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Sheltered employment in schizophrenia is related to disorganization symptoms, processing speed and metaphor comprehension

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Summary

Aim: The significance of cognitive functioning deficits in schizophrenia is already well acknowledged. The relationships among lower and higher order cognitive skills and symptoms, as well as their relevance to holding a paid job are relatively less researched, though. The purpose of this study was to conduct an analysis concerning these issues.

Method: This study included 62 individuals with schizophrenia, 33 of them employed in paid sheltered jobs and 29 attending occupational therapy. They were assessed with tests of cognitive functions including communication skills. Psychopathological symptoms were assessed with the PANSS.

Results: The assessed cognitive skills turned out to be interrelated as well as showed associations with positive, negative and disorganization symptoms. Furthermore, regression analysis showed that sheltered employment status is predicted by shorter reaction time, better comprehension of metaphors and lower severity of disorganization symptoms.

Conclusions: Multiple associations among basic and higher cognitive skills provide support for the concept of a generalized cognitive dysfunction in schizophrenia. Beside psychopathology symptoms, both basic and higher cognitive skills are also independently predictive of professional functioning in schizophrenia. This suggests potential areas of cognitive rehabilitation that could affect employability.

Key words: work, cognitive functioning, psychopathology

Introduction

In schizophrenia, cognitive ability is an important predictor of both the course of the illness as well as the functional outcomes in real life settings [1–4], medication adherence [5], or even the length of lifespan [6]. While the accumulated evidence is not monolithic, it generally shows that deficient performances in various cognitive domains are interrelated, and that correlations reach medium to high strength, especially for composite test scores [7, 8]. This phenomenon, often referred to as a generalized or global cognitive deficit [9], seems to have greater predictive value than symptom severity as far as treatment outcomes and daily functioning are concerned [1, 10, 11].

The primary cognitive areas identified as deficient in schizophrenia – from speed of processing to problem solving [12] – were already being frequently researched before the turn of the last century [13]. Nonetheless, further studies proved the significance of impaired social cognition [14] and its relation to poor social functioning [15]. This domain includes the growing literature on impairment in communication ability, which indicates that both verbal [16] and nonverbal [17] skills are affected and have been found to be associated with functional outcomes, e.g., vocational functioning [18] as well as with the quality of life [19]. Notably, one of the most evident communication impairments pertains to the comprehension of figurative language with associated deficits in irony and humor comprehension [20–22]. As remarked by Thoma and Daum [23], this impairment might constitute an endophenotypic marker of schizophrenia.

As regards psychopathology, cognitive deficits seem to be most often associated with the severity of negative symptoms [8, 24, 25]. Occasionally positive symptoms also show up in relation to cognition [26]. However, it should be noted that positive symptoms are usually most susceptible to pharmacotherapy [27], therefore the pattern of their associations with cognitive functioning may be distorted. A separate issue to consider is whether some negative symptoms are just manifestations of cognitive deficits [28, 29]. Moreover, when taken into account, disorganization syndrome seems to have similar relationships with cognitive skills [24, 30], or even surpass other symptoms in this respect [31, 32]. Other studies suggest disorganization is associated with more complex processes, whereas negative symptoms are rather associated with basic skills [33, 34].

From a clinical standpoint, the focus is on functional outcomes of people with schizophrenia, and there may be a difference between symptomatic remission and functional recovery [35, 36]. In our previous report [37], we noted differences in communication skills between employed and unemployed clinical subjects. This study investigates the associations between cognitive functions and psychopathology as well as evaluates their independent relationships to holding a paid sheltered job. In current literature on functional outcomes of people suffering from schizophrenia,

communication ability is often assessed with general measures, which make an overall evaluation of communication skills [18, 38]. This study incorporates the Right Hemisphere Language Battery [39] that focuses on cognitive facets of interpersonal communication. While few recent studies on schizophrenia have used the RHLB assessment [40], it has not been utilized it in connection with functional indicators. Another issue this study touches upon regards psychopathology assessment. In studies employing popular symptomatic measures, theoretically derived divisions into positive, negative and general syndromes are usually applied, although literature shows there is more of them [41]. This obviously affects the findings. Therefore, in our analyses we have included five syndromes based on a meta-analysis of factorial solutions for the Positive And Negative Symptom Scale (PANSS) [42, 43], arguably the most popular symptom measure nowadays. Summing up, the objective of our study was the assessment of interrelations between symptoms and cognitive skills as well as finding out which are independently predictive of employment status. We expected that beside symptom severity also cognitive functioning, in particular communication-related skills, may prove to fulfill this role.

Material

All subjects gave their informed consent to participate in the study. The study procedures conformed to the ethical standards of the Declaration of Helsinki and were approved by the Bioethical Committee at the Jagiellonian University Medical College, Krakow, Poland. The sample included in the analyses comprised of 62 individuals with schizophrenia, diagnosed by experienced psychiatrists based on clinical interviews and medical documentation. All participants were adults with no psychoorganic or serious somatic disorders and free of psychoactive substance abuse. All were native Polish speakers living in or around Krakow, Poland. A total of 33 participants worked in sheltered employment at social firms in the hospitality and catering sector (VOC subgroup); 29 participated in occupational therapy workshops (OCC subgroup). Demographic and clinical data are presented in Table 1.

Table 1. **Demographic and clinical data**

	Whole sample n = 62	VOC subgroup n = 33	OCC subgroup n = 29	significance of between-group differences
	Mean (SD)	Mean (SD)	Mean (SD)	
age	42.0 (9.1)	42.1 (9.06)	41.9 (9.4)	t=0.09; p=0.933
years of education	14.4 (2.8)	14.0 (2.8)	14.7 (2.9)	t=0.95; p=0.347
	n (%)	n (%)	n (%)	
n (%) of males	34 (55%)	16 (48%)	18 (62%)	chi^2=1,15; p=0.284

table continued on the next page

paranoid schizophrenia	55 (89%)	30 (91%)	25 (87%)	chi^2=1.8; p=0.560
undifferentiated schizophrenia	3 (5%)	1 (3%)	2 (7%)	
simple schizophrenia	1 (2%)	0 (0%)	1 (3%)	
schizoaffective disorder	3 (5%)	2 (6%)	1 (3%)	
conventional antipsychotics	3 (5%)	2 (6%)	1 (3%)	chi^2=0.27; p=0.873
atypical antipsychotics	42 (68%)	22 (68%)	20 (69%)	
mixed antipsychotics	16 (26%)	9 (26%)	7 (25%)	
chlorpromazine equivalent (mg/day)	514.66 (295.99)	512.12 (297.13)	517.54 (299.91)	t=−0.07; p=0.944
duration of psychosis (in years)	19.44 (9.93)	19.75 (10.28)	19.07 (9.68)	t=0.27; p=0.788
number of hospitalizations	6.44 (5.52)	6.42 (5.79)	6.45 (5.30)	t=−0.02; p=0.987
PANSS total (30 items)	59.15 (19.49)	50.06 (13.53)	69.48 (20.24)	t=−4.49; p<0.001
PANSS positive (5 items)	10.97 (5.09)	9.03 (4.01)	13.17 (5.35)	t=−3.47; p=0.001
PANSS negative (8 items)	17.08 (7.36)	14.33 (5.91)	20.20 (7.67)	t=−3.40; p=0.002
PANSS disorganization (5 items)	9.45 (4.49)	7.42 (2.97)	11.75 (4.81)	t=−4.32; p<0.001
PANSS excitement (4 items)	5.66 (2.05)	5.55 (2.29)	5.79 (1.76)	t=-1.09; p=0.639
PANSS emot. distress (4 items)	7.95 (2.91)	7.57 (3.01)	8.38 (2.76)	t=−0.47; p=0.281

OCC – occupational therapy participants; VOC – sheltered employment workers

The social firms and occupational therapy workshops are based in Krakow, Poland. Occupational therapy workshops (OTW) are dedicated to people suffering from mental illnesses whose mental condition and limited professional and social competences prevent them from undertaking paid jobs. The workshops provide person-adapted training in skills such as handicraft, tailoring, carpentry, cooking, or computer operation. Social firms, in turn, offer entry-level jobs to individuals who have a certificate of severe or moderate mental disability, stable health condition (including symptomatic remission), and a satisfactory level of key social competences (e.g., ability to cooperate with others). Candidates also need to be self-motivated to work. Potential employees are mainly recruited from among OTW users or from day wards, but sometimes future employees are directly referred by psychiatrists who treat them or apply for a job on their own. After the management's initial acceptance, candidates participate in an on-the-job training. It lasts from a week to several months, depending on individual experience and during that period the individual learns the job and simultaneously their professional and social skills are being assessed. Employed individuals are paid for their work.

The subjects in our study were either employed for at least a year prior to the study or were unemployed participants of occupational therapy. All subjects belonged to the same population of mostly chronic schizophrenia outpatients with various levels of functional ability and illness severity.

Method

The assessment of the severity of symptoms in schizophrenia was made with the Positive and Negative Symptom Scale (PANSS) by Kay et al. [42]. Total scores were calculated as well as five syndrome domains (positive, negative, disorganization, excitement, and emotional distress symptoms) in accordance with the results of meta-analysis of studies assessing the factor structure of the scale, conducted by van der Gaag et al. [43]. Cognitive functions were assessed with a set of tools which included: the Montreal Cognitive Assessment (MoCA) by Nasreddine et al. [44] – a compact screening measure of basic cognitive skills; the Rey Auditory Verbal Learning Test (RAVLT) – a task of learning and memorizing 15 words, without the interference list; the Tower of Hanoi (ToH) – a wooden puzzle assessing executive function, consisting of five tasks of increasing difficulty; the Right Hemisphere Language Battery (RHLB-PL) [39] – a Polish version of a communication skills measure by Karen Bryan, consisting of 11 subtests (Comprehension of Inferred Meaning, Lexical Semantic Comprehension, Verbal Humor Appreciation, Commentaries Test, Picture Metaphors, Written Metaphors, Explaining Picture Metaphors, Explaining Written Metaphors, Emotional Prosody Test, Linguistic Prosody Test, Discourse Analysis); facial emotion identification (FEIT) and discrimination (FEDT) – computerized tasks used to measure recognition of basic emotions (happiness, anger, sadness, fear, disgust, surprise, and neutral expression); facial sex discrimination (FSDT) – a computerized control task employed to confirm intact ability to recognize faces. The three computerized tasks utilized images from Radboud Faces Database [45].

Statistical analyses

Pearson correlation coefficients and logistic regression were used to analyze the data. As correlation coefficients are effect size measures on their own, they were chosen to evaluate the strength of the relationships between variables. Logistic regression was employed to identify independent predictors of employment. To increase reliability of the findings the bootstrap method was used [46] with base number of 2,000 samples and 95% confidence intervals, which were used to estimate statistical significance [47]. This method is unaffected by divergence of data from the normal distribution and still it does not sacrifice any part of the information contained in the data, as is the case of nonparametric methods. Significance levels based on standard testing are also indicated in the tables. All analyses were performed with IBM SPSS Statistics software.

Results

First, Pearson correlation coefficients for measures of cognitive functioning and symptom severity, along with 95% confidence intervals estimated by the bootstrap method based on 2,000 samples, were calculated. They are presented in Table 2 and 3 with significant results underlined.

Except the FSDT score and mean reaction time in the FSDT, the analyzed indicators of cognitive functioning show significant interrelations. The strongest correlations were observed for total scores of the RHLB and MoCA, including their correlation at r = 0.79.

Table 2. **Pearson correlation coefficients with bootstrapped confidence intervals estimated for associations between measures of cognitive functioning (n = 62)**

	RHLB – total score	MoCA – total score	ToH – number of completed tasks	RAVLT – delayed recall	RAVLT – delayed recognition (list)
MoCA – total score	0.79** [0.63; 0.88]				
ToH – number of completed tasks	0.52** [0.29; 0.73]	0.57** [0.39; 0.73]			
RAVLT – delayed recall	0.38** [0.17; 0.58]	0.44** [0.26; 0.62]	0.24 [-0.01; 0.49]		
RAVLT – delayed recognition (list)	0.26* [0.06; 0.49]	0.32* [0.14; 0.51]	0.33** [0.05; 0.63]	0.50** [0.30; 0.66]	
FEIT –total score	0.77** [0.54; 0.87]	0.67** [0.47; 0.80]	0.40** [0.18; 0.65]	0.27* [0.08; 0.49]	0.22 [-0.03; 0.48]
FEDT –total score	0.56** [0.34; 0.73]	0.54** [0.35; 0.69]	0.52** [0.32; 0.68]	0.28* [0.03; 0.50]	0.24 [0.03; 0.44]
FEDT – mean reaction time	0.03 [-0.35; 0.43]	-0.06 [-0.39; 0.32]	0.05 [-0.26; 0.37]	-0.12 [-0.37; 0.18]	0.17 [-0.02; 0.35]
FSDT – total score	0.11 [-0.17; 0.42]	0.14 [-0.13; 0.39]	0.13 [-0.20; 0.45]	0.19 [-0.11; 0.43]	0.08 [-0.19; 0.34]
FSDT – mean reaction time	-0.34** [-0.59; – 0.02]	-0.37** [-0.57; – 0.11]	-0.24 [-0.54; 0.06]	-0.24 [-0.47; 0.00]	0.04 [-0.20; 0.21]

MoCA – Montreal Cognitive Assessment; ToH – Tower of Hanoi puzzle; RAVLT – Rey Auditory Verbal Learning Test; RHLB – Right Hemisphere Language Battery; FEIT – Facial Emotion Identification Task; FEDT – Facial Emotion Discrimination Task; FSDT – Facial Sex Discrimination Task;

* correlation significant at $p<0.05$; ** correlation significant at $p<0.01$

Among five syndrome scores the most numerous correlations with cognitive function measures were found for disorganization, which has the strongest associations with RHLB (r = – 0.55) and MoCA (r = – 0.47) scores, as well as with FEIT (r = – 0.39) and FEDT (r = – 0.38) scores. Generally lower correlations are found for positive and negative dimensions. These three syndromes have similar, moderate, positive association with mean reaction time in FEIT (r ≈ 0.3). Excitement symptoms, excluding a weak correlation with RHLB score, and emotional distress symptoms, are not associated with cognitive measures. None of the symptomatic dimensions has shown significant associations with ToH puzzle, FSDT score or mean reaction time.

Table 3. **Pearson correlation coefficients with bootstrapped confidence intervals estimated for associations between measures of cognitive functioning and symptom severity (n= 62)**

	PANSS positive	PANSS negative	PANSS disorganization	PANSS excitement	PANSS emotional distress
RHLB – total score	-0.34** [-0.53; – 0.16]	-0.34** [-0.54; – 0.10]	-0.55** [-0.71; – 0.35]	-0.21 [-0.41; – 0.02]	-0.16 [-0.41; 0.11]
MoCA – total score	-0.29* [-0.50; – 0.08]	-0.35** [-0.56; – 0.10]	-0.47** [-0.65; – 0.26]	-0.15 [-0.36; 0.04]	-0.18 [-0.41; 0.09]
ToH – number of completed tasks	-0.15 [-0.42; 0.11]	-0.11 [-0.39; 0.14]	-0.17 [-0.47; 0.10]	0.12 [-0.08; 0.28]	0.03 [-0.25; 0.27]
RAVLT – delayed recall	-0.43** [-0.66; – 0.16]	-0.30* [-0.51; – 0.07]	-0.44** [-0.62; – 0.22]	-0.03 [-0.29; 0.21]	-0.24 [-0.47; 0.00]
RAVLT – delayed recognition (list)	-0.43** [-0.66; – 0.11]	-0.24 [-0.47; 0.02]	-0.37** [-0.59; – 0.09]	0.15 [-0.07; 0.30]	-0.15 [-0.34; 0.05]
FEIT – total score	-0.23 [-0.48; – 0.02]	-0.07 [-0.33; 0.20]	-0.39** [-0.61; – 0.10]	-0.17 [-0.37; 0.02]	-0.05 [-0.29; 0.21]
FEDT – total score	-0.16 [-0.39; 0.08]	-0.18 [-0.41; 0.05]	-0.38** [-0.60; – 0.14]	0.15 [-0.09; 0.34]	-0.01 [-0.26; 0.22]
FEDT – mean reaction time	0.04 [-0.17; 0.25]	0.11 [-0.16; 0.36]	0.03 [-0.27; 0.30]	-0.08 [-0.29; 0.17]	0.11 [-0.14; 0.35]
FSDT – total score	-0.25* [-0.46; 0.02]	-0.17 [-0.37; 0.08]	-0.19 [-0.38; 0.04]	0.07 [-0.13; 0.24]	-0.08 [-0.27; 0.15]
FSDT – mean reaction time	0.30* [0.09; 0.51]	0.33** [0.11; 0.54]	0.32* [0.06; 0.55]	-0.02 [-0.19; 0.17]	0.18 [-0.04; 0.38]

MoCA – Montreal Cognitive Assessment; ToH – Tower of Hanoi puzzle; RAVLT – Rey Auditory Verbal Learning Test; RHLB – Right Hemisphere Language Battery; FEIT – Facial Emotion Identification Task; FEDT – Facial Emotion Discrimination Task; FSDT – Facial Sex Discrimination Task; PANSS – Positive and Negative Symptom Scale;

* correlation significant at $p<0.05$; ** correlation significant at $p<0.01$

To analyze the associations of symptoms and cognitive skills with employment status a multivariate logistic regression model was employed. First, we checked for significant point-biserial correlations of employment status with measures of symptoms and cognition, including variables presented in Table 3 as well as scores for the eleven RHLB subtests, scores for seven single expressions in FEIT, RAVLT scores for recalling and recognition without delay, and total PANSS score. Significantly correlated variables were: mean reaction time in FSDT, identification of surprise expression in FEIT, RHLB subtests of Inferred Meaning, Written Metaphors, Explaining Picture and Written Metaphors, Language and Emotional Prosody, and positive, negative and disorganization syndromes. They were entered into a backward stepwise logistic regression model, which reduced the number of significant predictors down to three, namely: disorganization syndrome, mean reaction time in sex differentiation task and explaining picture metaphors of the RHLB. Next, a new logistic regression model was created utilizing bootstrap method based on 2,000 samples, which included these three predictors and also controlled for sex, dosage of neuroleptics and MoCA score. This model turned out to be significant ($chi^2 = 27.72$, df = 6, $p < 0.001$ and Nagelkerke's $R^2 = 0.48$). The three selected predictors were significant, but none of the controlled variables, according to the confidence intervals for B (Table 4). Odds ratios indicated that more severe disorganization symptoms and longer reaction time are associated with lower odds of being employed (OR = 0.78 and OR = 0.26, respectively), while higher score in the metaphor test – with higher odds (OR = 1.7).

Table 4. **Multivariate logistic regression model for sheltered employment status in a sample of schizophrenia outpatients (n = 62)**

				bootstrap	bootstrap – 95% CI for B	
	B	Significance	OR	Significance	lower b.	upper b.
PANSS Disorganization	-0.244	0.011	0.784	0.005	-0.850	-0.063
FSDT – mean reaction time (s)	-1.366	0.025	0.255	0.049	-6.709	-0.185
RHLB – Expl. Picture Metaphors	0.528	0.031	1.696	0.022	0.078	1.651
sex	0.186	0.786	1.205	0.817	-3.401	2.328
MoCA score	-0.158	0.176	0.854	0.137	-0.539	0.119
dosage of neuroleptics	0.000	0.777	1.000	0.778	-0.003	0.003
Constant	4.392	0.220	80.814	0.246	-4.384	21.316

PANSS – Positive and Negative Symptom Scale; RHLB – Right Hemisphere Language Battery; FSDT – Facial Sex Discrimination Task

The classification accuracy of the model equaled 75.8%. Interestingly, after excluding highly outlaying results of one subject (Cook's distance = 1.8), the accuracy of the new model rose to 80.3%, with the biggest change among predictors concerning

the odds ratio for the reaction time (OR = 0.086), while relatively small changes for explaining metaphors (OR = 1.650) and disorganization (OR = 0.758).

Discussion

The results obtained in this study are consistent with two trends that can be found in the literature exploring the relations between symptoms, cognition and functioning. First, it is the presence of mutual associations between higher and more basic cognitive functions. Second, it is the importance of both symptom severity, as well as basic and complex cognitive skills, often from the domain of social cognition, in relation to professional and social functioning [7, 8, 18, 48–51]. Present results, therefore, confirm the observation by Dickinson and Coursey [7] that various indicators of cognitive functions are not independent, although they seem to be treated this way. The correlations in our study turned out to be the stronger the more complex skill measures were considered and generally the observed associations suggest general cognitive dysfunction, which may result from dependencies between various functions and cognitive domains. This is in agreement with previous findings [9, 52, 53].

Correlations of psychopathological symptoms with cognition turned out to be moderately negative. This pertains to positive, negative and disorganization syndrome, the latter turning out to be most strongly associated with general assessment of cognition (MoCA), cognitive aspects of communication (RHLB) and recognition of emotions (FEIT, FEDT). This confirmed our expectations based on the content of items of this syndrome and previous findings [31]. Thus, symptoms of disorganization may point to underlying social cognition and communication deficit, which is in line with observations of other researchers [30, 32]. Disorganization seems to especially reflect deficits in more complex cognitive functions [24, 33, 54, 55]. Still, the disorganization syndrome has been much less often researched than positive or negative one [25], mainly probably because there still is no widely utilized scale that would natively include disorganization dimension. Instead, current literature offers various methods of its estimation, what also hinders comparisons. Positive symptoms, in turn, either do not correlate as often with cognition, especially in meta-analyses or large sample studies [8, 25, 56], or such associations are weaker [32]. Partial responsibility for that may lay with the aforementioned effect of antipsychotic medications. However, positive symptoms do appear in relation to functional outcomes [7, 48, 57] including work [50, 58], as well as in connection with higher cognitive skills [26, 55]. In the studied sample, an additional factor that may increase their presence is the chronicity of the illness. Somewhat surprising is the lack of significant correlations between symptoms and the measure of executive function, namely the ToH. This task turned out to be rather demanding for the subjects and eventually we settled for the number of completed puzzles as the performance measure. Its low variability probably affected the strength of those correlations.

In this study, we were particularly interested how symptoms and cognition are associated with employment status in schizophrenia. The importance of both symptoms and cognitive function as regards employment has been noted earlier [48, 50, 57]. Interestingly, among syndromes, disorganization proved to be the strongest employment predictor. Because in literature it was rarely assessed, usually negative symptoms proved significant in separating employed from unemployed, whereas positive symptoms were related to the support needed on the job [11, 50, 58]. One of the studies which included disorganization was a study of Dickinson and Coursey [7], where it was, beside negative symptoms, one of predictors of social functioning. Particularly interesting are results of Evans et al. [48], who studied predictive importance of cognitive and symptomatic indicators in a prospective study of chronically ill people who were offered various forms of employment. The researchers found key importance of disorganization symptoms, as well as verbal memory, executive function and speed of processing as predictors of work behaviors assessed four months later. Unfortunately, they did not use any measure of communication skills. Nonetheless, the significance of processing speed is confirmed by both reports, as well as other studies concerning work [4, 10, 48, 50] or functioning in community [7, 51]. As Dickinson et al. pointed out, this aspect of disturbed cognitive skills seems to be an ubiquitous predictor of functioning in schizophrenia [59]. Lastly, this study also points to cognitive aspects in communication, in particular to the importance of understanding figurative language. To our knowledge, this is the first study which assessed cognitive aspects of communication skills, including comprehension of metaphors, in the context of professional functioning. Nonetheless, the results can be referred to studies in related areas. For example, Langdon and co-authors [26] have found that the understanding of metaphors has an additional contribution above the explanatory input of intellectual ability and executive function measures when trying to assess whether a subject is a patient or a control group member. In the context of functioning, more research has referred to general, holistic assessments of communication skills. In the current context, interesting results were obtained by Dickinson et al. [18], who found that social/communication skills measured through simulated conversations (role-playing) are linked to measures of verbal understanding and processing speed, and independently forecast employment. Lexén and Bejerholm [38], in turn, indicated that better communication and interaction skills correlate with more hours worked and higher income, while Merrill et al. [52] noted that poor communication correlates with overall poor performance in task performance. It is noteworthy, that in our study various aspects of communication skills, as measured with the RHLB, were related to employment status. Among them explaining the meaning of metaphors proved to be the best predictor in the final model, along with processing speed and disorganization symptoms. In the current literature, the functioning of people with schizophrenia is often associated, apart from the speed of processing, with measures

of verbal skills or communication. Moreover, a meta-analysis of the relationships of neurocognition and social cognition with functioning by Fett et al. [51] revealed that community functioning is most strongly associated with verbal skills, that is fluency, memory and learning, as well as with the speed of processing. Perhaps, therefore, beside the speed of processing, comprehension of metaphorical language also has some diagnostic potential in the context of social or professional functioning of people suffering from schizophrenia.

The present study was exploratory in nature and does not allow to directly infer about causal relations. However, it does highlight the importance of the cognitive aspect of communication skill and speed of processing, along with psychopathology, in relation to everyday functioning in schizophrenia. Sheltered workplaces, while undoubtedly posing many job-related demands, offer additional support and probably better job-person matching compared to open market jobs. The selection process for such jobs, on the other hand, with a 'trial period', shows similarities to that of the free market. Interestingly, sheltered work does not seem to help reduce the impact of cognitive deficits on functioning [60], therefore it may be the only possibility for some patients to work and be unattainable for others. Perhaps cognitive rehabilitation strategies focused on communication skills could improve this situation, but this requires further research.

Conclusions

The obtained results confirm the phenomenon of so-called generalized cognitive dysfunction, in which deficits at various levels of cognitive functioning are interrelated. The associations of cognition with positive, negative and disorganization symptoms are of low to medium strength. While the severity of symptoms, especially disorganization syndrome, seems to be an obvious obstacle to having even a sheltered job, the speed of processing and the ability to understand metaphorical language are also independent predictors of employment, indicating the important role of basic and higher cognitive functions for professional functioning in schizophrenia and their potential utility for diagnostic purposes.

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