



Original Article

Relationship between perceived depression, suicidal ideation, and return to work among cancer survivors in South Korea: A national survey analysis

Haeryun Cho^a, Hye Suk Jun^{b,*}^a Department of Nursing, Wonkwang University, Iksan, Republic of Korea^b Department of Nursing, Kangdong Sacred Heart Hospital, Hallym University, Seoul, Republic of Korea

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ABSTRACT

Objective: This study aimed to investigate the relationship between perceived depression, suicidal ideation, and return to work among cancer survivors in South Korea, with a focus on sociodemographic and employment-related factors.

Methods: A secondary analysis of data from 874 cancer survivors, retrieved from the 2015, 2017, and 2019 Korean National Health and Nutrition Examination Surveys, was conducted. Key variables included employment status, household income, marital status, perceived depression, and suicidal ideation. Data were analyzed using descriptive statistics and chi-square tests.

Results: Female cancer survivors reported higher rates of perceived depression compared to male survivors. Survivors with lower household incomes or without spouses experienced elevated levels of both perceived depression and suicidal ideation. Those in the nonworking group exhibited significantly higher rates of these psychological challenges compared to those who had returned to work. However, the type of job performed was not associated with perceived depression or suicidal ideation.

Conclusions: Returning to work, regardless of job type, is associated with improved psychological health among cancer survivors, emphasizing the importance of employment in fostering social interaction and emotional stability. Interventions supporting the return-to-work process and addressing the specific needs of vulnerable groups are critical for improving the overall well-being of cancer survivors.

Introduction

Despite an annual increase in the rate of cancer incidence, the survival rate of cancer patients has improved owing to the development of early diagnosis and medical technology in recent years.^{1,2} The 5-year survival rate of cancer patients was 70.7% in the last 5 years (2015–2019), increasing from 54.1% 15 years ago (2001–2005).³ Moreover, intensive management of cancer survival should be considered by switching from the existing disease-centered treatment to a long-term management model.

During treatment, recovery, and rehabilitation, cancer survivors face various problems, particularly when they find it difficult to maintain or find a job. Cancer survivors find it challenging to return to work because of physical problems such as poor health status, functional limitations, and pain, as well as psychosocial problems such as stress, cognitive limitations, and lack of energy.⁴ In fact, 24.0% of cancer survivors lose their jobs after a cancer diagnosis, and 20.7% experience discrimination in the

workplace.⁵ Frustration with returning to work can cause personal health deterioration, economic hardship, social isolation, and loss of the core workforce in society, as well as an increase in medical expenses and a decrease in the productive population.^{5–7} Hence, returning to work following cancer treatment is an essential step in the recovery of the patient's social life. This includes restoring financial ability, self-confidence, and the capacity to return to their regular lives before cancer diagnosis.^{8,9}

The management of cancer survivors places a strong emphasis on the significance of depression and suicidal ideation as markers of health, focusing on curing cancer and restoring the quality of life comparable to that before diagnosis. Depression is a common psychological reaction in cancer survivors, reducing the adherence and survival rates of cancer treatment^{10,11} and increasing suicide risk.¹² Furthermore, the suicide mortality rate of cancer survivors is 1.5–1.7 times higher than that of the general population.¹³ Although suicidal ideation is not an essential factor that induces suicidal behavior, it is a behavioral indicator that can lead to suicide attempts and suicidal behavior. Therefore, recognizing suicidal

* Corresponding author.

E-mail address: love9573@hanmail.net (H.S. Jun).<https://doi.org/10.1016/j.apjon.2024.100611>

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ideation can reduce the risk of suicide and suicidal behavior.

Employment status and occupational factors, such as working hours, working status, occupation type, and working schedule, are reportedly related to the prevalence of depression.^{14,15} Unemployment reportedly increases the risk of suicide.^{16,17} Additionally, since unemployed cancer survivors experience more pain, anxiety, and depression than those who return to work,¹⁸ the possibility that mental health is strongly related to return to work should be considered.

Qualitative studies have mainly analyzed the experiences of cancer survivors related to returning to work^{2,19} as well as physical and psychosocial problems.^{4,20} In particular, studies targeting breast cancer survivors have been actively conducted.²⁰⁻²² However, studies on perceived depression and suicidal ideation following return to work among cancer survivors are insufficient. When considering work types, such as regular and non-regular employees, levels of depression and suicidal ideation were reported to be higher among non-regular workers than among regular workers.^{23,24} This indicates the impact of job insecurity on psycho-emotional well-being, and there are limitations in specifically examining the relationship between depression, suicidal ideation, and work type among cancer survivors.^{23,24}

Therefore, we aimed to analyze the association between perceived depression and return to work and the association between suicidal ideation and return to work among cancer survivors in South Korea. The ultimate goal was to provide the foundational data necessary to develop strategies to enhance the psycho-emotional well-being of cancer survivors. The specific purposes of this study were as follows: (1) to identify the general characteristics, including sociodemographic characteristics, health-related risk behaviors, and clinical characteristics of cancer survivors; (2) to identify differences in return to work, perceived depression, and suicidal ideation according to sociodemographic characteristics and health-related risk behaviors; and (3) to identify differences in perceived depression and suicidal ideation according to work type.

Methods

Design

This study employed a descriptive design and secondary analysis. A secondary analysis was conducted using data from three separate years (2015, 2017, and 2019) of the Korea National Health and Nutrition Examination Survey (KNHANES), with data analyzed according to the KNHANES guidelines.

Participants

This study used raw data from the sixth (2015), seventh (2017), and eighth (2019) KNHANES conducted by the Korea Disease Control and Prevention Agency (KCDA). The KNHANES is a statutory survey on the health behavior of people and the prevalence of chronic diseases, and has national representation and reliability. The KNHANES is a nationwide survey that calculates national statistics through annual surveys of health levels, health-related consciousness and behaviors, and the food and nutrition intake of 10,000 Koreans in accordance with the National Health Promotion Act. Representative samples were extracted from citizens over the age of 1 year living in South Korea. KNHANES uses a two-step stratified colony sampling method. The first stratification was based on the city, province, and housing type. The second stratification criterion was the residential area ratio, ratio of household heads' educational backgrounds, age, and ratio of single-person households. Nursing homes, military facilities, prisons, and foreign households were excluded. Cancer survivors included all individuals diagnosed with cancer at any point in their lives. In this study, cancer survivors were defined as participants who self-reported a cancer diagnosis made by a physician, irrespective of their current cancer or treatment status. Among the 23,617 raw data points, 951 cancer survivors were aged ≥ 19 years. In total, 77 data points were excluded because of a diagnosis of depression ($n = 66$) or incomplete responses ($n = 11$). Finally, 874 data points were analyzed in this study, with 369 and 505 in the working and nonworking groups, respectively (Fig. 1).

Measurement

The general characteristics of the participants included sociodemographic factors, health-related risk behaviors, and clinical characteristics. The sociodemographic factors included sex, age, household income, years of education, and marital status. Health-related risk behaviors included alcohol consumption and smoking. The clinical characteristics were based on the cancer type. In the last week, have you worked more than 1 hour for income or as an unpaid family worker for more than 18 hours? Wage workers employed and paid by others or companies were classified as regular, temporary, or daily workers. Individuals who operated their businesses were classified as self-employed, whereas those who assisted family members or relatives without payment were classified as unpaid. The term "regular worker" refers to an individual employed for at least 1 year in accordance with the company's internal regulations who receives severance pay, bonuses, and various

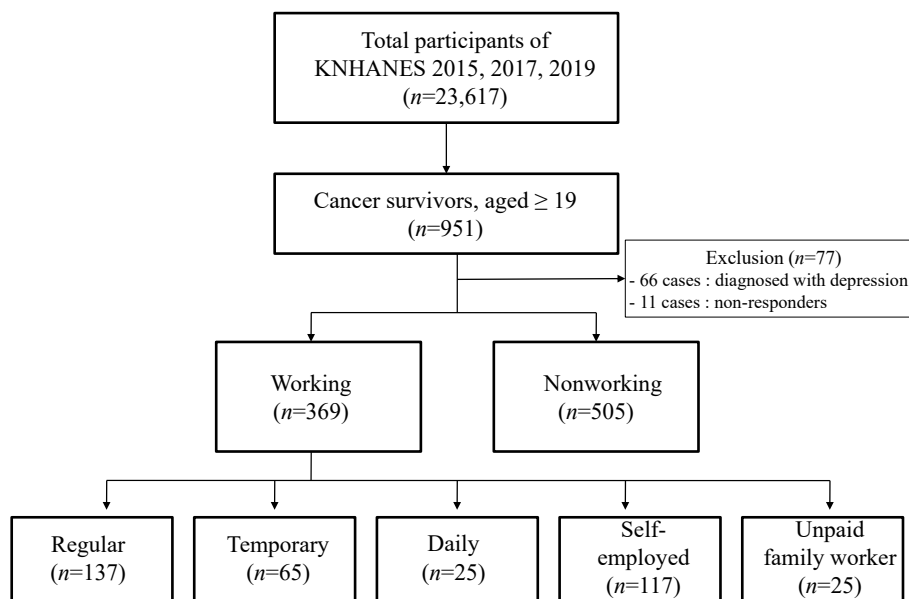


Fig. 1. Flow diagram of inclusion of return to work among cancer survivors.

allowances. “Temporary worker” denotes an individual employed for a period of at least 1 month but < 1 year. “Daily worker” is defined as someone employed on a daily basis for < 1 month, receiving daily wages, or working intermittently without a fixed location and being compensated for their work. The data used in the analysis was based on responses to the following questions according to the KNHANES: “In the past year, have you experienced persistent sadness or hopelessness for at least 2 weeks to the extent that it interfered with your daily functioning?” for perceived depression, and “In the past year, have you seriously contemplated suicide?” for suicidal ideation. Responses were categorized as either “Yes” or “No.”

Data analysis

Data were analyzed using SPSS/WIN 28.0 (IBM Corp., Armonk, NY, USA). The general characteristics and main variables of the participants were analyzed using descriptive statistics. Furthermore, the associations between general characteristics, return to work, perceived depression, and suicidal ideation were analyzed using the χ^2 test. The effect size of the 2×2 contingency table was phi (ϕ), and Cramer's V was used for the effect size of the other tables. The calculated effect size was analyzed according to Cohen's guidelines.²⁵

Ethical considerations

The KNHANES was conducted by the KCDA, and in compliance with the Personal Information Protection Act and Statistics Act, only de-identified data were provided so that the survey data could not be traced to individuals. After obtaining approval for exemption from deliberation from the Kangdong Sacred Heart Hospital Institutional Review Board (IRB No. KANGDONG 2022-01-001), and the raw data were downloaded from the KNHANES website.

Results

General characteristics

The proportion of men and women was 39.5% and 60.5%, respectively. The age groups were 61–70 years and 71 years or older, accounting for 28.3% and 32.6%, respectively. Household incomes were 27.1% and 28.9% for the lower and middle-lower income groups, respectively, and most participants were married (76.9%). Of the cancer survivors, 39.1% consumed alcohol less than four times a month and 63.6% had never smoked. The cancer types included thyroid, stomach, breast, and colorectal cancer. In addition, 42.2% of cancer survivors had returned to work, 14.3% had perceived depression, and 5.6% had suicidal ideation (Table 1).

Return to work, perceived depression, and suicidal ideation according to general characteristics

The differences in return to work, perceived depression, and suicidal ideation according to general characteristics are presented in Table 2. In terms of returning to work, workers in their 40s and 50s accounted for 20.1% and 30.6%, respectively, and in the nonworking group, those in their 60s and 70s accounted for 30.9% and 43.4%, respectively ($\chi^2 = 108.622$, $P < 0.001$). Of the working survivors, 31.7% had ≥ 13 years of education compared to 25.1% of the nonworking group ($\chi^2 = 16.406$, $P = 0.001$). Regarding perceived depression, the proportion of women reporting depression was higher than that of men ($\chi^2 = 4.179$, $P = 0.041$). Moreover, 40.8% of the depressed group had a “low” household income ($\chi^2 = 15.924$, $P = 0.001$), and 28.0% of the divorced or widowed cancer survivors reported depression ($\chi^2 = 6.665$, $P = 0.036$). Among cancer survivors with suicidal ideation, 42.9% had a “low” household income ($\chi^2 = 8.093$, $P = 0.044$), and 44.9% had ≤ 6 years of education ($\chi^2 = 8.002$, $P = 0.046$). In other words, cancer

Table 1

General characteristics and major variables including return to work, perceived depression, and suicidal ideation ($N = 874$).

Characteristics	Categories	n (%)
Sex	Male	345 (39.5)
	Female	529 (60.5)
Age (years)	≤ 40	49 (5.6)
	41–50	101 (11.6)
	51–60	192 (22.0)
	61–70	247 (28.3)
	≥ 71	285 (32.6)
House income	Lowest	237 (27.1)
	Lower middle	253 (28.9)
	Upper middle	198 (22.7)
	Highest	186 (21.3)
Education (years)	≤ 6	246 (28.1)
	7–9	135 (15.4)
	10–12	249 (28.5)
	≥ 13	244 (27.9)
Marital status	Married	672 (76.9)
	Divorced/Widowed	173 (19.8)
	Single	29 (3.3)
Alcohol consumption	Never drinker	156 (17.8)
	Former drinker	255 (29.2)
	Less than 4 times a month	342 (39.1)
	More than twice a week	121 (13.8)
Cigarette smoking	Never smoked	556 (63.6)
	Former smoker	252 (28.8)
	Current smoker (once in a while)	10 (1.1)
Cancer type	Current smoker (every day)	56 (6.4)
	Thyroid cancer	185 (21.2)
	Stomach cancer	156 (17.8)
	Breast cancer	129 (14.8)
	Colorectal cancer	104 (11.9)
	Cervical cancer	76 (8.7)
	Lung cancer	39 (4.5)
	Liver cancer	17 (1.9)
	Others	168 (19.2)
Return to work	Working	369 (42.2)
	Nonworking	505 (57.8)
Perceived depression	Yes	125 (14.3)
	No	749 (85.7)
Suicidal ideation	Yes	49 (5.6)
	No	825 (94.4)

survivors with suicidal ideation have low household income and education. Furthermore, 77.7% of the cancer survivors without suicidal ideation were married, 28.6% of the cancer survivors with suicidal ideation were divorced or widowed, and 8.2% were single ($\chi^2 = 6.946$, $P = 0.031$).

Difference in perceived depression and suicidal ideation according to return to work

Among cancer survivors who returned to work, 32.0% reported perceived depression, whereas 43.9% reported no perceived depression ($\chi^2 = 6.245$, $P = 0.012$). Additionally, 26.5% of those who returned to work reported suicidal ideation, whereas 43.2% reported no suicidal ideation ($\chi^2 = 5.238$, $P = 0.022$). Perceived depression and suicidal ideation were significantly lower among those who returned to work (Table 3). No statistically significant difference was observed between perceived depression ($\chi^2 = 9.204$, $P = 0.056$) and suicidal ideation ($\chi^2 = 3.526$, $P = 0.474$) according to work type (Table 4).

Discussion

In this study, the rate of return-to-work among cancer survivors in South Korea was 42.2%. According to previous studies on return to work rates among cancer survivors, the global average was 63%, with Germany reporting a notably higher rate of 74%.^{6,18,26} Compared to previous studies, the results of this study showed that the rate of return to work for cancer survivors in South Korea was low, reflecting the country's

Table 2
Return to work, perceived depression, and suicidal ideation according to sociodemographic characteristics and health-related risk behaviors (N = 874).

Characteristics	Categories	Working (n = 369)	Nonworking (n = 505)	χ^2 (P)	V (Effect size)	Perceived depression (Yes)	Perceived depression (No)	χ^2 (P)	V (Effect size)	Suicidal ideation (Yes)	Suicidal ideation (No)	χ^2 (P)	V (Effect size)
		n (%)	n (%)			(n = 125)	(n = 749)			(n = 49)	(n = 825)		
Sex	Male	149 (40.4)	196 (38.8)	0.219 (0.640)	0.17 (Medium)	39 (31.2)	306 (40.9)	4.179 (0.041)	0.07 ^a (Small)	18 (36.7)	327 (39.6)	0.163 (0.686)	
	Female	220 (59.6)	309 (61.2)			86 (68.8)	443 (59.1)			31 (63.3)	498 (60.4)		
Age (years)	≤ 40	25 (6.8)	24 (4.8)	108.622 (<0.001)	0.17 (Medium)	8 (6.4)	41 (5.5)	2.103 (0.717)		4 (8.2)	45 (5.5)	3.683 (0.451)	
	41–50	74 (20.1)	27 (5.3)			11 (8.8)	90 (12.0)			2 (4.1)	99 (12.0)		
	51–60	113 (30.6)	79 (15.6)			29 (23.2)	163 (21.8)			12 (24.5)	180 (21.8)		
	61–70	91 (24.7)	156 (30.9)			32 (25.6)	215 (28.7)			16 (32.7)	231 (28.0)		
	≥ 71	66 (17.9)	219 (43.4)			45 (36.0)	240 (32.0)			15 (30.6)	270 (32.7)		
Household income	Lowest	61 (16.5)	176 (34.9)	59.550 (<0.001)	0.15 (Medium)	51 (40.8)	186 (24.8)	15.924 (0.001)	0.08 (Small)	21 (42.9)	216 (26.2)	8.093 (0.044)	0.06 (Small)
	Lower middle	100 (27.1)	153 (30.3)			34 (27.2)	219 (29.2)			12 (24.5)	241 (29.2)		
	Upper middle	92 (24.9)	106 (21.0)			24 (19.2)	174 (23.2)			11 (22.4)	187 (22.7)		
	Highest	116 (31.4)	70 (13.9)			16 (12.8)	170 (22.7)			5 (10.2)	181 (21.9)		
Education (years)	≤ 6	78 (21.1)	168 (33.3)	16.406 (0.001)	0.08 (Small)	51 (40.8)	195 (26.0)	11.994 (0.007)	0.07 (Small)	22 (44.9)	224 (27.2)	8.002 (0.046)	0.06 (Small)
	7–9	58 (15.7)	77 (15.2)			18 (14.4)	117 (15.6)			5 (10.2)	130 (15.8)		
	10–12	116 (31.4)	133 (26.3)			27 (21.6)	222 (29.6)			9 (18.4)	240 (29.1)		
	≥ 13	117 (31.7)	127 (25.1)			29 (23.2)	215 (28.7)			13 (26.5)	231 (28.0)		
Marital status	Married	300 (81.3)	372 (73.7)	9.765 (0.008)	0.07 (Small)	85 (68.0)	587 (78.4)	6.665 (0.036)	0.06 (Small)	31 (65.3)	641 (77.7)	6.946 (0.031)	0.06 (Small)
	Divorced/ Widowed	55 (14.9)	118 (23.4)			35 (28.0)	138 (18.4)			14 (28.6)	159 (19.3)		
	Single	14 (3.8)	15 (3.0)			5 (4.0)	24 (3.2)			4 (8.2)	25 (3.0)		
Alcohol consumption	Never drinker	45 (12.2)	111 (22.0)	33.386 (<0.001)	0.11 (Small-medium)	24 (19.2)	132 (17.6)	1.028 (0.794)		9 (18.4)	147 (17.8)	9.923 (0.019)	0.06 (Small)
	Former drinker	89 (24.1)	166 (32.9)			40 (32.0)	215 (28.7)			18 (36.7)	237 (28.7)		
	Less than 4 times a month	181 (49.1)	161 (31.9)			45 (36.0)	297 (39.7)			10 (20.4)	332 (40.2)		
	More than twice a week	54 (14.6)	67 (13.3)			16 (12.8)	105 (14.0)			12 (24.5)	109 (13.2)		
Cigarette smoking	Never smoked	241 (65.3)	315 (62.4)	6.776 (0.079)		85 (68.0)	471 (62.9)	2.557 (0.465)		29 (59.2)	527 (63.9)	5.878 (0.118)	
	Former smoker	94 (25.5)	158 (31.3)			33 (26.4)	219 (29.2)			13 (26.5)	239 (29.0)		
	Current smoker (once in a while)	7 (1.9)	3 (0.6)			0 (0.0)	10 (1.3)			0 (0.0)	10 (1.2)		
	Current smoker (every day)	27 (7.3)	29 (5.7)			7 (5.6)	49 (6.5)			7 (14.3)	49 (5.9)		

^a phi (ϕ).

Table 3The difference between perceived depression and suicidal ideation according to return to work ($N = 874$).

Characteristics	Categories	n (%)	n (%)	χ^2	P	ϕ (Effect size)
Return to work	Working	Perceived depression		6.245	0.012	0.08 (Small)
		Yes (n = 125)	No (n = 749)			
Return to work	Nonworking	Suicidal ideation		5.238	0.022	0.08 (Small)
		Yes (n = 49)	No (n = 825)			
Return to work	Working	40 (32.0)	329 (43.9)	6.245	0.012	0.08 (Small)
		85 (68.0)	420 (56.1)			
Return to work	Nonworking	13 (26.5)	356 (43.2)	5.238	0.022	0.08 (Small)
		36 (73.5)	469 (56.8)			

Table 4The difference between perceived depression and suicidal ideation according to work type ($N = 369$).

Characteristics	Categories	Regular (n = 137)	Temporary (n = 65)	Daily (n = 25)	Self-employed (n = 117)	Unpaid family worker (n = 25)	χ^2 (P)
		n (%)	n (%)	n (%)	n (%)	n (%)	
Perceived depression	Yes	10 (7.3)	11 (16.9)	6 (24.0)	11 (9.4)	2 (8.0)	9.204 (0.056)
	No	127 (92.7)	54 (83.1)	19 (76.0)	106 (90.6)	23 (92.0)	
Suicidal ideation	Yes	3 (2.2)	3 (4.6)	0 (0.0)	5 (4.3)	2 (8.0)	3.526 (0.474)
	No	134 (97.8)	62 (95.4)	25 (100.0)	112 (95.7)	23 (92.0)	

cultural context²⁷ in which the negative stigma of cancer survivors and side effects of cancer treatment persist. As the number of cancer survivors with socioeconomic activities in South Korea increased from 25% in 2007% to 37% in 2015,³ the return to work of cancer survivors in South Korea is expected to improve in the future.

In this study, 74.3% of cancer survivors who did not return to work were 61 years of age or older. This finding is consistent with previous studies that reported the lowest return-to-work rates for breast cancer survivors in the 60-year-old age group.²⁰ Older age is a typical retirement stage and exacerbates the difficulties associated with working after cancer survival, further limiting employment opportunities.⁷ In South Korea, the relative poverty rate of the population aged 65 years and over is 38.1%,²⁸ which is approximately 2.7 times higher than the average for OECD member countries (14.1%).²⁹ Therefore, a national strategy supporting older cancer survivors who are vulnerable populations must be prepared to give them the freedom to enjoy their life.

In this study, the proportion of cancer survivors with shorter educational periods was higher in the nonworking group than in the working group. Wang et al.²² and Schmidt et al.²¹ reported that the predictor of unemployment after breast cancer surgery was related to a low educational level, which is similar to the results of this study. These results may be explained by the relationship between educational level and career choice and access to better jobs.³⁰ Cancer survivors with low educational attainment are more likely to be daily or non-regular workers without specialized knowledge or skills that are likely to be re-employed.¹⁹ Consequently, to assist cancer survivors with limited educational background in finding gainful employment, social policies, such as vocational training programs linked to employment and lifelong learning support, are required.

According to this study, the proportion of women with perceived depression among cancer survivors was higher than that of men. Gerbi et al.,¹⁰ reported that among American cancer survivors, a higher proportion of women were diagnosed with depression than men. Despite some differences related to country or pubertal stage due to biological differences in neurotransmitters, such as serotonin,³¹ women are approximately twice as likely to experience depression as men.³² Health care providers should recognize that female cancer survivors are vulnerable to depression and carefully monitor their depressive symptoms. Regularly assessing health status and engaging in effective communication to support emotional well-being is essential. Additionally, after cancer treatment, assisting the patients in returning to work by preparing them appropriately for their physical condition and occupational needs is important.

In this study, a higher proportion of cancer survivors with perceived depression and suicidal ideation was found in the low-income group. In previous studies, cancer survivors' financial problems have been reported to increase depression and suicide risk, which is similar to the results of this study.^{33,34} The non-fulfillment of economic needs is known to cause stress for individuals and is closely related to physical and mental health.³⁵ Particularly, the economic burden associated with cancer treatment expenses and income reduction can be interpreted as being negatively related to depression and suicidal ideation among cancer survivors. Therefore, developing tailored depression and suicidal ideation prevention programs that consider the household income of cancer survivors is essential. For instance, programs that offer mental health counseling and treatment at no cost or at a reduced fee should be implemented for low-income cancer survivors to facilitate the early detection and management of depression and suicidal ideation. Establishing a free online platform on which low-income patients with cancer can share their experiences and receive emotional support may help alleviate depression and reduce suicidal ideation. Additionally, interventions and policies that encourage the reemployment of cancer survivors are expected to contribute to maintaining their psycho-emotional well-being.

In this study, cancer survivors who were divorced, widowed, or single had higher incidences of perceived depression and suicidal ideation than those who were married. In previous studies,^{10,11} cancer survivors without spouses reported higher levels of depression, which is similar to the results of this study. Family plays a crucial role in the patient's overall well-being by providing emotional stability through meaningful engagement and serving as a support system.³⁶ In the absence of a spouse, social support to help patients adapt to crisis situations may be limited,¹⁰ which may have affected our results. Additionally, the absence of a spouse may indicate a lack of additional income to ease the economic burden, which could explain the higher levels of depression and suicidal ideation observed among cancer survivors without spouses. The finding that low household income is associated with depression and suicidal ideation supports this interpretation. Therefore, assessing the support system for cancer survivors and providing a social support network for cancer survivors without spouses are necessary to encourage the formation of mutual relationships through social participation and activities.

Perceived depression was more prevalent in the nonworking than in this study compared to the working group. Kim and von dem Knesebeck³⁷ reported that employment uncertainty exacerbates depressive symptoms, which supports the results of this study. Working eases

depression by fostering regular activities and a variety of interpersonal contacts, in addition to reducing economic stress.^{18,21,27} Moreover, as employment provides a steady lifestyle and social interactions that boost psychological stability and life satisfaction,^{18,27} the nonworking group in this study also reported higher levels of perceived depression.

Among cancer survivors with suicidal ideation, a higher proportion belonged to the nonworking group than to the working group. The interpersonal theory of suicide³⁸ states that when individuals do not belong to a valuable group, their sense of belonging is frustrated (thwarted belongingness), or when they feel like they are a burden to society (perceived burdensomeness), their desire to commit suicide arises. Cancer survivors stated that “to work again is to exist as a human being as long as you are not a patient,” which means that one can escape from the role of the patient and perform a social role again.^{2,18,26} Furthermore, the work of cancer survivors plays an important role in finding “economic support, psychological well-being, change of mood, occupational achievement, and self-esteem.”^{18,27} Although the generalizability of this finding may be limited, 5.6% of the cancer survivors had suicidal ideation in this study. Notably, a higher proportion of individuals with suicidal ideation was found in the nonworking group than in the working group.

Finally, in this study, no differences were observed in perceived depression and suicidal ideation according to the type of work, including regular, temporary, daily, self-employed, and unpaid family work. Generally, non-regular work in South Korea is known to be an unstable type of employment, and it has a negative effect on depression due to poor working environments, low wages, and restrictions on autonomous life.²³ However, the results of this study suggest that the work itself, rather than the type of work, may be associated with a reduction in depression and suicidal ideation among cancer survivors. Returning to work for cancer survivors indicates the thought of making a valuable social contribution and regaining control over the daily routine and life that was lost during cancer treatment.¹⁸ If a cancer survivor is physically and mentally in good health, depression and suicidal ideation can be reduced by providing minor employment opportunities, even if these are not regular jobs. Therefore, survivors can continue working even after being diagnosed with cancer. Policies are required to raise awareness among cancer survivors, caregivers, medical personnel, and the public, to allow them to return to work. Meanwhile, this study had a small sample size for each type of work, and there appeared to be potential differences in the proportion of participants perceiving depression in each occupation; therefore, repeated verification through extended research is warranted.

Implications for nursing practice and research

Cancer survivors face difficulties in returning to work due to physical and psychological problems during treatment and recovery; however, this study found that it is crucial to provide cancer survivors with an opportunity to return to work in any type of job to reduce depression and suicidal ideation. Therefore, in the case of cancer survivors, an approach involving systems such as work adjustment or leave of absence is required to avoid resigning because of illness. Furthermore, education is needed in the workplace to eliminate prejudices regarding cancer survivors' return to work, and the government should establish a support system to ensure that cancer survivors have the opportunity to return to work by providing customized employment and education services.

Limitations and strengths

This study has several limitations. First, confirming perceived depression and suicidal ideation over time in the cancer survivors was not possible. Second, cancer characteristics such as cancer stage, treatment stage, cancer type, and year of diagnosis were not analyzed. In this study, several relationships with small effect sizes were identified between returning to work, perceived depression, and suicidal ideation in cancer survivors. Therefore, reconfirming the effect size of the relationship through repeated

validation with various participants was essential. Univariate analyses were performed to identify the possible associations. However, considering that both return to work and the variables were associated with sociodemographic characteristics such as education level and household income, there may be a potential confounding effect of these characteristics on the observed relationship between return to work and outcomes. Therefore, regression analyses should be conducted to account for potential confounders. Nevertheless, this study is meaningful in that it investigated the relationship among returning to work, perceived depression, and suicidal ideation among cancer survivors, which can be generalized by analyzing a sample representative of the Korean population.

Conclusions

This study analyzed the relationship between perceived depression and suicidal ideation according to cancer survivors' return to work, using national big data from South Korea. Results indicated that returning to work and household income were positively related to depression and suicidal ideation among cancer survivors. In addition, returning to work, regardless of the work type, was associated with lower levels of depression and suicidal ideation. Based on the findings of this study, the development of customized return to work intervention strategies and social support policies is suggested for cancer survivors who are older, less educated, low-income, and without a spouse. Furthermore, considering the type of cancer and survival period of cancer survivors, follow-up research on depression and suicidal ideation after returning to work and studies exploring factors influencing cancer survivors' return to work are suggested.

CRedit authorship contribution statement

Haeryun Cho: Conceptualization, Methodology, Formal analysis, Writing – original draft, review, and editing, Funding acquisition. **Hye Suk Jun:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, review, and editing. All authors had full access to all data in the study, and the corresponding author had the final responsibility for the decision to submit the manuscript for publication. The corresponding author attests that all listed authors meet the authorship criteria and that no others meeting the criteria have been omitted.

Ethics statement

This study was approved by the exemption from deliberation at Kangdong Sacred Heart Hospital Institutional Review Board (IRB No. KANGDONG 2022-01-001).

Declaration of generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

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Data availability statement

Data supporting the findings of this study are available from the corresponding author upon request.

Declaration of competing interest

The authors declare no conflict of interest.

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