

Rates of Cognitive and Functional Impairments Among Sheltered Adults Experiencing Homelessness

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Objective: This study examined rates of objective cognitive and functional impairments and associations between cognitive performance and performance-based functional capacity in a well-characterized sample of adults experiencing homelessness.

Methods: One hundred participants completed a brief neuropsychological and functional capacity assessment and self-report questionnaires. Cognitive impairment rates were determined by comparing mean scores with published normative data, as well as by examining frequency of scores >1 SD below the mean. Pearson correlations were used to examine associations between cognitive and functional capacities.

Results: Overall, 65% of the study participants had scores in the cognitively impaired range on a brief cognitive screening test, 30% had impaired processing speed, and 11% met cognitive criteria for intellectual disability. Furthermore, 48% of the sample met functional impairment criteria, and poorer cognitive performance was strongly associated with poorer performance-based functional capacity ($p < 0.001$).

Conclusions: Cognitive and functional impairments are common among sheltered adults experiencing homelessness, underscoring the need for routine objective cognitive screening and rehabilitation services.

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Homelessness is a major social challenge in the United States. Although many studies have explored medical, psychiatric, and socioeconomic pathways to homelessness, few have examined the relationship between cognitive impairment and homelessness (1, 2). Furthermore, methodological inconsistencies have contributed to reports of variable rates of impairment; nevertheless, cognitive impairment is over-represented in the homeless population and is likely to be both a risk factor for and perpetuator of homelessness (2).

Severe mental illnesses and substance use disorders are highly prevalent among people who are homeless and may adversely affect cognitive functioning along with additional risk factors, including traumatic brain injury and malnutrition. Cognitive impairments are key determinants of functional outcomes for people with severe mental illnesses or substance use disorders (3, 4), and similar associations are likely to exist between cognitive deficits and psychosocial functioning among individuals who are homeless. However, only one study, by Stergiopoulos et al. (5), has examined the relationship between objective cognitive and functional performance in a small sample of homeless ($N=30$) and housed ($N=21$) psychiatric inpatients with schizophrenia spectrum disorders. Although the two groups did not significantly differ in cognitive and functional performance,

poorer verbal memory and executive functioning and processing speed independently predicted poorer functional capacity in the full sample, underscoring the importance of neuropsychological screening and interventions to improve cognition and functional disability.

Stergiopoulos and colleagues' (5) findings are significant for the development and delivery of effective preventive and rehabilitative services for people who are at risk for or are currently experiencing homelessness. Cognitive interventions

HIGHLIGHTS

- Cognitive and functional impairments were found to be more common among adults experiencing homelessness than among adults in the general population.
- Poorer cognitive functioning was associated with poorer functional skills, underscoring the need for psychosocial interventions that improve cognition and functioning in this population.
- Understanding cognitive and functional impairments among people experiencing homelessness may improve clinical treatment and service delivery to improve housing and health outcomes.

in homeless populations, for example, may improve independence and daily functioning. Moreover, underappreciation of the presence and importance of cognitive and functional impairments within this community can affect homeless individuals' ability to use services and impede efforts to achieve housing and financial stability. As such, we aimed to examine rates of cognitive impairment and impaired functional capacity and investigate the association between cognitive performance and performance-based functional capacity of sheltered adults experiencing homelessness. We hypothesized that rates of cognitive impairment and impaired functional capacity of adults experiencing homelessness would exceed normative expectations. Furthermore, we expected that poorer cognitive performance would be associated with poorer performance-based functional capacity.

METHODS

One hundred clients residing at the Father Joe's Village homeless shelter in San Diego between February 2012 and March 2013 participated in this study. These study participants represented 16% of all residents informed about the study ($N=626$); 175 contacted the study team, of whom 126 were eligible and scheduled for testing; 26 were lost to follow-up or refused to participate. Inclusion criteria were age between 18 and 89 years and ability to complete testing in English and provide voluntary informed consent. The University of California, San Diego, Institutional Review Board and Father Joe's Village approved all study procedures.

After providing informed consent, the participants were asked about recent drug use to determine whether same-day neuropsychological testing was contraindicated. The 60- to 90-minute neuropsychological and functional assessments were administered by study staff at the shelter. Participants received a \$20 gift card as compensation.

Demographic and clinical characteristics were obtained via participants' self-reports and review of their shelter records. The shelter used the Psychiatric Diagnostic Screening Questionnaire (PDSQ) (6) to assess psychiatric diagnoses and current symptoms, the Simple Screening Questionnaire (7) to assess substance use history, and the Test of Adult Basic Education (8) to determine grade-level estimates of academic skill in reading, math, and language.

The reading subtest from the Wide Range Achievement Test–Fourth Edition (WRAT-4) was used to estimate premorbid IQ. The two-test version of the Wechsler Abbreviated Scale of Intelligence (WASI) was used to assess the Full Scale Intelligence Quotient (FSIQ). The coding subtest from the Wechsler Adult Intelligence Scale–Fourth Edition (WAIS-IV) provided estimates of processing speed. The Montreal Cognitive Assessment (MoCA) is a global cognitive test we used to screen for mild cognitive impairment (9). We used the University of California, San Diego, Performance-Based Skills Assessment–Brief (UPSA-B) (10) to measure financial and communication skills in role-play scenarios. Total scores range from 0 to 100, with higher scores reflecting

better performance. Scaled scores were derived from the normative profile of the UPSA-B for comparison (11).

Cognitive impairment frequencies were classified according to two cutoffs: scores >1 SD and >1.5 SDs below the mean. Additionally, we used chi-square tests to assess whether the cognitive and functional performance of the study sample on each test differed from an expected level of impairment (>1 SD below the mean; lower than 16th percentile) in the general population. An established cutoff score of <60 on the UPSA-B was used to examine the rates of individuals who would not be expected to be able to live independently (10). Normative scores in the sample were compared with 50th percentile normative scores for each test by using one-sample t tests. Average performance-based functional capacity scaled scores were compared with mean values in the normative sample for the UPSA-B (11). One-sample t tests were used to compare the sample's mean value on the MoCA with a published mean value in a normative sample (9). The originally recommended cutoff score of 26 was used to identify the proportion of participants who would be classified as having at least mild cognitive impairment (9). Mild cognitive impairment rates were also calculated with a more conservative MoCA cutoff score of 23, which is associated with an improved false positive rate and overall diagnostic accuracy (12).

RESULTS

The characteristics of the 100 participants in this study sample are detailed in Table 1. Overall, participants reported being homeless at least 3.4 ± 3.8 times (mean $\pm$ SD) over their lifetime, with 64 having had more than one episode of homelessness. At shelter entry, 29 met the criteria of the U.S. Department of Housing and Urban Development for chronic homelessness (i.e., either continuously homeless for 1 year or at least four episodes of homelessness in the past 3 years). Including their current shelter stay, participants had stayed in transitional housing 1–15 times previously (2.5 ± 2.8).

Table 2 presents data on the cognitive and functional capacity measures, as well as the one-sample t test comparisons of each test to the 50th percentile normative score (or the normative sample mean raw score). The estimated premorbid IQ of 92.4 ± 13.8 was significantly lower than the average standard score of 100 ($p < 0.001$) but was still within the average range (90–109). The WASI FSIQ score of 97.7 ± 16.1 was within the average range and not statistically significantly different from the average standard score. However, 11 participants met the cognitive criteria for intellectual disability (FSIQ ≤ 75) according to *DSM-5*. Participants' performance on both matrix reasoning (49.9 ± 11.7) and vocabulary (46.1 ± 11.5) subtests of the WASI were within the average range, with only the vocabulary T-score being significantly lower than the 50th percentile T-score of 50 ($p = 0.001$). Participants' mean processing speed scores (7.8 ± 2.8) were in the low-average range but just above the cutoff for mild impairment (scaled score < 7) and were significantly lower than the 50th percentile–scaled score of

10 ($p < 0.001$). On the basis of the impairment criterion of >1 SD below the mean (below 16th percentile in normative samples), 21 participants had impairments on the WASI matrix reasoning subtest, 21 had impairments on the FSIQ, 22 showed impairment on the WASI vocabulary subtest, and 23 exhibited impairment on the WRAT-4 reading subtest, but differences were not clinically or statistically significant. However, 30 participants exhibited practically and statistically significant impairment on the WAIS-IV coding subtest ($\chi^2=5.53$, $df=1$, $p=0.02$).

The participants' MoCA total score of 23.9 ± 3.8 was significantly lower than expected scores in the general population ($p < 0.001$). Using the MoCA mild cognitive impairment cutoff of 26 (9), 65 of the participants would be classified as having at least mild cognitive impairment ($\chi^2=49.82$, $p < 0.001$). In contrast, using a MoCA cutoff of 23 (12), 30 of the current sample would be classified as having at least mild cognitive impairment.

Performance on the UPSA-B was in the low-average range and significantly lower than the 50th percentile-scaled score of 10 ($p < 0.001$), with 48 participants meeting criteria for impairment ($\chi^2=23.53$, $p < 0.001$) and 17 scoring < 60 , the cutoff for individuals not expected to be able to live independently. Higher estimates of premorbid IQ ($r=0.55$) and better performance on WASI matrix reasoning ($r=0.64$), WASI vocabulary ($r=0.55$), WAIS-IV coding ($r=0.42$), and MoCA ($r=0.58$) were associated with UPSA-B scores ($p < 0.001$).

DISCUSSION

The results of this study indicate that individuals in a sample of adults experiencing homelessness had higher rates of cognitive impairment than the general population, particularly in the domains of crystallized knowledge and processing speed. Furthermore, we found high rates of functional impairment and a strong association of poorer cognitive performance with poorer performance-based functional capacity, underscoring the need for routine cognitive screening and rehabilitation in this population.

Participants' premorbid IQ and current IQ were estimated to be in the average range; however, 11% of the sample met the cognitive criteria for intellectual disability. Current IQ estimates were partly based on performance on a test of crystallized knowledge, which may explain the lack of a difference between the current and premorbid IQ estimates despite other indications of current cognitive impairment. The average higher IQ in our sample relative to other samples (1) could be due to a substantial representation of homeless veterans in our sample, a subgroup known to have an IQ in the average range (13), probably in part because Armed Services Vocational Aptitude Battery requirements disqualify individuals with low IQs from military service. Rates of cognitive impairment on the MoCA were 65% with the originally recommended cutoff of 26 (9) and 30% with a cutoff score of 23 (12), both significantly higher than impairment rates among people in the general population. Overall, these findings are consistent with those of previous

TABLE 1. General sample characteristics of 100 shelter residents

Sample characteristic	Range	N or M $\pm$ SD
Demographic characteristic		
Age (M $\pm$ SD years)	18–66	48.9 $\pm$ 9.2
Female		19
Education (M $\pm$ SD years)	0–18	11.7 $\pm$ 2.2
Hispanic/Latino		10
Non-Caucasian		35
Ever married		14
Veteran		52
Lifetime N times in jail/prison	0–51	4.4 $\pm$ 7.8
Tests of Adult Basic Education (N=72)		
Reading grade-level estimate	.7–12.9	10.1 $\pm$ 3.2
Language grade-level estimate	0–12.9	7.8 $\pm$ 3.9
Math grade-level estimate	2.3–12.9	8.0 $\pm$ 3.2
Clinical characteristics (M $\pm$ SD)		
Years since last alcohol use	0–39	2.7 $\pm$ 6.6
Years since last drug use	0–57.7	6.4 $\pm$ 11.1
SSI-SA total score (N=98) ^a	0–14	2.0 $\pm$ 3.3
PDSQ total score (N=94) ^b	0–113	19.6 $\pm$ 26.5

^a SSI-SA, Simple Screening Instrument for Substance Abuse; higher scores indicate greater risk for substance abuse.

^b PDSQ, Psychiatric Diagnostic Screening Questionnaire; higher scores indicate greater symptomatology.

studies indicating that cognitive impairment is common among people who are homeless (1, 2). Overall, participants exhibited low-average performance on processing speed (coding subtest), and 30% scored in the impaired range, almost double the impairment rate seen in the general population. Previous studies have suggested that brief screening measures may inadequately capture the significant cognitive impairment in the homeless population (1) and that the coding subtest of the WAIS may be particularly useful for integration with routine care in service settings, given its sensitivity to brain injury and general cerebral integrity (14). Nevertheless, the cross-sectional design of our study precludes interpretation of these impairments as an indication of decline from previous levels of functioning.

To our knowledge, this is the first study that has characterized rates of impairment in functional capacity within a sample of adults who are homeless and receiving shelter services. Nearly half the sample (i.e., 48) met criteria for impairment on the UPSA-B, a performance-based functional capacity measure; 17% of the total sample scored below the cutoff of 60 on the UPSA-B, which is used to identify individuals who may be unlikely to live independently (10). Furthermore, consistent with previous findings (5), estimates of premorbid IQ and performance across all neurocognitive measures were directly associated with performance-based functional capacity.

Our use of a reliable and valid screening measure (i.e., the MoCA) and of additional neuropsychological tests advances knowledge about the cognitive functioning in the homeless population. With previous evidence suggesting that cognitive impairment rates range from 2% to 82% among people

TABLE 2. Cognitive and functional capacities of the study sample^a

Test	M±SD	t ^c	p	Percentage impaired ^b	
				>1 SD	>1.5 SD
Functional capacity					
UPSA-B	7.1±3.2	-9.3	<.001	48	37
Neuropsychological measures					
WRAT-4 reading	92.4±13.8	-5.5	<.001	23	11
WASI matrix reasoning	49.9±11.7	-.1	.925	21	13
WASI vocabulary	46.1±11.5	-3.4	.001	22	15
FSIQ	97.7±16.1	-1.4	.155	21	12
WAIS-IV coding	7.8±2.8	-7.9	<.001	30	19
MoCA raw score ^d	23.9±3.8	-9.4	<.001	65	30

^a FSIQ, Full Scale Intelligence Quotient; MoCA, Montreal Cognitive Assessment; UPSA-B, University of California, San Diego, Performance-Based Skills Assessment–Brief; WAIS-IV, Wechsler Adult Intelligence Scale–Fourth Edition; WASI, Wechsler Abbreviated Scale of Intelligence; WRAT-4, Wide Range Achievement Test–Fourth Edition. The WRAT-4 word reading subtest and FSIQ scores are expressed as standard scores (M±SD=100±15), the WASI matrix reasoning and vocabulary subtest results are expressed as T scores (M±SD=50±10), the WAIS-IV coding subtest and UPSA-B results are expressed as scaled scores (M±SD=10±3), and the MoCA score is expressed as a raw score (range 0–30). Higher scores on all tests signify better performance.

^b Cognitive impairment was indicated by scores >1 SD or >1.5 SDs below the mean.

^c df=99.

^d The two percentages of the study sample impaired for this score denote proportions of individuals below raw score cutoffs of <26 and <23, respectively.

who are homeless (1), mild cognitive impairment rates of homeless individuals, as measured by a comprehensive neuropsychological assessment, are likely to lie somewhere within our range of 21% to 65%. Of note, cognitive performance was not significantly associated with PDSQ-derived psychiatric diagnoses; these results will be published in a forthcoming paper. Overall, these findings underscore the need for targeted cognitive interventions to improve functional outcomes for this population. Given the availability of low-cost, manualized protocols, behavioral health providers or clinicians could easily integrate evidence-based compensatory cognitive strategies into routine care in homeless shelters. Integration of cognitive interventions in current health care and social services systems for homeless individuals is further supported by a longitudinal investigation by Stergiopoulos and colleagues reporting high prevalence and persistence of neurocognitive impairment in this population (15). Moreover, that study found no significant association between housing stability and changes in cognitive functioning over an 18-month period, suggesting that housing stability, while important, may not modify risk for enduring neurocognitive impairment.

Our study was limited by its cross-sectional design and reliance on a self-selected sample. Shelter residents who may have had trouble navigating the system, for cognitive or other reasons, could have been less likely to enroll or more likely to drop out while waiting for their study appointment. Psychiatric diagnoses were based on a self-administered questionnaire. We also excluded non-English speakers, and most of the participants were men. Thus, cognitive and functional performance of women who are homeless remains relatively underinvestigated. Adults experiencing homelessness

may be impaired in additional cognitive abilities not measured in this study. Additionally, because sampling occurred at a shelter where residents could stay for up to 2 years, results may not extend to unsheltered populations, individuals living in short-stay emergency shelters, or those housed by friends or relatives. Future investigations should consider longitudinal designs and the inclusion of executive functioning measures (e.g., cognitive flexibility, problem solving, and planning), which may directly correlate with functional outcomes and homelessness risk.

CONCLUSIONS

Our results underscore the importance of cognitive and functional capacity assessments to identify individuals who might benefit from neurocognitive interventions. Early identification of such impairments could improve services, such as earlier assistance with benefit applications and more assistance with social services. Providing cognitive rehabilitation

services to adults experiencing homelessness may also lead to better functional skills, potentially improving their ability to navigate service systems on their own and helping them achieve and maintain stable housing.

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First-Person Accounts Invited for Column

People who have experienced psychiatric illnesses, their family members, and professionals engaged in providing care are invited to submit first-person accounts of their lived experiences for the Personal Accounts column. The editors are looking for articles that create conversations and move the field forward. Authors may publish under a pseudonym if they wish. Material is not subject to peer review. Maximum length is 1,600 words.

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