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Working with cancer: health and employment among cancer survivors

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ABSTRACT

Purpose: Cancer affects a growing proportion of US workers. Factors contributing to whether they continue or return to work after cancer diagnosis include: age, physical and mental health, health insurance, education, and cancer site. The purpose of this study was to assess the complex relationships between health indicators and employment status for adult cancer survivors.

Methods: We analyzed pooled data from the 1997–2012 US National Health Interview Survey (NHIS). Our sample included adults with a self-reported physician diagnosis of cancer ($n = 24{,}810$) and adults with no cancer history ($n = 382{,}837$). Using structural equation modeling (SEM), we evaluated the relationship between sociodemographic factors, cancer site, and physical and mental health indicators on the overall health and employment status among adults with a cancer history.

Results: The overall model for cancer survivors fit the data well ($\chi^2(374) = 3654.7$, $P < .001$; comparative fit index = 0.98; root mean square error of approximation = 0.04). Although black cancer survivors were less likely to report good-to-excellent health, along with Hispanic survivors, they were more likely to continue to work after diagnosis compared with their white counterparts. Health insurance status and educational level were strongly and positively associated with health status and current employment. Age and time since diagnosis were not significantly associated with health status or employment, but there were significant differences by cancer site.

Conclusions: A proportion of cancer survivors may continue to work because of employment-based health insurance despite reporting poor health and significant physical and mental health limitations. Acute and long-term health and social support are essential for the continued productive employment and quality of life of all cancer survivors.

Introduction

With major improvements in cancer detection and treatment, increasing numbers of cancer survivors return or continue to work after cancer diagnosis [1,2]. Recent literature reflects this trend among survivors, many of whom continue to work even during active cancer treatment [3]. However, cancer survivors' ability to work strongly depends on their overall health status which, in turn, is influenced by age, cancer, stage at diagnosis, sequelae, treatment, access to health care, and health insurance [4–7].

Previous research has reported that most working cancer survivors in the United States are highly educated, middle-aged individuals reporting two or more functional limitations [8]. Because a large proportion of cancer survivors are of working age, understanding the impact of the physical and mental health status of this population on their employment is important for employers, health care providers, public health planners, and cancer patient advocates, as well as the survivors themselves and their families. Most studies of cancer survivorship lack in-depth examinations of the relationships between employment and reported health status, activities of daily living (ADLs), and physical and psychological

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limitations. Although these factors have been studied independently [3,9–11], their joint impact on health and employment status remain unknown. Thus, our main aim was to fill this gap by exploring the relationship between selected health indicators and health and employment status among adult cancer survivors.

Methods

Participants

We analyzed pooled data from the 1997–2012 US National Health Interview Survey (NHIS), merging data from the sample adult files, person files, and the cancer-control modules [12]. The NHIS collects demographic and health information from a representative sample of noninstitutionalized US civilian population on an annual basis. Information is collected by household; one adult per family is randomly selected and administered questions related to health, including questions about cancer history. Annual adult response rates to the NHIS data used in this study averaged 71.3% (range, 69%–80%) [13]. All data were self-reported, and participants with missing information were excluded.

Variables

Participants were categorized as individuals with a cancer history (or cancer survivors) if they responded "yes" to the question "Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?" For this subsample, further questions permitted stratification by cancer site. For the purposes of this study, we looked at five of the most frequently diagnosed cancers within the United States (breast, prostate, lung, bladder, and colorectal cancers) [14]. The rest of reported cancer sites were grouped under "other" (referent). Persons with nonmelanoma skin cancer were not included in the study population.

The outcome variables of interest were employment and health status. Employment was dichotomously coded as currently "employed" or "not employed," determined by participants' response as to whether they were working (paid and unpaid) during the week before their NHIS interview. Health status was defined by self-reported health status measured on a Likert scale. To facilitate comparison with previous research, scale values were combined to create a dichotomous variable where health status was classified as "poor-to-fair" and "good-to-excellent".

We included health-related predictors referring to both physical and psychosocial health. A functional limitation results from a substantial impairment in an individual's ability to complete a range of tasks or major life activities for daily functioning, whether simple or complex; as such, functional limitations form the link between impairment and disability [15]. Respondents were asked about the level of difficulty experienced when performing a named task by themselves without using any special equipment. The response categories (ranging from 1 to 5) were "not at all difficult," "only a little difficult," "somewhat difficult," "very difficult," and "cannot do at all." Responses to these nine self-reported items (i.e., walking, standing, stooping, carrying, grasping, climbing, sitting, pushing, and reaching) were combined into a single "latent variable" (described below) measuring functional limitations. Three additional questions with the same response categories were captured by a second latent variable to assess performing instrumental activities of daily living (IADLs); these are complex skills needed for successful independent living, that is, social functions, relaxing, and shopping [16].

Limitations in performing basic activities and the effects of chronic conditions also encompass psychosocial factors, such as psychological distress, known to afflict cancer survivors. Based on the Kessler 6 (K-6) scale of psychological distress [17], participant responses to six questions "How often did you feel … (nervous, sad, restless, hopeless, worthless, or 'that everything was an effort')?" were measured by a single latent variable, psychological distress. The response options were "none of the time," "a little of the time," "some of the time," "most of the time," and "all of the time being," yielding a score between 1 and 5.

Sociodemographic variables included gender, age, Hispanic origin and race, education, and health insurance status. Age was measured as a continuous variable in years. Education was treated as three-level categorical variable: less than high school (referent), high-school diploma or equivalent, and some college or higher education. Hispanic origin and race were divided into four mutually exclusive categories: non-Hispanic white (white; referent), non-Hispanic black (black), Hispanic, and non-Hispanic other or multirace (other race). Based on their health insurance, participants were classified as privately insured (referent), publicly insured, and uninsured, using the definitions and classification commonly used by the National Center for Health Statistics [18].

Data analytic plan

For the analyses, we used structural equation modeling (SEM) because of the complexity of the examined pathways and variables (including latent variables). The use of SEM allowed the simultaneous evaluation of all variable relationships, as opposed to the individual effects of each predictor in separate multivariable logistic regression models. Also in SEM, latent variables may be used to measure multiple item scales independent of random measurement error, resulting in improved measurement reliability. Data management and descriptive analyses were conducted using (SAS/STAT, version 9.2; SAS Institute Inc., Cary, NC) [19], we used Mplus, version 5.2 (Muthén & Muthén, Los Angeles, CA) [20], to test study hypotheses within a SEM framework. Owing to the complex sample survey design, we performed all analyses adjusting for sample weights and design effects [12,21]. Records from each survey year were weighted according to person-level weights provided in annual NHIS data files. Weights were adjusted according to the number of representative years used in the analyses [12]. The distribution of the variables was examined through frequency tabulations to identify outliers and data errors, and variables were tested for collinearity.

As the focus of this study was on cancer survivors, the SEM analysis included only those individuals, aged 18 years and more, who both participated in the 1997–2012 NHIS surveys and had been diagnosed with cancer (except nonmelanoma skin cancer; $n = 24{,}810$). Figure 1 displays the measurement model examined in this study. First, using confirmatory factor analyses (CFAs), we estimated individual latent variable models. Second, we measured the fit of all three latent variables in a three-factor model to validate the latent variable measures using model fit indices. Third, we estimated the hypothesized structural equation model.

Preliminary analyses were conducted to determine whether there were sufficient associations (i.e., covariation) among the variables to permit model estimation, or if the correlations of these variables were high. Next, the distribution of antecedent variables (i.e., demographic and cancer-related characteristics), functional limitations, IADLs, and psychological distress among participants with and without a cancer history by employment status was examined (Table 1). CFAs were then fitted for each latent variable separately and together in a three-factor model. Finally, we estimated the hypothesized structural equation model (Fig. 1).

Model fit for latent variables and the full SEM was evaluated in terms of (1) the comparative fit index (CFI), which compares the hypothesized model to a null model with no paths or latent