Reality Testing in Children with Childhood-Onset Schizophrenia and Normal Children: A Comparison using the Ego Impairment Index on the Rorschach

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Objective: The aim of this study was to examine reality testing in schizophrenic children and compare it with normal children using minus responses subcomponent in ego impairment index of the Rorschach test.
Methods: In a descriptive design, 20 accidentally sampled children, including 10 schizophrenic and 10 normal children, were recruited in to two groups and were compared in terms of reality testing subcomponent of Ego Impairment Index (EII). After initial interview, the Rorschach inkblot test was administered on the two groups, and Distorted Quality responses (FQ-) were calculated. The results were then analyzed by independent t-test and Cohen's d for effect size .
Results: The result of independent t-test revealed that the mean of minus responses in schizophrenic children was significantly higher than that of normal children. In addition, the usefulness of the Rorschach ego impairment index (EII) in evaluating reality testing in schizophrenic children was confirmed. In addition, it was found that defect in reality testing is one of the prominent characteristics of schizophrenic children .
Conclusion: The higher minus responses in schizophrenic children indicate that schizophrenic children have weaker functioning in reality testing compared with normal children.

Key words: *Reality testing, childhood-onset schizophrenia (COS), normal children, minus responses subcomponent, ego impairment index (EII), Rorschach*

Childhood-onset Schizophrenia (COS) is a rare and severe type of schizophrenia and is characterized by the beginning of psychotic symptoms before the age of 12 (1). Examination of the phenomenology, neuropsychology, and biology of clients with COS suggests that Childhood-onset Schizophrenia shares basic pathophysiologic features with later-onset forms of the disorder (2). It is uncertain whether the current syndromal definition of schizophrenia will map precisely onto the genome (3). To date, neurobiological studies of children with COS have supported a hypothesis that the disease process in childhood and in later-onset schizophrenia is similar (2). Several factors are involved in the incidence of schizophrenia with childhood onset and its heritability is estimated to be about 80 percent (4). Diagnostic criteria in schizophrenic children are the same as those of adults, except that schizophrenic children, instead of showing regression in performance, do not reach to the expected levels of social and educational performance (4),(5). Cognitive impairments (6), thought disorders, and deficits in communication are of the most important features of the schizophrenic clients (1).

Results from several independent studies clearly demonstrate that schizophrenia can be diagnosed reliably during middle childhood using the same criteria used with adults (7). Although there are still a limited number of studies that have used semi-structured diagnostic interviews to elicit diagnostic information [e.g. (8),(9)], there is a convergence of findings across these studies and those that employed chart reviews or less structured diagnostic procedures (e.g. (10),(11)) The diagnostic process can be complicated by difficulties distinguishing between immature responses that are typical in younger children and pathologic symptoms such as thought disorder and delusions (7). Because the speech of young children is frequently less logical and coherent, Caplan and his colleagues (12) have reported that their measure of formal thought disorder is better at discriminating between children with schizophrenia and non-

schizophrenic controls after the age of seven . Although major advances have been made in assessment procedures, the definitional boundaries of schizophrenia require further clarification. This leads to a number of diagnostic dilemmas and ambiguities (7). First, childhood-onset schizophrenia frequently presents with insidious, as opposed to acute, onset. Although some children experience acute onsets of schizophrenia, the majority of children appear to show insidious onset patterns and earlier anomalies prior to the onset of the full schizophrenic syndrome (13), (14). Second, the high rate of comorbid disorders observed in children, particularly those with severe disorders, can also present diagnostic dilemmas. Like children with a variety of disorders, many schizophrenic children meet criteria for additional diagnoses (15). Although it is unclear how the presence of a comorbid condition (codiagnosis) should be viewed in the context of a schizophrenic diagnosis, studies that have employed semi-structured diagnostic interviews have generally reported high rates of codiagnoses among children with schizophrenia. For example, Russell et al. (15) found that 68% of their sample of schizophrenic children met the criteria for another diagnosis, the most common of which were conduct/oppositional disorder (31%) and atypical depression or dysthymic disorder (37%). Given these difficulties and dilemmas in diagnosis process of COS, the studies dealing with etiology and theoretical aspects of schizophrenia can be helpful to develop more accurate diagnostic tools and clearer criteria.

Many pioneer and contemporary scientists, consider schizophrenia as a deficit in ego functions. Eugen Bleuler (16) postulated that the central phenomenon in schizophrenia was a splitting of ego due to a disruption in associative links, which, under normal conditions, would ensure unified functioning of the personality. This splitting of ego thus brings about a breakdown in its unity, together with concurrent attempts to recover the lost cohesion. Such attempts are made manifest through the most directly observable symptoms, namely alterations in the flow of thought, emotional ambivalence, delusions, and hallucinations. These clients tend to dedicate greater interest to their own internal fantasies than to the outside world. The imaginary creations of such individuals totally occupy their interest and, for them, have the status of self-evident reality (17). According to Freud (18), schizophrenia shows a predisposing fixation that occurs during a very early stage in the development of the libido, namely autoerotism. He formulated the hypothesis that there is a narcissistic regression that leads to a total relinquishment of any object-oriented love by seeking exclusively autoerotic satisfaction. Freud indicated that delusions of grandeur are a consequence of the de-investment in the outside world and an expression of the return of the libido to ego, threatened by an intense outflow of energy. Later dynamic psychologists postulated that childhood

schizophrenia is the consequence of defective ego development [e.g. (19)].

Given its importance, ego quickly became a focus in the personality assessment literature. Barron (20) developed a new scale that "…appears to measure the various aspects of effective personal functioning which are usually subsumed under the term 'ego-strength'"(20). The Bell Object Relations Reality Testing Inventory [BORRTI; (21)] is as a self-report measure with 90 true/false items comprising a total of 7 scales assessing two domains of functioning. Four scales specifically target object relations (Alienation, Insecure Attachment, Egocentricity, and Social Incompetence), and three target reality-testing (Reality Distortion, Uncertainty of Perception, and Hallucinations and Delusions; (22). Beres (23) elaborated on Hartmann's conception to describe a cluster of ego functions that overlap, but also perform unique adaptive roles. His model of ego assessment has been inspiring researchers for 50 years. For example, Fenchel and Flapan (24) created a framework for understanding the therapeutic effects of analytic group psychotherapy based on Beres' work; and, Juni and Stack (25) related addiction severity to a Beres-inspired measure of ego functioning. Beres' (23) model of ego assessment identifies 7 ego functions: relation to reality, regulation and control of instinctual drives, object relationships, thought processes, defense functions, autonomous functions, and the synthetic function.

For the purpose of this article, we considered the function of relation to reality or reality-testing. Brenner (26) defined reality testing as "the ability of ego to distinguish between the stimuli or perceptions which arise from the outer world on the one hand, and those which arise from the wishes and the impulses of the id on the other. This function corresponds to the aspect of Freud's conception of ego, which is charged with perceiving reality accurately. Theoretically, it develops gradually as the child becomes more responsible for fulfilling his or her own needs via interactions with the environment. Successful adaptation requires the ability to distinguish between fantasy and reality, and to transcend self-centeredness and an overly concrete notion of the 'objective' world (23). Respectively, neurosis and psychosis involve ignoring and denying reality in order to manage anxiety, with the latter representing a more severe degree of defensive departure that includes delusions and hallucinations (18). Efforts to derive psychometrically sound assessment instruments have been only modestly successful, and in many instances projective measures have proved more useful than self-report tests in this regard (27),(28). For example, Rorschach inkblot method provides reliable indexes of inaccurate or distorted perception of reality (29). The Rorschach test, by the nature of the processes it involves, in likewise a pan-theoretical instrument: a diagnostic test based on perception (30). The 10 inkblots that constitute the test present subjects with a problem-

solving task in that the stimuli are, or might be, something other than what they actually are (i.e. inkblots). The perceptual cognitive processes that subjects invoke in formulating and articulating their responses provide clues to their current and characteristic ways of dealing with life experiences – their psychological state or trait, including how they perceive their environment, how they process information, and how they prefer to cope with problem-solving situations (31).

One of the indices in Rorschach test is to examine reality-testing is Ego Impairment Index (EII). It was developed by Viglione, Perry, and Meyer (32) who summarized the seven functions of ego in Beres' (23) model into five functions and by use of Rorschach variables that independently describe psychological pathologies, began to develop ego impairment index. This scale suggests a single combined score that is extracted from five subcomponents. They suggested if ego function could be precisely assessed, a basis could be offered to predict the clinical status of the patient. Perry and Viglione (33) also offered ego impairment index as a diagnostic tool. Studying each of the subcomponents, bring deeper understanding of the type and characteristics of a deficit. For example, by studying the subcomponent of weighted sum of "Big Six" special scores (WSum6), thinking process can be evaluated in different groups. Scoring above +1.3 in each of the subcomponents of the index, especially in the subcomponent of minus responses, represents a significant distortion (32). Viglione, Perry, and Meyer (32) also suggested that comparing each subcomponents of EII separately, provides a better understanding of the reason of ego distortion in clients. One of the subcomponents of the Rorschach ego impairment index (EII) is reality testing (32).

Reality-testing is calculated by the number of minus responses. Minus responses represent ignoring or distortion of the reality (31). When the frequency of minus responses is considerably high, it represents significant cognitive malfunctioning that can be associated with variety of psychological and neural problems (31). Research findings have documented that subjects who give numerous minus responses are likely to have a schizophrenic disorder and that schizophrenic individuals are likely to give numerous minus responses (30),(31). With respect to the Rorschach, the tendency to give minus form responses can be formulated as representing or driving from inaccurate perception. People with numerous minus responses in their records are distorting reality and not seeing the world the way most people do. With respect to the nature of psychopathology, the primary and readily identifiable characteristics of schizophrenia include a loss of touch with reality; schizophrenic people tend to perceive themselves and their experience inaccurately and to see the world than most people (30).

Mild distortion in reality is reflected by the Distorted Form Quality (FQ-), which represents the properties of uncommon responses that disregard the appropriate use of the blot counters. The object specified are, at best, difficult to see and, in many instances, impossible to find. In fact, they are violations of reality. Studies concerning the FQ- illustrate that the score discriminates between non-clients and more seriously disturbed psychiatric groups (31). It also tends to differentiate schizophrenics from schizotypal and borderline personality disorders (34). Some minus responses probably occur because of meditational negligence (35), but most seen to be products of preoccupations, affective interference, or more diffuse cognitive impairments. For instance Epstein (36) has reported persons with mild or moderate to severe traumatic brain injury have noticeably low FQ+'s and high FQ-'s. Bombel (37) also showed schizophrenic clients have more FQ- responses. Pinto (38) found that the Rorschachs of 50 adolescents with substantial histories of disruptive behavior contained significantly higher frequencies of minus and unusual responses, and Bartell and Solanto (39) have noted higher than expected FQ-'s among children diagnosed with ADHD. However, there is no research examining the frequency of minus responses and reality testing in childhood schizophrenia and this study is the first study that considers this issue.

Materials and Method

The current study design was -comparative. The research population included all the clients hospitalized in Roozbeh hospital in Tehran with the diagnosis of childhood-onset schizophrenia in the and lived in Tehran. Because of the low frequency of COS, convenient sampling was used. After reviewing records of clients admitted at Roozbeh Hospital in Tehran, 11 cases were found with diagnosis of childhood-onset schizophrenia. One of these cases lived in a remote city, so there was no possibility of interviews and tests. None of the remaining 10 participants were hospitalized; but all were outpatients under the care of psychiatrists at Roozbeh Hospital. Using Structured Clinical Interview for DSM-IV -TR, the diagnosis of childhood-onset schizophrenia was confirmed for all of our 10 cases by the child psychiatrist of the project. Rorschach test was administered on them individually. Normal children were sampled too. After full implementation of the Rorschach test, each subject's protocol was coded, and then the scores of the EII for each subject were calculated. The measures of ego impairment were determined according to the scores given to each subject.

Instruments

Ego Impairment Index (EII): This index contains 5 critical Rorschach variables (31) developed by Perry and Viglione (33). Theoretically, EII has been developed on the basis of Beres' (23) model of ego assessment. EII was designed to correspond to four functions: (a) relation to reality; (b) thought processes;

(c) defense functions of ego; and (d) object relationships. Impairment in these ego functions was captured using the following five Rorschach scores (i.e., object relationships and thought processes were each measured using more than one Rorschach score; (32),(33)): (a) Sum FQ- (distorted form quality; measures perceptual inaccuracy or poor reality testing); (b) WSUM6 (weighted sum of six cognitive special scores; measures various types of thought disturbance); (c) Critical (originally termed 'de-repressed') contents (anatomy, blood, explosion, fire, food, sex, X-ray, aggressive movement and morbid content, 1 measures needs/ urges that are typically inhibited or indirectly expressed); (d) M- (distorted human movement responses, measures disturbances in object representations; (32)); and (e) Human Representational Variable or Human Experience Variable in the original EII, measures human perception and representation (40). Extensive factor analyses have revealed both high reliability and validity of the Ego impairment index (31). The interclass correlation coefficients of the EII subcomponents ranged from 0.93 to 0.98 in Perry and Viglion's study. In a study by Perry, McDougall, and Viglione (41), kappas for EII subcomponents ranged from 0.63 to 0.89. Test-retest correlations of the EII were found to be r = 0.78 over a 9-week period (33). To date, no research has been conducted in Iran to examine validity and reliability of EII. However, discriminative validity of EI can be examined in this study. The scores obtained by the ego impairment index are not affected by age, gender, IQ, or medication (42). These features make EII very useful in research.

FQ-: The FQ- is a code assigned when a distorted, arbitrary, and unrealistic form is used to create a response. The answer is imposed on the blot structure with total or near total disregard for the counters of the area used. FQ has reasonably substantial long-term and short-term retest reliability, yielding coefficients ranging from .80 to .90. Minus responses are not uncommon, but usually occur in low frequencies (10).

Results

The mean and standard deviation of the age of schizophrenic children and normal children was 11 (1.15) and 11.3 (0.82) respectively at the time of diagnosis. Schizophrenic children sample included 5 males and 5 females and our normal children sample consisted of 6 males and 4 females.

The average score of minus responses in schizophrenic children is significantly higher than that of normal children and all of normal children except one subject had fewer minus responses compared to schizophrenic children. Although the mean of minus responses in schizophrenic children was lower than the criterion of + 1.3 (9), three of them were having this criterion and as expected, none of the normal children in this sample had a score higher than +1.3.

Normality of distribution checked using Kolmogorov–Smirnov and Shapiro-Wilk tests for the minus scores of the both groups and it revealed that the data of the both groups conform to a normal distribution (p > 0.05). Independent t-test was used to compare the mean scores of negative responses. In addition, due to small sample sizes, Cohen's d and r for effect size were calculated. The result of this comparison is demonstrated in table 1.

The mean difference of normal and schizophrenic children on the minus responses subcomponent - that is related to reality testing – was statistically significant (t (18) = 5.78 P < 0.001). In other words, the hypothesis of this study was confirmed and schizophrenic children in the subcomponent of reality testing on EII had lower scores. Cohen (43) gives the guideline that r> 0.5 for social sciences is large, so the large r for the effect size in this study indicates large effect size of the difference between the two groups. There were significant differences between the two samples in other subcomponents of EII as shown in table 2 .

As seen in table 2, our schizophrenic sample significantly differed from normal children in 3 other subcomponents. First, schizophrenic children provided more special scores, indicative of having more thought disturbance. Second, subjects with COS presented more distorted human movement responses than normal children. Third, they had more poor human representation and fewer good human representations in their protocols.

Table 1: Comparison between negative responses in normal and schizophrenic children

	Normal children (*n* = 10)	Schizophrenic children (*n* = 10)
Mean	0.25	1.17
Standard deviation	0.21	0.45
t- test	5.78**	
Cohen's *d*	-2.62	
Effect size *r*	-0.795	

**p < 0.01

Table 2: Comparing other subcomponents of EII in normal and schizophrenic children

	M (SD)				
	Normal	COS	t	*d*	Effect size r
Weighted Sum of Six cognitive special scores (WSUM6)	0.87 (0.18)	1.39 (0.36)	-4.08**	-1.83	-0.67
Critical Contents (CC)	0.09 (0.07)	0.33 (0.18)	-4.03**	-1.81	-0.67
Distorted Human Movement (M-)	0.28 (0.21)	0.59 (0.44)	-2.06	-0.92	-0.42
Poor Human Response (PHR)	0.20 (0.06)	0.41 (0.15)	-4.19**	-1.86	-0.68
Good Human Response (GHR)	0.22 (0.10)	0.13 (0.07)	2.42*	1.08	0.47
Responses (R)	1.23 (0.19)	1.30 (0.30)	-0.66	-0.28	-0.14

*p < 0.05; **p < 0.01
EII: Ego Impairment Index

Discussion

In this study, the EII was applied to compare normal children and schizophrenic children in term of reality testing. We did not analyze gender differences in FQ-responses due to the small sample size, and it is noteworthy to mention that previous research did not reveal any gender differences in minus responses (44). The mean score of minus responses in normal children was 0.25. This score indicates that normal children do not have any defect in their reality testing. In addition, none of the normal children had a score higher than the criteria of 1.3. In fact, the maximum minus response score for normal children was 0.705 which is in the normal range. On the other hand, the mean score of minus responses in schizophrenic children was 1.17 that is in support of our hypothesis, and was significantly higher than that of normal comparison group (t (18) = 5.78 P < 0.001). In addition, 3 of the schizophrenic children (Clients 2, 5, 9) had the score above the criteria of 1.3. It is considerable that 4 subjects (Clients 4, 6, 7, and 10) in our schizophrenic group had scores below 1 which indicates that although using minus responses is a good research tool for studying any kind of defect in reality testing, it does not have enough accuracy to be used as the only diagnosis tool, because simple sign approaches alone do little to help our understanding of subjects' psychology. However, the results of this study show the efficacy of the ego impairment index as an auxiliary tool for diagnosis of COS in Iran's population. In fact, the consistency of the diagnoses made by project psychiatrist and the data obtained by EII confirms its relative diagnostic and discriminative validity. Therefore, minus responses in the Rorschach test can be used as an indicator of the level of reality testing in the process of diagnosis and assessment of children with schizophrenia .

Previous studies had shown that psychotic clients provide higher minus scores (45),(46), but none of them provide this score in patients with child-onset schizophrenia. Bannatyne, Gacono and Greene (45) found that the Rorschach reality testing index (X- ≥ 0.20) was elevated for the majority of psychotic clients. In addition, Adrian and Kaser-Boyd (47) reported a significant, positive relationship between the EII and Scale 8 (Schizophrenia) with T-scores of the Minnesota Multiphasic Personality Inventory. Another study (48) that compared patients with Schizophrenia spectrum disorders (SPD) and normal controls using EII, found high EII scores, indicative of increased pathology in schizophrenia spectrum groups. In the study, the FQ- score was also higher in SPD groups. Further, a recent study shows impaired reality testing in an animal model of schizophrenia (49). Standard deviation for schizophrenic children was higher than that of normal children. The result repeats previous findings indicating a greater dispersion of the scores among schizophrenic clients (34). Our data suggest that schizophrenic children perceive the outer world in a manner distinct from normal children. Considering that reality testing is an important ego function with a significant impact on children's environment and relationships with their parents (50), we can conclude that normal children have better relationships with their environmental components. In addition, people with cognitive deficits provide more minus responses (36). This study is in parallel with Bombel's (37) study that showed higher thought disorder in schizophrenic clients using EII. Relation to reality (or reality testing) refers to the person's ability to manage the trade-offs between internal needs and environmental demands (42). The deficit in this ability in the schizophrenic children may make them inconsistent and impulsive (31). For example, Pinto (38) reports that adolescents with disruptive behavior show higher minus responses than the comparison group. A related study by Kimhy et al (51) compared visual form perception in individuals at high risk for psychosis, recent onset schizophrenia and chronic schizophrenia. They found lower FQ+ responses and higher FQ- responses in individuals at high risk for psychosis, recent onset schizophrenia and chronic schizophrenia .

Future studies can examine the relation between EII scores and the other variables assumed to be associated with schizophrenia. A Meta-analysis shows that EII scores are significantly related to psychiatric severity (52). In addition, we recommend larger sample sizes to be used in future studies. Studying the relationship between each EII subcomponent with cognitive – behavioral patterns in schizophrenic children will provide a better

understanding of their mental performances. A comparison between EII scores of schizophrenic and autistic children can also evaluate the diagnostic ability of EII.

Limitations

It was impossible to randomly sample schizophrenic children because the disorder is rare. It was impossible to sample normal children randomly too because the population is too large, so both groups are not representative and the findings are not generalizable to the entire population. In addition, the sample group was not large enough to generalize to the populations. Nonetheless, given the heuristic nature of this study, the findings could lead to new hypotheses for future studies.

Conclusion

Minus responses in the Rorschach are directly related to people's impression of external environment. Perry et al. (46) using minus responses subcomponent evaluated reality testing across schizophrenia spectrum. They concluded that it can differentiate between kinds of schizophrenia spectrum. This study tested Perry et al.'s hypothesis on schizophrenic children and found significant results. First, the usefulness of EII in evaluation of reality testing in schizophrenic children was confirmed. Second, in line with other researches, this study revealed that defect in reality testing is one of the prominent characteristics of schizophrenic children.

Acknowledgments

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