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Effects of Cognitive Status on Life Participation of Cancer Survivors

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Effects of Cognitive Status on Life Participation of Cancer Survivors

Abstract

The purposes of this study were to identify the cognitive status of cancer survivors, determine the effect of cognitive status on function and participation in daily activities, and explore how cancer survivors perceive changes in their cognition. The study used a quantitative nonexperimental cross-sectional design. The participants included 35 cancer survivors from two different sites. Instruments included the Montreal Cognitive Assessment (MoCA) and the Reintegration to Normal Index-Postal Version (RNLI-P) in the measurement of cognitive impairment and functional performance respectively. Data were also collected with a supplemental questionnaire to explore participants' perspectives on their cognitive difficulties and current function. The participant scores on the MoCA indicated cognitive impairment (μ= 25) and their scores on the RNLI-P demonstrated subpar reintegration (μ=9.64). Twenty-one participants answered the supplemental questionnaire. In content analysis of questionnaire responses, 17/21 participants reported some level of cognitive change related to cancer and cancer treatment. Data from an open-ended question were organized into four categories: decreased participation, more selective in activities, balance in activities, and cognitive changes. Study results indicate a large percentage of cancer survivors demonstrate mild cognitive impairment as well as changes in participation in instrumental activities of daily living.

Keywords

cancer survivor, cognition, participation

Credentials Display and Country

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Advances in research and treatment techniques have resulted in a growing number of cancer survivors (Cohen, 2010). However, with these new advancements come new concerns. Changes in cognition have been identified as an effect of cancer treatment in an estimated one-third of cancer patients and survivors (Raffa et al., 2006). Research has shown that symptoms associated with mild cognitive impairments (MCIs), including difficulty with new learning, forgetfulness, and managing daily activities, are prevalent among cancer survivors (Baxter, Dulworth, & Smith, 2011; Jenkins et al., 2006; Tannock, Ahles, Ganz, & van Dam, 2004). Consequently, a concern for cancer survivors is how cognitive impairments might affect their function and life participation after treatment. To date, there has been limited research on how cognitive changes caused by cancer treatment affect survivors' participation in daily activities.

Background

Cognitive Changes and Daily Function

Tannock et al. (2004) found that cancer survivors had concerns about cognition, in particular memory and concentration, following treatment. Ahles and Saykin (2001) noted similar findings across patients with different cancers who received systematic standard-dose chemotherapy. The participants in the study by Ahles and Saykin reported that cognitive impairments interfered with their career and educational goals, as well as with everyday functioning. In a more recent study, Baxter et al. (2011) found that of 38 participants, several encountered a decrease or change in their participation in everyday life, including physical and leisure activities. In a longitudinal randomized study, Kvale et al. (2010) determined that participants showed cognitive impairments that led to difficulty with instrumental activities of daily living (IADLs), particularly those associated with driving. These difficulties contributed to disabilities among the participants by affecting their ability to perform daily tasks.

Much of the research involving cancer-related cognitive impairment is found in studies with breast cancer survivors. For example, Jenkins et al. (2006) reported that of 128 breast cancer survivors, 83% noticed changes in memory and 80% noticed a change in concentration. These changes decreased to 60% and 45%, respectively, after three years. In another study of 52 breast cancer survivors, 17-25% showed significant cognitive impairments following cancer treatment (Von Ah et al., 2009). Reid-Arndt, Hsieh, and Perry (2010) demonstrated that cognitive impairments continue to be prevalent up to one year after treatment has ended. Moreover, these impairments have been shown to have an effect on daily tasks, such as the ability to make employment decisions and return to work (Munir, Burrows, Yarker, Kalawsky, & Bains, 2010). Breast cancer patients have also expressed similar cognitive dysfunctions after receiving adjuvant therapy (i.e., additional chemotherapy, radiation, or other treatment) to decrease cancer reoccurrence. In a study by Shilling and Jenkins (2007), 142 breast cancer patients reported cognitive impairments, particularly with memory (71%) and concentration (64%). The use of Tamoxifen, an anti-estrogen drug taken by premenopausal breast cancer patients, has been shown to result in widespread cognitive impairments (Palmer, Trotter, Joy, & Carlson, 2008).

Cancer survivors across many diagnoses, including gastrointestinal, lung, lymphoma, head and neck, prostate, and breast cancer, have reported difficulties with activities requiring cognitive functioning many months and years after completing treatment (Mah, Bezjak, Loblaw, Gotowiec, & Devins, 2011). Grosshans, Meyes, Allen, Davenport, and Komaki (2008) found that persons with lung cancer receiving radiation showed a decrease in both executive function and language. It has also been estimated that 15% of persons with small-cell lung cancer may experience cognitive impairments following treatment (Kanard, Frytak, & Jatoi, 2004). In a study by Schagen et al. (2008), 50% of testicular cancer survivors (N = 70) reported cognitive impairments following chemotherapy treatment. In addition, difficulties with verbal memory and motor speed were evident in persons diagnosed with lymphoma cancers for up to two years following treatment (Correa et al., 2009).

MCI and Daily Function

MCI is defined as an intermediate clinical state between normal cognitive function and dementia that focuses primarily on memory, concentration, and attention (Petersen, 2004). In recent years, it has been researched as a diagnostic entity to be used with a variety of populations, including the cancer population. Results of a study by Tuokko (2007) found that 69% of participants with MCI (N = 101) demonstrated functional impairment, particularly involving memory and executive function. In a study by Baxter et al. (2011), of the 25 cancer patients reporting difficulty with memory, planning, or attention, 36% scored as having a mild cognitive impairment.

Farias et al. (2006); Perneczky et al. (2006); and Artero, Touchon, and Ritchie (2001) all concluded that persons with MCI are affected by cognitive impairments, which can result in a wide range of deficits in everyday life. Kurz, Pohl, Ramsenthaler, and Sorg (2009) have suggested that MCI interferes with social planning, such as structuring and maintaining social contacts. Maintaining the social aspects of life is an important domain in quality of life (QoL) among cancer survivors (Bloom, Petersen, & Kang, 2007). In a large study of breast cancer survivors receiving adjuvant and/or Tamoxifen therapy (N = 763), 30% were shown to have poorer functioning on several dimensions of QoL (Ganz et al., 2002).

More specifically, Okonkwo, Wadley, Griffith, Ball, and Marson (2006) and O'Connor, Edwards, Wadley, and Crowe (2010) suggested that persons with MCI have trouble with a variety of IADLs, including difficulties with telephone use, transportation, shopping, meal preparation, housework, medications, and money management. Chirikos, Russell-Jacobs, and Jacobsen (2002) reported that these impairments are likely to affect work effort and earnings. In a study investigating persons with MCI and money management, Okonkwo et al. (2006) found that persons with MCI made more errors affecting work effort, earnings, and overall economic status. Persons with MCI also have increased difficulty using technology, such as cell phones, remote controls, microwave ovens, and computers. These technological tools are important for daily life, and difficulty using them can impede daily function and participation (Rosenberg, Kottorp, Winblad, & Nygard, 2009).

Adequate cognitive function is crucial to performing IADLs associated with function and participation. However, there is limited literature that relates cognitive dysfunction to cancer survivors' daily participation. Further research is needed to identify evidence-based interventions geared toward life participation.

Method

Purpose of Study

Initially, this study had two purposes. The first was to identify the posttreatment cognitive status in a population of cancer survivors. The second was to determine how these changes affected their function and participation in daily life activities. A third purpose was eventually added, which explored how cancer survivors perceived changes in their cognition.

Research Design

This study used a nonexperimental cross-sectional design to explore quantitative data relevant to cancer-related cognitive changes. Measures were taken for attention, concentration, executive function, memory, calculation, and orientation related to mild cognitive impairment, as well as how well the participants engaged in daily activities. Data gathered by questionnaire included participants' perceptions of how cancer treatments and MCI affected their daily routines and participation in activities. This study was a collaborative project completed in Towson, Maryland, and Houston, Texas.

Participants

The participants recruited for this study were adult cancer survivors. The operational definition of cancer survivor was an individual with a diagnosis of cancer who had completed primary treatment for cancer. Inclusion criteria were that participants had the physical language and visual abilities needed to complete the assessments. No exclusion criteria were placed on cancer type, gender, ethnicity, or adult age.

Instruments

The instruments used included the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005), the Reintegration to Normal Living Index–Postal Version (RNLI-P) (Daneski, Coshall, Tillingand, & Wolfe, 2003), and a supplemental questionnaire. The MoCA is a screening tool designed to detect MCI that takes approximately 10 min to administer. The tool assesses different cognitive domains: attention, concentration, executive functions, memory, language, visuospatial skills, conceptual thinking, calculations, and orientation. The MoCA has been used previously to detect MCI in several populations, including persons with Alzheimer’s disease, Huntington’s disease, Parkinson’s disease, cardiovascular disease, and brain metastases. The highest possible score on the MoCA is 30 points, and a score of 26 or above is considered normal. When compared to normal controls, the MoCA has a sensitivity level of 87% for normal controls and 90% for persons exhibiting an MCI. The test-retest reliability coefficient is .92, with an internal consistency measured by Cronbach’s alpha at 0.83. The MoCA has been demonstrated to be sensitive in identifying MCI in aging adults compared to age-matched controls and age-matched persons diagnosed with dementia (Nasreddine et al., 2005).

The RNLI was developed in 1988 to assess life participation by measuring how well an individual returns to normal living patterns following an incapacitating diseases or injury (Wood-Dauphinee, Opzoomer, Williams, Marchand, & Spitzer, 1988). The RNLI used a visual analog scale to assess participants’ perceptions on 11 declarative statements representing domains of daily functioning (e.g., mobility and self-care), daily activities (e.g., work, recreational, and social activities), roles and personal relationships, and general coping skills. The RNLI was found to have an internal consistency, as measured by Cronbach’s alpha, of 0.90 (Wood-Dauphinee et al., 1988) and a concurrent validity of 0.72 (Spitzer, Dobson, & Hall, 1981).

In 2003, the RNLI was revised as a postal version and was renamed the RNLI-P. To complete the RNLI-P, the participants answer 11 questions by choosing “agree” or “disagree” (Daneski et al., 2003). One point is given for each agree statement, and zero points for each disagree statement. The lowest score possible is a 0. The highest score, 11, indicates maximum integration. Reliability measures have shown that the RNLI-P is an excellent measure of reintegration into life following a traumatic event or injury. The test-retest reliability of the RNLI-P, as measured by the kappa level, is 0.92 (Daneski et al., 2003).

The supplemental questionnaire was designed by the researchers (and had been used in a previous study) to obtain more in-depth information regarding the participants’ perceptions of cognitive dysfunction and their current abilities to function and participate (Baxter et al., 2011). Areas addressed in the questionnaire included safety at home, safety with driving, the ability to return to work, and the level of participation compared to life before the cancer diagnosis and treatment. The questionnaire consisted of two yes/no questions, four questions to be ranked on a five-point Likert scale, and one open-ended question. Questions were as follows:

- Do you have any trouble with memory, planning, or attention?
- When you are home alone, do you feel safe?
- Have you returned to work?
- If yes, what percentage of your normal job functions are you able to do?
- Do you drive?

- If yes, do you feel you are as safe a driver as you were before being diagnosed with cancer?
- Compared to your lifestyle prior to diagnosis, how has your participation in daily activities changed?

Procedures

The researchers recruited the participants through a convenience sample of Towson, Maryland, and Houston, Texas, area cancer survivors. In Towson, the participants were recruited from a wellness center using a recruitment brochure, through personal contacts, and via a snowballing technique. In Houston, participants were recruited through personal contacts, followed by a snowballing technique. In both Towson and Houston, data collection occurred in a location that was convenient for each individual participant: quiet, free from distractions, and containing a table with two chairs. The participants were provided the purpose of the study, in written form and verbally, and given an opportunity to ask questions. Then the participants were provided with an informed consent document, approved through the respective affiliated universities, and assigned a unique code number to maintain anonymity.

Data collection began with each participant completing a self-report form for age, gender, race, diagnosis, time since diagnosis, time since last treatment, and type of treatment received. Then, the researchers administered the MoCA and the RNLI-P, alternating the sequence to decrease the influence of one test on the other. Data collection began in Towson, followed by data collection in Houston. During the data collection in Towson, many of the participants commented on how their participation in activities changed as a result of cancer and cancer treatment. To capture this concept of change in activities and participation, the researchers decided to add a supplemental questionnaire for the Houston participants. Therefore, only the Houston participants completed the supplemental questionnaire, which was administered in an alternating sequence with the MoCA and the RNLI-P.

Data Analysis

The researchers used SPSS version 17.0 for data analysis (SPSS, 2009). Descriptive statistics were used to analyze the data. Frequencies were calculated for diagnoses of cancers, types of treatment, time since last treatment, and highest level of education. Total scores for the MoCA and the RNLI-P were calculated. The prevalence of MCI was determined by identifying the number of participants who scored below 26 on the MoCA. A correlation was done comparing the MoCA and the RNLI-P scores.

The researchers used content analysis to analyze the participants' responses to the supplemental questionnaire. By definition, an MCI does not interfere with the ability to respond appropriately to inquiries. The researchers constructed a case-by-variable matrix for the data, with a row for each participant and a column for each question of the questionnaire (Bernard, 2013). Responses to the open-ended question of the supplemental questionnaire were coded and assigned to categories. Frequencies of data were then computed.

Results

The participants for the study included 35 adult cancer survivors; 12 participants were from the Northeast (Towson), and 23 participants were from the South (Houston). Demographic data for the participants are shown in Table 1. The educational backgrounds of the participants were as follows: seven (20%) had completed high school, six (17.14%) had an associate's degree, 11 (31.42%) had a bachelor's degree, six (17.14%) had a master's degree, and five (14.30%) had a doctorate degree.

Diagnostic and treatment modalities data are also shown in Table 1. Data regarding recurrence were not available, as the participants were not asked if this was their first and only cancer occurrence.

Table 1

Participant Demographic, Diagnosis, and Treatment Data (N = 35)

Gender	
Female	22
Male	13
Age	
20s	3
30s	2
40s	2
50s	8
60s	10
70s	7
80s	3
Race	
Caucasian	28
Asian	3
Hispanic	2
African American	1
Other	1
Time Since Last Tx	
0-1 year	13
1+-5 years	11
5+-10 years	4
10+ years	7

Diagnosis	
Breast	10
Colorectal	2
Other	8
Combination	7
Ovarian/Gynecological	1
Prostate	7
Type of Tx	
Chemotherapy	8
Radiation	4
Hormonal	3
Surgery	5
Chemotherapy + Radiation	9
Radiation + Hormonal	3
Multiple Treatments	3

MoCA Scores

The scores obtained from the MoCA ranged from 20 to 29, with a mean score of 25.0 (*SD* ± 2.5). Of the 35 participants, 22 (62.9%) scored 25 or below, and 13 (37.1%) scored 26 or above. The scores for each section were evaluated and compared with the total points possible in each section. The three sections of the MoCA with the lowest percentage of correct scores were delayed recall (20%), visuospatial/executive function (37.1%), and language (45.7%). Attention and abstraction both had scores of 57.1% correct. Naming and orientation both had scores of 91.4% correct.

A Pearson product-moment correlation coefficient was computed to assess the relationship between MoCA scores and time since last treatment. As noted in Table 1, time since last treatment ranged from less than one year (n = 13) to 10 or more years (n = 7). There was no correlation between MoCA and time since last treatment [r = .102, *p* = .558].

RNLI-P Scores

The scores on the RNLI-P ranged from six to 11 (Table 2), with a mean score of 9.64 (*SD* ± 1.12). Of the 35 participants, four (11.4%) scored an 11 on the RNLI-P, which indicated full reintegration into daily living. The majority of the respondents indicated less than optimal integration. Of the specific statements asked, 29 (82.9%) disagreed with the statement, “I feel embarrassed when I am with other people.” All other statements had fewer than four (11.4%) participants in disagreement. The MoCA and the RNLI-P scores were compared and yielded a correlation of r = .04, *p* = .818.

Table 2

RNLI-P Scores Across Participants (N = 35)

RNLI-P Scores	11	10	9	8	7	6
Participants: n (%)	4 (11.43%)	23 (65.71%)	3 (8.57%)	3 (8.57%)	1 (2.86%)	1 (2.86%)

Supplemental Questionnaire Responses

Twenty-one of the 23 Houston participants answered the supplemental questionnaire. Seventeen (80.95%) answered yes to the question, "Do you have any trouble with memory, planning, or attention?" Eight (38.1%) reported a little, four (19.05%) reported somewhat, three (14.29%) reported much, and two (9.52%) reported a great deal. Of the 17 participants who self–reported changes in cognition, 10 (58.8%) had scored 25 or below on the MoCA and had a mean RNLI-P score of 8.9 (*SD* ± 1.59). Conversely, there were seven who self-reported difficulties with cognition, but who also had MoCA scores of 26 or above, indicating a possible misperception of cognitive changes.

Four categories were developed from the coded responses to the open-ended question in the supplemental questionnaire (Table 3). Decreased participation was the most frequently reported change; the participants stated it was due to decreased energy or fatigue and/or taking longer to perform activities. Three participants reported that they were "very tired most days," while two participants expressed that they "took more naps." One participant eloquently summed up what many of the others expressed with the statement, "slower, less energy in general."

Table 3
Summary of Participant Responses to Supplemental Questionnaire by Category (n = 21)

Category	Number of Responses	Percentages*
Decreased participation; decreased energy and/or takes more time to complete activities	11/21	52.38%
More selective in activities	8/21	38.09%
Balance in activities	5/21	23.81%
Cognitive changes	4/21	19.04%

Note. The supplemental questionnaire was administered to Houston participants only. Twenty-one of the 23 participants answered the supplemental questionnaire.
*Percentages total more than 100%; some participants identified more than one category of concern.

The next largest number of responses related to being more selective in activities in which to participate. The World Health Organization (WHO) defines participation as "involvement in a life situation" (World Health Organization, 2001, p. 10). So a change in participation for this study was defined as a change (sometimes a decrease) in involvement in a life situation. One participant described that he/she "stopped participating in previous organizations." Another participant expressed that he/she "could not devote the time needed for school [college courses]."

Five participant comments were categorized as striving for a balance in activities. This was evident when one participant expressed the "need for more balance in life." Another participant related the need to "plan ahead" or schedule daily activities, while another expressed that he/she "tried to maintain all daily activities."

Four participants reported cognitive changes that interfered with their participation. These included decreased memory, concentration, comprehension, and the ability to multitask.

Discussion

The purposes of this study were to identify the cognitive status in cancer survivors posttreatment, determine how those changes affected their function and participation in daily life activities, and explore how cancer survivors perceived changes in their cognition. The results established that a significant percentage of the cancer survivors believed they had trouble with memory, planning, or attention. These findings support previous studies in which cancer survivors self-reported or presented with symptoms of MCI (Ahles & Saykin, 2001; Baxter et al., 2011; Reid-Arndt et al., 2010; Shilling & Jenkins, 2007; Tannock et al., 2004; Von Ah et al., 2009).

No correlation was found between the MoCA scores and the RNLI-P scores. It is possible that the RNLI-P is not sensitive enough to detect subtle changes and allow for correlation analysis. Although the analysis showed no relationship between the MoCA and the RNLI-P scores, 31 of the 35 participants had scores on the RNLI-P that indicated that they believed they were not reintegrated into normal living. These results suggest that cancer survivors have potential difficulty in returning to normal routines. This is supported in the literature, which indicates that people with memory difficulties experience problems participating in normal routines, work, and social functions (Artero et al., 2001; Farias et al., 2006; Perneczky et al., 2006).

Performance skills that decrease participation in daily life are areas of concern for occupational therapy practitioners (American Occupational Therapy Association [AOTA], 2008). The lowest percentages of correct scores on the MoCA were delayed recall (memory), executive function, and language, all indicating areas of most difficulty in cognition. In addition, 80.95% of the participants who answered the supplemental questionnaire reported difficulty with memory, planning, and attention. According to the *Occupational Therapy Practice Framework* (OTPF)

(AOTA, 2008), attention, memory, perception, and thought are considered body functions under client factors. Delayed recall is necessary for an individual to plan and manage the performance of an activity. Furthermore, an individual needs executive functioning to identify possible solutions for a proposed problem in daily functioning. These specific mental functions affect the performance skills clients use to participate in daily occupations.

By definition, a determinant of MCI is that there is minimal or no change in abilities and participation in basic routines and IADLs, even though there is a change in cognition. However, research suggests a link between MCI and impairments in IADLs (O'Connor et al., 2010; Okonkwo et al., 2006). The present study offers insight on the specific IADLs that have the potential to be problematic for cancer survivors: performance at work; formal educational participation; community mobility (e.g., driving); and social participation with community, family, and peers. Overall, this study shows a decrease in life participation, as evidenced by 88.57% of the participants reporting 10 or less on the RNLI-P and therefore indicating decreased participation and changes in integration into daily living. These results support work by Lyons, Lambert, Balan, Hegel, and Bartels (2013), which found that changes in activity and participation level were frequent in older cancer survivors.

Limitations

The results of this study are preliminary and should be interpreted with caution. A small sample size (N = 35), the large range of the participants' ages, and the large range of time since last treatment detract from the interpretability of the study. Given the size of the sample, there is not enough power for generalization to the population. In addition, the use of two different locations, with no attempt to control for a specific diagnosis or a specific time since treatment, contributes to the study's limitations. Recruitment and data collection procedures varied at the two locations. This may have affected the study's results, although the researchers judge the probability of this unlikely as the tests used do not require stringent procedures.

A number of the participants (28.6%) were aged 70 years and older. Cognitive decline with aging is a frequent concern in research with older adults, and age-related cognitive decline may have contributed to the results of the study. However, as previously mentioned, the MoCA has been demonstrated to be sensitive in identifying MCI in aging adults when they are compared to age-matched controls and age-matched persons diagnosed with dementia (Nasreddine et al., 2005). Also, three of the 10 participants aged 70 years and older had MoCA scores above 26.

A further limitation is that researchers did not obtain the participants' prior level of cognitive functioning. Several studies have indicated that obtaining a baseline for cognition in the cancer population is difficult because the psychological effects of stress, anxiety, and depression related to a cancer diagnosis can result in cognitive changes (Vardy, Rourke, & Tannock, 2007). Therefore, although decreased cognitive status is evident in many cancer survivors, it is difficult to attribute changes in cognitive status specifically to cancer and cancer treatments.

The range of time since last treatment varied from less than one year to 34 years, and seven participants reported 10 or more years since their last treatment. Given this wide range of time, it is possible that recognition of changes in cognition and function specifically attributable to the cancer and treatment may not be accurate. Yet, there was no correlation found between time since treatment and MoCA score [$r = .102$, $p = .558$]. Some participants who were five to 10 years posttreatment had some MCI, and some who were fewer than five years posttreatment had no MCI.

Finally, a limitation is that question number 10 on the RNLI-P is worded in a negative manner compared to the other questions on the RNLI-P. Question 10 reads, "I feel embarrassed when I am with other people." Since this is the only question worded with a negative slant, if it is not read carefully, respondents might inadvertently pick "agree" even if they are functioning and integrated into their previous daily routines. This phenomenon might have negatively affected RNLI-P scores by lowering them artificially. It is also possible that the RNLI-P is not sensitive enough to capture the difficulties verbalized by cancer survivors.

Implications for Occupational Therapy Practice

The results of this study suggest several practice implications. First, persons who are living following cancer diagnosis and treatment should be evaluated for cognitive impairment and for participation in activities of daily living and IADLs. The areas of increased difficulty include visuospatial/executive functioning, delayed recall, and language. The OTPF (AOTA, 2008) defines each of these cognitive functions as necessary for task completion. Further, they are important for participation in habitual and nonhabitual activities. In addition, occupational therapy should include strategies and interventions to improve or compensate for changes in cancer survivors' cognitive skills.

Many participants in this study indicated that increased fatigue and increased time needed to complete activities contributed to decreased participation in activities. Therefore, it is imperative that practitioners address these concerns. Occupational therapy for post-cancer care individuals with MCI should include interventions to increase participation in activities of daily living and IADLS, with strategies such as activity and/or contextual modifications, pacing, and energy conservation techniques.

Much of the literature indicates that changes in daily tasks are frequent side effects of cancer and cancer treatments (Chirikos, et al., 2002; O'Connor et al., 2010; Okonkwo et al., 2006; Rosenberg et al., 2009). Furthermore, changes in activity, participation level, and routines are frequent in older cancer survivors (Lyons et al., 2013). However, there has been little written to indicate that there are changes in activities, participation, and routines for younger persons as a result of cancer and cancer treatments. This study suggests that changes in participation, including needing more time for engaging in activities, being more selective in activities, and trying to find a balance in participation, are a result of cancer and cancer treatments. Yet, not all of the changes in participation were negative. Several of the participants suggested changes in participation that they perceived as beneficial, including an increased spirituality. The implication is that all areas of occupation, including work engagement, social participation, leisure activities, and rest, are important factors in the occupational therapy assessment.

Many of the study participants offered comments and insights related to changes in activities and participation. Occupational therapy practitioners can assist clients in evaluating their selection of activities and participation, including finding a balance of activities. Practitioners can help clients reflect on their occupational profile; examine current priorities, abilities, concerns, and risks; and find community engagement activities that fit their priorities and abilities.

Practitioners need to be aware of the possible cognitive dysfunctions cancer survivors may be experiencing. Also, practitioners need to recognize the particular areas of cognitive dysfunction that are prevalent in cancer survivors. This awareness can lead to effective evaluation and treatment by occupational therapy practitioners, ultimately increasing their clients' participation in daily life. Since cancer survivors also experience other health conditions, such as hip replacement, arthritis, or stroke, understanding related cognitive dysfunctions can also assist practitioners when encountering such patients.

Future Research

Suggestions for future studies include the need for a large-scale study of MCI in cancer survivors across specific diagnoses, and the need to examine the influence of gender, race, and age. A longitudinal study would be ideal for determining the long-term cognitive effects of cancer treatment, yet a cross-sectional study with a larger population would be more feasible and would generate similar data. In addition, researchers should examine the relationship among specific cancer treatments and MCI, and determine the best instrument to measure participation in daily routines. Last, but most important, it is necessary to establish best practices to increase participation in everyday activities for cancer survivors experiencing MCI.

Conclusion

The results of this study add to the growing body of knowledge indicating that cancer survivors show MCIs, specifically in memory, executive function, and visual/spatial processing. There also appears to be a connection between MCI and a self-reported decrease in participation in daily activities, specifically IADLs. These findings suggest that rehabilitation for cancer survivors should include an evaluation for cognitive function and interventions that focus on the promotion of strategies to improve function and increase participation in daily routines. As the number of cancer survivors increases, occupational therapy practitioners can play an important role in cognitive rehabilitation and reintegration into daily living.

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