Social Science & Medicine 156 (2016) 55–63

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Influence of neighborhood-level factors on social support in early-stage breast cancer patients and controls

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ARTICLE INFO

Article history:
Received 9 June 2015
Received in revised form
4 March 2016
Accepted 15 March 2016
Available online 17 March 2016

Keywords:
Breast cancer
Perceived social support
Neighborhood socioeconomic deprivation
Health disparities
Longitudinal cohort study

ABSTRACT

Rationale: Low social support has been linked to negative health outcomes in breast cancer patients.
Objective: We examined associations between perceived social support, neighborhood socioeconomic deprivation, and neighborhood-level social support in early-stage breast cancer patients and controls.
Methods: This two-year longitudinal study in the United States included information collected from telephone interviews and clinical records of 541 early-stage patients and 542 controls recruited from 2003 to 2007. Social support was assessed using the Medical Outcomes Study Social Support Survey (MOS-SS). Residential addresses were geocoded and used to develop measures including neighborhood social support (based on MOS-SS scores from nearby controls) and neighborhood socioeconomic deprivation (a composite index of census tract characteristics). Latent trajectory models were used to determine effects of neighborhood conditions on the stable (intercept) and changing (slope) aspects of social support.
Results: In a model with only neighborhood variables, greater socioeconomic deprivation was associated with patients' lower stable social support (standardized estimate = −0.12, $p = 0.027$); neighborhood-level social support was associated with social support change (standardized estimate = 0.17, $p = 0.046$). After adding individual-level covariates, there were no direct neighborhood effects on social support. In patients, neighborhood socioeconomic deprivation was associated with support indirectly through marriage, insurance status, negative affect, and general health. In controls, neighborhood socioeconomic deprivation was associated with support indirectly through marriage ($p < 0.05$).
Conclusion: Indirect effects of neighborhood socioeconomic deprivation on social support differed in patients and controls. Psychosocial and neighborhood interventions may help patients with low social support, particularly patients without partnered relationships in deprived areas.

1. Introduction

Social support has been recognized as an important determinant of morbidity and mortality in both the general population (Galea et al., 2011) and in cancer patients (Pinquart and Duberstein, 2010). Although social support's effects on health have been hypothesized to be mediated by mental health pathways, researchers have found evidence of direct physiological effects of social support through the endocrine, cardiovascular, and immune systems (Uchino et al., 2012; Umberson and Montez, 2010).

Social support plays a key role in quality of life and other outcomes following breast cancer diagnosis and treatment (Courtens et al., 1996; Epplein et al., 2011). Low social support at the time of breast cancer diagnosis and initial treatment has been linked to the development of anxiety and depression following diagnosis (Hill et al., 2011; Patten et al., 2010; Schroevers et al., 2003). Higher levels of social support have been associated with better subsequent physical health (Ganz et al., 2003), lower levels of distress (Andreu et al., 2011), decreased risk of recurrence (Epplein et al., 2011), and longer survival (Epplein et al., 2011; Kroenke et al.,

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http://dx.doi.org/10.1016/j.socscimed.2016.03.023
0277-9536/

2013; Pinquart and Duberstein, 2010; Soler-Vila et al., 2003). Although social support at the time of diagnosis may be protective, the literature suggests that support tends to decrease over time (Bloom and Kessler, 1994; Courtens et al., 1996; Den Oudsten et al., 2010) and that women with a greater decrease have worse psychosocial outcomes (Thompson et al., 2013).

Although social support is often measured at the individual level, social support by definition involves interaction between people, often living in close proximity to one another. Healthy People 2020, the blueprint of health goals for the United States, asserts, "Understanding the relationship between how population groups experience 'place' and the impact of 'place' on health is fundamental to the social determinants of health—including both social and physical determinants" (U.S. Department of Health and Human Services, 2014).

Residential neighborhoods have both direct and indirect effects on health (Adler and Rehkopf, 2008; Macintyre and Ellaway, 2003; Robert, 1999b) and may provide both *social support* and *social capital* (Bernard et al., 2007). Social support is a term used to encompass functions provided by others in order to assist someone (e.g. emotional support) (Thoits, 2011), whereas the term social capital refers to social networks and the generalized norms of trust and reciprocity held by the people within such networks (Putnam, 2001). Although social support is conceptually related to social capital, social capital has both individual and collective properties, including the dimension of the collective efficacy of a group (Putnam, 2001). Social capital may affect the social support available to individuals, with places with lower levels of social capital offering fewer opportunities for individuals to develop supportive relationships (Taylor et al., 1997). Informal resources such as social support that need to be accessed frequently may be especially affected by physical proximity, and one of the posited pathways through which a neighborhood's built environment may affect health is through providing places and opportunities for social interaction (Bernard et al., 2007). Neighborhood effects on factors such as social support may vary by population group or health outcomes (Macintyre and Ellaway, 2003). In addition to these social factors, socioeconomic deprivation at the neighborhood level may also affect general health (Malmstrom et al., 1999; Robert, 1999a). A longitudinal study of initially healthy men and women found that neighborhood socioeconomic deprivation was associated with higher overall mortality and marginally higher cancer-related mortality (Major et al., 2010).

The effects of neighborhood-level characteristics on cancer-related outcomes—including incidence, tumor characteristics, treatment, survivorship, and mortality—also have been assessed (Gomez et al., 2015). Research describing neighborhood-level characteristics has focused largely on racial/ethnic composition and socioeconomic conditions at the neighborhood level (Gomez et al., 2015). In breast cancer patients, low neighborhood socioeconomic status (SES) predicts worse all-cause and non-breast-cancer-specific survival above and beyond the effects of individual SES (Lian et al., 2014); these associations may, however, vary by race/ethnicity (Shariff-Marco et al., 2014). African American women with breast cancer living in metropolitan areas with higher levels of racial segregation are at increased risk of mortality from breast cancer compared to White women living in those same metropolitan areas (Russell et al., 2012). In addition, breast cancer patients living in census tracts with a high risk of home foreclosure reported worse self-rated health than women living in areas with low foreclosure risk; this association was explained by lower income, lower physical activity levels, and worse perceived neighborhood conditions (Schootman et al., 2012). Neighborhood characteristics also may affect health behaviors. Breast cancer survivors living near alcohol outlets (retail and restaurants) were more likely to consume alcohol excessively compared to survivors living farther away (Schootman et al., 2013).

Little is known, however, about how such neighborhood factors affect trajectories of social support over time in breast cancer patients. Our prior latent trajectory analysis of change in perceived social support in early-stage breast cancer patients and women without breast cancer (age-matched controls) in a Midwestern metropolitan area found that marital status and negative affect (a latent variable derived from anxiety and depression scores) were associated with the stable level of perceived social support over time in both patients and controls. Specifically, we found that married women and women with lower negative affect consistently reported higher levels of social support at four separate interviews conducted over two years (Thompson et al., 2013). Strikingly, we found in patients that being African American was linked both to higher stable levels of social support *and* a steeper drop in social support (slope) over the two-year study period following a breast cancer diagnosis. Race may, however, be a proxy for other variables linked to health, such as neighborhood of residence (LaVeist et al., 2011).

The current study was designed to examine how neighborhood factors affect social support. We build on prior analyses that focused solely on individual characteristics (Thompson et al., 2013) by adding a new dimension: neighborhood context. Using geocoded residential addresses, we developed neighborhood measures of both social support and socioeconomic deprivation that would allow us to examine the effects of the neighborhood context on change in social support. First, we determined whether neighborhood characteristics, including neighborhood-level social support and neighborhood socioeconomic deprivation, would predict the slope and intercept of individual-level perceived social support in breast cancer patients. Second, we examined these same neighborhood variables as predictors of the slope and intercept of individual-level perceived social support in patients after adjusting for individual-level variables. Next, we explored the indirect effects of neighborhood-level variables on individual-level perceived social support through the individual-level variables in patients. Finally, we determined whether the indirect effects for neighborhood variables were the same for patients and controls.

We hypothesized that lower neighborhood-level social support and higher neighborhood socioeconomic deprivation would be associated with a lower intercept and steeper slope of social support in patients, and that these independent effects would hold after adjusting for individual-level variables. We previously found that controls exhibited stable levels of individual-level perceived social support over time (Thompson et al., 2013) and therefore did not believe that neighborhood variables would affect slope in controls. Thus, we also hypothesized that higher levels of neighborhood socioeconomic deprivation would predict lower intercept of individual-level social support in controls.

2. Methods

Between October 2003 and June 2007, we prospectively identified patients and controls aged 40 and older (i.e., the age then recommended for screening mammography (American Cancer Society, 2014)) from two university hospitals in a Midwestern metropolitan area for a longitudinal quality-of-life study. Patients with newly diagnosed with ductal carcinoma *in situ* (DCIS) or early-stage (I and IIA) invasive breast cancer confirmed by surgical pathology following definitive treatment surgery (lumpectomy or mastectomy) were eligible to participate. We concurrently recruited controls, matched to patients by age group (40–49, 50–69, ≥70), following a normal/benign screening mammogram from one of the hospital's cancer screening centers. After obtaining