Exploration of Neuroscience

Open Exploration

Open Access Original Article

Correlation between self-perceived cognitive problems and objective cognitive impairment in non-CNS cancer patients in a resource-constrained health setting in South Africa

Antonio G. Lentoor*, Tiro B. Motsamai

Department of Clinical Psychology, School of Medicine, Sefako Makgatho Health Sciences University, Pretoria 0204, South Africa

***Correspondence:** Antonio G. Lentoor, Department of Clinical Psychology, School of Medicine, Sefako Makgatho Health Sciences University, Ga-Rankuwa, Pretoria 0204, South Africa. antonio.lentoor@smu.ac.za
Academic Editor: Janine Gronewold, University Hospital Essen, Germany
Received: December 19, 2024 **Accepted:** March 19, 2025 **Published:** April 16, 2025

Cite this article: Lentoor AG, Motsamai TB. Correlation between self-perceived cognitive problems and objective cognitive impairment in non-CNS cancer patients in a resource-constrained health setting in South Africa. Explor Neurosci. 2025;4:100684. https://doi.org/10.37349/en.2025.100684

Abstract

Aim: Cognitive complaints are frequent among cancer patients. These issues can significantly affect the patient's quality of life and are linked to a higher risk of developing dementia. However, their occurrence does not consistently correlate with measurable objective cognitive dysfunction, which contributes to their negligence in oncological care. Thus, this study aimed to examine the relationship between subjective and objective measures of cognitive function in patients without CNS involvement in a developing context.

Methods: A cross-sectional study was conducted with 50 patients aged 18 and above shortly after diagnosis of non-CNS cancer but before any systematic treatment at a tertiary hospital in Gauteng. The patients completed a self-perceived cognitive impairment (PCI) assessment, and the mini-Montreal Cognitive Assessment (mini-MoCA) as an objective measure of cognition. Correlational analyses were conducted to examine the relationship between self-perceived cognitive problems and performance on the mini-MoCA.

Results: The results of the study revealed the presence of both self-perceived cognitive problems and objective cognitive impairments among the study cohort. There was a small non-significant association between self-PCI and the objective measure of cognitive impairment on the mini-MoCA, $r_s(43) = 0.220$, $P = 0.147$. Notably, only the memory sub-domain showed a significant but moderate positive association with self-PCI, $r_s(43) = 0.325$, $P = 0.029$.

Conclusions: This study offers initial evidence of both subjective and objective cognitive impairment in non-CNS cancer patients before treatment in a resource-constrained setting. While there was a small non-significant association between global objective cognitive impairment and patients' PCIs, a significant moderate association was revealed between the memory sub-domain and PCI. These results underscore the need for thorough cognitive assessment before treatment, as both the presence of cognitive impairment and patients' perceptions of it can influence treatment compliance and everyday functioning.

Keywords

Subjective cognitive function, cognitive dysfunction, cancer, non-central nervous system, resource-constrained setting, self-reported cognition, quality of life

Introduction

Cancer is a proliferate global health concern, with approximately 20 million new cases diagnosed in 2022 [1]. The foregoing burden of cancer is projected to increase to 35.3 million new cases by 2050, which is a 76.6% increase from the estimated 20 million cases previously estimated in 2022 [2]. This burden is likely to be disproportionately felt in low- and middle-income countries (LMICs), where the majority of new cancer cases occur in the context of low resources [3]. This is significant, as the increase in the burden of cancer comes with a backlash of diverse cancer morbidities such as neuropathies, psychological challenges, and, of recent interest, cognitive problems/cancer-related cognitive impairment (CRCI) [4].

Previously referred to as "chemo brain" due to the presumed effects of chemotherapy as the sole cause [5], CRCI involves objective neuropsychologically tested deficits in patients' cognitive functions, such as perception, attention, language, thinking, learning and memory, action planning, understanding, reasoning, and problem-solving [6]. According to Boscher et al. [7], these deficits manifest as patients' subjective reports of cognitive concerns, such as complaining about forgetfulness, being easily distracted, and difficulty finding words. Available evidence suggests that the foregoing cognitive difficulties can occur before, during, and following any systematic cancer treatment [8, 9]. As Janelsins et al. [10] noted, the prevalence rate was estimated to be 30% before treatment, 75% during treatment, and 35% after treatment.

CRCI has been found to significantly impact cancer patients' quality of life, treatment adherence, and treatment outcomes [10]. Studies have also found that long-term experience of cognitive problems can prevent patients from returning to their occupational function, social activities, and family life following treatment [11]. For example, in a study conducted by Haywood et al. [12], difficulties associated with executing regular activities, relationality, work-related functioning, psychological distress, and socializing challenges were reported to exist among cancer survivors with CRCI. Thus, emphasizing the need for early identification of cognitive impairment and tailoring timely interventions to buffer against the negative impact of both cancer and cancer treatment on the cognitive ability of patients.

Previous studies have assessed CRCI using both self-report measures and neuropsychological tests, which yield perceived cognitive problems and objective cognitive impairments [13]. For example, studies by Lange et al. [14] and Araujo et al. [15] have found perceived cognitive complaints and objective cognitive impairment among non-CNS cancer patients. However, correlations between perceived cognitive problems and objective cognitive impairment have not always been consistent. Some evidence attributes the inconsistency to the fact that perceived cognitive difficulties may be more related to psychological distress rather than impairment in cognition [16]. For example, in a systematic review by Bray et al. [17], 14 out of 44 studies found a small to moderate correlation between self-reported cognitive concerns and neuropsychological test performance among breast cancer patients. In other studies, a small or no association was reported, suggesting that perceived cognitive problems may not always reflect objective cognitive impairments but are more related to psychological state [14, 18, 19]. This is an important consideration in understanding CRCI since patients' perceptions of cancer impairment are important and they impact quality of life, especially functional ability and activities of daily living. Furthermore, the emerging evidence suggests that self-perceived cognitive problems are one of the strongest predictors of progression to mild cognitive impairment [20, 21].

Given the inconsistencies in the literature on the association between perceived cognitive problems and objective cognitive function, there is a need to assess cancer patients using both self-report measures and neuropsychological tests to avoid underestimation or overestimation of cognitive dysfunction (as recommended by the International Cancer Task Force-ICTF). This can lead to mitigation against the impact

of cognitive problems on quality of life (QOL) and functionality in patients with non-central nervous system cancers. More importantly, in the African context where research on this issue has been neglected, it can fill an important knowledge gap that has the potential to directly impact clinical care, particularly in the pre-treatment phase of patients in resource-constrained environments. Based on the emerging evidence from developed countries [22, 23], patients with non-CNS cancer, including breast cancer, colorectal cancer, etc.—even in the pre-treatment phase—self-report on problems related to concentration and attention (i.e., struggling with multitasking), memory (i.e., difficulties with remembering important information) and executive functioning (i.e., some complaining of having difficulties making decisions in daily functioning). This is a significant problem as it can interfere with the decision to start cancer treatment and adherence to the cancer treatment protocol. For this reason, understanding the self-perception of cognitive impact in patients with non-CNS cancers is important, as it may correlate with their objective cognitive functioning. Thus, this study aimed to examine the association between self-perceived cognitive functioning and the performance on an objective neuropsychological test—the mini-Montreal Cognitive Assessment (mini-MoCA), amongst patients with non-CNS cancer from a resource-constrained environment in South Africa. Understanding this association could help validate the use of self-reported assessment as a reliable indicator for further assessment of objective neuropsychological testing in the local context. This could lead to early identification of cognitive impairments and timelier psycho-cognitive interventions, potentially mitigating the impact of cognitive dysfunction on patients' everyday functioning and overall quality of life.

Materials and methods

Research design and study participants

In a cross-sectional study, 50 patients (mean age = 43.32 years, SD = 14.66) were recruited via purposive sampling from a local tertiary hospital in Gauteng, South Africa, to participate in the study. The study was conducted between January 2023 and July 2024. Participants were enrolled based on the following inclusion selection criteria: fluency in conversational English; aged 60 and below; first diagnosis of non-CNS cancer; no history of oncological treatment; and no history of neurological disorders or neurodegenerative diseases. Participants who did not meet the above criteria were excluded. The participants were recruited with the assistance of the treating oncologists and nurses through a referral process.

Ethics

Approval to conduct this study was granted by the Sefako Makgatho University Research Ethics Committee (SMUREC) [SMUREC/M/48/2020: IR]. Permission was also obtained from the hospital Chief Executive Officer (CEO) and the respective heads of departments of each of the medical wards where recruitment and data collection were undertaken. Written informed consent was obtained from the patients who voluntarily agreed to participate in the study after information about the study was provided to them. They had the right and the autonomy to refuse to participate without a negative impact on their care. The study was conducted in accordance with the Declaration of Helsinki [24].

Data collection

Data were collected in person via an iPad by a postgraduate clinical psychology student under the supervision of a licensed clinical psychologist with a specialty in neuropsychology. Following the informed consent process, the participants who met the inclusion criteria were requested to complete a short sociodemographic and health-related information questionnaire and a subjective cognitive functioning assessment. Thereafter, the electronic mini-MoCA test was administered as a measure of objective neuropsychological assessment to approximate cognitive functioning. All data were collected before any exposure to chemotherapy treatment. To minimize the possible effect of fatigue, all the assessments were conducted between 8 am and 12 noon. The assessment took up to 30 minutes. Following the assessments, all the participants were debriefed and were provided with information on psychological care in case of any psychological distress.

Measures

A self-developed electronic questionnaire comprising a socio-demographics and health-related factors survey and a Functional Assessment of Cancer Therapy-Cognitive (FACT-Cog) Version 3 as a measure of subjective cognitive function was used. The commonly used neuropsychological test, the brief mini-MoCA, was administered as a measure of objective cognitive function.

Socio-demographic variables and health-related factors

Socio-demographic variables collected included the participant's sex, age, nationality, ethnicity, marital status, educational level, and employment status. We also collected health-related factors, including cancer type, stage of disease, and the presence of comorbidities.

Perceived cognitive assessment

The perceived cognitive impairment (PCI) subscale from the FACT-Cog Version 3, a self-report measure that assesses subjective cognitive complaints among cancer patients was used for this study [25]. The PCI has a total of 20 reverse items and contains statements such as "I have had trouble forming thoughts" and "My thinking has been slow'' which are scored based on a 5-point Likert scale ranging from never (scored 0) to several times a day (scored 4) [25]. In alignment with Oliveira et al. [25] and Pembroke et al. [26], all the item scores were re-coded and yielded total scores ranging from 0 to 80, with scores lower than 60 indicating poor cognitive functioning and higher scores indicating good cognitive functioning. The FACT-Cog PCI has previously been found valid and reliable, with an acceptable Cronbach alpha ranging from 0.77 to 0.97 [25, 26].

Objective cognitive assessment

The electronic mini-MoCA, a shortened version of the Montreal Cognitive Assessment (MoCA), was used to detect mild cognitive impairment. The measure consists of eight original MoCA items, including trails, drawing a clock, serial subtraction, watch-ruler abstraction, verbal fluency, orientation to the place, naming (rhinoceros), and delayed recall [27]. As a brief neuropsychological measure, the items tap into seven core neurocognitive domains, including visuospatial/executive functioning (trails and clock drawing), attention (serial subtraction), abstraction (watch-ruler), language (verbal fluency), orientation (place), naming (rhinoceros), and memory (delayed recall) [28]. The total scores range from 0 to 16, with possible mild cognitive impairment defined as a total score of less than 12 [27, 29]. The mini-MoCA has been found to have a significant agreement with the MoCA with a 93% sensitivity level and a 92% (PPV 98%, NPV 75%) specificity to abnormal MoCA scores (< 26) [30]. Suggesting that it is an ideal brief measure of mild cognitive impairment for busy clinical settings, such as oncology units, making it an ideal choice of assessment for the current context. Cronbach alpha for the mini-MoCA was found to be excellent (0.90) when administered to participants with neurological diseases [29].

Data analysis

The study included descriptive statistics such as frequencies, means, and standard deviations of the socio-demographics, health, and cognitive variables of the study population. A Spearman's correlation coefficient analysis was conducted to determine if there was a relationship between PCIs and overall performance on the mini-MoCA and its sub-domain scores. Secondary analyses—Fisher's Exact Test—were also conducted to determine whether there was a difference in the PCI and mini-MoCA performance categorical scores, for socio-demographics, and comorbidities. Data were analyzed using the Statistical Package for Social Sciences (SPSS) software (version 25.0) with a 2-tailed *P*-value < 0.05 considered statistically significant.

Results

Socio-demographic, health, and cognitive profile

Table 1 presents the socio-demographic, health, and cognitive profiles of the sample participants in this study. The sample included a total of 50 participants diagnosed with non-CNS cancers. The majority of the

participants were female (70.0%), black (94.0%), single (70.0%), with at least 9 years of education (76.0%), unemployed (70%), and living in an urban area (60.0%). At least 54% had a confirmed staging (I–IV), with one or more comorbidities (40.0%). Based on the PCI, 41.7% of the sample self-reported cognitive impairment in their daily function (Table 1). Performance on the brief objective neuropsychological test confirmed that 63.8% of the participants had mild cognitive impairment on the mini-MoCA (Table 1).

Table 1. Socio-demographic, health, and cognitive profile of the study participants (*N* = 50)

Socio-demographics		*n*	%
Sex	Male	15	30.0
	Female	35	70.0
Age	Young adults	29	58
	Middle to older adults	21	42
	Mean (standard deviation) (years)	43.32 (14.66)	
Ethnicity	Black	47	94.0
	White	3	6.0
Marital status	Single	35	70.0
	Married	15	30.0
Educational level	Primary to high school	38	76.0
	Post-high school	12	24.0
Employment status	Employed	15	30.0
	Unemployed	35	70.0
Place of residence	Rural	20	40.0
	Urban	30	60.0
Health profile			
Cancer type	Breast cancers	14	28.0
	Hematological cancers	27	54.0
	Colorectal cancers	4	8.0
	Gynecological cancer	4	8.0
	Missing	1	2.0
Cancer stage	Stage I	5	10.0
	Stage II	6	12.0
	Stage III–IV	16	32.0
	Not staged	23	46.0
Comorbidities	None	30	60.0
	One or more comorbidities	20	40.0
Cognitive profile			
PCI	Impaired	20	41.7
	Not impaired	28	58.3
Mini-MoCA	Impaired	30	63.8
	Not impaired	17	36.2

N = study population; *n* = subgroup sample size; % = percentage of proportion; young adults = 18 to 45 years old; middle to older adults = 46 years older and above; PCI valid cases = 48; mini-MoCA valid cases = 47

Association between the PCI, mini-MoCA, and domain-specific performance

Table 2 shows the results of the association between self-PCI, the overall mini-MoCA performance, and specific sub-domain performance. No significant association was found between PCI and mini-MoCA performance $r_s(43) = 0.220$, $P = 0.147$ (Table 2). In addition, only the sub-domain of memory had a significant but moderate positive association with self-PCI $r_s(43) = 0.325$, $P = 0.029$.

Difference between PCI and objective cognitive impairment, and covariables

Table 3 reports the results of the study participants that had a valid score for both PCI and mini-MoCA for comparison. The results showed no statistically significant difference in self-PCI and objective cognitive

Table 2. Association between perceived cognitive impairment and mini-MoCA performance

Measures	PCI	Mini-MoCA	Executive	Attention	Abstraction	Language	Naming	Memory
PCI	1	0.220	0.045	–0.035	–0.076	0.063	0.102	0.325*
Mini-MoCA		1	0.565**	0.529**	0.340*	0.234	0.235	0.835**
Executive[a]			1	0.033	0.047	0.079	0.223	0.299*
Attention[a]				1	0.090	0.232	–0.156	0.196
Abstraction[a]					1	0.140	–0.086	0.254
Language[a]						1	–0.166	0.038
Naming[a]							1	0.257
Memory[a]								1

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$ significance level (2-tailed); [a] mini-MoCA sub-domain (executive function, attention, abstraction, fluency, naming, memory); $n = 45$ had valid values for both PCI and mini-MoCA and were included in this analysis; Correlation coefficient based on Spearman's rho

Table 3. Difference in performance on PCI and mini-MoCA

Variables		mini-MoCA		*P*
		Impaired *n* (%)	**Not impaired *n* (%)**	
PCI	Impaired	13 (81.3)	3 (18.8)	0.110
	Not impaired	16 (55.2)	13 (44.8)	

n = subgroup sample size based on data available for both completed PCI and mini-MoCA; $n = 45$ had valid values for both PCI and mini-MoCA and were included in this analysis; Pairwise deletion of $n = 5$ missing data; % = percentage; *P* = Fisher's Exact Test with a significance level at $P < 0.005$ (2-tailed)

function on the mini-MoCA ($P = 0.110$). This suggests that impairment on the PCI and mini-MoCA may not be related in this study sample or that any observed difference could be due to random chance.

In Table 4, we report on the analysis of all completed PCI results. No significant differences by sex ($P > 0.99$), age ($P = 0.363$), relationship status ($P = 0.328$), educational level ($P > 0.99$), or health comorbidities ($P = 0.763$) were observed between the impaired and not-impaired PCI group. Table 5 reports on the analysis of all completed mini-MoCA results. Similarly, no significant differences were found by sex ($P = 0.204$), relationship status ($P > 0.99$), health comorbidities ($P = 0.546$), or education level ($P = 0.722$) between the impaired and not-impaired mini-MoCA performance with the exception of age, which showed a significant association with objective cognition ($P = 0.014$) (Table 5).

Discussion

The main objective of this current study was to determine the association between subjective and objective cognitive function in patients diagnosed with non-CNS cancer in a resource-constrained setting. The study results form part of the literature attempting to reconcile the debate on the inconsistencies between subjective cognitive complaints and objective cognitive function that has predominately been conducted in developed countries. Consistent with existing research [14, 16, 30], the results of this study found a small non-significant association between self-reported cognitive complaints, as measured by symptom endorsement on the PCI and performance on the brief objective neuropsychological test, the mini-MoCA, in this sample of South African patients with non-CNS cancer before treatment.

This finding is not surprising as existing literature from a systematic review and meta-analysis of general population studies by Burmester et al. [31], has revealed small associations between subjective and objective cognition, with limitations in small sample sizes. Similar to our study, previous studies with cancer patients have often been limited by small sample sizes [17], which may underestimate the effect size. However, it is worth noting that our current study effect size ($r = 0.22$) was considerably larger than that reported in general populations ($r = –0.13$). This larger effect size could be attributed to the memory sub-domain, which was statistically significant.

Table 4. Performance on PCI by socio-demographics, and comorbidities

Variables		*N*	Sex			Age			Relationship status			Education level			Comorbidities		
		48 *n* (%)	Female *n* (%)	Male *n* (%)	*P*	Young adults *n* (%)	Middle to older adults *n* (%)	*P*	Single *n* (%)	Married *n* (%)	*P*	Primary to high school *n* (%)	Post-high school *n* (%)	*P*	None *n* (%)	Present *n* (%)	*P*
PCI	Impaired (≤ 60)	20 (41.7)	11 (68.8)	5 (31.3)	> 0.99	11 (68.8)	5 (31.3)	0.363	13 (81.3)	3 (18.8)	0.328	12 (75.0)	4 (25.0)	> 0.99	10 (62.5)	6 (37.5)	0.763
	Not impaired	28 (58.3)	23 (71.9)	9 (28.1)		17 (53.1)	15 (46.9)		21 (65.6)	11 (34.4)		25 (78.1)	7 (21.9)		18 (56.3)	14 (43.8)	

n = subgroup sample size; *N* = 48 cases had valid PCI data for analysis; Pairwise deletion of *n* = 2 missing data; % = percentage of proportion; *P* = Fisher's Exact Test *P*-value with significance level at $P < 0.05$ (2-tailed)

Table 5. Performance on mini-MoCA by socio-demographics, and comorbidities

Variables		*N*	Sex			Age			Relationship status			Education level			Comorbidities		
		47 *n* (%)	Female *n* (%)	Male *n* (%)	*P*	Young adults *n* (%)	Middle to older adults *n* (%)	*P*	Single *n* (%)	Married *n* (%)	*P*	Primary to high school *n* (%)	Post-high school *n* (%)	*P*	None *n* (%)	Present *n* (%)	*P*
mini-MoCA	Impaired (≤ 12)	30 (63.8)	19 (63.3)	11 (36.7)	0.204	13 (43.3)	17 (56.7)	0.014	21 (70.0)	9 (30.0)	> 0.99	22 (73.3)	8 (26.7)	0.722	16 (53.3)	14 (46.7)	0.546
	Not impaired	17 (36.2)	14 (82.4)	3 (17.6)		14 (82.4)	3 (17.6)		12 (70.6)	5 (29.4)		14 (82.4)	3 (17.6)		11 (64.7)	6 (35.3)	

n = subgroup sample size; *N* = 47 cases had valid mini-MoCA data for analysis; Pairwise deletion of *n* = 3 missing data; % = percentage of proportion; *P* = Fisher's Exact Test *P*-value with significance level at $P < 0.05$ (2-tailed)

Indeed, memory is readily the first symptom of cognitive changes noticed by patients and caregivers leading to higher identification of impairment on objective testing [32]. This is particularly due to deficits in short-term and delayed memory recall, which are more sensitive to early-stage cognitive changes that individuals experience in their daily functioning [33]. Thus, it can be cautiously hypothesized that self-reported cognitive impairment may indicate early underlying cognitive deficits, particularly in memory, among pretreatment cancer patients. However, this hypothesis requires careful exploration in future research. Moreover, the association fell within the small to moderate range, suggesting that PCI might not always correlate with memory (or objective impairment), or it reflects the impact of modifiable factors [32]. This conclusion is supported by a review of 24 studies conducted by Hutchinson et al. [34], which highlighted the inconsistent associations between subjective and objective impairment in studies primarily focused on the correlation between PCI and memory.

Moreover, in this study, just over 40 percent of the participants self-reported cognitive complaints, while close to 64 percent of the sample were found to have objective mild cognitive impairment based on the performance on the mini-MoCA. Among individuals who did not self-report cognitive problems on the PCI, at least 55% were found to be cognitively impaired based on their performance on the mini-MoCA (Table 3). Conversely, about 18% of those who self-reported cognitive impairment on the PCI were found to perform within the cognitively intact range on the MoCA. This could suggest that some patients might be overestimating and underestimating their cognitive function, which is commonly seen in patients with anxiety-depressive symptomatology [35, 36]. It is well

reported in affective neuroscience research that emotional state affects cognitive performance and self-perception [36–38]. Previous research has suggested that the non-significance and inconsistent prevalence results could be due to the link between self-reported cognitive complaints and psychological factors such as depression, anxiety, and fatigue rather than underlying neurological fallout [8]. This is perhaps important to consider in interpreting the results since this study did not include the evaluation of the possible influence of depression, anxiety, and fatigue. Some research showed that not only was anxiety and depression high amongst patients with a recent diagnosis and before starting chemotherapy, but that it also had adverse effects on cognition, particularly attention, memory, information processing, and the self-appraisal ability of patients [19, 39, 40]. This factor may contribute to the current study results, but further research specifically investigating the influence of psychological factors is needed since previous research has found non-significant associations. Additionally, some existing research suggests that subjective and objective cognitive impairments might represent distinct constructs that are not well captured by current neuropsychological test batteries [20, 41]. Changes in everyday functioning and daily stressors may not be effectively measured through standardized testing, which could contribute to the inconsistencies observed in studies on subjective and objective cognitive impairment.

This study did not find a significant difference in sex, age, educational status, relationship status, or comorbidities between those who self-endorsed cognitive impairment and those who reported no impairment on the PCI measure. This is consistent with previous research that found no differences in PCI based on the aforementioned characteristics [19, 42–44]. Similarly, the performance on the objective measure, the mini-MoCA, study showed no significant differences in all the variables, except for age. The significant difference in mini-MoCA performance based on age aligns with predominant existing research showing that older cancer patients have a higher risk of cognitive impairment [39, 45, 46]. This can be attributed to age-related neurodegeneration and reduced cognitive plasticity or reserve [47]. In this study, we recruited a patient population younger than 60 years in an attempt to minimize the bias of possible age-related cognitive decline. To note, the sample of patients had a mean age of 43.32 years. The non-significant findings regarding these factors contradict earlier studies by Mandelblatt et al. [45] and Yang et al. [46], which found that the likelihood of impairment was significantly higher among women with lower education levels, those with greater comorbidity, and specific relationship statuses. This earlier research suggests that there may be a link between cognition and sociodemographics, as well as comorbidities. The differing results in this study might be influenced by the homogeneity of the study sample, which consisted of Black African patients from lower socioeconomic backgrounds who had access only to the government healthcare system.

The observed modest correlation, especially the significance in the memory subdomain, along with the notable yet underpowered effect of the global MoCA score, holds considerable importance in a low-resource setting. Thus, the findings underscore the importance of regular cognitive screening, psychosocial assessment, and psychoeducation as part of the early oncology care pathway. This is especially crucial during the acute period following diagnosis and before the initiation of any cancer treatment. It is important since patients frequently report cognitive problems to their primary oncologist but often feel dismissed [48]. The existing evidence suggests that cognitive symptoms can worsen depression-anxiety, while psychological issues can intensify cognitive complaints and dysfunction [48–50]. Therefore, regular screening and early assessments are important for identifying potential vulnerabilities to impairment. Early intervention can help mitigate the severity of cognitive impairment and psychological dysfunction, which can ultimately benefit patients starting chemotherapy and enhance overall treatment compliance.

This study has several limitations that should be acknowledged. Firstly, it is a cross-sectional correlational study, meaning it does not account for changes over time and precludes any form of causation. Secondly, depression, anxiety, and fatigue were not part of the current study analysis. Therefore, further research should investigate the relationship of the study variables over time and consider potential mediating or moderating factors, particularly the role of depression-anxiety symptoms. Thirdly, the participants in this study were recruited purposively, which introduced unavoidable selection bias due to

the nature of the study. Additionally, the results are based on data collected from a single treatment facility, limiting the generalizability of the findings. Caution should be exercised when interpreting the results too broadly. Fourth, although the MoCA has been used locally in research and clinical settings, it has not been normed for the local population. To the best of the researcher's knowledge, the study is one of the first to investigate the association of self-reported cognitive problems and objective cognitive impairment before treatment in this context. A notable strength of this study is the strict inclusion criteria, particularly the control for the influence of chemotherapy and surgery, both of which are independently linked to cognitive impairment [51, 52].

Conclusion

In conclusion, our results indicate that nearly half of non-CNS cancer patients exhibit PCI while over 60 percent demonstrated objective cognitive impairment before treatment. Consistent with previous research, mainly conducted in developed countries, this study found a non-significant association between self-reported cognitive problems and global objective cognitive impairment, while a significant moderate association was found at a memory subdomain level. These findings suggest that both self-perceived and objective cognitive issues are important independent health indicators that should be considered in the oncology patient population. The findings underscore the need for regular cognitive screening for oncology patients, especially during the pre-treatment phase.

Abbreviations

CRCI: cancer-related cognitive impairment

FACT-Cog: Functional Assessment of Cancer Therapy-Cognitive

mini-MoCA: Mini-Montreal Cognitive Assessment

MoCA: Montreal Cognitive Assessment

PCI: perceived cognitive impairment

Declarations

Acknowledgments

The authors acknowledge the assistance of the three research assistants (Bonga Mdletshe, Reorapetse Seabelo, and Maphuti Mothata) for helping with data collection. Reorapetse Seabelo is further acknowledged for assisting with data cleaning.

Author contributions

AGL: Conceptualization, Investigation, Writing—original draft, Writing—review & editing, Validation, Supervision. TBM: Investigation, Writing—original draft, Writing—review & editing. Both authors read and approved the submitted version.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

The Correlation between self-perceived cognitive problems and objective cognitive impairment in non-CNS cancer patients in a resource-constrained health setting in South Africa study was approved by the Sefako Makgatho University Research Ethics Committee (SMUREC) (ethics number: SMUREC/M/48/2020: IR). The study was conducted in accordance with the Declaration of Helsinki.

Consent to participate

Written informed consent was obtained from the patients who voluntarily agreed to participate in the study after information about the study was provided to them.

Consent to publication

Not applicable.

Availability of data and materials

The datasets supporting the study can be provided by the corresponding author upon reasonable request.

Funding

AGL is the principal investigator (PI) of this research project that was funded by the National Research Foundation Thuthuka grant number [129528] and Sefako Makgatho Health Sciences University Capacity Development Grant; and the Biological Psychiatry Early Research Career Award. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Publisher's note

References

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74:229–63. [DOI] [PubMed]
2. Bizuayehu HM, Ahmed KY, Kibret GD, Dadi AF, Belachew SA, Bagade T, et al. Global Disparities of Cancer and Its Projected Burden in 2050. JAMA Netw Open. 2024;7:e2443198. [DOI] [PubMed] [PMC]
3. Finestone E, Wishnia J. Estimating the burden of cancer in South Africa. South Afr J Oncol. 2022;6: a220. [DOI]
4. Santos JC, Pyter LM. Neuroimmunology of Behavioral Comorbidities Associated With Cancer and Cancer Treatments. Front Immunol. 2018;9:1195. [DOI] [PubMed] [PMC]
5. Wagner LI, Gray RJ, Sparano JA, Whelan TJ, Garcia SF, Yanez B, et al. Patient-Reported Cognitive Impairment Among Women With Early Breast Cancer Randomly Assigned to Endocrine Therapy Alone Versus Chemoendocrine Therapy: Results From TAILORx. J Clin Oncol. 2020;38:1875–86. [DOI] [PubMed] [PMC]
6. Horowitz TS, Suls J, Treviño M. A Call for a Neuroscience Approach to Cancer-Related Cognitive Impairment. Trends Neurosci. 2018;41:493–6. [DOI] [PubMed]
7. Boscher C, Joly F, Clarisse B, Humbert X, Grellard J, Binarelli G, et al. Perceived Cognitive Impairment in Breast Cancer Survivors and Its Relationships with Psychological Factors. Cancers (Basel). 2020;12: 3000. [DOI] [PubMed] [PMC]
8. Yang Y, Hendrix CC. Cancer-Related Cognitive Impairment in Breast Cancer Patients: Influences of Psychological Variables. Asia Pac J Oncol Nurs. 2018;5:296–306. [DOI] [PubMed] [PMC]
9. Phillips NS, Stratton KL, Williams AM, Ahles T, Ness KK, Cohen HJ, et al. Late-onset Cognitive Impairment and Modifiable Risk Factors in Adult Childhood Cancer Survivors. JAMA Netw Open. 2023;6:e2316077. [DOI] [PubMed] [PMC]
10. Janelsins MC, Kesler SR, Ahles TA, Morrow GR. Prevalence, mechanisms, and management of cancer-related cognitive impairment. Int Rev Psychiatry. 2014;26:102–13. [DOI] [PubMed] [PMC]
11. Bøhn S, Oldervoll LM, Reinertsen KV, Seland M, Fosså A, Kiserud C, et al. The feasibility of a multidimensional intervention in lymphoma survivors with chronic fatigue. Support Care Cancer. 2023;32:22. [DOI] [PubMed] [PMC]

12. Haywood D, Dauer E, Baughman FD, Lawrence BJ, Rossell SL, Hart NH, et al. “Is My Brain Ever Going to Work Fully Again?”: Challenges and Needs of Cancer Survivors with Persistent Cancer-Related Cognitive Impairment. Cancers (Basel). 2023;15:5331. [DOI] [PubMed] [PMC]
13. Országhová Z, Mego M, Chovanec M. Long-Term Cognitive Dysfunction in Cancer Survivors. Front Mol Biosci. 2021;8:770413. [DOI] [PubMed] [PMC]
14. Lange M, Hardy-Léger I, Licaj I, Pistilli B, Rigal O, Fel JL, et al. Cognitive Impairment in Patients with Breast Cancer before Surgery: Results from a CANTO Cohort Subgroup. Cancer Epidemiol Biomarkers Prev. 2020;29:1759–66. [DOI] [PubMed]
15. Araujo JM, Gómez AC, Jongh WZ, Ausejo J, Córdova I, Schwarz LJ, et al. A nationwide pilot study on breast cancer screening in Peru. Ecancermedicalscience. 2023;17:1494. [DOI] [PubMed] [PMC]
16. Dhillon HM, Tannock IF, Pond GR, Renton C, Rourke SB, Vardy JL. Perceived cognitive impairment in people with colorectal cancer who do and do not receive chemotherapy. J Cancer Surviv. 2018;12:178–85. [DOI] [PubMed]
17. Bray VJ, Dhillon HM, Vardy JL. Systematic review of self-reported cognitive function in cancer patients following chemotherapy treatment. J Cancer Surviv. 2018;12:537–59. [DOI] [PubMed]
18. Oliva G, Giustiniani A, Danesin L, Burgio F, Arcara G, Conte P. Cognitive impairment following breast cancer treatments: an umbrella review. Oncologist. 2024;29:e848–63. [DOI] [PubMed] [PMC]
19. Chen D, Mackenzie L, Hossain SZ, Wang J, Jiang P, Wang Y, et al. Cognitive impairment experienced by Chinese breast cancer survivors. Sci Rep. 2023;13:22245. [DOI] [PubMed] [PMC]
20. Si T, Xing G, Han Y. Subjective Cognitive Decline and Related Cognitive Deficits. Front Neurol. 2020;11:247. [DOI] [PubMed] [PMC]
21. Neto AS, Nitrini R. Subjective cognitive decline: The first clinical manifestation of Alzheimer's disease? Dement Neuropsychol. 2016;10:170–7. [DOI] [PubMed] [PMC]
22. Henderson FM, Cross AJ, Baraniak AR. ‘A new normal with chemobrain’: Experiences of the impact of chemotherapy-related cognitive deficits in long-term breast cancer survivors. Health Psychol Open. 2019;6:2055102919832234. [DOI] [PubMed] [PMC]
23. Ahles TA, Root JC. Cognitive Effects of Cancer and Cancer Treatments. Annu Rev Clin Psychol. 2018;14:425–51. [DOI] [PubMed] [PMC]
24. Association WM; World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013;310:2191–4. [DOI] [PubMed]
25. Oliveira AF, Santos IM, Fernandes S, Bem-Haja P, Torres A. Validation study of the Functional Assessment of Cancer Therapy-Cognitive Function-Version 3 for the Portuguese population. BMC Psychol. 2022;10:305. [DOI] [PubMed] [PMC]
26. Pembroke L, Sherman KA, Dhillon HM, Francis H, Gillatt D, Gurney H. Perceived cognitive impairment and occupational functioning in prostate cancer survivors: an exploratory cross-sectional analysis. J Cancer Surviv. 2025. [DOI] [PubMed]
27. Roalf DR, Moore TM, Wolk DA, Arnold SE, Mechanic-Hamilton D, Rick J, et al. Defining and validating a short form Montreal Cognitive Assessment (s-MoCA) for use in neurodegenerative disease. J Neurol Neurosurg Psychiatry. 2016;87:1303–10. [DOI] [PubMed] [PMC]
28. Hemrungrojn S, Amrapala A, Maes M. Construction of a short version of the Montreal Cognitive Assessment (MoCA) rating scale for the Thai population using Partial Least Squares analysis. Int J Neurosci. 2024;134:16–27. [DOI] [PubMed]
29. Granier KL, Segal DL. Convergent and predictive validity of the Mini MoCA and considerations for use among older adults. Psychiatry Res Commun. 2024;4:100201. [DOI]
30. Campbell N, Rice D, Friedman L, Speechley M, Teasell RW. Screening and facilitating further assessment for cognitive impairment after stroke: application of a shortened Montreal Cognitive Assessment (miniMoCA). Disabil Rehabil. 2016;38:601–4. [DOI] [PubMed]

31. Burmester B, Leathem J, Merrick P. Subjective Cognitive Complaints and Objective Cognitive Function in Aging: A Systematic Review and Meta-Analysis of Recent Cross-Sectional Findings. Neuropsychol Rev. 2016;26:376–93. [DOI] [PubMed]
32. Rosická AM, Teckentrup V, Fittipaldi S, Ibanez A, Pringle A, Gallagher E, et al. Modifiable dementia risk factors associated with objective and subjective cognition. Alzheimers Dement. 2024;20:7437–52. [DOI] [PubMed] [PMC]
33. Farias ST, Mungas D, Reed BR, Harvey D, Cahn-Weiner D, Decarli C. MCI is associated with deficits in everyday functioning. Alzheimer Dis Assoc Disord. 2006;20:217–23. [DOI] [PubMed] [PMC]
34. Hutchinson AD, Hosking JR, Kichenadasse G, Mattiske JK, Wilson C. Objective and subjective cognitive impairment following chemotherapy for cancer: a systematic review. Cancer Treat Rev. 2012;38: 926–34. [DOI] [PubMed]
35. Moritz S, Xie J, Penney D, Bihl L, Hlubek N, Elmers J, et al. The magnitude of neurocognitive impairment is overestimated in depression: the role of motivation, debilitating momentary influences, and the overreliance on mean differences. Psychol Med. 2023;53:2820–30. [DOI] [PubMed] [PMC]
36. Kairys AE, Valentine TR, Whibley D, Kratz AL. Mind the Mood: Momentary Depression and Anxiety Moderate the Correspondence Between Subjective and Objective Cognitive Functioning in Fibromyalgia. Arthritis Care Res (Hoboken). 2023;75:1967–75. [DOI] [PubMed] [PMC]
37. Sutin AR, Stephan Y, Terracciano A. Psychological Distress, Self-Beliefs, and Risk of Cognitive Impairment and Dementia. J Alzheimers Dis. 2018;65:1041–50. [DOI] [PubMed] [PMC]
38. Lukasik KM, Waris O, Soveri A, Lehtonen M, Laine M. The Relationship of Anxiety and Stress With Working Memory Performance in a Large Non-depressed Sample. Front Psychol. 2019;10:4. [DOI] [PubMed] [PMC]
39. Jung MS, Visovatti M, Kim M, Cha K, Dlamini N, Cui X. Cognitive impairment in women newly diagnosed with thyroid cancer before treatment. Support Care Cancer. 2022;30:8959–67. [DOI] [PubMed]
40. Juríčková V, Fayette D, Jonáš J, Fajnerová I, Kozák T, Horáček J. Pretreatment Cancer-Related Cognitive Impairment in Hodgkin Lymphoma Patients. Curr Oncol. 2023;30:9028–38. [DOI] [PubMed] [PMC]
41. O'Farrell E, Smith A, Collins B. Objective-subjective disparity in cancer-related cognitive impairment: does the use of change measures help reconcile the difference? Psychooncology. 2017;26:1667–74. [DOI] [PubMed]
42. Vardy JL, Dhillon HM, Pond GR, Rourke SB, Bekele T, Renton C, et al. Cognitive Function in Patients With Colorectal Cancer Who Do and Do Not Receive Chemotherapy: A Prospective, Longitudinal, Controlled Study. J Clin Oncol. 2015;33:4085–92. [DOI] [PubMed] [PMC]
43. Oliveira AF, Torres A, Teixeira RJ, Monteiro S, Pereira A, Santos IM. Perceived cognitive functioning in breast cancer patients treated with chemotherapy compared to matched healthy women: Evidence from a Portuguese study. Int J Nurs Pract. 2023;29:e13119. [DOI] [PubMed]
44. Areklett EW, Fagereng E, Bruheim K, Andersson S, Lindemann K. Self-reported cognitive impairment in cervical cancer survivors: A cross-sectional study. Psychooncology. 2022;31:298–305. [DOI] [PubMed]
45. Mandelblatt JS, Stern RA, Luta G, McGuckin M, Clapp JD, Hurria A, et al. Cognitive impairment in older patients with breast cancer before systemic therapy: is there an interaction between cancer and comorbidity? J Clin Oncol. 2014;32:1909–18. [DOI] [PubMed] [PMC]
46. Yang Y, McLaughlin EM, Naughton MJ, Lustberg MB, Nolan TS, Kroenke CH, et al. Social Support, social ties, and cognitive function of women with breast cancer: findings from the Women's Health Initiative (WHI) Life and Longevity After Cancer (LILAC) Study. Support Care Cancer. 2022;31:48. [DOI] [PubMed] [PMC]
47. Lange M, Rigal O, Clarisse B, Giffard B, Sevin E, Barillet M, et al. Cognitive dysfunctions in elderly cancer patients: a new challenge for oncologists. Cancer Treat Rev. 2014;40:810–7. [DOI] [PubMed]

48. Smidt K, Mackenzie L, Dhillon H, Vardy J, Lewis J, Loh SY. The perceptions of Australian oncologists about cognitive changes in cancer survivors. Support Care Cancer. 2016;24:4679–87. [DOI] [PubMed]
49. Jain N, Wang Y, Zhang Y, Jacobsen E, Andreescu C, Snitz BE, et al. It goes both ways: The relationship between anxiety and mild cognitive impairment. Int J Geriatr Psychiatry. 2023;38:e5899. [DOI] [PubMed] [PMC]
50. Guo Y, Pai M, Xue B, Lu W. Bidirectional association between depressive symptoms and mild cognitive impairment over 20 years: Evidence from the Health and Retirement Study in the United States. J Affect Disord. 2023;338:449–58. [DOI] [PubMed]
51. Keetile N, Osuch E, Lentoor AG, Rasakanya T. Association of Circulating Levels of Inflammatory Cytokines and Chemotherapy-Associated Subjective Cognitive Impairment in a South African Cohort of Breast Cancer Patients. NeuroSci. 2023;4:296–304. [DOI] [PubMed] [PMC]
52. Keetile NM, Osuch E, Lentoor AG. Chemotherapy-related subjective cognitive impairment in breast cancer patients in semi-rural South Africa. Health SA. 2021;26:1605. [DOI] [PubMed] [PMC]