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ORIGINAL RESEARCH

Gender Differences in Marital Status Moderation of Genetic and Environmental Influences on Subjective Health

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Abstract From the IGEMS Consortium, data were available from 26,579 individuals aged 23 to 102 years on 3 subjective health items: self-rated health (SRH), health compared to others (COMP), and impact of health on activities (ACT). Marital status was a marker of environmental resources that may moderate genetic and environmental influences on subjective health. Results differed for the 3 subjective health items, indicating that they do not tap the same construct. Although there was little impact of marital status on variance components for women, marital status was a significant modifier of variance in all 3 subjective health measures for men. For both SRH and ACT, single men demonstrated greater shared and nonshared environmental variance than married men. For the COMP variable, genetic variance was greater for single men vs. married men. Results suggest gender differences in the role of marriage as a source of resources that are associated with subjective health.

Keywords Subjective health · Marital status · Age differences · Gender differences · GxE interaction · Moderation model

For the IGEMS Consortium
Members of the consortium on Interplay of Genes and Environment across Multiple Studies (IGEMS) are listed in "Appendix".

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Introduction

Subjective health is the focus of great research interest because of the role it plays in predicting objective health and mortality. In fact, measures of subjective health predict mortality above and beyond objective health measures (Idler and Benyamini 1997; Latham and Peek 2013; McFadden et al. 2009). Many researchers have posited explanations for the paradoxical observation that putatively simple questions about health perceptions can provide information about objective health-related outcomes distinct from multiple objective measures of health (Benyamini 2011). A recent analysis tested four conceptualizations of subjective health (Franz et al. 2015); tests of age and gender moderation of genetic and environmental variance in subjective health measures supported the idea that subjective health taps personal intuitions about health and that these personal intuitions reflect cultural definitions and personal concepts of health (Bailis et al. 2003; Jylhä 2009, 2010). These conceptions of subjective health rely primarily on mechanisms *within* the individual—intuitions and perceptions about health. In the current analysis, we shifted the focus to an *external* mechanism, marriage, which may influence subjective health and thus may moderate the genetic and environmental contributions to subjective health.

Research has demonstrated that subjective health is related to external factors such as education, financial status, social support, marital status, and neighborhood characteristics that indicate the extent of resources individuals have to support and maintain their health (Benyamini 2011; Subramanian et al. 2006). Although marriage has many meanings, at its most basic level marital status can reflect socioeconomic status as well as social and physical support (Benyamini 2011; Zheng and Thomas 2013). The beneficial association between marriage and physical health has been amply demonstrated (Carr and Springer 2010; Robles and Kiecolt-Glaser 2003) and a recent meta-analysis supported the lower relative risk for mortality among married people compared with non-married groups (Manzolo et al. 2007). Research suggests that marriage supports maintenance of health behaviors, thus affecting disease prevention rather than treatment or recovery from severe illnesses (Zheng and Thomas 2013). For example, in a sample of twins discordant for marital status, the unmarried twin was more likely to smoke and less likely to exercise (Osler et al. 2008). Epidemiological studies of this nature cannot determine cause and effect, however; thus there is ongoing discussion about whether the association between marriage and health reflects selection or causation (Silventoinen et al. 2013).

The association of marital status with subjective health is nearly as well established as the association with physical health (Liu and Umberson 2008; Waite and Gallagher 2000). Evidence suggests that the relationship between marital status and subjective health reflects a tendency for married adults to be somewhat overconfident about their health status. In fact, Zheng and Thomas (2013) conclude that adults perceive marriage as a source of resources to support health, which results in both overestimation of health and delay in seeking medical care. Historical trends indicate that as gender roles and the meaning of marriage have changed over the last several decades, the relationship between marital status and subjective health has also changed (Liu and Umberson 2008).

The association between marital status and physical and subjective health may not be the same for men and women (Liu and Umberson 2008). Research suggests that men and women have diverse experiences of physical aging. Men tend to have earlier and more compressed histories of major illnesses and disability prior to death, while women live longer, have more health complaints across the life course, and higher prevalence of chronic disabling but not fatal diseases later in life (Sainio et al. 2006). As a result, men may focus more on life-threatening conditions when judging their own health, whereas women may focus on chronic conditions that are a greater part of their experience of aging (Deeg and Kriegsman 2003). Consistent with this, women tend to report poorer subjective health, and subjective health appears to be a weaker predictor of mortality in women than in men (Benyamini 2011; Benyamini et al. 2003; Deeg and Kriegsman 2003). Evidence for a gender difference in the association between marital status and subjective health is mixed, with some researchers finding a stronger protective effect of marriage for men than women (Liu and Umberson 2008; Williams and Umberson 2004), while others report no gender differences (Zheng and Thomas 2013).

Whereas previous studies focused primarily on gender differences in *means* and the predictive power of subjective health measures, we examined how genetic and environmental components of *variance* in subjective health are moderated by marital status, and whether that moderation effect differs for men and women. Multiple studies have reported heritability estimates for subjective health; however, to our knowledge, no other study has examined marital status moderation of these estimates. Studies of adult twins in Australia, Denmark, Finland, Sweden, and the U.S. have reported heritability estimates for subjective health primarily in the range of 25 to 30 % (for a review see (Franz et al. 2015). A recent twin analysis that included 12,900 individuals aged 25 to 102 from the Interplay of Genes and Environment across Multiple Studies consortium (IGEMS; (Pedersen et al. 2013), which is also the basis for the present study, provided a more nuanced understanding of genetic and environmental influences on subjective health. Results indicated that heritability varied significantly by age, gender, and subjective health measure. Here, we expanded those analyses to examine how age, sex, and marital status moderated genetic and environmental influences on subjective health. Although marital status is not purely an environmental measure (Trumbetta et al. 2007), we focused on relationship status as a marker for resources to support health by differentiating individuals who were living with partners (married or cohabiting) from those living alone (single, divorced, or widowed). We predict that living with a partner provides a protective or stabilizing influence that to some degree buffers individuals against age differences in genetic and environmental influences on subjective health identified by Franz et al. (2015). Furthermore, given the possibility of gender differences in the role of marital status in subjective health, we predict that living with a partner will modulate the heritability of subjective health differently for men and women. Finally, based on previous results, we also predict that the moderation effect of marriage will vary across different measures of subjective health.

Method

Participants

IGEMS is an international consortium of twin studies from the Nordic countries and the U.S. covering the adult lifespan (Pedersen et al. 2013). The sample sizes and age ranges from the IGEMS studies included here are presented in Table 1: a total of 26,579 individuals contributed relevant data to the current study. Age ranged from 23 to 102 years, with a mean of 55.2 (SD = 16.6). For reporting of sample sizes and means, the sample was divided into four approximately equal age groups: age <50, 50–59, 60–69, and >70 years. For the moderator analyses, both members of a twin pair were needed: the same-sex twin pairs available for each subjective health measure in each age group are presented in Table 2. Although sample size is presented separately by age group to indicate coverage across the lifespan, age was included as a continuous moderator in the biometric models.

Table 2 Number of twin pairs

Age Group	SRH		ACT		COMP	
	Men	Women	Men	Women	Men	Women
<50						
MZ	525	674	303	359	316	361
DZ	584	648	329	340	332	350
50–59						
MZ	778	548	590	237	587	234
DZ	858	801	517	256	516	258
60–69						
MZ	380	464	202	247	201	248
DZ	549	706	209	223	212	222
70+						
MZ	248	390	251	394	246	393
DZ	315	597	319	593	316	581
TOTAL	9065		5373		5369	

Table 1 IGEMS studies

Study	Label	Reference	N subjects	Age range	Vars
Finnish Twin Cohort	FTC	Kaprio and Koskenvuo (2002)	7870	53–67	SRH
Finntwin16	FT16	Kaprio et al. (2002)	4246	21–29	SRH
Longitudinal Study of Aging Danish Twins	LSADT	Christensen et al. (1999)	3311	70–102	SRH COMP ACT
Middle-Age Danish Twins	MADT	Osler et al. (2008)	4037	45–68	SRH COMP ACT
Midlife in the United States	MIDUS	South and Krueger (2012)	1764	25–74	SRH COMP ACT
Minnesota Twin Study of Adult Development and Aging	MTSADA	Finkel and McGue (1993)	835	25–92	COMP ACT
Origins of Variance in the Oldest-Old	OCTO-Twin	McClearn et al. (1997)	666	79–98	SRH COMP ACT
Swedish Adoption Twin Study of Aging	SATSA	Finkel and Pedersen (2004)	1711	26–93	SRH COMP ACT
Twin and Offspring Study in Sweden	TOSS	Neiderheiser and Lichtenstein (2008)	1069	32–60	SRH COMP ACT
Vietnam Era Twin Study of Aging	VETSA	Kremen et al. (2006)	1070	51–60	SRH COMP ACT

SRH self-rated health, COMP health compared with others, ACT health influences activities

Measures

Marital status

Marital status was recorded in various categories in the IGEMS studies. Because the focus of the current study was on partner presence as a marker of resources to support health, we created a dichotomous variable, combining married and cohabiting in one category, and widowed, divorced, and single in the other category. For simplicity, the two categories were labeled "married" and "single". The distributions of marital status across the four age groups for men and women are presented in Fig. 1. Percent single increased modestly but significantly from 8 to 12 % for men across the four age groups (χ^2 (df = 3, N = 12,201) = 202.2, $p < .01$). It increased more dramatically from 9 to 41 % for women, following population trends (χ^2 (df = 3, N = 14,378) = 2046.9, $p < .01$).

Subjective health

Three different types of questions were used to assess subjective health in the IGEMS studies (see Table 1). Nine of the studies included the most common question used to assess subjective health: "How would you rate your overall health?" In the literature, the acronym SRH is typically used to identify this question. Eight IGEMS studies asked participants to compare their health with others (COMP) using two slightly different forms: "compared to others your age, how would you rate your overall health?" was used by six studies and "I am as healthy as anyone I know" from the SF-36 version 1 (Ware et al. 1994) used by two. Participants in eight studies also indicated how their health affected their daily activities (ACT); five studies included a single question, "Is your health condition preventing you from doing things you like to do?" Three indicated whether their health affected their physical functioning in a list of

multiple behaviors from the SF-36. Responses to activities were averaged to create a single ACT score for these three studies.

Although the subjective health questions administered across the studies were similar or identical, the response scales varied from dichotomous options to 7-point Likert scales. To examine and reconcile differences among these putatively similar measures, we engaged in a harmonization process, collecting new data on all combinations of questions and answer schemes from an independent international sample of 1065 participants aged 30 to 98 (Gatz et al. 2015). The harmonization sample allowed us to verify that similarly worded questions correlated substantially, regardless of exact wording or response scales. Average correlations across response scales were .77 for SRH, .78 for ACT, and .63 for COMP. Average correlations across the three different subjective health questions were $r_{SRH·COMP} = .63$, $r_{SRH·ACT} = .57$, and $r_{COMP·ACT} = .46$. Comparison of three types of harmonization methods indicated that the optimal approach involved standardizing scores within samples to achieve a common metric, then pooling data across studies. To that end, the three subjective health questions were standardized separately within each sample and converted to T-scores (mean 50, SD 10). For all measures, high scores indicated better subjective health. Means across age groups in the combined IGEMS sample are presented in Fig. 2, indicating age, gender, and marital status effects. Different trends are evident for each subjective health item, with the smallest group mean differences seen for the COMP variable. Continuous age trends in mean subjective health estimated by the age moderation model resulted in the same pattern of results.

Statistical methods

To evaluate whether the genetic and environmental influences on subjective health ratings differed as a function of marital status, we utilized a modified version of the univariate twin model in which age and marital status were included as moderating variables (Purcell 2002; Van der Sluis et al. 2008). The standard univariate twin model incorporates monozygotic (MZ) twins and dizygotic (DZ) twins to decompose the variance of any phenotype into the proportion attributed to additive genetic influences (A), common or shared environmental influences (C), and unique environmental influences (E). The model used in the present study allows for differences in the A, C, and E parameters as a function of two continuous moderator variables (age and age-squared) and one categorical moderator variable (marital status). Moderation of the genetic and/or environmental variance components indicates that the contributions of these factors to the variance of subjective health vary by age and marital status. All models
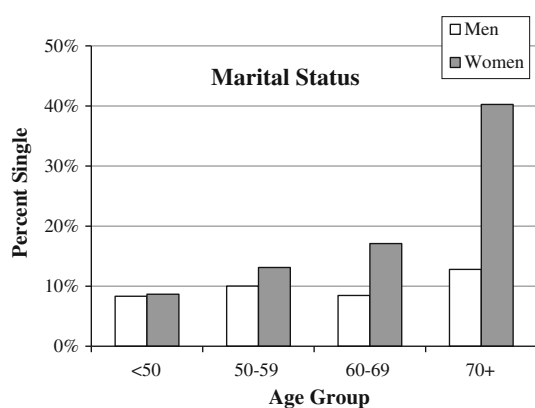

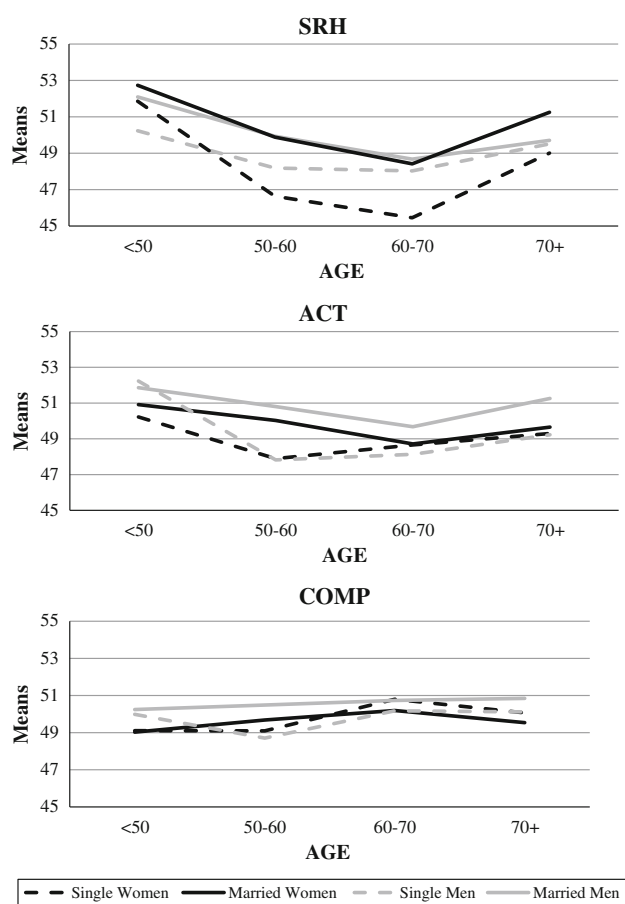Fig. 1 Distribution of marital status across age groups and gender

Fig. 2 Means for subjective health variables across age groups, gender, and marital status

were tested using the structural equation-modeling package Classic Mx 1.68 (Neale et al. 2003). Evaluation of relative model fit was performed using the likelihood-ratio-test (LRT). Significant LRT values indicate that the reduction in parameters resulted in a significant reduction in model fit.

Results

Previous analyses have focused on age and sex moderation of subjective health (Franz et al. 2015); the focus here was primarily on marital status moderation of subjective health for men and women. Therefore, model comparison focused on testing marital status moderation parameters. The first phase of model testing examined gender differences in these parameters and two models were compared: one in which all 19 model parameters were allowed to vary across gender versus a model in which the 3 marital status moderation parameters (for A, C, and E) were set equal across genders. Comparison of these two models indicated significant gender differences in marital status moderation of

subjective health for SRH (LRT = 8.13, df = 3, $p < .05$) and for ACT (LRT = 24.64, df = 3, $p < .01$), but not for COMP (LRT = 2.01, df = 3, *ns*).

In the next phase of model fitting, five models were tested separately for each gender (see Table 3). First the full model estimated all variance components and moderator parameters. In model 2, all marital status moderation parameters were dropped. In models 3 through 5, marital status moderation of each variance component (A, C, and E) was tested independently. For each model, all other parameters were retained: the primary A, C, and E variance components and the age and age-squared moderation of these components.

Comparing model 2 to model 1 indicated significant marital status moderation of only one subjective health measure in women: SRH. Testing each marital status moderation parameter separately (models 3 through 5) failed to identify the source of the marital status moderation of variance components of SRH in women. Minimization of Akaike's Information Criterion (loglikelihood − 2*degrees of freedom) can be used to identify the best-fitting model. In this case, AIC was smallest for model 3 for SRH in women, suggesting modest marital status moderation of C and E components. The estimates from the ACE model with full moderation (model 1) were used to depict marital status moderation of subjective health measures for women across age (see Fig. 3). A, C, and E components of variance, along with total variance, are presented for single and married women for the three subjective health measures. For SRH, slightly more C and E variance was evident for single women than for married women, resulting in greater total variance in SRH for single women than married women. The estimates for the A variance component from single and married women were nearly identical, so the lines on the graph overlap. Results for ACT suggest somewhat more A variance for single women than married women; however, the moderation parameter did not achieve significance (model 3 vs. model 1 = 3.20, df = 1, *n.s.*). Little distinction can be detected in the A, C, and E variance components for COMP in women; the lines for A and E variance components overlap. The general pattern of variance components across age matches the results reported by Franz et al. (2015). Heritability of SRH was estimated at 28 % for women across most of the age range, with a somewhat lower heritability estimated in late adulthood (17 %). Heritability for ACT showed a curvilinear trend over age, with highest estimates for younger women (17 and 25 %) and lower estimates for older women (2 %). Heritability for COMP increased across age from 7 % for younger women to 19 % for older women.

In contrast, evidence for significant marital status moderation of variance was found for all three subjective

Table 3 Model-fit statistics

Model	SRH		ACT		COMP	
	-2LL	df	-2LL	df	-2LL	df
Women						
1. Full model	75,425	10,198	38,845	5214	38,843	5205
2. Drop all MS moderation	75,435*	10,201	38,849	5217	38,847	5208
3. Drop MS moderation on A	75,425	10,199	38,848	5215	38,843	5206
4. Drop MS moderation on C	75,427	10,199	38,845	5215	38,843	5206
5. Drop MS moderation on E	75,427	10,199	38,845	5215	38,844	5206
Men						
1. Full model	68,817	9310	39,369	5368	39,822	5377
2. Drop all MS moderation	68,844**	9313	39,399**	5371	39,831*	5380
3. Drop MS moderation on A	68,817	9311	39,369	5369	39,826*	5378
4. Drop MS moderation on C	68,821*	9311	39,373*	5369	39,824	5378
5. Drop MS moderation on E	68,821*	9311	39,526**	5369	39,823	5378

* Model fit differs significantly from model 1 at $p < .05$

** Model fit differs significantly from model 1 at $p < .01$
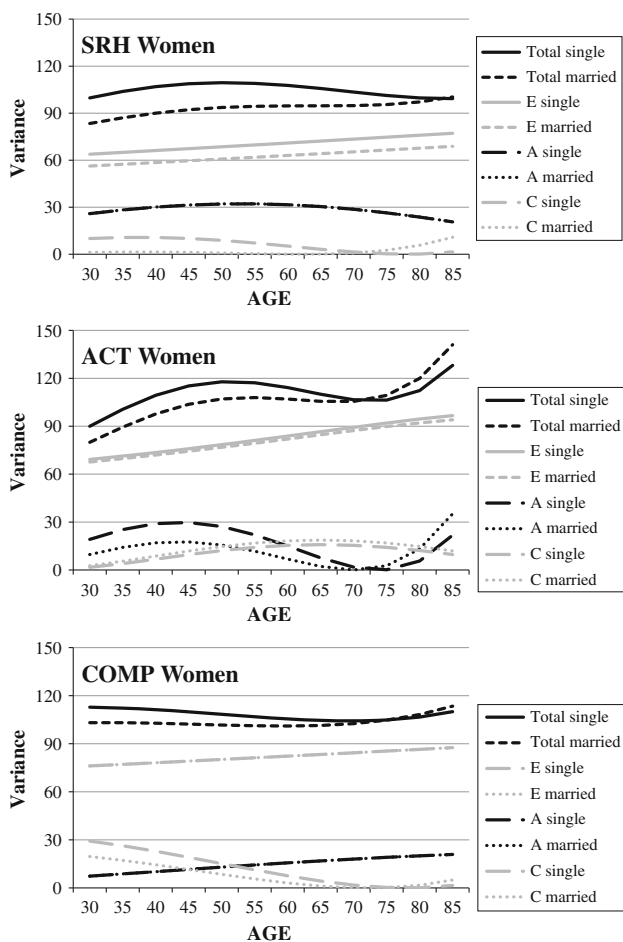
Fig. 3 Genetic and environemental components of variance across age and marital status for women. *SRH* self-rated health, *ACT* health impacts activities, *COMP* health compared with other

health measures in men, although the pattern of results differs across measures. For both SRH and ACT, model fitting indicated significant marital status moderation of C and E components of variance; whereas for COMP, model comparison indicated significant marital status moderation of the A variance component. The impact of marital status on variance components of the three subjective health measures in men is presented in Fig. 4. For SRH, single men demonstrate significantly more C and E variance than married men, resulting in more total variance. The difference in C variance between single and married men declines with age, as does total C variance, which reaches nearly zero for both groups of men at age 75. Genetic variance in SRH was basically identical for single and married men, so the lines on the graph overlap. Heritability is lower in younger men and the highest estimate is at age 70 (23 %).

For the ACT variable, A, C, and E components of variance are higher for single men then for married men, but only the differences in C and E components achieve significance (see Fig. 4). Whereas the differences in A and E variances are constant across the age range, marital status differences in C variance peak in midlife, around age 55; group differences are minimized earlier and later in the measured age range (age 30 and 75). Across most of the age range, total variance is about 30 % higher for single men compared with married men. Similar to SRH in men, heritability for ACT is highest at age 65 (26 %).

A markedly different pattern of marital status moderation of variance was found for the COMP variable. In this instance, marital status significantly moderated A variance, only (see Fig. 4). A variance is highest in midlife for both
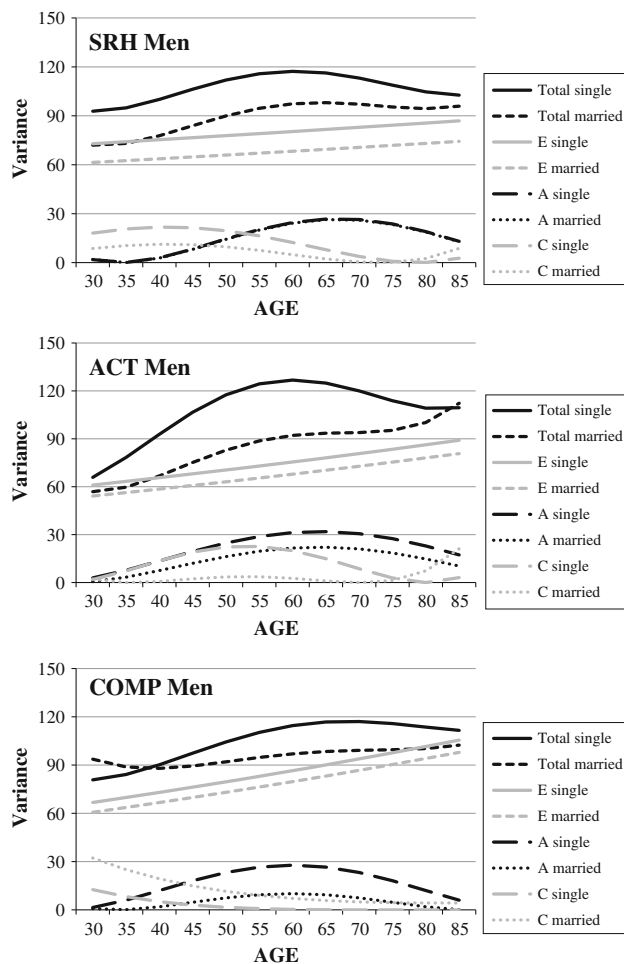
Fig. 4 Genetic and environemental components of variance across age and marital status for men. *SRH* self-rated health, *ACT* health impacts activities, *COMP* health compared with other

single and married men, but genetic variance estimated for single men is nearly three times higher then the genetic variance estimated for married men. As a result, heritability estimates in midlife for the COMP variable are 24 versus 10 % for single and married men, respectively. Note, however, that regardless of the different moderation patterns suggested for COMP for men and women, model comparisons indicated that the pattern of marital status moderation of COMP did not differ significantly between men and women. For all three subjective health measures, total variance was greater for single men than married men.

Discussion

Our examination of marital status moderation of genetic and environmental influences on subjective health across adulthood revealed varied patterns of moderation that differed for men and women and for the three distinct

measures of subjective health. In addition, we replicated the pattern of age moderation of genetic and environmental influences on subjective health reported by Franz et al. (2015) in a smaller sample of 12,900 individuals from the IGEMS consortium.

For men, marital status moderated shared and nonshared environmental components of variance for SRH and ACT and the genetic component of variance for COMP. As a result, shared and nonshared environmental components of variance were significantly greater for single men than for married men for the SRH and ACT measures. Whereas the differences in nonshared environmental variance were generally consistent across the age range, differences in shared environmental variance were higher for younger men than for older men. In fact, for ACT, estimates of shared environment were near zero for married men but peaked at 19 % at age 50 for single men. Thus, for men, marriage apparently provided a buffer that resulted in more stability in components of variance for subjective health across the age range. The marital status category that differed the most across the age groups for men was widowhood: 10.2 % of single men in the 50 s, 23.1 % of single men in their 60 s, and 57.6 % of single men over 70 were widowed. Paralleling this pattern, nonshared environmental variance of subjective health was greater in single men across the same age range. The percentage of single men reporting that they were divorced peaked in the 50–60 age range, approximately the same point in the age range that shared environmental variance peaked for SRH and ACT for single men and genetic variance peaked for COMP in single men. It would appear, then, that without marriage as a protective factor, the fluctuations in genetic and environmental components of variance are amplified.

The pattern of results for women was far less complex: marital status played only a modest role in greater environmental variance in single women for SRH. Thus, marriage provided at most a limited buffer against the environmental impact on health perceptions with age. However, across the life course—but especially after age 50—women are less likely to remarry after divorce or bereavement (Waite et al. 2009); thus marital status during this time period may be more stable for women than for men, resulting in less marital status moderation of variation in perceptions of health compared with men. Previous evidence for gender differences in the influence of marital status on *mean* subjective health has been mixed (Liu and Umberson 2008; Williams and Umberson 2004; Zheng and Thomas 2013). In the current analyses, despite gender differences in (a) the experiences of physical aging (Sainio et al. 2006), (b) the impact of marital status on environmental resources in these cohorts (Weaver 2010), and (c) the incidence of bereavement, marital status had very little impact on sources of variance in subjective health in

women. It may be that women in these cohorts are better able than men to maintain sources of social support independent of marital status, with the result that variance composition of subjective health is fairly consistent for single and partnered women. Some evidence suggests that men have smaller support networks than women and thus marriage constitutes a larger portion of men's social support networks (Dykstra and Fokkema 2007). Moreover, especially in these older cohorts, women are often responsible for maintaining and fostering the social interactions of both members of the pair (Dykstra and de Jong Gierveld 1994; Rosenthal 1985). Thus bereavement for men can mean loss of emotional and instrumental support for maintaining health (Chipperfield and Havens 2001). Consequently, although both men and women experience increased mortality rates immediately following bereavement, mortality rates tend to remain elevated for men, only (Kaprio et al. 1987). Regardless of marital status, then, women are more likely than men to be able to tap their larger support networks for the emotional and instrumental resources that result in stable heritability estimates for subjective health.

Finally, there were striking differences in genetic and environmental components of variance, and the marital status moderation of variance, across measures of subjective health. In fact, gender differences in marital status moderation of the COMP variable did not achieve significance. Different subjective health items tap different frames of reference (Manderbacka et al. 2003; Vuorisalmi et al. 2006), reflecting diverse combinations of psychological dispositions, situational factors, shared cultural values, and characteristics such as age, gender, class, or ethnicity (Jylhä 2009, 2010; Sprangers and Schwartz 1999). Some subjective health questions trigger more internal frames of reference (e.g., rate your overall health), whereas in others the frame of reference may be more external (e.g., rate your health compared to others your age; does health prevent you from doing things you like to do?) and may trigger more conscious or unconscious consideration of environmental support factors. The current results suggest that the different frames of reference triggered by the subjective health items were differentially affected by marital status (at least for men).

Our conclusions are subject to methodological limitations. First, combining data across studies was both a strength and a weakness of our approach. Combining studies provided sufficient power to examine effects simultaneously across age groups, gender, and marital status, which is impossible with smaller cohorts. However, it also necessitated harmonizing somewhat different measures of subjective health. The independent crosswalk study of our measures (Gatz et al. 2015) supported our approach. Moreover, consistent with our data, a cross-

national comparison of self-rated health found that relationships among SRH and covariates, including marital status and gender, were homogeneous across countries (Bardage et al. 2005). Second, we interpreted marital status as a measure of environmental resources to support physical and subjective health. Although alternative interpretations of the relationship between marital status and subjective health exist, marital status as a marker for health resources has been supported by the literature (Benyamini 2011; Zheng and Thomas 2013). Still, marital status does not tap only environmental variance, but genetic variance as well. However, the heritable influences on marital status appear to decline from 40 % in early adulthood to 0 % by age 50 and beyond (Trumbetta et al. 2007). Third, the participants were all from the U.S. and the Nordic countries, and in fact the Finnish twin studies contributed nearly half the available data for SRH. Results for ACT, which was not included in the Finnish data, are similar to the results for SRH. Moreover, previous reports of these analyses that did not include the Finnish twin studies produced very similar results (Finkel et al. 2014): addition of the Finnish twin sample provided more power but did not change the overall conclusions. Finally, as in any study including older adults, the sample was subject to survivor effects, particular in the oldest age groups. The slight reductions in total variance generally evident in late adulthood (particularly for men) likely resulted from absence of individuals in poorest health from the sample.

Overall, we observed that *external* factors, such as those tapped by marital status, were associated with genetic and environmental contributions to subjective health, indicative of gene by environment interaction. Gender and age differences, combined with marital status differences that may impact access to resources to support health, were associated with fluctuations in genetic and environmental components of variance in health perceptions. This relationship was far more pronounced for men than for women, likely as a result of different roles that marriage and partners play in social networks for men and women in these cohorts. Finally, these results join a growing body of evidence that not all measures of subjective health are equal. The manner in which the question is posed triggers a frame of reference that will impact the interplay of genetic and environmental influences on health perceptions.

Compliance with Ethical Standards

Appendix

Members of the consortium on Interplay of Genes and Environment across Multiple Studies (IGEMS) include: Nancy L. Pedersen (Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, and Department of Psychology, University of Southern California, Los Angeles, CA), Kaare Christensen (Department of Epidemiology, University of Southern Denmark, Odense, Denmark), Anna Dahl (Institute of Gerontology, School of Health Sciences, Jönköping University, Jönköping, Sweden), Deborah Finkel (Department of Psychology, Indiana University Southeast, New Albany, IN), Carol E. Franz (Department of Psychiatry, University of California, San Diego, La Jolla, CA), Margaret Gatz (Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, and Department of Psychology, University of Southern California, Los Angeles, CA), Briana N. Horwitz (Department of Psychology, California State University, Fullerton, CA), Boo Johansson (Department of Psychology, University of Gothenburg, Gothenburg, Sweden), Wendy Johnson (Department of Psychology and Centre for Cognitive Ageing and Cognitive Epidemiology, University of Edinburgh, Edinburgh, UK), Jaakko Kaprio, Department of Public Health, University of Helsinki, Helsinki, Finland), William S. Kremen (Center of Excellence for Stress and Mental Health, VA San Diego Healthcare Center, La Jolla, CA, and Department of Psychiatry, University of California, San Diego, La Jolla, CA), Robert Krueger (Department of Psychology, University of Minnesota, Minneapolis, MN), Michael J. Lyons (Department of Psychological and Brain Sciences, Boston University, Boston, MA), Matt McGue (Department of Psychology, University of Minnesota, Minneapolis, MN), Jenae M. Neiderhiser (Department of Psychology, The Pennsylvania State University, University Park, PA), Inge Petersen (Department of Epidemiology, University of Southern Denmark, Odense, Denmark), and Chandra A. Reynolds (Department of Psychology, University of California-Riverside, Riverside, CA).

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