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Higher-status occupations and breast cancer: A life-course stress approach

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ABSTRACT

Using the 1957–2011 data from 3682 White non-Hispanic women (297 incident breast cancer cases) in the Wisconsin Longitudinal Study, United States, we explore the effect of occupation in 1975 (at age 36) on breast cancer incidence up to age 72. Our study is motivated by the paradoxical association between higher-status occupations and elevated breast cancer risk, which presents a challenge to the consistent health advantage of higher social class. We found that women in professional occupations had 72122% and women in managerial occupations had 57–89% higher risk of a breast cancer diagnosis than housewives and women in lower-status occupations. We explored an estrogen-related pathway (reproductive history, health behaviors, and life-course estrogen cycle) as well as a social stress pathway (occupational experiences) as potential explanations for the effect of higher-status occupations. The elevated risk of breast cancer among professional women was partly explained by estrogen-related variables but remained large and statistically significant. The association between managerial occupations and breast cancer incidence was fully explained by job authority defined as control over others' work. Exercising job authority was related to higher breast cancer risk (HR = 1.57, 95% CI: 1.12, 2.18), especially with longer duration of holding the professional/managerial job. We suggest that the assertion of job authority by women in the 1970s involved stressful interpersonal experiences that may have promoted breast cancer development via prolonged dysregulation of the glucocorticoid system and exposure of the breast tissue to adverse effects of chronically elevated cortisol. Our study emphasizes complex biosocial pathways through which women's gendered occupational experiences become embodied and drive forward physiological repercussions.

Introduction

Lower morbidity associated with higher socioeconomic status (SES) is one of the most consistent findings in social epidemiology (Elo, 2009), yet one paradox persists: the elevated risk of breast cancer among women holding higher-status occupations. Higher-status occupations are defined as professional and managerial occupations that are at the top of the U.S. Census classification system and are characterized by the highest levels of socioeconomic prestige indexes (Stevens & Cho, 1985). Women in professional and managerial occupations have 1.4–2.0 times greater risk of breast cancer diagnosis than women in lower-status occupations (Danø, Andersen, Ewertz, Petersen, & Lynge, 2003; Larsen et al., 2011; Pukkala et al., 2009). Moreover, the effect of higher-status occupations on breast cancer risk is only partly explained by reproductive histories, exogenous hormones, health behaviors, and socioeconomic differences in screening mammography (Danø et al., 2004; Larsen et al., 2011; Sprague, Trentham-Dietz, & Burnside, 2010).

Because women with more socioeconomic resources are advantaged in terms of nearly all other health outcomes (Elo, 2009), the breast cancer risk associated with higher-status occupations presents a paradox that calls for particular attention to this disease. Existing research, however, is limited in several respects. Most studies were based on cross-sectional analyses of breast cancer rates across occupations or had a relatively short follow-up that did not capture the long latency period of breast cancer. Further, past studies considered a limited set of mediators potentially linking occupation to breast cancer and focused overwhelmingly on estrogen-related pathways, such as reproductive histories. Because

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estrogen-related factors explain only part of the excess risk for breast cancer associated with higher-status occupations (Danø et al., 2004; Larsen et al., 2011), researchers need to continue the search for explanatory mechanisms, especially psychosocial stressors to which women in higher-status occupations are exposed because of the structural and cultural constraints of a gendered workplace (Ridgeway, 2001).

Using the 1957–2011 data from the Wisconsin Longitudinal Study (WLS), we explore the effect of occupation in 1975 (at age 36) on breast cancer incidence up to age 72. Our study extends previous research in several important ways. A long follow-up captures a time lag between exposures in higher-status occupation and breast cancer onset. Because the WLS includes women's lifetime occupational histories, we explore not only the effect of occupation at a given time point but also the effect of the duration of occupational exposures. In addition, the WLS collected extensive information on job characteristics in 1975, which enables us to uncover specific aspects of higher-status occupations that are related to breast cancer.

Life-course mechanisms linking occupation and breast cancer

Biopsychosocial factors affecting the development of chronic conditions operate across the life course (Ben-Shlomo & Kuh, 2002). Consequently, the etiology of chronic diseases cannot be fully understood without incorporating earlier circumstances, in particular, exposures to health-related stressors (Pearlin, Schieman, Fazio, & Meersman, 2005). We adopt a life-course approach and explore how occupational experiences in young adulthood are related to breast cancer incidence over a 36-year period. To understand this relationship, we focus on two mechanisms – estrogen-related processes and social stress – that are not mutually exclusive and may supplement each other in explaining the effect of occupation.

A traditional approach to the etiology of breast cancer focuses on ovarian hormones, especially, estrogen (Kelsey, 1993). Influences that increase cumulative lifetime exposure to estrogen are considered important risk factors for breast cancer. Among these factors are reproductive history (later age at first birth and lower parity), health behaviors (regular alcohol use, sedentary lifestyle, and obesity for post-menopausal cancers), and components of the life-course estrogen cycle, including early age at menarche, late age at menopause, and hormone replacement therapy (Boyle & Boffetta, 2009; Friedenreich & Cust, 2008; Kelsey, 1993; Reeves et al., 2007; Vogel, 2008). Empirical studies highlight the importance of adopting a life-course approach to estrogen-related factors. For example, obesity increases the risk of post-menopausal breast cancer while decreasing the risk of pre-menopausal breast cancer (Reeves et al., 2007). Moreover, adiposity in early life has a long-term effect on breast cancer risk and is *inversely* related to the disease risk decades later (Sangaramoorthy, Phipps, Horn-Ross, Koo, & John, 2011).

Recently researchers have become interested in the social stress pathway to breast cancer and explored the prolonged exposure to steroid hormones produced by the adrenal cortex – glucocorticoids (GCs) – as an underlying physiological mechanism (Antonova, Aronson, & Mueller, 2011; McClintok et al., 2005). The effect of chronically elevated GCs, such as cortisol, is mediated by the activation of the glucocorticoid receptor (GR). GR is ubiquitously expressed in human breast tissue both in normal epithelium and cancerous cells (Antonova et al., 2011; McClintok et al., 2005). GR activation can directly promote mammary cell proliferation and inhibit apoptosis, which increases the risk of malignant transformations (Hermes et al., 2009).

Our study focuses on a cohort of women for whom particular types of employment presented exposure to a range of daily stressors. Participants in the WLS were born in 1939, launched their work and family trajectories in the 1950s and 1960s, and were the first cohort of White educated women to join the labor force in fairly large numbers (U.S. Census, 1970). U.S. women in professional and managerial occupations in the 1960s and 1970s faced socially structured stressors associated with gender stratification and cultural scripts of gender-appropriate behaviors (Kanter, 1977; Roussell, 1974). We consider the stress of female authority in managerial occupations and the stress of caring in professional occupations as gendered stress processes that can increase breast cancer risk via prolonged exposure of breast tissue to the anti-apoptotic and proliferative effects of chronically elevated cortisol.

The stress of female authority

Women of the WLS cohort who entered managerial occupations in the 1970s experienced prejudice and discrimination due to prevailing cultural attitudes that men made better leaders than women (Bartol, 1974; Kanter, 1977; Roussell, 1974). Neither men nor women preferred to work for a woman because women were seen as "temperamentally unfit" for management, which was consistent with the cultural stereotype of the woman boss as petty, controlling, and interfering (Bartol, 1974; Kanter, 1977). Roussell (1974) showed that high school departments headed by men were perceived as high in morale, whereas departments headed by women were perceived as high in "hindrance" – an indicator that the leader was seen as getting in the way of subordinates' interests. Women in authority positions across a range of workplace settings found themselves socially isolated from subordinates and superiors and were more likely than men to report lack of communication and support from superiors and co-workers (Kanter, 1977; Roussell, 1974). Taken together, these findings suggest that authority positions exposed women to interpersonal tension and negative social interactions in the workplace (Korabik, 1995; Roussell, 1974).

The stress of caring

Traditional gender expectations in the 1950s and 1960s constrained career choices of highly educated women to primarily gender-appropriate areas, mostly teaching and nursing. In the U.S. in 1970, 25% of all professional women were nurses and 39% were teachers (U.S. Census, 1970). The proportions in our study are very similar, with 31% of professional women employed as nurses and 39% as teachers in 1975. Employees in caring occupations are required to act in their clients' best interests and work in close contact with care recipients (Barron & West, 2007). Many workers feel responsible for clients' well-being, which may lead to emotional and physical exhaustion, distress, and the inability to withdraw from work obligations (Barron & West, 2007). Moreover, workers in caring occupations perform emotional labor, which involves an expression of empathy and comfort as well as the suppression of negative feelings (Barron & West, 2007; Hochschild, 1983). Not only is emotional labor one of the major causes of occupational stress (Pugliesi, 1999), but also women are more psychologically and physically vulnerable than men to the adverse consequences of emotional labor and suppression (Barron & West, 2007).

In sum, the central argument of our study is that, in addition to estrogen-related factors, higher incidence of breast cancer among higher-status women may be explained by gendered occupational experiences. To evaluate the salience of the social stress pathway, we explore (a) whether women in professional and managerial occupations at age 36 had a higher breast cancer risk over the next 36 years relative to women in lower-status occupations and housewives, (b) whether the risk associated with higher-status