PSYCHOMETRIC PROPERTIES OF THE ICELANDIC VERSION OF THE CALGARY DEPRESSION SCALE FOR SCHIZOPHRENIA
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Psychometric properties of the Icelandic version of the Calgary depression scale for schizophrenia

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Summary

Purpose and rationale

The purpose of this study was to check the psychometric properties of the Icelandic version of the Calgary Depression Scale for Schizophrenia (CDSS) and its ability to differentiate between negative symptoms of schizophrenia and depression. The CDSS is a 9-item depression rating scale that was especially developed to assess depression in schizophrenia. The rationale behind its development is that depression is often seen in patients with schizophrenia and is thought to be a different construct than the negative symptoms related to schizophrenia. Between 25% and 50% of patients with acute symptoms of schizophrenia are estimated to suffer from some depressive symptoms. Before the development of the CDSS clinicians generally used depression rating scales commonly used to measure depression in a non-psychotic sample, namely the Hamilton depression rating scale. These rating scales are however not suitable to measure depression in patients with schizophrenia because of their correlation with negative symptoms.

It is important to check the psychometric properties of the Icelandic translation and to determine a cut off score before it can be used for research and clinical purposes. Research shows that Patients with schizophrenia who also manifest depression in the course of their disorder tend to be associated with poorer quality of life, a greater medical comorbidity, more work impairment, a greater risk of relapse or hospitalization, poorer medication adherence, overall worse outcomes, increased distress as well as increased risk of suicide, whereas up to 10% of patients with schizophrenia are estimated to take their own lives.

Method

Participants were approached by one of two MSc students (first and second author) in psychology and asked to participate. After signing a form for informed consent, PANSS, M.I.N.I., CDSS and
DASS, were administered. The administration took place at one of three facilities at Landspítalinn and was conducted by the MSc students and the patients case managers who all had been trained in the use of the instruments administered. The data for each participant was collected within a period of one week. The study had been granted permission from the Scientific Ethical Committee of Landspitali - The National University Hospital of Iceland. (34/2015)

**Statistical analyses**

Descriptive statistics was computed for all scales, the prevalence of depression was assessed according to M.I.N.I.. Internal consistency of the Icelandic version of the CDSS was assessed using Cronbach’s alpha. The correlation of the CDSS with the depression scale of DASS was calculated to assess convergent validity. The correlation of the CDSS with all subscales of PANSS and the anxiety and stress scales of DASS was also calculated to assess the discriminant validity of the CDSS. A Signal detection analysis was carried out where a comparison was made with the depression diagnosis of MINI to assess the specificity and sensitivity of CDSS for depression relative to a cut-off score for depression diagnosis determined by the Youden index (Youden, 1950).

**Course of the study**

This study was carried out throughout the four semesters of the MSc course. In the first semester the research topic was chosen. In the second semester there was written a literature review about the chosen topic. In the third semester the method and procedure of the study were determined and preparation was made to get a permission from the Scientific Ethical Committee of Landspitali - The National University Hospital of Iceland. In the fourth and final semester the study got all the permissions needed and the data was gathered and examined, as well as the article was written.
The authors

The authors of this article are three: Þorri Snæbjörnsson, who gathered the data and wrote the article; Óttar G. Birgisson, who gathered the data; and Baldur Heiðar Sigurðsson, who was the instructor of the study.

The administration of this study took place at one of three facilities at Landspítalinn (Laugarásinn, Kleppur and Víðihlíð). Special thanks go out to Landspítalinn, and especially Laugarásinn, meðferðargeðdeild.
Abstract

This paper presents the psychometric properties of the Icelandic version of the Calgary depression scale for schizophrenia (CDSS). The aim of the study was to evaluate the reliability and validity of the Icelandic translation and to suggest appropriate cut-off score for the CDSS. The CDSS is a 9-item depression rating scale that was especially developed to assess depression in schizophrenia. The rationale behind its development is that depression is often seen in patients with schizophrenia and is thought to be a different construct than the negative symptoms related to schizophrenia. Between 25% and 50% of patients with acute symptoms of schizophrenia are estimated to suffer from some depressive symptoms. The participants in this study were 35, 27 men and 8 women. The mean age was 24.36. After signing a form for informed consent, PANSS, M.I.N.I., CDSS and DASS, were administered. The data for each participant was collected within a period of one week. The psychometric properties of the Icelandic version of the CDSS are not as good as the original and in fact not good enough to recommend its use. The internal consistency and the convergent validity are not satisfactory. The discriminant validity of the Icelandic version of the CDSS was good. The CDSS does have an excellent predictive ability and discriminates well between subjects with a diagnosis of depression from those who are not depressed. The signal detection analysis found an optimal cut-off score of 6 which is similar to the original scale.

Key words

Calgary depression scale for schizophrenia, depression, negative symptoms
Útdráttur


Lykilorð

Calgary depression scale for schizophrenia, þunglyndi, neikvæð einkenni
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The Calgary depression scale for schizophrenia (CDSS) is a 9-item depression rating scale that was specifically developed to assess depression in schizophrenia. The rationale behind its development is that depression is often seen in patients with schizophrenia and is thought to be a different construct than the negative symptoms related to schizophrenia. Before the development of the CDSS clinicians generally used depression rating scales commonly used to measure depression in a non-psychotic sample, namely the Hamilton depression rating scale (Addington, Addington and Atkinson, 1996). These rating scales are however not suitable to measure depression in patients with schizophrenia because of their correlation with negative symptoms (Goldman et al., 1992).

**Depression in schizophrenia**

The presence of depressive symptoms in schizophrenia has been recognized and documented since Kraepelin (1923) first described it. Between 25% and 50% of patients with acute symptoms of schizophrenia are estimated to suffer from some depressive symptoms (McGlashan and Carpenter, 1976; Siris and Bench, 2003; Siris, 2000; Schennach-Wolff et al., 2011). Depressive symptoms are apparent throughout the phase of the disorder and they tend to precede the first psychosis (Bustamante, Maurer, Loftier and Hafner, 1994; Schultze-Lutter et al., 2007), appear concomitantly with acute symptoms (Hirsch, 1982; Birchwood, Iqbal, Chadwick and Trower, 2000) and can still be present after the patients psychotic symptoms subside (McGlashan and Carpenter, 1976; Oosthuizen, Emsley, Niehaus, and Chilizia, 2006). The depressive symptoms seem to be less common between psychotic episodes compared to the earlier stages of the disorder (Lançon, Auquier, Reine, Bernard and Addington, 2001) and rarely occur anew in the recovery of the first episode (Upthe grove et al., 2010). Patients with schizophrenia who also manifest depression in the course of their disorder tend to be associated with poorer quality of life (Zisook et al., 2007), a greater medical comorbidity (Zisook et al., 2007), more work impairment (Sands and Harrow, 1999), a greater risk of relapse or hospitalization (Birchwood, Mason, MacMillan and Healy, 1993), poorer medication adherence (Schennach-Wolff et
al., 2011), overall worse outcomes (Sands and Harrow, 1999), increased distress (Collins, Remington, Coulter and Birkett, 1996) as well as increased risk of suicide (Sands and Harrow, 1999; Fenton, 2000; Harvey et al., 2008), whereas up to 10% of patients with schizophrenia are estimated to take their own lives (Caldwell and Gottesman, 1990; Fenton, McGlashan, Victor and Blyler, 1997). Mortensen and Juel (1993) found in their study of people with first episode schizophrenia that 50% of deaths in males and 35% of deaths in females were due to suicide, so men with schizophrenia seem to be in more risk of suicide than women. With all that said it still seems that depressive symptoms in this group tend to be neglected because the emphasis remains on treating positive and negative symptoms (Peralta and Cuesta, 2009).

**Difficulty in measuring depression in patients with schizophrenia**

A factor analytic study of patients with schizophrenia suggests that depression is a separate syndrome in schizophrenia (Kay and Sevy, 1990) but still researchers have had problems with determining the exact rate of depression in patients with schizophrenia. In a review of more than 36 studies by Siris and Bench (2003), depression ranged from 6% to 65%, with a modal rate of about 25%. They suggest that this big difference can be attributed to the different definitions used by authors of depression and/or schizophrenia, the phase of the illness and the time interval under observation. It is also difficult to differentiate among negative symptoms of schizophrenia and depression because both share some of the same features which makes the assessment difficult and negative symptoms can at times be indistinguishable from depression (Collins et al., 1996). Moreover, the fact that depressive symptoms are temporally variable (Craig, Richardson, Pass and Bregman, 1985) and the possibility of an overlap with the negative symptoms (Craig et al., 1985) makes this distinction even harder. Still another factor to take into account when trying to assess depression in schizophrenia is the poor correlation between observer-report and self-report of depression (Craig and Van Natta, 1976).
Majadas, Olivares, Galan and Diez (2012) discovered that depression is often an under-diagnosed problem in patients with schizophrenia, which means that many of them suffer from depression without a formal diagnosis of depression. They also found that depression could be associated with greater severity of symptoms of schizophrenia and that depression seems to overlap, in part, with negative symptoms. They conclude that since patients with stable schizophrenia manifested clinically relevant depressive symptoms without a diagnosis of depression and are not taking antidepressants nor getting psychological treatment, depression in people with schizophrenia is likely to be an under recognized problem in schizophrenia. Therefore it is very important to pay attention to depression in schizophrenia because it is important for treatment, diagnosis, and outcome.

**Negative symptoms in schizophrenia**

The problem with diagnosing depression in patients with schizophrenia becomes even harder when you consider the negative symptoms of schizophrenia which tend to have similar manifestation as depression. Tim Crow (1980) first introduced the term negative symptoms into psychiatry. He saw negative symptoms as the absence of desirable behavior whereas positive symptoms were the presence of undesirable behaviors and experiences (e.g. delusions and hallucinations). Researchers do not always agree which symptoms belong to negative symptoms but among those to be mentioned are affective flattening, avolition, alogia, anhedonia, attentional impairment as well as apathy (Morrison, Renton, Dunn, Williams and Bentall, 2004). Some of those symptoms are also seen in depression, for example anhedonia, apathy and alogia. Many researchers have mentioned absence of stimulation and social isolation as potential influences on negative symptoms (Morrison et al., 2004). Morrison et al. (2004) suggest that the overlap between depression and negative symptoms in schizophrenia could stem from the same cognitive biases that are known to be at work in depression, for example similar biases in the interpretation of events could play a part in the social withdrawal and apathy seen in patients manifesting negative symptoms. Negative symptoms could also have developed as a safety
behavior. This behavior may have served some function in the patients past and might still have a function to date whereas they might have developed a flat affect as a way to avoid being hospitalized or having their medication increased as perhaps has been the case in the past when they became upset (Morrison et al., 2004).

The percentage of patients with schizophrenia meeting criteria for recovery seems to range from 30% to 50% (Harrow, Grossman, Jobe and Herbener, 2005; Grossman, Harrow, Rosen, Faull and Strauss, 2008; Strauss, Sandt, Catalano and Allen, 2012) and according to Strauss, Harrow, Grossman and Rosen (2010) negative symptoms can be a good predictor of lower rates of recovery in schizophrenia patients. Furthermore, negative symptoms can affect the patient's ability to be socially active, to live independently, to perform activities of daily living, to work and study and to maintain personal relationships (Novick, Haro, Suarez, Vieta and Naber, 2009; Harvey et al., 2012; Rabinowitz et al., 2012).

**The Calgary Depression Scale for Schizophrenia**

Before the development of the Calgary depression scale for schizophrenia (CDSS) (Addington, Addington and Schissel, 1990) all of the depression scales that were used in researches assessing depression in patients with schizophrenia were developed to assess depression in non-psychotic individuals (Addington, Addington and Schissel, 1990). Even though research shows that depression in outpatients diagnosed with schizophrenia resemble depression in other groups (Weissmann et al., 1977), scales that were developed to assess depression in non-psychotic populations have been criticized for being inappropriate for psychotic patients and for this reason Addington, Addington and Schissel (1990) developed the CDSS rating scale that is specifically developed to assess depression in patients with schizophrenia. The scale is based on items selected from the Present State Examination
Making this distinction between depression and negative symptoms could have important clinical implications because depression could respond to antidepressant medication and/or psychological treatment (Addington, Addington and Maticka-Tyndale, 1994; Cuijpers, Gerhard, Donker and Van Straten, 2011; Pampallona, Bollini, Tibaldi, Kupelnick and Munizza, 2004) and it could be of help in the ongoing search for pharmaceutical treatment for negative symptoms (Meltzer, 1991).

It is clear then that the clinical concept of depression in schizophrenia has been widely studied and received considerable support (for review see Siris, 1991). Craig et al. (1985) pointed out that despite this support for depression in schizophrenia it remains difficult to measure it with the rating scales commonly used for this assessment, namely the Hamilton Depression Rating Scale (HDRS), because the validity of these scales has not been verified for the use in this population (Addington, Addington and Atkinson, 1996) and indeed HDRS seems to contain a factor that correlates strongly with the Scale for Assessment of Negative Symptoms (SANS) (Goldman et al., 1992). It is always important to determine what depression scales measure but when these scales are used on a population which they were not developed to be used on, like schizophrenia, the issue becomes even more important (Addington, Addington and Atkinson, 1996). HDRS was designed to assess depressive symptoms in patients who had been diagnosed with depression (Hamilton, 1967) but The Calgary Depression Scale for Schizophrenia (CDSS) is the only scale that is designed especially to assess depression in patients diagnosed with schizophrenia (Addington et al., 1990).

**Psychometric properties of the CDSS**

A study that compared the Psychometric properties of HDRS and the CDSS showed that the CDSS was less confounded by negative and positive symptoms of schizophrenia (Addington et al. 1996).
Furthermore, Collins et al. (1996) compared three measures of depression in schizophrenia (HDRS, PANSS depression subscale and CDSS) and demonstrated that all of these scales have a significant correlation when they are used in schizophrenia but both the HDRS and PANSS depression subscale are related to negative symptom scores from the PANSS negative subscale but the CDSS is not. These results show that the CDSS is a good measure of depression in schizophrenia because it seems to measure depression in schizophrenia independent of positive or negative symptoms and antipsychotic-induced side effects which makes this an important measure given how common negative symptoms are in schizophrenia (Collins et al., 1996; Lako, 2012).

In order to offer patients with schizophrenia in Iceland the best treatment possible as well as doing research on their disorder the CDSS becomes an important tool but in order to use it effectively it is important to make sure its psychometric properties are acceptable. The purpose of this study was to check the psychometric properties of the Icelandic version of the CDSS and its ability to differentiate between negative symptoms of schizophrenia and depression. It is therefore important to evaluate its psychometric properties and to determine a cut off score for the Icelandic population of patients with schizophrenia before it can be used for research and clinical purposes.

**Method**

**Participants**

The participants in this study were 35, 27 men and 8 women. The mean age was 24.36. All of the participants were recruited from an in-patient ward called "Laugarásinn, meðferðargreðdeild" which is an early intervention treatment center for young people (18-30 years old) with first episode psychosis at Landspitali - The National University Hospital of Iceland. Everyone seeking treatment at Laugarásinn from December 2015 to April 2016 were invited to participate in the study. Those who agreed to participate were recruited to the study. All the subjects fulfilled the formal criterion for having at least
one episode of psychosis and gave their written consent to take part in the study. There were no exclusion criteria in this study.

Measures

*The Calgary Depression Scale for Schizophrenia (CDSS)* (Addington, Addington and Schissel, 1990): is a 9-item structured interview which was designed for assessing depression independent of positive and negative symptoms of schizophrenia and extrapyramidal symptoms (EPS), which can arise from taking psychotic medications. Inter-rater reliability of the original CDSS is high for all patient groups and it also has high internal reliability and coefficient of discrimination as well as low root mean square residual, which suggest it has strong construct validity (Addington, Addington, Maticka-Tyndale and Joyce, 1992).

*MINI: Mini Neuropsychiatric Interview (MINI)* (Lecrubier et al., 1997): is a short diagnostic structured interview which goes through the diagnostics for the most common primary axis I psychiatric disorders. Questions about present conditions are asked as well as lifetime experience of manic episode, hypomanic episode and psychotic disorders. The inter-rater reliability of the MINI is high, with Kappa coefficients ranging from 0.88 to 1.0 for the test-retest reliability. Specificity and sensitivity are good for most diagnoses (Lecrubier et al., 1997).

*DASS: Depression, anxiety stress scales (DASS)* (Lovibond and Lovibond, 1995): Consists of 42 negative emotional symptoms measuring anxiety, stress and depression. Subjects rate, on a 4-point severity/frequency scale, the extent to which they have experienced each symptom over the past week. Each scale, anxiety, stress and depression, are measured by 14 items each. Scores for each scale are determined by the sum of these 14 items. Internal consistency, measured with coefficient alpha in a normative sample are 0.84 for anxiety, 0.90 for stress, and 0.91 for depression. Convergent and
discriminant validity are also acceptable (Lovibond and Lovibond, 1995). These results have been replicated for the 21 item version of the DASS used in this study (Antony et.al, 1998).

**PANSS: Positive and Negative Syndrome Scale (PANSS)** (Kay, Flszbein and Opfer, 1987): is a 30-item structured interview which was designed for assessing positive and negative symptoms of schizophrenia along with symptoms of general psychopathology. The PANSS rating is based on all information available to the clinician about the individual the past week. The clinician gets information from reports from family members and care staff as well as from the PANSS clinical interview taken with the individual himself. The reliability of the PANSS is good, the overall coefficient alpha for the Positive scale is 0.73 and 0.83 for the Negative scale. The construct validity, criterion-related validity, predictive validity and sensitivity to change are good. There has been some disagreement over the content validity of the PANSS but research suggests that it is adequate (Kay, Flszbein and Opfer, 1987).

**Procedures**

Participants were approached by one of two MSc students (first and second author) in psychology and asked to participate. After signing a form for informed consent, PANSS, M.I.N.I., CDSS and DASS, were administered. The administration took place at one of three facilities at Landspítalinn and was conducted by the MSc students and the patients case managers who all had been trained in the use of the instruments administered. The data for each participant was collected within a period of one week. The study had been granted permission from the Scientific Ethical Committee of Landspitali - The National University Hospital of Iceland. (34/2015)

**Statistical analyses**

Descriptive statistics was computed for all scales, the prevalence of depression was assessed according to M.I.N.I.. Internal consistency of the Icelandic version of the CDSS was assessed using
Cronbach’s alpha. The correlation of the CDSS with the depression scale of DASS was calculated to assess convergent validity. The correlation of the CDSS with all subscales of PANSS and the anxiety and stress scales of DASS was also calculated to assess the discriminant validity of the CDSS. A Signal detection analysis was carried out where a comparison was made with the depression diagnosis of MINI to assess the specificity and sensitivity of CDSS for depression relative to a cut-off score for depression diagnosis determined by the Youden index (Youden, 1950).

Results

Descriptive statistics and reliability

Table 1 shows descriptive statistics and Cronbah's Alpha for CDSS, DASS and PANSS. The mean score of CDSS was 4.7, which is quite low given that the highest score possible is 36. The mean score for inpatients on the original CDSS is 6.88 and 2.96 for outpatients (Addington, Addington, Maticka-Tyndale and Joyce, 1992). It is also worth noting that the highest score obtained on the CDSS in this study was 16 so there were no participant who got a particularly high score.

Cronbach’s alpha coefficients were calculated for CDSS, DASS and PANSS (table 1). The CDSS had a low level of internal consistency, as determined by a Cronbach's alpha of only .67. In comparison the Cronbach's alpha for PANSS total was .83 and .94 for DASS total. All the subscales for DASS had satisfactory internal consistency (.79 - .95), however all the subscales of PANSS had unsatisfactory internal consistency (.64 - .69).
Table 1. Descriptive statistics and Cronbach's Alpha for CDSS, DASS and PANSS

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Cronbach's Alpha</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDSS Total score</td>
<td>4.74</td>
<td>4.80</td>
<td>.67</td>
<td>.47 - .81</td>
</tr>
<tr>
<td>DASS Depression</td>
<td>6.10</td>
<td>6.96</td>
<td>.95</td>
<td>.91 - .97</td>
</tr>
<tr>
<td>DASS Anxiety</td>
<td>2.97</td>
<td>3.67</td>
<td>.79</td>
<td>.64 - .87</td>
</tr>
<tr>
<td>DASS Stress</td>
<td>4.00</td>
<td>4.26</td>
<td>.87</td>
<td>.78 - .93</td>
</tr>
<tr>
<td>DASS Total</td>
<td>13.03</td>
<td>13.42</td>
<td>.94</td>
<td>.90 - .97</td>
</tr>
<tr>
<td>PANSS Negative symptoms</td>
<td>11.03</td>
<td>5.09</td>
<td>.69</td>
<td>.50 - .83</td>
</tr>
<tr>
<td>PANSS Positive symptoms</td>
<td>9.77</td>
<td>4.85</td>
<td>.64</td>
<td>.41 - .80</td>
</tr>
<tr>
<td>PANSS General psychopathology</td>
<td>22.17</td>
<td>7.87</td>
<td>.67</td>
<td>.47 - .81</td>
</tr>
<tr>
<td>PANSS Total</td>
<td>46.06</td>
<td>16.57</td>
<td>.83</td>
<td>.73 - .90</td>
</tr>
</tbody>
</table>

The mean for all the items on the CDSS were calculated as well as the item-total correlation and Cronbach's Alpha if the items were deleted (table 2). All the items had a mean under 1 and two items, guilty ideas of reference and early wakening, have no correlation to the overall scale. Hopelessness is the only item that would raise the Cronbach's Alpha of the CDSS over .70, which could be considered as having a satisfactory internal consistency.
Table 2. Descriptive statistics for all items on CDSS, total r and Cronbach's alpha if item were deleted

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>.71</td>
<td>.96</td>
<td>.75</td>
<td>.55</td>
</tr>
<tr>
<td>Hopelessness</td>
<td>.89</td>
<td>2.0</td>
<td>.30</td>
<td>.72</td>
</tr>
<tr>
<td>Self depreciation</td>
<td>.66</td>
<td>1.0</td>
<td>.47</td>
<td>.61</td>
</tr>
<tr>
<td>Guilty ideas of reference</td>
<td>.17</td>
<td>.45</td>
<td>-.02</td>
<td>.69</td>
</tr>
<tr>
<td>Pathological guilt</td>
<td>.54</td>
<td>.78</td>
<td>.39</td>
<td>.63</td>
</tr>
<tr>
<td>Morning depression</td>
<td>.69</td>
<td>1.1</td>
<td>.53</td>
<td>.59</td>
</tr>
<tr>
<td>Early wakening</td>
<td>.37</td>
<td>.77</td>
<td>.04</td>
<td>.69</td>
</tr>
<tr>
<td>Suicide</td>
<td>.40</td>
<td>.74</td>
<td>.43</td>
<td>.63</td>
</tr>
<tr>
<td>Observed depression</td>
<td>.31</td>
<td>.47</td>
<td>.51</td>
<td>.64</td>
</tr>
</tbody>
</table>
Validity

Convergent and discriminant validity

Pearson's correlation coefficients were calculated between the CDSS total score and the depression scale of DASS (table 3). The CDSS had a low positive correlation to the depression scale of DASS (r = .35) indicating poor convergent validity. Person's correlation coefficients between all the other measures were calculated and were low to average (0.19 for negative symptoms to 0.41 for stress), indicating good discriminant validity. Despite this it is worth noting that the correlation between CDSS and other scales only reached statistical significance with regards to the DASS depression and stress scales.

Table 3. Correlations between CDSS total score, DASS depression scale and DASS anxiety scale

<table>
<thead>
<tr>
<th>DASS Depression</th>
<th>DASS Anxiety</th>
<th>DASS Stress</th>
<th>PANSS Negative symptoms</th>
<th>PANSS Positive symptoms</th>
<th>PANSS General psychopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDSS Total score</td>
<td>.353*</td>
<td>.255</td>
<td>.409*</td>
<td>.186</td>
<td>.333</td>
</tr>
<tr>
<td>DASS Depression</td>
<td>.673**</td>
<td>.713*</td>
<td>.268</td>
<td>.318</td>
<td>.248</td>
</tr>
<tr>
<td>DASS Anxiety</td>
<td>.749**</td>
<td>.137</td>
<td>.127</td>
<td>.281</td>
<td></td>
</tr>
<tr>
<td>DASS Stress</td>
<td>.160</td>
<td>.179</td>
<td>.307</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANSS Negative symptoms</td>
<td></td>
<td></td>
<td>.607**</td>
<td>.695**</td>
<td></td>
</tr>
<tr>
<td>PANSS Positive symptoms</td>
<td></td>
<td></td>
<td></td>
<td>.723**</td>
<td></td>
</tr>
</tbody>
</table>

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Signal detection analysis

The signal detection analysis showed that the CDSS has an excellent ability to discriminate between subjects with a diagnosis of depression from those who are not depressed according to MINI (AUC = 0.93). The signal detection analysis yielded an optimal cut-off score of 6 using the Youden index (J). A score above 6 has an 85% specificity and 89% sensitivity for the presence of a major depressive episode. The positive likelihood ratio was 5.78 and the negative likelihood ratio was 0.13 (table 4).

Table 4. Sensitivity, specificity, positive likelihood ratio, negative likelihood ratio and Youden Index for different cut-off scores on the CDSS

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Sensitivity</th>
<th>95% CI</th>
<th>Specificity</th>
<th>95% CI</th>
<th>Positive likelihood ratio</th>
<th>95% CI</th>
<th>Negative likelihood ratio</th>
<th>95% CI</th>
<th>Youden Index J</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3</td>
<td>100</td>
<td>66.4-100.0</td>
<td>73.08</td>
<td>52.2-88.4</td>
<td>3.71</td>
<td>2.0-7.0</td>
<td>0</td>
<td></td>
<td>-0.1692</td>
</tr>
<tr>
<td>&gt;5</td>
<td>88.89</td>
<td>51.8-99.7</td>
<td>76.92</td>
<td>56.4-91.0</td>
<td>3.85</td>
<td>1.8-8.1</td>
<td>0.14</td>
<td>0.02-0.9</td>
<td>0.6581</td>
</tr>
<tr>
<td>&gt;6</td>
<td><strong>88.89</strong></td>
<td><strong>51.8-99.7</strong></td>
<td><strong>84.62</strong></td>
<td><strong>65.1-95.6</strong></td>
<td><strong>5.78</strong></td>
<td><strong>2.3-14.7</strong></td>
<td><strong>0.13</strong></td>
<td><strong>0.02-0.8</strong></td>
<td><strong>0.7351</strong></td>
</tr>
<tr>
<td>&gt;7</td>
<td>77.78</td>
<td>40.0-97.2</td>
<td>92.31</td>
<td>74.9-99.1</td>
<td>10.11</td>
<td>2.6-40.1</td>
<td>0.24</td>
<td>0.07-0.8</td>
<td>0.7009</td>
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<tr>
<td>&gt;9</td>
<td>66.67</td>
<td>29.9-92.5</td>
<td>96.15</td>
<td>80.4-99.9</td>
<td>17.33</td>
<td>2.4-125.1</td>
<td>0.35</td>
<td>0.1-0.9</td>
<td>0.6282</td>
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</table>

Discussion

This paper presents the psychometric properties of the Icelandic version of the Calgary depression scale for schizophrenia (CDSS). The aim of the study was to evaluate the reliability and validity of the Icelandic translation and to suggest an appropriate cut-off score for the presence of depression. The psychometric properties of the Icelandic version of the CDSS are not as good as the original and in fact not good enough to recommend its use. The internal consistency and the convergent validity are not satisfactory. These results are not consistent with the original findings of Addington, Addington,
Maticka-Tyndale and Joyce (1992) and suggest that the internal consistency and convergent validity of the Icelandic version of the CDSS is not equivalent with the original version. It is worth noting that although the convergent validity was not good enough, the fact that the correlation between CDSS and other scales only reached significance with regards to the DASS depression and stress scales but not to other measures suggest that the CDSS may be more related to depression than to other measures used in this study.

There are two items on the Icelandic version of the CDSS, guilty ideas of reference and early wakening, that have no correlation to the overall scale. This could contribute to the low internal consistency of the CDSS and suggests that the translation of these two items are not satisfactory and should be revised before the scale is further researched. Removing these two items from the scale would not have considerable effect on the Cronbach's Alpha of the CDSS. Removing the item "Hopelessness" from the scale would however raise the Cronbach's Alpha beyond .70 which could be considered as satisfactory. However it would be more desirable to fix the translation of the two items that have no correlation to the overall scale, to get a better internal consistency, than to remove items from it.

The discriminant validity of the Icelandic version of the CDSS was good as the correlation between it and other measures intended to measure different concepts, namely the PANSS subscales and the anxiety and stress scales of DASS, were low. These results are consistent with the original findings of Addington, Addington, Maticka-Tyndale and Joyce (1992) although it is questionable how meaningful such results are given the poor reliability and convergent validity.

The CDSS however does have an excellent predictive ability and discriminates well between subjects with a diagnosis of depression from those who are not depressed. The ROC curve analysis found an optimal cut-off score of 6 which is similar to the original scale. These results are consistent.
with the original findings of Addington, Addington, Maticka-Tyndale and Joyce (1992). According to the sensitivity and specificity of the CDSS, approximately 89% of patients who get a score above 6 are depressed according to MINI diagnosis and approximately 85% of patients who get a score below 6 do not have depression. The likelihood ratio given by the ROC curve suggest that a participant is a little less than six times as likely to get a score above 6 if he has a diagnosis of depression, compared to those who do not have this diagnosis.

The study had several limitations. First, it had very few participants and the results would possibly benefit from having more participants. Since the CDSS only contains 9 items it could be more sensitive to the small sample size in this research. The internal consistency for instance is not far from being satisfactory and could possibly increase with more participants, as indicated by an upper limit of the confidence interval of 0.81. More participants and in particular more depressed participants could also mean that the correlation with the depression scale of DASS would increase. Also, it was impossible to conduct factor analysis due to a small sample size. With more participants it would be desirable to conduct factor analysis to verify that the CDSS only has one factor loading. The second limitation is that it could be possible that the reason for the poor correlation between the CDSS and the depression scale of DASS stems from the different nature of the measures since DASS is a self-report measure and CDSS is a clinician rated measure (Craig and Van Natta, 1976). Since lack of insight is common in people with schizophrenia it is possible that the participants are underestimating their depression symptoms compared to the measures that were evaluated by the researcher, namely the CDSS and MINI. It is possible that the convergent validity would be better if the research used another clinician rated depression scale.

In summary, these results suggest that the psychometric properties of the Icelandic version of the CDSS are not satisfactory and it should not be used for research and clinical purposes until it has been further evaluated with a larger sample. The reason could be that the translation is not good enough or
there were not enough participants in this research. Whatever the reason, it is important to keep researching and improving the Icelandic version because the CDSS is a good tool to use both in research and in clinical settings and could improve the service provided to people with schizophrenia in Iceland.
References


