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Research paper

Neurocognitive clusters: A pilot study of young people with affective disorders in an inpatient facility

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ABSTRACT

Background: There is growing evidence to support the need for personalised intervention in the early stages of a major psychiatric illness, as well as the clear delineation of subgroups in psychiatric disorders based on cognitive impairment. Affective disorders are often accompanied by neurocognitive deficits; however a lack of research among young adult inpatients highlights the need to assess the utility of cognitive testing in this population.
Methods: A computerised cognitive battery was administered to 50 current inpatient young adults (16–30 years; 75% female) with an affective disorder. Patients also completed a computerised self-report questionnaire (to measure demographics and clinical features) that included items evaluating subjective impressions of their cognition.
Results: Hierarchical cluster analysis determined two neurocognitive subgroups: cluster 1 (n = 16) showed more severe impairments in sustained attention and memory as well as higher anxiety levels, compared to their peers in cluster 2 (n = 30) who showed the most impaired attentional switching. Across the sample, poor sustained attention was significantly correlated with higher levels of current anxiety and depressive symptoms, whereas poor verbal memory was significantly associated with increased psychological distress.
Limitations: This study has a relatively small sample size (due to it being a pilot/feasibility study). Furthermore, future studies should aim to assess inpatient samples compared to community care samples, as well as healthy controls, on a larger scale.
Conclusions: The findings suggest neurocognitive profiles are important in understanding phenotypes within young people with severe affective disorders. With clear subgroups based on cognitive impairment being demonstrated, the clinical utility and use of new and emerging technologies is warranted in such inpatients facilities. This pilot/feasibility study has strengthened the utility of cognitive screening as standard clinical care in an inpatient unit.

1. Introduction

Affective disorders are characterised by disturbances in mood and emotional state (i.e. episodes of depression, mania and/or anxiety). Early stages of affective disorders may also be accompanied by functional impairment and neuropsychological changes such as difficulties in mental flexibility (Hermens et al., 2011), attention (Thompson et al., 2005), memory (Thompson et al., 2005) and executive function (Sweeney et al., 2000). Furthermore, studies have shown that patients' neuropsychological (or 'neurocognitive') course is one of the best predictors of long-term function, over and above current affective symptoms (Lee et al., 2015).

To our knowledge there are very few studies that have specifically examined neurocognition in inpatients with affective disorders. Sweeney et al., (2000) utilised a computerised cognitive battery assessing working memory, set-shifting, visual learning and short term memory. A total of 93 inpatients (58 non-bipolar major depression (M = 32 years of age) and 35 bipolar (M = 31 years of age)) were compared to 51 healthy controls (M = 36 years of age) (Sweeney et al., 2000). This study found more severe deficits in neuropsychological profiles of patients experiencing a manic/mixed illness phase (including deficits in executive function, episodic and working memory),

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compared to patients during a more depressive illness phase (less severe deficits in episodic memory only) (Sweeney et al., 2000). Another study by Levy and Weiss (2010) examining inpatients with bipolar disorder ($n = 59$, $M = 37$ years of age) used a computerised cognitive battery assessing attention and working memory, visual and verbal memory, and executive function. This study found more severe neurocognitive deficits in verbal memory and executive function in inpatients with psychotic symptoms, compared to those without psychotic symptoms (Levy and Weiss, 2010). The results of both of these studies (Levy and Weiss, 2010; Sweeney et al., 2000) suggest potential markers for neurocognitive impairment based on the presence or absence of certain symptoms and/or severity of illness. However, given the age of the patients in these studies these findings may also be due to differences in illness chronicity.

Whilst various literature shows the associations between neurocognitive performance and longitudinal outcomes (Lee et al., 2015, 2013), the strength of neurocognitive performance beyond diagnostic course (Lee et al., 2015), and the clear delineation of cluster phenotypes based on neurocognitive measures including sustained attention and verbal learning (Lee et al., 2015); there is a paucity of research and general lack of information in regards to young adult inpatients with affective disorders, and more specifically in relation to their neurocognitive profiles and associated symptom management. Historically, neurocognitive performance (or deficits for instance) has been able to explain variations in functional abilities in psychiatric disorders (Alden et al., 2015), furthermore cognitive subgroups have been found in patients with bipolar disorder suggesting phenotypes that allow for more targeted and personalised assessment (Burdick et al., 2014). Research shows that acute psychiatric symptoms can affect cognitive performance (David et al., 2008) (which would be expected to be especially evident in an inpatient sample), therefore the association between acute symptoms and cognitive performance is another key factor to explore. Burdick et al., (2014) examined the utility of a cognitive battery in 136 outpatients with bipolar disorder ($M = 40$ years of age) using a hierarchical cluster analysis. Three distinct subgroups were found, including; (i) a cluster with intact cognitive performance comparable to healthy controls; (ii) a cluster with moderate impairments in four of the seven cognitive domains (selective impairment); and (iii) a cluster with global impairment across all cognitive domains (Burdick et al., 2014). The presence of cognitive subgroups has also been demonstrated in early stages of affective disorders specifically. Our group previously examined the neuropsychological profiles of 109 help-seeking young adult outpatients ($M = 20$ years of age) by also using a hierarchical cluster analysis (Hermens et al., 2011). In this study of outpatients we also found three distinct cluster profiles characterised by (i) poor memory; (ii) poor mental flexibility; or (iii) more global impairments (Hermens et al., 2011). Such literature therefore suggests that young adults with acute affective disorders are differentiated by patterns of neurocognitive impairment, and more importantly there appears to be a tendency to form distinct neurocognitive subgroups, despite diagnostic or symptomatic similarities. The clinical importance of these neurocognitive subgroups may lie in their ability to allow for more targeted assessment (Burdick et al., 2014), likewise there may be an indication of early affective disorders being characterised by different cognitive profiles and severity of illness (Hermens et al., 2011). In particular, these two studies (Burdick et al., 2014; Hermens et al., 2011) support the notion of further research into the neurocognitive profiles of more severe cohorts such as inpatient young adults with affective disorders (Burdick et al., 2014). Whilst a lot of research into cognitive clustering has been undertaken in community and outpatient samples, there is also, as noted above, examples of inpatient samples. There is an argument that acute psychopathology in community samples of people with mental illness, is less likely to impact neurocognitive test performance compared to a more severe inpatient sample, thus suggesting the potential impact of illness severity on the accuracy of assessment and current neurocognitive ability. However, it is important to assess neurocognitive ability, and the extent of impairments and deficits (e.g. reduced attention and concentration, and the impact of encoding and consolidation of memory) in more severe cohorts to facilitate a more personalised approach to mental health care. Furthermore, neurocognitive testing has the potential to be impacted by various factors including sleep, mood, or the time said testing was completed (i.e. morning or afternoon), however these are factors that need to be taken in consideration based on each individual case. In addition to this, the previous studies above have shown the clear delineation of neurocognitive clusters in regards to illness severity and differences in symptoms (Hermens et al., 2011; Levy and Weiss, 2010; Sweeney et al., 2000), which suggests research into cognitive clusters is of clinical importance.

The current aim of this study therefore was to determine whether there are neurocognitive cluster profiles within such patients. We hypothesised that inpatients would show impaired neuropsychological profiles, and that one cluster would be distinguished by global impairment.

2. Methods

2.1. Patients and design

To examine whether neurocognitive profiles of admitted young adults with acute affective disorders differ, this paper reports on a cross-sectional analysis of neurocognitive and clinical data collected as part of a pilot study examining the feasibility of using computer-assisted neurocognitive assessment. The inclusion criteria are comprised of: (i) patients currently admitted to the Young Adult Mental Health Unit (Uspace); and (ii) current presentation of a severe affective episode (i.e. depressive, manic, anxiety; including those with psychotic features). Exclusion criteria for this study were: (i) insufficient fluency in the English language to participate in the cognitive testing; (ii) unable to consent due to intellectual impairment (for example, IQ < 70) or severity of mental illness (as determined by the treating psychiatrist/psychologist); and (iii) refusal to provide informed consent. Comorbid or pre-existing childhood-onset conditions (e.g., Attention Deficit Hyperactivity Disorder (ADHD) and conduct disorder), as well as alcohol or other substance misuse or autistic spectrum disorders were not exclusion criteria. We conducted a pilot study of 50 young people, aged 16–30 years, who were current inpatients at the Young Adult Mental Health Unit ('Uspace'), St Vincent's Private Hospital Sydney, Australia for the assessment of mental health problems. Active recruitment of patients was between May and December 2016. A total of 68 patients were approached to participate in the pilot study (73.5% consented to participate and completed the full protocol). The remaining non-consenting patients did not want to participate due to: (i) 'not feeling they were in a good enough headspace' ($n = 9$); (ii) feeling the study did not appeal to them ($n = 1$); and/or (iii) disruptive symptomatology (e.g., high anxiety and nervousness surrounding possible performance, participation and/or results) ($n = 2$). Several patients were also unable to be followed up for the informed consent process due to being discharged early, or being transferred to a different hospital due to medical reasons ($n = 6$). Patients were determined to have a primary diagnosis of major depressive disorder, anxiety disorder, or bipolar disorder through consensus diagnosis; that is, via multidisciplinary clinical assessment (by psychiatrists, psychologists and allied health professionals) at Uspace, St Vincent's Private Hospital. Primary diagnosis for patients ($n = 50$) were as follows: $n = 41$ with a depressive disorder [major depressive disorder (MDD) ($n = 41$)]; n = 4 with an anxiety disorder (AD) [obsessive-compulsive disorder (OCD) ($n = 2$); generalised anxiety disorder (GAD) ($n = 2$)]; $n = 5$ with a bipolar disorder [bipolar disorder I (BD I) ($n = 2$); bipolar disorder II (BD II) ($n = 3$)].