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e-HCL-32: a useful, valid and user friendly tool in the screening of bipolar II disorder

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Abstract

Background and objectives: Bipolar type II (BDII) is a frequent disorder with high morbidity and mortality, characterized by depressive and hypomanic episodes. Early diagnosis can be effective in improving long-term prognosis. However, diagnosing BDII is challenging due to the difficulty in detecting past hypomanic episodes. The HCL-32 is a widely used and reliable screening instrument for the detection of past hypomanic episodes. Making this tool available to more patients could help diagnose and treat undetected cases of BDII earlier. New technologies such as the Internet have been previously used for this purpose with favorable outcomes. Accordingly, the objective of this study is to evaluate the acceptability, validity, reliability and equivalence of an online version of this questionnaire.
Methods: From May 2012 to March 2013, 52 participants attending an outpatient mental health clinic completed a paper version of the HCL-32 (HCL-32) and its online version (e-HCL-32) within two weeks. After its completion, they were asked to answer a brief satisfaction survey.
Results: No differences were found (HCL-32 mean total score = 17.73 (SD = 7.37), e-HCL-32 mean total score = 18.28 (SD = 7.09). $T = -1.720$, $p = 0.092$, 95% CI = −1.21 to 0.09) between the results of the paper and pencil HCL-32 compared to its online version (e-HCL-32). The psychometric properties of the online version of the hypomania checklist (e-HCL-32) were good and comparable to the paper and pencil version. 80% of participants found online questionnaires to be easier to answer and more user-friendly.
Conclusion: The results of this study support the use of an online screening tool for the detection of previous hypomanic episodes (necessary for BDII diagnosis) as it showed to have a similar validity and reliability to the traditional paper and pencil method.

1. Introduction

Bipolar type II (BDII) is not a milder form of bipolar disorder as its high morbidity and mortality rates reflect [1]. Patients usually present more affective episodes and shorter inter-episode intervals, lower rates of recovery, similar suicide risk, as well as neurocognitive and socio-functional impairment compared to Bipolar type I (BDI) [1–4]. It may be the most frequent bipolar phenotype, with prevalence ranging from 0.5% to 6% of the population depending on the definition used [1,5].

Diagnosing BDII requires correct identification of a prior episode of hypomania, which can be challenging in some contexts. It takes almost 8 to 10 years since the first symptoms appear until a diagnosis is made [6]. Moreover, approximately 40% to 50% of BDII patients were previously misdiagnosed as major depressive disorder (MDD) receiving an inappropriate treatment approach [7]. The diagnosis of BDII may be more difficult and less reliable than that of BDI [8].

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Early diagnosis can be effective in improving long-term prognosis of bipolar patients [9,10]. In this respect, the self-applied questionnaire Hypomania Checklist-32 (HCL-32) was developed as a sensitive instrument to detect patients with a previous history of hypomanic symptoms in clinical and non-clinical settings [11]. The HCL-32 showed to be a reliable instrument with acceptable psychometric properties and transcultural stability in the many languages in which it has been validated so far, including Spanish [11–17]. In addition, a shortened version of 16 items (HCL-16) based on the HCL-32 scale has been recently developed and has shown similar psychometric properties [18].

Making this tool available to a greater number of subjects could be helpful in diagnosing and treating undetected or misdiagnosed cases of BDII. The wide use of new technologies such as the Internet may be helpful for this purpose. These technologies have been successfully adopted in mental health contexts, and offer important advantages over paper and pencil assessments, including patient convenience, reduced missing data and lower costs.

However, there are risks in assuming that both formats will produce equivalent results [19,20]. Even though the content could be essentially the same, the way the questions and answers are displayed, the possibility to correct prior questions and the setting in which the questionnaires are completed could influence the results [21]. As a result, showing the equivalence between paper and pencil and Internet versions is necessary. Addressing this concern, the International Test Commission elaborated guidelines to develop and administer this type of tests [22].

The aim of this exploratory study is to determine the psychometric properties of an online Spanish version of the HCL-32 (e-HCL-32) and to compare their results with the HCL-32 paper and pencil Spanish version (HCL-32).

2. Methods

The study was conducted from May 2012 to March 2013. Participation in the study was proposed to a consecutive sample of adult patients attending the outpatient mental health clinic of the Hospital Clinic of Barcelona. Their usual psychiatrist explained briefly the aim of the study and offered an invitation. If the patient agreed, an informed consent was handed out and signed. This first explanation and the informed consent only mentioned that the study was about online assessment methods, which comprised answering a paper and pencil questionnaire, a similar online questionnaire and after both had been completed, an interview by an independent psychiatrist on their mental health status. This study was approved by the Ethics Committee of the Hospital Clinic of Barcelona.

2.1. Participants

Selection criteria included symptomatic stability within the last three months, defined as a score of ≤8 on the 17-Hamilton Depression Rating Scale (HDRS17; [23,24]) and ≤6 on the Young Mania Rating Scale (YMRS; [25,26]) to ensure the validity of the answers taking into account that HCL-32 is a retrospective questionnaire. Additional exclusion criteria were mourning, visual impairment, lack of internet access and difficulties in speaking Spanish.

52 patients diagnosed with bipolar disorder type I, II and NOS, as well as unipolar major depression, dysthymic disorder, and schizoaffective disorders, according to DSM-IV-TR criteria [27] were assessed by an independent psychiatrist in a clinical interview after both versions of the questionnaire were completed.

2.2. Instrument

The HCL-32 is a self-applied questionnaire to detect past hypomanic symptoms. It comprises a list of possible hypomanic symptoms that the patient has to answer as Yes or No. In addition, it has 8 different sections evaluating severity and impact of the symptoms in the patient's life. The total score is obtained by adding affirmative responses [11].

The Spanish validation of the HCL-32 had a coefficient of internal consistency of 0.94 and the test–retest reliability was of 0.92. Moreover, its diagnostic performance measured under the ROC curve was 0.92. A score of 14 or more affirmative responses to hypomanic symptoms was considered the cut-off point for a suggestive bipolar case with a suitable sensitivity value of 0.85 and an acceptable specificity value of 0.79 [11].

2.3. Procedure

At the time of the first appointment, the paper and pencil HCL-32 was completed by patients; socio demographic and clinical characteristics were also registered. In addition, patient's email address was noted. Participants were informed that they would receive an email with a link and an assigned random code in two weeks in order to complete the online version of the questionnaire (e-HCL-32).

After completing the online questionnaire, a satisfaction survey was sent to the participants' email address to evaluate their perception of the experience. The survey consisted of five yes or no questions regarding the simplicity, reliability, accuracy, quickness and usefulness of the online method compared with the paper and pencil. An additional final question inquired about the global satisfaction with the online questionnaire using a Likert scale.

The e-HCL-32 questionnaire and the collected data were hosted in an external independent server (www.esurveypro.com). The HCL-32 and e-HCL-32 instruments contained exactly the same questions. The online version could only be accessed once by the patient with the corresponding code, but they could change their answers until submission was made.

2.4. Statistical analysis

Statistical analyses were performed using SPSS version 18.0. *Phi* and Pearson correlations coefficients analyses were performed to compare item and total scores of both versions, respectively. A paired T-student test was used to determine significant differences between the total scores of both versions.

In order to evaluate the internal consistency reliability, Cronbach α analysis was conducted separately for each version of the HCL-32 (online and paper and pencil). Parallel-test reliability analysis was also conducted. Concurrent validity was analyzed comparing DSM-IV-TR diagnostic criteria and the score obtained in the HCL-32, by means of the point biserial correlation coefficient. In addition, sensitivity and specificity of each version were assessed, and the cut-off point was established by evaluating the ROC curves. Finally, a principal component analysis was carried out to describe the internal structure of the e-HCL-32.

3. Results

110 patients were initially invited to participate in the study. Of these, 52 met the inclusion criteria and agreed to participate. All of them completed both forms of the questionnaire and were included in the analysis. This final sample included 20 men (38.5%) and 32 women (61.5%) whose age ranged from 19 to 70 years (mean = 43, SD = 12.99). Based on DSM-IV-TR [27], their diagnoses included bipolar disorder (71.2%), major depressive disorder (7.7%), dysthymic disorder (13.5%) and schizoaffective disorder (7.7%).

The main reason given by the patients who didn't accept to participate in the study was time limitations (24%), while about 15% expressed other concerns for participating in this kind of studies (no interest, privacy and confidentiality concerns). Among the excluded patients, the vast majority lacked internet access or skills to use it (46%), one patient had visual impairment and eight patients (13%) were symptomatic at the moment of the initial interview with their psychiatrist.

The mean interval between the completion of the paper and online versions of the HCL-32 was 17.1 days (SD = 6.6). Parallel-forms reliability was 0.97.

The Pearson correlation coefficient between the total scores of both versions was high (0.94) and significant ($p < 0.001$) (Fig. 1). There was no difference between mean total scores (HCL-32 mean total score = 17.73 (SD = 7.37), e-HCL-32 mean total score = 18.28 (SD = 7.09). T = −1.720, p = 0.092, 95% CI = −1.21 to 0.09). In addition, the *Phi* correlation coefficients between the HCL-32 and the e-HCL-32 for each item were significant (ranging from 0.45 to 0.92) (Table 1).

Concurrent validity using the diagnostic variable was 0.56 ($p < 0.01$) for the HCL-32 and 0.56 ($p < 0.01$) for the e-HCL-32.

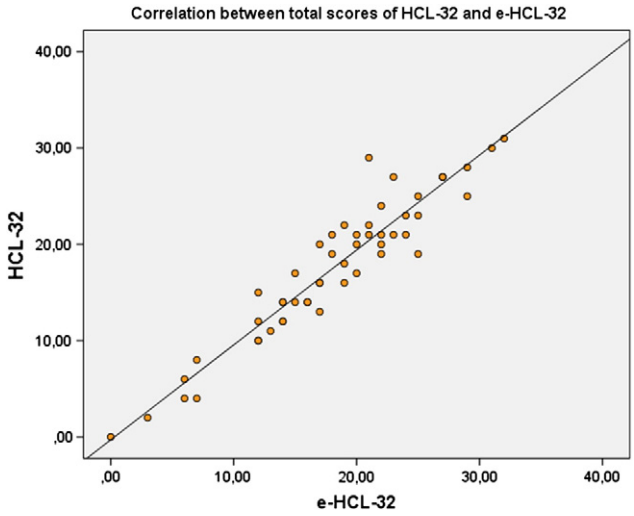

Fig. 1. The scatter plot shows a good Pearson's correlation coefficient (0.94) found in the total scores of the paper and pencil and the online version (e-HCL-32) of the HCL-32.

Cronbach's alpha was 0.901 for the HCL-32 and 0.868 for the e-HCL-32, showing high internal consistency reliability.

In order to make sensitivity and specificity analysis, we divided the sample into two groups taking the possibility of having had past hypomanic episodes into account (Group 1 = bipolar and schizoaffective disorders; Group 2 = major depressive disorder and dysthymic disorders). Using the ROC curve (area under the curve (AUC) 0.803 for HCL-32 and 0.827 for the e-HCL-32) (Fig. 2), a score of 14 was found to be the optimal balance point between sensitivity and specificity, which is the same cut-off described in the Spanish validation study [11]. Using this cut-off point the sensitivity and specificity of HCL-32 were 87.80% (95% CI = 73.80 to 95.92) and 72.73% (95% CI = 39.03 to 93.98), respectively. The Positive Predictive Value (PPV) found for this version was of 92.31% (95% CI = 79.11 to 98.30) and the Negative Predictive Value (NPV) was 61.54% (95% CI = 31.64 to 86). The e-HCL-32 showed similar results with a sensitivity of 92.68% (95% CI = 80.08 to 98.46), a specificity of 72.73% (95% CI = 39.03 to 93.98), a PPV of 92.68% (95% CI = 80.08 to 98.46) and an NPV of 72.73% (95% CI = 39.03 to 93.98).

Regarding the internal structure of the e-HCL-32, the screen plot showed a two-factor solution to be the most appropriate. This structure is identical to the one found in the original validation study of the Spanish version of the HCL-32 [11]. Matrix rotation (using Kaiser's Varimax method) showed that factor 1 comprises 9 items (factor loadings >0.50): items 2, 3, 5, 10, 11, 19, 20, 22 and 24 which are related to increased energy. In addition, factor 2 comprises 9 items as well: 7, 12, 14, 16, 17, 29, 30, 31 and 32 which are related to risk taking or unusual behaviors. Both factors explain 34% of the variance (Table 1).

Finally, 24 of 52 patients answered the satisfaction survey. Of them, 80% found online questionnaires easier to complete and more user-friendly than paper and pencil

Table 1
Phi correlation coefficients between both versions of the HCL-32 items and factor analyses.

Hypomania checklist symptom		N	r φ*	Sig.	Component	
					1	2
1	I need less sleep	52	.700	.000	.461	−.074
2	I feel more energetic and more active	52	.925	.000	.829	.051
3	I am more self-confident	51	.636	.000	.640	.150
4	I enjoy my work more	50	.633	.000	.344	.344
5	I am more sociable	52	.897	.000	.588	.251
6	I want to travel and/or do travel more	52	.617	.000	.371	.343
7	I tend to drive faster or take more risks	50	.451	.001	−.090	.583
8	I spend more/too much money	52	.702	.000	.354	.346
9	I take more risks in my daily life	52	.731	.000	.355	.482
10	I am physically more active	52	.788	.000	.685	.013
11	I plan more activities or projects	52	.703	.000	.513	.384
12	I have more ideas. I am more creative	52	.551	.000	.270	.529
13	I am less shy or inhibited	52	.833	.000	.245	.482
14	I wear more colorful and more extravagant clothes/make up	52	.639	.000	.392	.615
15	I want to meet or actually do met more people	52	.680	.000	.394	.048
16	I am more interested in sex	52	.924	.000	.354	.531
17	I am more flirtatious and/or more sexually active	52	.882	.000	.283	.524
18	I talk more	52	.487	.000	.464	.029
19	I think faster	52	.814	.000	.703	−.019
20	I make more jokes	52	.841	.000	.512	.435
21	I am more easily distracted	52	.690	.000	.260	.368
22	I engage in lots of new things	52	.654	.000	.517	.183
23	My thoughts jump from topic to topic	51	.828	.000	.340	.433
24	I do things more quickly and/or more easily	52	.843	.000	.558	.294
25	I am more impatient and/or get irritable	52	.812	.000	.361	−.027
26	I can be exhausting or irritating for others	51	.722	.000	.065	.343
27	I get into more quarrels	52	.783	.000	.000	.357
28	My mood is higher, more optimistic	52	.738	.000	.477	.304
29	I drink more coffee	52	.829	.000	.153	.631
30	I smoke more cigarettes	52	.706	.000	−.113	.669
31	I drink more alcohol	52	.775	.000	−.128	.626
32	I take more drugs (sedatives, stimulants)	50	.807	.000	−.126	.587
Eigenvalue					5.7	5.1
Variance explained					17.9%	16.2%

Bold numbers represent each item of the HCL-32. The Eigenvalue and the Variance explained are part of the Factor analysis results.

* Phi correlation coefficient.

versions, 63% found them faster and 73.33% more convenient. The global satisfaction of the online method was in range of 6 to 9 for 81.46% of the patients.

4. Discussion

The results of this study support the use of an online tool for screening previous history of hypomania (necessary for BDII diagnosis) as it showed a similar validity and reliability to the traditional paper and pencil method used in this study and in the original validation study of the Spanish version of the HCL-32 [11]. Furthermore, the sensitivity of both versions was close to the sensitivity described in the initial validation study.

However, of the patients invited to participate in the study, only half of them met the diagnostic criteria and agreed to participate; some reasons mentioned for not taking part in the study were difficulties with internet access or lack of computer skills, poor interest, lack of time and worries about confidentiality. These data were surprising and opposed to the available data regarding internet accessibility in the world and particularly in Spain, where 69.8% of households have Internet connection according to a 2013 survey [28]. Taking these data into account, we found obvious problems regarding the use of Internet among psychiatric patients, which could be related to neurocognitive and functional impairment associated with some psychiatric conditions, including bipolar disorder [3,29,30]. Shorter alternatives to the HCL-32, such as the HCL-16, are some of the options that could be explored in the future in order to save time to those patients who did not want to participate due to test time-consuming reasons [18].

Among the participants who replied to the satisfaction survey, online assessment tools were valued positively, easy and user-friendly. Accordingly, previous studies using Internet tools among psychiatric patients have shown adequate acceptability levels and even preference over conventional methods [20,21,31,32]. Nonetheless, the survey response rate in our study was low (46%). One possible explanation could be the fact that the time lapse between the completion of the e-HCL-32 and the reception of the survey had not been previously communicated to participants as well as the satisfaction survey was the third questionnaire of the study. In fact, this response rate is not uncommon according to a meta-analysis studying e-mail or web based surveys [33]. In this last study, the average mean response rate among 68 surveys in 49 studies was 39.6% whereas other studies in the healthcare found percentages closer to ours (i.e. 50%) [34].

Due to the exploratory nature of the study, it has some limitations. Among them, the most relevant were the small sample size and the absence of a healthy control group. Instead, we included dysthymic and schizoaffective disorder patients who, albeit valid, were not included in the original Spanish validation of the HCL-32. Additionally, the fact that the study was conducted in a mental health context could limit the generalization of the results in other contexts such as primary care and community settings where the screening of bipolar disorder could be especially useful. These potential disadvantages could be compensated by replicating the study enrolling larger community samples.

Concerning the methodology, it's worth mentioning the fact that the order in which questionnaires were completed (first, the paper and pencil version of the HCL-32 and second the e-HCL-32) could have influenced the results by a "test-wiseness" effect. However, to decrease the odds of this issue we sent the e-

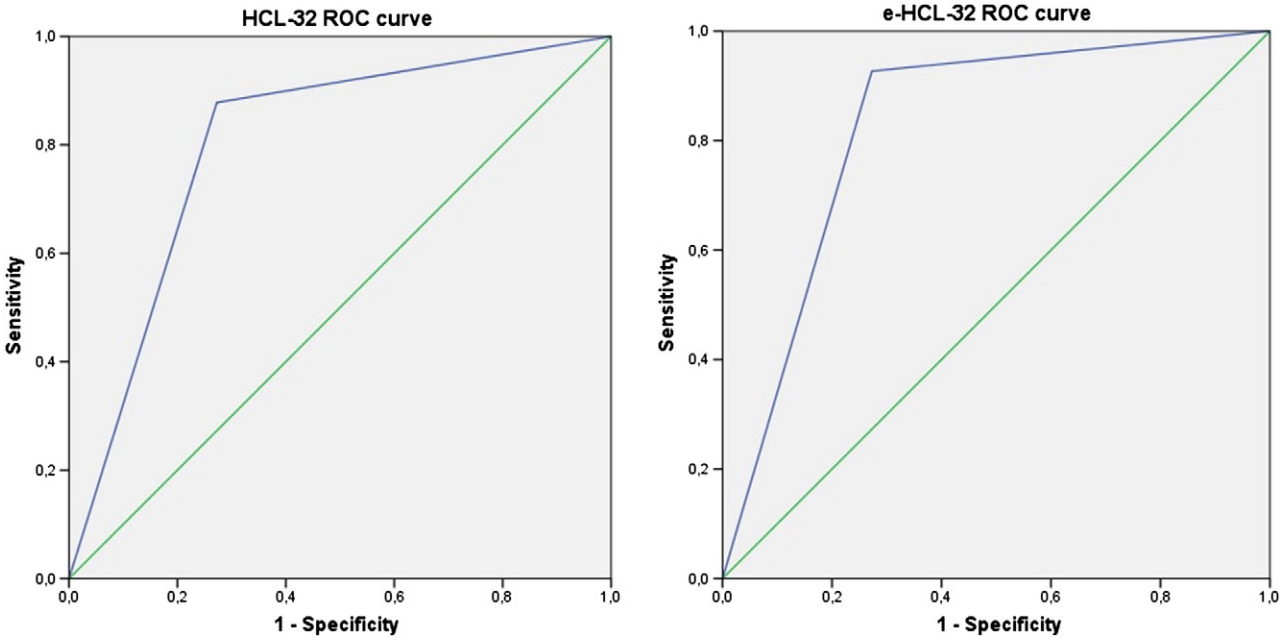

Fig. 2. The figures show the ROC curves of the paper and pencil version of the HCL-32 (left) and the online version (e-HCL-32) (right).

HCL-32 two weeks after the paper and pencil version had been completed. In this regard, although the mean total score of the e-HCL-32 was slightly higher when compared to the paper and pencil version, the difference was not statistically significant (HCL-32 = 17.73 vs. e-HCL-32 = 18.28).

The high specificity and, especially the PPV results found, should be taken with caution since they could be influenced by the characteristics of the sample which included a high proportion of bipolar patients. As it is widely known, the PPV is affected by the prior probability of the illness. However, since the HCL-32 is intended as a screening tool and not a diagnostic one, the main parameter to consider is the sensitivity of the test which showed good values (>90%). This is especially relevant in the screening of low prevalence illnesses like bipolar disorder [35].

Accessible, cost-effective and user-friendly instruments for clinical evaluation and research are necessary as they have the potential to reach a greater proportion of the target population. Internet tools meet these conditions proving to be as reliable and valid as traditional paper and pencil methods, with an adequate acceptability [20,32].

Regarding bipolar disorder, Internet tools have shown their validity as a useful screening method [32], which is important as early diagnosis is of paramount importance in the prognosis of this illness [9,10]. Similarly, other Internet-based interventions have been successfully implemented to cover different components of the treatment of this disorder such as online psychoeducation and psychotherapy programs [36–38], as well as online psychosocial assistance and self-management tools [39–41].

In summary, this study adds more evidence to the use of online assessment tools by showing similar psychometric properties of the e-HCL-32 compared to the paper and pencil questionnaire.

Conflict of interests

Prof. Vieta is a consultant or grant recipient of Almirall, Astra-Zeneca, Bristol-Myers-Squibb, Elan, Eli Lilly, Ferrer, Forest Research Institute, Gedeon Richter, Glaxo-Smith-Kline, Janssen-Cilag, Jazz, Lundbeck, Merck, Novartis, Otsuka, Pfizer, Roche, Sanofi, Servier, Schering-Plough, Shire, Sunovion, Takeda, Teva, and United Biosource Corporations. Other authors have no conflicts of interest to declare.

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