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Screening for psychological distress using the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS): Initial validation of structural validity in dialysis patients☆

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ABSTRACT

Objective: To validate the factor structure of the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS)- which is a composite measure of depression and anxiety using the Patient Health Questionnaire-9 and Generalised Anxiety Disorder Scale (GAD-7), in a sample of haemodialysis patients.
Method: Screening data ($n = 182$) used to select entry into a feasibility study of an online cognitive-behavioural therapy intervention for distress in dialysis patients were analysed here. Structural validity of the PHQ-ADS was evaluated using confirmatory factor analysis (CFA), assessing alternative models including a bi-factor model. In the bi-factor model all items from the PHQ-9 and GAD-7 (16-items in total) were loaded onto a general distress factor. Respective items of the PHQ-9 and GAD-7 were specified as subgroup factors. Omega-hierarchical was calculated to indicate the level of saturation of a multidimensional scale by a general factor. Construct validity was determined against the Brief Illness Perception Questionnaire.
Results: A bi-factor PHQ-ADS model had good fit to the data (chi-square = 96.1, $p = 0.26$, CFI = 0.99; TLI = 0.99; RMSEA = 0.02). The general distress factor accounted for approximately 84% of the explained variance (omega-h = 0.90). Distress scores were significantly higher in females compare with males. There was a significant association between distress and negative illness perceptions ($r = 0.58$, $p < 0.01$).
Conclusions: The PHQ-ADS appears to have good structural validity in haemodialysis patients and is sufficiently unidimensional to warrant the use of a total distress score. A full psychometric analysis of the PHQ-ADS in a larger sample of dialysis patients is warranted.

1. Introduction

Psychological distress, including symptoms of depression and anxiety, is highly prevalent among individuals with End-Stage Kidney Failure (ESKF) treated with dialysis [1–3]. Depression in particular has been well documented as a common extra renal comorbidity in approximately 30–40% of ESKF patients [2], and is associated with poor outcomes most notably increased mortality risk [4–7].

Within ESKF, depression symptoms have been evaluated using a variety of measures including the Beck Depression Inventory (BDI-II) [8,9] and the Patient Health Questionnaire-9 (PHQ-9) [10,11]. These tools appear to hold good validity as severity measures of depression among individuals with kidney disease [12,13]. Although less studied in the context of ESKF, anxiety is thought to be common in dialysis patients [14] and has typically been evaluated using the Hospital Anxiety Depression Scale (HADS) [15–19].

Although many of these measures have been well validated in general and patient populations, it has been recently argued that a distress composite measure or score for depression and anxiety symptoms could be beneficial [20]. The main premise for this argument is that depression and anxiety symptoms often coexist and interventional approaches (particularly psychologically based therapies) are effective at reducing both concurrently [20]. Furthermore, given the high co-existence between depression and anxiety severity measures often

produce moderate-high correlations between these constructs which implicates issues of multicollinearity in multivariate analysis [20]. For example, the correlation between the depression and anxiety subscales of the HADS is often high, questioning the unique separation these symptoms. A meta-confirmatory factor analysis of the HADS has revealed the presence of a strong underlying general factor concluding that a total score is more appropriately applied to indicate general distress [21].

Kroenke et al. [20] recently examined the validity of the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS), which is a composite score of depression and anxiety using the PHQ-9 [10,11] and Generalised Anxiety Disorder Scale (GAD-7) [22]. Data was utilised from three trials; two of which in patients with chronic musculoskeletal pain and the other in oncology patients. They found that a bi-factor measurement model was sufficiently unidimensional to warrant the use of a single composite score indicating distress. Moreover, the measure demonstrated adequate convergent and construct validity, in addition to preliminary evidence regarding sensitivity to change. Cut-off scores of 10, 20 and 30 are reported to correspond to mild, moderate and severe levels of distress (depression/anxiety).

The aim of the present study was to provide an initial evaluation of the PHQ-ADS structural validity in haemodialysis patients and to examine potential associations with clinical factors and illness perceptions. Screening data used to select entry into a feasibility study of an online cognitive-behavioural therapy intervention for distress in dialysis patients was utilised here [23,24]. We hypothesised that our findings would support those of Kroenke et al. [20], revealing evidence for a bi-factor measurement model underlying the PHQ-ADS with sufficient unidimensionality to warrant use of a total distress score.

2. Methods

2.1. Patients and study design

Established haemodialysis patients (HD) from the renal service of Guy's & St Thomas' NHS foundation trust were screened for depression and anxiety symptoms using the PHQ-9 and GAD-7 respectively ($n = 182$). As part of routine care, screening was delivered on-dialysis using IMPARTS (Integrating Mental and Physical healthcare: Research Training and Services) web-based screening interface [25]. IMPARTS has research ethics approval from the National Research Ethics Service Research Database Committee, which permits the use of de-identified data collected through IMPARTS for research purposes (ethics application reference number: 12/SC/0422). Patients were eligible to be screened providing they were ≥ 18 years old, received in-centre HD and could speak English. The screening process asked potential patients for permission to contact them about participation in the feasibility study. Patients who: had mild-moderately severe psychological distress symptoms, [scores of 5–19 on the Patient Health Questionnaire (PHQ-9) and/or a score ranging from 5 to 14 on the Generalised Anxiety Disorder questionnaire (GAD-7)] and who gave permission for research contact were then approached to seek consent for participation in the trial [23]. The study received NHS ethics approval.

2.2. Screening measures

2.2.1. PHQ-9 and GAD-7

Depression symptoms were assessed using the PHQ-9 [10,11]. The PHQ-9 assesses nine symptoms, with each item rated on whether the symptom has bothered the respondent "not at all", "several days", "more than half of the days" or "nearly every day" in the last two weeks. A sum score ranging between 0 and 27 indicates severity, with higher scores representing more severe depression. PHQ-9 scores of 5, 10, 15, and 20 represent mild, moderate, moderately severe and severe depression, respectively. The GAD-7 [22] has seven items with response options identical to the PHQ-9. A sum score ranging between 0 and 21

indicates severity, with higher scores representing more severe anxiety. Cut points of 5, 10, and 15 can be interpreted as representing mild, moderate, and severe levels of anxiety.

2.2.2. PHQ-ADS

PHQ-ADS is a composite measure of depression and anxiety, taken from summing the PHQ-9 and GAD-7 items [20]. Bi-factor CFA from three trial data sets provided evidence for a bi-factor structure underlying the PHQ-ADS, with sufficient unidimensionality to warrant a total score for distress. Scores can range from 0 to 48, with higher scores indicating more distress. The PHQ-ADS demonstrated good convergent and construct validity. Cut-points of 10, 20 and 30 can be used to indicate mild, moderate and severe levels of distress.

2.2.3. Illness perceptions

The Brief Illness Perception Questionnaire (B-IPQ) [26] was used to assess illness perceptions. Seven items measured beliefs about ESKF on different dimensions scored on a Likert scale from 0 (not at all) to 10 (extremely) including, *Consequences, Timeline, Personal Control, Treatment Control, Illness Coherence, Concern* and *Emotion*. As used in previous studies [27,28], a sum score was calculated for the B-IPQ. In the present study, higher scores indicate more unhelpful negative perceptions of ESKF.

2.3. Demographic and clinical data

As part of the IMPARTS screen the following data were collected automatically via electronic records; Age, gender, serum haemoglobin (g/L), serum albumin (g/L), and C-reactive protein (CRP, mg/L). CRP was categorised as above or below 5 mg/L to indicate the presence of inflammation (CRP > 5 mg\L). Comorbidities (presence of cancer, liver disease, lung disease, cardiovascular disease, ischemic heart disease, diabetes, peripheral vascular disease smoking status and history of depression) were recorded from medical notes (identified conditions listed), but only in patients who provided consent for their notes to be manually accessed *independently* from the routine IMPARTS screen ($n = 116/182$; 63.7%). Depression (PHQ-9), anxiety (GAD-7) and distress scores (PHQ-ADS) did not differ significantly between those with available comorbidity data and those without. A summary of patient demographic and clinical characteristics are shown in Table 1.

2.4. Statistical methods

Confirmatory factor analysis (CFA) was used to evaluate the factor structures of the PHQ-9, GAD-7 and PHQ-ADS, using Weighted Least-Squares with Mean and Variance adjustment (WLSMV) estimation. For the GAD-7, a unidimensional (1-factor) model was evaluated. Bi-factor

Table 1
Patient characteristics.

Variable	Statistic
Age (mean, s.d.)	54.9 (16.9)
Gender (male, %)	102 (56)
Haemoglobin g/L (mean, s.d.)	10.5 (1.5)
Serum Albumin g/L (mean, s.d.)	41.2 (4.5)
CRP[a] (> 5 mg/L, %)	79 (43.6)
Co-morbidities[a]	
Diabetes	38 (32.8)
Ischemic heart disease	29 (25.0)
Peripheral vascular disease	19 (16.4)
Cardiovascular disease	17 (14.7)
Liver disease	8 (6.9)
Lung disease	4 (3.4)
Current smoker	2 (1.7)
History of depression	2 (1.7)

[a] Noted from medical records-only available in a subsample ($n = 116$).