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WeCanWork study: well-being of male cancer survivors working physically demanding jobs

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Abstract

Background Male cancer survivors performing physically demanding work have received less attention in the scientific literature compared to other groups. We hypothesized that men newly diagnosed with cancer have better well-being if they have less physically demanding jobs.

Methods Seventy-six male workers completed the NIOSH Worker Well-being Questionnaire (WellBQ) approximately three months after starting cancer treatment. We used descriptive statistics to describe the demographics and worker well-being of the study sample and pooled t-tests to determine whether there were differences between respondents who had more physically demanding work and those with fewer physical demands.

Results Male cancer survivors with physically demanding jobs reported poorer wage ($p < 0.001$) and benefit ($p = 0.04$) satisfaction, less autonomy ($p = 0.03$) and flexibility ($p = 0.004$), and greater financial insecurity ($p = 0.002$). They also experienced more negative job attitudes ($p = 0.0003$), and workplace safety concerns ($p < 0.001$) and less sleep ($p = 0.05$), with less support outside of work ($p = 0.03$) compared to men with less physically demanding jobs.

Conclusions Our study highlights worker well-being differences approximately three months after initiating cancer treatment between men with and without physically demanding jobs. There are opportunities for employers to support worker well-being, specifically those with physically demanding jobs. Additionally, male cancer survivors with physically demanding jobs may need greater support outside of the workplace. Future research with a larger and longitudinal sample of male cancer survivors could inform how to support survivors from diagnosis through treatment and beyond.

Keywords Total worker health, Worker well-being, Job demands, Cancer survivorship, Employment, Work demands

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Background

The number of cancer survivors in the workplace is rising, credited to improved early detection of cancer, rising prevalence of cancer among younger people and advances in medical protocols that allow many to remain employed while undergoing treatment [1, 2]. For example, Yabroff et al. reported that about half of cancer survivors do not alter their work schedules after a cancer diagnosis and 16% who do make changes to their employment still work part-time [3]. Those who remain employed often face challenges due to the physical, cognitive, and psychological impacts of cancer and its treatment. A focus on the work experience of cancer survivors in physically demanding work is especially needed [4] in light of the observation that physically demanding work is associated with poor work ability [5] and poor health outcomes [6].

Cancer survivors who keep working through treatment can experience physical and cognitive challenges [7]. They often experience fatigue that may reduce the stamina needed to carry out work tasks. They may experience chronic or debilitating pain from cancer itself, treatments, or surgeries [8]. Depending on cancer type, they may experience physiologic impairment of vital organ function, such as lung capacity and oxygenation, orthostasis or neurovestibular impairment. In addition, cancer survivors report psychological challenges such as depression and anxiety [7], cognitive impairment [7], and disturbed sleep that can compound these problems. It can take months to resolve or adjust to these symptoms [1], if at all, depending on clinical course and prognosis.

It is important to assess the needs of male cancer survivors who perform physically demanding work [9, 10]. Butow et al.'s [1] recent meta-review of cancer survivors' return to work found that most workplace studies focused on female breast cancer survivors, indicating a gap in cancer survivorship research. Studying the needs of male cancer survivors is important for several reasons. First, men and women can have different experiences at work that may be related to physiologic- and socially constructed differences [11]. Second, their job assignments and working conditions can differ. For example, men are over represented in physically demanding jobs, such as construction and mining [12]. Finally, research demonstrates that men may perceive additional pressure to return to work to provide for their families [9].

Conceptual models of cancer and work [13, 14] illustrate the complexity of supporting employed cancer survivors. Personal health and well-being, symptoms, function, work demands, work environment, policies and procedures, and economic factors all influence return to work and work outcomes. Butow et al.'s [1] meta-review supports the role of the work environment along with the home and societal environment in cancer survivors'

successful return to work. de Moor et al.'s recommendations to improve work outcomes for cancer survivors calls for more work to be done to understand ways employers can support cancer survivors at work [15]. Based on this evidence supporting the need for more holistic approaches, we adopted a *Total Worker Health*® approach to understanding the needs of working cancer survivors [16] as promoted by the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH) [17].

One of the methodologic pillars of the TWH approach is the assessment of worker well-being. Given the paucity of research that directly addresses the relationship between male cancer survivors' well-being and work conditions, we conducted a study of workers newly diagnosed with cancer using the NIOSH Worker Well-being Questionnaire (WellBQ). NIOSH created the WellBQ to improve theoretical clarity about worker well-being, to offer a structure for characterizing the different dimensions of worker well-being, and to identify opportunities for ways to improve workforce well-being [18].

The purpose of this study is to describe the worker well-being of men approximately three months after initiating cancer treatment in an academic medical center setting. We hypothesize that the worker well-being of men newly diagnosed with cancer is better amongst those who have less physically demanding work than those who have more physically demanding work.

Methods

Sample

From March 2022 to October 2023, we recruited our study sample through physician referrals, and systematic review of medical records at the participating academic medical center, primarily through a gastrointestinal oncology clinic. We enrolled patients aged 21 to 70 years who were newly diagnosed with a malignant solid tumor, receiving adjuvant treatment, and working at least 10 h a week at diagnosis. A self-reported survey and cancer stage and type information was collected approximately three months following the start of adjuvant treatment. We chose this timeframe because it allowed the patient to recover from surgery and to adjust to immediate adverse effects of treatment. Of the total number of participants enrolled ($N=134$), we excluded 30 participants because they declined the invitation to take the survey, 9 were removed because they were females, 17 were removed because they were not working at least 1 h per week three-months post cancer diagnosis, and 2 were removed because questions regarding job tasks were incomplete. The final study sample included 76 men who were working at least 1 h three-months post cancer diagnosis.

Ethical approval was provided by the Colorado Multiple Institutional Review Board (#21-4139). All participants

provided written informed consent. All research was performed in accordance with the Declaration of Heliski.

Survey instrument

The WellBQ questionnaire includes constructs across five broad domains that address work and non-work settings as well as elements of well-being. Worker well-being is defined as an integrative concept that relates quality of life to the individual's health, and work environment, organization, and psychosocial conditions of work. Unlike other indicators of well-being used in prior cancer survivorship studies, the WellBQ instrument assesses workers' quality of life alongside whether basic conditions at work and outside of work are fulfilled. The measure was pilot tested with almost 1,000 respondents [19] and researchers have subsequently used the WellBQ in different working populations [20, 21].

The WellBQ includes 68 questions across five domains: (1) work evaluation and experience— example question on a 1–4 satisfaction scale, “Overall, I am ____ with my job.”; (2) workplace physical environment and safety climate— example question on a 1–4 unsafe to safe scale, “Overall, how safe do you think your workplace is?”; (3) workplace policies and culture— example question on a 1–4 disagree/agree scale, “At my organization, I am treated with respect”; (4) health status— example question on a 1–5 scale, “Would you say that in general, your health is poor, fair, good, very good, or excellent?”; and (5) home, community and society— example question on a 1–4 satisfaction scale, “In general, how satisfied are you with your life?”. Of note, respondents are asked to “please answer the questions about your current job or the job that you held most recently.” The full questionnaire can be found on NIOSH's website [22].

We supplemented the WellBQ survey with demographic questions, employer accommodation questions, and questions about physical job demands including questions about exerting physical effort, lifting, and stooping, kneeling, or crouching (see Additional file 1). Each was rated on a scale of 1–4, all or most of the time, most of the time, some of the time, or none or almost none of the time. A physical work demands variable was generated by averaging their responses to these questions. Participants who indicated, on average, they did these tasks either all or almost all the time or most of the time were considered to have physically demanding jobs. Finally, cancer type and stage were extracted from the participant's electronic health record. Participants were asked to complete the study survey via RedCAP hosted online by the University of Colorado Denver [23, 24].

Analysis

Constructs in our survey were either measured with one question or multiple questions. For those that were

measured with multiple questions, we took the average of the questions to get an overall construct value. We then used descriptive statistics to describe the demographics and worker well-being of our study sample. For categorical variables, we used chi-square tests to compare differences between respondents who had more physically demanding work and those with less physical demands. For continuous variables, we first used Lavine's tests to determine whether the variances between groups were unequal. All tests indicated that variances were equal between groups and thus pooled t-tests were used to compare groups. We used a p-value of less than 0.05 to determine significant differences. Finally, to facilitate understanding of the magnitude of the differences, we calculated the effect size using Cohen's *d* where a small effect size is less than 0.2, medium is 0.5, large is 0.8, and a very large effect size is 1.3 [25]. All analyses were completed in Stata version 18.

Results

Table 1 reports descriptive statistics for the sample, stratified by whether the participant was employed in a physically demanding job. Cancer survivors were on average age 51.48 (Standard deviation (SD) = 12.48) years and white/White (84.0%). One-quarter (25.6%) of the cancer survivors worked in physically demanding jobs. A greater proportion of those with physically demanding jobs reported being unmarried, had less education, were Hispanic or Latino, either working part-time or on temporary leave, and earning less than \$85,000 in annual household income. All respondents reported similar levels of agreement with the statement that they currently work to maintain health insurance benefits, although those with physically demanding jobs reported more agreement with the statement that they would change jobs if they could be assured comparable benefits.

Almost half (44.9%) had gastrointestinal cancer and about one third (30.80%) had cancer of the male genital organs with the remaining cancer types spread across eight different types (see footnote at bottom of Table 1). Overall, cancer survivors had cancer stages distributed mostly across stages from 2 to 4 (AJCC 8th edition). There was a trend for cancer survivors in physically demanding work to have more of an advanced staged cancer.

At three-months post-diagnosis, cancer survivors worked an average of 40.01 (SD = 13.9) hours per week. One-quarter (27.3%) worked for businesses with fewer than 50 people and most worked for private, for-profit organizations (79.3%).

Workplace accommodations.

Table 2 displays the types of employer accommodations provided to participants stratified by whether they had a physically demanding job. Most (84.2%) participants

Table 1 Sample demographics of cancer survivors with and without physically demanding jobs

	Total	Low physical demands	High physical demands	P-val
	M (SD) / n (%)	M (SD) / n (%)	M (SD) / n (%)	
N	76 (100%)	61 (80.30%)	15 (19.7%)	
Age, mean	51.70 (12.15)	52.78 (12.26)	47.33 (10.99)	0.120
Marital status				
Single	13 (17.3%)	9 (15.0%)	4 (26.7%)	0.038
Committed relationship	7 (9.3%)	5 (8.3%)	2 (13.3%)	
Married/civil union	47 (62.7%)	42 (70.0%)	5 (33.3%)	0.009
Separated	1 (1.3%)	0 (0.0%)	1 (6.7%)	
Divorced	7 (9.3%)	4 (6.7%)	3 (20.0%)	
Widowed	0 (0%)	0 (0%)	0 (0%)	
Education				
Grade school or less	1 (1.3%)	0 (0.0%)	1 (6.7%)	0.160
Some high school or technical school	1 (1.3%)	0 (0.0%)	1 (6.7%)	
High school or technical school graduate	12 (15.8%)	7 (11.5%)	5 (33.3%)	
Some college	15 (19.7%)	11 (18.0%)	4 (26.7%)	
College graduate	33 (43.4%)	30 (49.2%)	3 (20.0%)	
Some graduate or professional school after college	4 (5.3%)	3 (4.9%)	1 (6.7%)	
Completed advanced degree	10 (13.2%)	10 (16.4%)	0 (0.0%)	
Race				
Asian	2 (2.7%)	2 (3.4%)	0 (0.0%)	0.015
Black or African American	2 (2.7%)	1 (1.7%)	1 (6.7%)	
White	62 (84.9%)	50 (86.2%)	12 (80.0%)	
More than one race	4 (5.5%)	4 (6.9%)	0 (0.0%)	
Another group not listed	3 (4.1%)	1 (1.7%)	2 (13.3%)	
Ethnicity				
Hispanic or Latino	11 (14.9%)	6 (10.0%)	5 (35.7%)	0.932
Not Hispanic or Latino	63 (85.1%)	54 (90.0%)	9 (64.3%)	
Cancer type				
Gastrointestinal	27 (44.3%)	7 (46.7%)	34 (44.7%)	0.062
Male genital organs	19 (31.1%)	5 (33.3%)	24 (31.6%)	
Other*	15 (24.6%)	3 (20.0%)	18 (23.7%)	
Cancer stage				
Stage 1	8 (10.5%)	7 (11.5%)	1 (6.7%)	0.316
Stage 2	25 (32.9%)	23 (37.7%)	2 (13.3%)	
Stage 3	22 (29.0%)	18 (29.5%)	4 (26.7%)	
Stage 4	19 (25.0%)	11 (10.1%)	8 (53.3%)	
Un-staged or unknown	2 (2.6%)	2 (3.4%)	0 (0.00%)	
I currently work to maintain health insurance (1–4, strongly agree to strongly disagree)	2.4 (1.0)	2.47 (1.0)	2.33 (1.0)	0.017
I would change jobs if I could be ensured comparable benefits (1–4, strongly agree to strongly disagree)	2.90 (0.91)	3.00 (0.87)	2.36 (1.03)	0.029
Employment status 3-months post-diagnosis				
Full time	56 (73.7%)	49 (80.3%)	7 (46.7%)	0.632
Part time	12 (15.8%)	7 (11.5%)	5 (33.3%)	
Temporary leave from which you plan to return	8 (10.5%)	5 (8.2%)	3 (20.0%)	
Hours worked per week 3-months post-diagnosis	40.09 (14.06)	39.70 (9.74)	41.67 (25.48)	0.463
Size of business 3-months post-diagnosis				
<24 employees	19 (27.5%)	15 (26.3%)	4 (33.3%)	0.463
25–49 employees	2 (2.9%)	1 (1.8%)	1 (8.3%)	
50–99 employees	4 (5.8%)	4 (7.0%)	0 (0.0%)	
100+ employees	44 (63.8%)	37 (64.9%)	7 (58.3%)	

Table 1 (continued)

	Total	Low physical demands	High physical demands	P-val
	M (SD) / n (%)	M (SD) / n (%)	M (SD) / n (%)	
Employer type 3-months post-diagnosis				0.657
Government	7 (9.3%)	5 (8.2%)	2 (14.3%)	
Private, for profit company	58 (77.3%)	47 (77.0%)	11 (78.6%)	
Non-profit organization	5 (6.7%)	4 (6.6%)	1 (7.1%)	
Self-employed	5 (6.7%)	5 (8.2%)	0 (0.0%)	
Annual household income				< 0.001
<\$85,000	50 (67.6%)	13 (21.7%)	11 (78.6%)	
≥\$85,000	24 (32.4%)	47 (78.3%)	3 (21.43%)	

*Other cancer types included: sarcoma, carcinoma, hemangioendothelioma of skin, astrocytoma, leiomyosarcoma, glioma, dermatofibrosarcoma protuberans, oligodendroglioma

Table 2 Employer accommodations among cancer survivors with and without physically demanding jobs (N = 76)

	Total	Low physical demands	High physical demands	P-val
	M (SD) / n (%)	M (SD) / n (%)	M (SD) / n (%)	
Employer got someone to help you	24 (31.6%)	16 (23.2%)	8 (53.2%)	0.12
Employer gave you shorter workdays	39 (51.3%)	31 (50.8%)	9 (60.0%)	0.52
Employer allowed you to change your start and stop times	64 (84.2%)	53 (86.3%)	11 (73.3%)	0.20
Employer allowed more breaks and rest periods	56 (73.7%)	47 (77.1%)	9 (60.0%)	0.30
Employer arranged transportation	4 (5.3%)	4 (6.6%)	1 (6.7%)	0.99
Employer changed your job to something you can do	18 (23.7%)	11 (18.0%)	7 (46.7%)	0.02
Employer helped you learn new skills	16 (21.1%)	10 (16.4%)	6 (40.0%)	0.05
Employer got you special equipment	10 (13.2%)	8 (13.1%)	2 (13.3%)	0.13
Employer helped you get rehab services	12 (15.8%)	8 (13.1%)	4 (26.7%)	0.20

were given the option to change their start and stop times and half (50.3%) were given the option to work shorter days. Participants with physically demanding jobs were more likely to report two accommodations: change their job to something they could do ($p = 0.02$) and employer helped them learn a new skill ($p = 0.05$).

Worker well-being

Table 3 reports the statistically significant worker well-being differences between cancer survivors with and without physically demanding jobs. Detailed tables describing results for all factors measured by the WellBQ can be found in additional file 2.

Work evaluation and experience

Cancer survivors rated aspects of the WellBQ work evaluation and experience domain highly (see Supplemental Table 1). For example, cancer survivors rated their supervisor support highly (Mean (M) = 3.6/4.0, SD = 0.8) with no differences between those with and without physically demanding jobs.

Compared to cancer survivors with low physical demands, cancer survivors with high physical demands reported lower job satisfaction (M = 3.7/4.0, SD = 0.6 vs. M = 3.1 SD = 0.8), wage satisfaction (M = 3.4/4.0 SD = 0.6 vs. M = 2.6 SD = 1.0), and autonomy (M = 3.5/4.0 SD = 0.8

vs. M = 3.0 SD = 1.1) as well as worse work-related negative affect— for example, feeling anxious, angry, discouraged, and/or gloomy while working (M = 2.3/7.0 SD = 0.8 vs. M = 3.2 SD = 1.5) (see Table 2).

Workplace policies and culture

Overall, cancer survivors rated many aspects of their workplace culture highly (see Supplemental Table 2). For example, cancer survivors reported a supportive work culture (M = 3.5/4.0 SD = 0.61) with no differences between those with and without physically demanding jobs. Differences between those with and without physically demanding jobs were related to workplace policies (see Table 2). Compared to cancer survivors with low physical demands, cancer survivors with high physical demands report fewer job benefits (M = 8.3/14 SD = 3.7 vs. M = 6.0 SD = 4.4) and less workplace flexibility (M = 3.1/4.0 SD = 1.0 vs. M = 2.2 SD = 0.9).

Workplace physical environment and safety climate

Most workplace physical environment and safety climate factors were rated poor amongst participants with high physical demands. Compared to cancer survivors with low physical demands, cancer survivors with high physical demands report worse perceptions of overall workplace safety (M = 3.8/4.0 SD = 0.5 vs. M = 3.2 SD = 0.8),

Table 3 Significant worker well-being differences between cancer survivors with and without physically demanding jobs

WellBQ domain and construct	Total	Low physical demands	High physical demands	P-val	Effect size (Cohen's d)
	Mean (SD)	Mean (SD)	Mean (SD)		
Work evaluation and experience					
Job Satisfaction (1–4)	3.6 (0.71)	3.7 (0.6)	3.1 (0.8)	0.008	0.85
Wage Satisfaction (1–4)	3.2 (0.77)	3.4 (0.6)	2.6 (1.0)	< 0.001	0.97
Autonomy (1–4)	3.4 (0.85)	3.5 (0.8)	3.0 (1.1)	0.034	0.52
Work-related negative affect (1–7)	2.5 (1.05)	2.3 (0.8)	3.2 (1.5)	0.003	-0.75
Workplace policies and culture					
Job benefits (1–14)	7.8 (3.93)	8.3 (3.7)	6.0 (4.4)	0.042	0.57
Workplace flexibility (1–4)	2.9 (1.02)	3.1 (1.0)	2.2 (0.9)	0.004	0.95
Workplace physical environment and safety climate					
Overall workplace safety (1–4)	3.7 (0.60)	3.8 (0.5)	3.2 (0.8)	< 0.001	0.90
Workplace safety climate (1–4)	3.5 (0.74)	3.6 (0.7)	3.1 (0.9)	0.026	0.62
Physical work environment satisfaction (1–4)	3.54(0.56)	3.6 (0.5)	3.2 (0.8)	0.011	0.60
Work-related physical violence				0.004	n/a
No	70 (97.2%)	58 (82.9%)	12 (17.1%)		
Yes	2 (2.8%)	0 (0.0%)	2 (14.3%)		
Health status					
Sleep hours				0.052	n/a
≤ 6 h	25 (34.25%)	16 (27.12%)	9 (64.29%)		
7 h	27 (36.99%)	24 (40.68%)	3 (21.42%)		
8 h	17 (23.29%)	16 (27.12%)	1 (7.14%)		
≥ 9 h	4 (5.48%)	3 (5.08%)	1 (7.14%)		
Work-related injury				< 0.001	n/a
No injury	69 (95.8%)	59 (85.5%)	10 (76.9%)		
Injury	3 (4.2%)	0 (0.0%)	3 (23.1%)		
Injury consequence				0.041	n/a
No consequence	15 (88.2%)	11 (73.3%)	4 (26.7%)		
Require first aid or medical treatment, change in job activities, or lost time from work	2 (11.8%)	0 (0.0%)	2 (33.3%)		
Home, community and society					
Financial insecurity (1–4)	2.2 (0.8)	2.1 (0.8)	2.9 (0.7)	0.002	-1.0
Support outside of work (1–4)	3.5 (0.7)	3.6 (0.7)	3.1 (0.8)	0.030	0.69

SD = Standard deviation

workplace safety climate ($M=3.62/4.0$ $SD=0.66$ vs. $M=3.31$ $SD=0.9$), and physical work environment satisfaction ($M=3.6/4.0$ $SD=0.5$ vs. $M=3.2$ $SD=0.8$) as well as more work-related physical violence (0 (0%) vs. 2 (14.3%) (see Table 2).

Health status

Most health status factors were rated similarly amongst cancer survivors with and without physically demanding jobs (see Supplemental Table 4). The only factors statistically significantly different between groups were sleep hours, work-related injury and injury consequence (see Table 2). Compared to cancer survivors with low physical demands ($n=16$, 27.12%), cancer survivors with high physical demands reported fewer sleep hours ($n=9$, 64.29%), $p=0.05$). There were also significant differences in work-related injury and injury consequence; however,

the prevalence of work-related injury was low in both groups.

Home, community and society

All home, community, and society factors were rated lower amongst cancer survivors with high physical demands. Financial insecurity and social support outside of work were found to be statistically different (see Table 2). Compared to cancer survivors with low physical demands, cancer survivors with high physical demands report more financial insecurity ($M=2.1/4.0$ $SD=0.8$ vs. $M=2.9$ $SD=0.7$) and less support outside of work ($M=3.6/4.0$ $SD=0.7$ vs. $M=3.1$ $SD=0.8$).

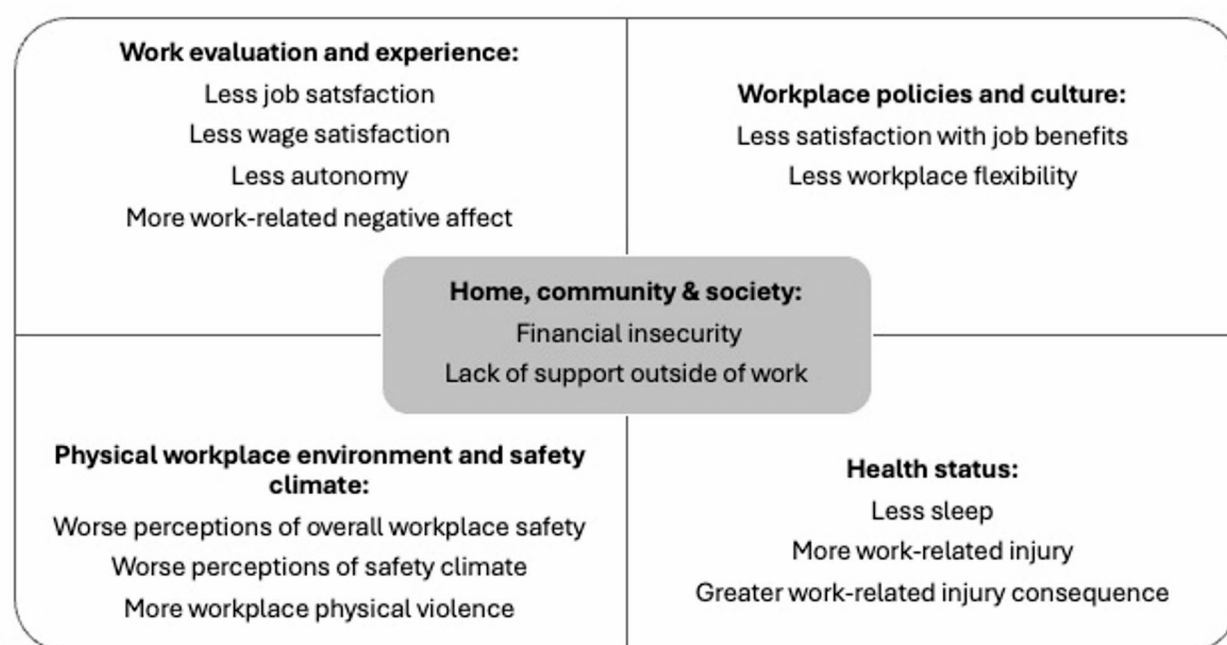


Fig. 1 Worker well-being challenges that male cancer survivors with physically demanding jobs face, compared to those without physically demanding work

Discussion

We assessed the worker well-being needs of 76 male cancer survivors who were employed in physically demanding jobs three-months after initiating cancer treatment and compared their well-being to those with less physically demanding jobs. We found that participants with physically demanding jobs differ from those with less physical job demands on several demographic indicators, including having a more advanced staged cancer, as well as dimensions of well-being. Survivors employed in physically demanding work reported lower wages and benefits, less flexibility, and greater financial insecurity. They reported more negative job attitudes and greater workplace safety concerns. Beyond the workplace, they reported less sleep and less support outside of work. Figure 1 summarizes these differences.

Our study points to the short-term negative impact of cancer on financial security. Prior research suggests that male workers in physically demanding jobs risk long-term job loss as well. So et al. [26] observed reduced employment 1-year after diagnosis and Le et al. [27] observed reduced employment 15-years after diagnosis among men with physically demanding jobs. Our study shows the association of financial insecurity, specifically among survivors in physically demanding jobs. While both groups reported similar levels of intentions to stay at their job to maintain benefits, those with physically demanding jobs were more likely to report an inability to change jobs without benefit loss.

Workplace safety climate perceptions amongst male cancer survivors with physically demanding jobs has not been previously studied. Prior research demonstrates that safety climate is related to employee safety practices and injuries on the job [28], especially in physically demanding jobs [29]. Thus, the perceptions of poor safety climate reported by male cancer survivors with physically demanding jobs suggest they may be at risk for injury that would compound the health concerns they already face. Additional workplace support may be needed [30]. For example, sleep quantity is a concern in this working population, which could put them at greater risk of injury in an unsafe work environment [27, 31]. Interventions to support sleep and recovery may be needed to both support cancer treatment and prevent on the job injury.

Our finding that male cancer survivors with physically demanding jobs reported more negative job affect (feeling anxious, angry, discouraged, and/or gloomy while working) warrants more investigation. While ratings between those with and without physically demanding jobs were both relatively low, it still may be a signal that those with physically demanding jobs feel less supported by their organization. Given that negative job affect is correlated with poor job satisfaction and organizational commitment [32], employers who wish to retain cancer survivors as employees should provide accommodations such as job flexibility and autonomy. Both are critical workplace resources that cancer survivors need to complete treatment and recover from the disease and

treatment side effects [1, 33]. Flexibility to modify work routine, flex work hours, and reduce work hours can offer these workers a chance to control their work schedule while undergoing treatment and recovery. Furthermore, autonomy to decide how they do their work can contribute to greater job satisfaction and better performance [34]. Finally, in situations where job flexibility and autonomy is not possible, employers could focus on improving communication and leadership practices so that workers feel supported to disclose their conditions and seek accommodations.

Recent research suggests that loneliness is a cancer mortality risk factor [35], and our study suggests this may be especially important to address amongst male cancer survivors with physically demanding jobs. Butow et al. notes the important role that social support can play in helping cancer survivors return to work [1]. Support at home can offer a break from home-based duties and allow for recovery before the next physically demanding workday. In our study, male cancer survivors with physically and non-physically demanding jobs reported similar perceptions of support within the workplace but different perceptions of support outside of the workplace. This may be due in part to the demographics of our study sample. Those with physically demanding jobs were more likely to be single, separated or divorced. Thus, they may not have the level of support at home compared to their married counterparts.

Our study suggests a trend for more advanced staged cancer amongst male cancer survivors in physically demanding jobs. 83% of those with physically demanding jobs had stage 3 or 4 stage cancer compared to 40% of those without physically demanding jobs. Future research should seek to understand the demographic and clinical differences that may contribute to this trend. For example, future research could seek to understand whether this trend is due to a lack of participation in early cancer screening. Prior research has found several factors that may impede cancer screening, including language barriers [36], health insurance [37], access to paid sick leave [38], cultural attitudes and beliefs [39], and demographic factors such as race and ethnicity [40] are barriers to cancer screening.

Limitations

The present study had a small sample size of men recruited primarily at a gastrointestinal oncology clinic who continued to work three months after initiating cancer treatment, limiting generalizability of study findings. Most of our study participants were white and almost one-third had an annual household income of greater than or equal to \$85,000. The work experiences of men with other kinds of cancers or demographic backgrounds may differ than those who participated in our

study. The cross-sectional study design limits our ability to determine whether physically demanding work is causally associated with worker well-being or vice versa. Finally, we do not know the kinds of work tasks that the men were required to perform and thus cannot speculate about what kinds of industries or jobs may be contributing to the relationships observed in the study. Cancer stage might have also contributed to the relationships observed, but we could not include it in our analysis due to small a sample size. Future studies with larger sample sizes are needed to validate the findings and evaluate other potential contributions to the differences observed.

Conclusions

Our study highlights the worker well-being differences between male cancer survivors currently employed in physically demanding jobs three months after initiating treatment. There are several opportunities for employers and oncology teams to support worker well-being, specifically those with greater physically demanding jobs. Additionally, we find male cancer survivors with physically demanding jobs may need greater support outside of the workplace. Future research should focus on comparing our findings with a larger sample of male cancer survivors shortly after diagnosis as well as evaluating long-term trends in well-being as cancer survivors progress from diagnosis, treatment, and to remission.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-23147-8>.

Supplementary Material 1

Supplementary Material 2

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Not applicable.

Author contributions

NS conceptualized, analyzed and interpreted the data and wrote the original manuscript draft. MD, AD-R, LT, CB, MG, BW, LN, and CB assisted with data interpretation and assisted with manuscript reviewing and editing. AD-R managed and cleaned the research data. CB secured grant funding for this research project and oversaw the research project. MG served as project manager. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was provided by the Colorado Multiple Institutional Review Board (#21-4139). We obtained informed consent from all participants. All research was performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Authors information

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