Published in final edited form as:

Gen Hosp Psychiatry. 2009 ; 31(4): 327–333. doi:10.1016/j.genhosppsy.2009.03.005.

Typical Somatic Symptoms of Pregnancy and Their Impact on a Diagnosis of Major Depressive Disorder

Kimberly Ann Yonkers, M.D.^{1,2,3}, Megan V. Smith, Dr.Ph.³, Nathan Gotman, M.S.³, and Kathleen Belanger, Ph.D.³

¹Department of Psychiatry, at the Yale School of Medicine

²Department of Obstetrics, Gynecology and Reproductive Sciences at the Yale School of Medicine

³Department of Epidemiology and Public Health at the Yale School of Medicine

Abstract

Objective—We sought to determine whether trimester of pregnancy influences the ability to diagnose major depressive disorder (MDD).

Method—838 subjects completed a Composite International Diagnostic Interview and the Edinburgh Postnatal Depression Scale (EPDS) before 17 weeks pregnant, at 26–30 weeks of pregnancy and 4–12 weeks postpartum. Subjects responded to a checklist of MDD symptoms regardless of stem question endorsement. We compared rates of symptom expression by response (Y/N) to stem questions, and trimester, using logit analysis. Receiver Operating Curves determined optimal EPDS thresholds.

Results—Most symptoms from the DSM-IV checklist were endorsed significantly more often in the first compared to later trimesters (Odds Ratios ranged from 1.39–14.16 for the first vs. later trimesters), independent of response to depression stem questions or medication treatment. Despite this, stem positive and stem negative groups differed significantly for 10 out of 13 symptoms (Odds Ratios 2.29–6.89), independent of trimester. The EPDS had an optimal cutoff of 10 and showed acceptable predictive value.

Conclusions—Pregnant women commonly experience somatic and other symptoms in this first trimester but depressed women still differ from those who are not depressed. “Appetite increase,” “oversleeping” and “increase in energy” (e.g. agitation). were uninformative with regard to an MDD diagnosis.

Keywords

Mood disorders/unipolar; Obstetrics and Gynecology; Pregnancy; Women

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Please address correspondence to Dr. Yonkers at: 142 Temple Street, Suite 301, New Haven, Connecticut, USA Fax: (203) 764–6766; E-mail: Kimberly.Yonkers@yale.edu.

In the past year, Dr. Yonkers received research grants from Eli Lilly and study drug from Pfizer for an NIMH trial. Drs. Belanger and Smith and Mr. Gotman have nothing to disclose.

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INTRODUCTION

It is widely acknowledged that women who become pregnant experience alterations in sleep, appetite/weight, energy and possibly concentration. Candidate symptoms for a depressive disorder also include disruptions in sleep, changes in appetite or weight, fatigue, psychomotor retardation, and difficulty concentrating. Some suggest that the overlap between selected symptoms of depression and the normative experiences of pregnancy render it difficult to make a diagnosis of depression in pregnant women.[1] On the one hand, clinicians and patients may attribute symptoms to pregnancy rather than to a depressive disorder. Alternatively, clinicians and especially researchers who rely on the use of standardized questionnaires may over-diagnose a depressive disorder in pregnant women if they consider somatic experiences “pathological” rather than normal.[1] As a potential solution, some researchers recommend elimination of questions that assess somatic and behavioral symptoms of pregnancy when screening and diagnosing mood disorders in pregnant women. [1-3] The relevance of somatic symptoms to the criteria for a depressive disorder has also been questioned by Zimmerman et al and Andrews [4] who note that they may confound a diagnosis of major depressive disorder (MDD) among individuals with a general medical condition. [5] On the other hand, sleep, energy and appetite vary across gestation and may confound the assessment of a depressive disorder at one time but not another. Moreover, behavioral and somatic complaints expressed by depressed pregnant women have been found to statistically relate to the severity of a mood disorder [6] and when strongly endorsed, may alert clinicians to the existence of a depressive disorder in pregnancy.[7]

Depression screening measures are used to identify women who have are at high risk for a depressive disorder and hence require additional clinical assessment. In pregnant and postpartum women, a measure that is widely used is the Edinburgh Postnatal Depression Scale (EPDS).[2] Although this questionnaire asks about sleep, it does not rely on other somatic or behavioral symptoms to identify women at risk for a unipolar mood disorder. This may lessen confounding by somatic and behavioral symptoms. However, even a screening measure such as this may have operating characteristics that change across pregnancy and the postpartum period.[8,9] Repeat longitudinal assessments from a large cohort of pregnant women may help to clarify whether there are changes in the performance of diagnostic and screening instruments for depression during different stages of pregnancy.

In this report we aimed to: 1) determine if the rates of behavioral and somatic symptoms in pregnant women vary across trimesters and independently of a possible depressive disorder diagnosis; 2) assess whether somatic and behavioral complaints differ between women who did versus did not endorse gateway symptoms that are necessary for a depressive disorder diagnosis (e.g. depressed mood, diminished interest or discouragement); 3) compare rates of a depressive episode during each trimester of pregnancy using standard DSM IV criteria and the criteria given by Zimmerman and colleagues [5] that eliminate somatic symptoms ; 4) compare the performance of a screening measure (the EPDS) during the three trimesters of pregnancy to assess whether the stage of pregnancy, during which somatic and behavioral symptoms vary, influences optimal thresholds for a possible depressive disorder.

METHOD

Inclusion/Exclusion Criteria

Subjects in this analysis were the first 838 qualifying participants of the Yale Pink and Blue Study, a longitudinal cohort study investigating the effects of depression and antidepressant treatment on birth outcomes. For this analysis, we included women who were screened and interviewed for the Yale Pink and Blue Study and also participated for sufficient time to have experienced the two follow-up interviews. Women were eligible to participate if they were

intending to deliver at a participating hospital, were at least 17 years of age, had not yet completed 17 weeks of pregnancy and were willing to provide informed consent. Women were ineligible if they had a known multi-fetal pregnancy, required insulin for diabetes, did not speak English or Spanish, had plans to relocate or intended to terminate their pregnancy.

From interested respondents, we invited an “exposed group” who were either depressed or at risk of developing a depressive disorder to participate. This group included women who endorsed depressed mood or treatment for depression currently or within the past five years, and women who had experienced a traumatic event and had symptoms of re-experiencing that event. We also randomly selected one out of every three women who had neither a diagnosis of, nor treatment for a depressive disorder in the last five years nor a history of trauma and re-experiencing, as “non-exposed” controls.

Subject Recruitment and Retention

We recruited women from their clinicians’ offices or from hospital-based clinics in Connecticut and Western Massachusetts between 2004 and 2008. We initially interviewed participants face-to-face, usually at home, before 17 completed weeks of pregnancy. Participants were re-interviewed by phone at 30 ($\pm$ 2) weeks of pregnancy and again at 8 ($\pm$ 4) weeks postpartum. Subjects were reimbursed \$20 per interview and a \$20 bonus for all three interviews. Approval for the study was obtained from the Human Investigation Committee at Yale University School of Medicine and from affiliated hospitals and all participants provided verbal and written consent.

Our recruitment flow is illustrated in Figure 1. By Oct 14, 2006, we screened 3161 women, including 596 (19%) who potentially had a psychiatric illness, recent history of an illness or were taking psychotropic medication, and another 1485 (47%) who had none of the stipulated exposures. We randomly selected 487 (33%) of the women with no exposures to participate as a comparison group. Of the 1083 potentially eligible women, we interviewed 928 (86%) women within the cut-off date for this dataset. Seven hundred and sixty (82%) women successfully completed both subsequent interviews and 88 (9%) completed one of the two remaining interviews. We excluded ten of the 848 women who completed a face-to-face interview due to uncertainty about their pregnancy dates, leaving 838 subjects available for the final analysis.

Assessment Procedures

All interviews included the depression and anxiety disorder sections of the World Mental Health Composite International Diagnostic Interview (WMH-CIDI) [10] a valid and reliable lay interview.[11] Interviewers underwent at least 4 days of training and completed a minimum of 6 practice interviews and at least two fully supervised interviews each type before becoming eligible to conduct independent interviews. Interviews were audiotaped with permission of the subject. After completed, they were checked and coded with reference to the audiotape as needed. Additionally, a random sample of 10% were assessed for reliability. This included a supervisor call to the subject to confirm critical information (~5%) or complete review of the audiotape and comparison to the written interview (~5%).

The WHO CIDI 2.1 interview asks lifetime and 12 month time frames. We adjusted time frames to obtain information by 28 day months across pregnancy. The WHO-CIDI asks about possible low mood or anhedonia or discouragement. According to CIDI instructions, only subjects who endorse these problems are typically asked about additional depressive symptoms since these questions are mandatory for a diagnosis of major or minor depressive disorder. However, all subjects were asked at all three interviews about possible behavioral, cognitive and somatic symptoms of depression since we hoped to assess the relevance of these experiences to a

diagnosis of depression during pregnancy. The symptoms asked of all subjects included; 1) appetite decrease, 2) appetite increase, 3) trouble sleeping, 4) oversleeping, 5) decrease in energy, 6) increase in energy, 7) moving slowly, 8) feeling jittery, 9) thinking slowly, 10) racing thoughts, 11) trouble concentrating, 12) indecisiveness, and 13) feeling guilty/worthless. Subjects who answered negatively to the stem questions were not asked about possible suicidal ideation although this was captured for those who responded affirmatively to a stem question.

Subjects were administered the EPDS at each interview.[2] The EPDS collects information about symptoms from the prior week and was designed for use with pregnant and postpartum women. It has 10 items and scores range from 0 to 30 with a cut-off of ≥ 12 indicating a possible depressive illness.[2] In depression screening, the sensitivity has been found to vary from 65%–100%, while specificity estimates ranged from 49% to 100%; positive predictive value estimates ranged from 22% to 79%.[12] This scale shows good internal consistency (Cronbach's $\alpha = 0.87$) and has been used in different languages and cultures. [13]

Additional data collected included demographic, educational, obstetrical and treatment (medication) information. We obtained information on childhood and adult trauma and abuse as well as stress, which will be the topic of future reports.

Analytic Approach—We collected information on depressive symptom expression on a month-by-month basis. For ease of presentation, we collapsed monthly data into trimesters and considered an individual positive for a symptom in a particular trimester if she expressed the symptom for at least 14 days during the trimester. Similarly, use of at least one dose of medication during any given trimester was coded as positive for use of medication for that trimester.

A goal of this analysis was to explore the role of the various somatic, cognitive and behavioral symptoms in determining a diagnosis for a depressive disorder in pregnancy. This precluded use of these symptoms to initially diagnose major depressive disorder. Instead, we relied on the results of the CIDI depression module “stem questions,” i.e. feeling sad or discouraged or uninterested for 14 continuous days during a month to determine whether someone was likely depressed. We selected these symptoms because at least one is obligatory for a diagnosis of minor or major depressive disorder. Because our goal was to explore possible differences in symptom expression over time, we allowed depression group membership to vary by trimester. Thus, a subject who was positive for a stem question in the first trimester but not the others was included in the possibly depressed group for the first trimester but was in the not depressed group for the other trimesters.

For the longitudinal analysis, we classified participants who answered affirmatively to any of the stem questions as depressed for that particular trimester. Antidepressants can have side effects that can alter symptom expression (e.g. increase or decrease sleep). Because of this, we included an indicator variable for subjects who took antidepressant medication. This indicator was allowed to vary by trimester. We used analysis of variance (ANOVA) to compare crude stem positive and medication use rates across trimesters.

We categorized age as less than 20 years old, between 20 and 35, and 35 years old or greater. Education was grouped as less than high school, high school, some college, and college or greater. Number of previous live births was categorized as 0, 1, and 2 or more.

Data on the number of symptoms, depression and medication use varied by trimester. For each symptom, in order to estimate whether there were differences between stem positive or negative women, or expression by trimester, we used a generalized linear mixed model with logit link

that accounted for within subject correlation. Parameters for each model were estimated using generalized estimating equations (GEE) and an unstructured correlation matrix. Group differences for depression, trimester, and medication were calculated using linear contrasts. For each symptom, age, education, parity, race, and marital status were considered as covariates, but only the most relevant factors were included in each final model.

To determine whether the point of assessment in pregnancy influenced the performance of the EPDS, we constructed receiver operating characteristic curves, which plot the “true positive” rate (sensitivity) on one axis and the “true negative” rate (1-specificity) on the other axis . [14] The optimal threshold for identifying a possible case of MDD was determined after application of standard DSM IV criteria to subjects. The time frame for the EPDS is one week and for MDD, information was collected according to a one month (28 day) interval. In order to best match time frames, we used the CIDI month that was closest to administration of the interview and hence most proximal to administration of the EPDS. First trimester EPDS was compared to MDD in pregnancy month 3, second trimester EPDS to pregnancy month 7, and third trimester EPDS to pregnancy month 10.

Finally, to directly assess whether rates of MDD are confounded by somatic symptoms of pregnancy, we used the system employed by Zimmerman et al [5] to define MDD in our cohort. These criteria eliminated appetite changes, sleep disturbance, fatigue and psychomotor changes. Rather than five symptoms, these criteria stipulate only three symptoms for a diagnosis of MDD. We used the Kappa statistic and asymptotic 95% confidence intervals to compare rates of MDD after application of standard DSM IV criteria and Zimmerman criteria.

Results

The demographic characteristics of the cohort are given in Table 1. The majority of women were between 20 and 34 years old (69%), completed college (57%), were non-Hispanic white (80%), married (74%), and had planned their pregnancy (64%). However, a substantial minority did not fit these characteristics. Of the 838 women, 349 (42%) had no prior live births.

The rates of affirmative endorsement for at least one stem question, by trimester were 9% (n=72), 5% (n=41) and 3% (n=27). Rates of medication use were 12% (n=98), 9% (n=71) and 8% (n=62). Both probable rates of depression ($p<.0001$) and rates of medication use ($p=.02$) differed significantly across trimesters. After application of standard CIDI diagnostic algorithms, only 2 women had MDD in every trimester, and 5 women had either MDD or minor depressive disorder (MinD) in every trimester. Comparatively, 779 (93%) women had no reported MDD and 733 (87%) women had no MDD or MinD.

Positive responses to the stem questions tended to cluster together. The number of positive responses to the stem questions decreased over time but this pattern of clustering held during subsequent trimesters. The CIDI considers “sad” and “discouraged” as one item and thus we grouped these together. In the first trimester, 58 (7%) women responded affirmatively to the “sad/discouraged” stem questions as well as the “uninterested” stem question. These rates were 32 (4%) and 19 (2%) in the second and third trimesters, respectively. Only 14 (2%) endorsed either “sad/discouraged” or “uninterested” questions in the first trimester, 9 (1%) in the second trimester and 8 (1%) in the third trimester.

Crude symptom rates decreased after the first trimester (Table 2) while endorsement of symptoms varied widely. For example, 73% of the population experienced “decrease in energy” in the first trimester compared to 3% who were “feeling jittery”. In the second and third trimesters these percentages dropped to 31% and 29% for “decrease in energy” and 1% and 2% for “feeling jittery” in the second and third trimesters, respectively. Most of the other symptoms showed similar decreases after the first trimester. On average, participants endorsed

3.29 symptoms (95% CI: 3.15—3.43) in the first trimester compared to 1.79 (95% CI: 1.66—1.93) in the second trimester and 1.41 (95% CI: 1.29—1.53) in the third.

Odds ratios for expression of symptoms during the first trimester compared to the second and third trimester are presented in Table 3. These results controlled for endorsement of stem questions (Y/N) and medication use in an attempt to understand the effects of pregnancy independent of stage of pregnancy or medication use. Eight of the thirteen symptoms, including “appetite decrease”, “appetite increase”, “oversleeping”, “decrease in energy”, “moving slowly”, “thinking slowly”, “racing thoughts”, and “trouble concentrating” were significantly higher in the first trimester than the second and third, respectively. Additionally, “trouble sleeping” was significantly higher in the first trimester compared to the third, and “feeling jittery”, “indecisive”, and “feeling guilty/worthless” were significantly higher in the first compared to the second trimester. The exception was that the symptom “increase in energy” was slightly lower in the first trimester compared to the second.

Overall, women who responded affirmatively to a stem question for MDD had more symptoms than women who did not offer a positive response to these symptoms. Women who were treated with antidepressant medication had only slightly more symptoms than non-medicated women (see Table 4). Ten of thirteen symptoms, including “appetite decrease”, “trouble sleeping”, “decrease in energy”, “moving slowly”, “feeling jittery”, “thinking slowly”, “racing thoughts”, “trouble concentrating”, “indecisive”, and “feeling guilty/worthless” had significantly higher occurrence in the stem question-positive group compared to the stem question negative group. Four of the thirteen symptoms, “oversleeping”, “decrease in energy”, “racing thoughts”, and “trouble concentrating” had significantly higher rates for women who took medication compared to the non-medicated group.

The ROC analysis indicated that the optimal threshold of the EPDS for detection of an individual who has a probable CIDI diagnosis of MDD was 10 in all three trimesters. (see Table 5). Sensitivity and specificity were slightly higher in the second trimester while positive predictive value dropped in the third trimester due to the small number of cases.

Finally, there was generally good agreement between the standard DSM IV and the Zimmerman criteria for a diagnosis of MDD, although agreement varied across pregnancy (see Table 6). The Zimmerman criteria identified 40 (5%), 20 (2%), and 11 (1%) subjects as in episode for MDD during the first, second and third trimesters, respectively. After application of the standard DSM IV criteria, 42 (5%), 25 (3%), and 10 (1%) were diagnosed with MDD, respectively during the first, second and third trimester. The corresponding Kappa statistics were 0.82 (95% CI: 0.72--0.91) in the first trimester, 0.79 (95% CI: 0.66--0.93) in the second trimester and 0.86 (95% CI: 0.69--1.00) in the third trimester.

DISCUSSION

Our analysis shows that the DSM algorithm can be applied to pregnant women, although minor modifications may be optimal. Given that nearly all candidate symptoms for a depressive disorder occur more frequently in the first trimester, clinicians and researchers can consider several options: 1) increase the number of symptoms needed for a diagnosis of MDD in pregnancy to account for normative symptoms of pregnancy or 2) rely on symptoms that are more informative such as those that were more highly associated with stem questions of depression. As shown in Table 4, these were symptoms with the higher odds ratios and included “feeling guilty/worthless”, “trouble concentrating”, in contrast to symptoms such as “appetite increase”, “oversleeping”, and “increase in energy”, which did not differentiate between women who were stem positive or stem negative.

The latter strategy, shortening the DSM-IV criteria list and relying on cognitive symptoms has been endorsed by Zimmerman [5] and Andrews [4]. One could argue that a shorter criteria set has advantages for our colleagues in other medical specialties since it would be easier to remember. [5] However, such shortening would exclude many symptoms that are informative such as “appetite decrease”, “trouble sleeping”, “decrease in energy”, “moving slowly”, “jittery”, and “thinking slowly”. This may have implications for measuring illness severity or determining the specificity of a criteria set.

Interestingly, stage of pregnancy did not influence the performance of the EPDS, despite changing background symptoms in pregnant women. Of note, the threshold rate we found for the EPDS is somewhat lower than that found by others.[9,12] While subjects in our cohort were carefully characterized, this was not a treatment seeking group and we may have included women who are more mildly ill than women in other studies.

It is notable that in this large cohort of pregnant women, the rates of endorsement for the stem questions of depression decreased over time. This came about despite the fact that at intake, we intentionally recruited women who were not in episode, but at risk for either major or minor depressive disorder. The decrease in rates of probable depression also occurred notwithstanding the decrement in use of antidepressant medication over time. While a decrease in the risk of depression may reflect a true effect of the pregnant state, the reported diminution of depressive symptoms we found across pregnancy could also be biased by subject recall or selection criteria. In our study, women could enroll in the study up to 16 completed weeks of pregnancy and information collected prior to enrollment would be retrospective while subsequent data are prospective. Other researchers find that in longitudinal cohort studies, the rates of depression are much lower for prospective compared to retrospective data.[15] Cohorts that better represent the true population and follow women at a point prior to conception and through pregnancy, may clarify these questions.

The interpretation of our findings should consider several additional limitations. We did not ask all subjects about suicidal ideation. This is a very specific symptom for depression but is uncommonly endorsed, especially in pregnancy (data available upon request). Further, it should be considered that our diagnostic information was gathered by lay interviewers and not by clinicians. Clinicians may follow hunches and ask additional, probing questions but lay interviewers are constrained by fully structured questions.

In sum, pregnancy, especially the first trimester, influences the rates at which candidate symptoms of depression are endorsed. Somatic symptoms are influenced most in pregnancy but reports of cognitive symptoms are also affected. Shortening MDD checklists to exclude somatic symptoms may be easier to implement in practice but also results in a loss of potentially relevant information. Additional analytic approaches, such as differential item functioning may further assess the informative nature of depressive symptoms in pregnancy and the estimated change in prevalence if symptom checklists are shortened.

Source of Funding

This study was supported by a NICHD grant entitled, “Effects of Perinatal Depression on PTD and LBW,” # 5 R01HD045735 to K.B. and K.A.Y. M.V.S. was supported by grant T32MH014235 from the NIMH. None of the funding sources had any role in study design; in the collection, analysis, or interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

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Figure 1.
Subject Recruitment and Retention

Table 1
Population Characteristics (n=838)

Characteristic	N	%
<i>Age (yrs)</i>		
< 20	35	4
20 – 34	581	69
≥35	222	27
<i>Education</i>		
Did Not Complete High School	45	5
High School Completion Only	121	15
Some College	192	23
College Completion or More	480	57
<i>Race</i>		
Non-Hispanic White	671	80
Non-Hispanic Black	54	7
Hispanic	84	10
Other (includes more than one race/ethnicity)	29	3
<i>Married</i>	624	74
<i>Planned Pregnancy</i>	533	64
<i>Parity</i>		
0 Previous Births	349	42
1 Previous Birth	297	35
≥2 Previous Births	192	23

Table 2
Observed Symptom Frequencies by Trimester

Symptom	Trimester 1		Trimester 2		Trimester 3	
	N	%	N	%	N	%
1 – Appetite Decrease	325	39	133	17	92	12
2 – Appetite Increase	274	33	209	26	105	13
3 – Trouble Sleeping	355	43	306	38	253	32
4 – Oversleeping	450	55	118	15	62	8
5 – Decrease in Energy	604	73	248	31	234	29
6 – Increase in Energy	38	5	56	7	32	4
7 – Moving Slowly	198	24	133	17	116	15
8 – Feeling Jittery	27	3	9	1	19	2
9 – Thinking Slowly	110	13	56	7	46	6
10 – Racing Thoughts	101	12	46	6	41	5
11 – Trouble Concentrating	175	21	77	10	76	10
12 – Indecisive	57	7	33	4	32	4
13 – Feeling Guilty/Worthless	41	5	15	2	13	2
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Total # Symptoms	3.29	(3.15, 3.43)	1.79	(1.66, 1.93)	1.41	(1.29, 1.53)

Table 3
Odds Ratios of Trimester Differences for Behavioral and Cognitive Symptoms

Symptom	Trimester 1 vs. 2			Trimester 1 vs. 3			Trimester 2 vs. 3		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
1 – Appetite Decrease	3.23	(2.60, 3.99)	<.0001	4.73	(3.67, 6.10)	<.0001	1.47	(1.13, 1.90)	<.01
2 – Appetite Increase	1.39	(1.14, 1.70)	<.01	3.20	(2.52, 4.06)	<.0001	2.30	(1.85, 2.86)	<.00
3 – Trouble Sleeping	1.17	(0.98, 1.39)	0.07	1.51	(1.25, 1.83)	<.0001	1.29	(1.07, 1.55)	<.01
4 – Oversleeping	7.02	(5.63, 8.76)	<.0001	14.16	(10.71, 18.74)	<.0001	2.02	(1.52, 2.68)	<.00
5 – Decrease in Energy	5.96	(4.93, 7.21)	<.0001	6.20	(5.06, 7.59)	<.0001	1.04	(0.87, 1.25)	0.68
6 – Increase in Energy	0.63	(0.43, 0.94)	0.02	1.14	(0.73, 1.79)	0.57	1.80	(1.18, 2.73)	<.01
7 – Moving Slowly	1.52	(1.21, 1.91)	<.001	1.74	(1.37, 2.22)	<.0001	1.15	(0.91, 1.45)	0.24
8 – Feeling Jittery	2.80	(1.26, 6.23)	0.01	1.14	(0.64, 2.03)	0.65	0.41	(0.18, 0.90)	0.03
9 – Thinking Slowly	1.93	(1.43, 2.59)	<.0001	2.22	(1.61, 3.06)	<.0001	1.15	(0.81, 1.65)	0.44
10 – Racing Thoughts	2.15	(1.59, 2.91)	<.0001	2.23	(1.60, 3.11)	<.0001	1.04	(0.70, 1.53)	0.86
11 – Trouble Concentrating	2.41	(1.88, 3.09)	<.0001	2.23	(1.70, 2.92)	<.0001	0.92	(0.69, 1.24)	0.60
12 – Indecisive	1.59	(1.10, 2.30)	0.01	1.46	(1.00, 2.13)	0.05	0.92	(0.60, 1.40)	0.70
13 – Feeling Guilty/Worthless	2.46	(1.36, 4.45)	<.01	2.35	(1.27, 4.36)	<.01	0.96	(0.47, 1.95)	0.90

Table 4
Odds Ratios of Depression and Medication Use for Behavioral and Cognitive Symptoms

Symptom	Depression Stem Positive vs Negative		Medication Use vs No Medication Use	
	OR	95% CI	P	P
1 – Appetite Decrease	2.95	(1.98, 4.41)	<.0001	0.16
2 – Appetite Increase	1.05	(0.69, 1.59)	0.84	0.58
3 – Trouble Sleeping	2.72	(1.88, 3.93)	<.0001	0.58
4 – Oversleeping	1.32	(0.86, 2.04)	0.20	<.001
5 – Decrease in Energy	2.73	(1.79, 4.15)	<.0001	0.02
6 – Increase in Energy	0.57	(0.25, 1.33)	0.19	0.63
7 – Moving Slowly	2.29	(1.58, 3.34)	<.0001	0.73
8 – Feeling Jittery	3.25	(1.67, 6.31)	<.001	0.08
9 – Thinking Slowly	3.50	(2.19, 5.59)	<.0001	0.42
10 – Racing Thoughts	2.39	(1.45, 3.95)	<.001	0.04
11 – Trouble Concentrating	3.94	(2.63, 5.88)	<.0001	<.001
12 – Indecisive	3.54	(2.03, 6.19)	<.0001	0.46
13 – Feeling Guilty/Worthless	6.89	(3.82, 12.42)	<.0001	0.17

Table 5

Summary Statistics for the EPDS ROC Analysis

ROC Analysis Statistic	Trimester 1	Trimester 2	Trimester 3
Optimal Cutoff	10	10	10
Sensitivity	80%	94%	80%
Specificity	83%	87%	89%
Number of Cases of MDD	29 (3%)	17 (2%)	5 (1%)
Positive Predictive Value	13%	14%	4%

Table 6
Concordance between Zimmerman MDD and Full DSM-IV MDD

Concordance Statistic	Trimester 1	Trimester 2	Trimester 3
Sensitivity	81%	72%	90%
Specificity	99%	>99%	>99%
Number of Cases of DSM-IV MDD	42 (5%)	25 (3%)	10 (1%)
Positive Predictive Value	85%	90%	82%
Overall Agreement	98%	99%	>99%
Kappa	0.82	0.79	0.86
Kappa (95% CI)	(0.72, 0.91)	(0.66,0.93)	(0.69, 1.00)