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REGULAR ARTICLE

Does the Hispanic Mortality Advantage Vary by Marital Status Among Postmenopausal Women in the Women's Health Initiative?

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Abstract

Background Literature assessing the effect of marital status on mortality has underrepresented, or altogether omitted Hispanics and the potential moderating effect of Hispanic ethnicity on these relationships. Given cultural and network dynamics, marital advantages in older Hispanic women may be greater than other groups given their family-focused, collectivist orientation.

Purpose The purpose of this study was to understand whether older Hispanic women exhibited a more pronounced marital advantage as compared with non-Hispanic Whites.

Methods We used longitudinal data from the Women's Health Initiative (WHI) Observational Study and Clinical Trials (N = 161,808) collected initially from 1993 to 1998 and followed until 2018. Our sample excluded those respondents indicating "other" as their race-ethnicity and those missing marital status and race-ethnicity variables (N = 158,814). We used Cox-proportional hazards models to assess the association between race-ethnicity, marital status, and the interactive effect of race-ethnicity and marital status on survival.

Results After controlling for socioeconomic status (SES) and health controls, we found a Hispanic survival advantage when compared with non-Hispanic Whites and all other racial-ethnic groups with the exception of Asian/Pacific Islander women (all significant HRs < 0.78, all ps ≤ 0.001). Hispanics had a higher rate of divorce when compared with non-Hispanic Whites. The interactive effect of race-ethnicity and marital status was not significant.

Conclusions U.S. Hispanic, postmenopausal women exhibit a mortality advantage over and above marital status despite their high rates of divorce. Implications and potential explanations are discussed.

Clinical Trial Registration NCT00000611.

Keywords Marital status · Race-ethnicity · Hispanic · Latina · Mortality · Hispanic mortality paradox

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Introduction

Hispanics are the fastest growing minority group in the United States, accounting for 17.5% of the U.S. population and projected to grow to 28.6% (111.2 million Hispanics) by 2050 [1]. Despite their significant national presence, Hispanic health is not well understood as they are often left out of major scientific studies, or the health of other racial-ethnic minorities is

generalized to them. Similar to non-Hispanic African Americans/Blacks, Hispanics endure significant socioeconomic and structural vulnerabilities that are associated with poor health outcomes. For example, Hispanics have among the lowest rates of educational attainment and income levels, and among the highest rates of poverty relative to other racial-ethnic groups in the U.S. Hispanics are also less likely to have health insurance, a regular healthcare provider, and more likely to report their quality of care as fair/poor [2]. Despite these vulnerabilities, Hispanics tend to have better health and live an average of 3.3 years longer than non-Hispanics including non-Hispanic Whites [3–5]. These paradoxical effects have generated a great deal of interest in sociocultural resilience that may offset disproportionate risk [6,7].

One potential contributing pathway for these outcomes may be cultural differences in the experience of social ties including marriage. Decades of literature demonstrate a robust association between marital status and mortality in older individuals. Being married or in a marital-like relationship is associated with lower mortality and positive economic outcomes, whereas divorce and widowhood are associated with increased risk of mortality from all causes [8–11]. Well-established gender differences in the size of these effects suggest that older men may experience a greater effect of marital status on mortality when compared to older women [12, 13]. Further, different mechanisms may underlie these gender differences among aging adults, providing justification for future stratified or separate investigations across genders [14].

The overwhelming majority of this literature, however, has underrepresented or omitted Hispanic individuals and the potential moderating effect of Hispanic ethnicity and culture on marital status and mortality. Cultural values among Hispanics are characterized by interpersonal harmony, likeability, empathy, and the promotion of positivity in interpersonal situations within the context of familial obligation and respect [15]. Older Hispanic women are revered elders who provide emotional nurturing and tangible support to familial ties and network members [16]. Moreover, Hispanic social networks tend to be tight-knit clusters of kinships spanning multiple generations [17]. Older Hispanic women may experience especially protective effects of marriage given these cultural norms and network dynamics manifesting in a culturally specific experience of marriage and partnership. For the same reasons, marital dissolution in older Hispanics may be especially detrimental with divorce and widowhood significantly disrupting kinship dynamics. Thus, the magnitude of the classic *marital survival advantage* in older Hispanic women may be greater than other groups given their family-focused, collectivist orientation. Marital dissolution or never marrying is a ubiquitous social exposure for Hispanics. Currently, they report the second highest level of divorce in the USA (46% of Hispanic marriages end in divorce), and the highest levels of never marrying (37.5%) [18]. It is prudent to understand how marital status may be a risk and/or resilience factor contributing to Hispanic mortality.

Marital Status and Mortality in Hispanics

Few studies have assessed how marital status may affect mortality in Hispanics with respect to other racial-ethnic groups. Among the limited work in this area, one study found that never-married Hispanic women have a lower risk for obesity, a known mortality risk factor, when compared with their married, Hispanic counterparts [19]. However, authors did not perform racial-ethnic comparisons in this study. In addition, two studies found that the nativity status of Hispanic women moderated the relationship between marital status and mortality such that married U.S.-born, Hispanic cancer patients have a higher risk for cancer specific mortality than their married, foreign-born peers [20, 21]. Although these studies highlight the importance of including nativity and other acculturation variables in analyses, they do not include extensive controls such as socioeconomic status (SES) and concomitant health variables (e.g., smoking and physical activity). Including such controls may illuminate potential pathways through which race-ethnicity and marital status effects manifest. In sum, there remains little published evidence examining racial-ethnic differences in the magnitude of these effects across marital statuses.

To address these gaps, the purpose of this study was to understand whether older Hispanic women exhibited a more pronounced marital advantage as compared with non-Hispanic Whites using data from the Women's Health Initiative (WHI). The WHI is one of the largest ethnically representative samples of postmenopausal women in the USA [22]. We sought to replicate past literature by assessing whether there was a broad, Hispanic survival advantage, as well as a broad marital survival advantage in the WHI clinical trial (CT) and observational (OS) samples. Next, we assessed racial-ethnic differences across marital categories while controlling for age, language preferences, SES, and health variables known to correlate with mortality. Specifically, we tested whether the classic martial advantage was greater in Hispanics than in non-Hispanic Whites. We hypothesized that

this marital advantage would be more pronounced in older Hispanic women versus non-Hispanic Whites.

Methods

Data Source and Study Population

We used longitudinal data from the WHI CT and OS samples. The WHI is a longitudinal, national health study of postmenopausal women (N = 161,808) with aims focused on understanding the leading causes of common chronic diseases [22]. The WHI recruited women from 40 clinical centers across the USA between the years 1993 and 1998. The final analytical sample (N = 158,814) was restricted to all race-ethnicities with the exception of those respondents who identified as "other" (– n = 2,240) and those who had missing data on race-ethnicity and/or marital status questions (– n = 754). The "other" race-ethnicity category was omitted as it presents a challenge in creating a precise understanding of the influence of race-ethnicity on mortality.

Inclusion criteria for the WHI were the following: postmenopausal status, ages 50–79 years, and no plans of relocating for at least 3 years. The study prohibited women from participating in WHI if they reported medical conditions with a survival prognosis of 3 years or less, dementia, active alcohol or drug dependency, or severe mental illness. Women in the original CT and OS were followed for 8–12 years, and continued follow-ups are planned until 2020 for consenting respondents [22]. After this time, respondents will continue to be followed until death. All women in the WHI CT and OS studies provided written informed consent and all clinical sites obtained local Institutional Review Board approval.

Measures

Mortality

Mortality outcomes for CT and OS respondents were documented through death certificates, hospital records, autopsy reports, and records from the National Center for Health Statistics' National Death Index [23]. For more information about recording and adjudication see a protocol described elsewhere [23].

Marital status

Marital status was collected from each respondent at baseline. Women who reported being married or in a "marital-like" relationship were combined, and women who reported being separated or divorced were also combined due to small cell sizes in marital like and separated categories. Marital transitions were considered for this analysis, however, the marital status of women in the WHI CT was only collected once (baseline). This limitation did not allow us to track marital transitions in half the women in our analyses, thus martial transitions were not included in our models.

Relevant controls

We assessed whether the effects of marital status and race-ethnicity were diminished by the inclusion of SES and health related variables known to be associated with mortality. The inclusion of these variables highlights potential pathways through which marital status or Hispanic ethnicity might manifest. Socioeconomic variables including household income and educational attainment are known predictors of health and mortality [24]. Health related variables included in our models were smoking and alcohol use/history, physical activity, self-reported health, and waist and hip measurements; these variables are robustly associated with mortality [25–29]. Language preference (English vs. Spanish) was included in models to adjust for potential acculturation effects within Hispanics. Although language preference is not a true measure of acculturation, it has been used extensively as a proxy measure [30].

Age, race-ethnicity, household income, and education were collected from each respondent at baseline. Race-ethnicities included Hispanic, non-Hispanic Black/African American, American Indian/Alaskan Native, Asian/Pacific Islander, and non-Hispanic White. Race-ethnicity is a sociocultural and political construct. Race-ethnicity is included in this study as a social proxy for myriad interpersonal and systematic advantage and disadvantage, and common experiences of culture within these groups. It is not a biological variable. Income was defined as the following annual income categories: <$20,000, $20,000–$34,999, $35,000–$49,000, $50,000–$74,999, and >$75,000. Education was defined as the following categories: high school or below, some college, or college graduate and above. Alcohol consumption was defined with the following levels: less than one drink per week, 1–7 drinks per week, greater than 7 drinks per week, past drinker, or nondrinker. Smoking behavior was defined as never smoked, past smoker, and current smoker. Physical activity was calculated using a ratio rate at which respondents expended energy relative to their weight, or metabolic equivalent of task (MET) hours per week with scores ranging from 0 to 143.33. Higher MET scores indicate greater metabolic expenditure. Self-reported health was measured using the SF-36 General Health Assessment with scores ranging from 0 to 100; higher scores indicate greater health [31].

Table 1. Demographic characteristics of the Women's Health Initiative OS and CT samples

	Hispanic		AA/Black		Asian/PI		American Indian/A		NH White		Total	
	n = 6,455		*n* = 14,560		*n* = 4,176		*n* = 710		*n* = 132,913		*n* = 158,814	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*N*	%
Marital status												
Married	3,245	50.27%	5,224	35.88%	2,613	62.57%	349	49.15%	78,552	59.10%	89,983	62.01%
Single	248	3.84%	801	5.50%	218	5.22%	22	3.10%	5,021	3.78%	6,310	4.35%
Divorced	1,243	19.26%	3,969	27.26%	458	10.97%	145	20.42%	17,893	13.46%	23,708	16.34%
Widowed	775	12.01%	2,899	19.91%	562	13.46%	118	16.62%	20,752	15.61%	25,106	17.30%
Income												
<$20,000	2,118	32.81%	3,882	26.66%	472	11.30%	218	30.70%	17,402	13.09%	24,092	16.60%
$20,000–$34,999	1,301	20.15%	3,136	21.54%	727	17.41%	153	21.55%	29,907	22.50%	35,224	24.27%
$35,000–$49,999	906	14.04%	2,335	16.04%	732	17.53%	113	15.92%	25,741	19.37%	29,827	20.56%
$50,000–$74,000	708	10.97%	2,176	14.95%	939	22.49%	97	13.66%	24,962	18.78%	28,882	19.90%
≥75,000	478	7.41%	1,364	9.37%	981	23.49%	53	7.46%	24,206	18.21%	27,082	18.66%
Education												
≤HS/GED	2,271	35.18%	3,107	21.34%	785	18.80%	203	28.59%	25,441	19.14%	31,807	21.92%
Some College	2,016	31.23%	5,109	35.09%	1,346	32.23%	286	40.28%	46,442	34.94%	55,199	38.04%
≥College	1,224	18.96%	4,677	32.12%	1,720	41.19%	145	20.42%	50,335	37.87%	58,101	40.04%
Alcohol Behavior												
7+ drinks/week	260	4.03%	562	3.86%	113	2.71%	48	6.76%	16,117	12.13%	17,100	11.78%
<7 drinks/week	1,014	15.71%	1,793	12.31%	366	8.76%	129	18.17%	34,186	25.72%	37,488	25.83%
<1 drink/week	1,944	30.12%	4,096	28.13%	1,134	27.16%	181	25.49%	40,546	30.51%	47,901	33.01%
Past drinker	1,262	19.55%	4,277	29.38%	790	18.92%	177	24.93%	20,544	15.46%	27,050	18.64%
Nondrinker	1,031	15.97%	2,165	14.87%	1,448	34.67%	99	13.94%	10,825	8.14%	15,568	10.73%
Smoking												
Current	416	6.44%	1,507	10.35%	151	3.62%	65	9.15%	8,108	6.10%	10,247	7.06%
Past	1,641	25.42%	5,078	34.88%	931	22.29%	255	35.92%	53,460	40.22%	61,365	42.29%
Never	3,454	53.51%	6,308	43.32%	2,769	66.31%	314	44.23%	60,650	45.63%	73,495	50.65%
Language												
Spanish	1,601	24.80%	–	–	–	–	7	<1.00%	19	<1.00%	1,627	1.02%
Mortality												
All-cause	625	9.68%	2,498	17.16%	465	11.14%	142	20.00%	28,203	21.22%	31,933	20.01%
CVD	153	2.37%	943	6.48%	129	3.09%	45	6.34%	7,903	5.95%	9,173	5.75%
Cancer	250	3.87%	788	5.41%	182	4.36%	35	4.93%	9070	6.82%	10,325	6.47%
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Age	60.24	6.79	61.59	7.13	63.05	7.53	61.61	7.48	63.57	7.20	63.23	7.23
General health	68.83	20.43	67.79	19.14	74.94	16.67	67.79	21.83	75.05	17.37	74.11	17.83
Waist–hip-ratio	0.82	0.08	0.82	0.08	0.82	0.07	0.84	0.09	0.81	0.08	0.81	0.08
Physical activity	10.46	13.73	9.6	12.75	13.05	14.18	11.57	15.43	12.83	13.76	12.44	13.73

Note. OS, observational study; CT, clinical trial; excludes respondents that chose "Other" race/ethnicity. AA, African American; PI, Pacific Islander; A, Alaskan; NH, non-Hispanic; HS, High School; not all respondents answered all demographic questions. "–", no respondents in this category took the survey/interviewed in Spanish.

Statistical Analyses

Sample characteristics are presented using means and standard deviations (*SD*) or percentages across corresponding subsamples in Table 1. Cox proportional hazards models were computed to assess the associations of race-ethnicity, marital status, and other predictors with survival [31]. Time to death was calculated as the number of days a person lived postbaseline interview. Respondents who remained alive at the last follow-up date were censored due to nonevent occurrence. In our model assumption tests, we found that age did not remain proportional with survival over time, thus time was allowed to vary in our models [32, 33].

Models were built systematically with Model 1 controlling for time-varying age at baseline, study design (OS and CT arm distinctions), and the language in which respondents took the survey. Next, SES variables including income and education were added to Model 1 followed by health variables including alcohol and smoking behaviors, physical activity, general health, and waist–hip-ratio. Covariates were added one at a time at each modeling step. We monitored whether the addition of a covariate made any hypothesized effects disappear.

Results

Women in the sample were on average 63.2 (7.2) years old, primarily married (62.01%), and non-Hispanic White (83.7%). See Table 1 for other demographic distributions. The sample (N = 158,814 total; n = 6,484 Hispanics) contained 31,933 events (625 Hispanic events) over 23.2 years; thus, 20.1% of women in the WHI OS and CT samples were deceased by the final assessment. The mean survival time adjusted for age was 20.04 years.

Hispanic Survival Advantages

We assessed whether Hispanic ethnicity was protective when compared with other non-Hispanic race-ethnicities while controlling for marital status. As non-Hispanic Whites were the default reference group (group with the largest n), we ran planned contrasts to assess survival in Hispanics as compared with other non-White racial-ethnic groups. We adjusted the alpha level using the Bonferroni correction 0.05/4 = an alpha level of p = .0125 to account for several statistical tests (Hispanics vs. four other racial ethnic groups including non-Hispanic Whites). Consistent with the broader literature, race-ethnicity was associated with all-cause mortality after adjusting for age, treatment arm, marital status, SES, and health variables, χ^2 (4, N = 135,925) = 91.08, p < .001. As expected, Hispanics showed an advantage over non-Hispanic Whites at Model 1 (hazards ratio (HR) = 0.82, 95% confidence interval (CI) = [0.753, 0.899], p < .001), in the SES model (HR = 0.74, 95% CI [0.679, 0.817], p < .001), and in the health adjusted model (HR = 0.75, 95% CI [0.686, 0.826], p < .001). Hispanics also showed a survival advantage over non-Hispanic Blacks at Model 1 (HR = 0.70; 95% CI [0.634, 0.768], p < .001), the SES adjusted model (HR = 0.67; 95% CI [0.607, 0.741], p < .001), and the health adjusted model (HR = 0.78; 95% CI [0.704, 0.870], p < .001). Hispanics were held as the reference group for comparisons against Asians/Pacific Islanders and American Indians/Alaskan Natives as Hispanics had a greater n than both groups. When compared with Hispanics, American Indians/Alaskan Natives had a greater risk for death than Hispanics in Model 1 (HR = 1.70, 95% CI [1.406, 2.043], p < .001), the SES adjusted model (HR = 1.67, 95% CI [1.375, 2.034], p < .001), and the health adjusted model (HR = 1.42, 95% CI [1.152, 1.743], p = .001). There was no difference in survival between Asians/Pacific Islanders and Hispanics, across all models all HRs > 0.87, all ps > .025.

Sensitivity Analyses

To test whether controlling for language preference covaried out any cultural nuances captured by this variable, potentially diffusing or weakening overall Hispanic effects, we performed a series of sensitivity analyses. We estimated a series of planned contrasts comparing the risk for early mortality in primarily English speaking Hispanics versus primarily Spanish speaking Hispanics. Contrary to our expectations, risk for mortality did not differ across Hispanic women who speak primarily English and those who prefer Spanish, all HRs > 0.93, all ps > .082.

Given these findings, we decided to remove language use from our analyses to test whether including this variable weakened any hypothesized effects. However, results did not change significantly when removing language preference. All substantive interpretations of results remained the same.

Marital Survival Advantages

Next, we assessed whether the exposure of being married was protective when compared with other marital statuses while controlling for Hispanic ethnicity. A married survival advantage was observed in the WHI sample controlling for both SES and health variables. Table 2 includes the HRs and corresponding 95% CIs for Model 1,

Table 2. Cox proportional hazards estimates of marital status and relevant covariates predicting mortality in Women's Health Initiative, OS and CT samples

	Model 1			Model 1 + SES adjusted			Model 1 + SES + health adjusted		
	HR	95% CI	*p*	HR	95% CI	*p*	HR	95% CI	*p*
Marital status[a]									
Married	1.00			1.00			1.00		
Single	1.34	(1.266, 1.408)	<.001	1.21	(1.140, 1.278)	<.001	1.18	(1.115, 1.251)	<.001
Divorced	1.33	(1.283, 1.368)	<.001	1.15	(1.109, 1.190)	<.001	1.08	(1.039, 1.117)	<.001
Widowed	1.38	(1.339,1.414)	<.001	1.19	(1.154, 1.226)	<.001	1.16	(1.126, 1.197)	<.001
Race/ethnicity									
NH White	1.00			1.00			1.00		
Hispanic	0.82	(0.753, 0.899)	<.001	0.74	(0.679, 0.817)	<.001	0.75	(0.686, 0.826)	<.001
AA/Black	1.18	(1.131, 1.230)	<.001	1.11	(1.063, 1.161)	<.001	1.01	(0.965, 1.056)	.690
Asian/PI	0.71	(0.650, 0.781)	<.001	0.71	(0.649, 0.786)	<.001	0.69	(0.627, 0.762)	<.001
American Indian/A	1.40	(1.182,01.647)	<.001	1.25	(1.047, 1.483)	.013	1.14	(0.957, 1.367)	.139

Note. OS, observational study; CT, clinical trial; Model 1 is adjusted for age and study design (trial arm).

[a]Marital status was measured at study baseline. Model 1 adjusts for age, language preference, and study design; SES, socioeconomic status. SES variables include income and education. Health variables include the following at baseline: smoking status, alcohol behavior, waist-hip ratio, physical activity, and general health status (survey); Reference category is a married women (at baseline) who completed their interview in English, with ≤ to a high school diploma, and a household income of less than $20,000 annually.

the SES adjusted model, and the health adjusted model. Consistent with the broader literature, marital status was associated with all-cause mortality after adjusting for age, language, treatment arm, SES, and health variables, χ^2 (3, N = 135,925) = 143.75, p < .001, with single (HR = 1.19, 95% CI [1.121, 1.262], p < .001), divorced (HR = 1.10, 95% CI [1.064, 1.146], p < .001), and widowed (HR = 1.20, 95% CI [1.165, 1.241], p < .001), women significantly more at risk for death compared with married women.

Does the Hispanic Mortality Advantage Vary by Marital Status?

Distributionally, marital status varied across race-ethnicity χ^2 (12, 158,792) = 4,089.42), p < .001. Hispanic women experienced divorce at a greater rate (22.82%) than non-Hispanic Whites (14.20%) and Asians/Pacific Islanders (11.69%), but had similar rates with American Indians/Alaskan Natives (22.59%), and lower rates of divorce than non-Hispanic Blacks (30.33%). Hispanics had similar levels of never married singletons when compared to all other racial-ethnic groups. Lastly, Hispanics had lower levels of widowhood (14.61%) when compared with non-Hispanic Blacks (22.88%) and American Indians/Alaskan Natives (18.32%), but similar levels to non-Hispanic Whites (16.89%), and Asians/Pacific Islanders (14.73%).

To assess our second aim we tested an interactive effect of race-ethnicity by marital status on survival, however, contrary to our hypothesis, the interaction was not significant at Model 1, the SES adjusted model, and the health adjusted model all χ^2s < 11.35, all ps > .50.

Discussion

This study examined the association of race-ethnicity, marital status, and all-cause mortality with a specific focus on older Hispanic women. Our results provide evidence for the Hispanic mortality advantage existing above and beyond marital status—a robust predictor of mortality, in one of the largest, diverse samples of postmenopausal women in the USA. These associations held after systematically adjusting for income, education, and health variables including: smoking, alcohol use, physical activity, perceived health status, and waist–hip ratio. Further, as in numerous examinations preceding the current study, we also found a martial advantage for all-cause mortality such that older, married women have lower risk for early death compared with their uncoupled counterparts [13, 34, 35]. These effects remained after controlling for age, SES and health variables suggesting that the association between marital status and mortality is not explained by these controls. In addition, mortality risk did not differ between Hispanic women who speak primarily English versus those who prefer Spanish. Although previous studies demonstrate a mortality advantage for foreign-born versus U.S.-born Hispanics, the literature surrounding acculturation (and its various proxies) and mortality is less clear. For example, previous research that found that limited English-language

proficiency is associated with food insecurity, lower use of preventive health care services such as heart disease and cancer screenings, and higher 10-year coronary heart disease mortality [30]. Scholars also suggest the use of English-language proficiency or similar proxies may be an imprecise measure of acculturation or nativity [30]. Sensitivity analyses revealed that controlling for language preference versus not, did not change the findings of our original analyses.

As with all observational studies, the findings reported here are correlational, but provide evidence that being of Hispanic ethnicity provides a mortality advantage for older women despite high levels of divorce in this group. This study is similar to past and current literature suggesting that Hispanics have lower all-cause mortality than NHWs and other minority groups with similar risk profiles regardless of their vulnerable socioeconomic status, exposure to structural and interpersonal discrimination, and disease risk factors [4, 5]. Hispanic health scholars have hypothesized that strong, culturally informed social capital among Hispanics might explain these health advantages [36, 37]. Moreover, older Hispanic women are integral members and revered elders within their respective social networks [16]. Given these cultural and network dynamics in older Hispanics, and the assumption that marital advantages are due to social, emotional, and tangible benefits from a spouse, we expected cultural differences in the *experience of marriage* in Hispanics versus others, or an optimal effect of being married versus not in Hispanics when compared to non-Hispanic Whites. However, why this association was not observed, remains unclear.

The lack of expected findings may be attributed to distributional differences in levels of marital status across racial-ethnic groups. For example, older Hispanic women in the WHI had the lowest levels of widowhood compared with other groups. Indeed, this may be explained by their partners living longer if they were married within their race-ethnicity. However, as these data were not collected, this cannot be confirmed. Curiously, however, racial-ethnic minority groups with similar risk profiles *in addition to* similar (American Indians/Alaskan Natives) or *greater* (Black/African American) levels of divorce than Hispanics, exhibit no difference in mortality risk when compared with non-Hispanic Whites after controlling for health variables. This suggests health variables such as smoking and physical activity are pathways through which mortality differences occur. However, this relationship was *not* observed in Hispanics as they exhibited advantages over all groups with the exception of older Asians/Pacific Islanders; there were no mortality differences between Hispanics and Asians/Pacific Islanders. It is important to note, that Asians/Pacific Islanders also share similar collectivist values with Hispanics concerning family and respect of elders [38]. Indeed, these cultural similarities may contribute to similar mortality advantages observed in this group.

Another potential explanation for our findings may be that postmenopausal women (mean age = 63.2 years) are a unique sample and age-specific processes relative to racial-ethnic groups and marital status have obscured the expected effects. For example, older women (~62 years of age) probably have less gender-specific roles such as caring for children. This consideration is especially relevant to older Hispanic women, as Hispanic social networks are comprised of primarily kinships including large, immediate families. Indeed, divorce, widowhood, or remaining single would have a greater impact on younger Hispanic women with young children as opposed to older Hispanic women with self-sufficient, adult children. Further, the appraisal of social stress specific to interpersonal relationships (e.g., divorce, widowhood) varies across racial-ethnic groups potentially contributing to a diffusion of expected effects. In a study of aging adults, Brown et al. found that older Hispanics were less upset by relationship-based stressors than other racial-ethnic groups [39].

Other explanations for our unexpected results include considerations that are relevant to Hispanics as a whole. Perhaps potential pathways through which mortality advantages manifest in Hispanics are more complex than may be captured by a categorical measure of marital status. For example, marital status does not represent the experience of relational quality within interpersonal relationships. Hispanics may have culturally different experiences of social ties, but this difference may be captured instead by marital quality [12]. Further, social ties themselves encompass multiple dimensions including social network size and closeness, neighborhood cohesion, social support, social integration, etc. Future work should aim to capture the rich social environments of older women through multidimensional models of social capital [16, 17]. Lastly, our analyses do not model contextual activations of support behaviors by spouses (e.g., severe illness, disasters). Molina and colleagues found that Hispanics were adept at mobilizing social networks and creating new, temporary networks for access to resources and support during the aftermath of Hurricane Katrina [40]. Future research seeking to understand social resilience factors in Hispanics would benefit from a close examination of such contextual activations of spousal and network support.

The current findings add to the emergent literature seeking to elucidate areas of social risk and resilience in older Hispanics. Although this study has many strengths including an ethnically diverse, large longitudinal design, there are many limitations that restrict the generalizability of our findings. Primarily, our study only explores these associations among postmenopausal women. We were unable to speak to

differential effects across gender and age on marital status and health as past and current literature recommends [11, 13]. In addition, we were unable test whether the nativity status of Hispanics was predictive of mortality. Nativity is an important moderator of the mortality advantage observed in Hispanics in the USA [41–43]. The sample of Hispanics in the WHI is not representative of the broader Hispanic population. Past research indicates that Hispanics have the largest rates of never marrying (37.5%) nationally, however, in the WHI only 3.84% of Hispanics have never married. Though, similar levels of never marrying were present across racial-ethnic groups. Unfortunately, Hispanics are underrepresented in the general biomedical literature. Future studies examining biopsychosocial mechanisms should aim for oversampling Hispanic respondents. Further, we lack information regarding the race-ethnicity of respondents' partners, and concomitant marital quality in married women, which limits our ability to interpret findings [44]. Lastly, marital status is not static over time and changes in this social exposure can undoubtedly affect health [45]. Unfortunately, given data restrictions we were unable to account for this potentially important predictor.

Even in the context of greater longevity, Hispanic health is not perfect. Scholars refer to U.S. Hispanic health as paradoxical. Yet, we argue that there are copious, substantive gaps in our understanding of Hispanic health and the social determinants *specific* to this group. Our results, although not in the manner we hypothesized, offer a small modicum understanding in this effort. Our results likewise highlight the need for future research focused on closing these substantive gaps. Large studies (e.g., current study) are helpful in synergizing epidemiology and the social sciences with the aim of uncovering social exposures that confer risk and resilience in ethnic-minority populaces. Studies such as ours create space and foster hypothesis generation for more focused investigations to elucidate culturally nuanced mechanisms.

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