THE GERONTOLOGICAL SOCIETY OF AMERICA®

Journals of Gerontology: Medical Sciences
cite as: *J Gerontol A Biol Sci Med Sci*, 2018, Vol. 73, No. 11, 1574–1580
doi:10.1093/gerona/gly062
Advance Access publication 27 March 2018

OXFORD

Research Article

Midlife Predictors of Health-Related Quality of Life in Older Women

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Received: August 30, 2017; Editorial Decision Date: March 8, 2018

Decision Editor: Anne Newman, MD, MPH

ABSTRACT

Background: Midlife represents an important time to evaluate health status and health behaviors that may affect health-related quality of life (HRQL) in later years. This study examines change in women's HRQL over 11 years from ages 47–59 to 57–69 and identifies midlife characteristics that predict HRQL at older ages.

Methods: Physical (PCS) and mental component summaries (MCS) of the SF-36 were used to assess HRQL from 2002 to 2013 in 2,614 women from the Study of Women's Health Across the Nation (SWAN), a multiethnic/racial cohort study. We used locally weighted scatterplot smoothing (LOESS) models to obtain unadjusted predicted mean trajectories of PCS and MCS as a function of age.

Results: LOESS predicted PCS declined from 51.6 to 47.1, whereas MCS increased from 49.2 to 53.1. In multivariable models, controlling for baseline PCS, higher baseline physical activity ($p = .002$) and increase in physical activity from baseline ($p < .0001$) predicted better PCS. Time since baseline (ie, aging; $p < .001$), higher baseline body mass index ($p < .0001$), increased body mass index over time ($p < .0001$), smoking ($p < .05$), two or more medical conditions ($p < .0001$), sleep problems ($p < .0001$), and urinary incontinence ($p < .0001$) were related to lower PCS. Early ($p = .004$) and late postmenopause ($p = .001$; vs. premenopause) and aging ($p = .05$) predicted higher MCS. Predictors of lower MCS were less than very good health ($p < .0001$), sleep problems ($p < .0001$), stressful life events ($p < .0001$), higher perceived stress ($p < .0001$), and higher trait anxiety ($p = .004$). Race/ethnicity was related to MCS, but not PCS.

Conclusions: Several potentially modifiable midlife factors, such as improved sleep hygiene, physical activity, and body mass index, might improve HRQL for older women.

Keywords: Longitudinal, Mental health, Physical health, Functioning, Health-related quality of life

Increased life expectancy contributes to large-scale population age shifts with an estimated 71 million Americans over age 65 by the year 2030 (1). Health-related quality of life (HRQL) is a key aspect of aging, and it is an important outcome in the evaluation of both function and disease progression. HRQL denotes an individual's perception of the impact of changes in their physical and emotional health status on their functioning and well-being (2). HRQL is multidimensional and consists of physical health and functioning, emotional functioning, role limitations, and social functioning domains. Lower self-rated HRQL in older adults in the general population is a good indicator of health status and a good prognostic indicator of long-term mortality, even after adjustment for other risk factors and comorbidities (3–6). Healthy People 2010 identified one of their goals as increasing the quality and years of a healthy life and recommended continued monitoring of HRQL and its correlates in the U.S. population (7).

Although physical functioning generally declines with age, mental health remains stable or even improves (8–10). Midlife is a pivotal time for these changes as it balances growth in some areas of life (such as life satisfaction) and declines in physical areas (11). The Midlife in the United States Study (MIDUS), a national longitudinal study following adults aged 25–75, found that although physical health and cognitive

performance showed steady decrements over ages 32–84, life satisfaction showed an upward trend from middle age to old age (11). In the Australian Longitudinal Study of Women's Health, physical aspects of HRQL declined progressively across the life span, whereas mental aspects rose in young and mid-aged women but subsequently declined in later life (9). The Whitehall II longitudinal study reported that mental health improved after midlife, reaching a plateau at age 60, but physical health declined with age, accelerating after age 60 (10).

These shifts in physical and mental health beginning in midlife highlight the importance of identifying midlife factors that can lead to better HRQL at older ages. Healthy behaviors such as never smoking, moderate alcohol consumption, physical activity, and eating fruits and vegetables at midlife have been associated with successful aging in the Whitehall II cohort study (12). Stress at midlife has been associated with disability 28 years later in a Finish longitudinal cohort (13). MIDUS found that supportive social relationships, regular exercise, and positive attitudes about control in midlife were associated with maintaining functional health (14). While noting the importance of midlife factors for health at older ages, these studies typically examine only a few midlife predictors within a single study. These studies also consist of largely white samples, thus lacking consideration of racial/ethnic differences.

In addition to these limitations, none of these studies included the menopausal transition, which is a key physiological and psychological event for women at midlife. Several studies have found that the menopause transition and/or symptoms associated with menopause (eg, hot flashes, night sweats, vaginal dryness) have a negative impact on HRQL (15–18). These studies, however, only examined HRQL over a short period of time (15–17) and do not consider how this transition affects HRQL at older ages.

These analyses use data from the longitudinal multiethnic/racial Study of Women's Health Across the Nation (SWAN) to address these limitations. Specifically, we aim to (a) examine change in physical and mental HRQL separately over an 11-year time span among black, Hispanic, Chinese, Japanese, and white women aged 47–59 at current analysis baseline to aged 57–69 and (b) identify a wide variety of sociodemographic, behavioral, health, psychosocial characteristics, and characteristics of the menopausal transition of women at midlife that predict better physical and mental HRQL separately at older ages.

Methods

Sample and Procedures

SWAN is a multiracial/ethnic cohort study characterizing biological and psychosocial changes occurring during the menopausal transition (19). From 1995 to 1997, each of seven clinical sites recruited non-Hispanic white women and women belonging to a predetermined racial/ethnic minority (African American women in Pittsburgh, Boston, Michigan, Chicago; Japanese women in Los Angeles; Hispanic women in Newark; Chinese women in Oakland, California). The protocol was approved by Institutional Review Boards at each site. All participants provided written informed consent.

Baseline eligibility included age 42–52 years; an intact uterus and at least one ovary; not pregnant, lactating, using oral contraceptives, or hormone therapy; and having a menstrual cycle in the 3 months before screening. Among cohort-eligible women, 50.7% (N = 3,303) entered the longitudinal study (19). Participants were assessed in-person at baseline and approximately annually through follow-up visit 13 from 1997 to 2013 using a standardized protocol of detailed questions about medical, reproductive and menstrual history; lifestyle and psychosocial factors; physical and psychological symptoms; and anthropometric measurements. All instruments were translated into Spanish, Japanese, and Cantonese. The full Medical Outcomes Study Short Form Health Survey (SF-36) was not administered until SWAN visit 06, which is considered baseline in the current analysis. Women were excluded from the current analysis if they did not complete any study questionnaires between visits 06 and 13 (n = 594) or if they completed questionnaires, but were missing the main outcome measures at all visits (n = 95), leaving a total of 2,614 women in the analytic sample.

Measures

Primary outcome

We used the SF-36 to assess HRQL using the original coding algorithm in which raw scores are transformed to a 0–100 range (20). The SF-36 is a generic HRQL measure yielding eight subscales and two summary scores: the physical component summary (PCS) and the mental component summary (MCS) (21). We chose to use the two component scores rather than a preference-based measure (22–24) to separately evaluate observed physical and mental HRQL. The PCS includes the subscale domains of physical functioning, role limitations caused by physical health problems, bodily pain, and general health perceptions. The MCS includes the subscale domains of vitality, social functioning, role limitations due to emotional problems, and mental health. The SF-36 was administered at visits 06, 08, 10, 12, and 13.

Predictors

Predictors of HRQL were selected based on variables previously found to be significantly related to HRQL (18,25). Sociodemographic variables were age, marital status (married or living as married, separated/divorced/widowed, never married), race/ethnicity, educational attainment (less than high school, high school or some college, college/more than college), and difficulty paying for basics (somewhat/very hard to pay for basics, not at all hard). Ethnicity was self-defined by respondents in response to the open-ended question: "How would you describe your *primary* racial or ethnic group?" Responses were categorized as white, black, Chinese, Hispanic, or Japanese.

Health-related factors included self-assessed health (excellent/very good, good, fair/poor; only included in analyses of the MCS); number of medical conditions (none, 1, 2 or more), as well as secondary analyses that examined past or current report of arthritis/osteoarthritis, diabetes, and migraines; menopause status; hormone use; and menopausal symptoms. Menopause status was categorized as premenopausal (bleeding in the previous 3 months with no change in menstrual regularity in the past year), early perimenopausal (bleeding in the previous 3 months and changes in menstrual regularity in the past year), late perimenopausal (amenorrhea in previous 3 months but bleeding in past year), or postmenopausal (>12 months of amenorrhea). Premenopausal hormone therapy users were excluded for the duration of their hormone use, as their menopausal status during that time cannot be determined. Data from participants who stopped hormone therapy during the study were included from the time their menopausal status could again be determined forward. Symptoms included sleep problems (difficulty falling asleep, staying asleep, and/or early morning awakening at least three to four times per week in past 2 weeks), vasomotor symptoms (hot flashes or night sweats, at least 6 days in the previous 2 weeks), vaginal dryness (past 2 weeks: none, 1–5 days, 6–14 days), and urinary incontinence (never, <1 d/wk in past month, ≥1 d/wk in past month).

Lifestyle and anthropometric variables included current cigarette smoking, physical activity (26,27), and body mass index (BMI; weight [kg]/height [m^2]). Psychosocial factors included perceived stress (summed score of four items, with the total score ranging from 5 [never] to 25 [fairly often]) (28), stressful life events (none,

1, 2 or more), attitudes toward aging and menopause (29), positive and negative affect (PANAS), trait anxiety, optimism, and emotional and instrumental social support (four-item summed scale) (30), and depressive symptoms (score ≥ 16 on Center for Epidemiologic Studies Depression [CES-D] scale) (31). Depressive symptoms and positive and negative affect were only examined in relation to the PCS because of overlap with the MCS.

Variables were time varying starting with visit 06 with the exceptions of educational attainment and race/ethnicity, which were obtained at study baseline; optimism, which was measured at the first follow-up; and trait anxiety, which was measured at the fourth follow-up.

Statistical Analyses

SAS system version 9.3 (SAS Institute, Inc., Cary, NC) was used for all analyses. Preliminary analyses included descriptive plots and summary statistics for all study variables and an examination of the correlation among predictors. Continuous variables were assessed for normality. Nonparametric locally weighted scatterplot smoothing (LOESS) regression was used to fit a smooth curve to the repeated measures of PCS and MCS as a function of age from the current study baseline (visit 06) through follow-up (visit 13). The LOESS plots revealed that the mean trajectories of both PCS and MCS were essentially linear (Figure 1).

Repeated measures linear mixed effects models were used (PROC MIXED) to examine change in HRQL from mid to older age. This modeling approach was chosen because it is relatively robust to missing data and allows women to contribute different numbers of observations and to remain in the model even if they do not have complete data for all follow-up visits. In addition, our models incorporated a random intercept term to account for the correlation between repeated measures from the same woman. Time was treated as a random effect.

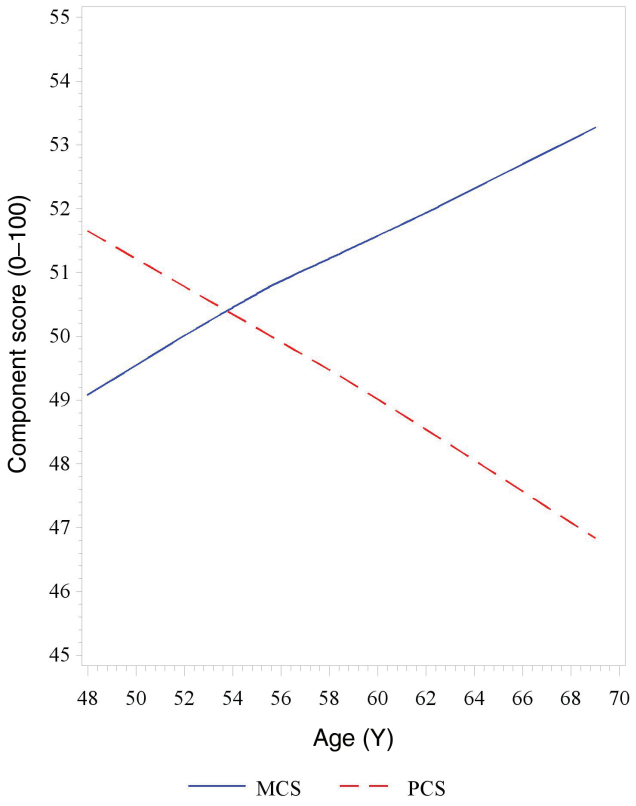

Figure 1. Locally weighted scatterplot smoothing (LOESS) plots of physical (PCS) and mental (MCS) component summaries as a function of age.

Separate models were constructed for PCS and MCS, with model building for both outcomes following the same general process.

We first examined the unadjusted effects of aging for each outcome, with models including age at baseline and time. These potential predictors of HRQL were assessed in bivariate models, and those identified at $p < .10$ were included in the multivariable model building. Baseline age, time, site, and ethnicity were forced into all multivariable models. Multivariable model building began with all predictors included in the model. Variables were then removed one at a time based on p values and percent change in effect estimates, until all remaining variables (except for forced variables) were significant at $p < .05$. We also examined the effect of changes in BMI and physical activity on PCS and MCS in separate models that included current analysis baseline (visit 06) and change from baseline. We determined effect size using Cohen's d for dichotomous or categorical predictors and Cohen's f^2 for continuous predictors.

We ran sensitivity analyses to assess the impact of mortality during follow-up on our results. We first conducted the analyses described above including all women in the sample and then again excluding women who had died during follow-up.

Results

Sample Characteristics

Characteristics of the analytic sample at visit 06 are presented in Tables 1 and 2. The mean age was 52.5 years (range 47–59 years).

Table 1. Baseline[a] Demographic and Psychosocial Characteristics of the Analytic Sample, 2002–2004 ($N = 2,614$)

Continuous Variables	Mean (*SD*)	Median (IQR)
Age (y)	52.5 (2.7)	52.3 (50.3–54.5)
Positive affect score (range, 10–50)	32.5 (8.0)	33.0 (27.0–38.0)
Negative affect score (range, 10–50)	16.2 (5.9)	14.0 (12.0–19.0)
Perceived stress (range, 4–20)	7.7 (3.0)	7.0 (5.0–10.0)
Social support (range, 0–16)	13.0 (3.1)	14.0 (11.0–16.0)
Categorical Variables	***n***	**%**
Race/ethnicity		
White	1,260	48.2
Black	730	27.9
Hispanic	139	5.3
Chinese	224	8.6
Japanese	261	10.0
Somewhat/very hard to pay for basics	585	26.9
Education		
Less than high school	572	22.0
High school/some college	847	32.7
College/more than college	1,174	45.3
Marital status		
Married	1,542	65.5
Never married	306	13.0
Separated/widowed/divorced	507	21.5
Number of very stressful life events		
0	1,194	55.0
1	441	20.3
≥2	535	24.7
CES-D ≥ 16	392	17.2

Note: CES-D = Center for Epidemiologic Studies–Depression; IQR = interquartile range.

[a]Physical and mental component summaries were first collected at the sixth annual follow-up (FU06). Thus, FU06 is the baseline visit for this analysis.

Table 2. Baseline[a] Health and Health-Related Behaviors of the Analytic Sample, 2002–2004 (*N* = 2,614)

Continuous Variables	Mean (*SD*)	Median (IQR)
Physical activity (range, 3–14)	7.5 (1.8)	7.5 (6.2–8.8)
Body mass index (kg/m^2)	28.9 (7.4)	27.3 (23.3–32.9)
PCS (range, 0–100)	50.8 (9.1)	53.4 (46.9–57.0)
MCS (range, 0–100)	50.1 (9.9)	53.1 (46.0–57.1)
Categorical Variables	***n***	**%**
Menopause status		
Pre/early perimenopause	796	37.6
Late perimenopause	239	11.3
Early natural post	379	17.9
Late natural post	597	28.2
Surgical post	104	4.9
Hormone user	287	13.6
Vasomotor symptoms: at least 6/14 d	587	25.8
Vaginal dryness		
None	1,562	68.9
1–5 d/past 2 wk	406	17.9
6–14 d/past 2 wk	299	13.2
Urinary incontinence		
Never	956	42.7
<1 d/wk in past month	859	38.3
≥1 d/wk in past month	425	19.0
Sleep problems ≥3–4 times per wk/past 2 wk	906	41.7
Smoker	291	12.8
Overall health		
Fair/poor	342	15.1
Good	748	33.0
Excellent/very good	1,174	51.9
Number of chronic medical conditions		
0	1,361	52.1
1	653	25.0
≥2	599	22.9

Note: IQR = interquartile range; MCS = mental component summary; PCS = physical component summary.

[a]PCS and MCS were first collected at the sixth follow-up (FU06). Thus, FU06 is the baseline visit for the analysis.

The average PCS and MCS scores were 50.8 (*SD* = 9.1) and 50.1 (*SD* = 9.9), respectively.

HRQL Over Time

To comprehensively examine patterns of change in PCS and MCS scores and aging, LOESS models utilizing all available data from study participants were used to obtain the unadjusted model-predicted mean trajectory of PCS and MCS as a function of age (Figure 1). As seen in this figure, predicted PCS steadily declined 4.5 points from scores of 51.6–47.1. The predicted MCS gradually increased 3.9 points with age from scores of 49.2–53.1.

Predictors of PCS Over Time

Most predictors were significantly related to PCS in bivariate models. Higher baseline physical activity and greater increase in physical activity from baseline, greater positive and negative affect, and greater optimism and social support were associated with higher PCS (Supplementary Table). Lower PCS scores were related to older age and time (ie, aging); lower education, not being married; difficulty paying for basics at study baseline; higher BMI at baseline (visit 06) and increased BMI over time; current smoking; one or more medical conditions; sleep problems; frequent vasomotor symptoms, vaginal dryness, and urinary incontinence; and trait anxiety and cynical hostility. Late perimenopause, postmenopause, and surgical menopause were all associated with lower PCS compared with pre or early perimenopause. Black women reported significantly lower PCS scores compared with white women.

In multivariable models controlling for baseline PCS, higher baseline physical activity, greater increase in physical activity from baseline, higher positive affect, and higher negative affect predicted higher PCS (Table 3). Lower PCS scores were related to time (ie, aging), difficulty paying for basics at study baseline, higher BMI at baseline (visit 06), increased BMI over time, current smoking, two or more medical conditions, greater sleep problems, frequent vaginal dryness, and frequent urinary incontinence. There was no significant effect for race/ethnicity or baseline age. The effect size for baseline PCS was quite large, and the effect sizes for baseline age, time, change in PA and change in BMI were small.

Predictors of MCS Over Time

In bivariate analyses, variables significantly related to higher MCS over time included older age, time (or aging), increased BMI over time, greater physical activity at baseline, and increased physical activity, greater positive affect, more positive attitudes toward aging and menopause, and greater optimism and social support (Supplementary Table). Less than high school education, not being married, difficulty paying for basics, current smoking, less than very good health, more frequent vasomotor symptoms, vaginal dryness, urinary incontinence, sleep problems, at least one stressful life event, negative affect, cynical hostility, trait anxiety, and perceived stress were related to lower MCS. Notably, Hispanic women reported significantly lower MCS and Japanese women higher MCS compared with white women. Early and late postmenopause were associated with better MCS compared with pre or early perimenopause.

In multivariable models controlling for baseline MCS, black race, Japanese and Chinese ethnicity (compared with white women), early post and late postmenopause (compared with premenopause), and time (ie, aging) were the only significant predictors of higher MCS (Table 4). Significant predictors of lower MCS were less than very good health, frequent sleep problems, one or more stressful life events, higher perceived stress, and higher trait anxiety. Most of the effect sizes were small, but greatest for baseline MCS, being Hispanic, greater than two stressful life events, and higher perceived stress.

Black, Japanese, and Chinese women had higher MCS than white women and Hispanic women had lower scores. Additional analyses found that education, financial strain, marital status, comorbidities, or BMI did not fully account for the significantly lower MCS scores among Hispanics, although BMI did reduce the regression coefficient (data not shown). This suggests that other factors unmeasured in our study, such as perceived discrimination, may account for lower scores among Hispanics.

Mortality Sensitivity Analysis

Mortality during follow-up was relatively low. Fifty-eight (2.2%) participants died between visit 7 and visit 13. Analyses excluding these 58 women were nearly identical in terms of estimates, significance, and effect sizes to those found in the analyses conducted including the entire sample.

Table 3. Physical Component Summary: Final Adjusted Model With Effect Sizes

Model[a]	β (95% CI)	*p* Value	Cohen's *d*
Race/ethnicity			
White (REF)	–	–	0.07
Black	0.04 (–0.40, 0.47)	.87	0.02
Chinese	–0.17 (–0.95, 0.61)	.67	0.09
Japanese	–0.68 (–1.39, 0.04)	.06	0.16
Hispanic	–1.36 (–7.28, 4.55)	.65	
Somewhat/very hard pay for basics	–0.39 (–0.72, –0.05)	.03	0.03
Current smoker	–0.49 (–0.98, –0.01)	.05	0.05
Medical conditions			
None (REF)	–	–	
1	–0.27 (–0.62. 0.09)	.14	0.04
≥2	–1.13 (–1.52, –0.74)	<.0001	0.13
Sleep problems ≥3–4 times per wk/2 wk	–0.67 (–0.94, –0.40)	<.0001	0.08
Vaginal dryness			
None (REF)	–	–	
1–5 d/2 wk	0.10 (–0.23, 0.44)	.54	0.01
6–14 d/2 wk	–0.42 (–0.79, –0.05)	.03	0.03
Urinary incontinence			
Never (REF)	–	–	
<1 d/wk past month	0.06 (–0.24, 0.36)	.71	0.00
≥1 d/wk past month	–0.78 (–1.16, –0.39)	<.0001	0.10
			Cohen's f^2
Baseline PCS	0.77 (0.75, 0.79)	<.0001	0.86
Baseline age (y)	–0.01 (–0.07, 0.05)	.82	0.03
Time since baseline (y)	–0.15 (–0.19, –0.10)	<.0001	0.04
Baseline physical activity score	0.16 (0.06, 0.27)	.002	0.0003
Change in physical activity from baseline (1 unit)	0.37 (0.25, 0.50)	<.0001	0.03
Baseline BMI	–0.06 (–0.09, –0.03)	<.0001	0.002
Change in BMI from baseline (1 unit)	–0.37 (–0.44, –0.29)	<.0001	0.04
Positive affect	0.04 (0.02, 0.06)	<.0001	0.001
Negative affect	0.06 (0.04, 0.09)	<.0001	0.005

Note: BMI = body mass index; CI = confidence interval; PCS = physical component summary; REF = referent group.
[a]Adjusted for study site.

Discussion

Consistent with other studies (8–10), we found a decrease in the PCS and an increase in the MCS as women aged. The PCS and MCS changes, as well as the relative effect sizes, although generally small, were clinically meaningful (32,33). Up until age 54, PCS was higher than MCS. At age 54, MCS became higher than PCS and scores continued to diverge with age. MIDUS found a similar crossover effect with life satisfaction increasing and physical health decreasing around age 60 (11).

As expected, for both the PCS and MCS, baseline levels at midlife were highly related to those later in life. In multivariable models, we found additional modifiable variables that independently predicted better (or worse) physical functioning later in life. These included BMI (both at baseline and change over time), current cigarette smoking, physical activity (both at baseline and change over time), sleep problems, and physical symptoms (frequent vaginal dryness and frequent urinary incontinence). Although other studies have shown that physical activity at midlife (34) even at older ages (35) is related to maintaining functional health at later ages and that greater BMI is related to subsequent lower physical functioning (36,37), we expand these findings to show that increasing physical activity between midlife and later life is beneficial, as is reducing BMI. Higher levels of *both* positive and negative affect were related to better physical functioning, consistent with the concept of emodiversity put forth by Quoidbach and colleagues who found that having a more complex emotional life consisting of both positive and negative emotions was associated with better physical health (38).

In addition to baseline MCS, only time (or aging) and postmenopause (compared with pre or early perimenopause) were related to better mental health in multivariable models. This pattern may reflect the increased risk for elevated depressive symptoms and disorder during the menopause transition, which subsequently decreases (39,40). Overall health less than good, sleep problems, stressful events, higher perceived stress, and higher trait anxiety were related to lower mental health.

The study has several limitations. Although results are based on a multiracial/ethnic cohort, some of the groups were too small to stratify results by race/ethnicity. Second, the analyses only include women who were still active in SWAN at visit 06 and beyond. In comparing those who remained in SWAN after visit 06 to those who dropped out, women who dropped out had significantly lower MCS scores at baseline (46.9 vs. 50.2), suggesting that the MCS scores reported at visit 13 may be an overestimate of the general population. Baseline PCS scores were slightly lower among dropouts (49.2 compared with 50.9), but this difference was not significant.

Important strengths of this study include (a) the availability of multiple repeated standard measures of diverse psychosocial and health-related correlates of HRQL and menopausal status; (b) the long follow-up period that allows evaluation of modifiable risk factors across the menopausal transition and the association of change

Table 4. Mental Component Summary: Final Adjusted Model With Effect Sizes

Model[a]	β (95% CI)	*p* Value	Effect Size Cohen's *d*
Race/ethnicity			
White (REF)	–	–	
Black	0.76 (0.31, 1.21)	.001	0.07
Chinese	1.18 (0.37, 1.98)	.004	0.12
Japanese	1.70 (0.96, 2.44)	<.0001	0.17
Hispanic	−4.73 (−7.70, −1.76)	.002	0.48
Menopausal status			
Pre/early perimenopause (REF)	–	–	
Late perimenopause	0.28 (−0.32, 0.88)	.36	0.03
Early postmenopause	0.76 (0.24, 1.27)	.004	0.08
Late postmenopause	0.92 (0.46, 1.38)	.0001	0.09
Surgical post	−0.21 (−1.02, 0.61)	.62	0.02
Overall health			
Fair/poor	−1.17 (−1.64, −0.69)	<.0001	0.13
Good	−0.33 (−0.66, −0.001)	.05	0.04
Excellent/very good	–	–	
Sleep problems ≥3–4 times per wk	−0.79 (−1.08, −0.50)	<.0001	0.08
Stressful life events			
None (REF)	–	–	
1	−1.01 (−1.36, −0.66)	<.0001	0.12
≥2	−2.39 (−2.74, −2.04)	<.0001	0.26
			Cohen's f^2
Baseline MCS	0.42 (0.40, 0.44)	<.0001	0.22
Baseline age (y)	0.01 (−0.06, 0.08)	.70	0.001
Time since baseline (y)	0.05 (0.001, 0.09)	.05	0.001
Perceived stress	−1.26 (−1.32, −1.20)	<.0001	0.20
Trait anxiety	−0.06 (−0.10, −0.02)	.004	0.001

Note: CI = confidence interval; MCS = mental component summary; REF = referent group. According to Cohen's guidelines, $d = 0.2$, $d = 0.5$, $d = 0.8$ represent small, medium, and large effect sizes, respectively; $f^2 \geq 0.02$, $f^2 \geq 0.15$, $f^2 \geq 0.35$ represent small, medium, and large effect sizes, respectively.

[a]Adjusted for study site.

in these risk factors with subsequent HRQL; and (c) a diverse sample with respect to race, ethnicity, and geography. This study adds to previous literature by showing the importance of good sleep for both physical and mental HRQL and that improving healthy behaviors between midlife and older age can lead to better HRQL at older ages. We also show that HRQL decrements during the menopause transition improve postmenopause. In addition, we found that Hispanic women had significantly lower MCS scores even after controlling for a range of variables, a finding that warrants further investigation.

In this sample of mid-aged women, self-reported physical health was slightly better than mental health at age 48. With aging, PCS scores declined and MCS scores improved such that at about age 54, MCS scores were higher than PCS scores. This study provides insight for clinicians and women into modifiable factors, including sleep hygiene, physical activity, and BMI, that can be addressed both in midlife and beyond to help women achieve successful aging.

Supplementary Material

Supplementary data is available at *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences* online.

Funding

The Study of Women's Health Across the Nation (SWAN) is supported by the National Institutes of Health (NIH), Department of Health and Human Services, through the National Institute on Aging (NIA), the National Institute of Nursing Research (NINR), and the Office of Research on Women's Health (ORWH; Grants U01NR004061, U01AG012505, U01AG012535, U01AG012531, U01AG012539, U01AG012546, U01AG012553, U01AG012554, U01AG012495). The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of the NIA, NINR, ORWH, or the NIH.

Acknowledgments

We thank the study staff at each site and all the women who participated in SWAN.

Conflict of Interest

None reported.

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