Depressive symptoms were assessed with the 10-item version of the Center for Epidemiologic Studies Depression scale [75]. Potential covariates were identified *a priori* and included in the present study if they were associated with the psychosocial factors in our sample or considered a risk factor for poor cognitive function [2, 42].

Statistical analysis

Descriptive statistics (mean and standard deviation) were calculated to describe the target population. The weighted mean, standard deviation, and zero-order bivariate Pearson's r correlation of psychosocial factors were calculated for reference. Bivariate associations between the covariates and psychosocial factors were examined using unadjusted linear regression models for complex survey data. Bivariate analyses are presented in the Supplemental Material.

In our main analyses, we converted each psychosocial factor into a z-score to compare findings across psychosocial factors. Given that there is precedence of differential associations of psychosocial factors with distinct domains of cognitive function [2, 7], we present in our tables the global cognitive scores and the individual tests. Survey-weighted adjusted linear regression models were used to evaluate the associations of each psychosocial factor with cognitive function. The base model (i.e., Model 1) was adjusted for age, sex, and education, which are known contributors to cognitive decline, and is shown to enable comparisons across studies. The fully-adjusted model additionally included Hispanic/Latino background, annual household income, language preference, and depressive symptoms (i.e., Model 2). In secondary analysis, all psychosocial factors were entered simultaneously into a regression model with each cognitive outcome entered separately. The purpose of our secondary analysis was to examine which psychosocial variable(s) is more strongly related to each cognitive function outcome, regardless of other psychosocial factors and all covariates. CVD risk factors were not included in the regression models because they have been previously proposed to be potential mediators of the associations of psychosocial factors with cognitive function [52, 76–80].

All analyses accounted for the complex study design. The sample design and sampling weights have been previously described [44]. Briefly, reported values were weighted to account for the disproportionate selection of the sample and to adjust for any bias effects due to differential nonresponse in the selected sample (except sample size which we report unweighted). Weights were also trimmed to limit precision losses and calibrated to the 2010 US Census characteristics by age, sex, and Hispanic/Latino background in each field site's target population. HCHS/SOL sampling weights are the product of a "base weight" (reciprocal of the probability of selection) and three adjustments: 1) non-response adjustments made relative to the sampling frame, 2) trimming to handle extreme values (to avoid a few weights with extreme values being overly influential in the analyses), and 3) calibration of weights to the 2010 U.S. Census according to age, sex, and Hispanic background. Data management was performed using SAS 9.4 software (SAS Institute, Cary, NC) and all statistical analyses were performed using Stata Statistical Software Release 15 (Stata Corp LP, College Station, TX). A significance level of $p < 0.05$ was used.

RESULTS

Descriptive statistics

In the target population, the mean age was 56 years, 56% were female, 30% were of Mexican background, and 49% had annual household income below $20K (Table 1). Most participants preferred to be interviewed in Spanish (85%). In the target population, the age-standardized prevalence rates of the five major CVD risk factors were as follows: hypercholesterolemia 59.5%, hypertension 53.9%, obesity 43.3%, diabetes 33.4%, and current smoking 16.7% (data not shown). Table 2 shows the range as well as the weighted mean, standard deviation, and zero-order bivariate correlations of psychosocial factors. The following psychosocial factors had r correlations ≥0.40: optimism was positively correlated with purpose in life ($r = 0.49$, $p < 0.001$) and social support ($r = 0.42$, $p < 0.001$); purpose in life was positively correlated with social support ($r = 0.40$, $p < 0.001$); and social support was negatively correlated with loneliness $r = -0.42$, $p < 0.001$). The bivariate associations between psychosocial factors and study covariates are presented in Supplementary Table 2. Unadjusted linear regression models showed differences in the mean levels of each psychosocial factor across Hispanic/Latino background. For example, ethnic identity and loneliness were higher among those of Dominican and Puerto Rican background; optimism was the highest among those of Cuban background; purpose in life and family cohesion were the lowest among those of Puerto Rican background; familism was the highest among those of Cuban background; and social support was the lowest among those of Central or South American backgrounds. Similarly, the unadjusted linear regression models indicated that there were significant associations of each higher education and higher annual household income with higher optimism, purpose in life, social network embeddedness, social support, and subjective social status; and with lower familism and loneliness.

Associations of each psychosocial factor with cognitive function

Intrapersonal resources—In Model 1, ethnic identity was positively associated with verbal fluency (β = 0.58; 95% CI = 0.04, 1.12) and processing speed (β = 0.86; 95% CI = 0.04, 1.68) (Table 3). Optimism was positively associated with global cognition (β = 0.06;

95% CI = 0.01, 0.10), verbal learning (β = 0.59; 95% CI = 0.21, 0.97), memory (β = 0.21; 95% CI = 0.04, 0.38), and verbal fluency (β = 0.59; 95% CI = 0.03, 1.15). Purpose in life was positively associated with all cognitive function outcomes. We found similar trends in the fully-adjusted model with a few exceptions. In Model 2, the relation of ethnic identity with verbal fluency (β = 0.87; 95% CI = 0.40, 1.34) and processing speed (β = 1.02; 95% CI = 0.34, 1.70) persisted; plus, there was a significant relation of ethnic identity with global cognition (β = 0.06; 95% CI = 0.02, 0.39). Optimism only remained associated with verbal fluency (β = 0.70; 95% CI = 0.23, 1.16). Purpose in life remained associated with all cognitive function outcomes in Model 2.

Interpersonal resources—In Model 1, family cohesion was positively associated with global cognition (β = 0.06; 95% CI = 0.02, 0.09), verbal learning (β = 0.67; 95% CI = 0.36, 0.99), and memory (β = 0.26; 95% CI = 0.10, 0.43) (Table 3). Familism was negatively associated and social support was positively associated with all cognitive function outcomes. Social network embeddedness was positively associated with global cognition (β = 0.09; 95% CI = 0.04, 0.14), verbal learning (β = 0.83; 95% CI = 0.46, 1.19), memory (β = 0.35; 95% CI = 0.09, 0.60), and processing speed (β = 1.243; 95% CI = 0.41, 2.07). Upon further adjustment, in Model 2, family cohesion was only associated with verbal learning (β = 0.32; 95% CI = 0.01, 0.64), but not with memory. Familism remained associated with global cognition (β = −0.06; 95% CI = −0.09, −0.03), verbal fluency (β = −1.21; 95% CI = −1.61, −0.80), and processing speed (β = −1.22; 95% CI = −1.85, −0.58), but did not remain associated with verbal learning or memory. Social network embeddednesswas only associated with verbal learning (β = 0.40; 95% CI = 0.07, 0.74). Social support remained associated with all cognitive function outcomes in both models.

Social stressors—In Model 1, perceived ethnic discrimination was only associated with higher processing speed (β = 1.15; 95% CI = 0.23, 2.06). Loneliness was negatively associated with all cognitive function variables in Model 1. Subjective social status was positively associated with global cognition (β = 0.09; 95% CI = 0.04, 0.14), verbal learning (β = 0.52; 95% CI = 0.13, 0.90), and processing speed (β = 2.20; 95% CI = 1.33, 3.07). Upon further adjustment, in Model 2, ethnic discrimination was no longer associated with processing speed. Loneliness remained associated with global cognition (β = −0.07; 95% CI = −0.10, −0.03), verbal fluency (β = −0.57; 95% CI = −0.93, −0.21), memory (β = −0.20; 95% CI = −0.37, −0.03), and processing speed (β = −1.10; 95% CI = −1.74, −0.46), but not with verbal fluency. Finally, there were no significant associations of subjective social status with cognitive function in Model 2.

Secondary analysis

Associations of all psychosocial factors with each cognitive function outcome —After entering all covariates and all psychosocial factors into the fully-adjusted model (Table 4), we observed that ethnic identity remained positively associated with global cognition, verbal fluency, and processing speed; optimism became negatively associated with processing speed; and purpose in life remained positively associated with all cognitive function variables. Family cohesion and social network embeddedness were no longer associated with verbal learning; familism remained negatively associated with global

cognition, verbal fluency, and processing speed; and social support only remained positively associated with global cognition and processing speed. Finally, loneliness remained negatively associated with global cognition, verbal learning, and processing speed but not with memory; perceived ethnic discrimination was no longer associated with processing speed; and no associations were observed of subjective social status with any of the cognitive function outcomes.

Post-hoc analysis

Familism subscales: family obligations, family support, and family as referent —Finally, as suggested in the literature [38], *post-hoc* analysis was conducted to identify whether significant associations of familism and cognitive function could be attributable to one or more of the three familism subscales. Adjusting for all covariates, the family obligations subscale was positively associated with higher memory scores only (β = 0.18; 95% CI = 0.04, 0.31), while the family support subscale was negatively associated verbal fluency scores only (β = −0.80; 95% CI = −1.26, −0.35) (Table 5). In contrast, the family as referent subscale was negatively associated with all of the cognitive function variables.

DISCUSSION

To our knowledge, this is the most comprehensive examination of the associations of psychosocial factors with cognitive function among a large sample of diverse middle-aged and older Hispanics/Latinos. Guided by the Reserve Capacity Model [24, 26], this study contributes to the literature in several ways. First, we extend results from previous studies conducted predominantly among older non-Hispanics Whites and Blacks to demonstrate that greater purpose in life [3, 4], higher social support [9–11], and lower loneliness [14–17] are each associated with better global cognitive function among middle-aged and older Hispanics/Latinos regardless of adjustments. Moreover, we demonstrate that purpose in life and social support are associated with each of the cognitive variables included in our study. Second, we highlight the need for incorporating culturally-relevant factors such as ethnic identity and familism (including its multiple dimensions) into the study of psychosocial factors and cognitive health of middle-aged and older Hispanics/Latinos. The distinct relationships of ethnic identity and familism with global cognition, verbal fluency, and processing speed (regardless of adjustments) may be particularly relevant in light of the overall importance of collectivistic values in Hispanic/Latino culture [81]. Third, we addressed gaps in the literature by examining various conceptually relevant psychosocial factors in one study (and ultimately in one regression model) as opposed to studying them in isolation. Toward that end, in our secondary analyses, we showed that the associations of purpose in life with cognitive function (i.e., global cognition and each of the individual cognitive tests) were the most robust because they were independent of all other psychosocial factors and study covariates.

We extend prior evidence that documented positive associations of purpose in life [3–6] and social support [9–13], and negative associations of loneliness [14–17], with cognitive functioning in primarily older non-Hispanic White and Black samples by showing that purpose in life and social support are positively associated with all five cognitive variables,

and loneliness is negatively associated with global cognition, verbal learning, memory, and processing speed among middle-aged and older Hispanics/Latinos. To our knowledge, the few studies [2, 6] that have examined the relation of purpose in life and cognitive function in Hispanics/Latinos have yielded inconsistent results; a cross-sectional study [2] reported an association but a longitudinal study [6] reported none. However, prior study samples were solely comprised of older adults which may contribute to discrepancy across studies. In fact, in the present study, we observed that purpose in life remained associated with all cognitive function variables regardless of all other psychosocial factors. Longitudinal research is needed to confirm the directionality of our findings related to purpose in life and cognitive function in Hispanics/Latinos. Given that there is evidence to suggest that sociodemographic factors such as Hispanic/Latino background, education, and income may act independently and interactively to modify the associations of psychosocial factors and cognition [7], future research should further examine the role of these sociodemographic factors. Moreover, since purpose in life was associated with higher education and income, which are strongly associated with better cognitive function, we cannot rule out the possibility of residual confounding in our study.

While theoretical work has suggested a potential association of ethnic identity and cognitive function [25], we empirically demonstrate for the first time (to our knowledge) that ethnic identity is positively associated with global cognition, verbal fluency, and processing speed. These findings can be interpreted in light of previous research documenting that ethnic identity (or in-group identification) may act as a buffer against the adverse effects of social stressors [81], potentially serving as a protective factor. We found that familism, a central value of Hispanic/Latino culture generally hypothesized to have protective health benefits [82], was negatively associated with global cognitive function, verbal fluency, and processing speed, and that these associations were largely driven by the family as referent subscale. Familism encompasses the important of one’s family as a source of support, well-being, and resources, while placing family needs before one’s needs [61]. Although family is a potential source of social support, it is possible that avoidant coping [83], dysfunctional thoughts [84], and/or negative interactions with family members are particularly stressful in family-centered cultures such as Hispanics/Latinos [85]. Moreover, the presence of strong cultural referent familism values encompassing expectations related to providing support (e.g., economic and/or caregiving) for family members may also help to explain the role of familism as a psychosocial stressor; particularly, given the relatively long life expectancy, high burden of chronic conditions, multi-generational family households, and socioeconomic adversity experienced by US Hispanics/Latinos [86]. Future research may better inform our understanding of the role of family and the importance of each referent subscale for cognitive function in this population.

Other psychosocial factors such as social network embeddedness, optimism, family cohesion, perceived ethnic discrimination, and subjective social status did not appear to have a ubiquitous relationship with cognition in our sample. For instance, social network embeddedness was associated with verbal learning only, which may reflect that the social domains included in our measurement tool (such as family, friends, and work) may not be equally meaningful for all aspects of cognitive function [36]. While our finding that higher optimism was only associated with higher verbal fluency performance is in disagreement

with prior work [34] showing an association with global cognitive impairment, this may be partially due to the fact that our optimism scale showed low internal reliability and should be used with caution [87]. Although we observed that family cohesion was associated with verbal learning performance only; yet, the 95% confidence interval was approaching zero, so results should be interpreted with caution. High levels of family cohesion may benefit cognition partly through higher levels of social contacts and integration with family members [31], suggesting that it may capture a different dimension of family relations than our familism scale. In contrast, perceived ethnic discrimination was not associated with any of the cognitive tests in fully-adjusted models. Despite previous research showing associations of higher perceived ethnic discrimination with worst cognitive function [39, 40], our null result may reflect the relatively lower burden of perceived ethnic discrimination in this cohort [35] or that those with better cognitive function were able to attribute discriminatory experiences to external as opposed to personal, intrinsic characteristics (which has been shown to buffer against the negative health effects of discrimination [35]). Similarly, subjective social status was not associated any cognitive test score in the fully adjusted model; with little work conducted among mid-to late-life adults, it is difficult to place these null results within the context of other studies reporting significant associations in older [88] and younger [41] samples.

Although the mechanistic pathways underlying the associations of psychosocial resources with cognitive function are beyond the scope of this cross-sectional study, potential direct and indirect mechanisms including lifestyle factors, CVD risk factors, and cognitive stimulation have support in the literature. For instance, psychosocial resources such as social support and purpose in life have been associated with healthier lifestyle factors (e.g., more physical activity and better diet quality) [76] and favorable profiles of CVD risk factors (e.g., healthy blood pressure and lower inflammation) [77] which, in turn, are associated with better cognitive outcomes. In fact, prior studies in the HCHS/SOL cohort have found that lower CVD risk factor burden [78, 79], ideal profiles of lifestyle and clinical CVD risk factors [52], and lower prevalence of the metabolic syndrome [80] are associated with better cognitive function. Engagement in cognitively stimulating activities such as reading newspapers or books; visiting a museum or library; and playing games has been found to be directly associated with better cognitive function [89–91] and has also been proposed to contribute to cognitive reserve by reducing the adverse effects of brain pathology on cognitive functioning [92]. While we demonstrate the differential associations of specific psychosocial factors with level of cognitive function, research is needed to explore whether psychosocial factors are associated with changes in cognitive function over time. Moreover, additional research is needed to examine whether these associations are modified by sociodemographic factors such as acculturation, cognitive reserve proxies (including measures of education and income), or Hispanic/Latino background—all of which may highlight the heterogeneity of this population.

Study limitations

Some limitations should be considered when interpreting study findings. First, as mentioned above, the cross-sectional design of our study does not allow for examination of causality and directionality of associations, nor underlying mechanisms such as depressive symptoms.

Equivocal evidence exists regarding whether depressive symptoms are a confounder or a mediator of the association between psychosocial factors and cognition. We chose to consider depressive symptoms as a confounder given prior work in HCHS/SOL [42, 96] and to show findings from the minimally-adjusted model to enable comparison across studies, however, recognize that others may disagree with this approach. While we focus on middle-aged and older adults, the psychosocial processes examined here likely began much earlier in life; thus, future research with a lifecourse approach is needed [93]. Second, participants with worse cognitive function may report poorer ratings of their social relationship than those with better cognitive function (i.e., response bias). While the relatively young age and high performance in the brief Six-Item (cognitive) Screener (61) in our cohort [42] could lessen these possibilities, we cannot rule them out entirely. Third, the use of different measures to assess psychosocial factors such as social networks across previous studies [36] limits our ability to compare our results to past findings. Moreover, the subjective social status ladder used in our study had ‘other people in the US’ as a reference category; it is unclear whether associations would differ if subjective social status was measured using another reference such as other people in the participants’ home country. Fourth, while we used a comprehensive battery of neurocognitive tests, the Word Fluency Test and the Digit Symbol Substitution Subtest were not originally developed for use in English and Spanish; thus, additional research is needed to explore their validity for use in Spanish. Another limitation related to our cognitive function variables is that overlapping relationships may exist between individual cognitive test variables due either to specific cognitive abilities required for task completion or to overall intelligence known as “g” [94]. Finally, because we excluded participants with stroke and heart attack, our findings may not be generalizable to all HCHS/SOL Sociocultural Ancillary Study participants.

Conclusion

Guided by the Reserve Capacity Model [24, 26] and using data from the landmark HCHS/SOL and its Sociocultural Ancillary Study, the present study addresses gaps in the literature on the associations of psychosocial factors with cognitive function among middle-aged and older Hispanics/Latinos. Intrapersonal factors, interpersonal factors, and social stressors had differential relationships with individual cognitive tests; however, purpose in life and social support were associated with cognition across all cognitive test measures and regardless of adjustments. Future research is needed to examine prospective associations, determine reverse causation, and mechanisms underlying the psychosocial factors and cognition associations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

REFERENCES

[1]. US Census Bureau (2010) The next four decades: The older population in the United States 2010 to 2050. https://www.census.gov/library/publications/2010/demo/p25-1138.html, Last updated May 2010, Accessed on February 26, 2018.

[2]. Zahodne LB, Watson CWM, Seehra S, Martinez MN (2018) Positive psychosocial factors and cognition in ethnically diverse older adults. J Int Neuropsychol Soc 24, 294–304. [PubMed: 28925347]

[3]. Lewis NA, Turiano NA, Payne BR, Hill PL (2017) Purpose in life and cognitive functioning in adulthood. Aging Neuropsychol Cogn 24, 662–671.

[4]. Boyle PA, Buchman AS, Barnes LL, Bennett DA (2010) Effect of a purpose in life on risk of incident Alzheimer disease and mild cognitive impairment in community-dwelling older persons. Arch Gen Psychiatry 67, 304–310. [PubMed: 20194831]

[5]. Wingo AP, Wingo TS, Fan W, Bergquist S, Alonso A, Marcus M, Levey AI, Lah JJ (2020) Purpose in life is a robust protective factor of reported cognitive decline among late middle-aged adults: The Emory Healthy Aging Study. J Affect Disord 263, 310–317. [PubMed: 31969260]

[6]. Kim G, Shin SH, Scicolone M, Parmelee PA (2019) Purpose in life protects against cognitive decline among older adults. Am J Geriatr Psychiatry 27, 593–601. [PubMed: 30824327]

[7]. Kelly ME, Duff H, Kelly S, McHugh Power JE, Brennan S, Lawlor BA, Loughrey DG (2017) The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: A systematic review. Syst Rev 6, 259–277. [PubMed: 29258596]

[8]. Sharifian N, Manly JJ, Brickman AM, Zahodne LB (2019) Social network characteristics and cognitive functioning in ethnically diverse older adults: The role of network size and composition. Neuropsychology 33, 956–963. [PubMed: 31192657]

[9]. Seeman TE, Lusignolo TM, Albert M, Berkman L (2001) Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. Health Psychol 20, 243–255. [PubMed: 11515736]

[10]. Zamora-Macorra M, de Castro EFA, Ávila-Funes JA, Manrique-Espinoza BS, López-Ridaura R, Sosa-Ortiz AL, Shields PL, del Campo DSM (2017) The association between social support and cognitive function in Mexican adults aged 50 and older. Arch Gerontol Geriatr 68, 113–118. [PubMed: 27788376]

[11]. Sims RC, Hosey M, Levy S-A, Whitfield KE, Katzel LI, Waldstein SR (2014) Distinct functions of social support and cognitive function among older adults. Exp Aging Res 40, 40–59. [PubMed: 24467699]

[12]. Krueger KR, Wilson RS, Kamenetsky JM, Barnes LL, Bienias JL, Bennett DA (2009) Social engagement and cognitive function in old age. Exp Aging Res 35, 45–60. [PubMed: 19173101]

[13]. Kats D, Patel MD, Palta P, Meyer ML, Gross AL, Whitsel EA, Knopman D, Alonso A, Mosley TH, Heiss G (2016) Social support and cognition in a community-based cohort: The Atherosclerosis Risk in Communities (ARIC) study. Age Ageing 45, 475–480. [PubMed: 27107128]

[14]. O'Luanaigh C, O'Connell H, Chin A-V, Hamilton F, Coen R, Walsh C, Walsh JB, Caokley D, Cunningham C, Lawlor BA (2012) Loneliness and cognition in older people: The Dublin Healthy Ageing study. Aging Ment Health 16, 347–352. [PubMed: 22129350]

[15]. Zhong BL, Chen SL, Tu X, Conwell Y (2017) Loneliness and cognitive function in older adults: Findings from the Chinese Longitudinal Healthy Longevity Survey. J Gerontol B Psychol Sci Soc Sci 72, 120–128. [PubMed: 27013536]

[16]. Donovan NJ, Wu Q, Rentz DM, Sperling RA, Marshall GA, Glymour MM (2017) Loneliness, depression and cognitive function in older US adults. Int J Geriatr Psychiatry 32, 564–573. [PubMed: 27162047]

[17]. Wilson RS, Krueger KR, Arnold SE, Schneider JA, Kelly JF, Barnes LL, Tang Y, Bennett DA (2007) Loneliness and risk of Alzheimer disease. Arch Gen Psychiatry 64, 234–240. [PubMed: 17283291]

[18]. Raeff C, Greenfield PM, Quiroz B (2000) Conceptualizing interpersonal relationships in the cultural contexts of individualism and collectivism. New Dir Child Adolesc Dev 87, 59–74.

[19]. Gallo LC, Penedo FJ, Carnethon M, Isasi CR, Sotres-Alvarez D, Malcarne VL, Roesch SC, Youngblood ME, Daviglus ML, Gonzalez P, Talavera GT (2014)The Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study: Sample, design, and procedures. Ethn Dis 24, 77–83. [PubMed: 24620452]

[20]. Molina KM, Jackson B, Rivera-Olmedo N (2016) Discrimination, racial/ethnic identity, and substance use among Latina/os: Are they gendered? Ann Behav Med 50,119–129. [PubMed: 26489844]

[21]. Valdivieso-Mora E, Peet CL, Garnier-Villarreal M, Salazar-Villanea M, Johnson DK (2016) A systematic review of the relationship between familism and mental health outcomes in Latino population. Front Psychol 7, 1632. [PubMed: 27826269]

[22]. Perreira KM, Gotman N, Isasi CR, Arguelles W, Castañeda SF, Daviglus ML, Giachello AL, Gonzalez P, Penedo FJ, Salgado H, Wassertheil-Smoller S (2015) Mental health and exposure to the United States. J Nerv Ment Dis 203, 670–678. [PubMed: 26237134]

[23]. Perreira KM, Marchante AN, Schwartz SJ, Isasi CR, Carnethon MR, Corliss HL, Kaplan RC, Santisteban DA, Vidot DC, Van Horn L, Delamater AM (2019) Stress and resilience: Key correlates of mental health and substance use in the Hispanic Community Health Study of Latino Youth. J Immigr Minor Heal 21, 4–13.

[24]. Gallo LC, Penedo FJ, Espinosa de los Monteros K, Arguelles W (2009) Resiliency in the face of disadvantage: Do Hispanic cultural characteristics protect health outcomes? J Pers 77, 1707–1746. [PubMed: 19796063]

[25]. Glymour MM, Manly JJ (2008) Lifecourse social conditions and racial and ethnic patterns of cognitive aging. Neuropsychol Rev 18, 223–254. [PubMed: 18815889]

[26]. Gallo LC, Matthews KA (2003) Understanding the association between socioeconomic status and physical health: Do negative emotions play a role? Psychol Bull 129, 10–51. [PubMed: 12555793]

[27]. Myers HF (2009) Ethnicity and socio-economic status-related stresses in context: An integrative review and conceptual model. J Behav Med 32, 9–19. [PubMed: 18989769]

[28]. Hill CV, Pérez-Stable EJ, Anderson NA, Bernard MA (2015) The National Institute on Aging Health Disparities Research Framework. Ethn Dis 25, 245–254. [PubMed: 26675362]

[29]. Stern Y (2002) What is cognitive reserve? Theory and research application of the reserve concept. J Int Neuropsychol Soc 8, 448–460. [PubMed: 11939702]

[30]. National Research Council (2006). When I'm 64. 10.17226/11474, Last updated 2008, Accessed on April 17, 2019.

[31]. Kuiper JS, Zuidersma M, Zuidema SU, Burgerhof JGM, Stolk RP, Oude Voshaar RC, Smidt N (2016) Social relationships and cognitive decline: A systematic review and meta-analysis of longitudinal cohort studies. Int J Epidemiol 45, 1169–1206. [PubMed: 27272181]

[32]. Boss L, Kang D-H, Branson S (2015) Loneliness and cognitive function in the older adult: A systematic review. Int Psychogeriatr 27, 541–553. [PubMed: 25554219]

[33]. Pew Research Center (2017) US Hispanic population growth has leveled off. https://www.pewresearch.org/fact-tank/2017/08/03/u-s-hispanic-population-growth-has-leveled-off/, Last updated August 3, 2017, Accessed on April 17, 2019.

[34]. Gawronski KAB, Kim ES, Langa KM, Kubzansky LD (2016) Dispositional optimism and incidence of cognitive impairment in older adults. Psychosom Med 78, 819–828. [PubMed: 27284699]

[35]. Molina KM, Estrella ML, Durazo-Arvizu R, Malcarne VL, Llabre MM, Isasi CR, Ornelas IJ, Perreira KM, Penedo FJ, Brondolo E, Gallo L, Daviglus ML (2019) Perceived discrimination and physical health-related quality of life: The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Sociocultural Ancillary Study. Soc Sci Med 222, 91–100. [PubMed: 30623798]

[36]. Kuiper JS, Zuidersma M, Oude Voshaar RC, Zuidema SU, van den Heuvel ER, Stolk RP, Smidt N (2015) Social relationships and risk of dementia: A systematic review and meta-analysis of longitudinal cohort studies. Ageing Res Rev 22, 39–57. [PubMed: 25956016]

[37]. Campos B, Ullman JB, Aguilera A, Dunkel Schetter C (2014) Familism and psychological health: The intervening role of closeness and social support. Cultur Divers Ethnic Minor Psychol 20, 191–201. [PubMed: 24773004]

[38]. Campos B, Roesch SC, Gonzalez P, Hooker ED, Castañeda SF, Giachello AL, Perreira KM, Gallo LC (2019) Measurement properties of Sabogal's Familism Scale: Findings from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Sociocultural Ancillary Study. J Lat Psychol 7, 257–272. [PubMed: 31853517]

[39]. Barnes LL, Lewis TT, Begeny CT, Yu L, Bennett DA, Wilson RS (2012) Perceived discrimination and cognition in older African Americans. J Int Neuropsychol Soc 18, 856–865. [PubMed: 22595035]

[40]. Shankar A, Hinds P (2017) Perceived discrimination: Associations with physical and cognitive function in older adults. Health Psychol 36, 1126–1134. [PubMed: 28639821]

[41]. Ursache A, Noble KG, Blair C (2015) Socioeconomic status, subjective social status, and perceived stress: Associations with stress physiology and executive functioning. Behav Med 41, 145–154. [PubMed: 26332932]

[42]. González HM, Tarraf W, Gouskova N, Gallo LC, Penedo FJ, Davis SM, Lipton RB, Argüelles W, Choca JP, Catellier DJ, Mosley TH (2015) Neurocognitive function among middle-aged and older Hispanic/Latinos: Results from the Hispanic Community Health Study/Study of Latinos. Arch Clin Neuropsychol 30, 68–77. [PubMed: 25451561]

[43]. Sorlie PD, Avilés-Santa LM, Wassertheil-Smoller S, Kaplan RC, Daviglus ML, Giachello AL, Schneiderman N, Raij L, Talavera G, Allison M, LaVange L, Chambless LE, Heiss G (2010) Design and implementation of the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol 20, 629–641. [PubMed: 20609343]

[44]. LaVange LM, Kalsbeek WD, Sorlie PD, Avilés-Santa LM, Kaplan RC, Barnhart J, Liu K, Giachello A, Lee DJ, Ryan J, Criqui MH, Elder JP (2010) Sample design and cohort selection in the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol 20, 642–649. [PubMed: 20609344]

[45]. Mijajlović MD, Pavlović A, Brainin M, Heiss WD, Quinn TJ, Ihle-Hansen HB, Hermann DM, Assayag EB, Richard E, Thiel A, Kliper E, Shin Y, Kim YH, Choi SH, Jung S, Lee YB, Sinanović O, Levine DA, Schlesinger I, Mead G, MiloŠević V, Leys D, Hagberg G, Ursin MH, Teuschl Y, Prokopenko S, Mozheyko E, Bezdenezhnykh A, Matz K, Aleksić V, Muresanu DF, Korczyn AD, Bornstein NM (2017) Post-stroke dementia – a comprehensive review. BMC Med 15, 01–12.

[46]. Gharacholou SM, Reid KJ, Arnold SV, Spertus J, Rich MW, Pellikka PA, Singh M, Holsinger T, Krumholz HM, Peterson ED, Alexander KP (2011) Cognitive impairment and outcomes in older adult survivors of acute myocardial infarction: Findings from the translational research investigating underlying disparities in acute myocardial infarction patients' health status registry. Am Heart J162, 860–869. [PubMed: 22093202]

[47]. Mellon L, Brewer L, Hall P, Horgan F, Williams D, Hickey A, McGee H, Shelley E, Kelly P, Dolan E (2015) Cognitive impairment six months after ischaemic stroke: A profile from the ASPIRE-S study. BMC Neurol 15, 31–40. [PubMed: 25879880]

[48]. Gu SZ, Beska B, Chan D, Neely D, Batty JA, Adams-Hall J, Mossop H, Qiu W, Kunadian V (2019) Cognitive decline in older patients with non-ST elevation acute coronary syndrome. J Am Heart Assoc 8, 1–19.

[49]. Heeringa SG, West BT, Berglund P (2010) Multiple imputation: Methods and applications for survey analysts. In Applied Survey Data Analysis, Chapman & Hall/CRC Press, pp. 335–368.

[50]. Lamar M, León A, Romo K, Durazo-Arvizu RA, Sachdeva S, Lipton RB, Perreira KM, Gallo LC, Cai J, Khambaty T, Carrasco J, Llabre MM, Eyler LT, Daviglus ML, González HM (2019) The independent and interactive associations of bilingualism and sex on cognitive performance in Hispanics/Latinos of the Hispanic Community Health Study/Study of Latinos. J Alzheimers Dis 71, 1271–1283. [PubMed: 31524155]

[51]. Lamar M, Durazo-Arvizu RA, Rodriguez CJ, Kaplan RC, Perera MJ, Cai J, Espinoza Giacinto RA, González HM, Daviglus ML (2020) Associations of lipid levels and cognition: Findings from the Hispanic Community Health Study/Study of Latinos. J Int Neuropsychol Soc 26,251–262. [PubMed: 31543086]

[52]. González HM, Tarraf W, Gouskova N, Rodríguez CJ, Rundek T, Grober E, Pirzada A, González P, Lutsey PL, Camacho A, Daviglus ML, Wright C, Mosley TH (2016) Life's simple 7's cardiovascular health metrics are associated with Hispanic/Latino neurocognitive function: HCHS/SOL results. J Alzheimers Dis 53, 955–965. [PubMed: 27340845]

[53]. González HM, Mungas D, Reed BR, Marshall S, Haan MN (2001) A new verbal learning and memory test for English-and Spanish-speaking older people. J Int Neuropsychol Soc 7, 544–555. [PubMed: 11459106]

[54]. González HM, Mungas D, Haan MN (2002) A verbal learning and memory test for English and Spanish speaking older Mexican-American adults. Clin Neuropsychol 16, 439–451. [PubMed: 12822053]

[55]. Lezak MD, Howieson DB, Loring DW (2004) Neuropsychological Assessment, New York City, NY.

[56]. Benton AI, Hamsher K (1989) Multilingual Aphasia Examination, 2nd ed, Iowa City, IA.

[57]. Wechsler D (1981) Manual for the Wechsler Memory Scale, San Antonio, TX.

[58]. Maneesriwongul W, Dixon JK (2004) Instrumenttranslation process: A methods review. J Adv Nurs 48, 175–186. [PubMed: 15369498]

[59]. Malcarne V, Chavira D, Fernandez S, Liu P (2006) The scale of ethnic experience: Development and psychometric properties. J Pers Assess 86, 150–161. [PubMed: 16599789]

[60]. Negy C, Snyder DK (2006) Assessing family of origin functioning in Mexican American adults: Retrospective application of the family environment scale. Assessment 13, 396–405. [PubMed: 17050910]

[61]. Sabogal F, Marín G, Otero-Sabogal R, Marín BV, Perez-Stable EJ (1987) Hispanic familism and acculturation: What changes and what doesn't? Hisp J Behav Sci 9, 397–412.

[62]. Merz EL, Roesch SC, Malcarne VL, Penedo FJ, Llabre MM, Weitzman OB, Navas-Nacher EL, Perreira KM, Gonzalez F, Ponguta LA, Johnson TP, Gallo LC (2014) Validation of interpersonal support evaluation list-12 (ISEL-12) scores among English- and Spanish-speaking Hispanics/Latinos from the HCHS/SOL Sociocultural Ancillary Study. Psychol Assess 26, 384–394. [PubMed: 24320763]

[63]. Brondolo E, Kelly KP, Coakley V, Gordon T, Thompson S, Levy E, Cassells A, Tobin JN, Sweeney M, Contrada RJ (2005) The perceived ethnic discrimination questionnaire: Development and preliminary validation of a community version. J Appl Soc Psychol 35, 335–365.

[64]. Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT (2004) A short scale for measuring loneliness in large surveys: Results from two population-based studies. Res Aging 26, 655–672. [PubMed: 18504506]

[65]. Operario D, Adler NE, Williams DR (2004) Subjective social status: Reliability and predictive utility for global health. Psych Health 19, 237–246.

[66]. Dimitrov DM (2010) Testing for factorial invariance in the context of construct validation. Meas Eval Couns Dev 43, 121–149.

[67]. Messick S (1994) Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. Am Psychol 50, 741–749.

[68]. Green EGT, Sarrasin O, Fase lN (2015)Immigration: Social psychological aspects. In International Encyclopedia of the Social & Behavioral Sciences, Wright JD, Elsevier, pp. 675–681.

[69]. Scheier MF, Carver CS, Bridges MW (1994) Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. J Pers Soc Psychol 67, 1063–1078. [PubMed: 7815302]

[70]. Scheier MF, Wrosch C, Baum A, Cohen S, Martire LM, Matthews KA, Schulz R, Zdaniuk B (2006) The Life Engagement Test: Assessing purpose in life. J Behav Med 29, 291–298. [PubMed: 16565785]

[71]. Moos R, Moos B (1994) Family Environment Scale manual, Palo Alto, CA.

[72]. Cohen S, Doyle WJ, Skoner DP, Rabin BS, Gwaltney JM (1997) Social ties and susceptibility to the common cold. J Am Med Assoc 25, 1940–1944.

[73]. Cohen S, Mermelstein R, Kamarck T, Hoberman HM (1985) Measuring the functional components of social support. In Social support: Theory, research and applications, Sarason IG, Sarason BR, eds. Springer, Dordrecht, pp. 73–94.

[74]. Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL (1994) Socioeconomic status and health: The challenge of the gradient. Am Psychol 49,15–24. [PubMed: 8122813]

[75]. Andresen EM, Malmgren JA, Carter WB, Patrick DL (1993) Screening for depression in well older adults: Evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). Am J Prev Med 10, 77–84.

[76]. Non AL, Román JC, Clausing ES, Gilman SE, Loucks EB, Buka SL, Appleton AA, Kubzansky LD (2020) Optimism and social support predict healthier adult behaviors despite socially disadvantaged childhoods. Int J Behav Med 27, 200–212. [PubMed: 31933126]

[77]. Kubzansky LD, Huffman JC, Boehm JK, Hernandez R, Kim ES, Koga HK, Feig EH, Lloyd-Jones DM, Seligman MEP, Labarthe DR (2018) Positive psychological well-being and cardiovascular disease: JACC Health Promotion Series. J Am Coll Cardiol 72, 1382–1396. [PubMed: 30213332]

[78]. Lamar M, Durazo-Arvizu RA, Sachdeva S, Pirzada A, Perreira KM, Rundek T, Gallo LC, Grober E, DeCarli C, Lipton RB, Tarraf W, González HM, Daviglus ML (2019) Cardiovascular disease risk factor burden and cognition: Implications of ethnic diversity within the Hispanic Community Health Study/Study of Latinos. PLoS One 14, 1–16.

[79]. Lamar M, Wu D, Durazo-Arvizu RA, Brickman AM, Gonzalez HM, Tarraf W, Daviglus ML (2017) Cognitive associates of current and more intensive control of hypertension: Findings From the Hispanic Community Health Study/Study of Latinos. Am J Hypertens 30, 624–631. [PubMed: 28402388]

[80]. González HM, Tarraf W, Vásquez P, Sanderlin AH, Rosenberg NI, Davis S, Rodrñguez CJ, Gallo LC, Thyagarajan B, Daviglus M, Khambaty T, Cai J, Schneiderman N (2018) Metabolic syndrome and neurocognition among diverse middle-aged and older Hispanics/Latinos: HCHS/SOL results. Diab Care 41, 1501–1509.

[81]. Cronin TJ, Levin S, Branscombe NR, van Laar C, Tropp LR (2012) Ethnic identification in response to perceived discrimination protects well-being and promotes activism: A longitudinal study of Latino college students. Gr Process Intergr Relations 15, 393–407.

[82]. Rinderle S, Montoya D (2008) Hispanic/Latino identity labels: An examination of cultural values and personal experiences. Howard J Commun 19, 144–164.

[83]. Sayegh P, Knight BG (2011) The effects of familism and cultural justification on the mental and physical health of family caregivers. J Gerontol Ser B Psychol Sci Soc Sci 66, 3–14. [PubMed: 20797972]

[84]. Losada A, Márquez-González M, Knight BG, Yanguas J, Sayegh P, Romero-Moreno R (2010) Psychosocial factors and caregivers' distress: Effects of familism and dysfunctional thoughts. Aging Ment Health 14, 193–202. [PubMed: 20336551]

[85]. Taylor RJ, Chae DH, Lincoln KD, Chatters LM (2015) Extended family and friendship support networks are both protective and risk factors for major depressive disorder and depressive symptoms among African-Americans and Black Caribbeans. J Nerv Ment Dis 203, 132–140. [PubMed: 25594791]

[86]. Balfour PC, Ruiz JM, Talavera GA, Allison MA, Rodriguez CJ, Rodriguez CJ (2016) Cardiovascular disease in Hispanics/Latinos in the United States. J Lat Psychol 4, 98–113. [PubMed: 27429866]

[87]. Pan TM, Mills SD, Fox RS, Baik SH, Harry KM, Roesch SC, Sadler GR, Malcarne VL (2017) The psychometric properties of English and Spanish versions of the Life Orientation Test-Revised in Hispanic Americans. J Psychopathol Behav Assess 39, 657–668. [PubMed: 29170597]

[88]. Zahodne LB, Kraal A, Zaheed A, Sol K (2018) Subjective social status predicts late-life memory trajectories through both mental and physical health pathways. Gerontology 39, 657–668.

[89]. Mitchell MB, Cimino CR, Benitez A, Brown CL, Gibbons LE, Kennison RF, Shirk SD, Atri A, Robitaille A, MacDonald SWS, Lindwall M, Zelinski EM, Willis SL, Schaie KW, Johansson B, Dixon RA, Mungas DM, Hofer SM, Piccinin AM (2012) Cognitively stimulating activities: Effects on cognition across four studies with up to 21 years of longitudinal data. J Aging Res 2012, 1–13.

[90]. Wilson R, Bennett D (2017) How does psychosocial behavior contribute to cognitive health in old age? Brain Sci 7, 1–15.

[91]. Marquine MJ, Segawa E, Wilson RS, Bennett DA, Barnes LL (2012) Association between cognitive activity and cognitive function in older Hispanics. J Int Neuropsychol Soc 18, 1041–1051. [PubMed: 22676914]

[92]. Boyle PA, Buchman AS, Wilson RS, Yu L, Schneider JA, Bennett DA (2012) Effect of purpose in life on the relation between Alzheimer disease pathologic changes on cognitive function in advanced age. Arch Gen Psyc 69, 499–505.

[93]. Liu S, Jones RN, Glymour MM (2010) Implications of lifecourse epidemiology for research on determinants of adult disease. Public Health Rev 32, 489–511. [PubMed: 24639598]

[94]. Johnson W, Bouchard TJ, Krueger RF, McGue M (2004) Just one g: Consistent results from three test batteries. Intelligence 13, 95–107.

Table 1

Descriptive characteristics of the target population: Middle-aged and older Hispanics/Latinos, HCHS/SOL SCAS (n = 2,818)

Characteristics	n	% or Mean (SD)
Age in years	2,818	56.2 (9.7)
Female	1,794	56.4
Hispanic/Latino Background		
Central or South American	486	12.6
Cuban	457	26.8
Dominican	277	10.3
Mexican	1,052	30.4
Puerto Rican	506	18.9
Other/ More than one	40	1.0
Education		
<High School	1,095	37.8
High School	624	20.7
>High School	1,099	41.5
Household Income		
<$20,000	1,395	49.3
$20,000–$50,000	997	32.0
>$50,000	223	10.4
Not reported	203	8.3
Preferred Spanish Language[a]	2,452	84.8
Depressive Symptoms[b]	2,818	8.0 (7.9)
Cognitive Function[c]		
Global Cognition	2,818	−0.0 (0.8)
Verbal Learning	2,818	22.5 (6.9)
Verbal Memory	2,818	8.1 (3.5)
Verbal Fluency	2,818	18.6 (8.9)
Processing Speed	2,818	34.7 (15.8)

SD, standard deviation. Sample size is unweighted and all other reported values are weighted to represent the target population. Values in parentheses are weighted standard deviations.

[a]Preferred Spanish language for baseline examination.

[b]Depressive symptoms were assessed using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10).

[c]Global cognitive function was calculated as the average of the z-scores (i.e., [individual value – mean value]/standard deviation) for performance across the four cognitive tests (i.e., verbal learning, verbal memory, verbal fluency, and processing speed).

Table 2

Descriptive statistics (range, weighted mean, and weighted standard deviation) and weighted zero-order bivariate correlations of psychosocial factors among middle-aged and older Hispanics/Latinos, HCHS/SOL SCAS (n = 2,818)

Psychosocial Factors	Range	M	SD	1	2	3	4	5	6	7	8	9	10
1. Ethnic Identity	4–5	3.6	0.6	1.00									
2. Optimism	1–24	17.1	4.8	0.22***	1.00								
3. Purpose in Life	6–30	25.1	4.4	0.28***	**0.49***	1.00							
4. Family Cohesion	0–8	6.9	2.1	0.12***	0.27***	0.23***	1.00						
5. Familism	8–70	54.3	8.2	0.14***	−0.01	0.03***	0.11***	1.00					
6. SNE	0–8	1.7	1.7	0.11***	0.16***	0.19***	0.18***	−0.01	1.00				
7. Social Support	0–36	26.0	8.1	0.23***	**0.42***	**0.40***	0.35***	0.01	0.36***	1.00			
8. Perceived Discrimination	17–85	24.4	10.4	0.04	−0.16***	−0.11***	−0.21***	−0.03	−0.03	−0.18***	1.00		
9. Loneliness	3–9	4.5	2.0	−0.04*	−0.29***	−0.31***	−0.32***	0.03	−0.25***	−**0.42***	0.26***	1.00	
10. SSS	0–10	4.2	2.3	0.04	0.10***	0.12***	0.04*	−0.13***	0.11***	0.11***	−0.05*	−0.10***	1.00

M, mean; SD, standard deviation; SNE, social network embeddedness; SSS, subjective social status. Values in bold indicate a correlation coefficient equal or greater than 0.40 or −0.40.

* $p < 0.05$

** $p <-0.01$

*** $p <0.001$.

Table 3

Associations of each ± psychosocial factor (treated as z-scores) with cognitive function among middle-aged and older Hispanics/Latinos, HCHS SCAS (*n* = 2,818)

	Global Cognition β (95% CI)	Verbal Learning β (95% CI)	Memory β (95% CI)	Verbal Fluency β (95% CI)	Processing Speed β (95% CI)
INTRAPERSONAL RESOURCES					
Ethnic Identity					
M1	0.03 (−0.01, 0.08)	0.17 (−0.23, 0.57)	−0.02 (−0.21, 0.17)	0.58 (0.04, 1.12) *	0.86 (0.04, 1.68) *
M2	0.06 (0.02, 0.09) **	0.29 (−0.07, 0.66)	0.10 (−0.08, 0.28)	0.87 (0.40, 1.34) ***	1.02 (0.34, 1.70) **
Optimism					
M1	0.06 (0.01, 0.10) *	0.59 (0.21, 0.97) **	0.21 (0.04, 0.38) *	0.59 (0.03, 1.15) *	0.17 (−0.65, 0.98)
M2	0.04 (−0.00, 0.08)	0.31 (−0.11, 0.72)	0.05 (−0.12, 0.22)	0.70 (0.23, 1.16) **	0.37 (−0.39, 1.13)
Purpose in Life					
M1	0.13 (0.08, 0.17) ***	0.89 (0.51, 1.28) ***	0.44 (0.27, 0.62) ***	1.28 (0.74, 1.82) ***	1.67 (0.93, 2.42) ***
M2	0.10 (0.06, 0.14) ***	0.58 (0.20, 0.96) **	0.29 (0.12, 0.47) **	1.27 (0.70, 1.84) ***	1.67 (0.98, 2.35) ***
INTERPERSONAL RESOURCES					
Family Cohesion					
M1	0.06 (0.02, 0.09) **	0.67 (0.36, 0.99) ***	0.26 (0.10, 0.43) **	0.32 (−0.16, 0.80)	0.40 (−0.33, 1.14)
M2	0.03 (−0.00, 0.06)	0.32 (0.01, 0.64) *	0.09 (−0.08, 0.25)	0.21 (−0.36, 0.78)	0.45 (−0.17, 1.08)
Familism					
M1	−0.12 (−0.16, −0.09) ***	−0.54 (−0.88, −0.21) **	−0.22 (−0.39, −0.06) **	−1.79 (−2.24, −1.34) ***	−2.49 (−3.17, −1.80) ***
M2	−0.06 (−0.09, −0.03) ***	−0.19 (−0.51, 0.13)	−0.01 (−0.17, 0.15)	−1.21 (−1.61, −0.80) ***	−1.22 (−1.85, −0.58) ***
SNE					
M1	0.09 (0.04, 0.14) ***	0.83 (0.46, 1.19) ***	0.35 (0.09, 0.60) **	0.69 (−0.05, 1.44)	1.24 (0.41, 2.07) **
M2	0.03 (−0.02, 0.08)	0.40 (0.07, 0.74) *	0.13 (−0.13, 0.38)	0.24 (−0.46, 0.94)	0.21 (−0.55, 0.97)
Social Support					
M1	0.12 (0.08, 0.16) ***	0.84 (0.54, 1.15) ***	0.37 (0.21, 0.54) **	1.11 (0.49, 1.73) ***	2.09 (1.40, 2.78) ***
M2	0.08 (0.04, 0.12) ***	0.50 (0.20, 0.80) **	0.19 (0.02, 0.37) *	0.98 (0.21, 1.76) *	1.21 (0.53, 1.89) **
SOCIAL STRESSORS					

	Global Cognition β (95% CI)	Verbal Learning β (95% CI)	Memory β (95% CI)	Verbal Fluency β (95% CI)	Processing Speed β (95% CI)
Ethnic Discrimination					
M1	0.03 (−0.01, 0.08)	0.02 (−0.40, 0.44)	0.04 (−0.13, 0.20)	0.43 (−0.13, 1.00)	1.15 (0.23, 2.06)*
M2	0.03 (−0.02, 0.08)	0.19 (−0.24, 0.61)	−0.11 (−0.07, 0.28)	0.27 (−0.34, 0.88)	0.53 (−0.29, 1.36)
Loneliness					
M1	−0.12 (−0.16, −0.09)***	−1.08 (−1.40, −0.76)***	−0.48 (−0.65, −0.32)***	−0.84 (−1.36, −0.31)***	−1.76 (−2.41, −1.12)***
M2	−0.07 (−0.10, −0.03)***	−0.57 (−0.93, −0.21)**	−0.20 (−0.37, −0.03)**	−0.48 (−1.01, 0.04)	−1.10 (−1.74, −0.46)**
SSS					
M1	0.09 (0.04, 0.14)***	0.52 (0.13, 0.90)**	0.20 (−0.00, 0.40)	0.74 (−0.05, 1.54)	2.20 (1.33, 3.07)***
M2	−0.00 (−0.05, 0.04)	−0.02 (−0.39, 0.35)	−0.12 (−0.31, 0.07)	−0.09 (−0.77, 0.58)	0.44 (−0.23, 1.10)

M, model; SNE, social network embeddedness; SSS, subjective social status. Sample size is unweighted and all other reported values are weighted to represent the target Hispanic/Latino population.

±Psychosocial factors were entered separately into each model. Model 1: Age, sex, and education. Model 2: Model 1+ Hispanic/Latino background, income, language preference, and depressive symptoms.

*$p<0.05$

**$p<0.01$

***$p<0.001$.

Table 4

Adjusted associations of all ± psychosocial factors (treated as z–scores) with each cognitive function outcome among middle-aged and older Hispanics/Latinos, HCHS SCAS (n = 2,818)

	Global Cognition β (95% CI)	Verbal Learning β (95% CI)	Memory β (95% CI)	Verbal Fluency β (95% CI)	Processing Speed β (95% CI)
INTRAPERSONAL RESOURCES					
Ethnic Identity	0.04 (0.01, 0.08)*	0.15 (−0.20, 0.51)	0.03 (−0.14, 0.19)	0.73 (0.30, 1.16)**	0.87 (0.19, 1.55)*
Optimism	−0.03 (−0.07. 0.01)	−0.07 (−0.49, 0.34)	−0.13 (−0.31, 0.05)	−0.11 (−0.72, 0.50)	−0.84 (−1.60, −0.09)*
Purpose in Life	0.09 (0.05, 0.13)***	0.46 (0.08, 0.85)*	0.30 (0.12, 0.48)**	1.09 (0.43, 1.74)**	1.58 (0.85, 2.31)***
INTERPERSONAL RESOURCES					
Family Cohesion	0.02 (−0.02, 0.05)	0.19 (−0.15, 0.54)	0.03 (−0.16, 0.22)	0.06 (−0.41, 0.53)	0.29 (−0.33, 0.92)
Familism	−0.08 (−0.12, −0.05)***	−0.32 (−0.63, −0.01)*	−0.07 (−0.22, 0.08)	−1.52 (−2.03, −1.02)***	−1.61 (−2.27, −0.95)***
SNE	0.01 (−0.04, 0.05)	0.22 (−0.10, 0.54)	0.06 (−0.19, 0.30)	−0.08 (−0.74, 0.58)	−0.26 (−1.02, 0.49)
Social Support	0.05 (0.00, 0.09)*	0.20 (−0.15, 0.55)	0.10 (−0.08, 0.28)	0.66 (−0.15, 1.46)	0.83 (0.14, 1.53)*
SOCIAL STRESSORS					
Ethnic Discrimination	−0.04 (−0.00, 0.08)	0.25 (−0.15, 0.64)	0.12 (−0.04, 0.29)	0.33 (−0.20, 0.87)	0.71 (−0.07, 1.49)
Loneliness	−0.04 (−0.08, −0.01)*	−0.41 (−0.78, −0.03)*	−0.15 (−0.32, 0.02)	−0.20 (−0.72, 0.33)	−0.82 (−1.47, −0.18)*
SSS	−0.01 (−0.05, 0.03)	−0.04 (−0.40, 0.33)	−0.12 (−0.31, 0.06)	−0.18 (−0.81, 0.45)	0.39 (−0.24, −1.02)

Sample size is unweighted and all other reported values are weighted to represent the target Hispanic/Latino population. Five separate linear regressions models were conducted: 1) adjusted associations of all psychosocial factors with global cognition; adjusted associations of all psychosocial factors with verbal learning; 3) adjusted associations of all psychosocial factors with memory; 4) adjusted associations of all psychosocial factors with verbal fluency; and 5) adjusted associations of all psychosocial factors with processing speed. SNE, social network embeddedness; SSS, subjective social status.

± All psychosocial factors were entered simultaneously into each model. Models adjusted for age, sex, education, Hispanic/Latino background, income, language preference, and depressive symptoms.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

Table 5

Adjusted[a] association of familism subscales[b] (treated as z-scores) with cognitive function among middle-aged and older Hispanics/Latinos, HCHS SCAS

	Global Cognition β (95% CI)	Verbal Learning β (95% CI)	Memory β (95% CI)	Verbal Fluency β (95% CI)	Processing Speed β (95% CI)
Familism Subscales[c]					
Family Obligations	0.02 (−0.01, 0.05)	0.24 (−0.08, 0.55)	0.17 (0.03, 0.31)*	−0.23 (−0.63, 0.17)	0.13 (−0.48, 0.74)
Family Support	−0.03 (−0.06, 0.00)	−0.04 (−0.35, 0.27)	−0.00 (−0.17, 0.16)	−0.78 (−1.24, −0.32)**	−0.22 (−0.89, 0.45)
Family as Referent	−0.12 (−0.16, −0.08)***	−0.57 (−0.91, −0.23)**	−0.20 (−0.37, −0.02)*	−1.66 (−2.16, −1.16)***	−2.37 (−2.99, −1.74)***

[a]Models adjusted for age, sex, education, Hispanic/Latino background, income, language preference, and depressive symptoms.

[b]Family obligations subscale (6-items) refers to one's obligation to family. Family support (3-items) subscale refers to perceived support from the family. Family as referent (6-items) subscale refers to considering family as referent for decision making.

[c]Sample size for each of the models is different for each familism subscale because the total familism score was calculated if a participant had < 20% of total items missing; Family obligations: $n = 2,817$; Family support: $n = 2,815$; Family as referent: $n = 2,818$.

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$.