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The Current Trends of Neuropsychological Assessment Implementation in Educational Environment

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Abstract

At present, there is high importance to involve Neuropsychological Assessment in the educational environment. The problematic issue reveals the idea of integrating neuropsychology and personality diagnostics procedure of adolescent and young age people. A new approach to the learning ability assessment should essentially be revealed in the understanding of personal neuropsychological status in adolescence and youth. Personality diagnostics in accordance with Neuropsychological Assessment calls for a multidisciplinary approach for destructive risks identifying in a young personality. The theoretical conceptualization of the problem of personality assessment is a systematic synthesis of modern trends of neuropsychology in the Russian scientific tradition and the world practice of neuropsychological diagnostics in adolescence and youth age. This review of relevant studies is focused on behavioral, personality and affective disorders in terms of neuropsychological basis. Results of this study also consider the cognitive and high mental impairments that accompany dysfunction in personality characteristics. There is a high risk of destructiveness developing and risky behavior forming that complicates the formation of emotional-volitional, motivational and personal spheres. The negative effect of condition in cognitive dysfunctions and personal destruction will generate failure in learning and reduced motivation to learn.

Keywords: neuropsychological status, neuropsychological assessment, educational environment, personal disorder, destructive behavior, adolescence, youth age.

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Introduction

The great value and educational meaning of active implementation of neuropsychological diagnostic methods in the educational environment are determined by the development of the idea of differentiated instruction based on the personal characteristics and ability of individuals. The problematic issue reveals the idea of integrating neuropsychology and personality assessment in the lack of knowledge about the relation system between brain functions and the development of personality. It has been determined that neuropsychological diagnostics and diagnostics of personal features in children or adolescent is not carried out systematically (Smith, 2007), that's why we don't get the whole picture of behavior in adolescent. At present, child and adolescent personality assessment should involve a large diversity of diagnostic methods, tools and new applications (Yalof, 2015) within the neuropsychological testing. Such testing assessment includes studies of basal and higher mental functions, sensorimotor functions, executive functions, affective and emotional functions (Sturm, 2007). Personality assessment calls for a multidisciplinary approach since this is a key point to understanding the nature of destructive risks in a young person. Neuropsychological Assessment implementation in an educational environment can also contribute to identifying anxiety, anger, and depressiveness as symptoms of deviant behavior or personal response to psychological discomfort. Through these methods used in education, personality should have the same educational and developmental opportunities.

This fact should probably be the point, that it is the neuropsychological foundations (in many ways) control neural patterns and psychological limitations for abilities or disabilities of a person. Psychology of personality, psychological assessment and support for child and adult in the learning process, one way or another, can be fully understood from a position of diagnostic results of neuropsychological status. Furthermore, it is important that neuropsychological diagnostic assessment and support in learning and training acquire a special relation with the cultural environment in which a child is brought up (Puente & Perez-Garcia, 2000).

The analysis of different studies devoted to the prospects of applying neuropsychological methods in the educational environment indicates that the vast majority of research projects consider neuropsychological methods of diagnosis and adjustment dealing with learning difficulties mainly in preschool and school age (Gulyaeva et al., 2020).

Relations between neuropsychological data and personality development in order to approach the assessment of functions of subcortical and cortical structures in adolescence and youth age have a particular interest.

Cortical and subcortical functions, in any case, lead to the development of cognitive function and social experience. The brain normal functioning has become a foundation of social norms which are introduced throughout childhood into youth. Emotional and behavior control violation due to disorder of the subcortical and cortical abnormalities may indicate probable risks of the impairment in personal traits development. This fact was described and discussed in various studies (Casey et al., 2008; Richter et al., 2014; Wallace et al., 2014).

The neuropsychological approach occupies a special area in understanding the problem of ontogenesis in normal and pathological conditions. Neuropsychological Assessment results at the practical level have overall objectives to identify and treat brain impairments affecting both children and adults (Lezak et al., 2004). However, in the context of the neuropsychological approach, the peculiarities and mental processes development according to personality features in adolescence and youth ages are still an unexplored area.

Purpose and objectives of the study

The study aims to analyze the involvement and implementation of the technologies of neuropsychological diagnostic methods in psychological destructive risks of personality development in adolescence and youth age. Neuropsychological Assessment is more likely to include personality assessment according to the understanding of educational problems, learning and behavioral disabilities in youth (Smith et al., 2010). This study provides an overview of scientific research on the problem concerning the link of personality characteristics in terms of neuropsychological basis.

Methodology

The theoretical analysis of research results on the neuropsychological diagnostic criteria and methods that could be implemented in the educational environment was carried out. The theoretical analysis is based on the current studies of the psychology of personality and clinical psychology, which define the principles and neural patterns for the formation of destructive risks and destructive behavior of personality in adolescence and youth development. The analysis of current trends was carried out drawing on the principles of neuropsychology in Russian scientific tradition, conceptualized by Vygotsky and Luria (Akhutina, 2003), Chomskaya (2005), Akhutina (2003), Glozman (2007). The discussion is also based on available data with generally accepted principles in world research practice of Neuropsychological Assessment of personality in adolescence and youth age. The main principle disclosed in this article is based on the idea of a causal relationship between the dysfunction of personal development and cognitive processes in brain functioning. This principle, according to the neuropsychological approach of Luria and Vygotsky, indicates that violations in behavior and personal development dysfunction are compensating mechanisms of cognitive problems.

The fundamental parameters of brain functioning such as mental functions (gnosis, praxis, speech, and thinking) are presented in relation to personality development dysfunction. The paper considers the criteria for negative personal development included negative affectivity, aggressiveness, behavioral disinhibition, violation of behavior and emotional control. Personal diagnostics using neuropsychological tools is required to solve problems in teaching and learning according to neuropsychological status in adolescents and youth.

Literature review

In a broad sense, Neuropsychological Assessment is the diagnostic application of identification of various cognitive skills and abilities, and cognitive functioning problems (Harvey, 2012). Vygotsky and Luria made a major significant contribution to the foundation of Neuropsychological Assessment. According to Akhutina (2003), Vygotsky first started developing the neuropsychological methodology in children's diagnostics, which is more difficult than adults testing. Luria, in turn, was a researcher-creator of neuropsychology as a new area of assessment of brain organization of the mental functions. The author described "the role of speech in the formation of voluntary actions" (Akhutina, 2003). It is fundamentally important to study a person as an individual within the framework of the human psyche and its elements as a system. This also means studying a specific personality in the aspect of all the social conditions of psyche functioning (Glozman, 2007). Higher mental functions are functional systems of social origin, not appeared in a ready-made form at birth. Higher mental functions are always formed and developed in the process of communication and activity of a child (Luria, 1973). In our view, these ideas for the current period are particularly important in the field of investigations relating to the educational environment. Neuropsychological Assessment of cognitive abilities and personality traits cannot be considered outside of the context of learning and education.

The current understanding of Neuropsychological Assessment can be analyzed in two lines:

1. Neuropsychological Assessment is a procedure or testing method applied to evaluate and recognize the behavioral and functional activity in the brain. The testing procedure identifies "cognitive, sensorimotor, emotional, and universal adaptive capacities of an individual" (Chang & Davis, 2011). This assessment line aimed at performing the following specified skills such as memory, attention, processing speed, reasoning, and problem-solving, spatial and language functions (Harvey, 2012).
2. Neuropsychological Assessment is a sustainable and holistic approach to understanding the relation of the brain to various dysfunctions in behavior and how mental health and mental activity are determined by brain localizations. This study line also involves factors of personal development and social environment in integration with neuropsychological capacities (Glozman, 2000, Glozman et al., 2004).

The neuropsychological approach to the assessment of personality implies qualitative and quantitative analyses, and the implementation of research results into practice (Glozman, 2007).

Both lines in the Neuropsychological Assessment allow us to establish causality and forecasts in neurobehavioral dysfunctions and personality disorders. Neuropsychological Assessment including diagnostic tools has to be optimized, especially in a view of the teaching and learning process, which should combine the basis of the obtained results with educational technologies. There are increasing requirements for neuropsychology and personal assessment. We should take on results of comparative studies and comparisons with the results of similar researches in the context of professional cooperation, especially in the field of neurorehabilitation and psychological support (Vasserman et al., 2017). Furthermore, an individual's awareness of developing or existing disorder in recognition, speech, and motor activity can lead to such personal changes as a heightened level of anxiety, frustration in situations of personal limited adaptation. The holistic neuropsychological approach will produce new relevance to the situation of mismatch between educational requirements and specificity of personal neuropsychological status in adolescent and youth development. According to Semrud-Clikeman and Teeter (1995), the integrated understanding and analysis of behavior, personality style, and neuropsychological deficits will provide a more inclusive, practical and valuable picture defining not only childhood but adult disorders. The complexity of integrated assessment is determined by the need to appeal wide knowledge from other areas of psychology. In addition, the evaluation procedure must be conducted on an individual basis and taking a lot of time. Neuropsychological Assessment is usually broader in scope than psychological or educational diagnostic evaluations.

Unfortunately, tutors, teachers and educators have insufficient knowledge about the specificity of the neuropsychological status of their students. So educators need support if they are to be effective in teaching and communication. Neuropsychologists assessment should be a part of children and adolescent educational process to provide the support that student needs (Ashton, 2015). The evaluation procedure includes finding out the symptoms of dysfunction, qualifying the structure of dysfunction and neuropsychological factor associating the symptoms of dysfunction, identifying the localization of the brain damage according to the assumed factor (Mikadze, Ardila & Akhutina, 2019). Moreover, neuropsychologists using information and knowledge about details of child learning difficulties and personality characteristics from a tutor, teacher or educator more accurately describe cognitive conditions or dysfunction and anticipate the plan of treatment difficulties and establish changes in educational programs. Each Neuropsychological Assessment procedure should give the related and standardized tests and rating scales within the interpretation of personality portrait.

Thus, Neuropsychological Assessment should involve observations of behavior in children, adolescents and interviews with parents and teachers. Neuropsychologists and educators, working together will provide an opportunity to show students difficulties, learning strengths and weaknesses, how to successfully overcome their barriers both in and outside of education.

Results

Vasileva and Petkov (2016) highlighted that the brain structures transform and adapt to the formation of psychic functions. The authors describe the relation “brain-psyche” and “synchronized interaction between the morphologic maturity of the brain structures and the developmental social conditions” (Vasileva & Petkov, 2016). In our view, this relation involves the third element – personality with social and individual experience. The Neuropsychological Assessment will consist of testing battery and tools on three components “brain-psyche-personality”. We assume that higher mental functions, which play a crucial role in coordinating, regulating, executive, communicative processes of mentality, determines the developmental path of personal traits and features. Behavioral habits and personal traits begin their formation based on the brain parts changing and the maturation of higher mental function.

The structure of Higher Mental Functions has three main functions relating to psyche development: gnosis, praxis and speech (language). The procedure of Neuropsychological Assessment of emotional and personal spheres according to Luria's and Chomskaya's approach should be conducted using evaluation methods of speech and praxis reactions. The abnormality in emotional and personality components is a consequence of the underdevelopment or injury in the brain structural component of mental activity (Chomskaya, 2005). The most meaningful and informative knowledge is the consideration of the cortical parts of the cerebral hemispheres in the frame of study of relations between neuropsychological features of formatting and functioning of brain structures and development of the emotional and personal spheres. This indicates that cortical parts predominantly carry out the functioning and integrative process of such higher mental functions as gnosis, praxis and speech.

We have made an attempt to systematize violations of higher mental functions (gnosis, praxis, and speech) and outline those functional areas of the brain that directly implement these functions. Gnostic functions are provided by the parietal-temporal-occipital region (TPO zone) of the brain. The morphophysiological basis of praxis is complex hierarchically organized functional systems including many levels and sublevels, which are characterized by a complex and multi-link afferent and efferent composition. Gnosis or gnostic function as general cognition and recognition ability is the source of building identity and social intelligence in person.

Normal gnosis functioning, as a neurocognitive part of mental activity, provides the knowing oneself and knowing others.

The most informative for Neuropsychology Assessment is the study of the cortical structures that provide the function of praxis. Praxis or motor regulation, as a neuroregulative part of sustained voluntary regulation in behavioral activity, allows motivation development in person; being a strong-willed and strong-headed person is based on normal praxis functioning through the interaction of training and education.

There is no limited localization for speech function, along with other higher mental functions. All sensory systems participate in the implementation of the speech function: auditory, visual, kinesthetic, motor, etc.; each of them contributes to the afferent and efferent bases of speech, and therefore the brain organization of speech and language is very complex. The left brain hemisphere (“dominant hemisphere”) is responsible for overall speech (language) function. The frontal and temporal cortexes of the cerebral hemispheres are responsible for the speaking function, understanding of reversed speech and synthesis of speech information. Speech (language) is the most complicated mechanism of thinking and conscious mental activity. Speech not only is the highest mental function in itself but also speech contributes to the transformation and development of other mental functions. Speech controls changes and complexities personality formation, the level of adaptation and socialization determined by this mental function.

Table 1 presents the specificity in dysfunction of gnosis, praxis and speech and consequences on personality sphere dysfunction. However, there are a number of premorbid factors, such as the initial emotional and personal characteristics, age, gender of the patient, the nature of the pathological process, that affect the personality disorder.

Table 1. Personality sphere dysfunction in accordance with mental functions impairments

Mental Function	Impairment	Personality Sphere Dysfunction
Gnosis	Agnosia	<ul style="list-style-type: none"> • paroxysmal negative affectivity • aggressiveness • negativism

Praxis	Apraxia	<ul style="list-style-type: none"> • emotional instability, changeable mood • excitability and anxiety predominance • impulsivity
Speech	Sensory/Motor Aphasia	<ul style="list-style-type: none"> • acting without thinking • behavioral disinhibition • affective nature of thinking • violation of self-perception and self-esteem

Again we appeal to the studies on destructive risks in personality concerning the topic of neuropsychological status taking into account the assessment criteria.

Adolescence and youth age are associated with the process of integrating the cognitive and emotional spheres from the neuropsychological point of view. Some adolescents with behavior problems have cognitive and learning disabilities. Transforming the personality of adolescents in the association with learning and cognitive disabilities increases the risk of disruptive and risky behavior (American Psychological Association, 2002). Thus, to the end of adolescence, there is a crystallization of voluntary behavior, critical thinking and emotional maturity.

The varying levels of difficulties of neuropsychological executive functioning, memory and processing speed were associated in youth with an obsessive compulsive disorder. Also it was found that neuropsychological cognitive dysfunction was not associated with OCD severity, although OCD in youth exists alongside cognitive impairment (Lewin et al., 2014). Another study similarly emphasizes that deficits of regulation and learning are shown by the weakness of emotion recognition, emotion learning, and emotion regulation in youth with Conduct Disorder (Kohls et al., 2020). Most neuropsychological dysfunctions tend to involve misunderstanding emotions, difficulty in experiencing empathy and guilt.

The neuropsychological difficulties in emotional and behavioral regulation determine the problems of decision-making process (Cauich & Aguilar, 2015). In concrete terms, this means that limited cognitive, emotional and regulative resources gap will not allow developing the highest individual features including morality, empathy, managing and controlling oneself activity. The results demonstrate the persistent limitation for learning and assimilation of cultural and social experience in adolescents and young people with behavioral problems.

Chomskaya, referring to Vygotsky's theory and Luria's ideas, pointed out the link between affection (emotional regulation) and cognitive functions. It was particularly important for neuropsychological assessment. Emotions act as motivating and triggering components of cognitive (mental, gnostic, mnestic, intellectual) activity on the one side, and controlling, regulating and assessing components of this activity in response to the need on the other (Chomskaya, 2005). Thus, some researchers pay special attention to the study of the emotional component in the mental activity of adolescents, in particular, we can find out manifestations of depressiveness in young persons (Oleychik, 2011). Affective difficulties and disorders are presently widespread in adolescence (Kopeyko & Oleychik, 2007). It was noted that depressions occurred in adolescence, considering neuropsychological status, have more negative social consequences for the young people, and moreover, depressiveness doubles the risk of developing deviant behavior and harmful habits in their future (Christie et al., 1988). Cognitive impairment largely determines the clinical picture of affective disorders (Doyle et al., 2005, Pluzhnikov et al., 2013). Specific cognitive disorders and dysfunctions have an association with the characteristics of schizoid personality disorder patients and schizotypal personality disorder patients (Pluzhnikov & Kaleda, 2015); neurocognitive deficit was found in patients with schizotypal personality disorder and patients with personality disorder (Pluzhnikov et al., 2013). Neurocognitive and emotion processing dysfunctions and abnormalities related to bipolar disorder have substantial implications for adolescent and young persons. Young people with BD exhibited the involvement of a broad range of cognitive impairments, including "sustained attention, verbal memory, learning and planning, and visuospatial skills" (Cahill et al., 2009). In addition to the discussed results, personal and affective disorders can trigger or aggravate the negative condition of mental functioning: cognitive, emotional and behavior regulation in adolescents and young people. Thus, we see a tendency to study neuropsychological status and personality disorders holistically; this understanding gives the reason to create a fundamentally new assessment approach of socialization features of adolescent and young personality in the educational environment.

Discussion and Conclusion

The results of various studies generally indicate the relations between the neuropsychological basis of mental functions/dysfunctions and personality traits. However, the review of theories and studies suggest that there is still a requirement to design a holistic Neuropsychological Assessment procedure. Complex Neuropsychological Assessment of cognitive, emotional abilities and personality traits would improve understanding, analyzing the intrinsic nature and quality of mental dysfunctions and supporting adolescent and young people.

Theoretical analysis of the current trends of Neuropsychological Assessment allows us to assert that the neuropsychological status should be carried out in the aspect of identifying personal characteristics and psychological difficulties from childhood to adolescence and youth. The negative effect of personal destruction will generate failure in learning and reduced motivation to learn. Recent studies indicate that the neuropsychological component of cognitive changes in behavioral, affective and personal disorders can determine the degree of socialization and adaptation to the educational environment in youth and adolescence. Based on the current results, the prospect of the Neuropsychological Assessment procedure in the educational environment of school and university becomes particularly important.

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