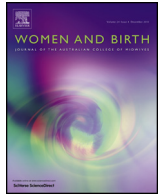




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ORIGINAL RESEARCH – QUANTITATIVE

## Translation and factor analysis of structural models of Edinburgh Postnatal Depression Scale in Serbian pregnant and postpartum women – Web-based study

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### ABSTRACT

**Background:** The Edinburgh Postnatal Depression Scale (EPDS) is well accepted for detecting symptoms of postnatal depression. The aim of this study was to examine psychometric properties and to evaluate structural models of the Serbian translation of EPDS in pregnant and postpartum women.

**Methods:** The original English version of the EPDS was translated into Serbian, and checked by means of back-translation. Data were collected via an anonymous online questionnaire posted on a Serbian website devoted to pregnancy topics. The study sample included 201 women (76 pregnant, 125 postpartum). The internal consistency of the scale was measured by Cronbach's  $\alpha$  coefficient. Principal component analysis was used to determine scale dimensions while confirmatory factor analysis was used to evaluate model fit.

**Findings:** Cronbach  $\alpha$  coefficient was 0.84 and 0.83 in pregnant and postpartum women, respectively, which indicated good internal consistency of the Serbian EPDS. Three dimensions of the scale were revealed in both groups of women. Goodness of fit indices described good and excellent model in pregnant and postpartum women, respectively. High level of depression symptoms (score  $\geq 13$ ) was recorded in 27.6% and 24.8% ( $p > 0.05$ ) of pregnant and postpartum women, respectively. Moderate level of depression symptoms (score 10–12) was recorded in 21.1% and 16.8% ( $p > 0.05$ ) of pregnant and postpartum women, respectively.

**Conclusion:** The Serbian translation of the EPDS showed good consistency and good model characteristics in pregnant and postpartum women. However, cut-off values, sensitivity and specificity of the scale should be determined in the further studies with more representative samples of women.

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### 1. Introduction

Antepartum and postpartum depression may have adverse effects on both mother and child. Depression in pregnancy may be an important risk factor for preterm birth, small size for gestational age, possibly low birth weight, and decreased breastfeeding initiation.<sup>1,2</sup> Postpartum depression is significantly increased in women with adverse pregnancy outcomes, especially when

related to the infant, and may increase interpersonal stress in the household, which subsequently contributes to reduced cognitive and social functioning of the child.<sup>2</sup>

The Edinburgh Postnatal Depression Scale (EPDS) was developed in 1987 by Cox et al., with purpose of detecting symptoms of postnatal depression in women.<sup>3</sup> Nowadays, the use of EPDS is well accepted in many countries.<sup>4</sup> The scale has been validated in pregnant, postpartum and non-postpartum women, as well as in men.<sup>3,5,6</sup> The validation of original version of EPDS showed the optimal cut-off value of 12.5 with sensitivity of 0.86 (95% confidence interval (CI) 0.70–0.95) and specificity of 0.78 (95% CI 0.63–0.88).<sup>3</sup> Explanatory factor analysis (EFA) and principal

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component analysis (PCA) were employed in the evaluation of EPDS characteristics in many studies. Cox et al. showed the original EPDS to be a one dimensional scale, but further studies revealed two or three dimensions.<sup>3,7–11</sup> These findings launched new research questions about the EPDS in terms of multidimensionality and potential detection of symptoms of anxiety and anhedonia by the sub-scales.

Few studies have used confirmatory factor analysis (CFA) when evaluating the EPDS with different groups of women. Factor analysis is essential for detailed specification of model assumptions, evaluation of model fit in different populations and gives better understanding of the relationship between the measured variables.<sup>7,12–15</sup>

Although more than 30 translated and validated versions of EPDS are available, the psychometric properties of the Serbian translation of the EPDS have not been described, in spite of its use in research.<sup>16</sup> The aim of this study was to examine the psychometric properties of the Serbian EPDS and to evaluate structural models of the EPDS in two samples of Serbian women (pregnant and postpartum) by using EFA and CFA. The aim was also to analyse differences of scale characteristics and scores between pregnant and postpartum women.

## 2. Participants and methods

### 2.1. Design

This is a cross-sectional web-based study. The study was a part of the multinational “Medication use in pregnancy” study where Serbia was one of the participating countries.<sup>17</sup> In Serbia, the study protocol was approved by the Ethics Committee for Clinical Trials of the Faculty of Pharmacy, University of Belgrade, Serbia.

A self-report questionnaire was developed in Norwegian and English for data collection in the “Medication use in pregnancy” study. The questionnaire was subsequently translated into Serbian for data collection among Serbian women. One part of the questionnaire included EPDS and questions about socio-economic and lifestyle characteristics of the women. The questionnaire was open to the public on the Serbian website devoted to pregnancy and child related topics ([www.ringeraja.rs](http://www.ringeraja.rs)) during the period October 1–November 30, 2011.

### 2.2. Study participants

Pregnant women at any gestational week and mothers with children younger than 1 year of age were eligible to participate. The exclusion criteria were multiple pregnancies and at least one missing value in EPDS. Participation in the study was anonymous and voluntary. Each woman had an opportunity to read all details about the study and to click “yes” if she wanted to participate, which was considered as informed consent. A total of 220 women accepted to participate in the study. Among them, 19 women were excluded from the sample (17 did not answer all the questions from the EPDS and 2 had multiple pregnancies). In total, 76 pregnant and 125 postpartum women were included in the study sample.

### 2.3. Assessment instrument

The EPDS was developed as 10 items instrument to identify depression symptoms in women during the postpartum period.<sup>3</sup> Each item consists of four statements about depression symptoms in the last seven days and is scored from 0 to 3 by order of statements. Accordingly, a total score of the scale could be from 0 to 30, where the higher score indicates a higher intensity of depression symptoms. According to the EPDS authors, a cut-off

value of  $\geq 13$  is considered to indicate a high level of depression symptoms, whereas scores of 10–12 are indicative of a moderate level of depression symptoms.<sup>3</sup>

### 2.4. Translation

The whole questionnaire, including EPDS, was translated into Serbian by two translators (M.O. and D.J., pharmacist and psychologist, respectively). It was back-translated by M.Z. (BA in English Language and Literature and US Registered Court Interpreter for Serbian) who did not have access to original English version. Back-translation was sent to the principal investigator (A.L.) who assessed the back-translated version as almost identical to the original.

### 2.5. Statistical methods

Descriptive statistics was used in description of categorical variables (expressed as frequencies and percentages) and continuous variables (expressed as means and standard deviations (SD)). Mean and proportion differences between pregnant and postpartum group of women were tested using *t*-test for independent samples and Chi-square test, respectively.

Psychometric properties of the Serbian version of EPDS were assessed for internal consistency of the instrument and measured by Cronbach's  $\alpha$  coefficient, where values  $\alpha \geq 0.9$  were considered excellent,  $0.7 \leq \alpha < 0.9$  as good,  $0.6 \leq \alpha < 0.7$  as acceptable,  $0.5 \leq \alpha < 0.6$  as poor and  $\alpha < 0.5$  as unacceptable.<sup>18</sup>

Factor structure and underlying dimensions of the EPDS in pregnant and postpartum women were checked by EFA and PCA, Varimax rotation and eigenvalue  $> 1$ . A coefficient level of  $> 0.40$  was chosen to indicate significant factor loading. Bartlett's test of sphericity with  $p < 0.05$  and Kaiser–Meyer–Olkin measure of sampling adequacy of 0.5 were used to check factor analysis.

Properties of the scale models in pregnant and postpartum Serbian women were examined by CFA. The scale models for each population were tested and confirmed using absolute fit indices (Chi-square test and Root Mean Square Error of Approximation (RMSEA)), incremental fit indices (Tucker–Lewis Index (TLI) and Comparative Fit Index (CFI)). A good scale model fit was confirmed if the chi square test was insignificant ( $p > 0.05$ ). The cut off value for RMSEA was 0.05, while values between 0.05 and 0.08 indicated fair fit and values over 0.10 indicated poor fit of data.<sup>19</sup> The cut off values of TLI and CFI were 0.9, and values over 0.95 indicated a good fit of data (excellent scale model).<sup>20</sup>

Statistical significance in all analyses was deemed likely if computed probability value was  $< 0.05$ . Data analysis was performed using Statistical Package for Social Science (SPSS) software (SPSS 18.0 for Windows, SPSS Inc., Chicago, IL, USA) and Analysis of Moment Structure Version 7 (AMOS 7).

## 3. Findings

### 3.1. Socio-demographic characteristics

The mean week of pregnancy in the group of pregnant women was  $25.7 \pm 8.5$ . The infant age was  $\leq 28$  weeks in 36.8% of postpartum women. Characteristics of the study sample are provided in [Table 1](#).

### 3.2. Reliability of the EPDS scores

Cronbach alpha coefficients for the total scale were 0.84 and 0.83 in pregnant and postpartum women, respectively. Accordingly, the Serbian EPDS showed good internal consistency in both groups.

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