Research Square

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Occupational Problems Identified by Cancer Survivors with Cancer-Related Cognitive Impairment (CRCI): a secondary data analysis

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Abstract

Purpose

This study aimed to describe occupational problems faced by cancer survivors coping with CRCI.

Method

A cross-sectional study was conducted on 89 adults with CRCI recruited from a hospital-based outpatient cancer center. Participants completed the Canadian Occupational Performance Measure (COPM) and their reported occupational problems were categorized by area and sub-area. Comparisons were made across gender, time since last treatment and severity of subjective cognitive complaints.

Results

Participants identified 4.1 occupational problems on average. The majority were in the productivity (43%) and leisure (38%) areas. A statistically significant gender difference was observed [$\chi^2(8) = 20.579$, $p = 0.008$]. No statistically significant differences were found between the groups based on the time since treatment or severity of cognitive complaints.

Conclusions

Cancer survivors with CRCI commonly reported problems at work and social participation. While some gender-based differences were observed, most demographic and medical factors were not associated with distinct occupational problems patterns. Taken together, these findings highlight the variability of occupational problems among survivors with CRCI. This points to the value of person-centered assessments and rehabilitation interventions.

Key Messages

- This study enhances the understanding of occupational challenges among cancer survivors coping with CRCI, emphasizing individualized profiles. This might help treatment adjustment and rehabilitation.
- Survivors coping with CRCI reported occupational problems mostly in work and socialization.
- Time since last treatment doesn't affect the occupational problems profile.

Introduction

Cancer ranks as a leading cause of death and a major barrier to increasing life expectancy in every country in the world. The International Agency for Research on Cancer estimates that 19.3 million newly

diagnosed cancer cases will occur worldwide in 2020, and 28.4 million cases are expected to occur in 2040, an increase of 47% [1]. In recent decades there has been an increase in cancer survival rates due to advances in treatment efficacy and early diagnosis of the disease [2]. Cancer treatments typically include surgery, chemotherapy, or radiation that control the disease. However, these treatments, together with the cancer itself, often result in damage to various body systems, creating long-term side effects, such as fatigue, depression, anxiety, pain syndromes, and cognitive impairment [3]. These bothersome side effects, in turn, can affect one's ability to perform daily activities [4].

Cancer-related cognitive impairment (CRCI) is one of the long-term health problems associated with cancer treatments affecting up to 75% of individuals recovering from Non-Central Nervous System (Non-CNS) cancers [5]. The etiology of CRCI is multifactorial, involving both the direct neurophysiological effects of cytotoxic drugs given for cancer treatment [6] as well as psychological issues related to coping with cancer, including anxiety, depression, and stress [7, 8]. According to current studies, the CRCI severity typically falls within the mild to moderate range [9] and predominantly impacts memory, processing speed, attention, executive function and various cognitive-communication domains [10–12]. A neuropsychological evaluation is commonly used to identify CRCI symptoms and symptoms can appear early or late in the disease course [4] and it is unclear whether symptoms of CRCI will improve over time [13]. Some reporting of the presence of symptoms many years after recovery [14].

Previous studies that have examined samples of cancer survivors with CRCI have shown that it adversely affects occupational and social functioning more than 5 years post treatment [4, 15]. Von Ah et al. (2013) found that cognitive impairment among cancer survivors had a significantly negative impact on self-esteem, self-confidence, and social relationships. These effects ranged from increased task completion times to occupational limitations in ADLs and IADLs at home [15]. In addition, survivors reported difficulty returning to work and potential compulsory career changes, or even retirement resulting from the cognitive demands of the job [15]. In other words, cancer survivors have difficulty resuming previous life roles and engaging in valued activities. This is especially true if those roles require high cognitive abilities [16, 17] such as reading [15].

The present study aims to deepen our understanding of occupational problems faced by cancer survivors coping with CRCI by examining differences across key subgroups. Specifically, we investigate variations in occupational problems based on (1) gender (2) time since last treatment at different survivorship stages [18, 19] and (3) the severity of subjective cognitive complaints.

Method

Study design and Participants

The present descriptive study is a secondary data analysis conducted as part of a randomized controlled trial that examined the efficacy of a novel intervention for cancer survivors coping with CRCI [20].

Baseline data from this trial, along with data from an earlier pilot study [21], were pooled for the current analysis. In total, 89 participants completed the baseline assessment and were included in the study.

All participant recruitment was conducted at the Hadassah-Hebrew University Medical Center, Jerusalem, Israel, by medical staff. Inclusion criteria: (a) Age > 18 years, (b) Expressed concerns about cognitive impairment due to cancer diagnosis or treatment, (c) Completed active cancer treatment for non-CNS at least 6 months before recruiting, (d) Daily access to a computer and the internet. Exclusion criteria: (a) Severe cognitive decline [Montreal Cognitive Assessment; MoCA < 19 [22]], (b) Unstable psychiatric condition according to medical records; and (c) History of a brain tumor or other severe neurological disorders.

Measures

Sample characterization

Demographic and medical questionnaire

A brief demographic questionnaire was used to collect background information (i.e. age, gender, living and marital status, education, and employment status). Additional medical data were retrieved from participants' medical records (including cancer type, time since treatment completion and treatment modes).

Outcome measures

Canadian Occupational Performance Measure (COPM; [23])

The COPM is a semi-structured interview suitable for a wide range of diagnoses. It was designed to help patients identify and evaluate occupational performance in the areas of self-care, productivity and leisure. These main areas are further divided into sub-areas. Self-care consists of 'personal care', 'functional mobility', and 'community management'; productivity consists of 'paid/unpaid work', 'household management', and 'play/school', and leisure consists of 'quiet recreation', 'active recreation', and 'socialization'. In the current study, participants selected up to five occupational problems using the COPM. The validity and reliability of COPM has been confirmed in numerous studies across various populations including cancer patients [24, 25].

Functional Assessment of Cancer Therapy Cognitive Scale (FACT-Cog; [])

The FACT-cog is a self-report questionnaire designed to assess the subjective cognitive function of cancer survivors experiencing cognitive decline. The Questionnaire includes 37 items categorized into

four groups: (a) perceived cognitive impairments (PCI); (b) impact of perceived cognitive impairments on quality of life; (c) comments from others; and (d) perceived cognitive abilities. Participants rate their perception of each item on a scale from 0 to 4 (0= 'never' and 4='several times a day') based on the last week. A higher score indicates better perceived functioning. The subtest scores of PCI (including 20 items) stand on their own as a reliable measure. In this study, we chose to refer to the cutoff point of 44 points, which is 1.5 standard deviations (SD) below the normative mean on the subscale and indicates significant subjective CRCI [7].The questionnaire has high internal reliability (Cronbach alpha = 0.707–0.929) [27] and has been translated into the Hebrew language according to FACIT standards.

Procedure

Approval for the research was granted by the Helsinki Committee of Hadassah Hospital (#0138-18-HMO). Oncologists and research personnel contacted potential cancer survivors who met the inclusion criteria and invited them for a first intake meeting. After obtaining written informed consent and confirming eligibility, assessments were conducted by occupational therapists using the COPM and the FACT-Cog. The problems were categorized by the research team. Total data collection was completed in approximately two years.

Data Analysis

Data were analyzed using IBM SPSS Statistics 26. Descriptive statistics were applied to the socio-demographic data analysis. Categorizing specific areas and sub-areas of activities was followed by an analysis of the prevalence of participation difficulties, defined as occupational problems in the COPM and. A Chi square test was used to examine between group differences in the occupational problems reported by survivors between two categorical variables: (a) gender (b); years since recovery in two separate binary groups analyzed independently, less than two / five years versus more than two years post-treatment. (c); and cognitive decline as assested using the PCI category from the FACT-Cog questionnaire.

Since multiple occupational problems were reported by each participant, the data were nested within participants and thus not statistically independent. Therefore, visual analysis of frequency distributions was used as a complementary method to explore potential patterns that may not be detectable through statistical tests alone.

Results

Eighty-nine participants completed the baseline assessment, from which data were extracted. Table 1 presents demographics and medical characteristics. The sample age range was 23–75 years. The majority of participants were women (n = 67, 75.3%), married (n = 67, 75.3%), and diagnosed with breast cancer (n = 48, 53.9%). The male group was older than the female group, but the difference was not significant.

Table 1

Sociodemographic and clinical characteristics of the participants (N = 89)

Age	**N (%)**	**Mean ± SD (Range)**
		51.97 ± 11.04
Male	22 (24.7)	56.00 ± 12.24
Female	67 (75.3)	49.87 ± 9.74
Family status		
Single	10 (11.2)	
Married	67 (75.3)	
Divorce	5 (5.6)	
Widow	3 (3.4)	
Non available	4 (4.5)	
Cancer type		
Breast	48 (53.9)	
Colorectal	8 (9.0)	
Lymphoma	9 (10.1)	
Melanoma	4 (4.5)	
Other types (i.e. lung, ovary, rectal and prostate)	20 (22.5)	
MoCA		24.11 (19–30)
Months since last treatment		33.64 (6-148)

Note: MoCA- Montreal Cognitive Assessment; [22]

Each participant identified an average of 4.1 occupational problems during the COPM interview, resulting in 361 occupational problems. The problems were grouped into three main areas as suggested by the COPM and then further subdivided into nine sub-areas, with three in each main area (Leisure – socialization, active recreation and quiet recreation; Productivity- school, household management and paid/unpaid work; Self-care- community management, functional mobility and personal care). Examples of the most common occupational problems reported are detailed in Table 2.

Table 2

Area	Sub area	Examples for occupational performance problems
Self-care	Personal care	Managing health
		Getting enough sleep
		Maintaining a healthy diet
	Functional mobility	Moving the body
	Community management	Driving a car
Productivity	Paid/unpaid work	Returning to work
		Maintaining concentration at work
	Household management	Remembering tasks around the house
		Completing desired activities with/for the children
	School	Maintaining concentration during studies
Leisure	Quiet recreation	Maintaining concentration while reading
		Remembering details from a movie or show
	Active recreation	Engaging in physical activities
	Socialization	Retrieving words and names in a social situation
		Maintaining contact with family and friends
		Participation in social conversations

The most frequently reported occupational problems observed in the productivity domain (n = 156, 43%) and the leisure domain (n = 136, 38%). Within these domains, the problems were most commonly identified in three sub-areas: (a) paid/unpaid work (n = 72, 20%); (b) socialization (n = 71, 20%); and (c) household management (n = 66, 18%). The lowest number of occupational problems were reported in the self-care area (n = 69, 19%) with the sub-area of functional mobility having the lowest number of identified problems (n = 7, 2%).

Gender differences in occupational problems

When examining the differences between genders across occupational performance areas (Fig. 1A), no significant differences were observed [$\chi^2(2) = 0.306$, $p = 0.858$]. However, a significant difference was found in a chi-square test between gender and the sub-areas [$\chi^2(8) = 20.579^{**}$, $p = 0.008$], in sub-areas of household management and school (Fig. 1B). Females reported 22% (n = 61) occupational problems in household management, making it the sub-area with the most identified problems among them. Males

on the other hand, reported only 6% (n = 5) occupational problems in this area. In the school sub-area males reported more occupational problems (n = 9, 11%) than females (n = 9, 3%).

Despite the absence of significant group differences, a visual examination of the data also revealed a gap in the paid/unpaid work sub-area between males (n = 18, 23%) and females (n = 54, 19%), with males having 4 percentage points higher than females. A similar gap was observed in the socialization sub-area (male n = 18, 23%; female n = 53, 19%). Conversely, in the personal care sub-area females reported more occupational problems (male n = 12, 11%; female n = 31, 15%), with females reporting 4 percentage points more than males. In addition, females reported more occupational problems in the sub-area of quiet recreation (male n = 4, 5%; female n = 27, 10%).

Time since recovery

We examined two time points since the last treatment. In the first analysis, participants were divided into those who completed treatment less than two years ago versus more than two years ago (Fig. 2A). In the second analysis, participants were divided into those less than five years versus more than five years post-treatment (Fig. 2B). In general, the duration since the last treatment did not show significant differences in the distribution of occupational problems across these time intervals. Specifically, a Chi-square test conducted for areas [χ^2=0.268, p = 0.875], and sub areas of occupational problems [$\chi^2(8)$ = 3.247, p = 0.918] revealed no significant differences between two years or more after the last treatment and five years or more [χ^2=0.103, p = 0.950], after the last treatment.

Severity of perceived cognitive impairment

The division according to PCI scores did not reveal a significant difference between the group with severe cognitive complaints (PCI score below 44, N = 51, 69%) and the group with moderate cognitive complaints (PCI score above 44, N = 34, 31%; Fig. 3A) [χ^2 (2) = 3.123, p = 0.210]. While no significant group differences were found, visual inspection of the data showed that the moderate complaints group reported more occupational problems in the leisure area (11 percentage points higher), whereas the severe group reported more in the self-care and productivity areas (6 and 5 percentage points, respectively).

In the division into sub-areas (Fig. 3B), the chi-square test revealed no significant dependence [$\chi^2(8)$ = 13.332, p = 0.101]. In spite of the non-significant results, visual analysis indicates that the most notable differences were found in sub-area household management, where survivors with severe cognitive complaints reported more occupational difficulties, whereas the opposite trend was observed for sub-area socialization, where people with moderate cognitive complaints had more problems. Additionally, visual analysis implies differences between the two cognitive complaints severity groups also in the school sub-area. It is noteworthy that the severe cognitive complaints group reported 4 percentage points lower than the moderate cognitive complaints group, constituting half of the occupational problems reported in this subarea. Conversely, in the quiet recreation sub-area, the severe cognitive complaints group reported 4 percentage points more than the moderate cognitive complaints group.

Discussion

This study is in line with the increasing call to treat cancer survivors as chronic disease patients, providing optimal follow-up care that addresses cancer's side effects along the cancer care continuum, as well as concerns regarding the impact of cancer diagnosis and treatment on quality of life [28]. The present study aimed to identify occupational problems faced by cancer survivors coping with CRCI, according to different subgroups. In general, occupational problems were identified using COPM in all three areas of the occupation, with the productivity area reporting the most. The three sub-areas with the highest reported problems were paid/unpaid work, household management and socialization. In addition, the current results reflect that men and women cancer survivors with moderate or severe cognitive complaints have long-lasting occupational performance deficits that persist > 5 years post-treatment. These individuals would benefit from routine functional assessments and rehabilitation to restore function in meaningful activities.

About 20% of all reported occupational problems were in the sub area of socialization. This was mainly related to a cognitive difficulty that appears in social encounter, for example, to retrieve words and names. These findings support a previous study that found higher frequency of difficulty in verbal fluency including word retrieval, among cancer survivors compared to healthy adults [29]. In addition, another study indicated self-perceived impairment in various cognitive-communication domains and reported more difficulty participating in social roles and activities [10].

It is noteworthy that, while this population of cancer survivors is assumed to fully recover one out of five problems (19%) occurs in the self-care domain and is even higher among survivors who complain of severe cognitive impairment. This is a high percentage for a population that is reintegrated in society. Similar results were found in a study among young adult cancer survivors in the chronic stage, as 25% of occupational problems pertaining to self-care [30]. Our results are also in line with a study who found that self-care is the most common and important area that allows long term self-management of the disease as while cancer survivorship rates have increased, and cancer has been positioned as a chronic illness status [31]. However, neither studies addressed CRCI nor cognitive complaints.

When categorizing occupational problems into groups, women reported more occupational problems in household management than men, who reported more occupational problems in the sub-area of school. These findings align with women's traditional roles in household management [32]. Indeed, the prevalence of household management problems among women has been consistent across several studies on healthy general populations [32], older adults [33], and chronic pain [34]. However, the high prevalence of problems among men than women in the learning domain had not been previously reported. This finding might be related to the characteristics of the sample, given that some of the men belong to the ultra-Orthodox Jewish community, which tends to prioritize men's pursuit of studies even in adulthood [35].

Our study also shows a consistent profile of occupational problems across participants. This is regardless of whether they completed treatment two or five years ago. Comparing occupational

problems based on time since last treatment to reflect long-term and late effects of cancer and treatment [36]. The analysis did not reveal any notable differences in both the time (2 and 5 years since last treatment) categories. However, productivity remains the area with the most occupational problems, with a particular concentration in the sub-area of paid/unpaid work. There is an especially noticeable difference among the group of people with perceived severe cognitive complaints. As shown in previous studies, cancer survivors have reported decreases in their ability to work as a result of CRCI compared with their pre-cancer functioning [15, 37] and general difficulty to re-integrating into work [25, 38].

While this comparison is based on a cross-sectional analysis, the lack of observed differences may suggest that these functional difficulties persist well beyond the early survivorship period. This aligns with previous work indicating that CRCI can last up to ten years after treatment completion and cancer recovery. In the absence of appropriate treatment, functional difficulties may remain stable [39], and hence these findings point to a potential need for developing targeted strategies and tools for this population.

Limitations

This study has several limitations. First, the overall sample size was relatively small and not evenly distributed across genders, which may have introduced bias and limits the subgroup comparisons (such as gender or cancer type). The study's validity is compromised because it is part of two intervention studies. This raises concerns about selection bias, and indeed, most survivors report coping with severe cognitive complaints. The representativeness of the sample affects the ability to generalize the findings to other cancer survivors populations. Additionally, the number of occupational problems reported by the participants varied, as they were required to choose at least three and up to six difficulties. Some participants focused solely on one area of occupation, while others pinpointed a central issue in each area. In addition, the present study analyzed all defined occupational problems regardless of their rating on the importance scale. Assessing the importance of each occupational problem could have provided additional insights into which occupations were more significant to survivors coping with CRCI among all the problems they encountered.

In addition, since this study employed a cross-sectional design, it could not examine how occupational problems evolve over time or determine whether they are due to reduced cognition or other side effects or comorbidities. Longitudinal research is needed to assess dynamic participation changes. Moreover, incorporating contextual factors—such as social policies, community-based supports, and workplace accommodations—could provide a broader understanding of how cancer survivors with CRCI navigate reintegration into daily life. Future studies should include a more diverse population of survivors coping with CRCI. They should also include larger and more varied samples, and may aim to determine similarities and differences among cancer types.

Conclusions

This secondary data analysis study contributes to the growing body of literature on CRCI. It provides a detailed description of occupational the problems experienced in daily life by cancer survivors. The current findings provide insights into the profile of occupational problems encountered by cancer survivors even years after the medical recovery. The survivors identified occupational problems mainly in socialization and work.

In addition, the present study examined the profile of occupational problems among cancer survivors coping with CRCI with various demographic and medical parameters. No significant differences were found between the different subgroups in most parameters (except gender), or at different chronic stages of the disease. This shows that the profile of occupational problems among survivors dealing with CRCI is personal and does not characterize a specific subpopulation. A variety of occupational problems reinforce the need for occupational therapists to perform personal assessments as a basis for setting treatment goals to help cancer survivors reintegrate into daily life. Future studies applying population-based assessment are needed to develop intervention programs aimed at supporting the return to work and social participation of survivors. Even though the results presented in this study were hardly novel, they provided a powerful voice for cancer survivors, and urged occupational therapists to act.

Declarations

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Hadassah Medical Centre (#0138-18-HMO).

Informed consent was obtained from all individual participants included in the study.

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Author Contribution

Author contribution: Y.G., M.N., and C.M. were responsible for the study conception and design. T.P. and T.M. applied for ethical approval. T.M., and E.O. were responsible for ongoing study procedure, participant recruitment, treatment, and data management. T.M., E.O. and C.H. were primarily responsible for data analysis and drafting the manuscript with support from Y.G. All authors critically reviewed the manuscript for content and style and approved the final version of the manuscript for submission.

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Data Availability

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

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Figures

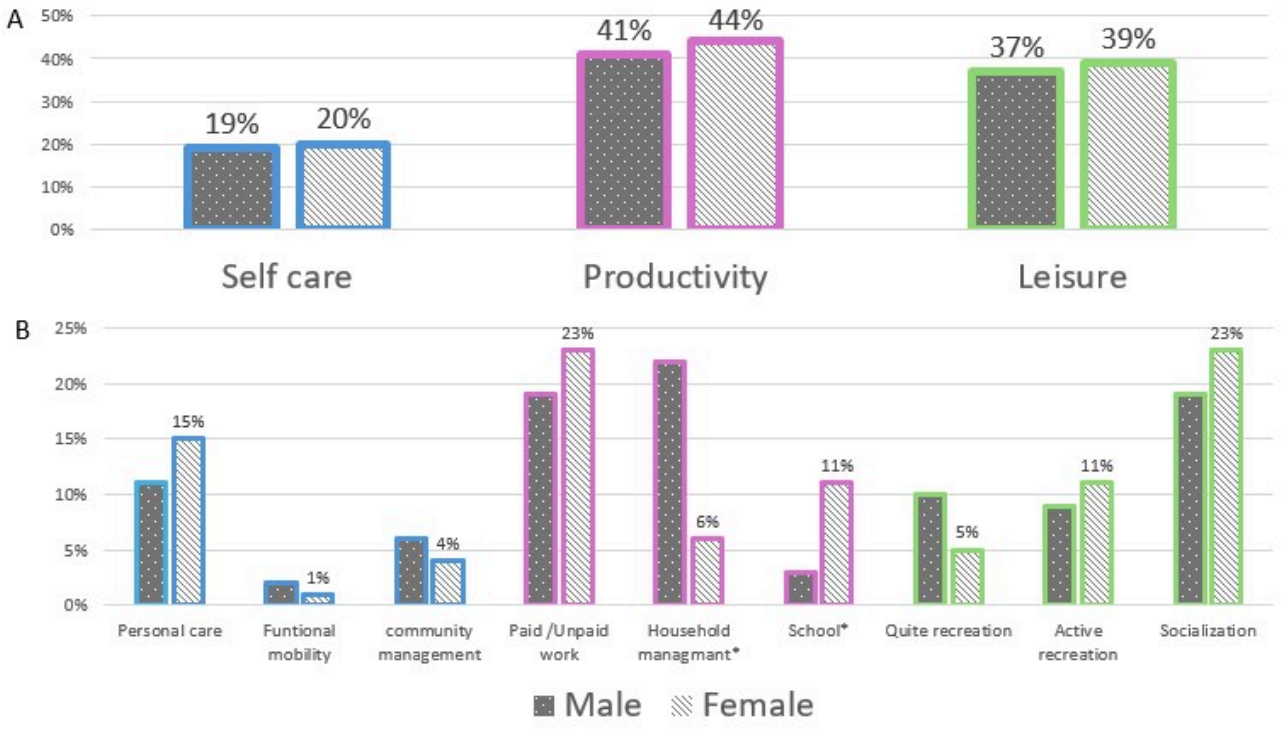


Figure 1. Occupational performance problems compared between genders A. Comparison between areas. B. Comparison between sub –areas.

Figure 1

See image above for figure legend.

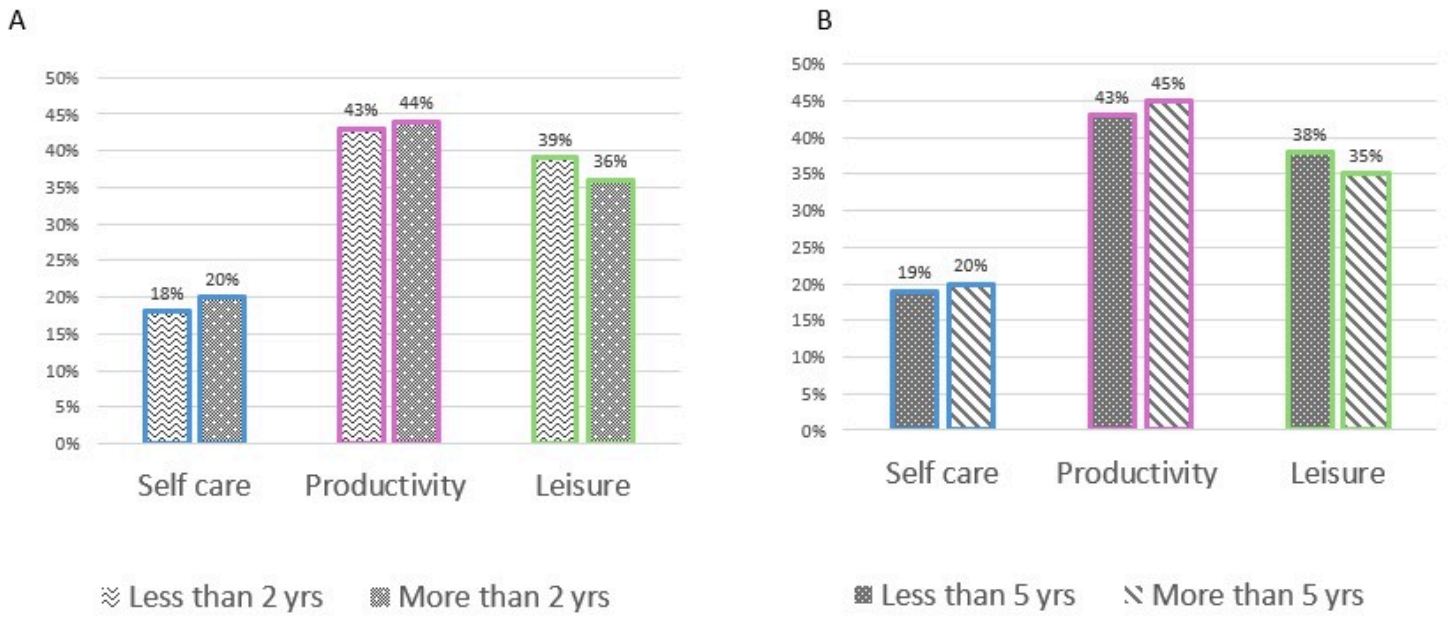


Figure 2. Areas of occupational performance problems compared between years from the last treatment. A. Comparison between less than 2 years and more than 2 years. B. Comparison between less than 5 years and more than 5 years.

Figure 2

See image above for figure legend.

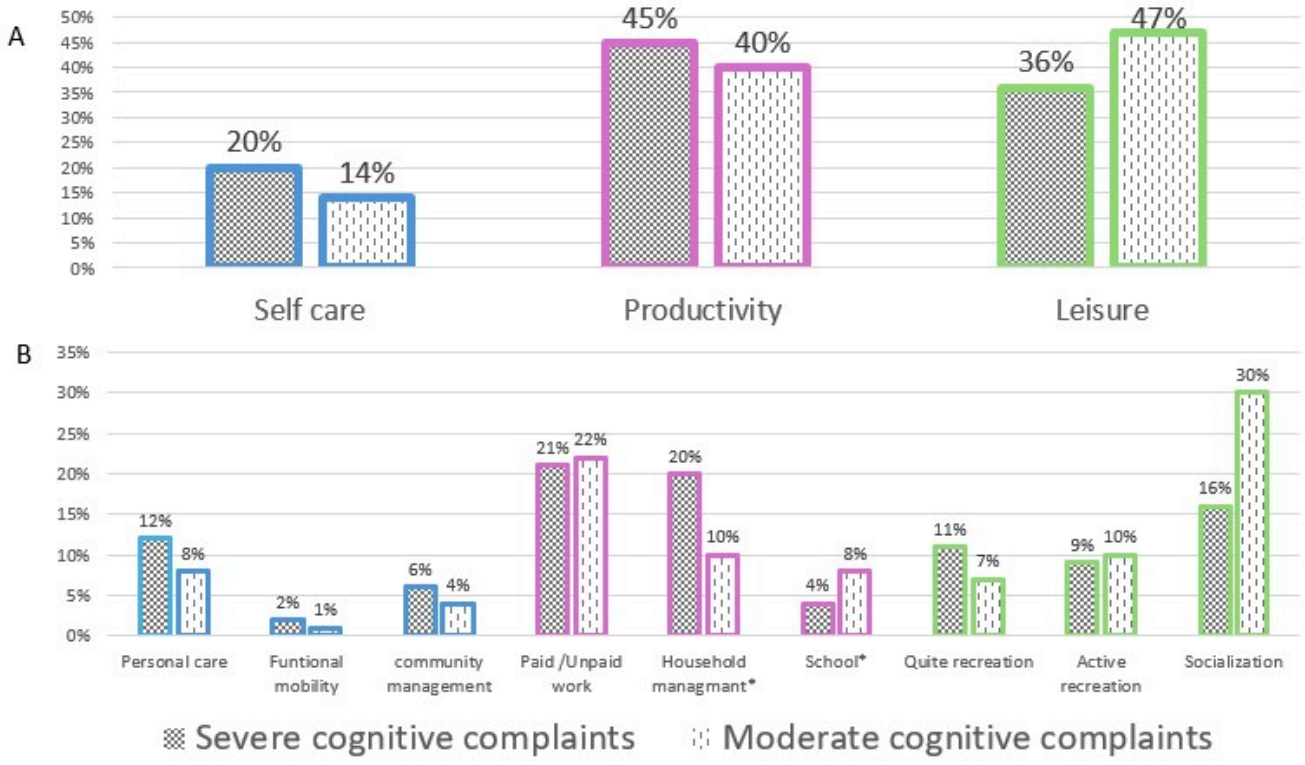


Figure 3. Occupational performance problems compared between PCI scores A. Comparison between areas. B. Comparison between sub –areas.

Figure 3

See image above for figure legend.