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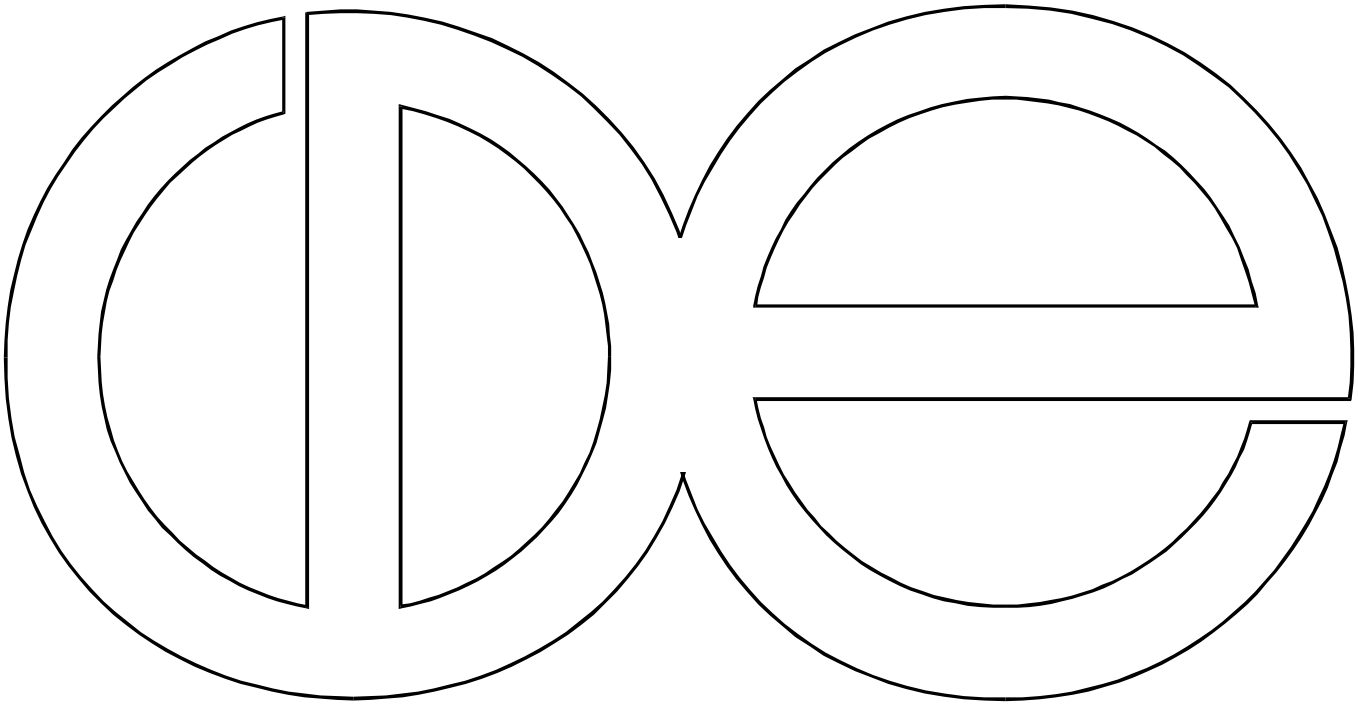

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Socioeconomic Status Differences in Hormone Therapy: Prevention or Patriarchy?

Abstract

The relative benefits and hazards of noncontraceptive hormone therapy (HT) for aging women remain a controversial medical and social issue. This study examined the lifetime incidence of HT use, how usage varied by surgery status, and the bivariate and net associations between a large array of SES indicators and the likelihood of midlife women ever using HT by age 53-54 among N=3,612 non-Hispanic white women participants in the Wisconsin Longitudinal Study 1957-1993. About half the sample of women had ever used HT; 79% who had ever used HT were currently using HT (38.5%). In multivariate logistic regression analyses, the most robust SES predictor of HT use was a woman's husband's occupational status (higher status associated with higher rates of use). This association withstood adjusting for all other measured sociological and biomedical factors (e.g., other health behaviors, menopausal symptoms, age at menopause, health insurance). The association of HT use and education differed for women who underwent hysterectomy and/or oophorectomy (where the odds of using HT were higher for less educated women) and for women with intact reproductive organs (where the odds of using HT were lower for less educated women). Only among women who had surgery was the association of education with use of HT persistent adjusting for all other measured factors. Additionally, a woman's own earnings and household net worth showed positive net associations with HT use. Two competing explanations for the observed relationship between husband's occupational status and women's HT use are discussed: HT as a preventive health behavior and HT as a socially influenced behavior to help maximize femininity.

Socioeconomic Status Differences in Hormone Therapy:

Prevention or Patriarchy?

Noncontraceptive hormone therapy (HT) use has increased during the last two decades in the United States as well as many other countries in the developed world (Thompson 1995). Prevalence estimates of HT use have ranged widely depending upon the sampling frame of the study (Derby et al. 1993; Johannes et al. 1994; Thompson 1995). Rates of prescribing HT in the U.S. have been found to be highest in the West and lowest in the East (Hemminki et al. 1988). Estrogen use was reported by approximately 25.5% of postmenopausal women participants in a major California epidemiological study who were interviewed between 1978 and 1981 (Standeven et al. 1986), and by about 31% of the same study's postmenopausal women who were interviewed between 1984 and 1987 (Barrett-Connor, Wingard, and Criqui 1989). HT is the most prescribed pharmaceutical treatment among midlife American women (National Center for Health Statistics 1995).

Contemporary women must decide upon HT use in a social context of conflicting ideological perspectives regarding its promotion (Lock 1993; Auerbach and Figert 1995; MacPherson 1981, 1993; McCrea 1983; Lewis 1993), and without a clear medical consensus on its advisability as a preventive (or palliative) health behavior (see, for example, Stanford 1996; Colditz 1996; Rosenberg 1993). Yet the question of short- and long-term HT is a pressing issue for an increasing proportion of the U.S. population; nearly 38 million women, approximately 14% of the total population, were 50 and older in 1995 (U.S. Bureau of the Census 1996). At age 50,

the average age of menopause, life expectancy for women is now about 31.4 years (U.S. Bureau of the Census 1996); thus, women must prepare to live a sizable proportion of their lives after reaching menopause. Better understanding the biomedical and psychosocial antecedents and consequences of HT use is clearly an important part of an agenda to better address issues fundamental to women's health (Auerbach and Figert 1995).

The use of HT is not random. While the most significant sociodemographic correlate of HT use other than age and gender is socioeconomic status (SES), SES has not been examined systematically in most studies of HT. SES is generally found to be positively associated with health-promoting behaviors and good health outcomes for both women and men (Adler et al. 1993; House et al. 1990, 1994; Feinstein 1993; Longino, Warheit, and Green 1989; Marmot, Kogevinas, and Elston 1987; Syme and Berkman 1976; Waldron 1991). Yet considerable public health debate continues regarding the mechanisms and processes whereby SES influences differences in health behaviors and health status (Adler et al. 1993; Andersen 1995; Link and Phelan 1995).

SES is measured in different ways — e.g., years of education, occupational status, and income. Different measures of SES tend to be only moderately correlated, and each captures different attributes of social status. One research approach to help elucidate the possible processes underlying any given relationship between a health outcome and SES is to examine multiple measure(s) of SES simultaneously, allowing for an assessment of which measure(s) yield the largest net associations (Mechanic 1989; Kessler 1982; McLeod and Kessler 1990). An evaluation of multiple measures concurrently also helps provide information that can: 1) lead to a

more reliable and accurate charting of SES differences in health-related outcomes, and 2) guide future national and small-scale data collection to include the most operative SES measures.

The primary goal of this study was to develop a more differentiated understanding of how SES is associated with the use of HT for midlife women. To this end, we investigated 1) the lifetime incidence of HT use and how it varied by surgery status in a large population sample of midlife women studied longitudinally for 35 years, and 2) the bivariate and net associations between a large array of SES indicators and the likelihood of midlife women ever using HT by age 53-54.

BACKGROUND

The Changing Sociohistorical Context of Hormone Therapy Use

About three decades ago, Robert A. Wilson, a doctor with strong ties to and support from the pharmaceutical industry (specifically, Wyeth-Ayerst, manufacturers of the equine estrogen, Premarin), promised that estrogen replacement therapy was the secret to remaining "feminine forever" (Wilson 1966; Wilson and Wilson 1963). His rhetorical construction of postmenopausal women as "unstable, estrogen-starved" (Wilson and Wilson 1963; 355) "castrates" (Wilson and Wilson 1963; 347) helped promote the medicalization of menopause as an "estrogen-deficiency" disease requiring "estrogen replacement" treatment (Goodman 1980; McCrae 1983; MacPherson 1981; 1993). His best-selling book (Wilson 1966), and the media publicity it provoked, contributed to the boom of estrogen therapy use among midlife women beginning in the late 1960s. By 1975, Premarin, the most popular brand of estrogen, had become the fifth leading prescription drug in the U.S. When two case-control studies in that same year indicated that

estrogen therapy led to an increase in endometrial cancer, prescriptions and sales dropped precipitously (U.S. Congress Office of Technology Assessment 1992). A consensus conference at the National Institutes on Health in 1979 concluded that most of the physical and psychological benefits claimed for estrogen HT were bogus. The conference committee concluded that only two signs were uniquely associated with menopause and could be ameliorated by estrogen therapy — vasomotor instability (e.g., hot flashes) and urogenital changes (e.g., decrease in vaginal lubrication) (Worcester and Whatley 1992).

Pharmaceutical companies and doctors began to popularize a new regime of HT in the 1980s: estrogen combined with progesterone was promoted to limit the risk of endometrial cancer. At the same time, some studies began to suggest that estrogen used alone may play a role in preventing cardiovascular disease (CVD) (Bush and Barrett-Connor 1985) and reducing postmenopausal bone loss (Ettinger, Genant, and Cann 1985; Lindsay et al. 1980).

Sales of estrogen again boomed in the 1980s (Hemminki et al. 1988), fueled in part by a major advertising initiative in 1985 by Wyeth-Ayerst. Their advertisements promoted the lifelong use of estrogen among all women over the age of 35 for prevention of what they graphically portrayed as “the ravages of osteoporosis” (Worcester and Whatley 1992).

However, biomedical researchers have continued to explore and question the effects of HT. For example, since the bone loss benefits of HT end when HT is discontinued, the feasibility of HT for universal osteoporosis prevention remains debatable (Ettinger and Grady 1993). Unopposed estrogen continues to be associated with endometrial cancer in clinical trials (Writing Group for the PEPI Trial 1995), yet taking progestins along with estrogens to reduce the risk of endometrial cancer also reduces the lipoprotein benefits of HT (Writing Group for the PEPI Trial

1995) — the hypothesized (though as yet unproven) mechanism whereby HT influences women's postmenopausal CVD (Matthews et al. 1996a, 1996b). Additionally, evidence has accrued that estrogen therapy with or without progestins increases the risk of breast cancer (Colditz et al. 1990; 1995; Steinberg et al. 1994). These changes in knowledge have not led to a decrease in HT use. Noncontraceptive estrogens were the most commonly prescribed medications at office visits made by women age 45-64 in the U.S. in 1992 (National Center for Health Statistics 1995).

Both physicians and women operate in an environment of changing social constructions of menopause and aging and changing knowledge regarding HT. While the medical literature on HT has developed at a quick pace, so too has the literature that dispenses advice to women regarding menopause, HT, aging and health. The medical establishment and its feminist critics stand at polar opposites regarding HT and other women's health issues, but they take different stands depending on whether the focus is in the U.S. or the U.K. (McCrea and Markle 1984; Lewis 1993). While in the U.K., the women's health movement has demanded HT for relief of menopausal symptoms, in the U.S. the feminist voice has been cautious toward HT (Worcester and Whatley 1992).

In the U.S., at one extreme was the call for the universal use of HT by menopausal and post-menopausal women by Wilson (1966). Today, a number of medical authorities still write of the "underuse" of HT (Thompson 1995; Stanford 1996). At the opposite pole, feminist critics and advocates of alternative therapies have decried the abuse and over-use of HT and have promoted a variety of "natural" alternatives (e.g., exercise, diet, vitamins, water-based vaginal lubricants) for ameliorating menopausally associated symptoms and for aging healthfully (National Women's Health Network 1989; Soffa 1996; Worcester and Whatley 1992). In the middle are

myriad women's health advocates who publish voluminous monographs on menopause and aging filled with checklists and worksheets designed to aid the midlife woman in her complex decision regarding whether to use HT or not (e.g., Love 1997; Northrup 1994; Vliet 1995).

The Correlates of Hormone Therapy

The strongest biological determinant of use of HT is surgical menopause (Derby et al. 1993; Egeland et al. 1988; Standeven et al. 1986; Stadel and Weiss 1975; Rosenberg et al. 1979; Johannes et al. 1994). The presence of menopausal symptoms, such as hot flashes and excessive sweating, are other biological factors found to be correlated with HT use (Stadel and Weiss 1975; Johannes et al. 1994). Health behavior indicators, such as exercise, alcohol consumption, smoking, and body mass index have also been associated with HT (Egeland et al. 1988; Johannes et al. 1994; Stampfer and Colditz 1991; Matthews et al. 1996a; Barrett-Connor, Wingard, and Criqui 1989; Derby et al. 1993). However, it seems unlikely that these behaviors actually cause HT use. Indeed, there is considerable current debate whether the selection into estrogen use by women with more positive health behavior profiles for CVD may, in fact, be part of the reason why some studies have found a beneficial relationship between using HT and reduced CVD (see Matthews et al. 1996a, 1996b for a recent study pointing in this direction; see Grodstein 1996 for a contrasting view).

SES is the major sociodemographic factor (aside from age and gender) that has been linked with HT. Higher rates of HT use have been found among women with higher household income (Derby et al. 1993; Rosenberg et al. 1979). Evidence regarding the association between education and HT use is mixed: some studies find higher educational attainment associated with higher rates of HT use (Stadel and Weiss 1975; Standeven et al. 1986; Matthews et al. 1996b);

others find no association (Derby et al. 1993; Rosenberg et al. 1979). However, most studies of the SES and HT relationship do not go beyond simple bivariate associations using cross-sectional data. This may be partly due to the fact that the focus in most HT studies has been on the effects rather than the determinants of HT. Many of these study designs purposively control or randomize selection factors, such as SES, or rely on nonrepresentative clinically-based samples.

The U.S. vital statistics system, unlike vital statistics in several European nations, has not routinely reported public health data by SES (Krieger and Fee 1994). A 1994 conference sponsored by NIH on "Measuring Social Inequalities in Health" reflected a growing awareness that socioeconomic differentials in health need to be considered a major public health concern in the U.S. (Lee, Moss, and Krieger 1995). There is a timely need for sociologists to contribute to the determination of how best to measure SES for health research, including studies of menopause and HT (U.S. Congress, OTA 1992). In order to make this contribution to public health research, medical sociologists and epidemiologists need to make *systematic* evaluations of whether it is important to include more than one measure of SES when modeling the determinants of health-related outcomes (Leigh 1993; Marks 1996; Winkleby et al. 1992). Further, it is important to examine evidence to discern whether the *same* SES measures are the most important (and appropriate) predictors of health behaviors and outcomes for different population groups, e.g., women vs. men, nonelderly vs. elderly, non-Hispanic whites vs. ethnic minority groups (Arber 1994). In the case of women, for example, is it parents' status, spouse's status, or own status that is most critical in influencing health-related outcomes? Additionally, are marital status and history, household composition, and parenthood status important measures to incorporate when considering SES for women (Arber 1994)?

Occupational status, which has been used extensively in studies of men, is a critical indicator of relative socioeconomic location in society. However, the use of occupational status as an indicator of women's SES location has been problematic historically because women's labor force attachment is less continuous due to life course periods devoted to childbearing, home production, and caregiving. In addition, women's underpaid, sex-segregated, and subordinate place in most labor markets has made it "conventional" wisdom to use a husband's occupational status as a marker for his wife, even if she was, indeed, employed.

However, using husband's occupational status for a woman has been severely criticized. Feminist researchers find it objectionable to have a woman's status ascribed solely as though she were a man's appendage (Arber 1989; Graham 1984). Higher rates of nonmarriage and marital dissolution have led to longer proportionate periods of women's lives when they are likely to be unmarried (Schoen and Weinick 1989). American women's labor force participation has markedly increased and become more continuous in recent decades (Bianchi and Spain 1986) permitting more feasible formulation and use of measures of individual occupational status across the entire population of women. Yet this approach is seldom taken.

To summarize, hormone therapy is an elective health behavior exercised by a large and growing proportion of the female population. The relative benefits and risks of HT continue to be debated. Given this sociomedical context, it is of considerable public health interest that women of higher social status, as indexed by women's own education and household income, use HT at higher rates than women of lower social status. Most of the research on the determinants of HT use have been cross-sectional. Additionally, most research studies to date have emphasized the effects, but not the predictors, of HT. HT studies often do not use randomly selected samples

from defined populations, or, as in case-control studies, they attempt to completely randomize or hold constant social factors by design. SES differences have not been studied evaluating multiple measures of SES concurrently or differentiating between measures of parental SES, spousal SES, and individual SES.

The goal of this study was to provide a more differentiated understanding of the relationship between SES and HT use among midlife women. Toward this end, we 1) examined the lifetime incidence of HT use and how it varied by surgery status and age at menopause in a large population sample of Wisconsin midlife women studied longitudinally from ages 18-53, 2) examined bivariate associations between a large array of women's parental, spousal, and personal SES indicators and HT use by age 53-54, and 3) examined a series of multivariate models that provide information about the relative net importance of multiple SES indicators as predictors of women ever using HT by age 53-54.

Based on previous research, we expected that a history of having had reproductive organ surgery and higher SES would be associated with greater odds of having ever used HT. However, we did not have a basis upon which to predict which SES measures might be the strongest net predictors of HT.

DATA AND METHODS

Sample

Data from the Wisconsin Longitudinal Study (WLS), a long-term study of a random sample of the Wisconsin high school graduating class of 1957 (N=10,317), were used for this study. The data were collected from the original respondents, their parents, or administrative

records from 1957 to 1992. In 1992-93, during the most recent data collection period when respondents were approximately 53 or 54 years old, 10,031 (97.2%) of the original 1957 sample of men and women were located, alive (9,455; 91.6%) or deceased (576; 5.6%). The 1992-93 data collection took place in two parts: an hour-long telephone interview, completed by 89.8% of living respondents (N = 8,493); and a twenty-page mailback survey completed by 80.9% of telephone respondents, or 72.7% of living original sample (1957) respondents (N=6,875). The data used for this paper included 3,612 women who completed the telephone and mailback survey in 1992-93 (see Hauser et al. 1994, for more design details).

The WLS respondents represent a relatively advantaged segment of the American population, having all completed high school in 1957, a time when about 25% of their Wisconsin birth cohort peers did not. They are almost all non-Hispanic whites, and have not had to face the additional burden of racial disadvantage. The population that the WLS graduate sample *does* represent — non-Hispanic high school graduates born around 1939-1940 — includes approximately 66% of the current American population about that age (Kominski and Adams 1992). Having some of the potentially most disadvantaged women from this birth cohort excluded from this study might be considered a drawback. However, like the noteworthy Whitehall samples of British civil servants (Marmot et al. 1991), this sample provides an excellent opportunity to examine whether there is truly a SES *gradient* in a health behavior, rather than only a difference between the most severely disadvantaged and everyone else (Adler et al. 1993; Marmot, Kogevinas, and Elston 1987). Additionally, an examination of SES differences in a health behavior for an exclusively non-Hispanic white sample allows us to investigate whether race/ethnicity is an adequate proxy for SES in public health statistics.

Measures

Hormone use. All female respondents to the WLS mailback survey were asked whether they had "ever taken hormones or birth control pills for menopausal or aging symptoms." Nearly half (49%) of the women in the sample reported ever using hormones for these purposes (see Table 1 for descriptive statistics for all analysis variables). In additional analyses (not shown) we found that 79% of those women who reported ever using hormones were currently using hormones at the time they were interviewed in 1992-93 — in other words, current prevalence of HT use for our sample was approximately 38.5%.

[Table 1 about here]

Surgery status. Women respondents to the WLS mailback survey received one of two versions of questions regarding women's health. While the questionnaire versions did not vary on items assessing ever using HT, age at last menstrual period, and menopausal symptomology, question items did change for surgery history and for HT utilization history. In the first version, women were asked if they had gone through or if they were currently going through menopause. If they answered "yes," they were asked, "Was menopause induced or hastened by a hysterectomy (surgical removal of your uterus and/or ovaries)?" (yes or no). The second version asked directly, "Have you ever had surgery to remove your uterus and/or ovaries?" and elicited from respondents all surgeries that applied to them — i.e., surgery to remove one ovary, two ovaries, and/or their uterus. For this paper, we differentiated among women who reported having any reproductive organ surgery by the questionnaire version. Women respondents reporting surgery on the first questionnaire version were coded 1 for the variable *surgery (old form)* because we cannot distinguish the specific organs removed in their surgery. Women reporting surgery on the second

version were coded according to the specific kind of surgery they underwent: *hysterectomy only, hysterectomy and oophorectomy,* and *oophorectomy only*. Women who did not respond to any of the surgery questions were coded as missing. About 29% of WLS main respondent women age 53-54 analyzed for this paper indicated they had had some type of reproductive organ surgery. This proportion is comparable to a national estimate of about 34% of U.S. women ages 50-54 in 1985 who were estimated to have had their uteri removed (Pokras and Hufnagel 1987: Table 4). It would also be expected that the WLS estimate might be a bit lower than the national estimate since the WLS women are relatively advantaged educationally, and education has been previously found to be inversely associated with the likelihood of hysterectomy (Kjerulff, Langenberg, and Guzinski 1993; Meilahn et al. 1989; Santow and Bracher 1992).

All the women were asked about their menstrual status. Women who had not "had a menstrual period in the last 12 months" were asked how old they were when they had their last period. Women who indicated that they had had a menstrual period in the last 12 months were considered to be still menstruating. For these analyses, women were grouped by the *age at which their periods stopped* (under 35, 35-39, 40-42, 43-45, 46-48, 49-51, 52-55, and age missing/did not stop/still menstruating).

Socioeconomic status. Measures of *father's educational attainment* and *mother's educational attainment* were based on information provided by respondents in 1975 regarding their father's and mother's highest year of school completed. *Father's occupational status* was also reported by respondents in 1975 and is measured by the Duncan Socioeconomic Index (SEI) male-based score for 1970 Census occupation and industry categories (Hauser and Featherman 1977). This same SEI index was the basis for *spouse's occupational status in 1975* and

respondent's occupational status in 1975. The SEI is constructed by regressing the prestige of occupations (as ascertained periodically by national survey) on occupational education (defined as the proportion of job holders who have completed a certain number of years of schooling) and occupational earnings (defined as the proportion of job holders who earn a certain amount of money per year). The estimated parameters from this model are used to calculate the predicted occupational prestige scores — i.e., SEI scores — for each occupational category. The male-based SEI we used provides a SEI ranking for all jobs that both men and women do, yet it is calculated using occupational earnings and occupational education of male job holders only. Comparisons of the total-based and male-based indexes indicate that the male-based index has more external validity for use with female and male samples than does the total-based index (Stevens and Featherman 1982; Hauser and Warren 1996). Since the SEI is based on job-level education and earnings, it does not have an extremely high correlation with individual-level education and earnings; e.g., the correlation between WLS respondent women's education and 1975 SEI score is $r = .46$ (see Appendix for a correlation matrix for all SES measures used in these analyses). *Parents' income* was computed using information obtained from Social Security record information for parents around 1957 (year of high school graduation) and merged into the WLS data file.

Respondent's educational attainment was based on respondent's report of the last year of completed schooling as of 1992-93 differentiating 1) those with only 12 years of high school education (the lowest attainment for this sample), 2) those obtaining 13-15 years, and 3) those with 16 or more years of education.

Respondent's occupational status 1975, as noted above, was measured using the Duncan Socioeconomic Index (SEI) (1970) rating of respondent reports of their current or last job at the time of the 1975 survey. Only 2.5% of the WLS women had never worked as of 1975 and could not be coded on this variable; these few female cases were flagged as "never worked" on a dichotomous variable included in the analyses. Complete and longitudinal coverage of occupational status for women is an exceptional feature of this study. Studies that have evaluated occupation as a predictor of health are typically cross-sectional and only consider current occupation for women; this often leads to the exclusion of a significant proportion of unemployed women in occupational analyses. Occupational status was differentiated into five quintiles (based on the entire sample of WLS women).

Respondent's income 1974 and *spouse's income 1974* were based on respondent reports in 1975 respondent and spouse income (if married) in 1974 (again, when respondents were about age 35). *Net worth 1993* was calculated by adding up the estimated value minus the outstanding debt respondents reported for several categories of personal property (e.g., home, business, farm, automobiles) and other assets (e.g., savings, investments). These data were not collected in 1975, so a causally prior measure of net worth is not possible to construct with these data. We included net worth in our analyses in addition to income because it captures additional variation in affluence and life style that is missing from more volatile measures of yearly income. Seven categories of net worth were contrasted in these analyses (see Table 1 for categories). *Home owner* is a dichotomous measure based on whether the respondent reported owning their own home (mortgaged or not) in 1992-93.

Additional predictors. *Mental ability* was based on the respondent's Henmon-Nelson intelligence score measured during their junior year of high school and obtained from school records. By including an ability measure, this analysis was better able to estimate the net effect of education above and beyond its association with personal differences in cognitive performance. (Ability and educational attainment are positively associated, r=.41.) The mental ability measure was split into five categories based on cut points at the 20th, 40th, 60th, and 80th percentile across the entire sample of WLS women and men.

Married 1993 was obtained from telephone survey report in 1992-93. Since HT use is so closely linked to reproductive behavior and reproductive organ health, we included measures of parity status in our analyses. *Number of biological children* was reported in the telephone survey in 1992-93. *Age at first birth* was computed from respondent responses to fertility history questions in 1975 and 1992-93. A variable for *3 children by age 24* was included in the analyses because it has been associated with a higher likelihood of hysterectomy (Santow and Bracher 1992).

All women were asked about the extent to which they experienced five *menopausal symptoms:* bone pains, depression, hot flashes, night sweats, and sleep disturbances. The response categories for each symptom (or sign) were: not at all, a little, somewhat, and a lot. Dichotomous measures for these symptoms were constructed where women who reported having a symptom at least "a little" were coded 1 as having had the symptom and coded 0 otherwise.

Health insurance status was assessed during the 1992-93 WLS telephone interview. Nearly the entire analyzed sample for this paper (96%) reported having health insurance of some kind, yet we felt it was useful for us to include this measure in our analysis since it might be

considered an indicator of health care access, an important prerequisite to obtaining HT and, in general, an important causal factor in the health care utilization model (Andersen 1995).

The health-related behaviors we examined were: *binge drinking* (a dichotomous variable where the respondent reported drinking more than five drinks on any one occasion in the last month were coded 1, or 0 otherwise); *vigorous exercise* (a dichotomous variable where respondents who reported three or more times a week of vigorous exercise such as aerobics, running, swimming, bicycling, etc. were coded 1, or 0 otherwise); *smoking status* (where we contrasted *former smokers* and *current smokers* with respondents who *never smoked*); and *body mass index* (BMI=weight in kilograms/height in meters^2; where we contrasted respondents whose BMI suggested they were *underweight*: BMI> 19, *overweight*: BMI $\geq$ 25 and < 29, and *obese*: BMI $\geq$ 29, with respondents who were *normal weight*: BMI $\geq$ 19 and < 25).

Analytic Approach

Logistic regression models yielding maximum likelihood parameter estimates were used for all analyses. In each case, respondents who indicated they had *ever taken hormones* for menopausal or aging symptoms by age 53-54 were contrasted with respondents who had not. Initially, individual predictors or a related cluster of predictors were examined. In subsequent stepwise models, all predictors were examined net of the effects of all the others. An examination of the zero order correlations between all of the SES measures indicated that multicollinearity was not a major problem (see Appendix). To the extent that there are associations among predictor variables, our ability to detect significant relationships is weakened; therefore when net significant relationships are found, they represent robust associations.

RESULTS

Hormone use by surgery status

Since HT has been consistently associated with surgery status in previous research, we began our analysis by examining the association between use of HT, surgery status, and age periods stopped (naturally or due to surgery). We created interaction terms for surgery (any type) X age periods stopped in this first analysis to test for interaction effects. The first panel of the first column of Table 2 (including variables age periods stopped < 35 through surgery X age missing) reports these results. As expected, we found that women who had had any type of reproductive organ surgery were significantly more likely to report ever having used hormones. For respondents to the second version of the questionnaire, we found that type of surgery also made a difference. The odds ratio for HT use associated with combined hysterectomy and oophorectomy vs. no surgery was 3.03 to 1.00. The odds of HT use for hysterectomy only and for oophorectomy only vs. no surgery were similar to each other — both about 1.80 to 1.00. This is interesting, since women who had a hysterectomy only might not have been expected to be surgically made "deficient" in estrogen.

[Table 2 about here]

We also found significant differences associated with the age at which periods stopped. The main effects for age periods stopped indicated that menopause prior to age 40 for nonsurgery women significantly increased the odds of HT in contrast to nonsurgery women whose periods stopped at the more typical ages of 49-51. It is notable that among women who had surgery, surgery prior to age 40, and at ages 43-45, was associated with a reduction in the odds of taking hormones. Although it might be expected that surgery at an earlier age would be associated with

a greater likelihood of hormone use, for this birth cohort of women, their ages 35-45 approximately coincided with the years 1975-1985 — the time period of heightened concern about the risks of HT and of declining rates of HT use. Because of the complexity of these associations, we created a table to better illustrate the relative odds of hormone use among the Wisconsin women based on these two variables (Table 3). Using a woman who did not have surgery and whose periods stopped at the modal age of menopause (ages 49-51) as the baseline, the odds ratios provided in Table 3 indicate that the highest odds ratio of HT use occurred for the women who had combined hysterectomy and oophorectomy at ages 46-48 — 3.16 (calculated by multiplying across the three relevant odds ratios from Table 2, Model 1: 3.03 X 1.08 X .97) to 1.00. Thus, at least for this cohort, for surgeries of any type, having surgery at an age very close to the expected age of menopause was associated with a greater likelihood of HT use than having surgery at a younger age.

[Table 3 about here]

Socioeconomic status predictors of hormone use

Our logistic regression analysis proceeded to examine the effects of our multiple SES indicators *one at a time* (in each case, adjusting for age periods stopped and surgery type — our baseline model) on the likelihood of hormone use. Each of the panels delimited by a solid line in the first column of Table 2 (Model 1) describes estimates from a separately fitted model. In each case we first examined a model which included the variable and its interaction with surgery status (variable X surgery status). If none of the interactions were statistically significant ($p < .05$), we reestimated the model without interactions (together with the baseline model).

The results of this sequence of model estimations yielded evidence of several significant relationships. Among the SES indicators, hormone use was positively associated with father's educational attainment, mother's educational attainment among women who had surgery, parents' income, father's occupational status, respondent's educational attainment, respondent's occupational status, respondent's income, spouse's income, net worth, and home ownership. Women who were married at age 53-54, women who reported depression or sleep disturbances during menopause, women who were former smokers (in contrast to never smokers), and women who were normal weight (in contrast to obese) also used HT at higher rates.

Since several significant associations between parental SES characteristics and HT use emerged when separate models were examined, we next estimated a model that included all of the parental SES indicators simultaneously, along with a new baseline model that included age periods stopped, surgery, and age periods stopped X surgery interactions. The odds ratio estimates from this model (Table 2, Model 2) suggested that the effect of father's education was accounted for by other parental characteristics: mother's education, father's occupational status, and parents' income. The effects of mother's education for women who had surgery, and the effects of parental income and father's occupational status remained significant. The odds ratios increased by about a third for all categories of surgery when controlling for parental SES in Model 2 compared to Model 1. The effect of surgery on HT was suppressed when SES was not controlled; this result is convergent with what we might have expected knowing that hysterectomy is more common among lower SES women (Kjerulff, Langenberg, and Guzinski 1993), and lower SES women are less likely to use HT.

For Model 3 we added respondent's own educational attainment to the previous model. Overall, the effects of parents' SES and respondent's SES as measured by education on hormone use appeared to be independent of each other. In the next model (Model 4) we added the mental ability measure to examine whether a woman's education was a proxy for her mental ability. The results (Model 4) indicated that ability was not a strong net predictor of hormone use. The effects of parents' SES and respondent's educational attainment remained relatively constant when mental ability was controlled. These findings refuted the hypothesis that differences in mental ability explain the positive association between HT use and educational attainment.

Respondent's occupational status and income were added in Model 5 to examine whether the life course pathway through which parental and respondent SES influence HT use was through respondent's occupational status and earnings. These results (Model 5) indicated that net of parental SES and respondent's education, respondent's occupational status and income were not major independent predictors of HT use.

By contrast, when we added spouse's occupational status and spouse's income to the next model (Model 6), we found that spouse's occupational status was a strong predictor of HT use net of other factors. The odds of using HT among women with husbands employed in a job in the lowest quintile of occupational status were reduced by a factor of 23% in contrast to women with husbands in the highest quintile of occupational status. Controlling spouse's occupational status and income also revealed significant effects of women's own earnings on HT use. Women with no earnings or earnings in the lowest two quintiles were less likely to have used HT than women in the highest quintile of earnings once spouse's SES was controlled.

Model 7 included the variable for net worth in 1993. Lower levels of net worth reduced the odds of hormone use in contrast to the highest net worth category adjusting for other factors. None of the effects for SES variables previously included were changed substantially by the addition of net worth.

Our final model (Model 8) added family variables (i.e., currently married, parity, and age at first birth), menopausal symptoms, health insurance, and health-related behaviors. Adjusting for all other factors, many SES factors continued to predict hormone usage. For women who had surgery, having less educated mothers decreased the odds of HT use. Parent's income during the respondent's high school years retained one significant contrast, such that being middle income vs. high income lowered the odds of HT use. Father's occupation in the lowest and middle quintiles vs. the highest quintile of the distribution decreased the odds of using HT. Among women who had surgery, respondents with educational attainment of some college vs. those with a college degree had increased odds of HT use. Being in the second quintile vs. the highest quintile of own occupational status and being in the lower three-fifths vs. the highest quintile of the income distribution for respondents at age 35 decreased the odds of HT use. Having husbands in any of the four lowest quintiles vs. the highest quintile of the occupational status distribution at age 35 and having net worth less than $200,000 vs. $400,000 or more at age 53-54 decreased the odds of ever using HT.

Numerous biological measures also remained independent determinants of hormone use. Any kind of reproductive surgery increased odds of HT use. Younger ages when periods stopped for nonsurgically menopausal women increased the odds of ever using HT, but younger ages when periods stopped for surgically menopausal women had the opposite effect. Fertility

behavior had trend level effects on HT use: having no children or more than five children and having a first child at age 30 or older reduced the odds of ever using HT. The experience of depression or sleep disturbance (trend effect) associated with menopause increased the odds of HT use. Current smokers compared to never smokers had decreased odds of ever using HT, but former smokers vs. never smokers had increased odds of HT use. Finally, being obese decreased the odds of having ever used hormone therapy.

DISCUSSION AND CONCLUSIONS

Our sample of midlife Wisconsin women has had considerable experience with noncontraceptive hormone therapy. Nearly half of the women had used HT, and of those who had ever used HT, 79% were current users at the time of the study. As expected, we found differences in ever having used HT according to how menstruation ceased (surgically or not) and when menopause took place (Table 3). While both of these factors have been found to vary by SES — lower SES women in the U.S. have more surgery (Kjerulff, Langenberg, and Guzinski 1993) and earlier surgical and non-surgical menopause (Shinberg 1995) than higher SES women — the associations of surgery and menopausal timing with HT use held up even when we controlled a substantial number of SES measures. Furthermore, associations of SES with HT use persisted, net of each other and net of surgery and menopausal timing. We would expect that each of our SES indicators could have stronger observed associations with HT use had we not controlled for surgery experience and age at menstrual period cessation in all of our models.

These are important considerations when comparing our results to other studies. In particular, many epidemiologically-focused studies which examine SES and HT only report the

observed bivariate association of SES and HT and do not simultaneously control other factors, such as menopausal and surgical history, other SES measures, and family structural factors. We also note that SES and HT associations were evident in our sample, which does not include racial and ethnic minority women or women at the lowest level of education. This evidence contributes additional support for the hypothesis of a SES gradient in health behaviors and health (Adler et al. 1993; Marmot, Kogevinas, and Elston 1987).

It is noteworthy that SES and HT associations continued even when controls were introduced for mental ability, health behaviors, and menopausal symptoms. Although this analysis was not designed to be a detailed examination of the all the potential mediators of the SES and HT relationship, we still found that these three factors do not account for the observed associations.

To answer the question, which SES measure is best or is most operative in influencing women's use of HT, we were interested in whether measures derived from a woman's own characteristics would have stronger associations than measures derived from characteristics of the woman's family members. For example, we might have expected that a woman's own occupational status would have a stronger association with HT use than her husband's occupational status. But our findings suggest otherwise. While a woman's own occupational status was associated with HT use when it was the only SES measure included in the model (Table 2, Model 1), when we also controlled other measures of SES (Models 5-7), estimates for her occupational status were reduced in magnitude as well as significance. However, associations of HT use with a woman's husband's occupational status were more robust. While the magnitude

of the estimates for spouse's occupational status did decrease when other measures of SES were controlled, the associations remained considerable and significant (Models 6-8).

This presents an interesting question: holding constant so many other factors (e.g., household income, wealth, a woman's education, menopausal symptoms, health-related behaviors) why are wives of high status men more likely than other women to use HT? While we cannot directly address this question in our current analysis, we can discuss this finding in light of other research. One typical hypothesis is that women in high status families are more intensive and regular users of the health care system, that they engage in better health behaviors, and that HT is one mechanism whereby women in high SES families accomplish a preventive health behavior. Yet our analysis included measures for a number of significant health behaviors and we still found robust effects for husband's occupational status. This casts doubt on the preventive health behaviors explanation.

However, in reviewing the sociohistorical and ideological context in which HT has arisen and been promulgated, a competing hypothesis is suggested. A woman with a high occupational status husband may be motivated to maximize her youthfulness and femininity as an additional indicator of her husband's status. Indeed, the early messages about HT promoted the drugs as promising "eternal beauty and femininity" (MacPherson 1993). While the message of "feminine forever" may not be as boldly brandished today as it was 30 years ago, HT is still promoted as a means to prevent ailments considered characteristic of becoming old and less attractive (Worcester and Whatley 1992). Does a woman married to a higher status man feel more obliged to maintain her youth and femininity for "her man" than a woman married to a lower status man? Is this part of the social exchange a woman consciously or unconsciously makes for having the

advantages of her husband's social status, even if she must undergo some potential health risks to do so?

Our data do not allow definitive answers to these questions. But examining a number of SES measures concurrently and finding the robust relationship between husband's occupational status and HT suggest that when looking for explanatory processes it may be just as important to focus on social factors such as dimensions of the marital relationship and gender ideology as it is to focus on, for example, factors such as financial wherewithal or health insurance. Our findings are also congruent with a social control theory of health behaviors (Umberson 1987; 1992), which suggests that health behaviors are better modeled as a function of both social influence and individual characteristics.

In sum, our results suggest that it is important for researchers to include multiple indicators of SES in studies that attempt to understand the relationship between social factors and women's health. Occupational status of both a woman and her spouse, if she has one, are important measures of SES to examine in addition to her educational attainment, household income, and, if possible, wealth. Our findings regarding the significance of the SES of a woman's parents as well as her husband for her own use of hormone therapy by midlife further highlight the significant contributions of a sociological approach to individual or biomedical understandings of health.

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TABLE 1. Descriptive Statistics for Analysis Variables

Variable	Mean [a]	Std Dev
Ever Hormone Therapy	0.487	(0.50)
Age Periods Stopped:		
under 35	0.065	(0.25)
35-39	0.077	(0.27)
40-42	0.068	(0.25)
43-45	0.076	(0.27)
46-48	0.113	(0.32)
49-51	0.202	(0.40)
52-55	0.085	(0.28)
Not stopped	0.314	(0.46)
Surgery		
Surgery (Old Form)	0.145	(0.35)
Hysterectomy Only	0.055	(0.23)
Hysterectomy w/ Oophorector	0.078	(0.27)
Oophorectomy Only	0.024	(0.15)
No Surgery	0.612	(0.49)
Surgery missing	0.087	(0.28)
Questionnaire Version		
Old Form	0.553	(0.50)
New Form	0.447	(0.50)
Father's Educational Attainment		
Less than high school	0.612	(0.49)
High school	0.249	(0.43)
Some college	0.065	(0.25)
Bachelor's or higher	0.073	(0.26)
Mother's Educational Attainment		
Less than high school	0.520	(0.50)
High school	0.329	(0.47)
Some college	0.092	(0.29)
Bachelor's or higher	0.059	(0.24)
Parent's Income 1957		
Lowest quintile	0.183	(0.39)
Second quintile	0.185	(0.39)
Middle quintile	0.190	(0.39)
Fourth quintile	0.186	(0.39)
Highest quintile	0.192	(0.39)
Missing	0.064	(0.24)
Father's Occupational Status 1957		
Lowest quintile	0.260	(0.44)
Second quintile	0.118	(0.32)
Middle quintile	0.200	(0.40)
Fourth quintile	0.204	(0.40)
Highest quintile	0.209	(0.41)
Missing	0.009	(0.10)

TABLE 1. Descriptive Statistics for Analysis Variables, continued

Variable	Mean [a]	Std Dev
Respondent's Educational Attainment		
High school	0.614	(0.49)
Some college	0.160	(0.37)
Bachelor's or higher	0.226	(0.42)
Mental Ability 1957		
Lowest quintile	0.151	(0.36)
Second quintile	0.193	(0.39)
Middle quintile	0.215	(0.41)
Fourth quintile	0.215	(0.41)
Highest quintile	0.226	(0.42)
Respondent's Occupational Status 1975		
Lowest quintile	0.183	(0.39)
Second quintile	0.158	(0.36)
Middle quintile	0.278	(0.45)
Fourth quintile	0.209	(0.41)
Highest quintile	0.147	(0.35)
Never worked/missing	0.026	(0.16)
Respondent's Income 1974		
No Income	0.418	(0.49)
Lowest quintile	0.107	(0.31)
Second quintile	0.104	(0.31)
Middle quintile	0.111	(0.31)
Fourth quintile	0.101	(0.30)
Highest quintile	0.114	(0.32)
Missing	0.044	(0.21)
Spouse's Occupational Status 1975		
Lowest quintile	0.145	(0.35)
Second quintile	0.185	(0.39)
Middle quintile	0.126	(0.33)
Fourth quintile	0.168	(0.37)
Highest quintile	0.211	(0.41)
Missing	0.165	(0.37)
Spouse's Income 1974		
No Income	0.096	(0.30)
Lowest quintile	0.097	(0.30)
Second quintile	0.181	(0.39)
Middle quintile	0.086	(0.28)
Fourth quintile	0.210	(0.41)
Highest quintile	0.173	(0.38)
Missing	0.156	(0.36)

TABLE 1. Descriptive Statistics for Analysis Variables, continued

Variable	Mean [a]	Std Dev
Net Worth 1993		
less than $5,000	0.087	(0.28)
$5,001-25,000	0.061	(0.24)
$25,001-50,000	0.068	(0.25)
$50,001-100,000	0.193	(0.39)
$100,001-200,000	0.261	(0.44)
$200,001-400,000	0.197	(0.40)
more than $400,000	0.137	(0.34)
Home owner	0.897	(0.30)
Marital Status		
Not Married in 1975	0.154	(0.36)
Currently Married, 1992-93	0.807	(0.39)
Number of Biological Children		
none	0.112	(0.31)
1	0.075	(0.26)
2	0.254	(0.44)
3	0.267	(0.44)
4	0.170	(0.38)
5 or more	0.122	(0.33)
Age at First Birth		
less than 20	0.141	(0.35)
20-21	0.257	(0.44)
22-23	0.214	(0.41)
24-29	0.229	(0.42)
30-54	0.047	(0.21)
Had three children by age 24	0.446	(0.50)
Self-reported Menopausal Symptoms		
Had Bone Pains	0.314	(0.46)
Bone pains missing	0.244	(0.43)
Had Depression	0.413	(0.49)
Depression missing	0.201	(0.40)
Had Hot Flashes	0.763	(0.43)
Hot flashes missing	0.061	(0.24)
Had Night Sweats	0.591	(0.49)
Night sweats missing	0.132	(0.34)
Had Sleep Disturbance	0.539	(0.50)
Sleep disturbance missing	0.164	(0.37)
Health Insurance	0.960	(0.20)
Health-related Behaviors		
Binge drinking in last month	0.064	(0.24)
Binge drinking missing	0.528	(0.50)
Vigorous exercise 3+ times/we	0.120	(0.33)
Vigorous exercise missing	0.032	(0.17)
Currently smoker	0.175	(0.38)
Former smoker	0.298	(0.46)
Never smoker	0.527	(0.50)
Smoking missing	0.019	(0.13)
Underweight (BMI<19)	0.017	(0.13)
Normal weight (19 <= BMI < 2	0.465	(0.50)
Overweight (25<= BMI < 29)	0.261	(0.44)
Obese (BMI >= 29)	0.223	(0.42)
BMI missing	0.035	(0.18)

Source: Wisconsin Longitudinal Study 1957-1993, female respondents (N=3612).

[a] Means for indicator variables are proportions.

TABLE 2. Odds Ratio Estimates for the Effects of Predictors of Having Ever Used Hormone Therapy by Age 53-54

		Odds Ratio Model 1 c	Odds Ratio Model 2	Odds Ratio Model 3	Odds Ratio Model 4	Odds Ratio Model 5	Odds Ratio Model 6	Odds Ratio Model 7	Odds Ratio Model 8
Age periods stopped									
under 35		1.38 *	1.40 *	1.44 *	1.45 *	1.45 *	1.41 *	1.39 *	1.37 +
35-39		1.32 *	1.33 *	1.35 *	1.33 *	1.34 *	1.35 *	1.38 *	1.39 *
40-42		0.83	0.83	0.85	0.86	0.85	0.85	0.86	0.88
43-45		1.08	1.10	1.12	1.12	1.11	1.12	1.14	1.13
46-48		1.08	1.08	1.09	1.09	1.09	1.08	1.10	1.11
49-51	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
52-55		0.98	0.99	1.00	1.01	1.00	1.01	1.02	1.02
age missing (did not stop)		1.18 **	1.19 **	1.18 **	1.18 **	1.19 **	1.18 **	1.18 **	1.18 **
Surgery Type									
No Surgery	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Surgery (old form)		2.36 ***	3.32 ***	3.05 ***	3.06 ***	3.10 ***	3.13 ***	3.19 ***	3.43 ***
Hysterectomy Only		1.83 ***	2.52 ***	2.29 ***	2.28 ***	2.28 ***	2.31 ***	2.36 ***	2.56 ***
Hysterectomy & Ooph.		3.03 ***	4.25 ***	3.90 ***	3.94 ***	3.96 ***	4.01 ***	4.09 ***	4.67 ***
Oophorectomy Only		1.80 ***	2.45 ***	2.25 ***	2.30 ***	2.30 ***	2.31 ***	2.36 ***	2.66 ***
Surgery missing		0.71 ***	0.71 ***	0.71 ***	0.71 ***	0.71 ***	0.71 ***	0.71 ***	0.77 ***
Interaction of Any Surgery with Age periods stopped									
surgery * under 35		0.57 **	0.58 **	0.56 **	0.56 **	0.55 **	0.56 **	0.57 **	0.56 **
surgery * 35-39		0.69 *	0.68 *	0.66 *	0.67 *	0.67 *	0.65 *	0.64 *	0.64 *
surgery * 40-42		1.05	1.03	1.00	1.00	1.01	0.99	0.98	0.95
surgery * 43-45		0.71 *	0.68 *	0.67 *	0.67 *	0.68 *	0.66 *	0.66 *	0.65 *
surgery * 46-48		0.97	0.96	0.95	0.94	0.95	0.94	0.94	0.94
surgery * 49-51	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
surgery * 52-55		0.89	0.85	0.84	0.85	0.85	0.83	0.83	0.88
surgery * age missing		0.69 *	0.68 *	0.69 *	0.70 *	0.69 *	0.68 *	0.70 *	0.68 *
Father's Educational Attainment									
less than high school		0.84 *	1.02	1.05	1.05	1.04	1.06	1.06	1.08
high school only		0.92	1.05	1.07	1.07	1.06	1.07	1.06	1.09
some college		0.87	0.95	0.96	0.97	0.96	0.96	0.97	0.95
bachelor's or higher	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mother's Educational Attainment									
less than high school		0.90	1.01	1.06	1.08	1.08	1.09	1.11	1.06
high school only		0.98	1.03	1.07	1.08	1.08	1.09	1.10	1.05
some college		0.92	0.99	1.01	1.01	1.02	1.03	1.05	1.04
bachelor's or higher	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Interaction of Any Surgery with Mother's Educational Attainment									
surgery * less than high school		0.78	0.78	0.72 +	0.71 +	0.71 +	0.71 +	0.70 +	0.70 +
surgery * high school only		0.65 *	0.65 *	0.60 *	0.59 **	0.59 **	0.59 **	0.59 **	0.60 **
surgery * some college		0.69 +	0.69 +	0.64 +	0.64 +	0.63 *	0.62 *	0.61 *	0.56 *
surgery * bachelor's or higher	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parent's Income 1957									
lowest quintile		0.78 ***	0.88 +	0.90	0.90	0.89 +	0.91	0.91	0.91
second quintile		0.84 **	0.92	0.94	0.94	0.93	0.95	0.95	0.95
middle quintile		0.77 ***	0.82 ***	0.83 **	0.83 **	0.83 **	0.84 **	0.85 *	0.86 *
fourth quintile		0.91	0.95	0.96	0.96	0.96	0.97	0.97	0.96
highest quintile	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parent's income missing		0.85 *	0.92	0.93	0.94	0.93	0.96	0.97	0.98
Father's Occupational Status 1957									
lowest quintile		0.75 ***	0.79 ***	0.80 ***	0.80 ***	0.80 ***	0.81 ***	0.80 ***	0.81 **
second quintile		0.85 *	0.88 +	0.89	0.90	0.90	0.90	0.90	0.91
middle quintile		0.83 **	0.86 *	0.88 *	0.88 *	0.88 *	0.88 +	0.88 *	0.88 +
fourth quintile		0.93	0.95	0.96	0.97	0.97	0.97	0.96	0.99
highest quintile	b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Father's occupation missing		0.74	0.78	0.79	0.80	0.79	0.78	0.77	0.79
R's Educational Attainment									
high school only		0.82 ***		0.86 **	0.89 *	0.94	0.96	0.97	1.00
some college		0.89 +		0.90	0.92	0.95	0.96	0.97	1.01
bachelor's or higher	b	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Interaction of Any Surgery with R's Educational Attainment									
surgery * high school only		1.17		1.19	1.20 +	1.20 +	1.21 +	1.18	1.15
surgery * some college		1.43 **		1.51 **	1.51 **	1.51 **	1.51 **	1.50 **	1.42 *
surgery * bachelor's or higher	b	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Mental Ability 1957									
lowest quintile		0.79 ***			0.85 *	0.86 *	0.87 *	0.89 +	0.87 *
second quintile		0.89 *			0.94	0.95	0.96	0.97	0.95
middle quintile		0.91 +			0.95	0.95	0.97	0.98	0.95
fourth quintile		1.01			1.05	1.05	1.05	1.06	1.05
highest quintile	b	1.00			1.00	1.00	1.00	1.00	1.00
R's Occupational Status 1975									
lowest quintile		0.82 **				0.96	1.01	1.02	0.98
second quintile		0.78 ***				0.87 +	0.88 +	0.88 +	0.85 *
middle quintile		0.87 *				0.94	0.95	0.95	0.93
fourth quintile		0.89 +				0.94	0.94	0.94	0.90
highest quintile	b	1.00				1.00	1.00	1.00	1.00
Never worked		0.94				0.99	0.98	0.96	0.91
R's Income 1974									
$0 Income		0.86 *				0.90	0.83 **	0.85 *	0.84 *
lowest quintile		0.85 *				0.89	0.82 *	0.84 *	0.81 *
second quintile		0.86 *				0.92	0.85 *	0.86 +	0.83 *
middle quintile		0.89				0.96	0.90	0.92	0.87
fourth quintile		0.91				0.98	0.95	0.96	0.93
highest quintile	b	1.00				1.00	1.00	1.00	1.00
R's Income Missing		0.92				0.97	1.04	1.03	0.95

TABLE 2. Odds Ratio Estimates for the Effects of Predictors of Having Ever Used Hormone Therapy by Age 53-54, continued

		Odds Ratio Model 1 c	Odds Ratio Model 2	Odds Ratio Model 3	Odds Ratio Model 4	Odds Ratio Model 5	Odds Ratio Model 6	Odds Ratio Model 7	Odds Ratio Model 8
Spouse's Occupational Status 1975									
lowest quintile		0.69 ***					0.77 ***	0.78 ***	0.81 **
second quintile		0.76 ***					0.82 **	0.83 **	0.85 **
middle quintile		0.79 ***					0.85 *	0.87 *	0.88 +
fourth quintile		0.81 ***					0.83 **	0.84 **	0.83 **
highest quintile	b	1.00					1.00	1.00	1.00
Spouse's job missing		0.78					0.82	0.80	0.85
Not Married in 1975	a	1.02					1.24	1.32	1.56
Spouse's Income 1974									
$0 Income		0.81 **					0.91	0.96	0.95
lowest quintile		0.78 ***					0.90	0.97	0.98
second quintile		0.83 **					0.94	1.01	1.00
middle quintile		0.89					0.99	1.04	1.02
fourth quintile		0.93					1.00	1.04	1.02
highest quintile	b	1.00					1.00	1.00	1.00
Spouse's Income Missing		0.64					0.69	0.74	0.63
Net Worth 1993									
less than $5,000		0.70 ***						0.83 *	0.88
$5,001-25,000		0.76 **						0.90	0.95
$25,001-50,000		0.75 ***						0.85 +	0.88
$50,001-100,000		0.67 ***						0.75 ***	0.76 ***
$100,001-200,000		0.76 ***						0.82 **	0.82 **
$200,001-400,000		0.87 *						0.90	0.91
more than $400,000	b	1.00						1.00	1.00
Home owner		1.16 *						1.13 +	1.10
Currently married		1.10 *							1.07
Number of biological children									
0		0.87							0.81 *
1	b	1.00							1.00
2		1.08							1.06
3		0.99							0.99
4		0.99							1.01
5		0.77 **							0.82 +
Age at first birth									
less than 20	b	1.00							1.00
20-21		0.92							0.91
22-23		0.98							0.92
24-29		0.96							0.91
30 or older		0.84 +							0.80 *
Interaction of parity with age									
Had 3 children by age 24		0.99							0.99
Under 3 children by age 24	b	1.00							1.00
Reported Symptoms									
Bone pains		0.93							0.99
No bone pains	b	1.00							1.00
Bone pains missing		1.05							1.05
Depression		1.19 ***							1.25 ***
No depression	b	1.00							1.00
Depression missing		0.96							0.98
Hot flashes		1.01							1.01
No hot flashes	b	1.00							1.00
Hot flashes missing		0.98							0.94
Night sweats		1.06							1.06
No night sweats	b	1.00							1.00
Night sweats missing		0.93							0.95
Sleep distrubances		1.15 **							1.11 +
No sleep disturbances	b	1.00							1.00
Sleep disturbances missing		1.05							1.04
Health Insurance Status									
Has Health Insurance		1.13							1.02
None	b	1.00							1.00
Health-related Behaviors									
Binge drinking in last month		0.98							1.05
No binge drinking in last month	b	1.00							1.00
Binge drinking missing		0.97							1.00
Vigorous exercise 3+ times/week		1.06							1.04
No vigorous exercise	b	1.00							1.00
Vigorous exercise missing		0.82 +							0.81 +
Currently smoker		0.91 +							0.89 *
Former smoker		1.22 ***							1.17 ***
Never smoker	b	1.00							1.00
Smoking missing		1.25							1.37 +
Underweight (BMI<19)		0.90							0.90
Normal weight (19 <= BMI < 25)	b	1.00							1.00
Overweight (25<= BMI < 29)		0.95							0.96
Obese (BMI >= 29)		0.75 ***							0.77 ***
BMI missing		0.79 *							0.78 *
-2 Log Likelihood			4548.82	4532.44	4521.04	4510.78	4474.58	4448.49	4294.28

Source: Wisconsin Longitudinal Study 1957-1993, female respondents (N=3612).

a Not married in 1975 also appears in the "bivariate" model for spousal income with a non-statistically significant estimated odds ratio, 1.34.

b reference category

c Results for each panel of estimates in column labelled Model 1 are adjusted for Age periods stopped and Surgery type.

+ p<= 0.10 * p<= 0.05 ** p<= 0.01 *** p<= 0.001 (two-tailed tests)

TABLE 3. Odds Ratio Estimates for the Joint Effects of Surgery Type and Age Periods Stopped on Having Ever Used Hormone Therapy By Age 53-54 [a]

Age Periods Stopped	No Surgery	Surgery Old Form	Hyst. Only [d]	Hyst.+ Ooph. [e]	Ooph. Only [f]
<35	1.38	1.86	1.44	2.38	1.42
35-39	1.32	2.15	1.67	2.76	1.64
40-42	0.83 [c]	2.06	1.59	2.64	1.57
43-45	1.08 [c]	1.81	1.40	2.32	1.38
46-48	1.08 [c]	2.47	1.92	3.17	1.89
49-51	1.00 [b]	2.36	1.83	3.03	1.80
52-55	0.98 [c]	2.06	1.60	2.64	1.57
Not Stopped	1.18	1.92	1.49	2.47	1.47

[a] Odds ratios were calculated using estimates obtained from a multivariate logistic regression of hormone therapy on age at last period, surgery type and the interaction of age at last period with surgery type (see Table 2, Model 1, panel 1).

[b] Reference category.

[c] Not significantly different from reference category.

[d] Hysterectomy only.

[e] Hysterectomy and oophorectomy.

[f] Oophorectomy

APPENDIX. Pearson Zero-Order Correlation Coefficients for Analysis Variables (N=3612)

	Hormone Therapy	Age Periods Stopped	Periods Not Stopped	Ever Any Surgery	Surgery (Old Form)	Hysterectomy Only	Hysterectomy w/Ooph.	Oophorectomy Only	New Form of Questionnaire	Father's Education
Age Periods Stopped	-0.152									
Periods Not Stopped	-0.062	-								
Ever Any Surgery	0.291	-0.476	-0.344							
Surgery (old form)	0.189	-0.261	-0.219	0.626						
Hysterectomy Only	0.053	-0.259	-0.132	0.367	-0.099					
Hysterectomy w/Oophorectom	0.186	-0.150	-0.150	0.442	-0.119	-0.070				
Oophorectomy Only	0.035	-0.092	-0.071	0.239	-0.065	-0.038	-0.046			
New Form of Questionnaire	0.050	0.028	-0.079	0.097	-0.369	0.268	0.323	0.175		
Father's Educational Attainmer	0.051	0.053	0.030	-0.032	-0.055	0.010	0.018	-0.018	0.035	
Mother's Educational Attainme	0.023	0.027	0.033	-0.008	-0.007	0.010	0.002	-0.025	0.001	0.515
Parents' Income 1957	0.045	0.001	0.030	-0.032	-0.030	-0.004	-0.016	0.007	0.009	0.296
Father's Occ. Status 1957	0.075	0.045	0.025	-0.027	-0.028	-0.003	-0.004	-0.007	0.018	0.512
R's Educational Attainment	0.055	0.082	0.074	-0.040	-0.025	-0.010	-0.015	-0.023	0.019	0.323
Mental Ability 1957	0.059	0.063	0.077	-0.042	-0.014	-0.003	-0.025	-0.047	0.015	0.242
R's Occupational Status 1975	0.047	0.076	0.061	-0.042	-0.027	-0.029	-0.016	0.005	0.012	0.224
Never Worked by 1975	0.018	0.004	-0.006	0.025	-0.003	0.029	0.024	-0.003	0.035	0.049
R's Income 1974	0.042	-0.038	-0.018	0.012	-0.014	0.006	0.026	0.016	0.039	0.010
Spouse's Occ. Status 1975	0.109	0.049	0.029	-0.029	-0.031	-0.014	0.013	-0.016	0.007	0.251
Not Married, 1975	-0.013	-0.001	-0.042	-0.002	-0.077	0.029	0.054	0.033	0.161	0.038
Spouse's Income 1974	0.082	0.019	-0.015	-0.008	0.018	-0.040	-0.006	0.003	0.000	0.140
Net Worth 1993	0.012	-0.018	0.014	-0.006	-0.016	-0.007	0.006	0.019	-0.016	0.018
Home Owner	0.041	-0.003	0.024	-0.001	0.018	0.002	-0.010	-0.030	-0.035	0.001
Currently Married, 1992-93	0.039	-0.006	0.031	0.007	0.024	-0.008	-0.012	-0.001	-0.058	-0.032
Number of Biological Children	-0.052	0.019	0.014	-0.015	-0.003	0.014	-0.028	-0.009	-0.041	-0.094
Age at First Birth	0.005	0.049	0.038	-0.038	-0.011	0.004	-0.044	-0.018	-0.039	0.015
Bone Pains	0.023	0.023	0.006	0.007	0.048	-0.034	-0.029	0.014	-0.058	-0.056
Depression	0.100	-0.022	-0.009	0.001	0.023	-0.002	-0.031	0.008	-0.018	-0.035
Hot Flashes	0.042	0.030	-0.079	-0.050	-0.002	0.011	-0.079	-0.023	-0.033	-0.025
Night Sweats	0.062	0.033	-0.044	-0.049	-0.030	0.007	-0.040	-0.020	0.001	-0.023
Sleep Disturbance	0.078	0.082	0.046	-0.067	-0.016	-0.021	-0.061	-0.025	-0.029	-0.042
Health Insurance	0.038	-0.015	0.020	0.039	0.040	-0.013	0.023	0.005	-0.029	-0.012
Binge Drinking	-0.020	0.024	-0.052	-0.010	0.013	-0.025	-0.021	0.013	-0.045	-0.068
Vigorous Exercise	0.034	0.014	0.021	0.001	0.024	0.006	-0.014	-0.035	0.010	0.061
Current Smoker	-0.061	-0.034	-0.095	-0.020	-0.039	0.009	-0.015	0.045	0.037	-0.027
Former Smoker	0.106	-0.062	-0.010	0.044	0.051	0.025	-0.003	-0.017	-0.018	0.071
Body Mass Index	-0.078	-0.019	-0.011	0.054	0.042	0.012	0.013	0.024	-0.008	-0.096

APPENDIX. Pearson Zero-Order Correlation Coefficients for Analysis Variables, continued.

	Mother's Education	Parents' Income	Father's Occ. Status	R's Education	Mental Ability	R's Occ. Status	Never Worked	R's Income	Spouse's Occ. Status	Not Married 1975	Spouse's Income
Parents' Income 1957	0.267										
Father's Occ. Status 1957	0.355	0.412									
R's Educational Attainment	0.317	0.264	0.309								
Mental Ability 1957	0.251	0.166	0.222	0.409							
R's Occupational Status 1975	0.198	0.160	0.220	0.460	0.343						
Never Worked by 1975	0.057	0.029	0.035	0.116	0.026	-					
R's Income 1974	0.052	-0.014	0.002	0.217	0.145	0.209	-0.098				
Spouse's Occ. Status 1975	0.198	0.217	0.253	0.367	0.227	0.303	0.060	-0.030			
Not Married, 1975	0.038	0.012	0.024	0.133	0.029	0.097	0.036	0.393	-		
Spouse's Income 1974	0.130	0.143	0.155	0.151	0.143	0.157	0.055	-0.027	0.315	0.001	
Net Worth 1993	0.044	0.070	0.030	0.031	0.028	0.022	0.004	-0.005	0.045	-0.020	0.112
Home Owner	-0.008	0.014	-0.007	-0.014	0.026	0.020	0.004	-0.070	0.030	-0.221	0.012
Currently Married, 1992-93	-0.063	-0.046	-0.044	-0.143	-0.070	-0.118	-0.008	-0.237	-0.027	-0.407	-0.027
Number of Biological Children	-0.094	-0.038	-0.087	-0.224	-0.087	-0.208	0.063	-0.326	-0.144	-0.285	-0.027
Age at First Birth	-0.001	0.014	0.000	-0.057	0.013	-0.054	0.019	-0.336	0.061	-0.354	0.033
Bone Pains	-0.048	-0.035	-0.030	-0.050	-0.053	-0.033	-0.002	-0.052	-0.061	-0.021	-0.018
Depression	-0.053	-0.026	-0.030	-0.039	-0.063	-0.068	-0.003	-0.031	-0.043	0.005	-0.033
Hot Flashes	-0.030	0.000	0.005	-0.074	-0.058	-0.043	-0.007	-0.021	-0.019	-0.042	0.004
Night Sweats	-0.033	-0.019	-0.014	-0.045	-0.049	-0.034	0.016	-0.016	-0.007	-0.045	-0.008
Sleep Disturbance	-0.028	-0.005	-0.025	-0.027	-0.018	-0.010	0.029	-0.045	0.015	-0.036	0.007
Health Insurance	-0.010	-0.001	0.015	0.025	0.040	0.047	0.016	0.002	0.043	-0.061	0.034
Binge Drinking	-0.074	-0.028	-0.041	-0.131	-0.070	-0.118	-0.005	-0.004	-0.139	-0.043	-0.022
Vigorous Exercise	0.047	0.068	0.067	0.086	0.012	0.037	0.030	0.004	0.083	-0.013	0.077
Current Smoker	0.012	-0.017	0.003	-0.089	-0.036	-0.041	-0.017	0.045	-0.018	0.025	0.003
Former Smoker	0.027	0.090	0.081	0.039	0.051	0.006	0.021	0.009	0.053	0.031	0.045
Body Mass Index	-0.056	-0.063	-0.067	-0.104	-0.018	-0.120	-0.030	-0.004	-0.186	0.007	-0.112

	Net Worth	Home Owner	Currently Married	Number of Bio. Children	Age at First Birth	Bone Pains	Depression	Hot Flashes	Night Sweats	Sleep Disturbance	Health Insurance	Binge Drinking	Vigorous Exercise	Current Smoker	Former Smoker
Home Owner	0.017														
Currently Married, 1992-93	0.039	0.364													
Number of Biological Children	-0.002	0.057	0.210												
Age at First Birth	-0.021	0.122	0.262	0.398											
Bone Pains	0.008	0.006	0.044	0.043	0.020										
Depression	-0.012	-0.017	0.024	0.017	-0.001	0.337									
Hot Flashes	-0.015	0.033	0.070	0.020	0.000	0.190	0.241								
Night Sweats	0.010	0.012	0.048	0.013	0.011	0.236	0.270	0.510							
Sleep Disturbance	0.024	0.036	0.062	0.022	0.019	0.323	0.405	0.336	0.429						
Health Insurance	0.030	0.199	0.150	-0.006	0.024	0.008	0.011	-0.008	-0.012	0.043					
Binge Drinking	0.003	0.007	0.001	0.047	0.008	0.002	-0.017	-0.008	0.028	-0.023	-0.049				
Vigorous Exercise	0.058	-0.003	0.003	-0.029	-0.012	-0.040	-0.025	-0.030	-0.011	-0.006	-0.015	-0.044			
Current Smoker	-0.022	-0.047	-0.077	0.002	-0.016	-0.031	-0.001	0.048	0.045	-0.025	-0.055	0.131	-0.080		
Former Smoker	-0.011	0.015	-0.019	-0.028	-0.004	0.010	0.040	0.009	0.047	0.035	0.023	0.057	0.026	-0.307	
Body Mass Index	-0.033	-0.018	0.006	0.081	-0.026	0.156	0.087	0.023	-0.004	0.011	0.015	0.021	-0.121	-0.084	0.010

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