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The relationship between cognitive functioning, age and employment in people with severe mental illnesses in an urban area in India: A longitudinal study

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ABSTRACT

Although there is substantial evidence of the association between cognitive impairment and work in people with severe mental illnesses (SMI) in developed countries, less is known about this relationship in developing countries such as India. Studies showing higher rates of employment in people with SMI in developing countries than developed ones raise the question of whether cognitive functioning is related to work status and characteristics of work (e.g., wages earned). We conducted a one-year follow-up study to investigate the relationship between employment and cognitive functioning, assessed with the Montreal Cognitive Assessment (MoCA), in 150 participants with SMI (92% schizophrenia) living in an urban area and receiving psychiatric outpatient treatment at a public hospital in India. The MoCA had good internal reliability and test-retest reliability over the one-year period. Better cognitive functioning was associated with younger age, shorter duration of illness, higher education, and male gender. Both younger and older participants with higher cognitive functioning at baseline were more likely to be employed at baseline and one year later. Work status at baseline and one year follow-up was consistently related to executive functions among younger participants, and to attention among older participants, suggesting changes over the course of illness in the importance of specific cognitive domains for achieving satisfactory work performance. The findings suggest that cognitive functioning is associated with employment in people with SMI in India. Attention to impaired cognitive functioning may be critical to improving employment outcomes in this population.

1. Introduction

Cognitive impairment is a hallmark feature of schizophrenia and other severe mental illnesses (SMI) (Depp et al., 2012b; Schaefer et al., 2013) and has an adverse impact on psychosocial functioning in this population (Green, 2006). Furthermore, impaired cognitive functioning is associated with attenuated benefit from psychosocial interventions for schizophrenia (Kurtz, 2011). One of the most important effects of reduced cognitive ability is its impact on vocational functioning. Extensive research from developed countries indicates that cognitive impairment is a robust predictor of unemployment in people with SMI, both concurrently and prospectively (Depp et al., 2012a; Dickerson et al., 2004; McGurk and Mueser, 2004; Tsang et al., 2010), and is associated with reduced benefit from evidence-based supported employment (McGurk et al., 2018, 2003). Furthermore, when people with impaired cognitive functioning obtain work in supported employment, more supports are needed to help them maintain their jobs (McGurk et al., 2003). Thus, the importance of cognition for employment in people with SMI is well documented in the literature from developed countries.

Less is known about the relationship between cognitive functioning and psychosocial adjustment, especially vocational functioning, in people with SMI living in developing countries, such as India. Several studies have examined the relationship between cognitive impairment and reduced psychosocial functioning in outpatients with schizophrenia in India, with five studies reporting significant associations (Bhagyavathi et al., 2015; Gopalakrishnan et al., 2015; Hegde et al., 2013; Palsetia et al., 2018; Soni et al., 2017), but not two others (Krishnadas

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et al., 2007; Kurtz et al., 2018). Only one study has evaluated the specific associations between cognitive impairment and employment. Srinivasan and Tirupati (2005) reported that among 88 individuals with schizophrenia residing in an urban area, 59 were employed (86.4% were working in mainstream jobs and 6.8% were working in family-run businesses), and cognitive functioning was related to greater likelihood of being employed, with workers having better performance on category fluency and executive functioning. However, the relationship between cognition and work was no longer significant after statistically controlling for negative symptoms.

While Srinivasan and Tirupati (2005) found some associations between cognitive functioning and employment status, the study has several limitations. First, participants with fewer than ten years of education were excluded, potentially ruling out more cognitively impaired individuals. Second, the study was conducted at a non-profit organization that provided a range of psychiatric rehabilitation services in addition to medication. Such rehabilitation services are rarely available in India (Rajkumar, 2015), limiting the generalizability of the findings to most other settings in the country. Third, the cross-sectional nature of the study limits the strength of conclusions that can be drawn as the stability of cognition and employment status over time is unknown.

There are several reasons why it is important to further investigate the link between cognition and employment in people with SMI in developing countries. Employment rates in people with SMI are higher in developing countries (Shibre et al., 2015; Thara, 2004; Yang et al., 2013) than developed countries (Jonsdottir and Waghorn, 2015; Marwaha et al., 2007). Two factors may contribute to these higher work rates. First, a significant proportion of people with SMI in developing countries work in family operated businesses, which likely have built-in supports and protections (Ran et al., 2011; Suresh et al., 2012). Second, the higher availability of unskilled jobs in developing countries than developed countries (World Bank, 2007, 2010) may facilitate employment in people with SMI living in developing countries (Akinsulore et al., 2015; Srinivasan and Thara, 1997). The important role of family operated businesses and ready access to unskilled jobs in developing countries raises the question of whether cognitive functioning has less impact on employment than in developed countries. In addition, most people with SMI living in urban areas in developing countries work for independent employers and such jobs may not have the protections available in family-run businesses. Therefore, it is important to evaluate whether cognitive functioning is related to work outcomes of people with SMI living in urban areas.

We conducted a one-year longitudinal study to evaluate the rates of work and interest in work, their stability over time, and correlates of work in people with SMI receiving psychiatric outpatient services at a public hospital in an urban area in India (Khare et al., 2021b; Khare et al., Ahead of Print). The primary findings showed that work status was stable over the one year, with approximately 90% of the 150 participants either employed (40% at baseline, 49.5% at follow-up) or unemployed at both assessments. Interest in work was also stable, with 78.8% of unemployed participants wanting to work at both assessments.

This paper is the first report of cognitive data from this study. We evaluated the stability of cognitive functioning over the one-year period, and its relationship to participant demographic and clinical characteristics, work status and outcomes, and interest in work among those not employed. The employment data from this study (Khare et al., 2021b; Khare et al., Ahead of print) and our previous study (Khare et al., 2021a, 2020) showed that men were more likely to be working than women, similar to the trends in the general population (Government of India et al., 2016). Therefore, we also evaluated whether there was an association between cognitive functioning, gender, and work. In addition, as age is associated with a decline in some aspects of cognitive functioning in the general population and in schizophrenia (Harvey, 2005), we examined whether the relationship between cognition and employment was the same in younger and older participants.

2. Method

The study was carried out at the psychiatry outpatient department of Regional Mental Hospital, a public hospital located in Pune district in the state of Maharashtra, western India. Study procedures were approved by the Institutional Review Board of Boston University, and study participants provided informed consent.

2.1. Participants

Inclusion criteria for the study were: 1) a diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder, or major depression based on the medical record; 2) 18 to 60 years old; 3) fluency in Marathi language; 4) residing in Pune district and receiving outpatient services at Regional Mental Hospital, Pune; and 5) willingness and ability to provide informed consent.

A total of 150 participants were enrolled in the study. Of these, 133 were evaluated at baseline with the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005), and 17 were evaluated with the MoCA– Basic (Julayanont et al., 2015), which was designed for individuals with no or very low education levels (defined in this study as lower than fifth grade education). This paper presents data on the 133 participants assessed on MoCA. The study cohort comprised participants with schizophrenia-schizoaffective disorder diagnoses (91.7%), the majority were men (70%) with an average duration of illness of 13 years (range = 4–39 years; 17 participants were within the first five years of illness). Among participants who were employed, 84% were working for independent employers, 6% were working in family-run businesses, and 10% were self-employed.

The one-year follow-up interviews were conducted either face-to-face or on the phone. Of the 133 participants who completed the MoCA at baseline, 73 (55%) completed it at follow-up. Another 21 participants were interviewed over the phone and provided employment data but could not be evaluated with the MoCA.

2.2. Procedures

All baseline assessments were administered by the first author. Two trained assessors with a Master's degree in psychology conducted the follow-up assessments, which were administered between 11 and 13 months after baseline. See Khare et al. (2021b, Ahead of Print) for other details.

2.3. Measures

2.3.1. Semi-structured interview

Two semi-structured interviews developed for our previous study (Khare et al., 2021a, 2020) were used to obtain demographic, clinical, and employment related information at baseline and the one-year follow-up. The interview queried demographic characteristics, clinical information, work history, and current work status. Job characteristics were collected for the employed, including hours worked/week and monthly earnings, how the current job was obtained (e.g., with the help of family or friends), and were asked yes/no questions about benefits (e.g., improved self-esteem), and problems (e.g., psychiatric symptoms interfering with work) related to work. Type of employer was categorized as working for independent employer, working in a family-run business, or self-employed. Unemployed participants were asked yes/no questions about barriers to work (e.g., stigma), interest in working, and, for those who wanted to work, supports that could help them get work (e.g., assistance with job search).

2.3.2. Montreal Cognitive Assessment (MoCA)

The MoCA (Nasreddine et al., 2005) is a widely used, 10-min paper and pencil test for screening cognitive impairment in a range of populations, including the aged and people with psychiatric illness. The

MoCA has been translated into multiple languages, including Marathi, and provides subscale scores on seven cognitive domains: visuospatial skills / executive function, naming, attention, language, abstraction, delayed recall, and orientation. MoCA total scores were formed by summing the scores of the seven subscales, with the total score ranging between 0 and 30.

2.4. Statistical analyses

We evaluated whether there were any differences between participants who did vs. did not complete MoCA at follow-up on demographic and clinical characteristics, work status, and cognitive functioning using chi-square analyses and *t*-tests. Intraclass correlations (ICCs), Pearson correlations and paired sample *t*-tests were used to calculate the test-retest reliability of total scores on the MoCA, as well as scores on specific cognitive domains, at baseline and follow-up. Inter-correlations between the specific cognitive domains at baseline and follow-up were evaluated by computing Pearson correlations. Cronbach's alphas for the MoCA total score at baseline and follow-up were calculated to assess internal consistency.

t-tests and Pearson correlations were performed to examine associations between the total MoCA score and baseline demographic and clinical characteristics. To evaluate the influence of age, gender, and their interaction on overall and specific domains of cognitive functioning we divided the sample into younger (<37 years old; mean = 31.5 years) and older (≥37 years old; mean = 45.3 years) participants based on a median split, and performed 2 (age) by 2 (gender) analyses of variance (ANOVAs) on the total MoCA score and subscales. The associations between the MoCA scores at baseline and work status at baseline and follow-up were evaluated separately for younger and older participants by computing *t*-tests. Pearson correlations were computed to investigate the relationships between the total MoCA score and work characteristics (e.g., monthly income) among participants employed at baseline and (separately) at follow-up.

Among the unemployed participants at baseline, *t*-tests were conducted to evaluate whether the total MoCA score was related to interest in work among younger and older participants. The associations between the total MoCA score at baseline and the number of barriers to work and number job supports desired by unemployed participants who wanted to work at baseline were evaluated by computing Pearson correlations for younger and older participants. Parallel analyses were conducted to examine whether the baseline MoCA total score was associated with interest in work, perceived barriers to work and desired job supports at follow-up among younger and older participants.

Lastly, to evaluate whether the pattern of associations between cognitive functioning and demographic and work characteristics in the total sample of participants with mixed psychiatric diagnoses was altered when the sample was restricted to schizophrenia-spectrum disorders, we recomputed the analyses described above including only participants with schizophrenia or schizoaffective diagnoses, and dropping the 11 participants with a mood disorder.

3. Results

Participants who completed the MoCA at follow-up were significantly older than those who did not (*Ms* = 38.3 years old vs. 34.7, respectively; $t = 2.2$; $df = 51.6$; $p = .03$), but did not differ on any other demographic or clinical characteristics, work status, or baseline MoCA total score.

Table 1 presents the total MoCA and specific cognitive domain scores at both assessments. The paired *t*-test comparing the baseline and follow-up total MoCA score was not significant, indicating that overall cognitive functioning did not change over the one-year period. In terms of specific cognitive domains, delayed recall improved significantly across the assessments, but not the other six domains. The ICCs were highly significant and showed good reliability on the executive function (0.75) and attention (0.82) subscales and total scores (0.85), and moderate reliability on the language, abstraction, delayed recall, orientation, and naming subscales (range: 0.57–0.71). Cronbach's alpha for the MoCA at baseline was 0.63 and 0.57 at follow-up, indicating moderate levels of internal consistency.

Table 1
Stability and reliability (intraclass correlation coefficients: ICCs) of MoCA scores at baseline and follow-up ($n = 73$).**

		Baseline	Follow-up			
	Range of scores	Mean (SD)	Mean (SD)	*t* (paired t-test)	*df*	*ICC*
Executive Function	0–5	2.42 (1.2)	2.51 (1.3)	−0.6	72	0.75***
Naming	0–3	2.55 (0.7)	2.66 (0.6)	−1.6	72	0.71***
Attention	0–6	3.53 (1.8)	3.59 (1.8)	−0.3	72	0.82***
Language	0–3	0.58 (0.8)	0.40 (0.7)	1.9	72	0.57***
Abstraction	0–2	0.81 (0.8)	1.00 (0.8)	−1.9	72	0.60***
Delayed Recall	0–5	1.47 (1.4)	1.90 (1.5)	−2.4*	72	0.61***
Orientation	0–6	5.44 (1.1)	5.44 (0.9)	0.0	72	0.69***
Total	0–30	17.59 (4.4)	18.29 (4.1)	−1.9	72	0.85***

* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.

Supplementary Table 1 provides Pearson intercorrelations between the total MoCA and specific cognitive domains scores at baseline and follow-up. Attention was the cognitive domain most consistently correlated with other cognitive domains, with all the correlations with attention significant at baseline except naming ($r = 0.08$), and all but two significant at follow-up (attention-abstraction, $r = 0.17$, NS; attention-delayed recall, $r = 0.11$, NS). Abstraction, delayed recall, and orientation were the cognitive domains that were least strongly correlated with other domains, with significant correlations at baseline between each of the domains and two other cognitive domains, and significant correlations at follow-up between each domain and one other cognitive domain.

Higher total scores on the MoCA were associated with higher levels of education, younger age, a shorter duration of illness, and male gender (Table 2). A Pearson correlation between age and education was not significant ($r = -0.08$; $p = .4$), but was significant between age and duration of illness ($r = 0.57$; $p < .001$). To examine whether duration of illness was related to cognition after controlling for age we computed a partial correlation, which was not significant ($r = -0.06$; $p = .5$). Results of *t*-tests and a Fisher's exact test indicated no significant differences between men vs. women on age ($t = 0.8$; $p = .4$), education ($t = 1.0$; $p = .3$), or history of hospitalization (Fisher's exact test $p = .3$).

Table 3 provides the results of the ANOVAs evaluating the effects of age and gender on the MoCA total and subscale scores at baseline. Significant gender differences were found on two of the MoCA subscales, with men performing significantly better on executive functions and attention. Age differences were also found indicating significantly better cognitive performance in younger participants on the language, and orientation subscales of the MoCA. Both gender and age had significant main effects on total MoCA scores, with men and younger participants performing better than women and older participants. Last, there was one significant age by gender interaction on orientation. To explore the nature of the interaction, *t*-tests were computed comparing younger men and women, and older men and women on this subscale. The gender difference in younger participants was not significant, but it was in older participants, with women performing worse than men ($t = 2.6$; $df = 65$;

Table 2
Associations between MoCA total and baseline demographic and clinical characteristics ($N = 133$).

Categorical variables	*Mean (SD)*	*t*	*df*	*p*
Gender				
Male ($n = 93$)	18.5 (4.2)	2.2	131	**0.027**
Female ($n = 40$)	16.8 (3.7)			
Marital status				
Ever married ($n = 80$)	17.8 (4.1)	−0.7	131	0.5
Never married ($n = 53$)	18.3 (4.2)			
Psychiatric diagnosis[a]				
Schizophrenia-spectrum ($n = 122$)	17.9 (4.2)	−0.8	131	0.4
Mood disorder ($n = 11$)	18.9 (3.5)			
Past psychiatric hospitalization				
Yes ($n = 122$)	17.9 (4.1)	0.04	131	0.9
No ($n = 11$)	17.9 (5.2)			
Current medical conditions				
Yes ($n = 24$)	18.1 (4.3)	0.2	131	0.9
No ($n = 109$)	17.9 (4.1)			
Current tobacco use				
Yes ($n = 68$)	17.6 (3.7)	−1.1	131	0.3
No ($n = 65$)	18.3 (4.5)			
Current alcohol use				
Yes ($n = 4$)	17.8 (2.9)	−0.1	131	0.9
No ($n = 129$)	17.9 (4.2)			

Continuous variables	Mean (SD)	Pearson *r*	*p*
Age	38.5 (8.7)	−0.26	**0.002**
Education	10.9 (2.8)	0.44	**<0.001**
Family income (USD)	385 (393)	0.06	0.5
Duration of illness (years)	13.8 (7.4)	−0.19	**0.02**

[a] Schizophrenia $n = 114$; schizoaffective disorder $n = 8$; bipolar disorder $n = 11$.

$p = .01$).

Table 4 summarizes the associations between baseline MoCA scores and work status at baseline for younger and older participants, and Table 5 summarizes the same associations between baseline MoCA scores and work status at the one-year follow-up. At baseline, both employed younger and older participants had significantly higher scores on attention and MoCA total than unemployed participants. Younger working participants also had better executive functions, abstraction, and orientation, whereas older working participants performed better on delayed recall than their unemployed counterparts. Work status at follow-up was related to executive functions and total MoCA scores among younger participants, and attention and total MoCA among older participants (Table 5).

Supplementary Table 2 presents the associations between cognitive functioning and work characteristics of younger and older participants who were employed at baseline, and Supplementary Table 3 provides the same analyses for those who were employed at follow-up. At baseline, better cognitive functioning was significantly associated with fewer hours worked/week, shorter job duration, and more problems related to work among younger participants, but there were no significant relationships between cognition and work characteristics among older participants. Cognitive functioning was not significantly related to any work characteristics among younger participants who were employed at follow-up, whereas among older participants better cognitive

Table 4
Associations between MoCA scores at baseline and work status at baseline for younger (< 37 years old) and older (≥ 37 years old) participants.

Younger participants

Baseline MoCA	Employed at baseline ($n = 21$) Mean (SD)	Unemployed at baseline ($n = 45$) Mean (SD)	*t*	*df*	*p*
Executive function	3.43 (0.9)	2.38 (1.2)	3.6	64	0.001
Naming	2.62 (0.7)	2.62 (0.7)	−0.02	64	0.9
Attention	4.67 (0.9)	3.56 (1.9)	3.2	63.1	0.002
Language	0.86 (0.9)	0.58 (0.8)	1.3	64	0.2
Abstraction	1.24 (0.8)	0.71 (0.8)	2.6	64	0.01
Delayed recall	1.95 (1.2)	1.53 (1.4)	1.2	64	0.2
Orientation	5.81 (0.5)	5.42 (0.9)	2.1	63.2	0.04
Total	21.29 (2.7)	17.49 (4.1)	4.5	56.1	<0.001

Older participants

Baseline MoCA	Employed at baseline ($n = 29$) Mean (SD)	Unemployed at baseline ($n = 38$) Mean (SD)	*t*	*df*	*p*
Executive function	2.55 (1.3)	2.11 (0.9)	1.6	49.4	0.1
Naming	2.59 (0.6)	2.68 (0.6)	−0.7	65	0.5
Attention	4.28 (1.3)	3.39 (1.7)	2.4	65	0.02
Language	0.24 (0.4)	0.42 (0.6)	−1.4	64.2	0.2
Abstraction	0.90 (0.8)	0.66 (0.7)	1.3	65	0.2
Delayed recall	1.72 (1.6)	0.95 (1.4)	2.1	65	0.04
Orientation	5.55 (0.9)	5.21 (1.0)	1.4	65	0.2
Total	18.66 (3.7)	16.13 (3.9)	2.6	65	0.01

Table 3
Associations between MoCA scores (means and standard deviations) at baseline and age and gender based on analyses of variance.

MoCA domain	Younger Participants Men ($n = 42$)	Younger Participants Women ($n = 24$)	Older Participants Men ($n = 51$)	Older Participants Women ($n = 16$)	Gender F^1	Age F^1	Gender * Age F^1
Executive function	3.00 (1.2)	2.21 (1.1)	2.31 (1.2)	2.25 (0.8)	3.81*	2.16	2.76
Naming	2.69 (0.6)	2.50 (0.8)	2.65 (0.6)	2.62 (0.5)	0.75	0.11	0.47
Attention	4.45 (1.3)	2.96 (1.9)	3.92 (1.6)	3.31 (1.5)	12.45*	0.09	2.21
Language	0.69 (0.8)	0.63 (0.9)	0.33 (0.6)	0.37 (0.5)	0.01	4.91*,[a]	0.15
Abstraction	0.93 (0.8)	0.79 (0.8)	0.76 (0.8)	0.75 (0.7)	0.26	0.47	0.17
Delayed recall	1.57 (1.3)	1.83 (1.4)	1.31 (1.6)	1.19 (1.4)	0.06	2.63	0.49
Orientation	5.52 (0.9)	5.58 (0.7)	5.53 (0.9)	4.81 (0.9)	3.45	4.68*	4.81*
Total	19.55 (3.8)	17.21 (4.3)	17.59 (4.4)	16.06 (2.6)	6.32*	4.08*	0.28

1. Degrees of freedom = 3, 129.
* $p \leq .05$.
[a] Levene's Test of Equality of Error Variances is significant ($p = .01$). The p value for F is 0.03.

Table 5
Associations between MoCA scores at baseline and work status at follow-up for younger (<37 years old) and older (≥ 37 years old) participants.

Younger participants					
	Employed at follow-up ($n = 24$)	Not Employed at follow-up ($n = 27$)			
Baseline MoCA	Mean (SD)	Mean (SD)	*t*	*df*	*p*
Executive function	3.13 (1.2)	2.37 (1.3)	2.2	49	0.03
Naming	2.63 (0.7)	2.67 (0.6)	−0.3	49	0.8
Attention	4.33 (1.5)	3.41 (2.0)	1.9	46.9	0.1
Language	0.92 (0.9)	0.70 (0.9)	0.9	49	0.4
Abstraction	1.08 (0.8)	0.78 (0.8)	1.3	49	0.2
Delayed recall	1.75 (1.4)	1.67 (1.4)	0.2	49	0.8
Orientation	5.79 (0.5)	5.30 (1.2)	1.9	35.9	0.1
Total	20.42 (4.0)	17.52 (4.1)	2.5	49	0.02

Older participants					
	Employed at follow-up ($n = 22$)	Not employed at follow-up ($n = 21$)			
Baseline MoCA	Mean (SD)	Mean (SD)	*t*	*df*	*p*
Executive function	2.41 (1.3)	2.14 (1.2)	0.7	41	0.5
Naming	2.50 (0.7)	2.62 (0.7)	−0.6	41	0.6
Attention	4.23 (1.2)	3.10 (1.9)	2.3	33.3	0.03
Language	0.32 (0.6)	0.33 (0.6)	−0.1	41	0.9
Abstraction	0.77 (0.8)	0.67 (0.7)	0.5	41	0.7
Delayed recall	1.59 (1.3)	0.81 (1.5)	1.8	41	0.1
Orientation	5.64 (0.9)	5.14 (1.2)	1.5	41	0.1
Total	18.36 (3.3)	15.57 (5.0)	2.2	41	0.04

functioning was associated with identifying fewer problems at work.

Among unemployed participants, interest in work at baseline or follow-up was not correlated with baseline MoCA among younger or older participants. Among younger and older unemployed participants who wanted to work, there were no associations between baseline total MoCA score and number of barriers to work identified at baseline ($M = 1.30$; $r = 0.07$; $p = .7$ and $M = 1.18$; $r = -0.01$; $p = .9$, respectively) or follow-up ($M = 1.12$; $r = 0.22$; $p = .3$ and $M = 0.53$; $r = 0.32$; $p = .2$, respectively). Baseline MoCA score was not related to the number of job supports desired by unemployed younger ($M = 2.80$; $r = 0.003$; $p = .9$) or older ($M = 2.91$; $r = -0.10$; $p = .6$) participants who wanted to work at baseline. Better cognitive functioning at baseline was significantly associated with higher number of supports desired by unemployed younger participants who wanted to work at follow-up ($M = 2.76$; $r = 0.43$; $p = .03$), but it was not significant among older participants who wanted to work at follow-up ($M = 2.13$; $r = 0.13$; $p = .6$).

For the sensitivity analyses conducted with participants with schizophrenia or schizoaffective disorder diagnoses, we did not interpret changes in the strength of associations between variables from statistically significant in the full sample ($p < .05$) to trend level significant ($p < .1$) in the restricted sample as meaningful because of reduced statistical power due to the smaller sample size. We examined two types of changes in the significance of associations: those that were statistically significant in the overall group but were no longer significant in the schizophrenia-schizoaffective disorder group ($p > .1$), and findings that were not significant in the overall group but became significant in the schizophrenia-schizoaffective disorder subgroup. Three differences were found. The ANOVAs in the overall group indicated significant age differences in which younger participants performed better on language and total MoCA score than older participants (Table 3), but neither of these differences were significant in the schizophrenia-schizoaffective group (Supplementary Table 4). In addition, while younger participants in the full sample who were employed at baseline performed significantly better on the orientation subscale than those who were not (Table 4), employment status was not significantly related to orientation in the younger participants with schizophrenia-schizoaffective disorder ($M/SD = 5.8/0.6$ for the employed and 5.5/0.9 for the unemployed; $t = 1.3$; $df = 58$; $p = .2$).

4. Discussion

This study is the first to our knowledge to examine the psychometric properties of the MoCA in an SMI population living in India (Haile et al., 2022), and to evaluate its relationship with work. The MoCA total score had moderate levels of internal consistency at baseline and follow-up (Cronbach's alphas = 0.63 and 0.57, respectively). These Cronbach's alphas are similar to those reported in three other studies from India using the MoCA with elderly participants or people with Parkinson's disease (range: 0.64–0.72) (Gupta et al., 2019; Krishnan et al., 2015; Thomas et al., 2018), and slightly lower than studies of the English version of the MoCA administered to persons with psychosis, Alzheimer's disease, or elderly participants (range: 0.76–0.83) (Gil-Berrozpe et al., 2020; Nasreddine et al., 2005). The test-retest reliability of the MoCA total over the one-year follow-up was also high ($ICC = 0.85$), with no significant change over time. The test-retest reliabilities of the MoCA subscale scores were also relatively high (*ICC*s ranging 0.57–0.82), with improvements over time suggesting practice effects for only one subscale (delayed recall). Two other studies from India reported higher test-retest reliabilities of the MoCA over shorter periods of time, including Pearson $r = 0.97$ over two weeks (Krishnan et al., 2015) and ICC = 0.87 over one-month (Gupta et al., 2019). Overall, these findings suggest that the MoCA has good internal and test-retest reliability over a relatively long follow-up period in a cohort of outpatients living in an urban area in India with predominantly schizophrenia diagnoses. In addition, as discussed below, the MoCA demonstrated good validity in predicting employment status in this population.

Previous research from developed countries (Landolt et al., 2016; McGurk and Meltzer, 2000; McGurk and Mueser, 2004), and one study from India (Srinivasan and Tirupati, 2005) have found cognitive functioning is related to work in schizophrenia. The present study adds to this research by showing that cognitive functioning at baseline was significantly related to current work status in both younger and older participants. Furthermore, cognition at baseline significantly predicted employment status one year later in both younger and older participants, extending prior research from developed countries showing prospective associations between cognition and work that has not examined age differences (McGurk and Mueser, 2004; Mueser et al., 2001). Employment status in this cohort was substantially stable over the one-year follow-up period (Khare et al., Ahead of Print), which may partly explain the association between baseline cognition and work status a year later. With respect to specific domains of cognitive functioning, among younger participants, employment at baseline and follow-up were consistently related to better executive function scores, whereas in older participants employment was consistently related to better attention, consistent with studies indicating age related attentional declines (Harada et al., 2013). It is possible that cognitive flexibility, speed of processing (the MoCA executive functions subtest includes measures of both problem solving and speed), and ability to solve problems have a stronger influence on work performance in younger participants, who have less experience in their jobs (job duration at baseline = 3.28 years vs. 6.11 for younger and older workers, respectively), whereas attention is more important for older participants who are more familiar with their jobs.

Studies from developed countries have reported significant associations between cognitive functioning and work outcomes, including hours worked, wages earned, and job tenure (Burton et al., 2018; Gold et al., 2002; McGurk et al., 2018). However, this study did not find consistent associations between cognition at baseline and work outcomes (including problems at work) for employed participants at

baseline or follow-up for either younger or older participants. Most employed participants in the present study were working in unskilled or semi-skilled jobs (Khare et al., 2021b), which they had held for an average of six years. These types of jobs may be less cognitively demanding than many of the jobs obtained by individuals with schizophrenia in developed countries, thus reducing the impact of cognition on work performance and related outcomes. In addition, more than half of the participants working for independent employers in this study found their jobs through family members, relatives, and/or friends (Khare et al., 2021b), suggesting that employed participants had multiple social supports for their roles as workers.

An unexpected finding was that men had higher cognitive functioning at baseline on MoCA total score, and two subscales (executive functions and attention), than women, despite the absence of gender differences in age, education, duration of illness, or prior hospitalizations. Research from developed countries has not consistently found gender differences in cognitive functioning in people with schizophrenia (Leung and Chue, 2000; Ochoa et al., 2012). Two studies from India have examined the relationship between gender and cognition in outpatients with schizophrenia, with mixed findings. Srinivasan et al. (2005) found no significant gender differences on a neuropsychological battery, except the visual paired associate learning test of the Wechsler Memory Scale, on which women performed better than men. The second study found better cognitive performance in men on measures of language, memory, and visuospatial abilities (Talreja et al., 2013).

The observed gender difference in cognitive functioning could reflect sampling bias due to females in the present study having a more severe mental illness than males. Women tend to have a more benign course of schizophrenia, including better psychosocial functioning and fewer hospitalizations than men, in both developed (Grossman et al., 2006; Riecher-Rössler and Häfner, 2000; Usall et al., 2002) and developing countries (Ran et al., 2015; Thara et al., 1994). As a result of the milder course of illness, women with schizophrenia may be less likely to be in treatment than men, especially in developing countries where the treatment gap for schizophrenia is approximately 70% (Gautham et al., 2020; Lora et al., 2012) compared to 40% in developed countries (World Health Organization, 2013), as reflected by the predominantly male (70%) composition of the present study cohort (92% schizophrenia) receiving public outpatient services. As the severity of a psychiatric illness is a major determinant of who receives treatment, and fewer women with schizophrenia were receiving outpatient treatment than men, those women who are in treatment may have a more severe disorder than the men, as reflected by their worse cognitive performance on the MoCA. In line with this interpretation, another Indian study conducted at a large public hospital also found that the majority outpatients with psychosis were men (54.5%), and the authors posited that the lower proportion of female outpatients may be more severely ill than the males (Chand et al., 2010). Furthermore, these authors did not find a gender difference in the proportion of outpatients with mood disorders (48.5% vs. 51.5%; Chand et al., 2010), suggesting the effect was specific to schizophrenia.

One limitation of the present study is that it did not include direct measures of illness severity, which could have helped address the relationship between gender, illness severity, and involvement in treatment. Relatedly, research suggests an overlap between symptoms and cognition in schizophrenia (Harvey et al., 1996; Srinivasan and Tirupati, 2005). Because this study did not employ a standardized measure of symptomatology, the contribution of symptoms to impaired cognitive performance remains unknown.

Comparisons between younger and older participants in cognitive functioning revealed better total MoCA scores for the younger group, with specific subscales scores indicating better performance on language and delayed recall. The lower cognitive functioning of the older participants may in part reflect the impact of schizophrenia on accelerating the effects of aging on the brain (Harvey, 2014, 2005). Aging in the general population is strongly associated with decrements in both memory and processing speed (Harada et al., 2013), and the MoCA language subscale includes fluency, which is strongly influenced by processing speed.

There was one significant interaction between age and gender in cognitive functioning on the MoCA: older women had significantly worse scores on orientation than older men, whereas there was no gender difference in orientation among the younger participants. Lower orientation in terms of awareness of such basic information as current date and location may reflect early signs of dementia. As reduced cognitive functioning in adulthood in the general population is predictive of increased risk for developing dementia later in life (Cervilla et al., 2004; Kremen et al., 2019), the lower cognitive functioning of the women in the present study sample may be a contributing factor to emergent signs of dementia among the older women, as indicated by worse orientation scores on the MoCA.

Some other limitations of the current study should be noted. First, most participants in the study were from urban areas. Our previous study showed that the nature and types of employment differ between people living in urban and rural areas in India (Khare et al., 2020). Thus, the findings of this study may not generalize to people with schizophrenia residing in rural areas. Second, cognitive functioning was assessed with the MoCA, which is designed to be a screening instrument for identifying cognitive impairment and does not provide as precise a measure of cognitive functioning as a comprehensive neuropsychological battery. Third, MoCA data were collected at follow-up from only 55% of the participants. Although there were no significant differences between participants who completed follow-up and those who did not, the groups could have differed in other ways that were not measured (e.g., symptom severity), and thus the findings should be interpreted with caution. Fourth, information regarding psychopharmacological treatment was not collected, which would have helped to understand the role of medications in cognitive performance. Fifth, participants were categorized into younger and older groups based on the median age. As greater cognitive decline tends to occur with advanced age (Howieson, 2015), this binary categorization limited the ability to capture age-related cognitive changes later in the lifespan. Lastly, this study included many statistical analyses and did not control for type I error, increasing the chances of spurious findings and underscoring the need for replication.

These limitations notwithstanding, this study demonstrates the importance of cognitive functioning in employment of people with SMI in India, consistent with substantial extant literature from developed countries. The findings suggest that vocational services developed for the cultural context of India may need to attend to cognitive impairment (e.g., cognitive remediation) to help individuals achieve their work goals.

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CRediT authorship contribution statement

Chitra Khare: Conceptualization, Funding acquisition, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Visualization, Project administration. **Kim T. Mueser:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing, Supervision. **Susan R. McGurk:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

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References

Akinsulore, A., Mapayi, B.M., Aloba, O.O., Oloniniyi, I., Fatoye, F.O., Makanjuola, R.O. A., 2015. Disability assessment as an outcome measure: a comparative study of nigerian outpatients with schizophrenia and healthy control. Ann. General Psychiatry 14, 1–7. https://doi.org/10.1186/s12991-015-0079-6.

Bhagyavathi, H.D., Mehta, U.M., Thirthalli, J., Kumar, C.N., Kumar, J.K., Subbakrishna, D.K., Gangadhar, B.N., 2015. Cascading and combined effects of cognitive deficits and residual symptoms on functional outcome in schizophrenia - a path-analytical approach. Psychiatry Res. 229, 264–271. https://doi.org/10.1016/j.psychres.2015.07.022.

Burton, C.Z., Vella, L., Twamley, E.W., 2018. Prospective memory, level of disability, and return to work in severe mental illness. Clin. Neuropsychol. 4046, 1–12. https://doi.org/10.1080/13854046.2018.1436725.

Khare, C., McGurk, S.R., Mueser, K.T. Ahead of Print. A 1-year prospective study of employment in people with severe mental illnesses receiving public sector psychiatric services in India. Psychiatric Rehabilitation Journal. https://doi.org/10.1037/prj0000512.

Cervilla, J., Prince, M., Joels, S., Lovestene, S., Mann, A., 2004. Premorbid cognitive testing predicts the onset of dementia and Alzheimer's disease better than and independently of APOE genotype. J. Neurol. Neurosurg. Psychiatry 75, 1100–1106. https://doi.org/10.1136/jnnp.2003.028076.

Chand, P., Murthy, P., Arunachalam, V., Naveen Kumar, C., Isaac, M., 2010. Service utilization in a tertiary psychiatric care setting in South India. Asian J. Psychiatr. 3, 222–226. https://doi.org/10.1016/j.ajp.2010.08.001.

Depp, C.A., Mausbach, B.T., Bowie, C., Wolyniec, P., Thornquist, M.H., Luke, J.R., McGrath, J.A., Pulver, A.E., Harvey, P.D., Patterson, T.L., 2012a. Determinants of occupational and residential functioning in bipolar disorder. J. Affect. Disord. 136, 812–818. https://doi.org/10.1016/j.jad.2011.09.035.

Depp, C.A., Mausbach, B.T., Harmell, A.L., Savla, G.N., Bowie, C.R., Harvey, P.D., Patterson, T.L., 2012b. Meta-analysis of the association between cognitive abilities and everyday functioning in bipolar disorder. Bipolar Disord. 14, 217–226. https://doi.org/10.1111/j.1399-5618.2012.01011.x.

Dickerson, F.B., Boronow, J.J., Stallings, C.R., Origoni, A.E., Cole, S., Yolken, R.H., 2004. Association between cognitive functioning and employment status of persons with bipolar disorder. Psychiatr. Serv. 55, 54–58. https://doi.org/10.1176/appi.ps.55.1.54.

Gautham, M.S., Gururaj, G., Varghese, M., Benegal, V., Rao, G.N., Kokane, A., Chavan, B. S., Dalal, P.K., Ram, D., Pathak, K., Lenin Singh, R.K., Singh, L.K., Sharma, P., Saha, P.K., Ramasubramanian, C., Mehta, R.Y., Shibukumar, T.M., Deuri, S.P., Krishnatreya, M., Gogoi, V., Sobhana, H., Sengupta, S., Banerjee, I., Sharma, S., Giri, A.K., Kavishvar, A.B., Dave, K.R., Chauhan, N.T., Sinha, V.K., Goyal, N., Thavody, J., Anish, P.K., Bina, T., Pakhare, A.P., Mittal, P., Ray, S., Chatterji, R., Akoijam, B.S., Singh, H., Gojendro, Kayina, P., Singh, L.R., Das, S., Puri, S., Garg, R., Kashyap, A., Satija, Y., Gaur, K., Sharma, D., Sathish, R.V., Selvi, M., Krishnaraj, Singh, S.K., Agarwal, V., Sharma, E., Kar, S.K., Misra, R., Neogi, R., Sinha, D., Saha, S., Halder, A., Aravind, B.A., Amudhan, R.S., Banandur, S.P., Subbakrishna, D. K., Marimuthu, T.P., Kumar, B.B., Jain, S., Reddy, Y.J., Jagadisha, T., Sivakumar, P. T., Chand, P.K., Muralidharan, K., Reddi, S., Kumar, C.N., Prasad, M.K., Jaisoorya, T. S., Janardhanan, C.N., Sharma, M.P., Suman, L.N., Paulomi, S., Kumar, K., Sharma, M.K., Manjula, M., Bhola, P., Roopesh, B.N., Kishore, M.T., Veena, S., Mary, K.A.R., Anand, N., Srinath, S., Girimaji, S.C., Vijayasagar, K.J., Kasi, S., Muralidhar, D., Pandian, R.D., Hamza, A., Janardhana, N., Raj, E.A., Majhi, G., 2020. The National Mental Health Survey of India (2016): Prevalence, socio-demographic correlates and treatment gap of mental morbidity. Int. J. Soc. Psychiatry 66, 361–372. https://doi.org/10.1177/0020764020907941.

Gil-Berrozpe, G.J., Sánchez-Torres, A.M., García de Jalón, E., Moreno-Izco, L., Fañanás, L., Peralta, V., Cuesta, M.J., Ballesteros, A., Hernández, R., Janda, L., Llano, K., López-Gil, J., López-Ilundain, J., Macaya, P., Martínez-Parreño, E., Papiol, S., Peralta, D., Ribeiro, M., Rosero, Á.S., Saiz, H., 2020. Utility of the MoCA for cognitive impairment screening in long-term psychosis patients. Schizophr. Res. 216, 429–434. https://doi.org/10.1016/j.schres.2019.10.054.

Gold, J., Goldberg, R., McNary, S., Dixon, L., Lehman, A., 2002. Cognitive correlates of job tenure among patients with severe mental illness. Am. J. Psychiatry 159, 1395–1402. https://doi.org/10.1176/appi.ajp.159.8.1395.

Gopalakrishnan, R., Behere, R., Sharma, P., 2015. Factors affecting well-being and socio-occupational functioning in schizophrenia patients following an acute exacerbation: a hospital based observational study. Indian J. Psychol. Med. 37, 423–428. https://doi.org/10.4103/0253-7176.168585.

Government of India, Ministry of Labour &amp, Employment, 2016. Report on Fifth Annual Employment - Unemployment Survey (2015-2016) Volume I.

Green, M.F., 2006. Cognitive impairment and functional outcome in schizophrenia and bipolar disorder. J. Clin. Psychiatry 67, 3–8. https://doi.org/10.4088/jcp.1006e12.

Grossman, L.S., Harrow, M., Rosen, C., Faul, R., 2006. Sex differences in outcome and recovery for schizophrenia and other psychotic and nonpsychotic disorders. Psychiatr. Serv. 57, 844–850. https://doi.org/10.1176/ps.2006.57.6.844.

Gupta, M., Gupta, V., Nagar Buckshee, R., Sharma, V., 2019. Validity and reliability of Hindi translated version of Montreal cognitive assessment in older adults. Asian J. Psychiatr. 45, 125–128. https://doi.org/10.1016/j.ajp.2019.09.022.

Haile, Y.G., Habatmu, K., Derese, A., Gouse, H., Lawrie, S.M., Alem, A., 2022. Assessing cognition in people with severe mental disorders in low - and middle - income countries : a systematic review of assessment measures. Soc. Psychiatry Psychiatr. Epidemiol. 57, 435–460. https://doi.org/10.1007/s00127-021-02120-x.

Harada, C.N., Natelson Love, M.C., Triebel, K.L., 2013. Normal cognitive aging. Clin. Geriatr. Med. 29, 737–752. https://doi.org/10.1016/j.cger.2013.07.002.

Harvey, P.D., 2005. Schizophrenia in Late Life: Aging Effects on Symptoms and Course of Illness. American Psychological Association, Washington D.C.

Harvey, P.D., 2014. What is the evidence for changes in cognition and functioning over the lifespan in patients with schizophrenia? J. Clin. Psychiatry 75, 34–38. https://doi.org/10.4088/JCP.13065su1.08.

Hegde, S., Thirthalli, J., Rao, S.L., Raguram, A., Philip, M., Gangadhar, B.N., 2013. Cognitive deficits and its relation with psychopathology and global functioning in first episode schizophrenia. Asian J. Psychiatr. 6, 537–543. https://doi.org/10.1016/j.ajp.2013.07.002.

Howieson, D.B., 2015. Cognitive Skills and the Aging Brain: What to Expect. Cerebrum 2015, 1–7.

Jonsdottir, A., Waghorn, G., 2015. Psychiatric disorders and labour force activity. Ment. Heal. Rev. J. 20, 13–27. https://doi.org/10.1108/MHRJ-05-2014-0018.

Julayanont, P., Tangwongchai, S., Hemrungrojn, S., Tunvirachaisakul, C., Phanthumchinda, K., Hongsawat, J., Suwichanarakul, P., Thanasirorat, S., Nasreddine, Z.S., 2015. The Montreal cognitive assessment - basic: a screening tool for mild cognitive impairment in illiterate and low-educated elderly adults. J. Am. Geriatr. Soc. 63, 2550–2554. https://doi.org/10.1111/jgs.13820.

Khare, C., Mueser, K.T., Fulford, D., Watve, V.G., Karandikar, N.J., Khare, S., Karandikar, D.N., McGurk, S.R., 2020. Employment functioning in people with severe mental illnesses living in urban vs. Rural areas in India. Soc. Psychiatry Psychiatr. Epidemiol. 55, 1593–1606. https://doi.org/10.1007/s00127-020-01901-0.

Khare, C., McGurk, S.R., Fulford, D., Watve, V.G., Karandikar, N.J., Khare, S., Karandikar, D.N., Mueser, K.T., 2021a. A longitudinal analysis of employment in people with severe mental illnesses in India. Schizophr. Res. 228, 472–480. https://doi.org/10.1016/j.schres.2021.01.004.

Khare, C., Mueser, K.T., Bahaley, M., Vax, S., McGurk, S.R., 2021b. Employment in people with severe mental illnesses receiving public sector psychiatric services in India. Psychiatry Res. 296, 113673 https://doi.org/10.1016/j.psychres.2020.113673.

Kremen, W.S., Beck, A., Elman, J.A., Gustavson, D.E., Reynolds, C.A., Tu, X.M., Sanderson-Cimino, M.E., Panizzon, M.S., Vuoksimaa, E., Toomey, R., Fennema-Notestine, C., Hagler, D.J., Fang, B., Dale, A.M., Lyons, M.J., Franz, C.E., 2019. Influence of young adult cognitive ability and additional education on later-life cognition. Proc. Natl. Acad. Sci. U. S. A. 116, 2021–2026. https://doi.org/10.1073/pnas.1811537116.

Krishnadas, R., Moore, B.P., Nayak, A., Patel, R.R., 2007. Relationship of cognitive function in patients with schizophrenia in remission to disability: a cross-sectional study in an Indian sample. Ann. General Psychiatry 6, 19. https://doi.org/10.1186/1744-859X-6-19.

Krishnan, S., Justus, S., Meluveettil, R., Menon, R., Sarma, S., Kishore, A., 2015. Validity of Montreal cognitive assessment in non-English speaking patients with Parkinson's disease. Neurol. India 63, 63–67. https://doi.org/10.4103/0028-3886.152637.

Kurtz, M.M., 2011. Neurocognition as a predictor of response to evidence-based psychosocial interventions in schizophrenia: what is the state of the evidence? Clin. Psychol. Rev. 31, 663–672. https://doi.org/10.1016/j.cpr.2011.02.008.

Kurtz, M.M., Gopal, S., John, S., Thara, R., 2018. Cognition, social cognition and functional disability in early-stage schizophrenia: a study from southern India. Psychiatry Res. 265, 231–237. https://doi.org/10.1016/j.psychres.2018.03.091.

Landolt, K., Brantschen, E., Nordt, C., Bärtsch, B., Kawohl, W., Rössler, W., 2016. Association of supported employment with cognitive functioning and employment outcomes. Psychiatr. Serv. 67, 1257–1261. https://doi.org/10.1176/appi.ps.201500183.

Leung, A., Chue, P., 2000. Sex differences in schizophrenia, a review of the literature. Acta Psychiatr. Scand. Suppl. 401, 3–38. https://doi.org/10.1111/j.0065-1591.2000.0ap25.x.

Lora, A., Kohn, R., Levav, I., McBain, R., Morris, J., Saxena, S., 2012. Service availability and utilization and treatment gap for schizophrenic disorders: a survey in 50 low- and middle-income countries. Bull. World Health Organ. 90, 47–54B. https://doi.org/10.2471/BLT.11.089284.

Marwaha, S., Johnson, S., Bebbington, P., Stafford, M., Angermeyer, M.C., Brugha, T., Azorin, J., Kilian, R., Hansen, K., Toumi, M., 2007. Rates and correlates of

employment in people with schizophrenia in the UKFrance and Germany. Br. J. Psychiatry 30–37. https://doi.org/10.1192/bjp.bp.105.020982.
McGurk, S.R., Meltzer, H.Y., 2000. The role of cognition in vocational functioning in schizophrenia. Schizophr. Res. 45, 175–184. https://doi.org/10.1016/S0920-9964(99)00198-X.
McGurk, S.R., Mueser, K.T., 2004. Cognitive functioning, symptoms, and work in supported employment: a review and heuristic model. Schizophr. Res. 70, 147–173. https://doi.org/10.1016/j.schres.2004.01.009.
McGurk, S.R., Mueser, K.T., Harvey, P.D., LaPuglia, R., Marder, J., 2003. Cognitive and symptom predictors of work outcomes for clients with schizophrenia in supported employment. Psychiatr. Serv. 54, 1129–1135. https://doi.org/10.1176/appi.ps.54.8.1129.
McGurk, S.R., Drake, R.E., Xie, H., Riley, J., Milfort, R., Hale, T.W., Frey, W., 2018. Cognitive predictors of work among social security disability insurance beneficiaries with psychiatric disorders enrolled in IPS supported employment. Schizophr. Bull. 44, 32–37. https://doi.org/10.1093/schbul/sbx115.
Mueser, K.T., Salyers, M.P., Mueser, P.R., 2001. A prospective analysis of work in schizophrenia. Schizophr. Bull. 27, 281–296. https://doi.org/10.1093/oxfordjournals.schbul.a006874.
Nasreddine, Z., Phillips, N., Bédirian, V., Charbonneau, S., Whitehead, V., Colllin, I., Cummings, J., Chertkow, H., 2005. The Montreal cognitive assessment, MoCA: a brief screening tool for mild cognitive impairment. J. Am. Geriatr. Soc. 53, 695–699. https://doi.org/10.1111/j.1532-5415.2005.53221.x.
Ochoa, S., Usall, J., Cobo, J., Labad, X., Kulkarni, J., 2012. Gender differences in schizophrenia and first-episode psychosis: a comprehensive literature review. Schizophr. Res. Treatment 2012, 1–9. https://doi.org/10.1155/2012/916198.
Palsetia, D., Chandrasekhar, K., Reddy, M., DeSouza, A., Karia, S., 2018. Executive function in patients with schizophrenia based on socio- occupational impairment: a cross-sectional study. Ind. Psychiatry J. 27, 181–189. https://doi.org/10.4103/ipj.ipj.
Rajkumar, S., 2015. Mental health services in India. J. Sociol. Soc. Welf. 18, 41–55.
Ran, M.S., Chen, S., Chen, E.Y., Ran, B.Y., Tang, C.P., Lin, F.R., Li, L., Li, S.G., Mao, W.J., Hu, S.H., 2011. Risk factors for poor work functioning of persons with schizophrenia in rural China. Soc. Psychiatry Psychiatr. Epidemiol. 46, 1087–1093. https://doi.org/10.1007/s00127-010-0285-0.
Ran, M.S., Mao, W.J., Chan, C.L.W., Chen, E.Y.H., Conwell, Y., 2015. Gender differences in outcomes in people with schizophrenia in rural China: 14-year follow-up study. Br. J. Psychiatry 206, 283–288. https://doi.org/10.1192/bjp.bp.113.139733.
Riecher-Rössler, A., Häfner, H., 2000. Gender aspects in schizophrenia: bridging the border between social and biological psychiatry. Acta Psychiatr. Scand. Suppl. 102, 58–62. https://doi.org/10.1034/j.1600-0447.2000.00011.x.
Schaefer, J., Giangrande, E., Weinberger, D.R., Dickinson, D., 2013. The global cognitive impairment in schizophrenia: consistent over decades and around the world. Schizophr. Res. 150, 42–50. https://doi.org/10.1016/j.schres.2013.07.009.
Shibre, T., Medhin, G., Alem, A., Kebede, D., Teferra, S., Jacobsson, L., Kullgren, G., Hanlon, C., Fekadu, A., 2015. Long-term clinical course and outcome of schizophrenia in rural Ethiopia: 10-year follow-up of a population-based cohort. Schizophr. Res. 161, 414–420. https://doi.org/10.1016/j.schres.2014.10.053.
Soni, A., Singh, P., Shah, R., Bagotia, S., 2017. Impact of cognition and clinical factors on functional outcome in patients with bipolar disorder. East Asian Arch. Psychiatry 27, 26–34.
Srinivasan, T.N., Thara, R., 1997. How do men with schizophrenia fare at work? A follow-up study from India. Schizophr. Res. 25, 149–154. https://doi.org/10.1016/S0920-9964(97)00016-9.
Srinivasan, L., Tirupati, S., 2005. Relationship between cognition and work functioning among patients with schizophrenia in an urban area of India. Psychiatr. Serv. 56, 1423–1428. https://doi.org/10.1176/appi.ps.56.11.1423.
Srinivasan, L., Thara, R., Tirupati, S., 2005. Cognitive dysfunction and associated factors in patients with chronic schizophrenia. Indian J. Psychiatry 47, 139. https://doi.org/10.4103/0019-5545.55936.
Suresh, K.K., Kumar, C.N., Thirthalli, J., Bijjal, S., Venkatesh, B.K., Arunachala, U., Kishorekumar, K.V., Subbakrishna, D.K., Gangadhar, B.N., 2012. Work functioning of schizophrenia patients in a rural south Indian community: status at 4-year follow-up. Soc. Psychiatry Psychiatr. Epidemiol. 47, 1865–1871. https://doi.org/10.1007/s00127-012-0495-8.
Talreja, B., Kataria, L., Shah, S., 2013. Cognitive function in schizophrenia and its association with socio-demographics factors. Ind. Psychiatry J. 22, 47. https://doi.org/10.4103/0972-6748.123619.
Thara, R., 2004. Twenty year course of schizophrenia: the Madras longitudinal study. Can. J. Psychiatr. 49, 564–569.
Thara, R., Henrietta, M., Joseph, A., Rajkumar, S., Eaton, W.W., 1994. Ten-year course of schizophrenia Madras longitudinal study. Acta Psychiatr. Scand. 90, 329–336.
Thomas, P.E., Raj, M., Adhikari, Prabha, Kotian, Shashidhar, 2018. Validity and reliability of Montreal cognitive assessment and its comparison with the translated Hindi mental status examination in a south Indian geriatric population. Indian J. Public Health Res. Dev. https://doi.org/10.5958/0976-5506.2018.00204.8.
Tsang, H.W.H., Leung, A.Y., Chung, R.C.K., Bell, M., Cheung, W.-M., 2010. Review on vocational predictors: a systematic review of predictors of vocational outcomes among individuals with schizophrenia: an update since 1998. Aust. N. Z. J. Psychiatry 44, 495–504. https://doi.org/10.3109/00048671003785716.
Usall, J., Haro, J.M., Ochoa, S., Márquez, M., Araya, S., 2002. Influence of gender on social outcome in schizophrenia. Acta Psychiatr. Scand. 106, 337–342. https://doi.org/10.1034/j.1600-0447.2002.01351.x.
World Bank, 2007. India: occupations. Retrieved from. https://datatopics.worldbank.org/JobsDiagnostics/.
World Bank, 2010. US: occupations. Retrieved from. https://datatopics.worldbank.org/JobsDiagnostics/.
World Health Organization, 2013. Mental Health Action Plan 2013-2020. WHO Library Cataloguing-in-Publication DataLibrary Cataloguing-in-Publication Data doi:ISBN 978 92 4 150602 1.
Yang, L.H., Phillips, M.R., Li, X., Yu, G., Zhang, J., Shi, Q., Song, Z., Ding, Z., Pang, S., Susser, E., 2013. Employment outcome for people with schizophrenia in rural v. Urban China: population-based study. Br. J. Psychiatry 203, 272–279. https://doi.org/10.1192/bjp.bp.112.118927.