

A systematic review of research on psychiatric mother-baby units

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Abstract

Purpose: Psychiatric Mother-Baby Units (MBUs) are currently viewed as best practice, particularly in the United Kingdom, Australia, and France, for improving outcomes for mothers and babies when the former are experiencing severe forms of mental illness. A growing number of publications have examined MBUs, but to date there has not been a comprehensive review of these studies. As such, the systematic review reported in this paper sought to address this gap. **Methods:** A systematic search was conducted for peer-reviewed research and grey literature published in English between 2000 and 2015. A final sample of 44 publications were identified that reported on empirical findings with regard to MBUs. Three quarters of the studies focused on individual MBUs and most studies were quantitative. **Results:** A thematic analysis of the studies identified three major themes: (1) admissions data, (2) outcomes for mothers, and (3) programs and interventions. The analysis also identified four secondary themes: (i) follow up after discharge; (ii) separation of mothers and babies after discharge; (iii) client satisfaction with MBUs; and (iv) partners of women admitted to MBUs. **Conclusions:** The findings of the review highlight gaps in knowledge about MBUs and provide suggestions for future research.

Keywords:

Mother-baby unit; mother-infant unit; mental health; psychiatric unit; systematic review; postpartum psychosis

Introduction

During the first half of the twentieth century, the separation of mothers and their babies was viewed as best practice when mothers were experiencing severe forms of mental illness and required psychiatric treatment. Howard (2000) notes that mothers tended to be admitted to institutions or asylums, particularly at the height of their usage in the early decades of the twentieth century. The practice of separating mothers and babies began to change, however, during the 1950s and 1960s, when research findings indicated that keeping mothers and babies together was best for establishing a secure mother-child relationship (Howard, 2000). This led to the creation of mother-baby units (MBUs), which appeared in some form in the late 1950s and early 1960s in the United Kingdom (UK) (Baker, Morison, Game, and Thorpe 1961). The first MBU in France was opened in 1979 in Créteil followed by three more in France in the 1980s (Cazas and Glangeaud-Freudenthal 2004), though joint mother-baby inpatient admissions occurred as early as 1960 (Baker et al., 1961). The 1980s saw the

establishment of MBUs in Melbourne, Australia and the first MBU in Belgium opened in 1985 in Zoersel (Glangeaud-Freudenthal et al. 2014).

MBUs appeared in the context of a range of social changes and research advances, including new understandings concerning the importance of the mother-baby relationship and attachment (e.g. Bowlby 1969), advances in relevant psychiatric treatments, the changing nature of asylums (directed by government policy), changing family structures (meaning that other carers were often not available), the development of social psychiatry, and the increase in the number of psychiatrists who were women (Cazas and Glangeaud-Freudenthal 2004; Howard 2000). Psychiatric mother and baby units (MBUs) are now viewed as the best setting for mothers with severe mental illness, given co-admission potentially reduces interruptions to attachment relationships (e.g. Cazas and Glangeaud-Freudenthal 2004; Green, Hofberg, Carr, Fanneran and Sumathipala 2016; National Institute for Health and Care Excellence 2014).

While MBUs are now established best practice in many countries, there is no accepted definition of how a MBU should be structured or run (Elkin et al. 2009). Generally, psychiatric MBUs refer to separate wards or buildings dedicated to housing mothers and their babies full-time, with at least four beds and cots or bassinets (Elkin et al. 2009; Glangeaud-Freudenthal, Howard, and Sutter-Dallay 2014). MBUs are usually staffed by multidisciplinary teams whose role it is to care for mothers and babies, with expertise focused on the treatment of mothers' mental health conditions, building attachment relationships and positive interactions between mothers and babies, and assisting mothers to gain skills in child care and development (Glangeaud-Freudenthal et al. 2014).

MBUs are currently most common in the UK, Australia, and France, where they have been actively promoted for several years. MBUs also exist in other European countries including Belgium (e.g. Glangeaud-Freudenthal and The MBU-SMF Working Group 2004), the Netherlands (Noorlander, Bergink, and van den Berg 2008), Hungary (Glangeaud-Freudenthal, Howard, and Sutter-Dallay 2014), and Germany (Grube 2005), and outside Europe in the United States (US) (Meltzer-Brody et al. 2014), Israel (Maizel, Katzenelson, and Fainstein 2005), India (Chandra, Desai, Reddy, Thippeswamy, and Saraf 2015), and Sri Lanka (Glangeaud-Freudenthal et al. 2014). The countries that have most actively promoted specialised inpatient MBUs include the UK, Australia, France, and Belgium, which is reflected by the higher number of MBUs in those countries. Although not included in this review, it is also worth noting that 24 of the 26 cantons (92%) in Switzerland offer joint mother-

baby admissions in general psychiatric wards, and since 2007 three cantons offer specialised inpatient perinatal-psychiatric care with 3-8 beds in each (Castro et al. 2015). Practices and admissions differ between (and within) countries, however, due to different mental health and perinatal care systems within each country, and the fact that they may cater for clients presenting with different mental health issues (Glangeaud-Freudenthal and The MBU-SMF Working Group 2004). The existence of individual MBUs can be tenuous, and numbers have fluctuated due to a range of factors including funding, the interest of doctors (who are largely responsible for keeping the units in existence), the children's status as patients or not, and the size of the unit (Cazas and Glangeaud-Freudenthal 2004).

Although at least two previous literature reviews have focused on psychiatric MBUs, these have specifically focused solely on mental health outcomes for women following admission (Gillham and Wittkowski 2015) and parenting capacity (Hammond and Lipsedge 2015). In addition, a review examining MBU care for mothers with schizophrenia or psychoses undertaken in the UK in 2006 (Irving and Saylan 2007) could find no studies that included randomised controlled trials and no studies with substantive evidence in the Cochrane Schizophrenia Group Trial Register. As a result, these authors highlight the urgent need for reliable evidenced based studies on MBU efficacy. The aim of the present systematic review is to provide an overall picture of empirical research which has been conducted in and about MBUs around the world. After outlining the systematic approach to undertaking the review, this article then reports on a thematic analysis of the studies identified in order to provide a picture of the key areas of current attention within research on MBUs.

Methods

Search strategy and inclusion criteria

Inclusion criteria were peer-reviewed empirical studies or grey literature that focused on psychiatric mother-baby units published in English in the last 15 full calendar years (i.e. 1 January 2000-31 December 2015). A systematic search of seven databases was conducted: PsycINFO, PubMed, Scopus, Sociological Abstracts, Web of Science, ProQuest Dissertations and Theses Global, and Google Scholar. Search terms used were "mother and baby unit*" OR "mother-baby unit*" OR "mother-infant unit*" OR "mother baby inpatient*" or "mother-baby psychiat*" OR "postpartum psychos*". These searches resulted in a total of 1,321 records - of which 487 were duplicates – leaving a total of 834 articles considered for inclusion (see Figure 1).

The second author conducted the search and reviewed all 834 article titles and abstracts. As can be seen in Figure 1, this initial process resulted in the exclusion of 757 articles. These studies were excluded because they were individual or small case studies, did not include empirical or primary data, or did not focus on psychiatric MBUs (e.g., focused instead on general settings, or settings such as prisons). Studies were also excluded if they included participants from MBUs but focused on separate research questions (e.g., were designed to develop a new psychiatric scale; e.g. Cunningham, Brown, and Page 2015), or if more than one kind of setting was included and the findings were not distinct. When a peer-reviewed journal article was published from a thesis and the two reported on the same research, the article but not the thesis was included (e.g. Butler, Hare, Walker, Wieck and Wittkowski 2014). When a thesis or section of a thesis had not been published then the original thesis was included (e.g. the section on staff in Butler 2013). Finally, articles which were in-press in 2016 were excluded as full texts could not be obtained for these papers.

Where it was unclear from the abstract whether or not an article met the inclusion criteria, the full-text was sought and reviewed against the inclusion criteria. If uncertainty remained, the third author also reviewed the abstract and full-text, and consensus was reached. As can be seen in Figure 1, studies were included if they were empirical studies or included primary data from psychiatric MBUs, and where the MBU was the focus of the study. Studies which were not empirical studies *per se* but reported on data about MBUs (such as client outcomes after admissions) were also included as they provide considerable information about the context of MBUs, particularly in terms of admissions. 37 publications were excluded after examining full-texts. An additional four sources were found at this point from an examination of reference lists of the articles remaining in the sample at this point.

Applying these inclusion and exclusion criteria resulted in a final sample of 44 publications with consensus from the second and third authors (see Figure 1). The 44 sources identified consisted of 41 refereed journal articles and three theses (Butler 2013; Kemp 2011; Masciantonio 2015). Articles were published in 22 different journals, with the largest number appearing in the *Archives of Women's Mental Health* (n = 13).

[INSERT FIGURE 1 ABOUT HERE]

Method of analysis

Since the final sample of articles include a mixture of research designs across a range of research questions associated with MBUs, it was not appropriate to conduct a meta-analysis. Instead, the method of data synthesis for this review was informed by The Joanna Briggs Institute 'aggregate mixed method synthesis', which draws upon the Bayesian approach to translating quantitative data into qualitative (Joanna Briggs Institute 2014). This approach presents a simplified, 'elegant and yet powerful method of combining data' (p. 13), without distorting the findings of the individual studies.

Three key themes predominated across the studies (1) admissions data (12 sources), (2) outcomes for mothers, using admissions and discharge data (10 sources) and (3) the impact of programs and interventions in MBUs (10 sources). Four secondary themes were represented in the studies: (i) follow up after discharge (6 sources); (ii) separation of mothers and babies after discharge (5 sources); (iii) client satisfaction of MBU (3 sources); and (iv) partners of women admitted to MBUs (2 sources). Follow-up after discharge as a theme tended to overlap with the major focus of outcomes and also with the secondary theme of separation after discharge. The remaining papers did not fit into repeated themes, but instead focused on understanding the characteristics of the population admitted to MBUs.

Results

In terms of summarising the overall findings of previous research, Table 1 provides an overview of sources included in the review, summarising methods and focus for each article.

[INSERT TABLE 1 ABOUT HERE]

Of the 44 sources included in the final sample, 31 focused on individual MBUs. Of these 15 reported on studies conducted in the UK, 9 in Australia, and the remaining 7 were spread evenly across Belgium, France, Germany, India, Israel, the Netherlands, and the US. The dominant methodology used in the studies of individual units was quantitative, focusing primarily on admissions data and outcomes of mothers admitted to MBUs.

The remainder of the sources focused on multiple MBUs, with Howard et al. (2004) focusing on 18 MBUs in the UK, Glangeaud-Freudenthal et al. (2013) focusing on 13 in France and 3 in Belgium, Glangeaud-Freudenthal et al. (2011) and Sutter-Dallay et al. (2015) focusing on 13 in France, Elkin et al. (2009) focusing

on 12 in England, Glangeaud-Freudenthal and The MBU-SMF Working Group (2004) focusing on 11 in France and Belgium, Salmon et al. (2003, 2004) and Abel et al. (2005) focusing on eight MBUs and three facilities in the UK, Buist et al. (2004) focusing on four in Australia, Vliegen et al. (2010; 2013) focusing on two in Belgium, and the remainder focusing on an unspecified multiple number in the UK (Howard, Shah, Salmon, and Appleby 2003) and Australia (Milgrom and Beatrice 2003).

It was evident that the same datasets and/or MBUs were often focused on, and thus there is a degree of overlap in the studies outlined in this review. In terms of the same datasets, Salmon and colleagues draw on the same UK Marcé database information (Salmon et al. 2003; Salmon et al. 2004), and Howard and colleagues draw on a similar dataset to Salmon and colleagues but from slightly different Marcé entries (Howard et al. 2003; Howard et al. 2004). In France, Glangeaud-Freudenthal and colleagues draw on different samples but there was however some overlap of data from 13 French MBUs from the Marcé database, which was justified by the aims of the studies (Glangeaud-Freudenthal et al. 2013; Glangeaud-Freudenthal et al. 2011; Sutter-Dallay et al. 2015). The data published in 2013 was added to the data from France published in 2011 (2001-2007; n=814), and the data from Belgium for the same period (2001-2007; n=1018) to allow more diversity in child status to study separation status at discharge from MBUs. The data used in Sutter et al. (2015) includes the 2011 data from France, and added data collected in France for three additional years to increase the sample size and statistical power for logistic regression on the impact of drug treatment upon the child (2001-2010; n=1071). The UK Marcé checklist used for data collection in multiple MBUs is also used in French studies to enable a collaborative comparison between the two countries. However the French version has more details on paternal disorders, drug treatments and past-history of both parents (Cazas et al. 2004). In terms of drawing on the same empirical study, Vliegen and colleagues use the same sample and similar instruments (Vliegen et al., 2010; Vliegen et al. 2013).

When specific MBUs were named in the 44 publications, it was evident that there are multiple sources collecting data from the same places: Bethlem Royal Hospital in South London, UK (Kenny et al. 2013; Pawlby et al. 2010; Seneviratne et al. 2003), Wythenshawe Hospital in Manchester, UK (Antonysamy, Wieck, and Wittkowski 2009; Neil, Sanderson, and Wieck 2006), Austin Hospital in Melbourne, Australia (Bilszta, Buist, Wang, and Zulkefli 2012; Nair, Bilszta, Salam et al. 2010; Nair, Bilszta, Shafira et al. 2010), Helen Mayo House in Adelaide, Australia (Connerty et al. 2015; Yelland et al. 2015); and unnamed MBUs in Belgium (Vliegen et al. 2010; Vliegen et al. 2013) and Manchester in the UK (Wan, Salmon et al. 2007; Wan, Warburton et al. 2007;

Wan et al. 2008). Additional sources may have collected data from the same MBUs without naming them. This highlights that aside from the larger scale Marcé database information, studies focus on a small number of MBUs.

The majority of sources used quantitative research designs including scales and/or surveys to collect data, either self-reported or completed by MBU staff. The most common instruments used were the Edinburgh Postnatal Depression Scale (7 studies) and the Marcé Clinical Checklist (6 studies). Clinical profiles and medical records were also used in some studies. Observations and video-taping was also used, particularly in analyses of programs and mother-infant attachment. Although rare, five studies were predominantly qualitative: Buultjens and Liamputtong (2007) and Connerty et al. (2015) on mothers; Kemp (2011), on fathers; and Masciantonio (2015) and Van Puyvelde et al. (2014) on mother-baby attachment. However methods that were arguably qualitative in parts (some in the analysis and some in the collection of data) were intermixed into six quantitative studies: Antonysamy et al. (2009) used semi-structured interviews with open-ended questions; Bilszta et al. (2012) used human-centred play therapy; Butler et al. (2014) used Q methods; Elkin et al. (2009) used multiple methods to identify services including consultations and personal telephone enquiries; Grube (2005) observed interactions in the ward; and Nair et al. (2010) in their client satisfaction survey, included open-ended questions which were then analysed for themes. These inclusions indicate a tendency for a mixed methods approach to the study of MBUs.

Key Theme 1: Admissions data from MBUs

The first theme identified in the analysis of the 44 sources was that of a focus on admissions data. Table 2 presents the admissions data for MBUs reported in the sources included in this theme, a major source of information for tracking outcomes. Thirteen sources provide detailed information about admissions to MBUs including number of joint admissions, maternal age, infant age, primary diagnosis, length of stay, and, in some cases, ethnic and/or socioeconomic backgrounds of mothers.

[INSERT TABLE 2 ABOUT HERE]

Maternal mean age ranged from 24.25 years (Chandra et al. 2015) to 33.5 years (Christl et al. 2015), and infant mean age at time of admission ranged from 9.6 weeks (Glangeaud-Freudenthal et al. 2013; Glangeaud-Freudenthal et al. 2011) to 7.82 months (Yelland et al. 2015). Mean length of stay ranged from 6.93 days in a

study in the US (Meltzer-Brody et al. 2014) to 11.6 weeks in a study in Israel (Maizel et al. 2005). These differences are likely to be, at least in part, due to the different nature and purpose of MBUs in different countries and regions.

Primary diagnosis for mothers varied greatly between the MBUs, again, likely a reflection of the varying nature and purpose of MBUs. The most common diagnoses overall were depressive illnesses, schizophrenia, and differing forms of psychosis.

Key Theme 2: Outcomes

The second theme identified in the analysis was that of outcomes for mothers. Outcomes for mothers were the focus of ten studies on MBUs, as outlined in Table 3. Overall, these studies suggest that the mental health of mothers who are admitted to MBUs improves significantly by the time they are discharged. The largest study conducted on outcomes was undertaken by Salmon and colleagues (2003), who analysed the outcomes of 1,081 women in eight mother-baby units in the UK, and found that 78% were symptom free or considerably improved in terms of maternal clinical outcome, and most scored at least 80% on three parenting outcomes. Women with schizophrenia, however, had poorer outcomes on all measures; but Abel et al. (2005) who used admissions data to relate predictors to outcomes found that protective factors such as social stability amongst women with schizophrenia enhances successful parenting in this group.

[INSERT TABLE 3 ABOUT HERE]

Similarly, Glangeaud-Freudenthal et al.(2011) in their analysis of 869 women in 13 mother-baby units in France found that two thirds (69%) of the women were symptom-free or considerably improved by the time they were discharged, with this being higher for those with issues appearing (or reappearing) in the postpartum period compared to those with chronic mental illness. Whilst most of the studies in this theme of outcomes use quantitative methods to measure outcomes, they also acknowledge the need for more holistic approaches to the mother-infant relationship within the family and their broader social and economic milieu.

Key Theme 3: Programs and interventions in MBUs

This third theme included a strong focus on interventions that enable parenting skills and emotionally responsive mother-infant interactions. The sources included in this theme are outlined in Table 4, which also includes

assessments of mother-infant relationships. In terms of specific findings, Butler et al. (2014) examined the views of mothers about a parenting program (the Baby Triple P Positive Parenting Programme) run in one UK MBU. The mothers viewed the program as beneficial, and the MBU as a good setting to engage in the program, although it was noted that a commitment to the programme may be difficult for mothers who are recovering from mental health issues, and that mothers said MBU staff needed to be familiar with the programme. Butler (2013) also examined the views of staff of a MBU about the same parenting program, finding that they too viewed the program as a positive intervention and the MBU as a useful setting for it.

[INSERT TABLE 4 ABOUT HERE]

Bilszta et al. (2012) examined the potential usefulness of video-only feedback or verbal-only feedback interventions in comparison to standard care to improve maternal parenting amongst women in an Australian MBU. They found that the interventions were not clearly better than standard care (which already include music and art therapy interventions). A video feedback intervention was also used by Kenny et al. (2013) in the UK to examine possibilities for improving mother-infant interaction. They found that there were improved interactions regardless of the diagnoses (including schizophrenia) of the mothers. In Belgium, Van Puyvelde et al. (2014) examined the potential for mother-infant group therapy using music to establish maternal-infant intersubjectivity. They found that maternal-infant intersubjectivity increased from Session 1 to Session 5, although their findings are based on a small sample.

Secondary theme i: Follow-up after discharge from MBU

Six papers explicitly focused on follow-up and outcomes following discharge from an MBU. A three and a half year follow-up study in Belgium found that 61% of mothers were functioning ‘relatively well’, but 39% continued to be impacted by severe depression (Vliegen et al. 2013; Vliegen et al. 2010). In the UK, Hipwell et al.’s (2000) follow-up study of 82 mother-infant dyads over the child’s first year of life found that mother-infant interactions were still impacted negatively by the mother’s illness. Also in the UK, a follow-up study of children aged 4-6 of mothers who had previously been inpatients in an MBU currently living with their mother were not found to have poorer developmental outcomes with comparison children or standardised child norms, although some had issues with attachment (Wan, Warburton et al. 2007).

One of the few qualitative studies about MBUs examines eight women's lived experiences following discharge from an MBU in Australia (Connerty et al. 2015). This study is important as it provides information to assist in understanding outcomes reported in quantitative studies. The study found that the women experienced returning home from the MBU as a significant life event, and that women did not feel they had clear enough support plans post-discharge. Meltzer-Brody et al. 2014 note that additional studies need to address the transition from inpatient to community care. Howard et al. (2003) use data from 1,255 mothers on the Marcé data base in 2001 to ascertain levels of continued social service supervision after discharge, noting that mothers with schizophrenia show a high risk of supervision and recommending that the whole family context should be treated.

Secondary theme ii: Separation of mothers and children at discharge from MBU

Five papers examined the separation of mothers and children at discharge from an MBU. Two large studies of over 1,000 mother/child pairings have been conducted (Glangeaud-Freudenthal et al. 2013; Howard et al. 2003), as well as a number of smaller studies. Glangeaud-Freudenthal et al.'s (2013) prospective longitudinal study of 1,018 women in France and Belgium found that most children were discharged with their mothers, but that 151 (14.8%) were separated at discharge. Of those separated, 41% of children were placed in foster families, 41% in institutions, 13% with family members (3% with fathers), and 1% stayed at the MBU for more than a month after the mother was discharged. Glangeaud-Freudenthal et al. (2013) argue that there were a number of risk factors for separation: babies with medical complications, type of psychiatric disorder for mothers, type of psychiatric disorder for fathers, mothers' lack of good social relationships with others, mothers receiving disability benefits, and low socio-economic class. The importance of large sample sizes using regression analysis of statistically independent risk factors such as neo-natal medical complications, maternal and paternal psychiatric disorders, maternal relationships with others, maternal disability benefits, and social class, is evident in Glangeaud-Freudenthal et al. (2013); and these authors argue that the larger sample results confirm studies that use univariate analysis of small samples. Additionally, Glangeaud-Freudenthal et al.'s study highlights the connection between the child's vulnerability and the existence of the above listed factors such as maternal and paternal mental health and psychosocial contexts.

Howard and colleague's (2003) analysis of the data of mothers entered on the Marce database in the UK identified data relating to discharge for 1,197 women. In terms of discharges, 77% (921) of babies were discharged with their mother without formal supervision. Of the 23% discharged with their babies under a form

of social services supervision or without their babies, 6% (75) were discharged with mothers placed on an 'at risk' register, 7% (81) were discharged with mothers under a protection or care order, 6% (69) were placed in voluntary foster care, and 4% (51) were placed in statutory care or adopted. There was an increased risk of supervision for mothers with schizophrenia and personality disorder, as well as in relation to social class, single marital status, behavioural disturbance, and psychiatric illness in partner. Smaller studies have also found that the type of mental health diagnosis is a key factor in separation at discharge (e.g. Poinso et al. 2002; Seneviratne et al. 2003).

Secondary theme iii: Client satisfaction with MBUs

Three studies examining client satisfaction with MBUs found experiences to be generally positive overall, including the finding that MBUs are preferable to general psychiatric wards. However, existing studies have small sample sizes (less than 60 participants). Neil et al. (2006) developed the Mother and Baby Unit Satisfaction Questionnaire, but note that it is limited because service users were not formally consulted in its development. Their study in the UK of 20 women found overall satisfaction to be high, and that the MBU was preferred over a general psychiatric ward. Women were most satisfied with baby equipment (very satisfied – 85%), visitor arrangements for partners/relatives (63.2%), partner involvement with baby (63.2%), appearance of the ward (65.0%), privacy (60%), and waiting times (57.9%). Women were least satisfied with involvement in their own care (very or quite dissatisfied – 50%) and organised activities (47.4%).

A modified version of the Mother and Baby Unit Satisfaction Questionnaire was used by Antonyamy et al (2009), also in the UK. Their survey of 57 women found that 84.2% were satisfied overall with the MBU. Over 90% were satisfied with baby care advice (96.4%), baby equipment (94.8%), and advice on child development (94.7%). Mothers were most dissatisfied with organised activities (33.4%) and food (17.6%). Interviews in the same study found that all women preferred the MBU to general psychiatric ward because they viewed it as more secure and thought it was important to be with their baby to help with recovery. Some mothers said they had insufficient access to doctors and nursing staff, and that there was a lack of organised ward activities.

Similar findings are evident from Nair et al.'s (2010) telephone survey of 37 women in Australia who had previously been admitted to a MBU. 60% of women said admission to the MBU was 'very' or 'quite' useful, but noted that areas to improve included increased staff availability (27%), staff behaviour (22%), and increased practical support availability (19%).

Secondary theme iv: Partners of women admitted to MBUs

Only two studies focused on male partners of women admitted to MBUs, although this topic is included in five additional papers (Bosanac et al. 2004; Gillham and Wittkowski 2015; Glangeaud-Freudenthal et al. 2013 and 2011; Poinso et al. 2002). Of the two studies where partners were a primary focus, Grube's (2005) German study with 31 male partners of women admitted to MBUs found that only a third of partners could be described as 'supportive' (a 'competent father', 'supportive partner', and 'having a symmetric relationship'), and that women with supportive male partners had a shorter stay in the MBU. Grube's study also highlights the high rate of male partners with psychiatric disorders.

Kemp's (2011) qualitative interview study with six fathers in the UK found that fathers tried to make sense of what had happened to their partner, felt limited in being able to help, faced competing physical and emotional demands of partner, child, and self, had their role and identity challenged by the MBU, and viewed that treatment should be family focused (including fathers).

Concluding discussion

This systematic review indicates that on the whole the MBU setting is a favourable environment for interventions and programs which lead to positive outcomes for post-partum mothers who fit the criteria for admission to a psychiatric MBU. However, to continue to warrant the role of the MBU as best practice for perinatal and postnatal care, researchers need to be more specific about the institutional and legislative contexts of studies. Additionally, more comparative studies need to be conducted on MBUs in and within different countries. For example, whilst this review indicates that whilst there are some similarities between the UK, Australia and France (i.e., the Marcé checklist is used in multiple MBUs in the UK and France), the remaining studies have diverse approaches. Further studies between countries using comparative instruments and methodologies would be useful to facilitate results comparison.

A limitation of this review in terms of providing an accurate international perspective is the exclusion of non-English language publications, particularly the existing French and German studies that use both qualitative and quantitative methods to evaluate MBUs. To this end we recommend future reviews are authored by a multi-lingual team of authors. Another limitation of our review is the timeframe of 2000 to 2015. We deemed it necessary to start our review in the year 2000 to provide a scope for the review (which was already significant),

as well as to focus on the most recent literature on MBUs. However, we note that important studies were published prior to the year 2000 and provide a useful context to knowledge about the development and history of MBUs. Alongside the sources included in our introduction, we note in particular the important work of Buist et al. (1990), Klompenhouwer and van Hulst (1991), Kumar et al. (1995), Brockington (1996), and Milgrom et al. (1998).

In terms of gaps in research, a notable absence in the sources identified was attention to the physical spaces of MBUs. Research that has focused on the health impacts of design clearly indicates that the built space shapes how clients experience mental health units more generally (Connellan et al., 2013). As such, it would seem important that into the future research is undertaken that focuses on the design, space, and architecture of MBUs, and especially how these can improve therapeutic outcomes.

Another absence in current research is the financial cost of MBUs. There is no doubt that they are expensive to operate well, but only one source (Kenny et al. 2013) recommends an evaluation of cost effectiveness in MBUs. We also recommend evaluations on cost effectiveness but if, as the current studies acknowledge, MBUs are the ideal for treating mothers experiencing severe forms of mental illness who require psychiatric treatment, then cost appraisals must take place alongside evaluations of care and practices. There also is a need for evaluating the care and practices of MBUs with more follow-up studies on the impact of MBU care. For example, evaluation questions on why MBUs are considered ideal in terms of issues such as attachment, postpartum psychosis, learning parenting, and avoiding guilt of separation, amongst others. Consequently a case also needs to be made to fund research and specifically randomised control trials that address the cost effectiveness of this best practice.

Methodologically the majority of studies exploring MBUs were quantitative in design, however there is a growing tendency to include qualitative approaches that provide a more contextualised picture of the experience of MBUs. More qualitative studies concerning the experiences of staff, mothers, partners and families/visitors in the MBU are also needed in order to provide important information concerning the broader contextual information that may influence outcomes for mothers and babies beyond the immediate clinical interventions that they receive.

Of the studies included in this review, there is a concerted call for the inclusion of the family at all stages including discharge and follow-up. Studies in this review show differences in outcomes for mothers with depressive illnesses to those with psychosis or schizophrenia, however it is clear that larger samples and more longitudinal studies need to be conducted with a focus on the role of family members.

In sum, this review indicates that much has been achieved by MBUs throughout the sixty years of their existence as a therapeutic entity. As is the case for any such entity, empirical evidence is vital to ensuring ongoing funding. Perhaps more importantly, however, empirical evidence has the potential to make a significant contribution to the types of services provided, and thus the outcomes for those whom such services target.

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Figure 1: Flowchart based upon the PRISMA 2009 Flow Diagram, demonstrating literature review process (Moher, Liberati, Tetziaff, Altman 2009).

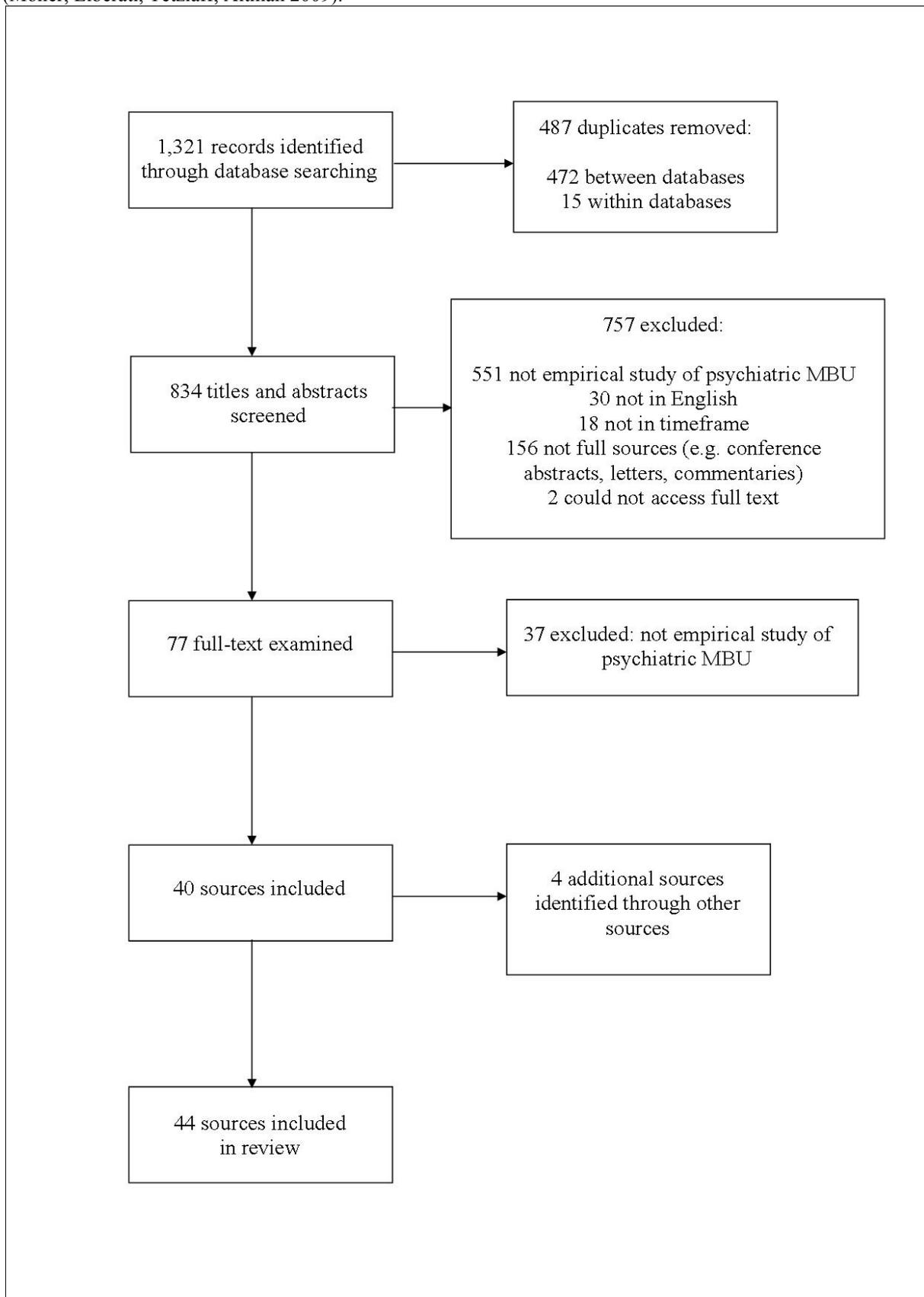


Table 1: Overview of sources included in review

Source	Number of MBUs (number of beds, where mentioned)	Countr/locationsies	Method	Focus
Abel et al. (2005)	8 MBUs, 3 mother baby facilities	UK	Marcé checklist admissions and final week data collected from 1153 women 09/96 – 09/02. Schizophrenia group compared with affective disorders group. Primary outcome predictors: 5 categories of social services intervention at discharge; secondary predictors: multi-d clinical teams' routine assessment. Interrator agreement established through comparing researchers' blind rating to clinicians. Descriptive statistics used for both groups and a modified version of Poisson regression for schizophrenia group.	Prevalence and predictors of parenting outcomes for mothers with schizophrenia.
Antonyamy, et al. (2009)	1	Manchester, England, UK	Before discharge from MBU 57 completed a survey (including modified version of Mother and Baby Unit Satisfaction Questionnaire) and semi-structured interviews	Client satisfaction on discharge
Bilszta et al. (2012)	1	Melbourne, Victoria, Australia	74 mothers completed scales before and after intervention: Edinburgh Postnatal Depression Scale, Neonatal Perception Inventory, and Parenting Sense of Competence Scale. Before the intervention mothers also completed the Sarason Social Support Questionnaire and the Adult Attachment Scale. Mothers were divided into three groups: video (25), verbal (26), standard care (23)	Video feedback intervention to improve maternal parenting
Blundell et al. (2012)	1	North of England, UK	Semi-structured interviews with 10 psychiatric nursing staff,	Nursing staff members' attitudes towards mothers in MBU

			including completion of repertory grid	
Bosanac et al. (2004)	1	Victoria, Australia	Scales/questionnaires completed by 7 women admitted to MBU (compared with 3 similarly diagnosed and aged women without young children who were admitted to an acute psychiatric ward). Scales used for both groups of women: Brief Psychiatric Rating Scale, the Scale for the Assessment of Positive Symptoms, and the Scale for the Assessment of Negative Symptoms. Short form questionnaires: the Social Provisions, the Parenting Stress Index's (PSI) life stress domain, and the Spanier Dyadic Adjustment Scale	Stress of parenting in the first year of life (comparison to women without children admitted to acute psychiatric ward)
Buist et al. (2004)	4 (6-8 beds)	Victoria, Australia	Four MBUs involved in retrospective study of unit admissions, providing routine data recorded on admissions. For one of these MBUs, a rigorous review of all patient files was undertaken	Primary data from MBUs
Butler et al. (2014)	1	North West of England, UK	Q-methodology with 15 mothers from MBU (7 with experience of program, 8 without). 88-item Q-sort and follow-up individual interviews	Views of mothers in MBU of a parenting program
Butler (2013)	1	North West of England, UK	Q-methodology with 16 staff (mostly nurses at different levels) working in MBU. 88-item Q-sort and follow-up individual interviews	Views of staff of a MBU of a parenting program
Buultjens et al. (2007)	1 (10 beds)	Melbourne, Australia	Semi-structured interviews with 10 women with post-natal depression admitted to MBU	Women's experiences of post-natal depression
Chandra et al. (2015)	1 (5 beds)	Bengaluru, India	Prospective data collection from MBU	Primary data from MBU
Christl et al. (2015)	1 (10 beds)	Sydney, Australia	Clinical profile of 191 mothers admitted to MBU. Mothers self-report questionnaires: Postnatal Risk Questionnaire, Edinburgh Postnatal Depression Scale, and Maternal	Clinical profile of women admitted to MBUs and outcomes

			Postnatal Attachment Scale. Patient medical records. Karitane Parenting Confidence Scales.	
Connerty et al. (2015)	1	Adelaide, Australia	Semi-structured interviews with 8 women following discharge from MBU	Mothers' experiences following discharge from MBU
Elkin et al. (2009)	12 (4-12 beds)	England	MBUs (usually the manager of the service) participated in structured interview	Survey of MBUs
Glangeaud-Freudenthal et al. (2011)	13	France	Marcé Clinical Checklist (French version) completed by physician managing the MBU for 869 women	Clinical improvement of mothers
Glangeaud-Freudenthal et al. (2013)	13 (France), 3 (Belgium)	France and Belgium	Marcé Clinical Checklist (French version) completed by physician managing the MBU for 1,018 women	Separation of mother/child at discharge from MBU
Glangeaud-Freudenthal et al. (2004)	8 (France), 3 (Belgium)	France and Belgium	Marcé Clinical Checklist (French version) completed by physician managing the MBU for 176 women	Primary data from MBUs
Grube (2005)	1	Frankfurt, Germany	Clinical interviews with 31 male partners of women admitted to MBUs. Including use of <i>Operationalisierte Psychodynamische Diagnostik</i> (Operationalized Psychodynamic Diagnostic) and Clinical Global Impression Scale	Male partners of women admitted to MBUs
Hipwell et al. (2000)	1	southeast England, UK	Follow up of 82 mother-infant dyads over the child's first year of life (split into two case groups – in-patients 25, community-based group 16, and control group 41). Use of Bethlem Mother-Infant Interaction Scale and videotaped play session with Play Observation Scheme and Emotion Rating scale for analysis	Parenting outcome after being discharged from MBU
Howard et al. (2004)	18	UK	18 MBUs completed the Marcé Clinical Checklist for 527 women	Parenting outcome after being discharged from MBU
Howard et al. (2003)	multiple	UK	Case-control study using data from MBUs and	Separation of mother/child at discharge from MBU

			facilities entered onto Marcé database. 1,255 mothers. Comparison between mothers who were discharged with their baby under formal supervision by social services or without their baby. Control group were women who were discharged with their infant under no supervision	
Kemp (2011)	1	east England, UK	Semi-structured interviews with 6 fathers. Interpretative Phenomenological Analysis	Fathers' experiences of a MBU
Kenny et al. (2013)	1 (13 beds)	South London, UK	Video feedback intervention. 49 in-patients of MBU. Comparisons to community-based group with similar severity of mental health diagnosis (67) and 'healthy' mothers (22). Videos analysed using CARE-Index	Video feedback intervention to improve mother-infant interaction
Maizel et al. (2005)	1 (2 beds)	Jerusalem, Israel	Data from the MBU	Primary data from MBU
Masciantonio (2015)	1 (6 beds)	Adelaide, Australia	Ethnography of one MBU	Critique of assumptions in MBU's biomedical practices, focusing on attachment
Meltzer-Brody et al. (2014)	1 (5 beds)	Chapell Hill, North Carolina, US	Self-report survey data (within 24 hours of inpatient admission and within 24 hours of discharge) completed by 80 women at admission and 91 women at discharge. Includes: The Edinburgh Postnatal Depression Scale, The Patient Health Questionnaire-9, The Work and Social Adjustment Scale, The adverse childhood experiences, The Generalized Anxiety Disorder scale, and patient satisfaction ratings	Primary data from MBU
Milgrom et al. (2003)	multiple	Melbourne, Australia	Structured interviews and psychometric questionnaires completed by mothers when their infants were 3 months old, and again at 24	Comparison of mothers with postnatal depression and control group for cognitive and defence styles

			months. Completed by 41 depressed women and 47 non-depressed control group women. Measures: The Edinburgh Postnatal Depression Scale, The Beck Depression Inventory, The Hamilton Depression Rating Scale, The Defence Style Questionnaire, The General Attitude and Beliefs Scale, and Levenson's Locus of Control Scale	
Nair, Bilszta, Salam et al. (2010)	1	Heidelberg, Victoria, Australia	37 women who had previously been admitted to a MBU completed a telephone-based service quality evaluation questionnaire	Client evaluation of MBU
Nair, Bilszta, Shafira et al. (2010)	1 (6 beds)	Heidelberg, Victoria, Australia	Data collected from 149 women's electronic and written medical records at MBU	Primary data from MBU
Neil et al. (2006)	1 (10 beds)	South Manchester, UK	20 women who had previously been admitted to a MBU completed the Mother and Baby Unit Satisfaction Questionnaire	Satisfaction survey of women admitted to MBU
Noorlander et al. (2008)	1	Rotterdam, the Netherlands	25 mothers Postpartum Bonding Questionnaire. Nursing staff completed the Bethlem Mother-Infant Interaction Scale and clinician(s) completed The Clinical Global Impression. Questionnaires were completed on a weekly basis	Infant/mother interactions
Pawlby et al. (2010)	1 (12 beds)	UK	Observations of 50 mothers' interaction with their infants on admission and discharge. Findings compared with those from 'health' mothers and their infants (49)	Infant/mother interactions
Poinso et al. (2002)	1 (4 beds)	Marseille, France	Data for 92 mothers and their 100 children admitted to MBU	Separation of mother/child at discharge from MBU
Salmon et al. (2003)	8 MBUs, 3 mother and baby facilities	UK	Demographic and clinical information collected on 1,081 joint mother-baby admissions (submitted by 8 MBUs to a central database). Marcé Clinical	Parenting outcomes

			Checklist	
Salmon et al. (2004)	8 MBUs, 3 mother and baby facilities	UK	Senior clinicians administered the Marcé Clinical Checklist, providing data on 1,081 joint MBU admissions	Parenting outcomes
Seneviratne et al. (2003)	1	London, UK	61 mothers admitted for parenting assessment (not suffering from an acute episode of psychiatric illness). Analysis of case notes and questionnaires with the currently allocated or previous social worker, or team manager (59 completed)	Separation of mother/child at discharge from MBU
Sutter-Dallay et al. (2015)	13	France	Database with data from Marcé Clinical Checklist (French version), sample of 1,071 women and their infants	Prenatal exposure to psychotropic drugs
Van Puyvelde et al. (2014)	1	Zoersel, Belgium	Five sessions of mother-infant group therapy (video recorded). Analysis of 4 mothers and their 4 infants who participated in all five sessions	Mother-infant group therapy to establish maternal-infant intersubjectivity
Vliegen et al. (2013)	2	Zoersel and St Camillus Gent, Belgium	3.5 year naturalistic follow-up study of 41 mothers admitted to MBU (55 in original sample). Measures completed when an inpatient and approx. 3,5 years after first study. Measures: The Beck Depression Inventory – Second Edition, The Leuven Emotion Scale, The State Trait Anxiety Inventory, The State-Trait Anger Expression Inventory, The Emotional Availability – Self Report, and A Life History Calendar	Follow-up of mothers
Vliegen et al. (2010)	2	Zoersel, Belgium	3.5 year naturalistic follow-up study of 41 mothers admitted to MBU (55 in original sample). Measures completed when an inpatient and approx. 3,5 years after first study. Measures: Dutch version of The Depressive Experiences Questionnaire, The Beck depression inventory–	Follow-up of mothers

			Second Edition, and A life history calendar	
Wan, Warburton et al. (2007)	1	Manchester, UK	15 mothers and 16 children (one pair of twins) participated in the study. All participants were evaluated with the Manchester Child Attachment Story Task. Additional measures included The McCarthy Scales of Children's Abilities, The Attachment Behaviour Questionnaire, The Strengths and Difficulties Questionnaire, Two 'theory of mind' (social mentalizing) tasks, The Beck Depression Inventory	Follow-up of children
Wan, Salmon et al. (2007)	1	Manchester, UK	38 women and their infants were observed in play interaction a week prior to discharge from MBU (interactions coded using The Global Ratings Scales of Mother-Infant Interaction). Clinical and sociodemographic data also collected	Infant/mother interactions
Wan et al. (2008)	1	Manchester, UK	Video-taped interaction of 45 mother-infant dyads in a four-minute play interaction	Infant/mother interactions
Whitmore et al. (2011)	1 (9 beds)	Birmingham, UK	Analysis of case notes and computerised records of 462 women. Clinical and demographic variables taken from the Marcé Clinical Checklist	Primary data from MBU
Yelland et al. (2015)	1 (6 beds)	Adelaide, Australia	Clinical interview and self-report assessments of maternal mental health at admission and discharge and self-report comparisons of the mother-infant relationship. Self-report scales used: Edinburgh Postnatal Depression Scale, Beck Anxiety Scale, McLean Screening Instrument for Borderline Personality Disorder, and Maternal Postnatal Attachment Scale	Primary data from MBU

Table 2: Mother and baby units admissions data

	Number of MBUs	Country/ies	Year(s) of data collection	Number of joint admissions	Maternal mean age in years	Infant mean age	Ethnic background	Socioeconomic background	Primary diagnosis at admission	Length of stay
Abel et al. (2005)	8 MBUs, 3 mother baby facilities	UK	1996-2002	1153	Range 25-35+	3 weeks at time of admission	56% of women with schizophrenia - 'white', 27% Black African or Caribbean, 11% South Asian, Indian subcontinent. 78% of women with affective disorders – 'white', 9% Black African or Caribbean, 7% South Asian, Indian subcontinent.	28% of women with schizophrenia – professional/managerial/skilled manual, 54% Semiskilled/unskilled, 18% never employed/unclassifiable . 51% of women with affective disorders – professional/managerial/skilled manual, 40% semiskilled/unskilled, 9% never employed/unclassifiable.	Schizophrenia N= 239 Affective disorders (3/4 of remaining mothers) N= 693	7 weeks
Chandra et al. (2015)	1	Bengaluru, India	July 2009-September 2003	237	24.25	At time of admission : Less than 8 weeks – 54%	-	Most from lower socioeconomic status and rural backgrounds	Bipolar disorder – 36.2% (86) Acute and transient psychosis – 34.5% (82) Depressive disorder – 14%	Mean 17.23 days

						(128) 8 weeks to 6 months – 37% (88) 6 months to 1 year – 8% (21)			(32) Schizophrenia – 6% (15) Other conditions – 7% (16)	
Christl et al. (2015)	1	Sydney, Australia	1 February 2010-31 August 2013	366 (191 included due to completeness of data, participation etc)	33.5 (SD=4.8)	3.2 months (SD=2.9)	-	-	Unipolar depression—severe – 42.9% (82) Unipolar depression—mild/moderate – 9.4% (18) Anxiety disorder – 25.7% (49) Personality disorder – 4.7% (9) Bipolar disorder – 8.9% (17) Acute psychotic disorder – 6.3% (12) Schizophrenia and schizophrenia-like disorders – 1.0% (2) Mental illness due to substance use – 0.5% (1) No diagnosis – 0.5% (1)	Mean 22.2 days (SD=12.1)
Glangeaud - Freudenthal et al. (2011)	13	France	1 January 2001-31 December 2007	814	31 years (range 15 to 47 years)	9.6 weeks	20% not born in France	-	Mood disorder – 38% Schizophrenia and other non-affective delusional disorders – 23%	Mean 10 weeks (SD=7) (range 1-16 weeks)

									Adult personality or behaviour disorders and cognitive or mental organic disorders – 23%	
Glangeaud - Freudenthal et al. (2013)	13 (France), 3 (Belgium)	France and Belgium	1 January 2001-31 December 2007	1,018 (869 in France, 149 in Belgium)	31 years (range 15 to 47 years)	9.6 weeks (range 0-50 weeks)	16% not born in France or Belgium (60% were from Africa, primarily Algeria, Morocco and the Republic of Congo)	Social class (higher of the two parents): Professional, intermediate 38% (382) Clerical or sales 29% (299) Workers, artisans or farmers, or no known profession 33% (337)	Psychotic affective disorders – 21% (217) Depressive episode or recurrent depressive disorder – 18% (183) Neurotic or other mood disorders – 15% (150) Schizophrenia or other non-affective psychotic disorder – 14% (142) Disorder of adult personality and behaviour – 13% (134)	Mean 75 days (range 5 days to 19 months)
Glangeaud - Freudenthal et al. (2004)	11	France and Belgium	1999-2000	176	30 (range 26 to 32)	10.6 weeks (range 4.4 to 15.6 weeks)	-	-	Schizophrenia or chronic delusional disorders – 25% (44) Personality disorders or intellectual disability – 22% (39) Depressive illness – 22% (38) Acute transitory psychosis – 11% (20) Bipolar disorders –	Mean 11 weeks

									11% (20) Other disorders – 9% (15)	
Maizel et al. (2005)	1	Jerusalem, Israel	1990-2003	43 (44 babies due to one set of twins)	29.4 (range 20-43)	2.5 months (range 5 days to 11 months)	69.7% (30) born in Israel (13.9%, 6 of Arabic origin) 18.6% (8) immigrated more than 5 years prior to hospitalisation 6.9% (3) had lived in Israel for less than 3 years	-	Schizophrenia – 23.2% (10) Mood disorder – 20.0% (9) Schizoaffective disorder – 9.3% (4) Psychotic disorders NOS – 13.9% (6) Personality disorders – 13.9% (6) Brief psychotic disorder – 6.9% (3) GAD – 4.6% (2) Schizophreniform disorder – 2.3% (1) Mental retardation – 2.3% (1) Adjustment disorder – 2.3% (1)	Mean 11.6 weeks (SD=15.52)
Meltzer-Brody et al. (2014)	1	Chapell Hill, North Carolina, US	September 2011-September 2012	92 admitted, 91 completed self-report measures (38 pregnant and 55 postpartum)	28.81	[for postpartum women – median weeks postpartum – 16 (range 1-72)	White – 54.95% (50) African-American – 31.87% (29) Hispanic – 13.64% (12) Asian American – 0.01% (1) Other – 10.99% (10)	-	Perinatal unipolar mood disorder – 60.43% Psychosis – 12% (11)	Mean 6.93 days
Nair, Bilszta, Shafira et al. (2010)	1	Heidelberg, Victoria, Australia	January 2006-December 2007	149 (109 focused on)	30.4 (range 16-42)	15.1 weeks (range 1-56 weeks)	-	-	Major depression – 46% (69) Schizophrenia – 19% (29) Postnatal psychosis	Mean 23.8 days (range 3-77)

									<p>– 13% (19) Bipolar affective disorder – 10% (15) Personality disorders – 4% (6) Schizoaffective disorder – 3% (4) PTSD – 1% (1) OCD – 1% (1) Delirium – 1% (1) No primary diagnosis/other 0-3% (4)</p>	
Salmon et al. (2004)	8 MBUs, 3 mother and baby facilities	UK	1996-2002	1,081	16-25 – 26% 26-50 – 73%	-	<p>White – 66% Black African – 11% Indian/Pakistani/Bangladeshi – 8% Other – 7% Black Caribbean – 6% Chinese – 1%</p>	<p>Professional, managerial – 23% Skilled manual – 18% Semiskilled, unskilled – 42% Unclassified (student/armed forces) – 4% Never employed – 7%</p>	<p>Depressive illness – 43% Schizophrenia – 21% Bipolar affective disorders – 14% Anxiety/phobia/panic disorder – 3% Personality disorder – 3% Obsessive-compulsive disorder – 1% Other/Unknown – 15%</p>	Mean 6 weeks
Seneviratne et al. (2003)	1	London, UK	mid-1993 to end 1998	61	27.90 (SD=6.4)	median age – 16 weeks (range 1-64)	<p>White – 67% Black-Caribbean – 21% (rest given in numbers: Black-African – 4 Asian – 1 Mixed race – 2)</p>	-	<p>Schizophrenia – 31% (19) Affective psychosis – 18% (11) Learning disability and other – 15% (9) Personality</p>	-

									Disorder – 10% (6) Depression – 10% (6) Learning disability – 2% (1) Substance abuse – 2% (1) No psychiatric illness – 13% (8)	
Whitmore et al. (2011)	1	Birmingham, UK	1 January 1998 to 31 December 2007	462	29.0 (range 15-46)	-	61.0% of sample ethnic origin was recorded: white – 65.6% Indian, Pakistani or Bangladeshi – 19.9% black Caribbean or black African – 8.6% Chinese – 0.7% Other – 5.3%	-	Depressive illness – 49.1% (227) Schizophrenia or other psychotic illness – 22.5% (104) Bipolar affective disorder – 15.6% (72) Neurotic disorders – 5.6% (26) Personality disorder – 3.0% (14) Other – 0.9% (9) No mental illness (concerns about mental health or parenting skills) – 2.2% (10)	Mean 62 days
Yelland et al. (2015)	1	Adelaide, Australia	18 month period	117	29.95	7.82 months	-	-	Major depressive illness – 46.2% Psychosis – 10.3% Bipolar disorder – 3.4%	Mean 22.34 days

Table 3: Outcomes for mothers

Source and country	Approach	Key points and recommendations
Abel et al. (2005)	Quantitative	Differences between mothers with schizophrenia and mothers with affective illnesses are not clear cut, good social interaction skills are a key contribution to attaining parenting skills; risk of physical harm to infants from mothers with schizophrenia is less than expected by clinicians; authors recommend 'more sophisticated approaches to the assessment of mothers with schizophrenia' (788.)
Bultjens et al. 2007 Australia	Qualitative. Semi-structured interviews and thematic analysis	Situating post-natal depression in feminist discourse. Considering societal expectations and stigmas relating to mother/parenthood. . Need for social support and a nurturing attitude towards mothers.
Chandra et al. 2015 India	Quantitative admissions data	Feasibility of clinical outcomes in an MBU in a 'low resource setting'. Importance of joint care and interventions for mother-infant dyads.
Christl et al. 2015 Australia	Quantitative.	Focus on mothers admitted to a private MBU with depression and anxiety. LOS and rates of improvement using a parenting scale, correlate with similar recent studies in the public system. Recommendation for observational methods using video feedback (not used in this study).
Elkin et al. 2009 England	Quantitative but including qualitative service identification	National survey of MBUs. Insufficient facilities in England. Organizational characteristics 'highly variable'.
Glangeaud-Fredenthal et al. 2004 France and Belgium	Quantitative	National data collection. Separate attention to pathology because 'outcome and context at discharge are different' (p. 63) More than half of partners or fathers have mental health problems. Larger sample needed to establish 'interaction between risk-factors' (p. 63)
Glangeaud-Fredenthal et al. 2011 France	Quantitative admissions data	Comprehensive data on social demographics. Rates of improved outcomes high for depression and affective disorders but not schizophrenia. Significance of partner's mental health for mother.
Hipwell et al. 2000 England	Quantitative.	Examination and comparison of the quality of mother-infant interactions and nature of attachment at 12 months. Play observations. 2 case groups and 1 control group. Findings highlight 'the importance of sample homogeneity' regarding mother's illness (p. 169).
Milgrom and Beatrice, 2003 Australia	Quantitative	Comparison of mature, neurotic and immature defence styles of depressed and non-depressed groups. In line with other studies and consistent with Beck's model, cognitive styles of depressed mothers show symptoms that are 'depressogenic' and at risk of using habitual defence styles.
Salmon et al.2003 United Kingdom	Quantitative	Largest reported sample of joint mother baby psychiatric admissions. Partner's lack of parenting skills a contributing factor.

		Poorer outcomes for mothers with schizophrenia.
Salmon et al. 2004 United Kingdom	Quantitative	Use of the same data in 2003 paper's national audit. Authors acknowledge that it is not a RCT. Vulnerabilities of 'poor social class' and lack of social support influence positive outcomes. Emphasis of high risk of harm in mothers with schizophrenia.

Table 4: Programs and Interventions

Source and country	Approach	Key points and recommendations
Blitszta et al. 2012	Quantitative but including qualitative play therapy	Importance of flexible interventions that cater to different needs of mothers. No marked difference between mothers who participated in the videoed intervention strategy and those who did not. Music and art therapy included here with CBT under 'standard care'.
Butler et al. 2014	Quantitative and Qualitative (Q-method)	Triple P Positive Parenting Program - 5 core principles: Safe and engaging environment; positive learning environment; assertive discipline; realistic expectations; parental self-care. MBUs provide a suitable setting for Triple P.
Butler et al. 2013	Quantitative and Qualitative (Q-method)	As above. Triple P as good preparation for home environment.
Kenny et al. 2013	Quantitative	Video feedback data showed that 'mothers with schizophrenia improved their interactive skills with infants as much as mothers with other mental diagnoses'.
Masciantonio et al. 2015	Qualitative	Use of psychotherapeutic attachment theory tool COS (Circle of Security).
Noorlander et al. 2008	Quantitative	Comparisons of emotional relationship improvements for mothers with post-partum depression and mothers with post-partum psychosis. Initially P-Depression more negative but the difference diminished over time. LOS longer for mothers with P-Depression than P-Psychosis
Pawlby et al. 2010	Quantitative coding and analysis..	Challenging assumptions that mothers with SMI have lower rates of interaction with their infants. Results differ from Wan et al. 2007 and 2008 findings of deficits in maternal responsiveness for schizophrenia diagnoses. Importance of gaining knowledge of normative levels of interactional behaviour. Mind-Mindedness approach to videotaped play observations of three clinical groups with one healthy mother-infant dyad group. ANCOVA (Analysis of covariance) coding.
Van Puyvelde et al. 2014	Qualitative	Music/dance therapy five week intensive. Music used to 'repair vitality' and increase intersubjectivity.
Wan et al. 2008	Quantitative coding/analysis.	Play interaction videoed with nurse outside the room to establish patterns or interaction. Behaviour and response identified and coded. Mothers with schizophrenia showed a low level of responsiveness compared with mothers with affective disorders.
Wan et al. 2007b	Quantitative	Mother infant dyads videoed a week before discharge over a 6 year period. Focus on maternal responsiveness of mothers with schizophrenia. Findings show infants of mothers with schizophrenia are 'significantly more avoidant'.