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Which Aspects of Socio-Economic Status are Related to Health in Mid-Aged and Older Women?

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A population-based study was conducted to validate gender- and age-specific indexes of socio-economic status (SES) and to investigate the associations between these indexes and a range of health outcomes in 2 age cohorts of women. Data from 11,637 women aged 45 to 50 and 9,510 women aged 70 to 75 were analyzed. Confirmatory factor analysis produced four domains of SES among the mid-aged cohort (employment, family unit, education, and migration) and four domains among the older cohort (family unit, income, education, and migration). Overall, the results supported the factor structures derived from another population-based study (Australian Bureau of Statistics, 1995), reinforcing the argument that SES domains differ across age groups. In general, the findings also supported the hypotheses that women with low SES would have poorer health outcomes than higher SES women, and that the magnitude of these effects would differ according to the specific SES domain and by age group, with fewer and smaller differences observed among older women. The main excep-

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tion was that in the older cohort, the education domain was significantly associated with specific health conditions. Results suggest that relations between SES and health are highly complex and vary by age, SES domain, and the health outcome under study.

Key words: socio-economic status (SES), measurement, physical and mental health, health care utilization, health behavior, women's health

A vast body of research demonstrates associations between socio-economic status (SES) and morbidity and mortality from a range of physical and mental health conditions. Low SES has been linked with the prevalence of cardiovascular disease (Brezinka & Kittel, 1996; Hallqvist, Lundbert, Diderichsen, & Ahlbom, 1998; McElduff & Dobson, 2000; Osler et al., 2000; Tyroler, 1999), obesity (Sarlio-Lahteenkorva & Lahelma, 1999; Sobal & Stunkard, 1989), Type 2 diabetes (Evans, Newton, Ruta, MacDonald, & Morris, 2000), hypertension (Vargas, Ingram, & Gillum, 2000), complaints and symptoms (Der, MacIntyre, Ford, Hunt, & West, 1999; Mackenbach, 1992), including constipation (Johanson & Sonnenberg, 1990), perceived general health (Hemingway, Nicholson, Stafford, Roberts, & Marmot, 1997; Mackenbach, 1992), and psychosocial stress (Mackenbach, 1992). Those with low SES are also reportedly at increased risk of engaging in unhealthy behaviors including smoking (Graham & Hunt, 1994; Power & Matthews, 1997), poor diet (Baghurst et al., 1990), physical inactivity (Crespo, Ainsworth, Keteyian, Heath, & Smit, 1999), and decreased use of health care services (Mackenbach, 1992).

SES inequalities in health may vary by gender and age. There is some inconsistency in results of studies that have compared SES differentials among men and women. Although some findings demonstrate stronger associations of SES with health outcomes among men (e.g., Arber, 1997; Elo & Preston, 1996), others show no sex differences (e.g., Hemingway et al., 1997). Some evidence suggests that inequalities increase over the adult years until later in life (House et al., 1994) and that SES differences in relative rates of mortality and morbidity are strongest among young to mid-aged adults (Mustard, Derksen, Bethelot, Wolfson, & Roos, 1997). It has been suggested that SES inequalities in health and mortality are small in the elderly, perhaps due to a narrowing of social and economic differentials once individuals leave employment (Anderson, Sorlie, Backlund, Johnson, & Kaplan, 1997). However, these findings may depend on country- or time-specific findings, such as social welfare support for the elderly. In addition, contradictory findings show SES gradients in health do exist among the elderly (Berkman & Gurland, 1998; Broom, 1984; Hart, Davey Smith, & Blane, 1998). Studies showing a narrowing of SES differentials among older adults have tended to rely on income as an indicator of SES, and the inclusion of

education in addition to income in the study by Berkman and Gurland (1998) may have contributed to its contradictory findings.

Such contradictory findings and use of varying indicators is likely to be attributable in part to disagreement over the conceptualization of SES. SES is the term commonly used to refer to the expression and distribution of such attributes as occupation, income, and status (Liberatos, Link, & Kelsey, 1988), although Kreiger et al. (1997) preferred the term *socio-economic position*, arguing that SES includes both access to and possession of material resources as well as prestige and position in a hierarchical ranking. According to seminal researcher Max Weber, differential social position is based on three dimensions: class (an economic concept, indicated, e.g., by income), power (related to political context), and status ("access to life chances" based on social and cultural factors; Liberatos et al., 1988; Weber, 1946). According to this definition, factors such as family background and lifestyle could be considered sociocultural factors reflective of the "status" dimension (Liberatos et al., 1988). Although not typically considered a component of SES, it is also now recognized that "ethnicity" is a social rather than biological construct (Kreiger, 2000) and ethnicity and migration history may also reflect "access to life chances." Migrants in Australia, for example, experience higher rates of unemployment and lower labor force participation rates than the Australian-born population (Australian Bureau of Statistics [ABS], 1999). This may be attributable to noneconomic factors, including migrants' experiences of discrimination in their new country. Although associations between health and SES are commonly explained in terms of the material reality of modern life, it is important to acknowledge the complex contribution of social, cultural, and behavioral factors (Scambler & Higgs, 1999), particularly when considering mental, as well as physical, health. Structural disadvantage and poorer life chances shape psychosocial orientations and lifestyle behaviors that are prejudicial to health. Hence the inclusion of migrant history as a social indicator along with conventional measures of SES provides a broader picture of socio-economic position and its association with a range of physical and mental health outcomes. Although we accept the "blurring" of material and social power that occurs with the use of SES, we adopt SES rather than *socio-economic position* in this article as the more widely understood term.

The measurement of SES is particularly problematic for women, because previous typically used methods of assigning SES, such as allocating a woman the occupational class of her husband, are often inappropriate (Koskinen & Martelin, 1994; McDonough, Williams, House, & Duncan, 1999). The increasing labor force participation rate of women, which is seeing dual earning as the most common form of family life (Bradley, 1998), now affords the potential to analyze patterns of inequalities in health using women's own occupational status, and in fact demands that this be done (Arber, 1997; Baxter, 1991). Similarly, measures such as income or occupation are often not appropriate for assigning SES to older

adults, who may be retired and/or on pensions (Daniel, 1984). The applicability of the SES measures to the specific populations being studied is critical (Liberatos et al., 1988). With older adults in particular, most research has used only limited indicators (notably education or income). In one of the few studies to investigate the use of multiple indexes of SES among older adults (Robert & House, 1996), it was found that the association between financial assets and health remained until quite late in life, and financial assets become a more important predictor of some measures of health than either education or income. This finding lends strength to claims that relying on a single indicator of SES is problematic, because different indicators of SES have different associations with specific health outcomes (e.g., Chandola, 2000). The use of several indicators, or of multidimensional methods of assigning SES, has been recommended (Liberatos et al., 1988; Martikainen, 1995).

In a recent study that attempted to address these problems, a set of individual-based, age-, and gender-specific indexes for assigning SES was developed (Mishra, Ball, Dobson, Byles, & Warner-Smith, 2001). Factor analysis of data from the 1995 Australian National Health Survey (NHS; ABS, 1995) produced consistent results that were interpreted in terms of five conceptually meaningful domains or factors of SES: employment, income, migration, family unit, and education. A factor can be interpreted as a dimension or construct that is a condensed statement of the relations between a set of variables (Kline, 1994). Results showed that age- and gender-specific SES scores based on these factors had stronger associations with physical and mental health than either an area-based index or the SES indicators developed in this study for middle-aged (40- to 44-year-old) men, and applied to the other age and gender groups. These results were interpreted as evidence that SES measures composed of social and demographic items demonstrate important age- and gender-specific differences that are relevant for health. However, further validation of the SES indexes, and investigation of their predictive ability for a range of health outcomes, is required.

The baseline surveys for the Australian Longitudinal Study on Women's Health (also known as the Women's Health Australia [WHA] project) presented an opportunity to examine these issues as they relate to women. Four main hypotheses examined in this article are:

1. The age-specific SES domains (employment, family unit, income, migration, and education) for women obtained for the NHS data will be replicated in the WHA data.

2. Self-reported measures of health will differ among SES groups defined for each of the SES domains, with women in low SES reporting poorer health outcomes than higher SES women.

3. The magnitude of SES differentials will vary among SES domains for different aspects of health; specifically, it is hypothesized that physical health and health care utilization will show stronger associations with economic domains and mental health will show stronger associations with sociocultural domains.

4. The SES differentials in health measures will be smaller for the older cohort than for the mid-aged cohort.

METHOD

The WHA project is a longitudinal study of factors affecting the health and well-being of three national cohorts of women who were aged 18 to 23 years ("young"), 45 to 50 years ("mid-aged"), and 70 to 75 years ("older") at the time of Survey 1 in 1996. This study, which is designed to track the health of women over a period of up to 20 years, will provide longitudinal data on health, health service use, sociodemographics, and personal information from 41,500 women. Since Survey 1, the three age cohorts have been surveyed annually on a rolling basis. It was not feasible to include the young cohort in this study, because education is known to be an important indicator of SES, and many of the young cohort of women were still in the process of acquiring educational qualifications.

Study Sample

The original WHA study sample was selected randomly from the national Medicare health insurance database (which incorporates all residents of Australia regardless of age, including immigrants and refugees). Women from rural and remote areas of Australia are overrepresented in the sample. Further details of the recruitment methods have been described elsewhere (Brown et al., 1998).

At Survey 1, in 1996, a total of 14,065 mid-aged women and 12,624 older women responded to the mailed surveys. The mid age cohort was surveyed for the second time in 1998, and the older cohort in 1999. There were two versions of Survey 2—a long version administered via mail (mid- aged: $N = 11,637$; older: $N = 9,510$) and a short version consisting of only selected questions, which was administered via telephone interview (mid-aged: $N = 691$; older: $N = 920$). The response rates for Survey 2 were 92% (for the mid-aged) and 91% (for older women) of those women who had consented at Survey 1 to further contact and had not subsequently died. The nonrespondents consisted of those who did not return Survey 2 (mid-aged: 6.5%; older: 7.6%) and those who declined to participate (mid-aged: 1.5%; and older: 1.8%). Women who responded to the short version of Survey 2 were excluded from the analyses because some of the variables relevant to this ar-

ticle were not collected in the short version of the survey. The sample for this study consisted of the 11,637 mid-aged women and 9,510 older women who responded to both surveys.

Measures

All of the demographic and socio-economic items in Surveys 1 and 2 were selected for analysis (25 items for the mid-aged women and 18 items for older women). For a few items, some categories have been collapsed due to small numbers of women. Most of the demographic and socio-economic items used in the analyses were collected in Survey 1. The items selected, and their response options, are outlined in Table 1.

A range of health conditions and behaviors that have been established in previous studies to be associated with indicators of SES were selected from Survey 1 as indicators of health.

1. Health conditions: Three specific health conditions that are known to be associated with SES were selected for inclusion in analyses. These conditions were: having ever been told by a doctor they had hypertension (two response options), being told by a doctor they had diabetes (two response options), and experiencing constipation in the last 12 months (four response options from *never* to *often*; responses of *sometimes* and *often* were used to estimate the prevalence).

2. Medical Outcomes Study Health Survey Short-Form (SF–36): Participants completed the SF–36 (Ware, Kosinski, & Keller, 1994), a widely used and validated measure of health-related quality of life, separated into physical and mental health component summary scores denoted as physical health (PCS) and mental health (MCS), respectively.

3. Health care utilization: The use of general practitioner services has been shown to be inversely related to SES levels (Young, Dobson & Byles, 2001). To measure the number of times health services were utilized in the last 12 months, respondents were asked, How many times have you consulted the following for *your own health* in the *last 12 months*? … Family doctor or another general practitioner; hospital doctor; specialist doctor, allied health professional; "alternative" health practitioner. The response options were: none, once or twice, three or four times, five or six times, seven or more times. Responses were scored based on approximate annual frequencies of health care utilization (*none* = 0; *once or twice* = 1.5; *three or four times* = 3.5; *five or six times* = 5.5; *seven or more times* = 8). These were summed over the five different types of providers of health services to give an overall measure of health care utilization ranging from 0 to 40.

TABLE 1
Items and Response Options for the Items Included in Factor Analyses

Item	*Order of Response Options (Number of Options)*
Marital status	Never married/separated/divorced/widowed, married/defacto (2)
Country of birth	Other, Asia, Europe (Non-English speaking), Other English speaking, Australia (5)
Year of arrival in Australia	Mid cohort: 1966 or later,1965 or earlier, Australian born (3) Older cohort: 1956 or later,1955 or earlier, Australian born (3)
Usual language spoken at home	Non-English, English (2)
Area of residence	Other rural/remote areas, large/small rural centres, capital city/other metropolitan centres (3)
Employment status	Mid cohort only: No paid work (unemployed , studying, unpaid voluntary work, sick, other), home duties, work without pay (eg family business), Employedûpart time, employed ûfull time (5)
Usual hours worked each week	Not applicable, 1û24, 25û40, 41 or more hours (4)
Whether in paid shift work	Not applicable, yes, no (3)
Whether in paid work at night	Not applicable, yes, no (3)
Occupation	Never had a paid job/other, manual workers/machine operators or drivers, sales and personal service workers/clerks, tradespersons/para-professional; professionals/managers or administrators (5)
Partner's occupation	Not applicable/never had a paid job/other, manual workers/machine operators or drivers, Sales and personal service workers/clerks, tradespersons/para-professional, professionals/managers or administrators (5)
Source of income for self/partner	
Wage or salary	Mid cohort: not applicable, no, yes (3)
Business/farm/partnership	Mid cohort: not applicable, no, yes (3)
Government pension or allowance	Older cohort: not applicable, no, yes
Superannuation or other private income	Older cohort: not applicable, no, yes
Gross personal income per annum	Mid cohort: Not applicable/don't know/not stated, $15,999 or less, $16,000–36,999, $37,000 or more (4)
Gross personal income of partner per annum	Mid cohort: not applicable/don't know/not stated, $15,999 or less, $16,000–36,999, $37,000 or more (4)
Highest qualification	Mid cohort: No formal qualification, School certificate, Higher school certificate, trade/apprenticeship/certificate/diploma, bachelor degree/higher degree (5) Older cohort: No formal qualification/School certificate, higher school certificate, Trade/apprenticeship/certificate/diploma/bachelor degree/higher degree (3)

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TABLE 1
(CONTINUED)

Item	*Order of Response Options (Numger of Options)*
Age first left school	Mid cohort: not applicable/16 years or younger, 17 years or older (2) Older cohort: Not applicable/14 years or younger, 15–16 years, 17 years or older (3)
Self reported class	Mid cohort: don't know/missing, working, middle/upper (3)
Whether has private hospital insurance coverage	No, Yes (2)
Whether has private health insurance for ancillary services	No, Yes (2)
Type of dwelling	Caravan/tent/cabin/houseboat/other, Flat/unit/apartment, house (3)
Name in the ownership/ purchasing/tenancy agreement	Not applicable/other family member/other, partner or spouse, self with partner or spouse, or self with others, or just self (3)
Whether lived alone	Yes, No (2)
Whether lived with partner or spouse	No, Yes (2)
Whether lived with own children	No, Yes (2)

4. Height and weights: Self-reported height and weight were used to compute body mass index (BMI = weight in kilograms/square of height in meters). BMI was classified according to the Australian National Health and Medical Research Council (1997) guidelines: underweight (<20.00 kg/m^2), acceptable weight (20.00-25.00 kg/m^2), overweight (25.01–30.00kg/m^2), and obese (>30.00kg/m^2.

5. Health behaviors: Physical activity scores were derived from self-reported frequency and intensity of leisure time physical activity. Scores were classified as: none or low, moderate, or high level of physical activity (Brown, Mishra, Lee, & Bauman, 2000). Cigarette smoking status was defined as nonsmoker or smoker.

Statistical Analysis

All demographic and socio-economic items were considered as ordinal variables. For each item, response options were arranged in ascending order with respect to SES. A separate category was created for the response "not applicable." The order of the categories in each item are given in Table 1. With the sample stratified by age, confirmatory factor analysis using the method of principal components and varimax rotation was performed on the demographic and socio-economic items. Items that

cross-loaded on several factors or had loadings of 0.5 or less on all the factors were subsequently eliminated. Inter-item reliability for each factor was assessed by Cronbach's coefficients for standardized variables. Kaiser's measure of sampling adequacy was used to quantify the degree of intercorrelation among the items and the appropriateness of factor analysis was also reported (Hair, Anderson, Tatham, & Black, 1997). In addition, the factor structures were compared with the results from the samples after they had been randomly split into two subsamples and the analyses repeated on each half.

Factor scores for each of the resultant SES domains were grouped into tertiles (or in some cases dichotomized). Univariate analyses (χ^2 test) and the Cochran–Armitage test for trend were used to compare percentages of women reporting medical history, symptoms, and health behaviors by SES tertiles (low, middle, and high SES). Multiple linear regression models were used to analyze the relation between physical health (the outcome variable) and the four SES domains simultaneously (four explanatory variables). The analyses were repeated for the outcome variables of mental health and health care utilization. Means and 95% confidence intervals (CI) were estimated for physical health, mental health, and health care utilization variables using the least square means option of the general linear models procedure of SAS (SAS Institute Inc., 1989). Bonferroni corrections were used to reduce the effects of inflated Type 1 errors due to multiple comparisons (Neter, Kutner, Nachtsheim, & Wasserman, 1996). To estimate the magnitude of SES differentials, mean difference and 95% confidence interval between the high and low tertiles were also calculated using means option of the general linear models procedure.

RESULTS

Factor analysis confirmed four independent factors for the mid-aged cohort and four independent factors for the older cohort. Table 2 sets out the factors, which together explain 66% and 69% of the variation in the data for the mid-aged and older women, respectively. The main difference was that the employment domain was the primary factor for the mid group; in the older group, this was replaced by the family unit domain followed by the income domain, which consisted of items relating to health insurance and source of income. The education and migration domains were the next most important factors for both cohorts.

Tables 3 and 4 show the relation between the SES domains and various health outcomes for the mid-aged cohort. Because the distribution of factor scores for the employment domain was bimodal, factor scores were dichotomized to low and high groups. For other factors, tertiles of scores were used, with the lowest tertile representing the most disadvantaged group. Physical and mental health scores generally increased across increasing SES tertiles,

TABLE 2
Items and Factor Loadings[a f] Determining Socio-Economic Status Dimensions for Mid-Aged and Older Women

	Mid-Aged Women 45–50 (n = 11,637)				*Older Women 70–75 (n = 9,510)*			
Item	*Factor 1 Employment*	*Factor 2 Family Unit*	*Factor 3 Education*	*Factor 4 Migration*	*Factor 1 Family Unit*	*Factor 2 Income*	*Factor 3 Education*	*Factor 4 Migration*
Whether in paid work at night[b]	0.94							
Whether in paid shift work[b]	0.94							
Employment status	0.91							
Usual hours worked each week	0.86							
Source of income for self/partner – wage or salary	0.54							
Whether lived with partner or spouse		0.93			0.96			
Marital status		0.91			0.93			
Whether lived alone		0.72			0.93			
Partner's occupation		0.65						
Gross personal income of partner per annum		0.57						
Highest qualification			0.77				0.84	
Age first left school			0.69				0.74	
Occupation			0.64				0.74	
Self reported class			0.55					
Year of arrival in Australia				0.65				0.81
Usual language spoken at home				0.56				0.85
Whether has private hospital insurance						0.80		
Whether has private health insurance for ancillary services						0.79		
Source of income for self/partner-government pension or allowance						0.68		
Source of income for self/partner super-annuation or other private income						0.64		
Eigenvalue (% of variance explained)	4.1 (26%)	3.0 (19%)	1.9 (12%)	1.4 (9%)	3.0 (25%)	2.4 (20%)	1.6 (13%)	1.3 (11%)

[a]Factor loadings are correlations of an item with a factor. [b]About 50% of all shift workers reported that they were in paid work at night.

TABLE 3
Means, Confidence Intervals (CI) and *p* Values for Physical and Mental Health and Health Care Utilization in Mid-Aged Women

		Employment			*Family Unit*			*Education*			*Migration*		
Mid	*Tertile*	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*
Physical health				<0.001			<0.001			<0.001			0.4
Low		48.3	47.9 – 48.7		49.7	49.3 – 50.0		49.4	49.1 – 49.7		49.8	49.4 – 50.1	
Middle[a]					50.4	50.0 – 50.8		50.7	50.4 – 51.0		49.9	49.5 – 50.2	
High		51.6	51.3 – 51.8		51.5	51.1 – 51.8		51.5	51.2 – 51.8		50.2	49.8 – 50.5	
Difference in physical health between high and low SES tertiles		3.3	2.9 – 3.6	<0.001	1.8	1.3 – 2.4	<0.001	2.1	1.5 – 2.6	<0.01	0.4	–0.9 – 1.7	0.04
Mental Health				<0.001			<0.001			0.006			0.6
Low		50.3	50.0 – 50.7		49.5	49.2 – 49.9		50.1	49.7 – 50.5		50.6	50.3 – 50.9	
Middle[a]					51.2	50.9 – 51.5		51.3	50.9 – 51.7		50.7	50.4 – 51.1	
High		51.1	50.9 – 51.4		51.9	51.6 – 52.2		51.2	50.8 – 51.6		50.9	50.5 – 51.2	
Difference in mental health between high and low SES tertiles		0.8	0.4 – 1.2	<0.001	2.3	1.8 – 2.9	<0.001	1.1	0.6 – 1.7	<0.01	0.3	–0.2 – 0.8	0.9
Health care utilization				<0.001			<0.001			0.02			0.6
Low		8.5	8.3 – 8.7		8.3	8.1 – 8.6		8.0	7.7 – 8.2		7.9	7.7 – 8.2	
Middle[a]					7.7	7.5 – 8.0		7.7	7.5 – 7.9		7.9	7.6 – 8.1	
High		7.6	7.4 – 7.7		7.6	7.3 – 7.8		8.0	7.2 – 8.2		**7.8**	7.6 – 8.1	
Difference in health care utilisation between high and low SES tertiles		–1.0	–1.2 – –0.7	<0.001	–0.7	–1.1 – –0.4	<0.001	0.0	–0.3 – 0.3	0.7	–0.1	–0.4 – 0.3	0.6

Note. SES = socio-economic status.

[a]Because the distribution of the factor scores corresponding to the Employment domain was bimodal, groups were dichotomized to low and high employment status.

TABLE 4
Percentages Reporting Health Conditions and Behaviors, by Tertiles[a] of Socio Economic Status (SES) Domains, in Mid-Aged Women, and Difference (With 95% Confidence Interval) Between Low and High Tertiles

		Employment[a]			*Family Unit*			
	N	*Low*	*High*	*Difference (95% CI)*	*Low*	*Mid*	*High*	*Difference (95% CI)*
Health Condition								
Diabetes	342	3.9	2.3**	–1.6 (–1.7, –1.5)	3.4	2.7	1.8[b**]	–1.6 (–1.7, –1.5)
Hypertension	2,558	24.0	19.8**	–4.2 (–4.3, –4.1)	22.1	21.8	17.9[b**]	–4.20 (–4.25, –4.15)
Constipation	3,170	28.0	24.8**	–3.20 (–3.24, –3.16)	26.3	25.6	23.6[b**]	–2.7 (–2.74 –2.66)
Health behavior								
Current cigarette smoker	2,024	17.3	16.9	–0.4 (–0.5, –0.3)	21.0	15.0	12.7[b**]	–8.3 (–8.4, –8.3)
Physical activity level (moderate/vigorous)	5,144	44.2	41.2**	3.0 (–3.04, –2.94)	41.7	42.4	43.7	2.0 (1.96, 2.04)
Obesity(% obese/very obese)	2,142	23.0	16.5**	–6.5 (–6.6, –6.4)	20.1	19.1	15.4[b**]	–4.7 (–4.8,–4.6)

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TABLE 4
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	Education				*Migration*			
	Low	*Mid*	*High*	*Difference (95% CI)*	*Low*	*Mid*	*High*	*Difference (95% CI)*
Health Condition								
Diabetes	4.0	2.1	1.8[b**]	–2.2 (–2.3, –2.1)	3.1	2.8	2.0[b**]	–1.1 (–1.2, –1.0)
Hypertension	23.7	20.2	18.0[b**]	–5.7 (–5.75, 5.65)	20.0	22.0	19.8*	–0.2 (–0.25,–0.15)
Constipation	28.5	26.1	20.9[b**]	–7.6 (–7.64, –7.56)	26.9	24.9	23.8[b**]	–.3.1 (–3.14,–3.06)
Health behavior								
Current cigarette smoker	20.2	16.9	11.7[b**]	–8.5 (–8.6, –8.4)	17.5	17.1	14.2[b**]	–3.3 (–3.4,–3.2)
Physical activity level (moderate/vigorous)	39.6	43.9	44.2[b**]	4.6 (4.57, 4.63)	42.4	41.2	44.2*	1.8 (1.76,1.84)
Obesity(% obese/very obese)	22.2	18.7	13.7[b**]	–8.5 (–8.6,–8.4)	17.4	20.4	16.7**	-0.7 (-0.8,-0.6)

[a]Since the distribution of the factor scores corresponding to the Employment domain was bimodal, groups were dichotomised to low and high employment status. [b]Cochran–Armitage test for linear trend: $P < 0.01$.χ^2 test for associations between health conditions and tertiles of SES domains:*$0.01 < p < 0.05$. **$p < 0.01$.

whereas health care utilization decreased for all domains. The most marked change occurred between the lowest tertile and the other two. For specific health measures shown in Table 4, there were significant linear trends across SES tertiles for the employment, family unit, and education domains except for cigarette smoking status (statistically significant for family unit and education only) and physical activity level (significant for employment and education only). Physical health differentials and health service utilization were largest for the employment domain and mental health differentials were largest for the family unit domain. Health behaviors and conditions differed most for the education domain.

There were substantially different relations between SES domains and health measures for the older cohort shown in Tables 5, and 6, with fewer statistically significant differences and smaller absolute differences. The family unit domain did not exhibit any significant associations with physical or mental health. The income domain had significant associations with the tertiles for mental health and health care utilization. As for the mid-aged cohort, physical and mental health generally increased across the education domain tertiles. With few exceptions, the only evidence of linear trends with specific health measures was found in the education domain. These tended to decline across education domain tertiles (with exceptions being physical activity, which markedly increased, and cigarette smoking, which was not significantly associated). The income domain showed significant differentials for cigarette smoking and obesity.

DISCUSSION

Overall, the results from the confirmatory factor analysis supported the factor structures derived from the NHS analysis with the exception of the housing domain, which did not appear in the WHA cohorts. This could be due to the different questions on housing included in each study. Five SES domains were identified overall, with four age-specific domains overlapping but differing slightly between mid-aged and older women. Age differences were consistent with those found in NHS analyses (Mishra et al., 2001). As expected, employment was not the primary factor among the older cohort, as only a small proportion of that age group reported that they were still in paid employment. Other income items such as gross personal annual income rarely appeared in the factors. This may be due to the high level (approximately 20%) of "don't know," "don't want to answer," or missing responses.

The results also supported the second and third hypotheses; namely that the SES groups would differ on health outcomes and that the magnitude of these SES differentials would vary according to the SES domain and health measure examined. Consistent with a vast body of previous research, results provide evidence of an inverse relation between SES and self-reported health. This study advanced

TABLE 5
Means, Confidence Intervals (CI) and P Values for Physical and Mental Health and Health Care Utilization in Older Women

	Family Unit			*Income*			*Education*			*Migration*[a]		
Tertiles	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*	*M*	*95% CI*	*p*
Physical health			0.5			0.06			< 0.001			0.6
Low	50.9	50.4–51.4		50.7	50.2 – 51.2		50.1	49.6 – 50.6		50.7	50.2–51.4	
Middle[a]	50.8	50.3–51.3		50.7	50.1–51.1		50.8	50.3–51.2				
High	50.8	50.3–51.3		51.2	50.7–51.7		51.5	51.0–52.0		50.5	50.5–51.1	
Difference in physical health between high and low SES tertiles	0.0	–0.6–0.7	1.0	0.5	–0.2–1.2	0.06	1.5	0.7–2.2	<0.001	0.05	–0.5–0.6	0.6
Mental Health			0.2			<0.001			<0.001			0.001
Low	51.4	50.6–51.5		51.0	50.6–51.4		50.2	49.7–50.7		50.5	50.0–51.2	
Middle[a]	51.5	50.4–51.3		51.0	50.8–51.4		51.8	51.3–52.3				
High	51.4	50.9–51.8		52.2	51.8–52.6		52.2	51.7–52.7		51.6	51.4–51.9	
Difference in mental health between high and low SES tertiles	0.0	–0.6–0.5	0.8	1.2	0.5–1.7	<0.001	2.0	1.3–2.7	<0.001	1.1	0.5–1.6	0.001
Health care utilization			0.01			<0.001			0.7			0.6
Low	10.0	9.6–10.3		9.2	8.9–9.5		9.9	9.6–10.3		9.6	9.3–10.0	
Middle[a]	10.1	9.8–10.5		9.7	9.5–10.0		9.7	9.4–10.0				
High	9.2	8.9–9.5		10.3	10.1–10.6		9.7	9.4–10.0		9.8	9.6–10.0	
Difference in health care utilization between high and low SES tertiles	–0.7	–1.1– –0.4	0.03	1.2	0.8–1.5	<0.001	–0.2	–0.7 – 0.2	0.7	0.2	–0.2–0.6	0.6

Note. SES = Socio-economic status.

[a]Because the distribution of the factor scores corresponding to the Migration domain was bimodal, groups were dichotomized to low and high migration status.

TABLE 6
Percentages Reporting Health Conditions and Behaviors, by Tertiles of Socio-Economic Status(SES) Domains, in Older Women, and Difference (With 95% Confidence Interval [CI]) Between Low and High Tertiles

		Family Unit				*Income*			
	N	*Low*	*Mid*	*High*	*Difference (95% CI)*	*Low*	*Mid*	*High*	*Difference (95% CI)*
Health Condition									
Diabetes	840	7.8	7.8	7.9	0.1 (0.0, 0.2)	8.8	8.0	6.8	–2.0 (–2.1, –1.9)
Hypertension	4915	48.2	47.8	47.6	–0.60 (–0.64, –0.56)	49.1	48.8	45.8	–3.30 (–3.34, –3.24)
Constipation	2607	27.5	25.3	22.2**	–5.3 (–5.4, –5.2)	25.4	26.3	23.3	–2.1 (–2.2, –2.0)
Health behaviors									
Current cigarette smoker	704	5.6	6.1	7.5*	1.9 (1.8, 2.0)	9.1	5.9	4.2**[b]	–4.9 (–5.0, –4.8)
Physical activity (% moderate/ vigorous)	4417	43.8	45.8	48.0*	4.20 (4.16, 4.24)	45.7	44.9	47.0	1.30 (1.26, 1.34)
Obesity(% obese / very obese)	1379	14.1	13.1	14.2	0.1 (0.0, 0.2)	15.4	14.7	11.3**[b]	–4.1 (–4.2, –4.0)

(CONTINUED)

TABLE 6
(CONTINUED)

	Education				*Migration*[a]		
	Low	*Mid*	*High*	*Difference (95% CI)*	*Low*	*High*	*Difference (95% CI)*
Health Condition							
Diabetes	10.2	7.2	6.2**[b]	–4.0 (–4.1, –3.9)	8.2	7.8	–0.4 (–0.5,–0.3)
Hypertension	51.4	48.2	44.1**[b]	–7.3 (–7.34, –7.26)	45.0	48.7*	3.7 (3.66,3.74)
Comstipation	30.5	23.5	21.0**[b]	–9.5 (–9.6, –9.4)	26.4	24.6	–1.8 (–1.9,–1.7)
Health Behaviors							
Current cigarette smoker	5.9	5.9	7.5	1.6 (1.5, 1.7)	8.1	5.9**	–2.2 (–2.3, –2.1)
Physical activity (% moderate/vigorous)	39.5	44.5	53.6**[b]	14.10 (14.06, 14.14)	47.6	45.4	–2.20 (–2.24,–2.16)
Obesity (% obese/ very obese)	16.7	13.7	11.0**[b]	–5.7 (–5.8,–5.6)	14.6	13.6	–1.0 (–1.1, –0.9)

[a]Because the distribution of the factor scores corresponding to the "Migration" domain was bimodal, groups were dichotomised to low and high migration status. χ^2 test for associations between health conditions and tertiles of SES domains.
[b]Cochran–Armitage test for linear trend: $p < .01$. *$.01 < p < .05$. **$p < .01$.

previous findings by showing that the magnitude of the SES–health associations differed depending on SES domain and the specific health outcome, with mental health differentials larger for economic aspects of SES (e.g., employment), but physical health and health care utilization differentials larger for sociocultural aspects (e.g., family unit). The results also partly supported the final hypothesis that SES differentials in health measures would be smaller for the older cohort than for the mid-aged cohort. The main exception was that in the older cohort, education was significantly associated with all the specific health measures, except health care utilization. This may be attributable to the likelihood that education level is stable in later adult life, unlike family unit or income, which are affected by widowhood or ceasing employment. Hence older women may become a more homogenous group in terms of their family situation and income, whereas differentials in education and associations with health outcomes remain. However, certain aspects (e.g., mental health and health care utilization) were significantly associated with either income or family unit. The implications of these findings for future research into health inequalities are that different domains of SES may be useful for identifying aspects of SES that are important for different health outcomes, but that at a minimum, education should be included as a measure of the SES of older adults.

The migration domain was found to be associated with symptoms (diabetes, hypertension, constipation) and health behaviors but not with self-rated physical and mental health or health care utilization. This may reflect cultural differences in perceptions of health. Further research into discrepancies between perceived and objective health in migrant groups is warranted, because the findings have implications for the responsiveness of the health care system to the needs of migrant women.

The fact that the relations between most of the SES domains and health outcomes were significant and meaningful (in terms of size of effects) when included in the regression models simultaneously (particularly for mid-aged women) demonstrates that these SES domains are independent predictors of health outcomes. In conjunction with findings that the magnitude of SES–health associations differed according to SES domain, these results suggest that different domains of SES are independently associated with different health outcomes. Acknowledging this study's cross-sectional design, these findings may reflect different pathways through which aspects of SES impact on health.

The findings support the validity of the measures developed in an earlier study by Mishra et al. (2001), reinforcing the argument that SES domains differ across age and gender groups and supporting arguments for the use of age- and gender-specific indexes in studies of health inequalities. Such a focus on specific population groups is particularly relevant for women. Women's increasing labor force participation, accompanied by growing numbers of female-headed families and the decline of fertility rates, challenges the traditional assumptions that the male breadwinner is the determinant of a household's socio-economic position

(Hayes & Jones, 1992). In the late 1980s, fewer women in their 50s than in their 40s were in paid work, and they tended to work from financial necessity (Arber & Ginn, 1995). Research suggests that this may be changing and that many women now in this age group are more ambitious than men of similar age (Bradley, 1998). Many young Australian women perceive a combination of motherhood and paid work to be the norm and aspire to such a lifestyle by the age of 35 (Wicks & Mishra, 1997). Despite their increasing participation in the paid workforce, women today still perform the majority of domestic and caring work (Bittman, 1995). Women are likely to be engaged in multiple social roles related to paid employment, family, child-care, and caring for others (Pugh & Moser, 1990); their lives thus remain markedly different from those of men. The need for gender-specific measures of SES, particularly those that take sociocultural factors into account, is therefore critical. In addition, factors such as delayed retirement and self-funded retirement will increasingly impinge on the material well being of older women. The "complex mosaic" (Mowl & Turner, 1995) of women's lives as they move through different life stages calls for more sensitive measures of SES to take account of this diversity.

Gender differences in health vary according to stage of the life cycle (Arber & Cooper, 1999) and increasing evidence suggests that socio-economic factors acting over the lifetime may have cumulative effects on health (Hart et al., 1998; Smith, Hart, Blane, Gillis & Hawthorne, 1997). The longitudinal nature of the WHA study affords the opportunity to further explore, over time, the marked difference between the age groups in regard to the influence of paid employment. Will continued participation in paid work through their young and middle years affect the SES of women after retirement? Will employment remain less relevant to older women? Or is the association demonstrated in this study a generational effect specific to these cohorts, derived from the fact that the mid-aged women have typically engaged in some form of paid work while the other older group has not?

Associations between the type of family unit and women's health require further investigation. Evidence from British studies suggests that differences between never-married women and divorced and separated women may vary by age and/or birth cohort. Among older British women, divorced and separated women may have experienced more harmful health effects than never-married women; however, among younger women, this difference may be absent or possibly reversed (Waldron, Weiss, & Hughes, 1997). The longitudinal WHA study affords opportunities to examine these associations over time for Australian women.

Strengths of this study include the large, representative population samples of women surveyed and the comprehensive range of health indicators assessed. Limitations include the fact that only those socio-economic and demographic items included in the WHA surveys could be included in analyses. Other potentially important proxies for SES, such as inherited wealth or material possessions, may

have altered the factor structure if they had been included. In addition, early life SES, which emerging evidence suggests plays a key role in contributing to health inequalities throughout life (e.g., Power & Matthews, 1997; Wamala, Lynch, & Kaplan, 2001), was not assessed comprehensively in this study. The data presented are cross-sectional, and hence results of the investigation described in this article demonstrate associations only. However, again the longitudinal WHA study provides great potential for future exploration of causal connections and the cumulative effects of SES on health over time, and in the context of significant life events. For example, what is the effect of children leaving home? Does the removal of such a demand on parental resources mean that housing unit becomes less relevant as a contribution to SES?

These findings add to the growing body of evidence demonstrating links between low SES and poor health and indicate that these associations differ depending on the domain of SES and the age group under study. The finding that different SES domains were differently associated with health outcomes across age groups suggests that underlying relations between SES and health are likely to be complex and governed by different mechanisms depending partly on age and aspect of health. Further research is required to untangle these complex patterns and investigate the causal mechanisms between SES and health outcomes. A better understanding of these causal pathways is critical to begin to address SES-related health inequalities.

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