Journal of Affective Disorders 208 (2017) 615–620

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Generating an efficient version of the Edinburgh Postnatal Depression Scale in an urban obstetrical population

Jackie K. Gollan[a,*], Stephen R. Wisniewski[b], James F. Luther[b], Heather F. Eng[b], John Louis Dills[b], Dorothy Sit[a], Jody D. Ciolino[c], Katherine L. Wisner[a]

[a] Department of Psychiatry and Behavioral Sciences, Northwestern University Feinberg School of Medicine, 676 North St Clair Street, Suite 1000, Chicago, IL 60611 USA
[b] Epidemiology Data Center, Graduate School of Public Health, University of Pittsburgh, 127 Parran Hall, 130 DeSoto Street, Pittsburgh, PA 15261, USA
[c] Department of Preventive Medicine-Biostatistics, Northwestern University Feinberg School of Medicine, 680 N Lake Shore Drive, Suite 1400, Chicago, IL 60611 USA

ARTICLE INFO

Keywords:
EDPS
Pregnancy
Factor structure
Depression
Anxiety

ABSTRACT

Background: Postpartum depression incurs significant burden and suffering.
Methods: We investigated the latent structure of the most commonly used screening measure, the Edinburgh Postnatal Depression Scale (EPDS) in women (*N*=15,172) and tested its predictive validity for the diagnosis of depression as determined with a structured clinical interview. Exploratory and confirmatory factor analyses, Receiver Operating Characteristic curves, and logistic regression analyses were conducted.
Results: A seven-item one factor scale (items 1, 2, 6, 7, 8, 9, 10) emerged with a Goodness of Index Fit Index (GFI) =.96, relative to the ten-item two factor version of the EPDS (GFI =.94). The seven-item EPDS achieved good sensitivity and specificity in predicting the 10-item EPDS, with a cut point score of 4 on the seven item EPDS to predict a 10-item EPDS score of 10 or more (sensitivity =95%, specificity =91%). The seven and 10-item EPDS showed a similar ability to predict a diagnoses of depression (area under the ROC curve=.795 for the 10-item, .770 for the seven-item EPDS). Logistic regression analyses showed similar predictive ability between the seven- and 10-item scales in predicting scores higher than 18 on the clinical interview
Limitations: The sample represents women from one Midwest medical center and the EPDS was measured via phone.
Conclusion: The seven-item one factor version of the EPDS is an efficient and effective measure of depression severity on par with the two factor 10-item version of the EPDS.

1. Introduction

An efficient postpartum depression (PPD) case identification and intervention strategy holds the potential to reduce maternal disability and to avert a new generation at risk. The most commonly used screening tool world-wide for postpartum depression is the 10-item Edinburgh Postnatal Depression Scale (EPDS; 1), which is designed to assess depression in the last seven days. Despite its design as being a measure of depression, several items on the EPDS refer to anxiety. Numerous studies have conducted factor analyses on the EPDS to test its operational efficiency towards the goals of making a precise assessment of postpartum depression. For example, in Table 1, a variety of studies support the EPDS as a one-dimensional measure, though some studies suggest that three items do not contribute to the depression factor (Berle et al., 2003; Des Rivieres-Pigeon et al., 2000; Reichenheim et al., 2011; Teissedre and Chabrol, 2004). However, some investigators have identified a two-factor structure in samples of pregnant (Teissedre and Chabrol, 2004) and postpartum women (Astbury et al., 1994; Guedeney and Fermanian, 1998; Logsdon et al., 2009; Matthey et al., 2006; Pallant et al., 2006; Phillips et al., 2009; Pop et al., 1992), and others support a three-factor structure in samples of postpartum women (Bowen et al., 2008; Brouwers et al., 2001; Chabrol and Teissedre, 2004; Jomeen and Martin, 2005, 2007; Montazeri et al., 2007; Ross et al., 2003; Small et al., 2007; Tuohy and McVey, 2008). Given the variety of results, new work is necessary to investigate the extent to which the EPDS reflects the dimensions of depression and anxiety, towards generating an evidence-based screening measure with increased internal factor consistency and internal

* Correspondening author.
E-mail addresses: j-gollan@northwestern.edu (J.K. Gollan), wisniew@edc.pitt.edu (S.R. Wisniewski), luterhj@edc.pitt.edu (J.F. Luther), eng@edc.pitt.edu (H.F. Eng), jldills@gmail.com (J.L. Dills), Dorothy.sit@northwestern.edu (D. Sit), jody.ciolino@northwestern.edu (J.D. Ciolino), Katherine.wisner@northwestern.edu (K.L. Wisner).

http://dx.doi.org/10.1016/j.jad.2016.10.013
Received 18 July 2016; Received in revised form 4 October 2016; Accepted 17 October 2016
Available online 18 October 2016

Table 1
Item factor loadings of studies reporting factor analyses results of the EPDS.

Study	Number Factors`	Sample	Factor 1 Depression	Factor 2 Anxiety	Factor 3 Anhedonia
Adouard et al., 2005	2	28–34 weeks pregnant,*n*=60	1, 2, 7, 8, 9	3, 4, 5, 6, 10	
Astbury et al., 1994	2	English, 6–9 months postpartum, *n*=771	1, 2, 5, 7, 8, 9, 10	3,4,5	
Berle et al., 2003	1	Norwegian, 6–12 weeks postpartum, *n*=411	1–10		
Bowen et al., 2008	3	1st prenatal visit, *n*=400	1, 2, 8	3, 4, 5	10
Brouwers et al., 2001	3	Second trimester, *n*=197	1, 2, 8	3, 4, 5	10
Chabrol and Teissedre, 2004	3	French, 2–3 days postpartum, *n*=299	8, 9, 10	3, 4, 5, 6, 7	1, 2
Des Rivieres-Pigeon et al., 2000	1	French Canadian, 3–5 weeks postpartum, *n*=224	1, 2, 6, 7, 8, 9, 10	3, 4, 5	
Guedeney and Fermanian, 1998	2	4 months postpartum, *n*=87	3, 4, 5, 6, 7, 9	1, 2, 8, 10	
Jomeen and Martin, 2005	3	Late 1st trimester/early 2nd trimester, *n*=101	1,2, 6, 7, 8, 9	3, 4, 5	10
Jomeen and Martin, 2007	3	English, early 3rd trimester, *n*=148	1, 2, 8	3, 4, 5	10
Logsdon et al., 2009	2	Adolescents, postpartum 4–6 weeks, *n*=149	1, 2, 8, 9,10	3, 4, 5, 6, 7	
Matthey, 2008	2	6 weeks postpartum, *n*=238	1, 2, 6, 7, 8, 9, 10	3, 4, 5	
Montazeri et al., 2007	3	Persian, 6–8 weeks postpartum, *n*=100	3, 4, 5, 8	6, 7, 8, 9, 10	1, 2
Pallant, Miller, Tennant, 2006	2	Australian, 6 wks to 6 months postpartum, *n*=324	1, 2, 3, 4, 6, 7,9,10	5, 8	
Phillips et al., 2009	2	Australian, inpatient, newly delivered to 12 months postnatal *n*=309	1, 2, 6, 7, 8, 9, 10	3, 4, 5	
Pop et al., 1992	2	Dutch, 4 weeks postpartum, *n*=293	1,2,7,8,9,10	3,4,5,6	
Reichenheim et al., 2011	1	Brazilian, five months or less postpartum, *n*=811	1,2,6,3,4,5,6,7,8,9,10		
Ross et al., 2003	3	Canadian, 6 weeks postnatal, *n*=150	1,2,8, 9	3, 4, 5	10
Small et al., 2007	3	Australian, 6–7 months postpartum, *n*=313	3, 4, 5, 6, 7, 8, 9	1, 2, 10	
Teissedre & Chabrol, 2004	1	French, 4–6 weeks postpartum, *n*=722	1–10		
Tuohy and McVey, 2008	3	3–9 months postpartum, *n*=440	7, 8, 9, 10	1, 2	3, 4, 5

reliability.

Further, item factor loading across studies reporting factor analyses of the EPDS have reflected a multidimensional view of the EPDS across divergent cultures and nationalities, and phases of peripartum, producing a construct of an 'anxiety' factor comprised of items 3, 4, and 5. Strong correlations between the EPDS total score and anxiety subscales in pregnant women (Brouwers et al., 2001) range from *r*=.56 on the anxiety subscale of the Symptom Checklist-90-R (Derogatis, 1994) and *r*=.54 on the State Trait Anxiety Inventory, State and Trait versions, although correlations between the STAI and EPDS lack full support in the literature (Spielberger et al., 1970; Stuart et al., 1998). However, anxiety and depression factors have shown strong associations at weeks 14 and 30 postpartum (*r*=.73; *r*=.82, respectively) (Stuart et al., 1998), suggesting a shared dimensional substrate of reactivity evident in pregnancy (Jomeen and Martin, 2005). Using a two-factor 10 item version of the EPDS reduce the efficiency of the EPDS and may conflate symptoms of depression with anxiety.

A second area of debate is the acceptability of the cut-point for identifying women with major depression during postpartum. The proposed cut-off by the developers is an EPDS $\geq$13 producing a specificity =78% and positive predictive value =73% (Cox et al., 1987; O'Hara and Swain, 1996).[1] The EPDS has been associated with scores on the Hamilton Rating Scale for Depression ≥20 (Williams and Terman, 2003; Peindl et al., 2004). However, findings from other studies support a cut-point of EPDS ≥15 during pregnancy (Cox et al., 1987) though these cut-off scores vary depending on the version of the EPDS (Adouard et al., 2005). Further, inconsistencies emerge with Cox and Holden's (2003) suggestion that clinicians use a cutoff score of ≥10 as an indicator of postpartum depression when ample resources to conduct post-screening clinical interviews are available, and a higher cutoff score (≥13) when limited capacity for post-screening evaluation exists.

A third, and clinically relevant, issue is the use of the EPDS as an efficient method to detect depression. A review of 37 studies validating the EPDS (Gibson et al., 2009) determined the capacity of the EPDS to detect depression when compared to a structured diagnostic interview. Using the ≥10 criterion, the sensitivity ranged from 59% to 100% and the specificity from 44% to 97%, and the ≥13 criterion resulted in sensitivity -and specificity spanning similar wide ranges from 34% to 100% and 49–100%, respectively. To the extent that there are two or more factors (representing depression, anxiety, anhedonia), the question remains to what extent would women who screen 'positive' would also be diagnosed with Major Depressive Disorder (MDD)?

Given the debates in the field, identifying an efficient version of the EPDS using a large urban sample in the United States may offer clinical value and permit clinicians to ascertain depression, anxiety, or a dimensional trait related to common mental disorders during postpartum. As a protocol for universal screening of postpartum depression has yet to be implemented, seeking to identify the extent to which the EPDS can capture 'true positive' cases has high public health significance. Specifically, it supports non-mental health clinicians in their effort to measure characteristics of depression that can be addressed with a treatment plan, while also educating patients of symptoms that may relate to a condition that requires self-monitoring and professional care. The study aims were to: 1) identify the specific latent structure of the EPDS in a large-scale community study of women using factor analyses; 2) investigate the extent to which the factorial structure derived in Aim 1 can be replicated with the remaining sample with a refined structural model; 3) identify the extent to which we can use this EPDS to establish new threshold scores for a shortened version of the EPDS that correspond to the standard EPDS threshold for clinical use; and 4) evaluate the extent to which the shortened EPDS predicts severity of depression using the Structured Interview Guide for the Hamilton Depression Rating Scale with Atypical Depression Supplement (SIGH-ADS) (Williams and Terman, 2003).

2. Methods

2.1. Study description

This was a secondary analysis from a dataset entitled '*Identification and Therapy of Postpartum Depression Study* (Wisner, PI; NCT 00282776, funding period 09/01/2006-07/31/2011). Basic information about this protocol is described elsewhere (Wisner et al., 2013). This study involved case identification, diagnoses, and intervention of

[1] Specificity is defined as the ability of the EPDS to correctly classify a person as healthy; sensitivity is defined as the ability of the EPDS to correctly define a person as depressed; positive predictive value is defined as the percentage of participants with a positive EPDS who actually have depression.