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Research Article

Symptom-Based Subtypes of Postnatal Depression

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Abstract

Background: Despite a long history of debate regarding subtypes of depression, there have been no attempts to examine subtypes of Postnatal Depression (PND) on the basis of symptom profiles.

Method: 413 mothers admitted to a residential program for unsettled infant behaviour completed a structured clinical interview for current and lifetime depressive and anxiety disorder diagnosis, self-report symptom measures and a range of self-report questionnaires relating to known depression risk/vulnerability factors. From this larger sample, a 'depressed' subsample (n = 159) was selected on the basis of interview and symptom-based questionnaire data.

Results: Five symptom-based factors were identified ('cognitive features of depression', 'physiological features of anxiety', 'emotional / affective features of depression', 'cognitive features of anxiety' and 'fatigue'). Three clusters differing in terms of depressive symptom severity were identified, with the severest cluster also being characterized by elevated levels of anxiety. There were no differences between the clusters with respect to the type of symptoms reported or vulnerability / risk factors.

Conclusion: This study found no evidence of qualitatively distinct symptom-based subtypes of PND, therefore adding to the growing body of evidence suggesting that depression is a uni-dimensional construct.

Introduction

There has been a long history of discussion regarding classification of the depressive disorders, and in recent years there have been numerous studies that have examined the latent structure of depression; however these have yielded a mixed array of results. Various depressive subtypes characterised by psychosomatic, cognitive-emotional, generalized anxiety, irritability, melancholic, somatic and psychotic symptoms have been identified [1-7]. However, overall, of the studies that have successfully identified subtypes, the majority have identified types differing in terms of a combination of 'typical'/ 'atypical' symptom presentations and symptom severity [8-11].

There have also been many studies that have failed to find evidence of subtypes. Numerous taxometric studies, conducted in samples of university students, adolescents and adults, have shown depression to be a continuously distributed syndrome [12-17]. A number of studies using latent class analyses have also led to similar conclusions [18-20]. In light of both the lack of consistency in the results of studies identifying subtypes, and the growing number of studies that have failed to find evidence of subtypes altogether, it seems that the current balance of evidence favours the view that depression is uni-dimensional and thus that different 'forms' of depression reflect quantitative variations along a severity continuum. However, given the lack of clarity in the literature to date, there is a need for the conduct of further empirical investigations, in a variety of clinical groups.

One particular clinical group in which the latent structure of depression has not been investigated is that of postnatal women. There has been some discussion in the literature about subtypes of postnatal depression, however this has tended to focus on etiological rather than symptom-based differences between subtypes. For example, Cooper and Murray [21] suggested that there may be two subtypes of women who become depressed in the postpartum period, one subtype whose depression is etiologically similar to depression experienced at other times of life (women with this subtype tend to have a history of recurrent non-postnatal depression), and another who experience a type of depression that is uniquely 'postnatal' (women with this subtype only tend to develop depression postnatal. Unfortunately, investigations of differences between these proposed subtypes have not found the anticipated differences. Hence, the question of whether these proposed subgroups of postnatal depressed women exist remains without a definitive answer [22-24]. Evidence of the prominence of anxiety symptoms and disorders in the postnatal period, occurring both independently and comorbidly with depression [25-28], also raises the possibility that there may be identifiable symptom-based subtypes of postnatal depression.

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Despite the discussions in the postnatal literature regarding etiologically-based subtypes of postnatal depression and the large number of sub typing investigations in the general depression literature, there have been no attempts to examine subtypes of postnatal depression on the basis of observable symptom profiles. The present study aimed to conduct such an investigation in a sample of women experiencing elevated levels of postnatal depressive symptomatology. Specifically, the study used cluster analysis to identify subgroups on the basis of co-varying symptoms, followed by examination of qualitative differences between the clusters in terms of known vulnerability and situational risk factors for depression (e.g., personality and cognitive vulnerability, stressful life events, low social support, difficult infant behaviour, depression history) [29-31].

Methods

Participants and procedure

Four hundred and thirteen English-speaking women with infants aged 0–12 months, who were admitted to the Karitane Residential Family Care Unit (RFCU) between September 2005 and October 2007 were invited to participate in this study. The RFCU is a 10-bed parent-infant unit located in Sydney, Australia. The 5-day multi-disciplinary RFCU program provides an intensive residential intervention for families with complex early parenting difficulties (e.g., infant sleep, settling or feeding difficulties). Rates of depression and anxiety were elevated in this sample compared to normal community samples [32]. Twenty one women admitted during this time were not asked to participate because they were either not proficient in speaking English (n = 8) or because the researcher could not speak with them due to practical issues related to the RFCU admission (n = 13). In total, 309 women gave informed consent and participated in the study. Of the 104 women who were asked but did not participate, 53 agreed but were subsequently prevented from participating because of practical constraints associated with the admission (e.g., insufficient time) and 51 declined. Common reasons provided by clients who declined were that they felt too overwhelmed by the admission to participate in research, that they did not want to have to talk about how they were feeling or that they did not have time to participate.

On the 3rd or 4th day of the 5-day RFCU admission, participants completed three self-report measures of depressive and anxiety symptomatology, namely the Edinburgh Postnatal Depression Scale (EPDS) [33], the Beck Depression Inventory – second version (BDI-II) [34], and the Beck Anxiety Inventory (BAI) [35]. The first 170 participants were also asked to participate in the Structured Clinical Interview for DSM-IV Diagnosis (SCID-I) [36] and to complete a longer set of self-report questionnaires relating to known psychosocial risk factors; of these 166 agreed (4 declined the interview and so just completed self-report measures). Interviews were conducted by a psychologist (JK) undergoing doctoral level training in clinical psychology (including extensive training in diagnostic interviewing) and who was blind to participant self-report symptom measure scores (EPDS, BDI-II and BAI). Interviews were not conducted on the whole sample for pragmatic reasons.

After collection of self-report questionnaire and interview data, a sub-sample of participants who were 'depressed' was selected. Participants were included in the 'depressed' sub-sample if either (i) they scored above the threshold recommended to be indicative of a possible case of major or minor depression on the EPDS (i.e., 10 or more) [33], (ii) they scored above the recommended threshold for moderate depression on the BDI-II (i.e. 20 or more) [34], or (iii) they were diagnosed with current major or minor depression using the SCID-I [36]. This approach was utilized in an attempt to identify as many of the women who were experiencing clinically significant depressive symptomatology as possible. In total, of the 309 participants, 174 (56%) met one or more of these criteria. Of these, one woman was excluded because she met diagnostic criteria for bereavement (using the SCID-I), and 14 women were excluded due to missing data on symptom self-report questionnaires. This left a total of 159 women in the final 'depressed' sub-sample. Of these, 99 women (62.3%) scored above the cut-off score on the BDI-II score, 138 (86.8%) scored in the clinical range on the EPDS score, and 50 (31.4% of those interviewed using the SCID-I) met DSM-IV diagnostic criteria for major or minor depression. 39.6% of those included in the final depressed sample were included on the basis of only one of the criteria for inclusion, 40.3% for two criteria and 20.1% for all three inclusion criteria.

Measures

Edinburgh postnatal depression scale (EPDS) [33]

The EPDS is a validated 10-item self-report measure for depressive symptoms in the perinatal period. Each item is rated on a 4-point scale ranging from 0 to 3, with higher scores indicating greater symptom severity. The Cronbach's alpha for the current sample was .86.

Beck depression inventory-II (BDI-II) [34]

The BDI-II is a validated 21-item self-report measure of depressive symptomatology. Each item is rated on a 4-point scale ranging from 0 to 3, with higher scores indicating greater symptom severity. The Cronbach's alpha for the current sample was .87.

Beck anxiety inventory (BAI) [35]

The BAI is a validated 21-item self-report measure of anxiety symptomatology. Each item is rated on a 4-point scale ranging from 0 to 3, with higher scores indicating greater symptom severity. The Cronbach's alpha for the current sample was 89.

Structured clinical interview for DSM-IV diagnosis (Research version) (SCID-I) [36]

The SCID-I is a validated semi-structured diagnostic interview for current and lifetime history of DSM-IV disorders. In the current study, participants were administered sections of the Mood episodes module (current and past major depressive episode, current and past manic or hypomanic episode, current dysthymia), the Optional module (current and past minor depressive disorder, symptomatic details of past major / minor depressive episodes) and the Anxiety disorders module (current and lifetime occurrence of panic disorder, social phobia, specific phobia, Obsessive Compulsive Disorder (OCD), Generalized Anxiety Disorder (GAD) and Anxiety Disorder Not Otherwise Specified (ADNOS)).

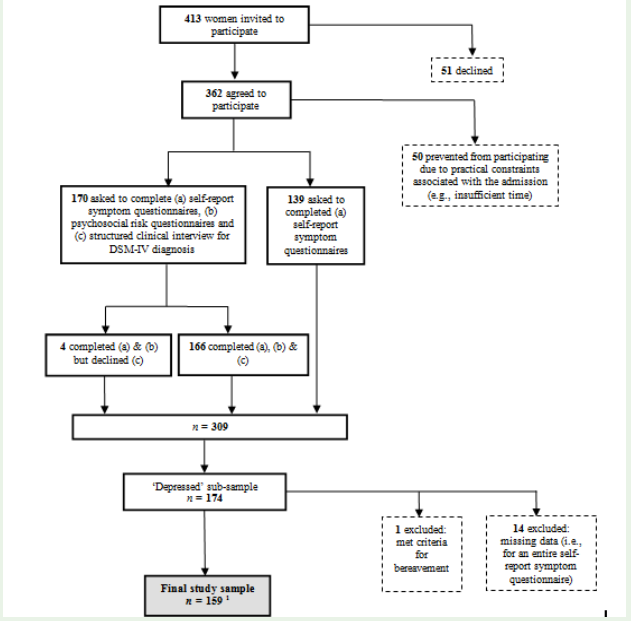

Figure 1: Participant recruitment and study procedure.
Note: (a) = self-report symptom questionnaires (EPDS, BDI-II & BAI); (b) = psychosocial risk questionnaires (DAS-24, MAQ, VPSQ, SPS, ICQ & LES); (c) structured clinical interview for DSM-IV diagnosis (SCID-I).
83 of the participants in the final study sample completed (a), (b) & (c)

Vulnerable personality style questionnaire (VPSQ) [37]

The VPSQ is a 9-item self-report personality scale developed specifically for use with postnatal women. Two VPSQ factors have been identified, 'vulnerability' and 'organized/responsive'. Of the two subscales, the vulnerability subscale has been shown to be the most reliable and internally consistent [37]. In the current study, in light of poor internal consistency ratings obtained for the total VPSQ (Cronbach's alpha = .40) and the organized/responsive subscale (Cronbach's alpha = .08), only the vulnerability subscale was used (i.e., items 2, 3, 4, 5, 7 & 9; score range 6–30, with higher scores indicating greater vulnerability). The Cronbach's alpha for the VPSQ (vulnerability subscale) score in the current sample was 76.

Dysfunctional attitudes scale-24 (DAS-24) [38]

The DAS-24 is a validated 24-item self-report questionnaire designed to measure the attitudes and beliefs underpinning a depressed cognitive style. The DAS-24 yields a total score (range 7–168), with higher scores indicating a greater degree of dysfunctional attitudes. The Cronbach's alpha for the total DAS-24 score in the current sample was 92.

Maternal attitudes questionnaire (MAQ) [39]

The MAQ is a validated 14-item self-report questionnaire designed to measure various expectations and attitudes toward motherhood that occur in relation to depressive illness in the postnatal period. The MAQ yields a total score (range 0–28), with higher scores indicating a greater degree of dysfunctional maternal attitudes. The Cronbach's alpha for the current sample was 79.

Life events scale for obstetric groups (LES) [40]

The LES is a validated 57-item life event containing non-trivial life events (obstetric and general) likely to be significant in an obstetric group. In the current study, respondents were asked to nominate whether or not they had experienced each event since the start of their most recent pregnancy. The Cronbach's alpha for the LES in the current sample was 66.

Social provisions scale (SPS) [41]

The SPS is a validated 24-item self-report questionnaire designed to measure social provisions (e.g., attachment, reassurance of worth, and opportunity for nurturance, reliable alliance, guidance, and social integration). The SPS yields a total score (24–96), with higher scores indicating better social provisions. The Cronbach's alpha for the SPS in the current sample was 92.

Infant characteristics questionnaire (ICQ) [42]

The ICQ is a validated measure of parental perceptions of 'difficult' infant temperament. The 6-item 'fussy/difficult' subscale of the ICQ (6-month version) was used in the current study. This subscale yields a total score (range 7–42), with higher scores indicating greater severity. The Cronbach's alpha for the ICQ fussy/difficult subscale in the current sample was .86.

Analyses

All analyses were conducted on the 'final study sample' (n = 159) (Figure 1), using SPSS Version 15.0. Twenty one missing EPDS, BDI-II and BAI items were imputed using regression analysis (estimation method). Given the exploratory nature of this study and the expectation that factors would be correlated, a maximum likelihood factor analysis was conducted using oblique rotation of BDI-II, BAI and EPDS items. Eigen values > 1 were used as the criteria for determining whether extracted factors accounted for a reasonably large proportion of the variance, and a coefficient level of .3 or above was chosen to indicate significant item factor loading [43]. The aim of the exploratory factor analysis was to identify underlying factors denoting co-varying symptoms, and thereby to reduce the number of items to be included in the cluster analysis. Given that the identified factors each contained different numbers of items, percentage-based scores were calculated to facilitate comparisons between the factors. That is, for each participant the total score for items loading onto the factor, divided by the total possible score for the factor (i.e., given the number of items in the factor), multiplied by 100. Then, to group individuals into symptom-based clusters, a k-means cluster analysis of the identified symptom-based factor scores was conducted. Finally, to examine characteristics of the identified clusters and to determine whether the clusters differed in terms of known vulnerability and situational risk factors for depression (i.e., personality vulnerability, dysfunctional attitudes, stressful life events, social support, difficult infant behaviour, and lifetime history of depressive and anxiety disorders), univariate ANOVA and chi-square analyses were conducted. Statistical significance was set at p = .05 and effect sizes were evaluated using Cohen's [44] descriptors, small (d = .2, w =.1), medium (d =.5, w =.3) and large (d =.8, w =.5).

Table 1: Item loadings and correlations coefficients for the identified five factors.

Item	Symptom	Symptom-based factors				
		Factor 1 Cognitive features of depression	Factor 2 Physiological features of anxiety	Factor 3 Emotional / affective features of depression	Factor 4 Cognitive features of Anxiety	Factor 5 Fatigue
BDI 7	Self-dislike	**.757**		-.103		
BDI 3	Past failure	**.746**	-.105	-.184	.120	-.109
BDI 14	Worthlessness	**.694**			.124	
BDI 8	Self-criticalness	**.578**			.137	
BDI 5	Guilty feelings	**.514**		.112	.145	
BDI 9	Suicidal thoughts or wishes	**.469**			-.154	.109
BDI 6	Punishment feelings	**.453**			.167	
EPDS 10	Thought of harming myself has occurred to me	**.402**		.120	-.226	
BDI 2	Pessimism	**.388**	-.120	.122		
BDI 13	Indecisiveness	**.376**			.101	.228
BDI 19	Concentration difficulty	**.371**				.303
BDI 17	Irritability	**.322**		.183		.229
BDI 4	Loss of pleasure	**.320**		.239		.241
BDI 11	Agitation	**.304**				.245
BAI 2	Feeling hot		**-.869**		-.140	-.132
BAI 21	Sweating (not due to heat)		**-.788**			-.114
BAI 20	Face flushed		**-.768**			
BAI 3	Wobbliness in legs		**-.360**	.123	.160	.188
BAI 12	Hands trembling	.124	**-.354**	-.217	.289	.149
BAI 13	Shaky	.115	**-.344**	-.227	.320	.211
BAI 18	Indigestion or discomfort in abdomen		**-.328**		.153	.192
EPDS 8	Sad or miserable			**.632**	.121	
EPDS 1	Laugh and see the funny side of things		-.157	**.600**	-.171	
EPDS 9	Been so unhappy that I have been crying			**.599**	.124	
EPDS 7	So unhappy had difficulty sleeping			**.556**		
EPDS 2	Looked forward with enjoyment to things	-.131		**.538**		.166
BDI 1	Sadness	.276		**.531**	.129	
EPDS 6	Things getting on top of me			**.515**		
BAI 17	Scared			.193	**.715**	
BAI 5	Fear of the worst happening	.175			**.635**	.111
BAI 9	Terrified			.180	**.588**	.145
BAI 10	Nervous	.203			**.559**	
BAI 16	Fear of dying				**.556**	-.103
BAI 14	Fear of losing control	.257	-.175		**.434**	
EPDS 5	Scared or panicky for no good reason	.148		.253	**.424**	-.186
BAI 7	Heart pounding or racing		-.293		**.395**	.171
BAI 15	Difficulty breathing		-.153	-.176	**.365**	
BDI 20	Tiredness or fatigue					**.785**
BDI 15	Loss of energy	.173		.106		**.625**
BAI 8	Unsteady		-.197		.335	**.356**

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BDI 12	Loss of interest	.248		.315		**.337**
BAI 4	Unable to relax		-.224	.145	.246	**.326**
	Correlation coefficients					
	Factor 1	1.000	-.302	.290	.304	.368
	Factor 2		1.000	-.111	-.352	-.267
	Factor 3			1.000	.054	.174
	Factor 4				1.000	.270
	Factor 5					1.000

Note: items with loadings < 0.1 suppressed

Table 2: Final Cluster Centers.

Symptom-based factor number	Symptom-based factor label	Mean symptom-based factor score[1] (%)		
		Cluster 1 (*n* = 80)	Cluster 2 (*n* = 55)	Cluster 3 (*n* = 24)
1	Cognitive features of depression	19.59	36.64	46.92
2	Physiological features of anxiety	8.87	18.87	42.92
3	Emotional / affective features of depression	34.43	48.83	48.61
4	Cognitive features of Anxiety	16.06	29.13	60.01
5	Fatigue	29.17	50.18	62.64

[1]Symptom-based factor scores computed as percentages of total possible factor score, i.e., total of all items loading onto the factor ÷ the total possible score for the factor (given the number of items in the factor) × 100.

Ethics Approvals

Ethics approval was obtained from the Sydney South West Area Human Research Committee and The University of Sydney's Human Research Ethics Committee.

Results

Participant characteristics

The mean (SD) maternal age for women in the depressed sub-sample was 32.02 (4.8) years (range: 19.8–43.8 years); 58.4% were first time mothers and 93.2% were in a married or de-facto relationship. Occupational backgrounds included managers (40.1%), associate professionals (16.8%), clerical workers (32.9%) and labourers and related workers (10.2%) [45]; 43.9% were university educated. There were 8 sets of twins in the sample, 54.9% of infants were male, and the mean (*SD*) infant age was 5.3 (3.1) months (range: 0.2–11.9 months).

Maximum likelihood factor analysis

The scree plot resulting from the maximum likelihood factor analysis of BDI-II, BAI and EPDS items identified a five factor solution, accounting for 42.33% of the variance. Ten items had low loadings (< .3) on the five factor solution (EPDS item 4, BAI item 11, BDI-II item 10, BAI item 1, BAI item 6, BDI-II item 18, BAI item 19, EPDS item 3, BDI-II item 21, BDI-II item 16). When these items were culled (leaving a total of 42 items), the five factors then accounted for 48.22% of the variance. Item loadings and correlations between the factors are shown in Table 1. Examination of the items loading onto each factor led to allocation of the following labels: Factor 1 - 'cognitive features of depression', Factor 2 - 'physiological features of anxiety', Factor 3 - 'emotional / affective features of depression', Factor 4 - 'cognitive features of anxiety' and Factor 5 - 'fatigue'. The correlations between the factors were all in the low–moderate range [44].

Cronbach's alpha coefficients were calculated to examine the internal consistency of the identified symptom-based factor scores. Cronbach's alpha coefficients were found to be satisfactory for each of the five factors (Factor 1 = .866; Factor 2 = .812; Factor 3 = .778; Factor 4 = .849; Factor 5 = .746). Given that the identified factors contained different numbers of items, percentage-based unit-weighted factor scores were calculated for each participant, to enable comparisons between the factors.

k-means cluster analysis

To group individuals into symptom-based clusters, a *k*-means cluster analysis based on participant's symptom-based factor scores for each of the five symptom-based factors was undertaken. Two, three and four cluster solutions were generated, with the three cluster solution appearing most parsimonious in terms of interpretability and the numbers of participants allocated to each cluster. There were 80 participants allocated to Cluster 1, 55 participants allocated to Cluster 2, and 24 participants allocated to Cluster 3. Final cluster centres (based on mean symptom-based factor scores) are shown in Table 2. For Factors 1, 2, 4 and 5, the mean symptom-based factor scores followed the same pattern, i.e., mild (cluster 1), moderate (cluster 2) and severe (cluster 3). For Factor 3, although clusters 2 and 3 were comparable, cluster 1 had the lowest mean symptom-based factor score. Thus it seems that overall; the clusters differed in terms of symptom severity. However, as shown in Figure 2, the difference between clusters 2 and 3 was most prominent for physiological and cognitive features of anxiety, highlighting elevated anxiety symptomatology to be a particular characteristic of cluster 3.

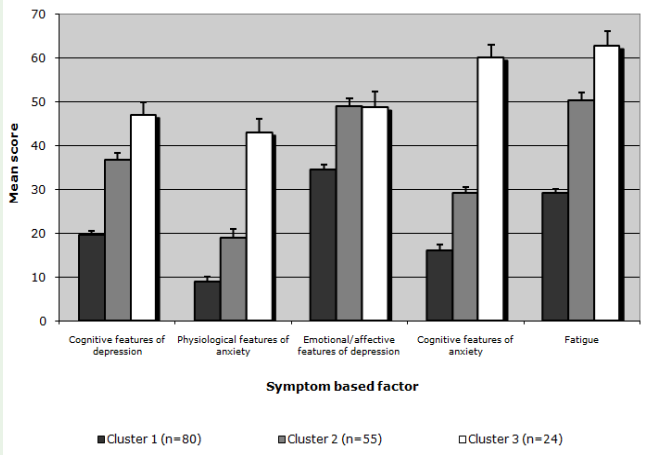

Figure 2: Mean symptom-based factor score by cluster membership.

Characteristics of the clusters

Mean scores on each of the vulnerability/situational risk factors for women in each of the three clusters are shown in Table 3. Univariate ANOVAs revealed significant group differences between the clusters on all variables, with the exception of fussy/difficult infant behaviour (ICQ–FD). Pair wise comparisons showed significant differences between the mean VPSQ (vuln) scores of clusters 1 and 2 ($p = .045$, $d = 0.44$), clusters 2 and 3 ($p < .001$, $d = 1.21$) and clusters 1 and 3 ($p < .001$, $d = 1.21$). For all other dependent variables (except ICQ-FD), pair wise comparisons revealed significant differences between clusters 1 and 2 ($ps < .036$, $ds > 0.45$) and between clusters 1 and 3 ($ps < .009$, $ds > 0.79$), but non-significant differences between clusters 2 and 3 ($ps > .097$, $ds < 0.55$).

As shown in Table 4, there were significant group differences in the proportions of women within each cluster who had current depression, a history of depression and a current anxiety disorder (according to DSM-IV diagnostic criteria) ($ps < .020$), but there were no significant group differences in terms of the proportions of women in each cluster with a history of an anxiety disorder ($p = .063$). Pair wise comparisons between the three groups were not conducted due to small sample sizes. However, as shown in Figure 3, the general pattern of results was similar to that found for symptom-based factor scores and vulnerability/situational risk factor variable scores, i.e., with cluster 1 being the mildest and cluster 3 being the most severe. Once again, the high frequency of anxiety disorders among the women in cluster 3 suggests that anxiety is a particular characteristic of this cluster.

Discussion

Haslam and Beck [14] have stated that "a subtype of major depression should represent a categorically distinct clinical form rather than simply an arbitrarily defined region on a continuous dimension, a matter of kind rather than a matter of degree" (*p*. 686). The aim of the current study was to examine whether symptom-based subtypes of depression could be identified in a sample of postnatal depressed women. Results revealed three clusters, each differing in terms of the 'degree' of depressive symptom severity but not in the nature or 'kind' of symptoms reported or in terms of any of the vulnerability / risk factors measured. These results are consistent with evidence from the growing number of studies that have failed to find evidence of qualitatively distinct subtypes of depression, thus adding further weight to the argument that depression is a uni-dimensional construct, whether it occurs in the postnatal period or not.

Before moving on to a more detailed discussion about the clinical implications of these results, a number of study limitations must be acknowledged. First, the generalizability of these results to other

Table 3: Symptom and risk / vulnerability measures by cluster membership.

Symptom measures								
Scale	Cluster 1 (n = 80)		Cluster 2 (n = 55)		Cluster 3 (n = 24)			
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*		
EPDS total	11.41	3.10	15.75	3.43	15.67	4.24		
BDI-II	16.38	5.16	27.00	5.76	32.94	7.74		
BAI	7.59	4.87	14.89	4.60	13.56	9.34		
Risk / vulnerability measures								
Scale	Cluster 1 (n = 49)		Cluster 2 (n = 36)		Cluster 3 (n = 13)			
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*F*	*P*
VPSQ (vuln)[1]	16.22_a	4.26	18.10_b	4.18	23.08_c	3.95	13.85	.000
DAS[1]	81.20_a	21.97	91.54_b	22.83	103.49_b	20.10	5.97	.004
MAQ[1]	5.78_a	3.08	9.34_b	4.13	10.85_b	5.67	13.44	.000
LES[1]	7.88_a	3.60	11.58_b	3.96	13.40_b	5.21	12.25	.000
SPS[2]	80.32_a	10.59	72.92_b	9.97	71.59_b	11.97	6.69	.002
ICQ (FD)[1]	26.33_a	6.45	28.07_a	7.11	26.58_a	7.55	0.69	.504

Notes: Means with the same subscript in the same row do not differ significantly at the .05 level according to the Fisher LSD procedure; n is smaller for risk/vulnerability measures than symptom measures due to the fact that all measures were not administered to all participants (Figure 1). [1]Higher score indicate greater dysfunction/ vulnerability; [2]higher scores indicate better social provisions

Table 4: Percentages of women in each cluster with current and previous anxiety and depressive disorders (diagnosed by structured clinical interview).

DSM-IV diagnosis	Cluster 1 (*N* = 44)		Cluster 2 (*N* = 30)		Cluster 3 (*N* = 9)		X^2 (2)	*p*
	n	%	*n*	%	*n*	%		
Current depression (major or minor)	21	47.7	23	76.7	6	66.7	6.41	.041*
History of depression (major or minor)	17	38.6	21	70.0	6	66.7	7.80	.020*
Current anxiety disorder	14	31.8	19	63.3	8	88.9	13.39	.001*
History of an anxiety disorder	22	50.0	20	66.7	8	88.9	5.53	.063

* $p < 0.05$

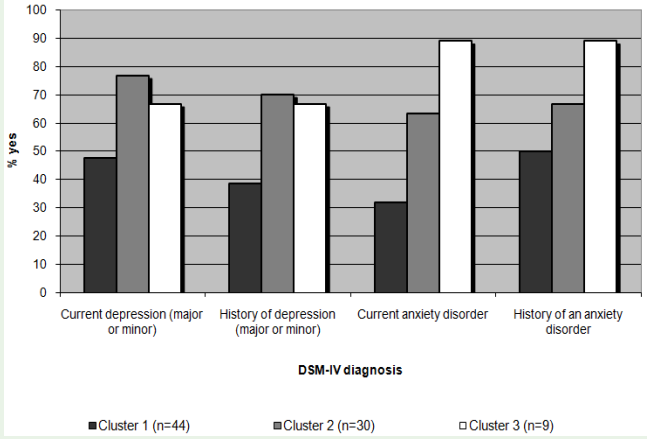

Figure 3: DSM-IV depression and anxiety disorder diagnoses by cluster membership.

postpartum samples is limited by the wide range of infant ages (0–12 months) and the fact the sample was comprised entirely of mothers with unsettled infants. Also, the fact that Karitane RFCU does not typically admit women presenting with very severe melancholic or psychotic depressions means that results may have been different had the study been conducted in a sample containing a wider spectrum of presentations. For example, Parker [46] has articulated a structural model of depressive disorders with three principal classes: psychotic, melancholic and non-melancholic depression. Obviously, there was no possibility of observing such groups in our sample. Another limitation of the present study is the size of the sample (particularly for the structured clinical interview and risk factor questionnaires). This posed restrictions on the types of analytic procedures that could be used. For example, had the sample been larger, taxometric or latent class analyses could have been performed. The cross sectional design of the study meant that details regarding longitudinal course were not observed and etiological factors were not able to be examined prospectively. Other limitations of the study include the reliance on self-report measures and the fact that other potentially relevant factors were not measured, for example, personality disorders or biological factors.

A final consideration relates to the analytic procedure used in this study. Cluster analysis has been criticized because it invariably yields categories, whether or not underlying categories actually exist [47,48]. However, Carragher et al. [2] have suggested that "profiling patterns of depressive symptomatology is a potentially useful first step in informing tailored intervention and treatment strategies" (*p*. 97), and others have described cluster analysis as an effective and useful method for summarizing data, grouping individuals and gathering data to pose structural hypotheses [47,48]. Hence, despite not being able to provide definitive answers regarding subtypes of postnatal depression, this study is the first systematic examination of symptom-based subtypes of postnatal depression. It has therefore identified valuable information about the patterns of symptoms and the subgroups of women displaying postnatal depressive symptomatology, and in doing so has paved the way for further research.

These limitations notwithstanding, results of the current study provide clear evidence for a uni-dimensional view of depression. Of the three clusters, cluster 1 was the mildest cluster as these women were found to show the lowest scores on all symptom-based factors and risk/vulnerability variables. They were the least likely to meet criteria for a DSM-IV diagnosis of current depression, past depression or a current anxiety disorder. In contrast, cluster 3 was the most severe cluster, showing the highest scores on all symptom-based factors except for 'emotional/affective features of depression' (for which it was comparable to cluster 2). It was also identified as the group with the highest degree of personality vulnerability. Cluster 2 fell between the other two clusters with respect to the majority of variables and was therefore labelled the 'moderate' cluster. The fact that clusters 2 and 3 were so similar in terms of their mean 'emotional/affective features of depression' symptom-based factor scores (even though cluster 3 had higher mean scores on all other factors), indicates that this may be a feature that emerges when depression is of a moderate (rather than mild) level. The finding that cluster 3 was characterized by elevated levels of anxiety (symptoms and disorders) indicates that comorbid anxiety may be a particular feature of more severe postnatal depressions. The fact that depression occurring comorbidly with anxiety disorders is known to be associated with more severe complaints, poorer quality of life, poorer treatment response and greater symptom persistence than depression occurring alone [49-54], highlights the high risk status of this group.

There has been much discussion in the literature about the relationship between depression and anxiety disorders, and about the validity of the DSM's categorically based psychiatric classification model. In this study, the close relationship between anxiety and depressive symptoms was borne out by the fact that the general pattern of differences between the clusters was the same for both the depression and the anxiety factors, i.e., mild (cluster 1), moderate (cluster 2) and severe (cluster 3). However, of note was the fact that anxiety was particularly prominent in the severe cluster. Furthermore, even though the number of participants who were interviewed using the SCID-I was small, available data indicated that the proportions of participants in each cluster who met the diagnostic criteria for current anxiety disorders followed the same basic pattern as that of self-reported symptoms.

In sum, this study makes an important contribution to the continuing debate regarding subtypes and classification of depression, and does so by focusing on symptom-based differences between women suffering depression in the postnatal period. Rather than

finding evidence of qualitatively distinct symptom-based subtypes of postnatal depression, results of this study add to the growing body of evidence suggesting that depression is a uni-dimensional construct. Future research should seek to replicate these findings in larger postnatal samples, employing a variety of statistical procedures. This should be done with the ultimate aim of obtaining a better understanding of the condition of postnatal depression, thereby facilitating the provision of optimal treatments for those women in the postnatal period who experience clinically significant levels of depression and anxiety.

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