

A COMPARATIVE STUDY BETWEEN COGNITIVE IMPAIRMENTS OF ADULTS WITH SCHIZOPHRENIA AND CHILDREN WITH PSYCHOTIC SPECTRUM DISORDERS: A LITERATURE REVIEW

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SUMMARY

Background: Cognitive impairments have been extensively reported for patients suffering from schizophrenia but a lot of questions persist about these troubles. Several domains of cognitive functions are impaired which result in daily life difficulties. Many arguments tend to show that children suffering from psychotic spectrum disorders present cognitive impairments also but things are not clearly defined. The aim of this review is to compare the cognitive impairments of children suffering from psychotic symptoms and adults suffering from schizophrenia in order to improve the understanding of the two clinical affections. A better understanding of the disease is necessary to improve the health care which currently give poor results.

Subjects and methods: Besides the Diagnostic and Statistical Manual (DSM-5) and the French reference books, the present research has been conducted using PubMed, Medline, PsycINFO, PsycARTICLES and ScienceDirect. Literature about cognitive impairments of adults with schizophrenia and children with psychotic spectrum disorders is assessed and results are compared.

Results: Both children and adults suffer from cognitive impairments: language, memories, executive and motor functions and IQ are impaired. An important heterogeneity in the troubles has been observed and a poor knowledge in terms of onset time, evolution, intensity, impact on everyday life and therapeutic interest has been reported.

Conclusion: Adults with schizophrenia and children suffering from psychotic spectrum disorders have similar cognitive impairments in many domains of cognition. The similarities in term of cognitive impairments highlighted in the present work should support new studies in order to adapt to children the current cognitive therapies which are mostly provided to adults. As the cognitive impairments are heterogeneous, each patient should receive a tailored neurocognitive exam which takes into account its abilities and weaknesses.

Key words: psychotic spectrum disorders – schizophrenia – cognitive impairment – cognitive therapy

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INTRODUCTION

The term "schizophrenia", created by Bleuler, is used since he described the disease as a "splitting mind". The definition of childhood onset psychotic spectrum disorders is much less established. Many authors tried to define this affection using several terms like "pervasive developmental disorder", "evolutive disharmony", "psychotic disharmony", "complex personality disorder", "multiple complex developmental disorder",... which make the discussions confused. The diagnosis is difficult to perform as children do not have logical thinking and the capacity to express themselves like adults do (Speranza 2006). Moreover, the limit between a tremendous imagination and a delusion or a hallucination is sometimes unclear (Courvoisier 2001). The aim of this comparing work between adults with schizophrenia and children with psychotic spectrum disorders is to better understand the relationship that could link these two clinical affections. It is not already defined whether they are connected in the lifetime: childhood onset psychotic spectrum disorders can progress to adult schizophrenia (but sometimes psychotic symptoms decrease) or can be precursor of other psychiatric or organic diseases (Courvoisier 2001). However, having psychotic spectrum disorders in

childhood presents a high risk of developing schizophrenia in adulthood (Sprong 2008). The study of similarities and differences between these two clinical situations could help to better understand the disease(s) onset and its evolution. Different hypotheses have been made to explain the emergence of psychotic disorders. The major hypotheses, neurodegenerative and neurodevelopmental, will be discussed below regarding the cognitive results of this study. Cognitive impairments have been consistently reported in schizophrenia and are a core feature of the disease as they do not seem to be influenced by other symptoms, medication, lifetime evolution and affect men and women equally (Aleman 1999). Despite numerous studies, there are still many questions about their time of onset, evolution, severity, real impact on the quality of life and their therapeutic interest. The prevalence of these deficits affecting adults is considered to be between 61 and 78% (Heinrich 1998). Cognitive impairments in children with psychotic spectrum disorders are less known and their prevalence is not fully defined. Nevertheless, it has been shown that 10-20% of children and adolescents suffering from psychotic symptoms have a mental retardation or a low IQ (Dumas 1999). However, a not negligible part of psychotic patients do not suffer from cognitive impairments (e.g. Heinrich 1998) or suffer from cognitive

impairments with lifetime variability (Dumas 1999). Some authors explain the apparently normal cognition as a result of a low deterioration of a high premorbid IQ due to the disease onset (MacCabe 2012). Furthermore, it has been established that poor cognitive functioning predisposes to the emergence of the disease and inversely, high cognitive functioning protects from the disease onset and makes its prognosis better (Zammit 2004). Cognitive impairments impact the global quality of life (Thornicroft 2004), make the thoughts and the delusions less elaborate (Botbol 2005) and the theme of hallucinations simple and more repetitive (Dumas 1999). Some authors suggest that the deficits could be present before the onset of the disease (Üçök 2013) and could be used as a diagnostic predictor of the disease. Several therapies of cognitive remediation exist for adults: Integrated Psychological Treatment (IPT), Cognitive Remediation Therapy (CRT), Cognitive Remediation for Schizophrenia (RECOS) and Cognitive Rehabilitation with Computer (REHACOM)... Such methods are not yet adapted to children. Therefore, comparing children and adults could certainly lead to improve the earlier detection and management of these deficits.

SUBJECTS AND METHODS

Besides the Diagnostic and Statistical Manual (DSM-5) and the French reference books, the present research has been conducted on PubMed, Medline, PsycINFO, PsycARTICLES and ScienceDirect with a focus on studies covering cognitive performances of adults suffering from schizophrenia and children suffering from psychotic spectrum disorders. The first step was to collect information about the cognition, the nature of the impairments, their epidemiology, their nosology and their treatment. The keywords used were essentially: schizophrenia, psychotic spectrum disorders, cognitive impairments and cognitive remediation therapy. The second step was to compare the results collected for the two generations. No studies comparing cognitive impairments of adults with schizophrenia and children with psychotic spectrum disorders have been found.

RESULTS

A first finding is the variability of cognitive impairments in terms of onset and intensity. It seems that selective cognitive deficits occur against a background of very general impairments (Heinrichs 1998). In the next subsections, different cognitive categories are reviewed.

Language

Children with psychotic spectrum disorders present a delay in language acquisition (Asarnow 1995). These impaired communicative competencies can interfere with internal language and bring difficulties to organise

thoughts and interact with other people (Speranza 2006). Moreover, the speech is often disorganised by frequent derailment and incoherence both in adults and children (e.g. DSM-5 2013). They use atypical words, neologisms, loosening of associations and perseverations (de Perrot 2004). Quantitative abnormalities are also observed through poverty in the speech (van Beilen 2004).

Memories

Psychotic disorders alter episodic, semantic and working memories while procedural and implicit memories perform normally. Different hypothesis try to explain the origin of these troubles: a progressive degradation of the initial knowledge (Laws 2000), an alteration of the storage of the information itself (Rossell 2006) or troubles in information encoding and remembering (Mayer 2012). As a consequence, remembering the information is ineffective, which could explain the associative intrusions often seen in psychotic discourses (Nestor 1998).

Episodic Memory

Verbal and visual episodic memories are impaired: remembering events and their circumstances of emergence is altered (Fioravanti 2012). These troubles seem to be present before the clinical onset of psychotic symptoms (Brewer 2006) or at least at the beginning of the disease (Bilder 2000). These symptoms can be extremely invalidating as episodic memory impairments create biographic troubles and identity disorders (Peretti 2004).

Semantic Memory

Semantic memory impairments are directly linked to thought problems and delusions. It is showed that patients suffering from schizophrenia fail to name items based on their oral description, which could be a precocious sign of semantic memory impairments (Al-Uzri 2004). They also fail to spontaneously give words with the same semantic origin, demonstrating an outward shift of semantic memory limits (Chen 1993).

Working Memory

Verbal and visuospatial working memories are altered in schizophrenia, especially when the quantity of information to process is important (Rhinewine 2005). The difficulties seem to be stable over time and not influenced by the clinical evolution of the disease (Glahn 2003). These troubles have an important impact on psychotic symptoms as the behaviour is considerably disorganized: the purpose of an ongoing action can be forgotten (Peretti 2004).

Attention

Attention deficits are fundamental cognitive deficits in adults with schizophrenia (Fioravanti 2005) and in childhood with psychotic spectrum disorders (Frangou 2010). Patients with psychotic symptoms present deficits

in selective attention with many interference phenomena and deficits in mental inhibition (Peretti 2004). Sustained attention is also altered both in adults (Peretti 2004) and children (Rhinewine 2005).

Executive functions

Adults with schizophrenia and children with psychotic spectrum disorders suffer from general executive deficits (Frangou 2010). They both have difficulties in acquiring new abilities and show delays in the automation of new learning skills (Asarnow 1995). They suffer from poor mental flexibility, difficulties in inhibiting an acquired behavioural response and in targeting a pertinent stimulus (Orellana 2013). As a consequence, they persevere in their mistakes (Pantelis 2002) and their response to a stimulus is slower than the subjects of a control group (Fioravanti 2012). Furthermore, adults and children have difficulties in planning actions (Pantelis 2002), especially when they have to realise several actions in a limited time (Orellana 2007). Recently, it has been shown that the processing speed is the most severely impaired function (Dickinson 2007) and all these deficits could be explained by limitations in processing resource (Asarnow 1995).

Motor function

Adults with schizophrenia and children with psychotic spectrum disorders suffer from global and fine motor skill disabilities associated with abnormal movements like stereotypies and repetitive movements (Courvoisier 2001). These deficits begin in childhood with a delay in motor acquisition (Speranza 2006) and persist into adulthood with difficulties in learning new motor skills (Schwartz 1996). Simple and sequenced motor tasks are impaired by an increased time-latency before the motor response (Sullivan 2001) and bad synchronisation and coordination of the movements (Schwartz 1996). These problems could be explained by a slowing down in the response to a stimulus, especially when the sequence stimulus-response is complex (Wykes 1992).

Intellectual Quotient (IQ)

The IQ of adults and children seems to be similarly altered. Adults with schizophrenia present a mean IQ estimated between 84 and 107 (Fioravanti 2012) while children with psychotic spectrum disorders have a mean IQ estimated at 86.2 ± 15.9 (Green 1992). No relation has been found between the IQ level and the disease evolution or severity (Zammit 2004). The evolution of the IQ level is also not well established in the literature: some studies show that the IQ level remains stable over the time (Fioravanti 2012) while others show a decrease during the premorbid period (Khandaker 2011) or at the same time that the disease emerge (Meier 2014). After the disease onset, it has been observed that the IQ remains stable (Gochman 2005) or decrease (Hedman 2013).

DISCUSSION

Cognitive function has been extensively studied in adults suffering from schizophrenia while literature on childhood with psychotic spectrum disorders is quite poor. The difficulties come from the lack of a clear definition of childhood psychotic disorders and the multiple criteria of clinical diagnosis. Children with childhood onset schizophrenia and children with psychotic disorders not otherwise specified suffer from a similar pattern of generalized cognitive deficits (Kumra 2000). Accordingly with this observation, these two affections are indifferently processing in this review. That is the main weakness of this work which shows that more investigations on the classification of these psychotic disorders are necessary. A lot of similarities between children and adults have been shown. The similarities observed in these two clinical situations let us ask the origin of these troubles. The first hypothesis considers the cognitive impairments at the origin of the psychotic symptoms: a great pre-morbid cognitive deterioration would progressively lead to the emergence of psychotic symptoms. However, the observation that psychotic symptoms can be stable or increase despite a cognitive stability (Brewer 2006) would mean that cognitive impairments cannot explain on their own the development of psychotic symptoms. The second hypothesis is that patients suffering from psychotic symptoms have cognitive deficits since the pre-morbid period that increase with the disease onset. This hypothesis is supported by the observation that cognitive functions improve at the same time the psychotic symptoms decrease (Black 2011). The neurodegenerative and the neurodevelopmental hypotheses have been extensively studied for a while. The comparison between cognitive impairments of children and adults provides many arguments for the neurodevelopmental hypothesis. First of all, the relatives of patients with psychotic disorder exhibit minor cognitive impairments which could suggest a hereditary weakness (Snitz 2006). This can be expressed depending on different events of life rather than by a degenerative process (Snitz 2006). Secondly, cognitive functions can develop in the pre-morbid period, which is incompatible with a neurodegenerative process (Reichenberg 2010). Thirdly, the stability of the cognitive impairments despite the disease evolution (Brewer 2006) argues also against a neurodegenerative hypothesis. Finally, the observation of patients with psychotic disorder and an a priori normal cognitive status support the neurodevelopmental hypothesis too: these patients suffer from minor difficulties revealing a cognitive weakness not already expressed as a consequence of special events of life (MacCabe 2012). Despite these arguments, the developmental model is not sufficient to describe the entire course of cognitive impairments in psychosis. For example, recent studies suggest that children who will later develop schizophrenia suffer from early static deficits (in verbal

reasoning) and develop supplementary lags (in attention and working memory) as they become older (Reichenberg 2010). Comparing cognitive impairments in adults with schizophrenia and children with psychotic spectrum disorders provides elements to understand the functioning of the disease(s) which is a first step toward new perspectives of health care. It appears that classical care gives poor results in the improvement of cognitive impairments and new therapeutic tools are needed in order to improve the quality of life and the global functioning of patients. Cognitive remediation therapies are currently used to help the patients to fix their attention, to improve memory, motor coordination and mental flexibility as well as to solve problems (Black 2011). These therapies are mostly used for adults and give better results than pharmacological treatments. The results presented above have shown similar cognitive impairments in adults and children which should stimulate new studies to adapt these therapies to children.

CONCLUSION

The interest of this review is to compare cognitive impairments in children suffering from psychotic spectrum disorders and adults suffering from schizophrenia in order to improve the understanding of the two clinical affections. All the studies reviewed in the present work report similar cognitive impairments to both adults and children. However, a variability of cognitive impairments in terms of onset and intensity has been observed. Several hypotheses concerning the origin of the psychotic disorder are put forth. The neurodevelopmental hypothesis is discussed in light of cognition in this review. Different arguments are investigated but it seems that the developmental model cannot fully explain the disease onset. Understanding the origin of psychosis through a comparison between adults and children is a key point in order to improve health care. As the cognitive impairments are heterogeneous, each patient should receive a tailored neuro-cognitive exam which takes into account its abilities and weaknesses. Cognitive therapies give better results compared to classical and pharmacological treatments. However, these therapies are mostly suited to adults. The similarities in term of cognitive impairments highlighted in the present work should support new studies in order to adapt the current cognitive therapies to children.

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