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A comparison of the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Depression Screening Scale (PDSS) for peripartum depression screening

# Bachelorprojekt

# Abstract

# Problem Statement

· Does EPDS or PDSS offer the largest area under the curve in a receiver-operating-characteristics-curve?

· What are the trade-offs in deciding on an appropriate cut-off value for each questionnaire in this setting?

# 1. Introduction

*The basic background to the question you will work with, ending with a  brief and clear statement of the aim of your work, one aim being better than more aims (!). In this section you may cite individual articles, reviews and other (hopefully) reliable sources (e.g. textbooks). Brevity and clarity are basic virtues.*

Major depressive Disorder (MDD) is defined by the following diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders V (DSM-V) (pp. 160-161)1:

1. “Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.
   1. Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g. feels sad, empty, hopeless) or observation made by others (e.g., appears tearful).
   2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation).
   3. Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly evert day.
   4. Insomnia or hypersomnia nearly every day.
   5. Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down).
   6. Fatigue or loss of energy nearly every day.
   7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).
   8. Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
   9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.
2. The symptoms cause clinically significant distress or impairment in social, occupational, or other areas of functioning.
3. The episode is not attributable to physiological effects of a substance or to another medical condition.”

Minor depressive disorder (mDD) is not specified in the DSM-V, but was specified in the DSM-IV-TR (pp. 320-350){Anonymous:2013tn} as 2 to 4 of the abovementioned symptoms (A1-A9) during a 2-week period.

Both disorders can be appended the specifier “with peripartum onset” if the onset of the current or most recent episode of major depression occurs during pregnancy or in the 4 weeks following delivery{Association:2013vi}, p. 186. In this case this thesis will refer to MDD as major peri-partum depression (MPPD) and mDD as minor peri-partum depression (mPPD).

The incidence of MPPD is 3-6%, p. 186{Association:2013vi}. One can therefore easily argue that MPPD is an important health problem, as it has been argued that depression carries negative consequences for mother, child and family. While the aetiology of depression is not well understood, early treatment is more effective due to prevention of future negative consequences, and cost-effective treatment is availabe{Chisholm:2016bk}.

Postpartum Depression Screening Scale (PDSS)

Edinburg Postpartum Depression Scale (EPDS)

Receiver-operator characteristics (ROC)

# 2. Methods

**Search string**

("screening”[title] AND (“EPDS” OR “Edinburgh Postnatal Depression Scale”) AND ("Postpartum Depression Screening Scale” OR “PDSS”))

AND

(“comparative study”[publication type] OR “combined”[title] OR “comparison”[title] OR “comparative”[title])

AND

(“sensitivity” OR “specificity”)

NOT

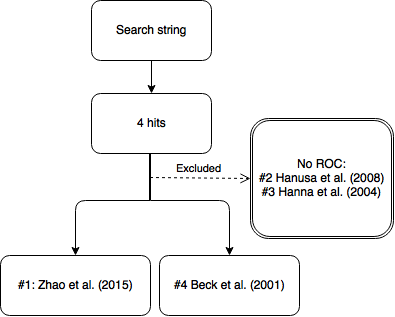
(“review”[publication type])

This is a Bachelor’s thesis and must therefore be written within certain boundaries. For this reason, the search-scope has been narrowed extensively.

“Pga. vejleder […], ellers ville jeg”

Searches were performed in the PubMed database.

The search-string consists of 4 blocks.

1. Subject matter.
2. Only comparative studies, as to isolate the characteristics of the questionnaires. Comparing the questionnaires via studies with information on only one questionnaire would run the risk of comparing the demographics of the studies, not the qualities of the questionnaires. – formulér bedre
3. Studies must use the word sensitivity or specificity in their abstract, to increase the chance of them supplying it in the article.
4. Reviews were excluded as we were instructed to use only original articles.

This search string returns 4 hits. Articles that did not contain ROC-curves (n = 2) were excluded.

This leaves us with two suitable articles, Zhao et al. and Beck et al.

# 3. Findings

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Criterion** | **Beck et al. (2001)** | | **Zhao et al. (2015)** | | |
| **Sample size** | 150 | | 842 | | |
| **Inclusion criteria** | · Age ≥ 18  · Able to speak and read English  · 2-12 weeks post-partum  · Delivered a live, healthy infant | | · Obstetric complication  · Pregnant (i.e. antepartum) | | |
| **Recruitment** | · Invitation during “Preparation for child-birth classes” (n = 122)  · Newspaper advertisement (n = 28) | | · Convenience sampling of all women with obstetric complications attending the antenatal clinic at Fudan University Hospital | | |
| **Age (mean ± S.D.)** | 30.5 ± 3.7 | | 31 ± 4.82 | | |
| **College or higher** | 81% | | 87.2% | | |
| **Major ethnicity** | White (87%) | | Asian (100%) | | |
| **Country** | United States | | China | | |
| **Language** | English | | Chinese | | |
|  | **Weeks since delivery (mean ± SD)** | | **Gestational weeks** | | |
|  | 5.6 ± 1.52 | | ≤ 12 | | 6.8% |
| 13-27 | | 49.0% |
| 28-34 | | 39.7% |
| ≥ 35 | | 4.5% |
| **Chronology\*\*** | Prospective study | | Prospective study | | |
| **Reference-standard test** | DSM-IV diagnostic interview | | Not applicable | | |
|  | **EPDS** | **PDSS** | **EPDS** | **PDSS** | |
| **Cut-off (MPPD)** | 12/13 | 79/80 | 12/13 | 79/80 | |
| **Cronbach’s α(entire test)** | 0.89 | Not reported | 0.78 | 0.95 | |
| **AUC (MPPD)** | 0.96 | 0.98 | 0.898\* | 0.983\* | |
| **AUC (MPPD & mPPD)** | 0.83\* | 0.91\* | 0.822\* | 0.979\* | |
| **RI administration delay\*\*\*** | None | | N/A | | |
| **Interviewer** | Nurse psychotherapist  (n = unknown) | | N/A | | |
| **Blinding** | Yes (interviewer blind to scores, blinding to clinical information not specified) | | N/A | | |
| *\* EPDS vs. PDSS statistically significant (p < 0.001)*  *\*\* Prospective: Demographic information collected before administration of tests*  *\*\*\* Time delay between administration of index test and reference test* | | | | | |

The sample size of Beck et al.2 is smaller than that of Zhao et al.3, 150 vs. 842.

Beck et al. include only women that are 2-12 weeks post-partum and delivered a healthy infant. Zhao et al. include only women that are antepartum and have had obstetric complications.

Both articles recruit based on convenience rather than for a specific demographic.

The population ages and educations of the two articles are comparable.

Beck et al. examine mostly white women whereas Zhao et al. examine Asians. This is also represented in the languages spoken.

The women participating in Beck et al. are 5.6 ± 1.52 (mean ± SD) weeks post-partum.

Both studies are prospective.

Beck et al. employ the DSM-IV diagnostic interview as their reference-standard test. Zhao et al. employ no DSM-IV reference-standard test.

Both tests employ the same cut-offs.

The PDSS has a larger ROC in all the results, but statistical significance is only reached in a subset of results.

The number of interviewers is unknown in Beck et al.

# 4. Discussion

For a comparison of articles to make sense, the methodology of the articles must be adequately similar.

**4.1 Test protocol**

**4.1.1 Construct**

*4.1.1.1 Construct similarity*

Beck et al. examine postpartum whereas Zhao et al. examine antepartum. In the DSM-V, depressive disorders can be appended the qualifier ‘with peripartum onset’ if manifestation is during pregnancy or in the 4 weeks following birth1. Following this example, ante- and postpartum depression are not examined as two separate constructs in this thesis.

The PDSS is made specifically for post-partum depression, as seen in some of its questions: “I had trouble sleeping even when my baby was asleep.”2 This question makes no sense in the context of antepartum depression, Presumably, Zhao et al. must have modified this question. No such information is given in Zhao et al.

Beck et al. published their article before the publishing of the DSM-V. A natural concern is that their diagnostic criteria for depression would be different than the ones of Zhao et al. However, both articles use a semi-structured interview with the diagnostic criteria of the DSM-IV as their reference-standard. Secondly, the DSM-V has seen no modifications in the criteria for depression relevant to this thesis, except that the specifier ‘with peripartum onset’ has been added4.

To imply unity among researchers around the criteria of peripartum depression would be excessive, but the working construct of this thesis and the included articles is the construct of the DSM-V.

**4.1.2 Index test**

*4.1.2.1 Index test comparability*

The comparability of the English and Chinese version of the PDSS is ensured by proper forward-backward translatability and validation5. The same holds true for the EPDS6.

*4.1.2.3 Chronology*

Both articles collect demographic information before administration of tests. This ensures that test-results do not affect participant reporting of demographic information.

**4.1.3 Reference standard**

For an analysis of a screening tool to be meaningful, a suitable reference-standard test must be used.

In the case of depression, the accepted reference-standard in the literature is a DSM-structured or semi-structured diagnostic interview. A discussion of whether this choice is valid is outside the scope of this thesis.

*4.1.3.1 Inter-observer variation*

The interview appears to have sufficient interrater reliability with Cohen’s kappas between .7 and 1 for each dimension7,8. An assessment of inter-observer variation for the present observers would have strengthened the results of the studies.

In Beck et al. the interviewer is a nurse psychotherapist. There is no explicit information on whether multiple therapists are used.

*4.1.3.1 Diagnostic review bias*

Every interviewer can affect the interview differently. It is therefore vital that the interviewer is blind to the scores of the screening test and, in the case of multiple interviewers, their concordance is assessed. If the interviewer preferentially diagnoses patients as depressed if they scored highly on one test, this test’s sensitivity and specificity will be artificially inflated.

In Beck et al., the interviewer is blind to the screening results and can therefore not affect the comparison of the questionnaires.

Whether the interviewer is blind to clinical information is not specified. There is therefore a risk of bias.

*4.1.3.1 Diagnostic test comparability*

The comparability of the Chinese and English versions of the DSM-IV interview is not sufficiently accounted for. The major study validating the translation contain very few cases of depression9. This weakens a comparison of the studies.

To estimate sensitivity and specificity, information on both true negatives, true positives, false negatives and false positives must be obtained. To know false positives and negatives, all screening results must be confirmed by a reference-standard test. In Zhao et al. this is not the case, as the reference-standard test has not been administered to all participants:

“Relative to other studies that reported the sensitivities and specificities of the screening measures for postpartum depression in comparison with diagnostic instruments […] the present study combined two depression screening tools […] to determine the efficacy without comparison with any diagnostic (e.g., SCID or DIS) instruments.” (p. 117 bottom left)

While many such methods exist, they all come with different methodological considerations and should be employed when a reference-standard test is not available10. Due to Zhao et al. not reporting which method they have used, any analysis of their statistical methodology is reduced to guess-work, and one must therefore hold the conclusions of the study in very low regard.

**4.1.4 Study populations**

In general, the method of recruitment and composition of the participants will only affect the generalisability of the results, not the internal validity.

*4.1.4.1 Demographic features*

Variation in the cultural manifestations of depression can affect the difference between the results of the two studies if one test’s questions more adequately encompass the dimensions of one culture. A generalized recommendation across cultures can therefore be dubious. Given that both studies favour the PDSS, this effect does not appear to influence the comparison critically.

In Beck et al., the mothers’ mean number of days since delivery was 39 (SD = 10.67). If the distribution is approximately symmetrical around the mean, a large amount of the participants will exceed the 4-week postpartum criterion for the DSM-V specifier of peripartum depression. The reasoning for this cut-off in the DSM-V is not expanded upon, and it’s therefore hard to gauge the severity of this discrepancy. It does, however, weaken the comparability of the study to the working-construct.

81% of the women in Beck et al. held at least a college degree. This number is abnormally high for the US, where the average number is 44% for 25-29 year olds, and 42% for 25 and over11. For this to affect the comparison between the questionnaires, one questionnaire must systematically result in a different result due to the educational level of the study participants. Given that the questionnaires read at a 3rd grade level, this seems unlikely.

*4.1.4.2 Disease prevalence*

Zhao et al. exclusively examine women with obstetric complications. Obstetric complications are a stressor, but it seems unlikely that they will change the peripartum depression construct in a way that will favour either scale, seeing as neither scale contains questions regarding obstetric complications. It might, however, increase the prevalence of depression and therefore be a source of variation for sensitivity and specificity12. The mode of this association is not known to the author of this thesis, however an association has been found empirically. This variation would not bias a comparison of the two tests.

*4.1.4.3 Population size*

Neither study has done calculations on the amount of participants required to attain sufficient statistical power. Such methods are readily available13. The articles therefore run the risk of recruiting either too few or too many participants, resulting in insufficient statistical significance or an unnecessarily high cost of information, respectfully. This has manifested itself in only one AUC-comparison reaching statistical significance in Beck et al. P < 0.05 is only a guideline, however, and every AUC in Beck et al. favours the PDSS. The P-values trend inversely with the number of subjects in each group, indicating that the number of subjects, rather than an underlying lack of difference in AUC, might be able to explain the P-values.

**4.1.5 Flow and timing**

*4.1.5.1 Disease progression bias (time difference between index test and reference test)*

In Beck et al., the reference-test is administered immediately following the index-test. The risk of disease-progression bias is therefore minimal.

*4.1.5.2 Induction of signal by questionnaire*

Each questionnaire might affect the mental state of the patient and therefore the patient’s response on the second questionnaire. It is therefore important that the questionnaires be administered in random order. This is the case for each study, however, neither study presents whether this randomization has been successful. This weakens the conclusions of the studies.

**4.1.6 Considerations in selection of optimal cut-off value**

*4.1.6.1 Consequences of a false-positive*

The consequence of a false-positive screen in a well-managed hospital is a diagnostic interview. However, a positive screen might affect point-of-care behaviour independently of the diagnostic interview due to inappropriate labelling14. The stress imposed on the women from this is gauged to be minimal. Given the history of downplaying the consequences of a positive screen in breast-cancer screening, further research is needed.

*4.1.6.2 Consequences of a false-negative*

A false negative might falsely reassure caregivers into believing that depression is not a possibility. This can lead to a lack of appropriate treatment and therefore worse outcomes for the patient.

Deciding on the optimal cut-off score is therefore not simply a question of finding the point on a ROC-curve closest to the top-left corner, but a consideration of the above trade-offs.

For this thesis’ comparison to be improved upon, further studies are needed with better methodology consistent with the accepted practices and with sufficiently large study populations to warrant conclusions for both major and minor depression. A broader search scope would be relevant for a comprehensive meta-analysis.

# Conclusion

Both studies indicate that the PDSS is the most precise questionnaire, however, due to the methodological discrepancies between the studies no firm recommendation of either questionnaire can be made. Further research is needed.

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