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Social Factors and Healthy Aging: Findings from the Louisiana Healthy Aging Study (LHAS)

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Abstract

Social behaviors are associated with health outcomes in later life. The authors examined relationships among social and physical activities and health in a lifespan sample of adults ($N = 771$) drawn from the Louisiana Healthy Aging Study (LHAS). Four age groups were compared: younger (21–44 years), middle-aged (45–64 years), older (65–84 years), and oldest-old adults (85 to 101 years). Linear regression analyses indicated that physical activity, hours spent outside of the house, and social support were significantly associated with self-reported health, after controlling for sociodemographic factors. Number of clubs was significantly associated with objective health status, after controlling for sociodemographic factors. These data indicate that social and physical activities remain an important determinant of self-perceived health into very late adulthood. Implications of these data for current views on successful aging are discussed.

Keywords

social support; social and physical activity; self-reported health; objective health status; successful aging

In recent years, *successful aging* has emerged as an important concept in social gerontology. Scholarly interest in successful aging may be driven in part by the aging of the post-World War II baby boom generation (Cherry, Marks, Benedetto, Sullivan, & Barker, 2013). By the year 2060, an estimated 98 million adults in the U.S. will be age 65 and older, which is more than twice as many as in the year 2013 (44.7 million) (Administration on Aging, 2015). The “oldest-old” (persons 85 years of age and older) are the fastest growing segment of the

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¹ The total number of participants in the LHAS is 869. The 771 LHAS participants in this study were selected for inclusion on the basis of having an MMSE score equal to or greater than 24, which is suggestive of cognitive health.

population. Given this demographic reality, basic research on the determinants of healthy aging is a timely and urgent imperative.

According to Rowe and Kahn (1997), the primary components to successful aging are: the absence of disease and disability and lack of predisposing factors towards these, the maintenance of physical and cognitive function, and continued involvement in social activities and productive pursuits. These three criteria are considered to be interdependent and predictive of one another (Cherry, Marks, et al., 2013). In our earlier work, Cherry, Jackson Walker, et al. (2013) examined relationships among social engagement, positive health behaviors, and physical health in nonagenarians (i.e., those 90 years and older) and two younger reference groups (age 21 to 59 and 60 to 89 years) who were enrolled in the Louisiana Healthy Aging Study (LHAS). We found that age, gender, and hours spent outside of the home were significantly associated with self-reported health assessed with the SF-36 PCS score (Ware & Sherbourne, 1992). The number of clubs and hours out were more important factors in the analyses of objective health status (defined as the number of chronic diseases) than positive health behaviors, after considering age group and education level. Cherry and colleagues' findings imply that social engagement remains an important determinant of physical health into very late adulthood. However, they did not take participants' level of physical activity into account, so further research is necessary.

In the present investigation, we address two issues with respect to the study of social factors and healthy aging in late adulthood. Our first aim was to examine age group and gender differences in social and physical activities, self-reported health, and objective health status. This study extends our earlier work in two ways. First, we sample from a broader range of cognitive status scores (i.e., MMSE of 24 and higher) relative to our earlier work, resulting in a larger sample ($N = 771$) which we partitioned into four age groups: younger (21 to 44 years), middle-aged (45 to 64 years), older (65 to 84 years) and oldest-old adults (85 + years). This approach is advantageous in that it allows for clearer inferences on health in midlife than in Cherry, Jackson Walker et al. (2013) where younger and middle-aged adults were combined. Second, we include the Yale Physical Activity Scale (YPAS) total energy score as index of physical activity (Dipietro, Caspersen, Ostfeld, & Nadel, 1993) to determine whether social factors still matter for health outcomes after taking the influence of physical activity into account. Based on prior literature, we expected to observe significant age group (Michael, Colditz, Coakley, & Kawachi, 2000) and gender differences (Unger, McAvay, Bruce, Berkman, & Seeman, 1999) in self-reported physical health. We also expected significant age differences in objective health status based on a cumulative index of chronic conditions, which would replicate our earlier findings.

Our second aim concerned predictors of physical health. We expected that social factors and physical activity would be significantly associated with self-reported health and objective health status after considering age and other salient individual difference characteristics. Of special interest was to determine whether social factors would account for unique variance in self-reported health and objective health status after statistically controlling for sociodemographic and physical activity variables. Such a pattern of outcomes would suggest that social factors still matter to health outcomes after taking physical activity into account,

confirming the beneficial effects of both social engagement and physical activity for successful aging in later life (Rowe & Kahn, 1997).

Method

Participants and Procedure

A total of 771 participants, who ranged in age from 21 to 101 years were sampled from the Louisiana Healthy Aging Study (LHAS), a multidisciplinary study of the determinants of longevity and healthy aging in oldest-old adults. The LHAS is a collaborative effort with behavioral and medical researchers from Louisiana State University (LSU) in Baton Rouge, LSU Health Sciences Center in New Orleans, Pennington Biomedical Research Center (PBRC), the University of Pittsburgh, and the University of Alabama at Birmingham. LHAS participants lived within an eight parish (county) area which spanned a 40-mile radius of Baton Rouge. Participants were recruited through random sampling of voter registration lists and the Center for Medicare and Medicaid Services files by personnel in the School of Public Health at the LSU Health Sciences Center in New Orleans. Information about the LHAS was mailed out to potential participants with a self-addressed, stamped envelope and postcard to return to indicate their interest in participating. Those who returned their postcards were contacted for a pre-visit at the PBRC where informed consent was executed and physiological and psychological measures were obtained. For those over the age of 70 years, this preliminary assessment was solicited in a home visit. Next, a day-long session was held at the PBRC where participants completed multiple measures of physical and psychosocial functionality. All participants were paid at least \$50 for their voluntary participation. The procedures used were reviewed and approved by the Institutional Review Boards of the participating institutions.

Table 1 presents the individual difference characteristics of the sample. We conducted one-way analyses of variance (ANOVAs) and chi square tests of independence (when indicated) on these data with age group as a between group factor. Cognitive status was assessed with the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975). An ANOVA on the MMSE scores yielded a significant age group effect, $F(3, 767) = 119.376, p < 0.001$. Pairwise comparisons (Tukey) confirmed that the younger and middle-aged adults' mean MMSE scores did not differ from each other ($p = 0.17$), although the two older groups' mean scores were lower than that of the two younger groups and significantly differed from each other (p 's < 0.001). A short-form of the Wechsler Adult Intelligence Scale Vocabulary subtest (Jastak & Jastak, 1964) was given as a measure of verbal intelligence. An ANOVA on the vocabulary scores yielded a significant age group effect, $F(3, 760) = 7.599, p < 0.001$. Participant's scores on the Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986) indicated that the majority (92%) were within the normal range at the time of testing. An ANOVA on the GDS scores yielded a significant age group effect, $F(3, 765) = 6.908, p < 0.001$, due to the oldest-old adults whose mean GDS score was significantly higher than the other groups (all p 's < 0.03) who did not differ from each other, yet well below the cutoff score of 6 representing mild depression. Participants also completed the Yale Physical Activity Survey (YPAS; Dipietro et al., 1993). In this study, we used the Yale total energy

expenditure subscale score which reflects a sum of time spent on various activities multiplied by an intensity code, after Kim et al. (2012).

Participants rated their level of education on a 7-point scale (see Table 1). A chi-squared test of independence showed a significant educational attainment by age group association, $\chi^2(18) = 66.055, p < 0.001$. Social activity ratings measured by the number of clubs and social organizations yielded a significant association to age group, $\chi^2(9) = 47.742, p < 0.001$, due to the younger adults who reported clubs and social organizations less often than expected. Analyses of the number of hours per week spent outside of the home also yielded a significant association to age group, $\chi^2(12) = 180.049, p < 0.001$ favoring the younger and middle-aged groups who reported more hours per week spent outside of their home than did the two older reference groups. Participants rated their satisfaction with social support they receive for dealing with day to day problems. Analyses of the social support ratings yielded a significant association to age group, $\chi^2(9) = 87.415, p < 0.001$, due to the younger and middle-age adults whose social support ratings were lower than the other groups' ratings. Participants indicated whether they had a confidant, described as someone they can talk to about issues that concern them. Analyses of the confidant ratings yielded a significant association to age group, $\chi^2(3) = 12.418, p = 0.006$, owing to the oldest-old who reported having a confidant less often than expected.

Dependent Measures

The 36-Item Short Form (SF-36) was used as a general indicator of overall health and well-being (Ware & Sherbourne, 1992; Ware, Snow, Kosinski, & Gandek, 1993). The SF-36 is a self-report questionnaire that measures eight health constructs, which contribute to overall mental (MCS) and physical (PCS) health profile scores for each participant. The PCS composite was used to estimate self-reported health in all statistical analyses reported here.

We created a cumulative index based on the presence of five chronic conditions: high cholesterol, hypertension, diabetes, arthritis, and heart problems as documented in each participant's medical history. These conditions range in severity from mild/moderate (e.g., high cholesterol and arthritis) to more severe (e.g., heart problems and hypertension), and were selected to provide a broad assessment of health. For each participant, scores of 0 (absence) and 1 (presence) were assigned for each health condition and summed to create a cumulative, composite index of health (range: 0 to 5).

Statistical Analyses

All statistical analyses were conducted using IBM SPSS version 22.0 statistical software system. Means and standard deviations are reported for all continuous variables. Frequencies and percentages (%) are reported for categorical variables. Separate hierarchical regression analyses were carried out with sociodemographic characteristics, social and physical activity scores as predictors for the criterion variables, self-reported health (SF-36 PCS) and objective health status (Chronic 5). In each of these regressions, age, gender, and education were entered first, in order to account for these sociodemographic variables before considering the predictors of central interest.

Results

Analyses of Age and Gender Differences

Table 2 presents self-reported health and objective health status. An ANOVA on the SF-36 PCS scores yielded significant main effects of age group, $F(3, 738) = 56.99, p < 0.001$ and gender, $F(1, 738) = 14.94, p < 0.001$. The Age Group x Gender interaction effect was also significant, $F(3, 738) = 5.48, p = 0.001$. Pairwise comparisons confirmed a statistically significant gender difference for the older ($p = 0.004$) and oldest-old adults ($p < 0.001$) and but not for the younger ($p = 0.746$) or middle-aged adults ($p = 0.755$), as the means in Table 2 (upper panel) suggest.

For objective health status, analyses of the chronic 5 health index yielded a significant age group main effect, $F(3, 763) = 118.507, p < .0001$. As can be seen in Table 2 (lower panel), the mean number of chronic conditions was highest for the older adults followed by the oldest-old adults who had fewer chronic conditions, but not significantly so. The two older groups had significantly more chronic conditions than the middle-aged adults (p 's < 0.001), who in turn had significantly more chronic conditions than the younger adults. There were no other significant effects.

Hierarchical Regression Analyses

SF-36 PCS scores—Inspection of Table 3 reveals that age, gender, and education accounted for a significant 23.8% of the variance in the self-reported health responses, $F(3, 722) = 75.216, p < 0.001$. When physical activity was added to the model, the demographic variables held their significance. Physical activity also made a significant contribution ($p < 0.001$), in support of our hypothesis. Together, these variables accounted for 25.2% of the variance, $F(4, 721) = 60.642, p < 0.001$. When the three social factors were added, the demographic and physical activity variables held their significance, although only hours spent outside of the home ($p < 0.001$) and social support ($p = 0.003$) made significant contributions. Together, these variables accounted for 28.3% of the variance, $F(7, 718) = 60.642, p < 0.001$. Importantly, these data support our hypothesis that social factors still matter for physical health, after physical activity has been taken into account.

Objective Health Status—Of the three demographic variables, only age made a significant contribution, and accounted for a significant 33.4% of the variance in the number of chronic conditions, $F(3, 744) = 124.302, p < 0.001$. When physical activity was added to the model, age held its significance ($p < 0.001$), but the physical activity variable was not a significant predictor. Together, these variables accounted for 33.4% of the variance, $F(4, 743) = 93.114, p < 0.001$. When the social factors were added, age held its significance, although only the number of clubs and social organizations ($p = 0.031$) made a significant contribution. Together, these variables accounted for 34.1% of the variance, $F(7, 740) = 54.598, p < 0.001$.

Discussion

In the present research, we examined age and gender differences in social and physical activity, and self-reported health and objective health status. Our first aim in this study was

to extend our prior work by taking a focused look at middle-aged adults, a segment of the adult population that may be at greater risk of premature death owing to an increase in life threatening diseases in midlife (Administration on Aging, 2015). To address this aim, we partitioned the sample to represent four age groups: younger (21-44 years), middle-aged (45-64 years), older (65-84 years), and oldest-old adults (85 to 101 years). Overall, younger and middle-aged adult groups were comparable on the social activity measures reported here. On the contrary, middle-aged adults' physical activity score was lower than that of the younger adults ($p = 0.03$) and no different from the older adults ($p = 0.82$). Oldest-old adults' physical activity score was significantly lower than all of the other age groups (p 's < 0.001), as expected. With respect to self-rated health, middle-aged adults' mean SF-36 PCS score was numerically lower than the younger adults, a marginally significant difference ($p = 0.065$). However, middle-aged adults reported a significantly greater number of chronic conditions than did the younger adults, consistent with our hypothesis. Together, these findings imply that middle-aged adults may be at risk for health-related problems which threaten the likelihood of successful aging, possibly due to a more sedentary lifestyle than their younger counterparts.

With respect to the two older reference groups, the mean SF-36 PCS score for the older adults was greater than that of the oldest-old adults, suggestive of a linear decline in self-reported health in later life. The more interesting aspect of these data was that age interacted with gender, where the gender difference in SF-36 PCS scores was not significant for the middle-aged and younger age groups, but a difference favoring males was evident in the two older age groups. This gender difference in physical functioning may be due to older women's tendency to have lower body weight and strength than do older men (Wood et al., 2005). The present results underscore the important role of physical function in fostering health-related quality of life in late adulthood (see also Fabre et al., 2007).

The second aim of this study was to determine whether social behaviors were still predictive of health outcomes after physical activity was statistically controlled. Importantly, we found that hours spent outside of the home and social support satisfaction were each significantly associated with self-reported health indexed by the SF-36 PCS scores (Table 3). Further, the number of clubs and social organizations reported also predicted objective health status, after taking sociodemographic factors and physical activity into account. Taken together, the results of these regressions indicate that social behavior still matters for health outcomes, in support of our hypothesis.

On a broader note, our results have theoretical and applied implications worthy of brief mention. With respect to theoretical implications, all age groups here, including the younger adults, reported the presence of chronic conditions. Thus, Rowe and Kahn's (1997) first criterion of successful aging, the absence of disease and disability and lack of predisposing factors toward these, does not appear to provide a reasonable account of the physical health realities for most of our sample who ranged in age from 21 to 101 years. The present results are not atypical in that most adults age 65 years and over have at least one chronic condition and many have more than one (Administration on Aging, 2015). We have suggested that objective health status based on the sum of chronic conditions is an adequate index of health, although future research to document the validity of this index is desirable. Our data

imply that Rowe and Kahn's first criteria may not be particularly helpful for understanding successful aging despite chronic health challenges, as previously noted in the literature (Cherry, Marks, et al., 2013; Strawbridge, Wallhagen, & Cohen, 2002). Regarding practical implications, we reiterate that current demographic trends predict a dramatic growth in the elderly population that is reason for concern. The increased likelihood of survival after age 80 today, or *mortality deceleration* (Vaupel et al., 1998), has many psychosocial, economic, and public policy implications. Identifying factors that are associated with the retention of health and promotion of successful aging remains a critical challenge for researchers.

In closing, the present results provide new evidence that extends the literature on social behaviors, physical activity, and health into very late adulthood. Our findings and their implications should be considered in light of at least two methodological limitations. First, these data are based on a cross-sectional design, so inferences about the directionality of effects are not warranted. Second, we did not include a measure of lifetime stress or biological indicators of healthy aging. One potentially important direction for future research would be to consider a boarder assessment of psychosocial variables that may impact health. Additional research to examine the role of genetic factors would also provide insight into biological variables that may inevitably thwart healthy aging (Kim & Jazwinski, 2015), an exciting possibility that awaits future research.

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Table 1

Sociodemographic and Individual Difference Characteristics (N = 771)

	Younger adults (21-44 years) n = 203	Middle-aged adults (45-64 years) n = 208	Older adults (65-84 years) n = 137	Oldest-old adults (85 years +) n = 223
	<i>M (SD)</i>			
Age	34.7 (6.4)	52.8 (5.0)	74.4 (5.2)	91.2 (2.4)
Cognitive status ^a	29.4 (1.0)	29.2 (1.1)	28.7 (1.4)	27.3 (1.7)
Vocabulary ^b	22.6 (7.4)	24.8 (7.8)	24.8 (7.3)	21.9 (7.4)
Affective status ^c	1.9 (2.3)	1.7 (2.4)	1.5 (1.7)	2.5 (2.2)
Physical activity ^d	8431.6 (6574.7)	7085.2 (4987.1)	6606.5 (4714.3)	3686.5 (3033.6)
<i>N (%)</i>				
Gender (female)	139 (68.5%)	123 (59.1%)	76 (55.5%)	126 (56.5%)
Education				
< 7th grade	0 (0.0%)	0 (0.0%)	1 (0.7%)	5 (2.3%)
7th to 9th grade	2 (1.0%)	1 (0.5%)	4 (2.9%)	19 (8.6%)
10 th to 11th grade	5 (2.5%)	2 (1.0%)	4 (6.8)	15 (3.4%)
High school or GED equivalent	36 (17.8%)	49 (24.1%)	40 (29.2%)	48 (21.6%)
Partial college or training	69 (34.2%)	68 (33.5%)	38 (27.7%)	68 (30.6%)
College degree	69 (34.2%)	51 (25.1%)	31 (22.6%)	42 (18.9%)
Graduate degree	21 (10.4%)	32 (15.8%)	19 (13.9%)	25 (11.3%)
Clubs and social organizations				
None	47 (23.4%)	36 (17.7%)	6 (4.4%)	23 (10.4%)
Between 1 and 3	143 (71.1%)	145 (71.4%)	102 (74.5%)	158 (71.5%)
Between 4 and 6	11 (5.5%)	14 (6.9%)	22 (16.1%)	31 (14.0%)
More than 6	0 (0.0%)	8 (3.9%)	7 (5.1%)	9 (4.1%)
Number of hours per week outside of home				
None	3 (1.5%)	1 (0.5%)	1 (0.7%)	15 (6.8%)
Between 1 and 5	10 (5.0%)	13 (6.4%)	30 (21.9%)	69 (31.2%)
Between 6 and 12	27 (13.4%)	30 (14.9%)	34 (24.8%)	66 (29.9%)

	Younger adults (21-44 years) n = 203	Middle-aged adults (45-64 years) n = 208	Older adults (65-84 years) n = 137	Oldest-old adults (85 years +) n = 223
Between 13 and 19	24 (11.9%)	27 (13.4%)	27 (19.7%)	28 (12.7%)
More than 19	137 (68.2%)	131 (64.9%)	45 (32.8%)	43 (19.5%)
Social support				
Very satisfied	99 (49.5%)	98 (49.0%)	106 (77.4%)	184 (83.3%)
Fairly satisfied	76 (38.0%)	77 (38.5%)	27 (19.7%)	32 (14.5%)
A little satisfied	18 (9.0%)	19 (9.5%)	3 (2.2%)	4 (1.8%)
Not satisfied	7 (3.5%)	6 (3.0%)	1 (0.7%)	1 (0.5%)
Confidant (yes)	192 (94.6%)	190 (93.1%)	126 (92.0%)	191 (85.7%)

Notes.

^a Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975).

^b A short-form of the Wechsler Adult Intelligence Scale Vocabulary subtest (Jastak & Jastak, 1964).

^c Geriatric Depression Scale (Sheikh & Yesavage, 1986).

^d YPAS total energy expenditure score expressed as kilocalories per week (Dipietro, Caspersen, Ostfeld, & Nadel, 1993).

Table 2**Dimensions of Physical Health by Age Group and Gender**

Variables	Younger adults (21-44 years)	Middle-aged adults (45-64 years)	Older adults (65-84 years)	Oldest-old adults (85 years +)
SF-36 PCS ^a				
Males	51.19 (8.20)	49.37 (9.06)	46.81 (8.28)	42.91 (9.98)
Females	51.60 (8.10)	48.96 (9.23)	41.83 (11.00)	36.74 (10.80)
Total	51.47 (8.11)	49.13 (9.14)	44.06 (10.15)	39.35 (10.87)
Number of chronic conditions ^b				
Males	0.48 (0.78)	1.21 (1.15)	2.43 (1.35)	2.02 (1.25)
Females	0.40 (0.69)	1.23 (1.17)	2.30 (1.24)	2.40 (1.09)
Total	0.43 (0.72)	1.22 (1.16)	2.36 (1.29)	2.23 (1.17)

Notes. Entries are means and standard deviations. Based on 746 respondents for whom SF-36 scores were available.

^a SF-36 physical health composite score (Ware et al., 2002).

^b Cumulative number of chronic conditions (range: 0 to 5) based on the full sample of 771 respondents.

Table 3
Multiple Regressions with Self-Reported Health and Objective Health Status as Criterion Variables

Health outcomes	Unstandardized coefficients			Standardized coefficients		
	B	SE B	β	P	R ²	
Physical health composite (SF-36 PCS)						
Step 1 (demographics)						23.8%
Age	-0.214	0.016	-0.451	< 0.001		
Gender	-2.743	0.724	-0.124	< 0.001		
Education	0.827	0.289	0.096	0.004		
Step 2 (demographics, physical activity)						25.2%
Physical activity ^a	< 0.0001	< 0.0001	0.125	< 0.001		
Step 3 (demographics, physical activity, social factors)						28.3%
Clubs	-0.415	0.602	-0.023	0.491		
Hours out	1.417	0.324	0.162	< 0.001		
Social support	-1.560	0.515	-0.101	0.003		
Objective health						
Step 1 (demographics)						33.4%
Age	0.034	0.002	0.572	< 0.001		
Gender	0.033	0.083	0.012	0.688		
Education	-0.033	0.033	-0.031	0.321		
Step 2 (demographics, physical activity)						33.4%
Physical activity ^a	< 0.0001	< 0.0001	0.006	0.852		
Step 3 (demographics, physical activity, social factors)						34.1%
Clubs	0.153	0.071	0.069	0.031		
Hours out	-0.064	0.038	-0.059	0.094		
Social support	0.053	0.061	0.027	0.385		

Notes.

^aYPAS total energy expenditure score expressed as kilocalories per week (Dipietro, Caspersen, Ostfeld, & Nadel, 1993).