

Executive Functions and Adaptive Behaviors in Adult Patients Diagnosed with Schizophrenia (part 1)

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Abstract

Introduction: *Patients diagnosed with schizophrenia present a level of impairment on a wide range of areas, such as cognition, memory, and adaptive mechanisms. Cognitive impairment, along with the degree of impairment of executive functions is a fundamental predictor of the degree of recovery and becomes a target in developing an intervention plan (Giraldo-Chica et al., 2017). However, despite the large number of years of study, the etiology and pathophysiology of schizophrenia are not fully understood, making treatment only modestly effective (Tandon et al., 2008).*

Objectives: *The purpose of this paper is to evaluate the degree of impairment of executive functions and adaptive mechanisms in order to better understand the nature and source of these deficits.*

Methods: *Research was conducted on a sample of 10 patients diagnosed with schizophrenia, aged between 30 and 60, of both genders – male (1) and female (9), who were selected by non-random sampling, volunteers receiving a set of questionnaires with early completion of the data processing agreement. The sample was extracted from 3 Psychiatric Hospitals in Bucharest, Romania. The degree of impairment of the participants was evaluated using the results obtained in the WCST (Wisconsin Card Sorting Test), D2 Attention Test, ABAS-II Test (Adaptive Behavior Assessment System) and MMS-2 Test (Mini Mental State Evaluation).*

Results: *The results indicated a severe impairment of executive functions and adaptive mechanisms, along with a moderate cognitive impairment. The general conceptual level of the subjects was placed in the severely affected performance range. Thinking processes were marked by perseverance in approaching a problem or situation, despite receiving negative feedback and continuing with it beyond the limit at which someone else would have sought another approach.*

Conclusions: *A future direction of research might be extending the number of participants in the study, in order to better evaluate the degree of impairment present in the targeted population. Better understanding the degree of impairment and extending existing research will offer a broader understanding in treating patients diagnosed with schizophrenia.*

Keywords: *schizophrenia, adaptive mechanisms, early trauma, Theory of Mind, cognition, memory, attention*

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I. Introduction

According to Bonnot et al. (2011), schizophrenia is defined as a severe and complex psychiatric disorder. Symptoms include hallucinations, delusions and disorganized speech. Schizophrenia is characterized by cognitive impairment, along with prominent deficits visible in executive functions (Giraldo-Chica et al., 2017).

One of the few features of schizophrenia accepted by most authors is that the disorder is heterogeneous. Part of the difficulty in detecting a consistent 'neuropsychological signature' associated with schizophrenia may be that there is no 'schizophrenia' (Blanchard & Neale, 1994, apud O'Carroll, 2000). Symptoms could be more clearly related to dysfunctional patterns of information processing, according to Liddle & Morris (1991, apud O'Carroll, 2000). Thus, schizophrenia has a heterogeneous clinical presentation, including cognitive impairment as one of the symptoms. Cognitive impairment includes attention, working memory, information processing and time processing and social cognition (Ayesa-Arriola et al., 2016, Fett et al., 2011, Reichenberg, 2010, apud Croca et al., 2018).

The last of these is described as a multi-dimensional construct, which includes the processing of emotions, social perception and knowledge. Also linked is the concept of Theory of Mind (ToM), defined as the ability to understand that others have a different mind, separate from our own mind, that will process information according to a personal set of emotions and thoughts (Green et al., 2005, apud Croca et al., 2018). However, the predominant view on the diagnosis of schizophrenia is that it is polygenic, the manifestation of the disorder resulting from the combined action of a multiple number of genes. Thus, certain individuals will have genes that will put them at an increased risk of developing this disorder without ever developing it (Meehl, 1962, apud Barch, 2005). However, if some of these genes are responsible and contribute to impaired cognitive function, then these people may have the same cognitive deficits as people diagnosed with schizophrenia (Barch, 2005).

Barch (2005) has characterized cognitive impairment as a key mechanism in the formation of the symptoms specific to the diagnosis of schizophrenia, stating that such impairment may be necessary, but not sufficient for the development of schizophrenia. Although not sufficient, cognitive impairment may play an important role in the quality of everyday functioning in society, and has a strong correlation to disorganized speech.

Liddle & Morris (1991, apud O'Carroll, 2000) conducted a study trying to discover a relationship

between a neuropsychological abnormal functioning and a particular symptom in the area of schizophrenia. They applied a battery of neuropsychological tests, which involved a sensitivity to lobe dysfunction. This battery was applied to a group of patients diagnosed with chronic schizophrenia. The signs and symptoms were then grouped into three syndromes: poor motor behavior, disorganization and distortion of reality. Disorder syndrome scores were associated with impaired test results that required the subject to inhibit known but inadequate responses. Scores associated with poor psychomotor performance syndrome have been also associated with slowing of cognitive processes.

Recently, Baxter & Liddle (1998, apud O'Carroll, 2000) concluded that disorganization syndrome may be associated with a specific difficulty in suppressing irrelevant verbal responses. Having such a relationship between a neuropsychological abnormality and a specific symptom would facilitate integrating the neuropsychological approach with the clinical diagnosis for schizophrenia. However, no model could provide a clear causal relationship between the two.

While the clinical diversity of symptoms may be related to the etiological and pathophysiological heterogeneity, a question about schizophrenia as a unitary diagnosis arises. One might be tempted to ask if schizophrenia is one distinct diagnosis or many entities and syndromes, grouped together, that cannot be delimited and distinguished. In this case we might need to change our perspective both in the process of evaluating it and in the process of establishing proper treatment (Tandon et al., 2009).

Heritability is often highlighted when talking about the diagnosis of schizophrenia, but it has been stated that onset may vary in association with environmental factors. These results might explain how some individuals vulnerable to develop this condition do not develop it. It seems that early life adversity, cannabis use and growing up in an urban environment may give rise to more severe pathology (Van Os, Kenis & Rutten, 2010).

A recently published meta-analysis of all studies conducted between 1965 and 2001 revealed, contrary to initial assumptions, that the rate of schizophrenia is uniform globally, that its incidence varies according to the degree of urbanization, migration and male gender, which are associated with a higher risk of onset. It is estimated that the chances of developing schizophrenia measure an average risk of 0.7% (Tandon, Nasrallah & Keshavan, 2008).

The risk of a psychotic disorder has been associated with urbanization, more clearly to the place

of birth. Incidence of psychotic disorders seems to correlate better with the urban environment of birth than to the environment in which the individual is living at the moment of developing schizophrenia. Although some findings are contradictory, there are a number of positive studies suggesting that factors such as prenatal stress, urban birth and child trauma exacerbate vulnerability to schizophrenia and other psychoses, while other factors, such as life events, especially migration, are a minority group, and highly expressed emotions, which appear later in the vulnerable individual, can move the person to the peak of psychosis (Lim, Chong & Keefe, 2009)

Despite the large number of years of study, schizophrenia remains obscure in terms of the etiology and psychopathology (Tandon, Nasrallah & Keshavan, 2008).

According to Nettle and Clegg (2006), considering the impairment of physical health in schizophrenia sufferers, this would be expected to lead to the disappearance of hereditary traits that predispose individuals to this condition. The fact that this does not seem to have happened has led many researchers to speculate that there must be other beneficial effects of traits, most likely manifested in healthy relatives (Huxley et al., 1964, Jarvik & Deckard 1977, Shaner et al., 2004, apud op. cit., 2006). Moreover, first-degree relatives of psychotic patients are often creative individuals, and the different result could be explained by a better phenotypic state (Heston, 1966, Karlson, 1970, apud ibidem, 2006).

However, the results obtained by Laurent et al. (2001) reveal that the group of relatives did not differ significantly in control, neither on WCST performance, nor on schizotypy scores, while a study by Szöke et al. (2004) stated that relatives of schizophrenic patients appear to have executive dysfunctions, although not severe. Although scores that indicate deficits on Wisconsin Card Sorting Test (WCST) might provide evidence upon family vulnerability, it cannot discriminate between individuals who will develop this condition or not (Wolf et al., 2002). A possible explanation for these differences is provided by the results of “The Finnish Adoptive Family Study of schizophrenia”, which examined the effect of the family environment as a risk factor for the development of a diagnosis of schizophrenia in adopted children from schizophrenic biological mothers. The risk of developing schizophrenic spectrum disorders in adopted patients who had a mother diagnosed with schizophrenia was higher than in control subjects, but only if they were exposed to a dysfunctional family environment (Tienari, 1994, apud Tsuang, 2000). Tsuang

(2000) concluded that genes control embryonic neurodevelopment, but the environment in turn produces changes. Overall, the impact of psychosocial stressors on the etiology of schizophrenia is undoubtedly an important factor (Lim, Chong & Keefe, 2009).

In terms of vulnerability to adult psychopathology, recent studies have offered strong evidence that the impact of environmental factors is mediated by an individual’s genotype (Morgan & Fisher, 2007). For example, studies have found a clear interaction between COMT genotype (catechol-O-methyltransferase) and cannabis use (Tunbridge et al., 2015). COMT genotype can be associated with the severity of the symptoms present during an psychotic episode, determining more intense positive symptoms in carriers of this genotype (Nieman et al., 2016). Furthermore, it appears that genetic risk mediates the impact of environmental factors, such as dysfunctional family relationships, in developing schizophrenia (Caspi et. al, 2005, apud Morgan & Fisher, 2007).

A prospective study that examined a cohort of 11,000 individuals found that the risk of developing schizophrenia among children from unwanted pregnancies is higher than in those from desired pregnancies (Myhrman et al., 1996, apud Lim, Chong & Keefe, 2009). In schizophrenia patients studies show a correlation between childhood abuse and dissociation, sexual abuse and hallucinations, long term-physical abuse and positive psychotic symptoms (Kilcommons & Morrison, 2005). These results are also supported by Schäfer et al. (2012), who stated that dissociative symptoms in patients with schizophrenic spectrum disorders appear to be closely related to experiencing a traumatic episode in childhood.

Traumatic episodes experienced during childhood have been associated with memory impairment, as well as reduced hippocampal volume in adults, according to a study by Shannon et al. (2009) on a group of 85 adults diagnosed with schizophrenia. The study shows a clear association between neurocognitive impairment and adverse childhood experiences. Individuals diagnosed with schizophrenia that had been exposed to traumatic experiences during childhood have greater working memory difficulties compared with individuals that were diagnosed with the same condition, but did not experience trauma growing up.

Executive functions

Elliott (2003, p. 49) stated that “the term executive function is used as an umbrella for various and complex cognitive processes and subprocesses”. Thus,

the term refers to the complex cognitive process necessary to coordinate a number of subprocesses to achieve a goal. Neuropsychological evidence suggests that executive processes are connected to the intact function of the frontal cortex. Impairment of executive functions has been associated with a wide range of conditions and is generally associated with a functional or structural pathology of the frontal cortex. Thus, executive functions are compromised in a wide range of clinical disorders.

According to Kurtz et al. (2001), in recent years a wealth of information has been accumulated, supporting the presence and stability of neuropsychological impairment in people diagnosed with schizophrenia. Research indicates that these deficits are evident in a wide range of areas including: verbal ability, complex perceptual functions, flexibility of cognition and abstraction, attention, learning, sensory skills, and psychomotor skills. They are stable over time and are relatively unresponsive to the effects induced by typical antipsychotics.

Neurocognitive deficits in schizophrenia are deeply relevant clinically. Keefe and Fenton (2007) stated that, if cognitive impairment were considered part of the diagnosis of schizophrenia, it would be important to demonstrate that its prevalence in patients diagnosed with schizophrenia is high. According to the results, patients with schizophrenia have scores with a standard deviation of 1.5-2.0, compared to those in the control group, who do not have a diagnosis. The most prominent deficit is visible in memory, attention, working memory, problem-solving ability, processing speed and social cognition.

According to O'Carroll (2000), although the general opinion is that significant impairment of cognitive function was thought to be evident only in older patients diagnosed with schizophrenia, in the last 25 years, studies have provided evidence that tends to contradict this hypothesis. It becomes obvious that cognitive impairment, which precedes the diagnosis of schizophrenia, is the norm. Recent literature has attempted to characterize the prevalence, degree of impairment, and nature of the neuropsychological abnormality found in patients diagnosed with schizophrenia.

Cognitive impairment appears to be present in some patients diagnosed with schizophrenia prior to diagnosis. Children that will later be diagnosed with schizophrenia show lower functioning of cognitive areas and difficulties in academic tasks, highlighting that they start early in life with a lower ability compared to individuals that will not develop schizophrenia.

Research shows that cognitive deterioration is correlated with measurable brain dysfunction, more than any other aspect of the diagnosis (Keefe, 2008).

Another study, by Baldeweg et al. (2004), showed a significant difference between the control group and patients diagnosed with schizophrenia. Patients scored poor in verbal intelligence, working memory, and verbal fluency, indicating more general cognitive impairment beyond long-term memory alterations. It can thus be inferred that the deterioration of executive functions and the Theory of Mind are the main features of schizophrenia, according to Emilio López-Navarro (2018). Impairment of executive functions is a common feature of the diagnosis of schizophrenia, respectively bipolar disorder. While deficits in cognitive social skills, including Theory of Mind, are suggested to be specific to schizophrenia, the existing evidence indicates a significant relationship between cognitive performance and both diagnoses (Bora, Veznedaroglu & Vahip, 2016).

Baldeweg et al. (2004) state that as executive functions depreciate significantly in patients diagnosed with schizophrenia compared to undiagnosed individuals, the impairment of Theory of Mind is expected to be greater in adult patients with schizophrenia.

The Theory of Mind is, according to Bora, Veznedaroglu & Vahip (2016, p. 1), "the ability to attribute mental states (feelings, beliefs and intentions), to understand and predict the behavior of others, based on their mental states". The term social cognition, according to Bozikas et al. (2006), includes processes such as Theory of Mind skills, recognition of affections, social perception and attributional style.

A study by Miyake et al. (2000, apud Croca et al., 2018) sought to find a correlation between deficits encountered in the Theory of Mind and executive functions in patients diagnosed with schizophrenia, using the Faux Pas Test (FPT) to evaluate the Theory of Mind, and Behavioral Assessment of the Dysexecutive Syndrome (BADS) and Wisconsin Card Sorting Test (WCST) to measure executive functions. The two groups of patients were divided as follows: 22 patients aged between 18 and 35 years and 18 patients aged between 35 and 50 years. The results showed that although both groups had poor results in the Theory of Mind measurement test, the group of patients over 35 years obtained lower scores at all tests, revealing a generalized pattern of dysfunction of the evaluated processes. Thus, as executive functions significantly depreciate in patients diagnosed with schizophrenia, compared to undiagnosed individuals, the impairment of

Theory of Mind is expected to be greater in adult patients with schizophrenia (Croca et al., 2018).

The results obtained by López-Navarro (2018) suggest that certain aspects of executive functions are specifically related to cognitive and affective performance, but also to the Theory of Mind, in the case of patients diagnosed with schizophrenia. Thus, the symptoms of depression and anxiety that accompany the positive symptoms of schizophrenia are associated with neurocognitive deficits that indicate disorders of executive function, attention, visual memory and social cognition. It also indicates difficulties in the ability to use abstract thinking (Kanchanatawan et al., 2017).

Both cognitive and affective functions are involved in paranoid delirium, according to the study by Bentall et al. (2009). The results of this study showed that paranoid delirium is associated with a combination of pessimistic thinking and impaired cognitive function, indicating a tendency to draw conclusions and an inability to make assumptions about the mental state of others. Therefore, treatment for patients with paranoid delirium should address both types of processes involved.

Executive functions are those involved in complex cognitive processes, such as problem solving, behavioral adaptation to new information, strategy generation, and sequential division of complex tasks. When these systems collapse, the behavior becomes poorly controlled, uninhibited. Coordination, control, and goal orientation are, therefore, at the core of the concept of executive functions (Elliott, 2003).

However, a limited number of studies have investigated approaches to rehabilitating these deficits (Kurtz et al., 2001).

One such mention is the one presented by Marsh et al. (2013), who explained the results obtained after the initiation of a program entitled “Mental-State Reasoning Training for Social Cognitive Impairment” (SoCog-MSRT), over a period of five weeks, with the aim of increasing social cognition in patients with schizophrenia. The objective of the study was to test the feasibility of implementing the SoCog-MSRT program in an environment that allows the rehabilitation and at the same time the evaluation of these methods in terms of improvements. The study had 14 participants diagnosed with schizophrenia or schizoaffective disorder. The results showed significant improvements, concluding that this program can improve the skills of Theory of Mind and social understanding. However, people with impaired working memory and a lower premorbid IQ may be less eligible to benefit from such training, the results being insignificant.

Neurobiology of schizophrenia

Remediation of executive functions in patients with schizophrenia is important in their rehabilitation, as these skills affect the patient’s ability to function in the community. The study by Pedersen et al. (2012) supports the hypothesis that compensatory neuronal activation in patients with schizophrenia helps them to achieve healthy control over cognitive tasks.

According to Bonnot et al. (2011), in recent years, schizophrenia has been increasingly recognized as a neurocognitive disorder, which has led to a growing literature on cognitive rehabilitation and suggested several potential improvements in cognitive function. The neurobiological basis of cognitive remediation has not been elucidated to date, although structural, functional, and metabolic abnormalities of the prefrontal cortex have been associated with cognitive impairment. According to Keshavan et al. (2008), functional imaging studies have provided evidence of alteration in the prefrontal lobe function and of less consistently temporal lobe function in patients diagnosed with schizophrenia. An interesting hypothesis, that has not been tested enough, could be that functional connectivity between these regions might be affected.

Patients with prefrontal cortex lesions have impaired cognitive, organizational, planning, and decision-making mechanisms, as well as behavioral disinhibition and impaired intellectual abilities (Elliott, 2003). This phenomenon is the result of the fact that “executive functions are supported by a distributed set of brain regions that includes the prefrontal cortex (PFC) and the thalamus, especially the mediodorsal nucleus (MD), which is mutually connected to the PFC” (Giraldo-Chica et al., 2017, p. 4). It has been proven that injuries to the MD core can alter executive functioning processes, sometimes mimicking the same level of deficits as those observed after PFC damage (op. cit., 2017).

However, it is important to note that the neurobiology of schizophrenia is more likely a complex accumulation of various factors, such as inherited vulnerability and environmental factors. It may be that adverse experiences during childhood accentuate this vulnerability, while adverse experiences during adolescence and adulthood might develop into ‘triggers’ for the diagnosis to develop. The fact that the onset of the psychosis usually occurs later in life comes as a stronger indicator of the essential part that environment plays in developing schizophrenia. Present studies view schizophrenia as a progressive pathophysiology with lead causes including several factors that work independently or in various combinations (Lim, Chong & Keefe, 2009).

Treatment of schizophrenia includes various types of medication, which consist of typical or atypical antipsychotics, antidepressants or mood stabilizers and anticholinergic agents (benztropine). Interestingly enough, despite the wide detrimental influence that these substances have on the neurotransmitter system and cognition, no difference has been observed between the patterns of cognitive impairment of individuals treated with medication and the individuals that have not received treatment. This finding might invalidate the belief that cognitive impairment in schizophrenia is an adverse side effect of the drug treatment (O'Carroll, 2000; Barch, 2005).

Adaptative mechanisms in schizophrenia

Cognition has been consistently associated with competence and life skills and social functioning. Thus, patients with better general neurocognitive abilities may have greater functional capacity, with evidence of direct relationships between neuropsychological impairment and real-world functioning (Bowie et al., 2008).

However, the link between social skills in the workplace and WCST performance was not supported by the research results. This finding suggests that difficulties in forming social relationships are linked to the inability to understand social rules in the work environment. Diffuse organic damage might explain how impairment in understanding unwritten social laws has an impact on the ability to socialize properly with colleagues (Lysaker, Bell & Beam-Goulet, 1995).

Regarding social abilities, disconnected speech was significantly associated with socially impolite behavior, while verbal underproductivity was associated with social disengagement and impaired friendships (Bowie & Harvey, 2008).

About the influence of age and progression in the disease, the study found that elderly patients with schizophrenia had greater functional deficiencies in a wide range of different areas, compared to other diagnostic groups of elderly patients receiving mental health care services. Greater deficits have been found for a wide range of personal care skills, social skills, community life skills, and cognitive functioning (Bartels, Mueser & Miles, 1997).

The study by Perivoliotis, Granholm & Patterson (2004) showed that whether patients lived in assisted or independent settings, they had significantly impaired functioning in a majority of functional areas assessed by the Independent Living Skills Survey (ILSS). Specifically, patients were affected in most functional areas assessed by the ILSS, including their

ability to maintain a proper appearance and clean clothing, to prepare and store food properly, to engage in effective health maintenance behaviors, to maintain personal hygiene, to look for a job, to participate in recreational activities and to manage their financial resources or to use public transport.

In order to reduce disabilities and promote functional recovery, it is essential to see rehabilitation and cognitive improvement as a platform on which skills could be more easily taught. They could then be generalized later, when faced with dynamic social and occupational desires (Bowie et al., 2008).

Implications of executive functions on the diagnosis of schizophrenia

Patients with schizophrenia display a large array of neurocognitive deficits that include impaired attention, thinking and reasoning, decision-making, planning ahead, executive functions, visual and working memory and difficulties in recognizing emotions (Reichenberg, 2010, Yu et al., 2015, Keefe & Harvey, 2012, Cuesta & Peralta, 1995, Schaefer et al., 2013, Seidman et al., 2003, Eng et al., 2013, apud Kanchanatawan et al., 2017). On average, cognitive impairment is severe or moderate compared to undiagnosed individuals in the control groups and almost all patients with schizophrenia demonstrate a decline in the cognitive function compared to the expected level if schizophrenia had not been present. This is the main factor influencing deficits in the functioning of the occupational, social and economic areas in patients diagnosed with schizophrenia and it is important to establish a target treatment. The profile of deficits encountered in patients diagnosed with schizophrenia may thus include the most important aspects of human cognition: attention, memory, reasoning, and processing speed (Keefe & Harvey, 2012).

Current findings support the view that cognitive impairment is directly related to the social and functional deficits of many patients diagnosed with schizophrenia (O'Carroll, 2000).

The results of a study by Lysaker, Bell & Beam-Goulet (1995) suggest that better performance on the WCST test is closely correlated with a better ability to function professionally.

In a study by Taylor & Abrams (1984), cognitive functions were compared in a number of 62 patients diagnosed with schizophrenia with those of a control group of 42 participants. The evaluation was done with neuropsychological tests that included evaluation of mild neurocognitive signs and aphasia, tachistoscope stimulation, items from the Mini-Mental

State, Halstead-Reitan Neuropsychological Test Battery, and the Luria-Nebraska Neuropsychological Battery. Patients diagnosed with schizophrenia obtained scores that revealed damage to the hemispheres, cortical region, and a global cognitive deficit. In the control group, no participants scored higher than the mean score, while three-quarters of patients diagnosed with schizophrenia scored moderately to severely. These differences were not the result of differences in age or medication.

In the acute phase, both patients with bipolar depression and those with unipolar depression may have impaired cognitive function, including a deficit in problem-solving ability, executive function, learning, spatial memory, visual processing, processing speed, and attention support (Egerhazi et al., 2013, apud Kanchanatawan et al., 2017).

A study by Bentall et al. (2009) revealed the relationship between cognitive and psychological processes associated with paranoid delusions. Results suggest that, if present, persecutory beliefs and pessimistic or depressive way of thinking have an impact on developing paranoid delusions. Pessimistic thinking includes low self-esteem, high level of anxiety and assumptions that bad things will happen.

Barch (2005) stated that, not surprisingly, most studies designed to examine the neuroscience of cognitive processes in schizophrenia found that most patients tended to perform poorer than those in the control group at a wide range of cognitive requirements. This may reflect an inability to engage in the task, rather than a disturbance in the regions of the brain or nervous system. Glahn et al. (2000) stated that the differences between the scores obtained when applying the WCST test to patients diagnosed with schizophrenia and the results obtained by the control group seem to be consequence of impaired memory. Patients diagnosed with schizophrenia encounter difficulty in maintaining information for a brief period of time, prior to this information being used in a more complex cognitive task. Impairment in memory function is present in a large proportion of patients diagnosed with schizophrenia and it is believed to significantly affect cognitive function, which predicts the clinical prognosis and social integration, as stated by McKenna et al. (1990, apud Baldeweg et al., 2004). Evidence shows that schizophrenia is accompanied by deficiencies in various components of working memory, including spatial working memory, long-term strategic memory, and strategy use (Zilles et al., 2010, apud Kanchanatawan et al., 2017).

It is important not only how memory is affected, but also how it works in patients with

schizophrenia, compared to subjects without a medical diagnosis. Kurtz et al. (2001) found that healthy subjects, when asked to study a list of words that differ according to the degree of 'pleasure', tend to remember more words associated with 'pleasant' feelings than words attributed to the 'unpleasant' list, a phenomenon called "Pollyanna effect". In contrast, it does not appear in patients diagnosed with schizophrenia, who seem to remember unpleasant, neutral and pleasant words at equally low rates. This result has been commonly attributed to anhedonia in patients with schizophrenia.

Please note that not only memory and cognition are affected. Schizophrenia is widely considered to involve attention deficits. However, the term 'attention' can be defined so broadly, according to Luck and Gold (2008), that impaired performance of any task could be interpreted as evidence of a lack of attention, which slowed cumulative progress in understanding attention deficit in schizophrenia.

A multitude of studies have shown that patients with schizophrenia have a reduced response time to a target stimulus. Steffy and Galbraith (1980, apud Kurtz et al., 2001) investigated the effect of financial encouragement and rewards on overall response time in 16 incarcerated patients diagnosed with schizophrenia. These procedures had an effect on their reaction time, which became comparable to the level of performance of the subjects in the control group.

Also, although not much attention was given to this construct in literature, temporal perception seems to play a key role in schizophrenia, according to Bonnot et al. (2011). They stated that the clinical evidence associated with psychopathological, biological and cognitive theories suggests that patients with schizophrenia have a deficit in temporal perception. Discrimination and reproduction of durations have been shown to be constantly affected. While psychopathological and phenomenological activity suggests that time perception disruption may be the key or underlying symptom in schizophrenia, neuroscience studies have failed to do the same.

There are many studies that have focused on attention, memory, and executive functioning in patients diagnosed with schizophrenia, without taking into account perceptual processing. However, perceptual functions are often disrupted in schizophrenia. Emotion perception factors in schizophrenia are considered essential predictors of clinical outcomes, such as social functioning (Leventhal & Scherer, 1987, Mandal et al., 1998, apud Butler, Silverstein & Dakin, 2008). According to Green et al. (2000, apud Bozikas et al., 2006, p. 81), perception affects

the ability to “accurately perceive, interpret and process emotional expressions in others”. The literature reveals the importance of emotional perception deficits and the relevance for clinical symptoms and social functioning of schizophrenia (Kohler et al., 2009). Current findings suggest that patients with schizophrenia have a moderate to severe impairment of facial expression perception (Chan et al., 2010).

O Syndrome (Omission syndrome) is an indicator of inappropriate behavior in response to instructions. It is obvious in the case of a large number of processed items (NT) accompanied by a higher percentage of errors (E%), especially by a large number of omission errors (E1). In people in the general population, a high value of this syndrome may indicate a superficial and inaccurate processing of stimuli, respectively a non-observance of instructions (Brickenkamp, 2010).

A Cognitive Shift neurocognitive training module was developed in order to ameliorate cognitive flexibility deficits in chronic schizophrenic patients. Three male patients who underwent the intensive program demonstrated significant gains in Wisconsin Card Sorting Test performance, gains that were maintained at a six-month reassessment (Delahunty, Morice & Frost, 1993). Enriched supportive therapy is demonstrated to have positive, yet modest, effects on cognitive impairment (Hogarty et al., 2004). Patients treated with cognitive therapy showed a clinically significant mean improvement in global functioning from baseline to 18 months that was greater than the improvement seen with standard treatment (Grant et al., 2012).

II. Method

Purpose of the research

The main purpose of this research is to highlight the degree of impairment in terms of functioning in the areas of responsibility of executive functions and adaptive mechanisms in patients with schizophrenia.

The secondary purpose is to identify whether there is a relationship between adaptation mechanisms and executive functions in people diagnosed with schizophrenia. In this sense, correlational and comparative analyses will be performed on a group of 10 people with schizophrenia.

Research objectives

O1. To carry out an experimental study on the adaptation mechanisms and executive functions that schizophrenic patients adopt.

O2. To measure adaptation abilities using the Adaptive Behavior Assessment System.

O3. To highlight the relationships between adaptation mechanisms and executive functions in people with schizophrenia.

O4. To measure executive functions using the Wisconsin Card Sorting Test.

O5. To measure the capacity of selective attention and ability to concentrate related to visual stimulation using the D2 Attention test.

O6. To quantify the deterioration in the quality of life of patients with schizophrenia, in their executive functions and adaptive mechanisms.

Research hypotheses

In order to achieve the objectives of this research, the following hypotheses are established:

H1. Patients with schizophrenia have a moderate-severe impairment in the areas responsible for the functioning of executive functions and adaptive mechanisms.

H2. Patients with schizophrenia with moderate to severe impairment of executive function have a high level of impairment of adaptive mechanisms.

Research variables

The variables used in conducting this research were the following:

Independent variables: gender of participants, age, diagnosis of patients, selective attention.

Dependent variable: adaptation mechanisms and executive functions in people diagnosed with schizophrenia.

Participants

The research was conducted between December 2017 and April 2018 on a sample of 10 people diagnosed with schizophrenia, aged between 30 and 60 years, of both genders, male (1 person) and female (9 people). The sample was extracted from 3 psychiatric hospitals in Bucharest. The participants were selected by non-random sampling, volunteers completing the data processing agreement.

Instruments

To conduct this research, the following questionnaires were used:

The demographic inventory is a list of personal data of participants and includes the following information: ID (code given to the participant for

confidentiality), age, gender, level of education, specifications for the diagnosis of schizophrenia, testimonials, concepts.

The D2 Attention Test (Brickenkamp, 2010) was originally developed as a tool for assessing the ability to drive. Attention, concentration and perceptual speed seem to be the essential variables that discriminate between 'good' and 'bad' drivers, the test being extremely useful in revealing performance at three levels:

1. speed or quantity, i.e., the number of stimuli processed in a given unit of time;
2. quality of performance, i.e., the levels of precision and accuracy of processing, which are inversely correlated with the percentage of errors;
3. the relationship between speed and performance accuracy that allows the observation of special elements of work behavior, such as initial agitation, constancy and instability, the efficiency of inhibition, fatigue etc.

It is a non-verbal tool that can be administered individually or in groups in just 8 minutes, including the time required for instructions. The D2 test can be used in various fields such as clinical, educational, transport psychology, neuropsychology, sports or in any area in which the orientation and selectivity of attention are relevant. Based on the test, indicators can be analyzed regarding:

1. the value of the total performance;
2. number of errors (omissions or commissions);
3. the total number of items processed minus the number of errors;
4. the ability to concentrate;
5. the fluctuation rate.

Mini-Mental State Examination, Second Edition (MMSE-2) (Folstein et al., 2010) is a standardized clinical examination for assessing cognitive impairment, being considered one of the most popular and reliable tools of its kind.

Its predecessor, MMSE, designed as an aid in the clinical examination of mental status, is already well known by Romanian specialists. The MMSE-2 screener has become the common language of all professionals, psychologists, psychiatrists, neurologists, geriatricians, family physicians or doctors of other specialties, focused on the rapid assessment of cognitive deficit, internationally.

MMSE-2 includes three versions (EV – extended version, VS – standard version and BV – short version), easy to handle and score by any specialist. The

examination with MMSE-2 is systematized by the clear enunciation of the items and instructions and by their placement in a well thought out order.

Wisconsin Card Sorting Test (WCST) (David A. Grant and Esta A. Berg, 1948; Heaton et al., 2011) includes four stimulus cards and 128 response cards that illustrate various shapes (circles, crosses, triangles, stars), colors (red, yellow, blue, green), and a number of figures (one, two, three, or four). The task is administered by presenting to the participant the four stimulus cards, arranged from left to right, the cards having the following symbols: a red triangle, two green stars, three yellow crosses and four blue circles. The participant is given 64 answer cards and is instructed to associate them to one of the stimulus cards as they consider appropriate, the rule being to not associate the answer cards repeatedly with the same stimulus card, before completing a row of four cards.

The participant is only told if the association is 'correct' or 'incorrect', but the sorting criterion is not revealed. There are four types of criteria: Color, Shape, Number and Others. Each answer given by the participant can be framed in three separate dimensions: Correct-Incorrect, Ambiguous-Unambiguous, Persevering-Non-Persevering. The test is not divided into scales, but several different scores are offered, such as: number and percentage of errors, persevering answers, etc.

The Adaptive Behavior Assessment System - Second Edition (ABAS-II) (Harrison & Oakland, 2003) provides a comprehensive assessment, based on carefully picked rules, of individuals' adaptive abilities. The test has a wide range of utility, covering ages from newborns to 89 years. ABAS-II can be used to assess a person's adaptive skills, to diagnose and classify certain disabilities and/ or disorders, to identify strengths and limitations, and to help document and monitor a person's progress through time.

ABAS-II provides results through assessment by multiple evaluators, capturing from several perspectives the functioning of a person and contributing to a complete measurement of a person's daily, functional abilities. The multidimensional quality of the instrument derives from the existence of the five evaluation forms, which are intended to assess people in different age ranges, coming from different backgrounds.

Data collection procedures

The questionnaires were distributed to people diagnosed with schizophrenia in December 2017 –

February 2018, in the form of 4 sessions, during six weeks. After completing and signing the data processing agreement, the participants filled in the identification ID and all the relevant data about them. They were given the opportunity to find out the results, they were informed that there were no right or wrong answers and that the results would be used only for research purposes.

Taking into consideration the diagnosis of schizophrenia and the lack of trust that the patients manifested towards the psychologist, the process of selecting participants and administering the tests consisted in making frequent brief visits to the hospital. The first such visit aimed to introduce the researcher to the patients, by their assigned doctor or nurse, as a way of ensuring perceiving the researcher as a person of trust. After these short visits, we started inviting patients in the evaluation room, to help them become acquainted with the environment, while discussing aspects regarding their physical state at the time, and their willingness to participate in the study. During the next visit we went through details about family history and collected data needed for carrying out the anamnesis, the actual tests being applied after going through these steps. However, there were 21 patients that could not be introduced in the present study, due to refusal of participating, or to manifesting psychotic episodes or paranoid delusions towards the researcher.

Research design

The design of the research is of experimental type, in the form of individual case studies (where the aim is to analyze a set of common features of some attitudes or manifestations in a given situation), inter-subject, in which a correlation between the mechanisms is evaluated, respectively the executive functions adopted by schizophrenic patients. Psychological interpretations were elaborated based on the anamnesis and the results scored after the patients completed the tests.

(to be continued)

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