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Title: The Course of Postpartum Depression: A Review of Longitudinal Studies

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- Identify the risk factors associated with persistence of postpartum depression.
- Evaluate the limitations of the literature.
- Determine the implications of the findings on women with postpartum depression and their children.

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REVIEW

The Course of Postpartum Depression: A Review of Longitudinal Studies

Nicole Vliegen, PhD,* Sara Casalin, PhD,* and Patrick Luyten, PhD

Learning Objectives: After participating in this educational activity, the physician should be better able to
1. Identify the risk factors associated with persistence of postpartum depression.
2. Evaluate the limitations of the literature.
3. Determine the implications of the findings on women with postpartum depression and their children.

This article aims to critically review studies published between 1985 and 2012 concerning the course of postpartum depression (PPD), as well as factors implicated in PPD with a chronic course. We provide a systematic, qualitative review of studies on the course of PPD, following PRISMA guidelines. The results show that although the majority of women recover from PPD, it becomes chronic in a relatively large subgroup of women. Several studies have identified risk factors predicting a chronic course of PPD. This review also emphasizes and discusses important conceptual and methodological limitations in existing research, which preclude drawing strong conclusions. Finally, the implications of these findings and suggestions for future research and clinical intervention are outlined.

Keywords: chronic depression, course and severity, longitudinal studies, postpartum depression

A large body of research has documented the association between maternal depression and adverse outcomes in offspring (for a review, see Downey & Coyne[1] and Weissman et al.[2]). Several studies suggest that these adverse effects are especially pronounced in mothers who suffer from chronic depression.[3–5] Furthermore, maternal chronic depression may be especially harmful in infancy since children are exposed to maternal disengagement and negative affect during their earliest months of life, a sensitive developmental period; this experience carries the risk of impairing their cognitive and verbal abilities and school readiness, and of leading to psychological problems.[6] It has also been shown that the severity and chronicity of maternal depression, rather than its diagnosis per se, are related to negative outcomes in the children.[7,8] Indeed, mothers suffering from chronic depression, compared to those with intermittent, episodic, or transient depression, have been shown to be less positive, sensitive, and engaged with their infants.[4,6,9] It is clear that more knowledge about the course of postpartum depression is urgently needed. Mothers' depression after the birth of their children may have significant, prolonged negative consequences not just for the mothers themselves but also for the children.

Although pregnancy is typically associated with expectations of new motherhood as a happy time, for a substantial number of mothers the postpartum period is primarily associated with feelings of sadness, fear, and loneliness. Between 50% and 80% of new mothers experience an episode of the "baby blues," characterized by mild but unmistakable sadness, exhaustion, unstable mood, and fear.[10] For mothers with full-blown postpartum depression (PPD), however, this period is even more difficult. In the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV),[11] PPD is defined as a current, or the most recent, episode of major depressive disorder (MDD) or of bipolar I or bipolar II disorder, if the episode has an onset within four weeks postpartum. Based on a meta-analysis of 59 studies using both self-report questionnaires and diagnostic interviews, O'Hara and Swain[12] estimated the prevalence of PPD to be 13%. They also found that the prevalence of PPD was slightly, although significantly, higher when assessed with self-report questionnaires (14%) compared to diagnostic interviews (12%). A more recent review by Gavin and colleagues[13] excluded studies using

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only self-report measures of PPD and found the prevalence of major depression during the first three months postpartum to be 7.1%. During this early postpartum period, mothers are at heightened risk for depression,[14,15] and the number of depressive episodes can be twice as high as during other periods in a woman's life.[16] During the first three months postpartum, parents are also at increased risk of hospital admission for mental disorders compared to nonparents of the same age,[17] with the highest risk of admission between 10 and 19 days postpartum.[17] This pattern, however, changes with increasing age: the risk of admission was found to be higher among nonparents, compared to age-matched parents, starting at about 30 years of age.

Because PPD has significant consequences for the baby, the depressed mother, and the early relationship between mother and child, knowledge about prolonged changes in the mental health of mothers with PPD may not only improve our understanding of the course of PPD but also inform prevention and intervention strategies.[18]

Hence, this article systematically reviews longitudinal studies that have examined the course of PPD, following the guidelines of the PRISMA statement.[19] It addresses the following questions: (1) How does PPD evolve beyond the postpartum period? Has empirical research identified different trajectories in processes of recovery? (2) Does the literature identify factors influencing the course of PPD? Which factors have been studied, and what are the conclusions that can be drawn from this body of literature? The discussion of the main results is followed by a broad discussion of the limitations of existing research that affect the interpretability and generalizability of research findings. Issues discussed are the conceptualization of PPD and its severity and chronicity; postpartum onset of depression versus previous vulnerability; the instruments used to assess PPD and its course; the samples investigated; and the role of treatment.

METHODS

For this review, empirical studies published in peer-reviewed journals in English between 1 January 1985 and 1 August 2012 were retrieved using several search engines (PubMed, PsycINFO, Lime, Google Scholar, and LibriSource) and the following combinations of subject headings: longitudinal research, follow-up, postpartum, postnatal, depression, depressive symptoms, depressive symptomatology, course, and chronic depression. The data search revealed 64 records. Studies were then screened according to five inclusion/exclusion criteria: (1) The study investigated PPD within the first three months after giving birth, since diagnostic criteria specify that the onset of PPD should be within four weeks postpartum and since PPD most frequently occurs in the first three months postpartum.[20] Studies that assessed PPD later than three months after childbirth were included only if they focused on PPD during the first three months after birth—for example, by assessing symptoms at some point during the first three months postpartum using a psychiatric interview (see below). (2) The study had a prospective, longitudinal design that included at least a second measure of depressive symptomatology beyond the postpartum period (e.g., at 3 months). (3) The study presented quantitative data for the PPD group (e.g., mean scores, correlations, prevalences) on clearly defined time points from childbirth. (4) Studies that did not differentiate between mothers with and without PPD were not considered further for review. (5) Studies on postpartum psychosis or bipolar affective disorders were excluded.

After two of the authors (NV and SC) screened for these inclusion and exclusion criteria, 23 longitudinal studies were identified for this review. A detailed list of studies excluded from the review can be obtained from the first author. Of the 23 included studies, 18 were conducted in community samples, and 5 used clinical samples (for an overview, see Tables 1 & 2). Sociodemographic or other risk factors for PPD were investigated in 15 of the reviewed studies.

RESULTS I: LONGITUDINAL COURSE OF PPD

Research on the course of PPD has examined (1) the severity of depression (mean depression rates on a depression questionnaire) over time, (2) the prevalence of depression after the postpartum period, or (3) different subgroups of women with PPD. In the following sections, we present the results of the 23 studies that we reviewed.

Severity of Depressive Symptomatology

Seven studies—four conducted in community samples[23,26,28,29] and three in clinical samples[37,39,42] (see Table 3)—investigated mean depression levels in the postnatal period. All the studies found decreasing depression scores over time. Follow-up in these studies ranged from 1 to 3.5 years. Two studies found that there was a statistically significant decrease in depression between initial assessment and follow-up,[29,42] whereas four studies described a decrease but did not calculate statistical significance.[26,28,38,39] Holden and colleagues[23] found a slight but statistically nonsignificant decrease in the level of depression in a sample of mothers who did not receive treatment for PPD, compared to a significant decrease in a sample who were treated.

In four studies, the mean level of depression decreased to below the cutoff value for depression defined in each study;[23,26,28,38] and in the other three studies, the level of depression at follow-up remained above the cutoff.[23,29,42,43] In the study by Holden and colleagues,[23] depression levels decreased below the cutoff for the treated mothers but not for the control sample (see Table 3). In the study by Milgrom and Beatrice,[39] a cutoff score for the Hamilton Depression Rating Scale (HDRS) was not reported.

In summary, these studies suggest that the severity of PPD decreases over time, consistent with the 1991 results of Cooper and colleagues,[44] who stated that a majority of depressive episodes after childbirth resolve within three to

Table 1

Reviewed Longitudinal Studies on Postpartum Depression in Community Samples

	Participants	Assessment time postpartum	Measures of maternal symptomatology	Types of results[a]
Wrate et al. (1985),[21] follow-up of Cox et al. (1982)[22]	30 PPD (recruited from a community sample, n = 105): 11 PPD 16 postnatal symptoms	T1: within 1 week T2: 3–5 months T3: 3 years	At all time points: SPI	(2), (3)
Holden et al. (1989)[23]	50 PPD (recruited from a community sample, n = 734): 26 PPD in 8 weeks of counseling provided by health visitors 24 PPD controls (no counseling)	T1: 6 & 12 weeks T2: 25 weeks	At all time points: EPDS (cutoff ≥12), SPI	(1), (2)
Campbell & Cohn (1997),[24] based on Campbell et al. (1995)[4]	130 subjects (recruited from a community sample, n = 2760): 67 PPD 63 nondepressed mothers	T1: 2 months T2: 4 months T3: 6 months T4: 9 months T5: 12 months T6: 18 months T7: 24 months	At all time points: CES-D, RDC, SADS	(2), (3), (4)
Viinamäki et al. (1997)[25]	39 with "minor psychiatric disorder" (recruited from a community sample, n = 139; maternity center for routine health checkup)	T1: 4–8 weeks T2: 2 years	At all time points: GHQ, ZSDS	(2), (3), (4)
NICHD Early Child Care Research Network (1999)[6]	552 PPD (recruited from a community sample, n = 1215; U.S. hospitals)	T1: 1 mth T2: 6 months T3: 15 months T4: 24 months T5: 36 months	At all time points: CES-D (cutoff >16)	(2), (3)
Edhborg et al. (2000)[26]	22 PPD (recruited from a community sample, n = 326)	T1: 2 months T2: 1 year	At all time points: EPDS (cutoff ≥12) At T1: ICQ (both parents) At T2: EMQ/EFQ (both parents)	(1), (2), (4)
Zelkowitz & Milet (2001)[27]	20 PPD-affected mothers (from sample of women with postpartum psychiatric disorder, n = 48) 50 controls	T1: 2 months T2: 6 months	At all time points: EPDS (cutoff ≥10), LIFE, PSI, SCID, SCL-90-R	(2), (4)

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Table 1
Continued

	Participants	Assessment time postpartum	Measures of maternal symptomatology	Types of results[a]
Beeghly et al. (2002)[28]	48 PPD (CES-D >16; recruited from a community cohort, n = 106) 57 nondepressed mothers (CES-D = 2–12)	T1: 2 months T2: 3 months T3: 6 months T4: 12 months	At all time points: CES-D	(1), (2), (3), (4)
Campbell et al. (2004),[9] based on NICHD (1999)[6]	385 PPD (recruited from a community sample, n = 1077; U.S. hospitals)	T1: 1 month T2: 6 months T3: 15 months T4: 24 months T5: 36 months	At all time points: CES-D (cutoff ≥16)	(2), (3), (4)
Horowitz & Goodman (2004)[29]	62 PPD (recruited from a community sample, n = 563)	T1: 2–4 weeks T2: 4–8 weeks T3: 10–14 weeks T4: 14–18 weeks T5: 2 years	At T1: EPDS (cutoff ≥10), PSI At other time points: BDI-II (cutoff ≥14)	(1), (2), (4)
Seimyr et al. (2004)[30]	54 PPD (recruited from a community sample, n = 272)	T1: 2 months T2: 1 year	At all time points: EPDS (cutoff ≥9/10)	(2), (4)
Campbell et al. (2007),[31] follow-up of NICHD (1999)[6]	215 PPD (recruited from a community sample, n = 1261)	T1–T5 T6: 4.5 years T7: 7 years	At all time points: CES-D (cutoff ≥16)	(3)
Ashman et al. (2008)[3]	159 PPD (recruited from hospitals, clinics, newspapers, etc.)	T1: 14 months T2: 24 months T3: 3.5 years T4: 4.5 years T5: 6.5 years	At all time points: CES-D (cutoff >16), LIFE, SCID Family contextual risk factors: composite scores of DAS, FES, LES, PSI, SSQ	(3), (4)
Klier et al. (2008)[32]	14 PPD (recruited from a community sample, n = 105; Vienna)	T1: at birth T2: 6 months T3: 18 months	At T1: structured psychiatric interview, EPI (risk index, created by summing 7 risk variables) At T2 & T3: EPDS (cutoff ≥10/11)	(4)
Blabey et al. (2009)[33]	104 PPD (recruited from a community sample, n = 444; Alaska)	T1: 3.6 months T2: 2 years later	At T1: PRAMS (two DSM-IV depressive symptoms & risk factors for chronic depression) At T2: CUBS	(2), (4)

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Table 1

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	Participants	Assessment time postpartum	Measures of maternal symptomatology	Types of results[a]
Campbell et al. (2009),[34] based on NICHD (1999)[6]	270 PPD (recruited from a community sample, n = 1357)	T1–T7: at 1 month and then every year T8: 9 years T9: 11 years T10: 12 years	At all time points: CES-D (cutoff ≥16)	(3)
Howell et al. (2009)[35]	215 PPD (recruited from a community sample, n = 563; English- or Spanish-speaking patients in an urban U.S. tertiary care academic medical center)	T1: 2 weeks T2: 6 months	At T1: triggers & buffers of depression At all time points: PHQ-2	(2), (3), (4)
Glavin et al. (2010)[36]	186 PPD (recruited from a community sample, n = 2247): 128 in supportive counseling 58 in treatment-as-usual condition	T1: 6 weeks T2: 3 months T3: 6 months T4: 12 months	At all time points: EPDS (cutoff ≥10)	(2)

[a] Four types of results are given: (1) mean depression levels, (2) prevalence of depression after the postpartum period, (3) subgroups of depressed mothers, and (4) influencing factors with regard to chronicity.

BDI, Beck Depression Inventory; BDI-II, Beck Depression Inventory, Second Edition; CES-D, Center for Epidemiological Studies Depression Scale; CUBS, Childhood Understanding Behaviors Survey; DAS, Dyadic Adjustment Scale; EMQ/EFQ, Experience of Motherhood/Fatherhood Questionnaire; EPDS, Edinburgh Postnatal Depression Scale ; EPI, Experience of Pregnancy Interview; FES, Family Environment Scale; GHQ, General Health Questionnaire; ICQ, Infant Characteristic Questionnaire; LES, Life Experiences Survey; LIFE, Longitudinal Interval Follow-up Evaluation; PHQ-2, Patient Health Questionnaire; PPD, mothers with postpartum depression; PRAMS, Pregnancy Risk Assessment Monitoring System; PSI, Parenting Stress Index; RDC, Research Diagnostic Criteria; SADS-L, Schedule for Affective Disorders and Schizophrenia–Lifetime; SCID, Structured Clinical Interview for DSM-III-R; SCL-90-R, Symptom Checklist 90–R; SPI, Standardized Psychiatric Interview; SSQ, Social Support Questionnaire; ZSDS, Zung Self-Rating Depression Scale.

Table 2

Reviewed Longitudinal Studies on Postpartum Depression in Clinical Samples

	Participants	Assessment time postpartum	Measures of maternal symptomatology	Types of results[a]
Buist (1998)[37] (T1) Buist & Janson (2001)[38] (T2)	45 PPD inpatients (23 mothers reported a history of childhood sexual abuse)	T1: when child was, on average, 3.9 months old (between 2.2 and 6.9 months old) T2: when child was, on average, 36.8 months old (between 31 and 39 months old)	At T1: full psychiatric interview, BDI (cutoff ≥23), DAS, HDRS (cutoff ≥15), MMI, NPI, PBI, PSE, PSI, SSQ, STAI At T2: BDI, DAS, HDRS, MMI, PSE, PSI, SSQ, STAI	(1), (2), (4)
Milgrom & Beatrice (2003)[39]	41 PPD inpatients 47 nondepressed mothers	T1: 3 months T2: 24 months	At all time points: BDI (cutoff ≥17), EPDS (cutoff >12), HDRS	(1), (2)
McMahon et al. (2005)[40]	62 PPD recruited from 100 mothers admitted to a parent-craft hospital for a week	T1: 4 months T2: 12 months	At all time points: ASQ, CES-D (cutoff >16), CIDI, DAS, DSQ, PBI	(2), (4)
Cornish et al. (2008),[41] follow-up of McMahon et al. (2005)[40]	77 PPD recruited from 111 primiparous mothers in a 5-day residential program for parenting problems	T1: 4 months T2: 12 months T3: 15 months	At T1 & T2: CIDI At all time points: CES-D (cufoff ≥16)	(2), (3), (4)
Vliegen et al. (2010)[42] Vliegen et al. (2013)[43]	41 PPD inpatients	T1: during postpartum hospitalization T2: on average, 3.5 years after T1	At T1 & T2: BDI-II, DEQ At T2: life history calendar	(1), (2), (3), (4)

[a] Four types of results are given: (1) mean depression levels, (2) prevalence of depression after the postpartum period, (3) subgroups of depressed mothers, and (4) influencing factors with regard to chronicity.

ASQ, Attachment Style Questionnaire ; BDI, Beck Depression Inventory; BDI-II, Beck Depression Inventory, Second Edition; CES-D, Center for Epidemiological Studies Depression Scale; CIDI, Composite International Diagnostic Interview; DAS, Dyadic Adjustment Scale; DEQ, Depressive Experiences Questionnaire; DSQ, Defense Style Questionnaire; EPDS, Edinburgh Postnatal Depression Scale; HDRS, Hamilton Depression Rating Scale; MMI, Monash Mother-Infant Interaction Scale; NPI, Neonatal Perception Inventory II; PBI, Parental Bonding Instrument; PPD, postpartum depression; PSE, Parenting Self-Efficacy Scale; PSI, Parenting Stress Index; SSQ, Social Support Questionnaire; STAI, State-Trait Anxiety Inventory.

Table 3

Mean Levels of Postpartum Depressive Symptomatology at Initial Assessment and Follow-up Points in Community Samples and Clinical Samples

	Mean levels of depressive symptomology	Other conclusions
Community samples		
Holden et al. (1989)[23,a]	Treated mothers: EPSD mean = 16 at T1; EPSD mean = 10.5 at T2 (no SD given) ($p < .001$) SPI symptoms mean = 25.5 at T1; SPI symptoms mean = 14 at T2 (no SD given) ($p < .001$)	Significant change for treated mothers; EPSD mean depression level decreased to level below the cutoff score (=12)
	Control group: EPSD mean = 15.5 at T1; EPSD mean = 12 at T2 (NS) SPI symptoms mean = 24 at T1; SPI symptoms mean = 23 at T2 (NS)	Small/nonsignificant change for nontreated depressed mothers; EPSD mean depression level remained above the cutoff score (=12)
Edhborg et al. (2000)[26]	EPSD mean = 15.5 (SD = 3.4, range = 13–24) at T1; EPSD mean = 7.6 (SD = 4.6) at T2	EPSD mean depression level decreased from above to below the cutoff score (=12)
Beeghly et al. (2002)[28]	CES-D mean = 20.4 (SD = 5.2) at T1; CES-D mean = 13.1 (SD = 8.2) at T3; CES-D mean = 11.4 (SD = 8.2) at T4	CES-D mean depression level decreased from above to below the cutoff score (=16)
Horowitz & Goodman (2004)[29,a]	EPSD mean = 14.12 (SD = 7.34) at T2; EPSD mean = 10.75 (SD = 6.84) at T3; EPSD mean = 10.65 (SD = 6.87) at T4; EPSD mean = 11.57 (SD = 9.49) at T5	Significant decrease between 4–8 weeks & 10–12 weeks (pairwise comparisons) EPSD mean depression level decreased but remained above the cutoff score (=10)
Clinical samples		
Buist (1998)[37] (T1) Buist & Janson (2001)[38] (T2)	Depressed mothers with history of sexual abuse: HDRS mean = 18.7 (SD = 4) at T1; HDRS mean = 9.4 (SD = 6.7) at T2 BDI mean = 36 (SD = 9.3) at T1; BDI mean = 13.2 (SD = 9.6) at T2 SAS mean = 63.3 (SD = 11.4) at T1; SAS mean = 47.9 (SD = 16.1) at T2	Decreased to under the cutoff score (15 for HDRS; 23 for BDI); smaller decrease in BDI depression level in PPD mothers
	Depressed mothers without history of sexual abuse (n = 22): HDRS mean = 18.7 (SD = 3.5) at T1; HDRS mean = 3.8 (SD = 3.8) at T2 BDI mean = 30.1 (SD = 9.3) at T1; BDI mean = 7.8 (SD = 6) at T2 SAS mean = 55.7 (SD = 15.3) at T1; SAS mean = 37.0 (SD = 13.1) at T2	BDI mean depression level decreased in PPD mothers from above to below the cutoff score (15 for HDRS; 23 for BDI)
Milgrom & Beatrice (2003)[39]	Depressed sample: HDRS mean = 13.3 (SD = 7.5) at T1; HDRS mean = 6.8 (SD = 6.8) at T2 Nondepressed sample: HDRS mean = 3.2 (SD = 2.9) at T1; HDRS mean = 2.6 (SD = 2.7) at T2	HDRS mean depression level decreased
Vliegen et al. (2010)[42,a] Vliegen et al. (2013)[43,a]	BDI mean = 24.06 (SD = 13.30) at T1; BDI mean = 14.28 (SD = 13.75) at T2 ($t = 4.63$; $p < .001$)	BDI-II mean depression level decreased significantly from highly above to slightly above the cutoff score (=13)

[a] Studies that calculated the change in mean depression level over time.

BDI, Beck Depression Inventory; BDI-II, Beck Depression Inventory, Second Edition; CES-D, Center for Epidemiological Studies Depression Scale; EPSD, Edinburgh Postnatal Depression Scale; HDRS, Hamilton Depression Rating Scale; NS, nonsignificant; PPD, postpartum depression; SAS, Spielberger Anxiety Scale, state subscale; SD, standard deviation; SPI, Standardized Psychiatric Interview.

Table 4
Prevalence of Postpartum Depression Mothers That Meet Criteria for a Later Episode of Depression in Community Samples and Clinical Samples

	3–4 months	6 months	9 months	12 months	18 months	24 months	3–3.5 years
Community samples							
Wrate et al. (1985)[21]							62%
Holden et al. (1989)[23]		62%					
Campbell & Cohn (1997)[24]	48%	30%	25%	24%	18%	13%	
Viinamäki et al. (1997)[25]						31%	
NICHD (1999)[6]							17%
Edhborg et al. (2000)[26]				6%			
Zelkowitz & Milet (2001)[27]		62%					
Beeghly et al. (2002)[28]	31%	35%	31%				
Campbell et al. (2004)[9]							23%
Horowitz & Goodman (2004)[29]	27%					31%	
Seimyr et al. (2004)[30]				39%			
Blabey et al. (2009)[33]						46%	
Howell et al. (2009)[35]		36%					
Glavin et al. (2010)[36]	31.7%	27.8%		20.2%			
Clinical samples							
Buist (1998),[37] Buist & Janson (2001)[38]							58%
Milgrom & Beatrice (2003)[39]						25%	
McMahon et al. (2005)[40]				60%			
Cornish et al. (2008)[41]				49%			
Vliegen et al. (2010)[42]							39%

six months. Depression levels do not always decrease to below the cutoff, however, and the decrease is not always statistically significant. In addition, the standard deviations are relatively high, indicating that change in depression levels within a sample is highly variable, suggesting that depressed mothers cannot be considered a homogeneous group (as discussed later in this review).

Prevalence of Depression After the Postpartum Period

All but three studies[3,4,32] report prevalences at different follow-up time points, with various intervals (see Table 4).

Studies in community samples suggest that 27% to 48% (median = 31.3%) of mothers with PPD still met criteria for major depression at 3 to 4 months postpartum (n = 4 studies); 30% to 62% (median = 35.5%) at 6 months (n = 6 studies); 25% to 31% (median = 28%) at 9 months (n = 2 studies); 6% to 39% (median = 23.1%) at 12 months (n = 4 studies); 18% at 18 months (n = 1 study); 13% to 46% (median = 31%) at 2 years (n = 4 studies); and 17% to 62% (median = 38.5%) at 3 years (n = 2 studies). Overall, these findings suggest that at any time point between 4 months and 3 years postpartum, about 30% of mothers diagnosed with PPD still meet criteria for depression.

In clinical samples, as might be expected, these figures are even higher: 49% to 60% of mothers with PPD continue to satisfy criteria for major depression at 12 to 15 months postpartum (n = 2 studies); 25% do so at 24 months postpartum (n = 1 study); and 39% to 58% of mothers still have major depression at 3 to 3.5 years postpartum (n = 2 studies).

In sum, these results indicate that about 30% of PPD-affected mothers in community samples and about 50% in clinical samples remain depressed throughout and beyond the first postnatal year.

Subgroups of Depressed Mothers

Twelve studies (ten conducted in community samples and two in clinical samples) focused on subgroups of depressed mothers (see Table 5).

Table 5

Subgroups of PPD Mothers That Met Criteria for a Later Episode of Depression in Community Samples and Clinical Samples

	Results
Community samples	
Wrate et al. (1985),[21] follow-up of Cox et al. (1982)[22]	Severity of depression at baseline: 11 (12%) severely depressed mothers (PPD) 16 (17%) mildly depressed mothers (PS) Course of depression: 12 (40%,[a] 11%[b]) chronically depressed: n = 2 severely depressed (PPD); n = 10 mildly depressed (PS) 15 (16%[b]) late depressed: suffered ≥ 1 depressive episodes after postpartum period 49 (54%[b]) never depressed
Campbell & Cohn (1997),[24] based on Campbell et al. (1995)[4]	Course of depression: 20 (30%) chronically depressed (SADS ≥ 18) 27 (41%) women with subclinical symptoms (SADS ≤ 16) 19 (29%) depression in remission (SADS ≤ 14)
Viinamäki et al. (1997)[25]	12 (31%,[a] 9%[b]) chronically depressed: ZSDS mean = 41.9 (SD = 5.2) at T1; ZSDS mean = 44.6 (SD = 9.5) at T2 27 (69%,[a] 19%[b]) remitted: ZSDS mean = 40.4 (SD = 5.2) at T1; ZSDS mean = 34.4 (SD = 6.5) at T2 100 (72%[b]) never depressed: ZSDS mean = 32.9 (SD = 4.9) at T1; ZSDS mean = 30.8 (SD = 6.2) at T2
NICHD Early Child Care Research Network (1999)[6]	92 (17%,[a] 7.6%[b]) chronically depressed: CES-D > 16, 4 or 5 times 663 (54.5%[b]) never depressed: CES-D < 16 at all time points 460 (37.9%[b]) sometimes depressed: CES-D > 16, 1 to 3 times
Beeghly et al. (2002)[28]	22 (46%[a]) chronically depressed: CES-D mean > 12 at 4 assessment times 26 (54%[a]) remission group 57 (control sample): CES-D mean ≤ 6.2 (SD = 5.0) at 4 assessment times
Campbell et al. (2004),[9] based on NICHD (1999)[6]	Severity and course of depression (further distinction within the "sometimes depressed" sample of the NICDH study): 198 (51%,[a] 18.4%[b]) remitted mothers: CES-D ≥ 16 at 1, 6, or 15 months 87 (23%,[a] 8.1%[b]) chronically depressed: CES-D ≥ 16, at least 3 time points 100 (26%,[a] 9.3%[b]) intermittently depressed: CES-D ≥ 16 at a minimum of 2 time points, separated by a period with CES-D < 16 Non-PPD mothers: 594 (55.1%[b]) never depressed: CES-D < 16 at all time points 98 (9.1%[b]) late depressed: CES-D ≥ 16 at 24 or 36 months

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Table 5

Continued

	Results
Community Samples	
Campbell et al. (2007),[31] based on NICHD (1999)[6]	Severity & course of depression (further distinction within the "sometimes depressed" sample of the NICHD study): 31 (14%,[a] 2.5%[b]) high–chronic mean CES-D from 32.8 (T1) to 27 (T7) 73 (34%,[a] 6.2%[b]) moderate–increasing: mean CES-D = 14.9 (T1); mean CES-D = 25.8 (T7) 71 (33%,[a] 5.6%[b]) high–decreasing: mean CES-D from 25.5 (T1) to 13.2 (T7) 40 (19%,[a] 3.6%[b]) intermittent: marked variations in mean CES-D over time 577 (45.6%[b]) low–stable: CES-D mean from 6.0 (T1) to 4.2 (T7) 469 (36.4%[b]) moderate–stable (subclinical): CES-D mean from 12.2 (T1) to 10.5 (T7)
Ashman et al. (2008)[3]	11 (8%[a]) chronic severe depression: average CES-D scores in the clinical range & the highest frequency of major depression diagnoses at all time points 40 (30%[a]) decreasing depressive symptoms over time: from high to moderate; from major to subthreshold depression diagnoses 82 (62%[a]) stable mild depression, average CES-D scores below clinical range: consistently low level of depression diagnoses throughout the study
Campbell et al. (2009),[34] based on NICHD (1999)[6]	Severity & course of depression (further distinction within the "sometimes depressed" sample of the NICHD study): 66 (24%,[a] 4.7%[b]) chronically depressed: CES-D $\geq$ 16 at all time points 59 (22%,[a] 5.1%[b]) early and decreasing: CES-D $\geq$ 16 most of the time, with a decrease to subclinical level at 24 months 145 (54%,[a] 10.9%[b]) moderately elevated: CES-D $\geq$ 16, with a decrease to subclinical levels at 6 & 15 months 416 (30.8%[b]) stable subclinical: CES-D always <16, but >never depressed 671 (48.5%[b]) never depressed: CES-D < 16 at all time points
Howell et al. (2009)[35]	PPD sample: 78 (36%,[a] 14%[b]) still depressed at T2 137 (64%,[a] 24%[b]) remission group Non-PPD sample: 54 (10%[b]) late onset (depressed at T2) 294 (52%[b]) never depressed
Clinical samples	
Cornish et al. (2008)[41] (T3 of the same sample as described by McMahon et al. (2005))[40]	38 (49%,[a] 34%[b]) chronically depressed: CES-D mean = 18.0 (SD = 10.6) at T1; CES-D mean = 22.3 (SD = 10.1) at T2; CES-D mean = 22.4 (SD = 10) at T3 39 (51%,[a] 35%[b]) brief depression: CES-D mean = 11.0 (SD = 6.2) at T1; CES-D mean = 7.3 (SD = 4.7) at T2; CES-D mean = 6.9 (SD = 4.4) at T3 35 (31%[b]) non-depressed: CES-D mean = 6.4 (SD = 4.1) at T1; CES-D mean = 5.4 (SD = 3.4) at T2; CES-D mean = 6.3 (SD = 4.0) at T3

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Table 5
Continued

		Results
Clinical samples		
Vliegen et al. (2010)[42] Vliegen et al. (2013)[43]		16 (39%[a]) chronically depressed: BDI mean = 29.76 (SD = 23.64) at T1; BDI mean = 28.81 (SD = 11.43) at T2 25 (61%[a]) remitted: BDI mean = 20.77 (SD = 15.54) at T1; BDI mean = 5.60 (SD = 4.43) at T2

[a] The percentage is calculated on PPD sample only.
[b] The percentage is calculated on total sample (normal controls included).
BDI, Beck Depression Inventory; CES-D, Center for Epidemiological Studies Depression Scale; PPD, postpartum depression; PS, postnatal symptoms; PSI, Parenting Stress Index; SADS, Schedule for Affective Disorders and Schizophrenia; SD, standard deviation; ZSDS, Zung Self-Rating Depression Scale.

Five of the studies specifically focused on the course of the depression. All five studies described two PPD groups. Howell and colleagues[35] found a remission group reporting depressive symptoms at baseline but not at 6 months, and an always-depressed group reporting depressive symptoms both at baseline and at 6 months. A one-year[28] and a two-year[25] follow-up study also found improved and chronically depressed mothers. In a 15-month follow-up study of a clinical sample, Cornish and colleagues[41] identified mothers who were depressed for a short period—that is, for no longer than one year postpartum—and those who were chronically depressed—that is, still depressed at 15 months postpartum. In a sample of inpatient mothers with PPD, Vliegen and colleagues[42,43] found remitted and chronic groups of mothers, with the latter being moderately to severely depressed at follow-up 3.5 years after baseline. Taking these results as a whole, all five studies found a group of mothers whose depression remitted, comprising 51% to 64% of the sample of initially depressed mothers, and a second group who were chronically depressed, representing 36% to 49% of the sample.

Seven other studies distinguished subgroups on the basis of both the course and severity of PPD. An early study by Wrate and colleagues[21] followed up a sample first described by Cox and colleagues.[22] Initially, Cox and colleagues[22] delineated two groups of depressed mothers in this sample, one severely depressed and one with mild postnatal symptoms. Of the total sample of 27 depressed mothers, 44% had subsequent depressive episodes. Wrate and colleagues[21] found, quite surprisingly, that the group with mild postnatal symptoms had a higher risk (62%) of developing chronic depression three years later than the severely depressed group (18%). Other studies included severity of depression but took it into account only at the follow-up points. Campbell and colleagues,[4,24] in a two-year follow-up study, found three subgroups: remitted (29%), subclinical (41%), and chronic (30%). At two months postpartum, these three subgroups were equally symptomatic and differed significantly from controls, but not from each other, on total symptom ratings. By four months, the subclinical and chronically depressed subgroups showed a significant and substantial decrease in symptoms relative to their initial high levels. Only the remitted subgroup, however, had dropped to the level of the control group on overall symptom ratings. Furthermore, only the chronic subgroup continued to show statistically elevated levels of depression throughout the follow-up period, despite some variability in symptom severity from one assessment to the next.

In a subsequent study, Campbell and colleagues[9] reanalyzed findings from the National Institute of Child Health and Human Development study.[6] Based on assessments three years postpartum, they found five subgroups, of which only two fell within the rubric of PPD: (1) early depressed (i.e., until 6 or 15 months; 18.4%

of the total sample, or 69% of those with PPD), and (2) chronically depressed (i.e., for a period of 3 years; 8.1% of the total, or 30% of those with PPD). The other subgroups were (3) never depressed (55.1% of the total), (4) late depressed (i.e., depressed since two or three years after childbirth; 9.1% of the total), and (5) intermittently depressed (i.e., experienced a minimum of two episodes of depression, but not necessarily in the postpartum period; 9.3% of the total).

At seven-year follow-up of the same sample, Campbell and colleagues[31] found six subgroups of depressed mothers, three of which can be considered to have PPD: (1) moderate–increasing (6.2% of the total community sample, or 34% of those with PPD), (2) high–decreasing (i.e., partially remitted; 5.6% of the total, or 33% of those with PPD), and (3) high–chronic (i.e., remaining highly depressed; 2.5% of the total, or 14% of those with PPD). The three other trajectories that they found were (4) low–stable (i.e., very low symptomatology; 45.6% of the total), (5) moderate–stable, or subclinically depressed (36.4% of the total), and (6) intermittent (i.e., marked variations of depressed versus nondepressed status, but not necessarily PPD; 3.6% of the total). At 12-year follow-up, Campbell and colleagues[34] found evidence for five subgroups, three with PPD: (1) early and decreasing (i.e., partial remission since 2 years postpartum; 5.1% of the total sample, or 22% of those with PPD), (2) moderately elevated (i.e., early partial remission; 10.9% of the total, or 54% of those with PPD), and (3) chronically depressed (4.7% of the total, or 24% of those with PPD). Others were (4) never depressed (48.5% of the total) and (5) stable subclinically depressed (30.8% of the total).

Ashman and colleagues[3] identified three subgroups of depressed mothers in a follow-up study from childbirth to age 7: (1) decreasing depressive symptoms (30%), (2) stable mild depression (i.e., consistent low level of depression; 62%), and (3) chronic severe depression (8%).

To summarize, despite variability in the number of subgroups found by different studies, all have consistently reported a chronically depressed group—that is, PPD mothers who continue to show clinically elevated depressive symptomatology, with estimates of prevalence varying between 23%[9] and 49%[41] (median = 38%). Most studies (with the exception of Ashman et al.[3] and Wrate et al.[21]) also identified a remitted group—that is, mothers who experience an acute major depression during the first three months postpartum but no longer show elevated symptoms during follow-up (from 6 months to 3.5 years). Two studies that followed up PPD mothers over a longer period (6.5 years[3] and 7 to 12 years[31,34]), however, did not find a fully remitted group. More specifically, a decreasing depression group was identified, indicating a decrease from high levels of depression at the baseline measurement to persisting subclinical depression at the final follow-up point.[3,31,34] Hence, it seems that when the depressive symptoms of mothers with PDD are examined for a longer follow-up period, all mothers experience a relapse of depressive symptoms, although not always to a clinical level. Also, a subgroup of PPD mothers were found who showed stable subclinical depressive symptoms throughout the study period.[24,31,34] Although the authors did not specifically define this last form as chronic, we highlight—consistent with the terminology in the PPD literature (see discussion)—that it is, in a strict sense, a chronic form of PPD. Furthermore, a distinction between high–chronic depression and so-called moderate–increasing depression has been made,[31] with the latter group comprising mothers who were moderately (subclinically) depressed during the postpartum period and showed increasing levels of depressive symptoms that have risen to a clinical level seven years postpartum.

Other studies have found subsamples of mothers who could not be considered chronically depressed or remitted. These mothers are labeled as showing *mild*[21] and *stable mild*[3] depression.

RESULTS II: FACTORS PREDICTING THE COURSE OF PPD

A considerable body of research has examined predictors of the onset of PPD, eliciting eight factors that clearly predict PPD: prenatal depression, a history of previous depression, a lack of social support, life stress, child-care stress, "baby blues," marital dissatisfaction, and prenatal anxiety (for a meta-analysis, see Beck).[45] However, no one has reviewed prospective studies that explore the risk factors associated with the persistence of PPD. Seventeen of the 23 studies included in the present review investigated sociodemographic or other risk factors, which we will discuss in more detail below.

Sociodemographic Differences Between Subgroups

In studies of the course of PPD, sociodemographic differences between depressed and nondepressed mothers or between different subgroups of depressed mothers are often controlled for in order to minimize confounding influences. In total, we identified 17 publications meeting the inclusion criteria of this review that examined sociodemographic factors (see Table 6).

Of the 17 studies examining the factors that influence the course of PPD, 4 studies either did not investigate sociodemographic differences between chronic and nonchronic PPD mothers[8,21,23,25,36,37,39,42] or used matched samples.[24]

AGE Out of nine studies that investigated the impact of age, only three reported an association between the child's or mother's age and chronic course of PPD. Ashman and colleagues[3] found that mothers whose depressive symptoms declined over time had younger children than mothers with subclinical depression, although no difference was found in the chronic depressive group.

Table 6

Influencing Factors with Regard to Chronicity in PPD Mothers That Meet Criteria for a Later Episode of Depression in Community Samples and Clinical Samples

	Results relating to demographic variables	Results relating to other risk factors
Community samples		
Campbell & Cohn (1997)[24]	No sociodemographic factors were investigated (because of matched samples)	Significant differences were found with regard to spousal support ($F(3, 84) = 5.38$; $p < .002$) No significant differences were found with regard to familial or personal history of depression
Viinamäki et al. (1997)[25]	Significant differences were found with regard to poor financial situation ($p < .05$)	Significant differences were found with regard to (1) inadequate social support ($p < .0001$); (2) subjective mental problems before & during pregnancy ($p < .001$), & especially 2 years later ($p < .0001$); (3) deteriorated relationship with partner before & during pregnancy ($p < .05$), & especially 2 years later ($p < .0001$); (4) stressful life events after delivery ($p < .0001$) & (5) depressive symptoms in postpartum period ($p < .0001$) High baseline depression scores combined with a deteriorating partner relationship predicted chronicity of mental health problems (logistic regression analysis)
Edhborg et al. (2000)[26]	No differences were found	Significant differences were found with regard to stress about motherhood 1 year postpartum ($F(1, 90) = 12.30$; $p < .0006$)
Zelkowitz & Milet (2001)[27]	Significant differences were found with regard to (1) maternal education ($t = -2.1$; $p < .05$) & (2) occupational status ($\chi^2 = 10.3$; $p < .05$)	Significant differences were found with regard to history of mental health problems (in particular, major depression)
Beeghly et al. (2002)[28]	No significant differences were found (due to strict inclusion criteria)	
Campbell et al. (2004),[9] based on NICHD (1999)[6]	Significant differences were found with regard to (1) level of education ($F(2, 1212) = 38.77$; $p < .001$), (2) income-to-needs ratios ($F(2, 1210) = 41.09$; $p < .001$) & (3) a partner present (χ^2 (2, 1215) = 57.30; $p < .001$)	Significant differences were found with regard to perceived social support ($p < .001$)
Horowitz & Goodman (2004)[29]	Parity & income were correlated with depression at T5; maternal age was not	Depression history ($\beta = .423$; $p < .0001$), lower social support ($\beta = .216$; $p = .035$) & higher parental distress ($\beta = -.221$; $p = .036$) were significant predictors of depression at T5
Seimyr et al. (2004)[30]	Significant differences were found with regard to financial worries ($p < .0001$)	No significant differences were found with regard to (1) losses & strains, (2) health problems & (3) partner support
Ashman et al. (2008)[3]	Significant differences were found with regard to age of the children	Contextual risk factors were associated with maternal depression ($r = .46$, $p < .001$) & were stable over time

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Table 6
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	Results relating to demographic variables	Results relating to other risk factors
Community samples		
Klier et al. (2008)[32]	No significant differences were found	Depressive symptoms at T2 predicted T3 depressive symptoms even when controlling for the contribution of maternal depression at birth ($r = .44$; $p < .001$) Separated psychosocial risk factors were unrelated to the chronicity of PPD Cumulative psychosocial risk (risk index) has a moderating influence on the stability of depressive symptomatology: Women with ≥2 out of 7 risk factors at birth were more likely to have stable depressive symptomatology across the infant's first 18 months of life, from T1 to T2 ($r = 0.36$; $p = .05$) & from T2 to T3 ($r = 0.55$; $p = .005$) Intercorrelations among the depression measures at all 3 time points were not significant for women with fewer than 2 risk factors
Blabey et al. (2009)[33]	No significant differences were found	A controlling partner was significantly associated with persistent PPD (OR = 6.9, 95% CI = 1.5–31.8; $p = .014$)
Howell et al. (2009)[35]	Proportionally fewer chronically depressed mothers were white (OR = 2.90, 95% CI = 1.33–6.33)	Chronically depressed mothers were more likely to have a history of depression (OR = 4.24, 95% CI = 1.93–9.32) than other subgroups Chronically depressed & remitted mothers reported the same levels of physical symptoms at T1 ($M_{diff} = -0.31$, NS), but chronically depressed mothers showed a smaller reduction in levels of physical symptoms ($M_{diff} = -0.78$; $p < .05$) Self-efficacy increased from T1 to T2 for remitted mothers ($F(1,136) = 60.20$; $p < .01$) & remained unchanged in the chronic sample ($F(1,77) = 0.43$, NS)
Clinical samples		
Buist (1998)[37]	No sociodemographic factors were investigated	PPD mothers with a history of childhood sexual abuse improved less compared to non-abused PPD mothers ($p < .05$ for both HDRS & SAS)
McMahon et al. (2005)[40]	Being non–English speaking was significantly associated with depression at T2 (Wald $\chi^2 = 5.04$; $df = 1$; $p = .02$; OR = 1.13)	The following factors were significantly associated with depression at T2: (1) depression score at T1 (Wald $\chi^2 = 13.59$; $df = 1$; $p = .00$; OR = 1.35), (2) low maternal care during childhood (Wald $\chi^2 = 7.12$; $df = 1$; $p = .01$; OR = 1.10), (3) anxiety over relationships (Wald $\chi^2 = 6.80$; $df = 1$; $p = .01$; OR = 1.18), (4) immature defense style (Wald $\chi^2 = 7.38$; $df = 1$; $p = .01$; OR = 1.05) & (5) low marital satisfaction at T1 (Wald $\chi^2 = 5.04$; $df = 1$; $p = .02$; OR = 1.05)
Cornish et al. (2008)[41]	Significant differences were found with regard to maternal age ($F(2, 109) = 2.50$; $p < .10$)	No other risk factors were investigated

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Table 6
Continued

	Results relating to demographic variables	Results relating to other risk factors
Clinical samples		
Vliegen et al. (2010)[42] Vliegen et al. (2013)[43]	Significant differences were found with regard to financial problems (69% vs. 31%: $\chi^2 = 4.39$; $p < .05$)	Current depressed mothers reported (1) more illness of close relatives (100% versus 46%: $\chi^2 = 5.21$; $p < .05$), (2) more-frequent moves from one residence to another (92% vs. 73%: $\chi^2 = 2.55$ (NS trend)) & (3) more frequent leaving the father of the child (46% versus 35%: $\chi^2 = .49$ (NS trend)) Concerning personality factors: self-criticism, but not dependency, assessed at T1 predicted both depression diagnosis & levels of depression at follow-up

HDRS, Hamilton Depression Rating Scale; HMRA, Hierarchical Multiple Regression Analysis ; NS, nonsignificant; PPD, postpartum depression; SAS, Spielberger Anxiety Scale, state subscale.

Cornish and colleagues[41] showed that chronically depressed mothers were slightly younger ($p < .10$) than mothers who had never been depressed. Campbell and colleagues[9] likewise found that intermittently and chronically depressed mothers were significantly younger than never-depressed and remitted-depressed mothers. By comparison, seven studies found no influence of the mother's age on development of chronic PPD.[26–29,32,33,35]

Socioeconomic status Of the nine studies investigating variables related to educational, occupational, and marital status, only three found that they affected the chronic course of PPD. The National Institute of Child Health and Human Development study[6,9] found that chronically depressed women had a lower level of education and a lower income-to-needs ratio than the remitted group. At one month postpartum, mothers classified as chronically depressed were more likely to have no partner and no plans to go out to work. Zelkowitz and Milet[27] found chronically depressed mothers to be lower in occupational and educational status than the group who had remitted ($p < .05$). Furthermore, Horowitz and Goodman[29] found a negative correlation between income and maternal depression scores at four to five months postpartum ($p < .001$). By comparison, six studies found no influence of socioeconomic status on development of chronic PPD.[3,30,32,33,35,41]

Parity Of the six studies that investigated the mother's parity, none found that it had influenced the course of PPD.[26,27,29,32,33,35]

Ethnicity Five studies investigated the possible influence of ethnicity. Howell and colleagues[35] found that chronically depressed mothers were more frequently nonwhite than mothers in their other three subgroups (never depressed, in remission, late onset). McMahon and colleagues[40] found that chronically depressed mothers were more often non–English speaking. By comparison, three studies found no influence of ethnicity on the course of PPD.[3,27,33]

Infant gender Of the five studies investigated the impact of the child's gender, none found that it influenced the chronic course of PPD.[26–28,35,41]

Risk Factors

A number of factors in the postpartum period have been found to predict a chronic course of depression, and some of these factors are also known risk factors for PPD. These factors can be divided into four categories, as follows:

Partner relationship and social support Three studies found that chronically depressed mothers reported significantly less satisfaction with spousal support than mothers who were subclinically depressed and those whose PPD remitted.[24,25,40] Two other studies took into account more specific aspects of the partner

relationship: Blabey and colleagues[33] found that a controlling, threatening partner was significantly associated with persistent PPD, and Vliegen and colleagues[42,43] found a (nonsignificant) trend for chronically depressed mothers to leave the fathers of their children more frequently. In addition, two studies found that chronically depressed mothers reported receiving less social support than mothers whose depression remitted.[9,29] By comparison, two studies did not find that social support differentiated between chronic and remitted PPD mothers.[30,35]

History of mental health problems or more specific childhood features Three studies found that mothers with chronic PPD were more likely to have a history of depression[29,35] or mental health problems,[25] though two studies found that a history of depression[24] or mental health problems[27] did not differentiate between subgroups with different courses of PPD. Buist and colleagues[37,38] found that PPD mothers with a history of childhood sexual abuse failed to improve as much as mothers who had not been abused. McMahon and colleagues[40] reported that a history of low maternal care during childhood was significantly associated with chronicity of PPD.

Contextual risk factors A chronic course of PDD was found to be associated with parental stress in two studies[26,29] and with financial worries in three.[25,26,42,43] Howell and colleagues[35] found that chronically depressed mothers showed a smaller reduction in postpartum physical symptoms over time compared to the remitted group. This study also showed that the incidence of health problems in the infants, such as colic and illness, did not differ between remitted and chronic PPD mothers. Vliegen and colleagues[42,43] found that chronically depressed mothers reported significantly more illness among close relatives and a (nonsignificant) trend of more-frequent moves from one residence to another. In two studies, a composite measure of stress was used. Ashman and colleagues[3] calculated a Contextual Risk Composite Measure that included stress in five domains (life events, marital dissatisfaction, parenting, family conflict, and lack of social support). A chronic course of depression was associated with higher levels of these contextual risks. Although the study did not examine whether contextual risk predicted a chronic course of PPD, these factors were stable over time, suggesting that the subgroup of mothers with chronic, severe depression experienced repeated exposure to stressful life circumstances. Klier and colleagues[32] computed a Multiple Risk Index including seven variables (household crowding, maternal age, problems during pregnancy, weight gain of less than 9 kg during pregnancy, dissatisfaction with social support, financial resources, and the child being unwanted). Women with two or more risk factors at birth were likely to have stable depressive symptomatology from birth to 6 months postpartum, and from 6 to 18 months; by comparison, the correlations among the depression measures at these three time points were not significant for women with fewer than two risk factors.

Personality factors Problems managing role demands,[35] anxiety over relationships and an immature defense style,[40] and high standards and excessive self-criticism[42,43] have been found to put mothers at increased risk of developing chronic PPD.

DISCUSSION AND CONCLUSIONS

The general findings of this review of 23 longitudinal studies that followed up mothers after a diagnosis of PPD can be summarized as follows. First, the reviewed studies found that the severity of the depression (mean level of depression) in mothers with PPD decreased at different time points in the postpartum period, but not always to a nondepressed level (below the cutoff), and that the decrease is not always statistically significant. Second, with regard to prevalence, studies indicate that an estimated 30% of PPD-affected mothers in community samples and 50% in clinical samples continue to have major depression during their child's first year of life and even beyond. Third, 12 publications distinguishing between subgroups of mothers with PPD consistently identified (1) a chronically depressed group of mothers who continued to experience clinically elevated depressive symptoms and (2) a remitted group of mothers who experienced acute major PPD but were no longer depressed at follow-up. When severity of depression was also taken into account, a more differentiated picture of chronic depression emerged, with subgroups of mothers showing (1) chronic major depression, (2) stable minor depression, or (3) recurrent major depression without full recovery between episodes. Taken together, these studies show that mothers with PPD cannot be considered a homogeneous group. A considerable proportion of mothers who experience PPD return to the level of depression of normal controls at four months postpartum and remain in remission throughout a long follow-up period, indicating that for these mothers, depression constitutes a time-limited problem. For a large group of mothers (38%), however, PPD is the prelude to the development of a chronic depressive disorder. Alternatively, as discussed in more detail below, chronic PPD may perhaps simply be the continuation of chronic depression or dysthymia that is already present. Finally, although a minority of the studies found evidence for sociodemographic differences (younger age of mother; lower maternal income and occupational and educational status; minority/nonwhite ethnicity), results regarding the four domains of risk factors seem to be more equivocal. More specifically, lower quality of partner relationship (with the exception of two of nine studies that did not find social support to have an influence), a history of depression, sexual abuse, or lower-quality maternal care, higher parental stress and contextual risk factors, and personality-related vulnerability have been consistently found to predict a chronic course of PPD. The incidence of infant colic and infant illness did not seem to differ between mothers whose PPD remitted and those whose PPD became chronic. In this regard, the

composite measures used in two studies[3,32] are of major interest. Both measures, which included five and seven domains of risk, respectively, revealed a chronic course of depression to be significantly associated with higher levels of contextual risk. These risk factors were stable over time, suggesting repeated or chronic exposure to stressful life circumstances.

Limitations

The results of this review are subject to various limitations. No "gold standard" is available for defining and measuring PPD and its course. As a consequence, studies have used different criteria to define PPD and different instruments to measure it at diverging time points. The large differences between these studies therefore need to be discussed carefully and critically. Of special note in this context are (1) the conceptualization of PPD and its severity and chronicity, (2) postpartum onset versus previous vulnerability to depression, (3) the instruments used to assess PPD and its course, (4) the samples investigated, and (5) the role of treatment. Finally, we propose guidelines for designing studies whose results would be easier to compare, which could lead, in turn, to a more consistent body of knowledge in this domain.

Conceptualization

The research we have reviewed concerning the course of PPD is hampered by the use of differing definitions that often do not take into account that depression is a heterogeneous disorder that ranges from mild, transitory disturbances of mood to severe, persistent depressed mood associated with severe social and occupational impairments.[7] Hence, a clear definition of key concepts is needed that considers the severity and course of the depression as distinct and important factors, particularly since studies have often confounded them.

With regard to the severity of depression, DSM-IV distinguishes between mild, moderate, and severe depression.[11] Earlier classification systems based on the Research Diagnostic Criteria[46] distinguished between *definite* major depression (depressed mood and five symptoms), *probable* major depression (depressed mood and four symptoms), and *minor* depression (depressed mood and three symptoms).[24]

In terms of the course of depression, DSM-IV describes chronic depression as depressive symptoms persisting for at least two years, and distinguishes between different types of chronic depression on the basis of the severity of symptoms:[47] (1) chronic major depression, referring to full-blown clinical depression lasting for a minimum of two years; (2) recurrent major depression without complete interepisode recovery, in which full clinical symptoms (i.e., meeting full DSM-IV criteria) and subthreshold symptoms alternate over a period of at least two years; and (3) dysthymia, referring to a condition characterized by depressed mood that persists for at least two years (which is conceptualized as a mild form of chronic depression). The Research Diagnostic Criteria diagnosis of intermittent depression is similar to dysthymia as defined in DSM-IV.[48] Dysthymia in combination with a major depressive episode is termed *double depression*.[47]

In the reviewed studies, operationalizations other than those described in the DSM-IV or Research Diagnostic Criteria are often used. In some studies, chronic depression is defined in terms of long-lasting depressive symptoms that are present from one follow-up period to the next, but not necessarily over a two-year period.[27,32] However, investigation of the course of PPD by the use of different follow-up points makes it difficult to distinguish between chronic depression and recurrent, or episodic, depression as a discrete acute episode of depression after a symptom-free period.[7] Furthermore, it is hard to detect whether depression is actually chronic, with depressive symptoms continuing from one follow-up period to the next, when only a few measurements are made at points over an extended period of time. If the follow-up points are spread out, it may not be possible to identify shorter-term changes in the course of the PPD. In this regard, some authors stress the importance of assessing depression in the interval between the study's established time points for measurement.[3,47]

PPD Onset Versus Previous Vulnerability

Most of the studies examining the course of PPD start to look at depressive symptomatology from childbirth on, partly guided by the postpartum-onset specifier of four weeks postpartum described in the DSM-IV-TR. In the studies that we reviewed, none examined whether PPD among the sample could actually be an extension of depression with onset during or before pregnancy. The time of onset of "postpartum" depression has, in fact, been frequently debated in the literature.[49,50] Some authors even question whether PPD should be considered as a specific entity.[51] These authors argue that being pregnant and giving birth to a child are major stressors that may lead to a new, or even the first, episode of depression in women who are vulnerable for this disorder. Of course, even then the term *postpartum depression* seems justified, as depression in early motherhood is characterized by many specific features such as being preoccupied with worries about the baby's well-being and about one's own abilities as a mother. Jones and Cantwell[52] similarly recommend the continued use of a *pregnancy and postpartum onset* specifier in each category of mood disorder in DSM-5.[53] Nevertheless, studies suggesting that 11.5%[50] and even up to 50%[49] of depressed women report depression onset before or during pregnancy point to the importance of assessing depression, as well as the vulnerability to depression, before the postpartum period. Congruent with these views, DSM-5 has extended the PPD specifier to include depressive symptoms occurring during pregnancy.

Only five studies covered in the present review investigated a history of depression among participants (as

discussed above), and three of them found such a history to be a possible risk factor for chronic PPD.[25,29,35] Consequently, we have only limited knowledge about how PPD might be a recurrence of a preexisting disorder in a subset of women. Furthermore, none of the studies specifically investigated prenatal onset of depression as a possible factor heightening the risk of a chronic course of PPD. Stowe and colleagues[50] therefore correctly argue that the heterogeneity of previous depression histories in samples of chronically depressed PPD women may explain the limited success of existing efforts to identify the risk factors for chronic PPD. This situation illustrates a disadvantage of a disorder-centered approach to the study of depression—an approach that tends to focus on the onset and course of specific disorders (such as PPD).[54] By contrast, a developmental, person-centered approach—one that follows women, over time, during the transition to motherhood—may be more appropriate and may yield important new insights into the nature of PPD.[55]

The current review therefore cannot draw conclusions regarding the association between the onset (prenatal or postpartum) of depression and its course, although the few existing studies suggest that, at least in a subsample of women, chronic PPD may be an extension of previous episodes of depression and thus probably reflects a nonspecific vulnerability to depression.

Instruments Used

Different self-report *instruments* have been used to assess PPD symptoms, whereas various clinical interviews have been used to diagnose PPD as a syndrome. Studies suggest that these various instruments and clinical assessments may result in considerable differences between findings, depending on the instruments/assessments and cutoffs that are used.

Questionnaires In empirical research, questionnaires are frequently used to assess the occurrence and severity of PPD. These include the HDRS,[56] Beck Depression Inventory (BDI, BDI-II),[57,58] General Health Questionnaire,[59] Center for Epidemiological Studies Depression Scale,[60] Comprehensive Psychiatric Rating Scale,[61] Edinburgh Postnatal Depression Scale (EPDS),[62] Postpartum Depression Screening Scale,[63] and Patient Health Questionnaire.[64] These measures are also often used to define clinical depression using a cutoff score. In studies using the Center for Epidemiological Studies Depression Scale, for instance, individuals scoring 16 or higher are commonly categorized as clinically depressed,[3,9,28,31,34,41,60] and different cutoff scores are often used to distinguish between different levels of severity. According to the scoring guidelines for the BDI, for example, a score of 11 is the lowest score for mild to moderate depression, whereas a score of 19 indicates the moderate-to-severe range.[65] In the BDI-II, total scores ranging from 0 to 13 represent "minimal" depression, 14 to 19 "mild," 20 to 28 "moderate," and 29 to 63 "severe" depression.[58] EPDS scores exceeding a threshold score of 10 (within family medical practices when used for screening purposes) and 12 (within research studies) indicate a greater likelihood of depression.[62]

Potential methodological problems that are associated with the use of cutoff scores[66] are the instruments' lower sensitivity (i.e., the number of women who are correctly diagnosed as depressed) and specificity (i.e., the number of women who are correctly diagnosed as not depressed). First, in several self-report instruments that were not specifically developed for assessing PPD, high scores (e.g., on the BDI) may reflect fatigue, low levels of bodily satisfaction, and loss of libido, which are all considered normal in the postpartum period. Self-report measures such as the EPDS were developed specifically for use within a postnatal population and take into account that these symptoms are common in the postpartum period. However, a meta-analysis reports that, whereas the specificities of the BDI, EPDS, and Postpartum Depression Screening Scale are all relatively high and similar, the sensitivity of these instruments varies considerably, with the latter two being more sensitive.[67]

Second, different cutoff scores have been used in different studies, making it difficult to compare results across studies. In defining clinical thresholds, studies have used BDI scores of $\geq$12,[68] $\geq$17,[39] and $\geq$23,[38] and BDI-II scores of $\geq$13,[42,43] and $\geq$14.[29] For the HDRS, Buist and Janson[38] used a cutoff of $\geq$15. For the EPDS, studies have used cutoff points of $\geq$9,[30,68] $\geq$10,[27,29,36] $>$12,[8,18,39] $\geq$12,[23,26,69] and $\geq$13.[70] See also in this context Matthey and colleagues' review[71] of several validation studies using the EPDS;[62,72–74] in discussing the use of "validated" versus "unvalidated" cutoff scores, the authors suggest that using validated cutoff scores of 13 for major depression and 10 for minor depression represents an optimal balance between sensitivity and specificity.

A final concern with regard to cutoff values relates to cultural differences. The prevalence of PPD,[68] the expression of depressive symptoms,[75] and the sensitivity and specificity of measures such as the EPDS[71,76] vary among different cultures. Consequently, the cutoff values validated in particular English-speaking populations cannot necessarily be generalized to other countries or cultures.

Clinical interviews Numerous standardized clinical interviews have been used in studies examining the course of PPD: Goldberg's Standardized Psychiatric Interview,[77] Present State Examination,[78] Montgomery–Åsberg Depression Rating Scale,[79] Schedule for Affective Disorders and Schizophrenia–Lifetime,[16] Diagnostic Interview Schedule III–Revised,[80] Structured Clinical Interview for DSM-III-R and DSM-IV,[81] and Composite International Diagnostic Interview.[82]

Although interviews may be more reliable than questionnaires, self-report measures are easier and less costly

to administer and do not require trained interviewers, which may explain their greater popularity, particularly in studies with large samples. Affonso and colleagues[68] state that questionnaire data should be used to analyze women's experiences of depressive symptoms but not to diagnose clinical depression, for which clinical interviews are necessary.

Another limitation of the reviewed studies is that they varied in sampling procedures, leading to samples being recruited from different populations of depressed individuals, including hospital patients, psychiatric clinic outpatients, clients of social service agencies, and people in the community. Some results are based on very small samples,[27,32] making it hard to generalize findings. Furthermore, the results from studies using community samples cannot simply be generalized to clinical populations. Given that few studies to date used clinical samples (n = 5) and that some studies included mothers with heterogeneous diagnoses,[27] it is difficult to draw conclusions about the specific postpartum depressed group.

The Role of Treatment

The heterogeneity of PPD makes it difficult to assess treatment. In two of the studies with nonclinical samples,[23,36] and in all five studies with clinical samples,[37–39,42,43] the mothers received some kind of support or treatment, but it is difficult to determine whether recovery occurred because of treatment or other factors.

Two studies examined the effect of supportive counseling on the course of PPD in nonclinical samples and showed that the prevalence of depression at one-year follow up was lower in participants who received the intervention than in those who did not (15% vs. 32%;[36] 31% vs. 62%[23]).

RECOMMENDATIONS FOR FUTURE RESEARCH AND CLINICAL INTERVENTIONS

In this section, we outline a number of recommendations for future research and intervention based on the above review.

First, future research should replicate published findings using larger samples, in a variety of clinical contexts, with an exclusive focus on mothers with PPD.

Second, the considerable heterogeneity in the conceptualization of PPD should be addressed. In order to obtain a systematic body of research on PPD and its course, studies should use more common, internationally agreed criteria; validated cutoff scores for instruments; more consistent and parallel procedures; and comparable measurement time points. With regard to this last category, future studies of PPD should define clear time points for assessing patients, assess depressive symptoms between these measurement points, and collect data on subclinical depressive symptomatology. The new definitions and criteria in DSM-5 represent an important step in this direction.

Third, congruent with a person-centered approach—and following the recommendations of several researchers in the field[83] who advocate a move beyond thinking of PPD as applying solely to the postpartum period—future research should investigate mothers' history of depression, as well as possible risk and protective factors, before delivery. A possible method for taking into account the onset and timing of depressive symptoms, treatment, and life events is the *life history calendar*[84,85] method, which is designed to collect detailed, individual-level event timing and sequencing data within an interview framework. With this method, it is easy to obtain information on mothers' history of depressive episodes, including any current depression (onset, timing, and duration), on important life events, and on treatments received (see Vliegen et al.).[42,43] In this regard, we recommended the use of *composite measures* that take into account several domains of contextual risk.[3,32]

Fourth, this review stresses the need for culturally sensitive studies investigating different racial and ethnic groups, and the need to consider other demographic variables such as socioeconomic status.[13]

Finally, studies should take into account individual personality factors that may influence the treatment-seeking patterns of mothers with PPD. We need more systematic, theory-driven research concerning the psychosocial[42,55] and biological factors[54] that may function, either separately or together, as either risk or protective factors in the development of PPD.

With regard to clinical implications, professionals should be aware that the onset of PPD is often before the postpartum period and that PPD can persist far beyond the first year after childbirth. Clinicians who treat PPD mothers need to be well informed about the prognosis and the different possible trajectories of the depression. Whereas for some mothers recover from their depressive symptoms fairly quickly, other mothers' experience of PPD signals the start of what proves to be a chronic disease, with considerable implications for the mother, child, and broader family. Consequently, programs specifically designed for PPD mothers need to include follow-up assessments in order to identify risk factors for the depression becoming chronic. Furthermore, clinicians need to be aware that mothers' previous episodes of depression and that possible contextual factors heighten vulnerability for a chronic course of depression.

In sum, families with mothers suffering from PPD need the engagement of clinicians who are sensitive to the signs that the depression may become chronic. Moreover, given that parental depression has a detrimental (and potentially long-term) influence on the development of children, parents need ongoing contact with clinicians who are mindful of the parent-child interaction as well as of each child's need for developmental support during early childhood and beyond.

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