Offspring outcomes when a parent experiences one or more major psychiatric disorder(s): a clinical review

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ABSTRACT

We sought evidence on quantifiable offspring outcomes, including their problems, needs and strengths, associated with their experience of major parental psychiatric disorder(s), focusing on schizophrenia, affective illnesses and personality disorder(s). We were motivated by the absence of any systematic exploration of the needs of offspring of parents in secure hospitals. Seven electronic databases were searched to identify systematic reviews of studies quantifying offspring outcomes when a parent, or parent surrogate, has major psychiatric disorder(s). Our search (updated in February 2018) identified seven high quality reviews, which incorporated 291 unique papers, published 1974-2017. The weight of evidence is of increased risk of poor offspring outcomes, including psychiatric disorder and/or behavioural, emotional, cognitive or social difficulties. No review explored child strengths. Potential moderators and mediators examined included aspects of parental disorder (for example severity), parent and child gender and age, parenting behaviours and family functioning. This clinical review is the first review of systematic reviews to focus on quantifiable offspring problems, needs or strengths when a parent has major psychiatric disorder(s). It narratively synthesises findings, emphasising the increased risk of offspring problems, whilst highlighting limits to what is known, especially the extent to which any increased risk of childhood problems endures, and the extent to which aspects of parental disorder moderate offspring outcomes. The absence of reviews' consideration of child strengths and protective factors limits opportunity to enhance offspring resilience.

INTRODUCTION

Interest in the outcomes for offspring who have experienced major parental psychiatric disorder is longstanding. However, offspring who have a parent in secure psychiatric care have received little examination in the research literature, although in England and Wales alone, 5,000-7,000 people are likely to currently have a parent detained in a secure psychiatric hospital[1]. We sought to examine one facet of how these offspring may present: measures of offspring problems, needs or strengths when a parent has one or more of the psychiatric disorder(s) commonly suffered by secure hospital patients – schizophrenia, major affective illness and/or personality disorder(s) (e.g.Coid[2]). A preliminary search of the PsycINFO database alone, yielded over 30,000 references when entering terms for psychiatric disorder and the parent-child relationship (see supplementary text1). Due to this volume of literature, we performed a review of systematic reviews, in order to bring together high quality research into one narrative synthesis and determine implications for future research. Due to the diversity of research within the reviews, and concern that not all findings were applicable to offspring of secure hospital patients, we kept our question broad, whilst retaining focus on the parental disorders most commonly suffered by secure hospital patients.

Objectives

Our objective was to answer, in a clinical review, the question, 'what quantifiable offspring outcomes, including problems, needs and/or strengths, are associated with their experience of major parental psychiatric disorder(s)?' We focused on schizophrenia, affective illnesses and personality disorder(s).

METHODS

Seven web-based search engines were searched (OVID Medline®, EMBASE, PsycINFO, AMED, Joanna Briggs Institute EPB Database, Scopus and Web of Science) from inception to February 2018. Key words were used as search terms to capture major psychiatric disorder(s), focusing on schizophrenia, severe affective illnesses and personality disorders, and to capture the parent-child relationship (supplementary text1). Search terms for offspring outcomes were not applied to avoid our expectations limiting the search. Major subject heading (MeSH) terms were used where available.

Searches identified 3,637 unique records. The first 100 titles and, where necessary, abstracts, were rated independently by two researchers (SA, NK) against the inclusion/exclusion criteria. Inclusion criteria required papers to be systematic reviews of studies of quantifiable outcome measures, concerning sons/daughters of a parent with a major psychiatric disorder. Exclusion criteria eliminated reviews with unreported/non-replicable methods, solely sub-diagnostic threshold parental problems or reviews without quantitative child measures (for full criteria see supplementary table1). Inter-rater reliability was 99%. Discrepancies were resolved through discussion. The remaining title and abstract screening was completed by one researcher (SA), leaving 86 papers. Full text examination by two researchers (SA, NK), left twenty reviews (figure 1).

Figure 1 about here

Quality assessment of these 20 reviews was undertaken by one researcher (SA) according to criteria across the five areas that Maniglio[3] describes as being consistent with the Centre

for Reviews and Dissemination guidelines[4]; these are that there should be sufficient information for replication, regarding evidence identification, study selection, data extraction, formal study quality assessment and objective data synthesis and analysis. Reviews which were rated 'good' (meeting all criteria) and 'fair' (meeting all but one of the criteria) were included; seven reviews were retained (see supplementary table2). References from included reviews were scrutinised for further reviews, but none met our criteria. Two researchers (SA, NK) extracted data from all seven reviews, according to review questions and methods (tables 1&2). An *a priori* decision was made to synthesise the findings into a clinical review. The review was conducted according to a protocol (available on request), but this was not registered. Studies reported in this review, from the seven systematic reviews, are referenced in the online supplementary text 2, with reference numbers preceded by 'S'.

Table 1: Offspring outcomes when a parent experiences major psychiatric disorder - research questions, review sources, design patterns of included studies and their country of origin

Authors Publication date	Main research question(s)/aim(s)	Databases and final search date Other sources	Number of studies Study designs Sample origins	Countries of origin of the studies included in the review
Rasic et al 2014	What is the risk of mental disorder(s) in offspring of parents with severe mental illness (schizophrenia, bipolar disorder or major depressive disorder)? Does risk extend beyond the disorder present in the parent?	MEDLINE/PubMed, EMBASE, and PsycINFO to end 2012 Reference lists were also searched	Total: 33 An unspecified mix of cross sectional and longitudinal studies 21 (64%) studies recruited unwell parents through clinics/hospital admissions +/- other methods	No geographical restrictions – studies were from the USA (11, 33%), 3 from Canada, 2 each from UK, Australia, Romania, Israel, and 1 each from Turkey, India, Spain, Holland, Palau, Switzerland, Finland, Sweden, Brazil, Denmark, Japan.
Goodday et al 2017	To test for associations between exposure to parental psychopathology in childhood and subsequent suicide-related behaviours in the offspring. To determine if any such associations differ by the type(s) and timing of parental psychopathology, gender of the parent and of the child, type of child psychiatric symptoms and family functioning	MEDLINE, CINAHL, EMBASE, PsycINFO, and Web of Science to March 2017 Grey literature - including dissertations/ theses, Child Welfare Information Gateway, Google Scholar Reference lists were also searched	Total: 54 19 cross sectional, 24 longitudinal, 11 case-control studies No further details given	No geographical restrictions - included USA (n=26, 48%), Europe (n=18, 33% - Belgium, Denmark, Finland, Germany, Netherlands, Norway, Poland, Sweden, UK) 'Africa', Brazil, Korea, New Zealand, Puerto-Rico, South Korea, Taiwan
Connell and Goodman 2002	To examine the relative strength of the association between psychopathology in mothers versus fathers and internalizing or externalizing disorders in their children	PsycINFO and ERIC – 1888 to 2001 Authors were contacted Notices were posted on Internet-based discussion lists for psychologists Reference lists were also searched	Total: 134 28 studies used parent clinical samples, 39 used child clinical samples, and 67 used community samples.	Not stated

Mendes et al 2011	To test the association between maternal depression and depression in school-age children To test for moderating effects of environmental and social covariates	Medline, Lilacs, Scielo, Index Psi and PsycInfo 2004 to 2010 Portuguese, Spanish & English search terms used[1]	Total: 30 16 longitudinal (9 community, 4 clinical and 3 mixed samples) 14 cross sectional (6 community, 6 clinical and 6 mixed samples)	24 (80%) from the USA; one each from Brazil, Chile, England, Germany, Hungary, and Malaysia
Lau et al 2017	To examine the relative risk of a range of affective and non-affective psychopathologies among offspring of at least one parent with bipolar disorder compared to offspring with no parental major psychiatric history	Medline, PsycInfo, EMBASE, Scopus to July 2015	Total: 17 7 longitudinal, 7 cross sectional, 3 cross-sectional from the longitudinal BIOS study[2] Samples recruited from inpatient (2), outpatient (2), both inpatient and outpatient (4), outpatient plus other methods (6), other methods (2), 'psychiatric clinic' (1)	Australia, Canada, Romania, Spain, Switzerland and USA (details of numbers not available) (Papers from other countries may have been included but only these were listed)
Eyden et al 2016	What are the psychopathological and psychosocial outcomes for offspring of mothers with borderline personality pathology? What are the mechanisms (parenting or mother/offspring characteristics) underpinning associations between maternal borderline personality pathology and offspring outcomes? (Two other questions were not relevant for our review)	PsycInfo, PubMed, EMBASE Web of Science, Scopus, ASSIA 1980 to July 2015 Manual searching of the journals: *Journal of Personality Disorders*, *Personality Disorders: Theory, Research and Treatment* Jan 2010 to July 2015 Reference lists were also searched	Total: 33[3] 8 cross sectional, 4 longitudinal, 21 case-control Samples: 15 community 10 clinical 4 community and clinical 4 not specified beyond 'high risk' (overall 12/33 studies involved 'high risk' samples NOS[4])	Studies were from USA (n=15, 45%), Australia (n=6, 18%), UK (n=4, 12%), Germany (n=3, 9%), Canada (n=3, 9%), France (n=1, 3%) and China (n=1, 3%) NB Does not equal 100% due to rounding.
Petfield et al 2015	What difficulties are experienced by children of mothers with borderline personality disorder? (Another question was not relevant for our review)	PsycINFO and Medline up to July 2014 Reference lists were searched 8 authors were contacted	Total: 17 - all described as cross sectional in Petfield[5] Samples' sources are not detailed in Petfield	No geographical restrictions imposed; country of each included sample not stated

[1] Search terms only in English unless otherwise specified.
[2] BIOS - Pittsburgh Bipolar Offspring Study.

[3] Eyden et al state that 33 papers met their inclusion criteria, and they have given details of 33 papers in their tables, however, in their narrative synthesis, a 34th paper appears (Macfie and Swan 2009), and a number of important findings are attributed to this paper, which is in their reference list. We have therefore also included the findings of the Macfie and Swan (2009) paper, as reported by Eyden et al, in our review.
[4] Not otherwise specified.
[5] Petfield et al: All 17 included studies are also in Eyden et al, but only 16 are described in Eyden et al's tables; 12 only are considered by Petfield et al to report child outcomes, although 13 appear to include child outcomes. All 17 studies are described as cross sectional in Petfield et al, but only 1/17 (Herr et al 2008) are described as cross sectional in Eyden et al, who labels all the remaining studies (except for one - Macfie & Swan - which does not appear in their table describing the studies), as case-control.

Table 2: Offspring outcomes when a parent experiences major psychiatric disorder: sample descriptions and offspring outcomes descriptions

Authors Publication date	Parental gender	Parental diagnosis	Offspring gender	Offspring age	Offspring outcomes measured	Offspring outcome measures Data sources
Rasic et al 2014	5/33 studies mothers only 28/33 studies - not specified	Schizophrenia or similar psychoses Bipolar affective disorder Major depressive disorder	1 study - daughters only 32 studies sons and daughters	Target: mean age of 10 years or more Actual: mean age of 10 years or more	Diagnosed psychiatric illness or disorder Excluding: - minor depression - bipolar spectrum disorder	All 33 included data directly from offspring All 33 studies used standardised interviews
Goodday et al 2017	10/54 studies - mothers only 44/54 studies - not specified	Any type of parental psychopathology according to ICD[1]/DSM[2] criteria or parental suicide related behaviours[3] (SRB)	1 study stratified for gender 1 study sons only 45 studies sons and daughters 7 studies gender unspecified	Target: 0 to 25 years Actual: mean age <25 years in all studies but in 14 (26%) studies upper age limit >25 years	Suicide related behaviours[3] Included: - severity of ideation - planned/unplanned attempts - lethality of attempts	38 studies included information directly from the offspring (+/- other sources) 12 studies only used offspring medical records/ICD[1] codes or cause of death registries 2 studies only included information about the child from parent/caregiver 2 studies used the SSAGA[4], which is for adults so it is likely it was parent-rated, given the offspring age ranges (7-14 years in one study, 12-26 in the other). 50 studies used at least one structured measure. It was unclear how structured data collection was in 2 studies with data collected from the child and in 2 studies which relied solely on medical records
Connell and Goodman 2002	53/127[5] studies- mothers only 19/127[5] studies - fathers only 55/127[5] studies-	'Parent mental health problems': a) alcohol/ other substance abuse or dependence b) depression c) anxiety d) schizophrenia	22/127[5] studies sons only 105/127[5] studies both sons	Target: ages 2 to 18 years Actual: mean age ranged from 1.70 to 17.50 years	'Childhood internalising behaviour problems': *Symptom ratings* of -depressed mood -anxiety - social withdrawal *Diagnoses* of	*Child symptoms of internalising behaviour problems*: 35 studies collected data from the child, 17 used 'combined sources'[7]. Other studies collected data from parent(s) or teacher(s). *Child diagnoses of internalising behaviour problems* 38 studies collected data from the child, 23 studies

	mothers and fathers	e) anti-social personality disorder f) bipolar disorder g) mixed, including symptoms or ratings of mental distress.	and daughters[6]	Overall mean of 9.37 years (SD 3.97 years)	-childhood depression - anxiety disorders 'Childhood externalising behaviour problems': *Symptom ratings* of - aggression - conduct problems - delinquency *Diagnoses* of -conduct disorder -oppositional defiant disorder - ADHD	used 'combined sources'[7]. Other studies collected data from parent(s) or 'chart review(s)'. *Child symptoms of externalising behaviour problems:* 11 studies collected data from the child, 21 studies used 'combined sources'[7]. Other studies collected data from parent(s) or teacher(s). *Child diagnoses of externalising behaviour problems:* 7 studies collected data from the child, 47 studies used 'combined sources'[7]. Other studies collected data from parent(s) or 'chart review(s)'. No information on how offspring outcomes were measured - structured/unstructured
Mendes et al 2011	Mothers only	Depression	3/30 studies daughters only 27/30 studies sons and daughters	Target: 6-12 years Actual: 1-17 years	Childhood depression	21 studies collected data directly from the child using questionnaires/structured self-report assessment/ semi-structured interview, using a schedule, with the child (+/- separate interview with the parent) 1 CBCL[8] (parent report) and SDQ[9] (responder not specified) 3 Various structured tools (responder unspecified) 5 various structured tools (parent only responder) All 30 studies used at least one structured tool
Lau et al 2017	4/17 mothers only 4/17 mothers and fathers 9/17 not stated	Bipolar I Bipolar II Schizoaffective disorder	1 study sons only 16 studies sons and daughters	Target: 2-30 years Actual: 2-30 years	Psychiatric disorder diagnoses Other emotional and behavioural outcomes	All 17 studies used a standardised diagnostic interview with the child +/- others CBCL[8] was used to rate offspring internalising/externalising behaviours
Eyden et al 2016	Mothers 33 studies	Emotionally unstable personality disorder	1 study daughters only	Target: unrestricted	Psychiatric disorder: - diagnoses - symptoms	15 studies collected data directly from child - interview/ questionnaire or direct observation/experiment 5 studies child data only from other sources

			1 study sons only 31 studies gender not specified	Actual: 2 months to adulthood (defined here as 19+ years) No mean child age given	Psychosocial outcomes: -Self-esteem -Interpersonal -Home environment	2 studies unclear from whom data was collected 11 studies no offspring outcomes specified 32 studies used structured tools 1 retrospective case record review, tool unspecified
Petfield et al 2015	Mothers 17 studies	Emotionally unstable personality disorder	Never specified	Target: 0-18 years Actual: 0-18 years	Child 'difficulties', including: - cognitive - behavioural - parent-child relationships - mental health	13 studies included child outcomes - either/both: - data collected from the child - data collected through direct observation of the child e.g. video of mother-child interactions - All 13 studies employed at least one structured measure

[1] International Classification of Mental and Behavioural Disorders
[2] Diagnostic and Statistical Manual of Mental Disorders
[3] Suicide related behaviours (SRB), which here includes suicidal thoughts, suicide plans, self-inflicted potentially or actually harmful behaviour, with or without clear intent to end one's life and completed suicide
[4] SSAGA Semi Structured Assessment for the Genetics of Alcoholism (for adults)
[5] Connell and Goodman report having identified 134 separate samples, however to ascertain this information on offspring gender, one had to manually count the studies listed in Connell and Goodman's appendix 4, in which the current authors could only identify 127 separate studies.
[6] No studies in this review only included daughters. The table in the review refers to the child gender being either 'mix', 'both' or 'boy' but it was not clear to the current authors what the difference is between 'mix' and 'both' was and we have considered these to both represent samples which included sons and daughters.
[7]It is unclear if one of these sources was the child
[8] CBCL Child Behaviour Checklist (parent-report)
[9] SDQ Strengths and Difficulties Questionnaire

PRESENTATION

Methodological comparability of included reviews

Review questions, methods, and thus the nature of included studies varied (tables 1&2). Of the 291 unique papers in the reviews, published between 1974 and 2017, just 17 were common to the two reviews of offspring of mothers with emotionally unstable personality disorder (EUPD)[5,6] and only five were shared across remaining reviews. Cross-sectional, longitudinal epidemiological studies, general population based studies, clinical cohorts, case-controlled studies and convenience samples were all represented. Although all reviews included data collected directly from offspring, the extent to which this was true varied (table 2). Three reviews employed meta-analysis[7,8,9] and four narrative synthesis alone[5,6,10,11].

Reviews varied in the extent to which they considered methodological differences between included papers. Although all reviews considered moderators, mediators or confounders in narrative, just two[7,8] of the three meta-analyses statistically tested for them; they found none with significant effect, except where findings lacked confidence due to small sample sizes and subgroup heterogeneity. Limitations reported narratively included a lack of clarity on recruitment methods or on diagnostic comorbidities[9], risk of bias – for example, studies measuring offspring exposure to parental psychopathology retrospectively[10], reliance on a single data source[11], predominance of cross-sectional study design and over-dependence on the parent for information about the child[5,6].

We aimed to cover all forms of parent-offspring relationship, but reviews rarely specified this. Only Rasic et al[8] required a genetic parent-offspring relationship, and only Connell and Goodman[7] explicitly included biological or social parent-offspring relationships. Neither parent nor offspring gender was consistently reported (table 2). Although all reviews included sons and daughters, three reviews confined parental gender to mothers[11,5,6]. All reviews specified offspring age, which varied from no restrictions[5] to a narrow focus (6-12 years[11]).

Outcomes

All reviews focussed on difficulties experienced by offspring, including psychiatric disorder [5,6,8,9,11], sub-diagnostic threshold emotional difficulties and self-directed aggression[5,6,7,9,10,11], behavioural difficulties[5,6,7,9], cognitive dysfunctions[5,6,11] and social difficulties[5,6] – each of which are detailed below. The only advantage, thus reported indirectly by the reviews, was an absence of disorder.

Offspring diagnosis of psychiatric disorder

Only one[8] of the five reviews examining offspring diagnosis focussed on offspring of parents with schizophrenia. These offspring were seven times more likely to develop schizophrenia than offspring with healthy parents, but were not at increased risk of any of the other six disorders examined (depression, bipolar disorder, anxiety disorders, attention deficit hyperactivity disorder (ADHD), behavioural disorders and substance misuse disorders) (table 3). Two reviews involving offspring of parents with bipolar disorder[8,9] found elevated risk of all disorders tested, except schizophrenia, and one[8] found this also for parental

depression, apart from with respect to offspring bipolar disorder (table 3). One review[11] reported that most of their included studies (17/22) found an increased risk of offspring depression at ages 6-12 years when mothers were depressed. The two reviews of offspring of mothers with EUPD[5,6] made little reference to offspring diagnosis, but both included one study[S1] of 140 children, aged 6-14 years, which found that they had increased susceptibility to depression compared to offspring of depressed mothers. One other paper in these reviews[S2] identified an increased offspring risk of ADHD at a mean age of 11-years.

Table 3: Absolute rates and relative risks of psychiatric disorder(s) in offspring of a parent who diagnosed with schizophrenia, bipolar affective disorder or major depressive disorder, compared to offspring of psychiatrically healthy parents, according to the two reviews which tested this (Rasic et al, 2014; Lau et al, 2017)

Outcome of diagnosed psychiatric disorder in offspring	Parental disorder	N[1] (no. of offspring)	Absolute rate[2] (AR)	95% CI[3]	Relative risk (RR)	95% CI[3]	P value	Review authors
Schizophrenia	Bipolar	581	0.04	0.02-0.10	2.76	0.67-11.27	0.158	R[4]
		NA	NA	NA	NA	NA	NA	L[5]
Bipolar Affective disorder	Bipolar	1415	0.06	0.04-0.09	4.06	1.91-8.62	0.000	R
		1290	NA	NA	8.97	3.85–20.91	< 0.0001	L
Depression	Bipolar	1466	0.14	0.11-0.18	2.07	1.27-3.35	0.003	R
		1494	NA	NA	2.43	1.64–3.60	< 0.0001	L
Anxiety	Bipolar	1288	0.27	0.22-0.33	1.92	1.56-2.36	0.000	R
		1572	NA	NA	2.14	1.63–2.81	< 0.0001	L
Behavioural disorder[6]	Bipolar	1027	0.14	0.10-0.19	1.84	1.24-2.72	0.002	R
		1410	NA	NA	2.48	1.64–3.74	< 0.0001	L
ADHD	Bipolar	1234	0.14	0.09-0.21	1.62	1.23-2.13	0.001	R
		1181	NA	NA	2.59	1.87–3.60	< 0.0001	L
Substance related disorder	Bipolar	1137	0.15	0.09-0.24	1.45	1.07-1.97	0.016	R
		1033	NA	NA	1.70	1.17–2.45	< 0.05	L
Any disorder	Bipolar	1285	0.60	0.53-0.67	1.66	1.50-1.83	0.000	R
		1214	NA	NA	1.98	1.70–2.32	< 0.0001	L
Schizophrenia	Schizophrenia	816	0.12	0.08-0.18	7.54	4.02-14.13	0.000	R
	Depression	266	0.04	0.01-0.11	1.52	0.63-3.64	0.349	R
Bipolar affective disorder	Schizophrenia	481	0.03	0.02-0.05	1.84	0.73-4.66	0.197	R
	Depression	553	0.03	0.01-0.13	5.03	0.90-28.18	0.066	R
Depression	Schizophrenia	740	0.15	0.09-0.25	1.31	0.78-2.20	0.312	R
	Depression	1339	0.26	0.15-0.41	2.38	1.94-2.91	0.000	R
Anxiety	Schizophrenia	511	0.15	0.07-0.29	0.97	0.68-1.39	0.87	R
	Depression	1298	0.29	0.19-0.43	1.78	1.41-2.25	0.000	R
Behavioural disorder[6]	Schizophrenia	69	0.29	0.20-0.41	1.90	0.81-4.49	0.142	R

	Depression	1380	0.16	0.08-0.30	1.80	1.56-2.09	0.000	R
ADHD	Schizophrenia	69	0.10	0.05-0.20	1.76	0.34-9.03	0.500	R
	Depression	1053	0.11	0.08-0.15	2.40	1.66-3.47	0.000	R
Substance related disorder	Schizophrenia	528	0.20	0.11-0.34	1.72	0.88-3.37	0.112	R
	Depression	884	0.11	0.06-0.20	1.72	1.30-2.27	0.000	R
Any disorder	Schizophrenia	729	0.47	0.34-0.60	1.45	1.17-1.79	0.001	R
	Depression	1273	0.57	0.46-0.67	1.64	1.40-1.92	0.000	R

[1] 'N' is the number of offspring of a parent with the specified psychiatric disorder on whom the particular calculation is based
[2] Absolute rate (AR), so 0.12 means 12% of all offspring of a parent with the specified psychiatric illness
[3] CI confidence interval
[4] R data from Rasic et al (2014)
[5] L= data from Lau et al (2017)
[6] Behavioural disorder in Rasic et al (2014) includes oppositional defiant disorder (ODD), conduct disorder (CD), and antisocial personality disorder, and in Lau et al (2017) it includes ODD and CD.

NA 'not available' - data not presented in the review(s)

Offspring emotional difficulties and self-directed aggression

All reviews except one[8] explored offspring 'emotional difficulties', which included sub-diagnostic threshold depression, anxiety, and emotional instability, unspecified emotional problems and/or suicide-related behaviours. Five reviews[5,6,7,9,11] concluded that offspring are at higher risk of these when a parent has a major psychiatric disorder. One review[5] specified a significant association between offspring problems and maternal 'symptoms' of EUPD (4 studies[S3,S4,S5,S6]). They cite one study[S2] as describing higher rates of personality disorder, but as offspring had a mean age of 12-years, these problems are arguably personality traits. Other studies in their review focused on, and found, higher rates of offspring 'emotional dysregulation'[S7,S8,S9,S10,] insecure attachment[S1,S11,S12,S13] unstable self-image[S8,S14] and suicidal ideation[S15]. The overlapping Petfield et al[6] review similarly reported higher offspring insecure attachment[S1,S8,S12,S13], and suicidal ideation[S15]. Only one study of the 34 from these two reviews was clearly reported to have found no higher risk of 'child emotional problems'[S16]. Emotional dysregulation in the offspring also emerged in two studies[S17,S18] in the Mendes et al[11] review of children of depressed mothers. Connell and Goodman[7], in their meta-analysis, found higher prevalence of combined anxiety and depression diagnoses and sub-diagnostic symptoms. Lau et al[9] found significant differences in Child Behaviour Checklist scores for internalising disorders between offspring with a parent with bipolar/schizoaffective disorder (n=145) and offspring of psychiatrically well parents (n=148), drawing on three studies[S19,S20,S21]. Relevant review findings with only one supporting study are detailed in supplementary tables 3a&3b.

One review[10] focussed on offspring suicide and suicide-related behaviours. Likelihood of offspring suicide was raised if a parent had schizophrenia[S22] or had died by suicide[S23,S24,S25], and also in one study[S23] which examined a wide range of parental psychopathology. Offspring suicide-related behaviours (SRB) were consistently associated with parental schizophrenia, maternal suicide, maternal suicide-related actions, and inconsistently with parental affective disorder, parental personality disorder, maternal suicide-related thoughts and paternal suicide (for full breakdown of offspring types of SRB, see supplementary tables 3a&3b).

Offspring behavioural difficulties

Four reviews[5,6,7,9] included reference to offspring sub-diagnostic threshold ADHD, oppositional defiant disorder and conduct disorder, anti-social personality traits and unspecified behavioural problems. Connell and Goodman's meta-analysis[7] found a small offspring population mean elevation of risk of 'externalising' sub-diagnostic threshold states and diagnoses with a wide range of parental psychiatric disorder(s). Lau et al[9] found significantly higher Child Behaviour Checklist externalising disorder scores among offspring with a parent with bipolar/schizoaffective disorder (n=145) compared with offspring of psychiatrically well parents (n=148), drawing on three studies[S19,S20,S21]. Both reviews focussing on offspring of mothers with EUPD[5,6] concluded that offspring were more likely to have behavioural difficulties[S2,S15,S16,S26].

Offspring cognitive dysfunctions

Three reviews[5,6,11] included offspring cognitive outcomes, encompassing thoughts, perceptions, and social cognitions, and all reported higher rates of difficulties for offspring of a parent with psychiatric disorder.

Mendes et al[11] report that offspring of depressed mothers have difficulty recognising 'positive bases', focus more on negative stimuli and show decreased flexibility in changing their focus of attention[S17,S18]. Both reviews of offspring of emotionally unstable mothers[5,6], reported poorer offspring self-representations[S8], and self-perception of friendship forming ability and of their own social acceptability[S12]. In pre-school children, both reviews[5,6] reported less developed offspring theory of mind and poorer offspring recognition of emotional expressions[S27].

Offspring social outcomes

Only the two reviews of mothers with EUPD[5,6] explored offspring experience of home and/or school and/or work, and, between them, they identified only two relevant studies[S2,S28]. Both found higher problem rates in home, school and social life compared to children of mothers with other personality disorders, although changes in household composition, witnessing of suicide attempts or parental abusive behaviour may have been the key problems here.

Offspring outcomes not reported in the reviews

By inference, the reviews collectively demonstrate that around half of offspring whose parent has a major psychiatric disorder remain psychiatrically well at the time of assessment.

However, positive outcomes, such as possible higher offspring self-esteem from taking caring roles, were not encompassed in the reviews' questions, although review discussions sometimes indicated offspring protective factors, such as secure attachment (Gratz et al[S11] in Eyden[5]).

Moderators and Mediators

Five reviews[5,6,7,10,11] explicitly consider the extent to which variables partly explain or 'mediate' any relationship between parental disorder and child outcomes, or the extent to which they 'moderate' any effect size found. Three reviews[5,6,10] quantified examination of this and suggest that under one in five papers did so [Eyden et al[5] 6/33(18%); Goodday et al[10] 9/54(17%); Petfield et al[6] 2/17(12%)]. Mendes et al[11] discuss moderators and mediators without labelling or quantifying studies which examine them, while Connell and Goodman[7] test for potential moderators and mediators but found sample sizes generally too small and heterogeneous for confidence in findings.

Additional parental factors

Only one review considered severity, complexity and/or chronicity of parental disorder[11]. According to two included papers[S29,S30], child depression was more severe when mothers experienced depression with comorbid disorders(s); another study suggested inter-relationships between maternal depression, comorbidity and maladaptive mother-child interactions[S31]. This review[11] further reported that three (all from the longitudinal STAR*D study) of their five papers assessing change in maternal depression found that as mother improved, so did the child[S32,S33,S34].

The impact of chronicity of exposure was considered – by definition in the two personality disorder reviews[5,6] – but also in Mendes et al[11]. The latter concluded that, overall, there was no relationship between offspring depression and chronicity of exposure to maternal depression, although they cite one longitudinal study as reporting that child depressive symptoms worsened the longer the parent had been depressed[S35].

Two reviews[7,10] examined parental gender effects. Maternal psychiatric disorder was more strongly associated with negative offspring outcomes than paternal disorder. Goodday et al[10] found this in all three studies which tested for it[S36,S37,S38]. Connell and Goodman[7] found that child 'internalising behaviours' were more strongly associated with maternal than paternal depression ($g=0.02$, $p<0.05$), and with maternal than paternal psychiatric disorder overall ($g=0.04$, $p<0.05$), although child 'externalising behaviours' were not differentially associated with parental gender. They also found evidence of interaction between child age and parental gender. Younger children were more likely to have emotional and/or behavioural difficulties when mother was affected rather than father, but older children when father was affected, this applying especially to paternal depression.

Child age at the time of parental illness was specifically addressed by Goodday et al[10] who noted that just a third (17/54) of their studies considered timing at all, most of them retrospectively. Among the seven prospective studies, two examined child age at exposure, one[S25] of which found a linear trend for timing of parental psychiatric inpatient admission and subsequent offspring suicide, with a slightly stronger association when the child was younger (under 3 years OR= 2.5, 95% CI 2.0, 3.0; 3-10 years OR=1.9, 95% CI 1.5, 2.4; or >10 years OR = 2.1, 95% CI 1.8, 2.6). The control group was randomly selected from the

general population, however, these analyses did not control for type, chronicity or severity of parental illness.

Offspring characteristics

Two[7,11] of the three reviews[7,10,11] considering offspring gender as a moderator indicated that girls may be more vulnerable than boys, although there was also interaction between offspring gender and age, and between offspring gender and parental gender; the third review[10] was equivocal. Mendes et al[11] cited six studies[S18,S39,S40,S41,S42,S43] as finding that older girls were more vulnerable to depression when their mother was depressed. Connell and Goodman[7] found that girls seemed to have more externalising problems when fathers experienced psychiatric disorder. Goodday et al[10] report that of three studies testing for moderation by offspring gender, one reported a significant interaction between offspring gender and maternal depression on offspring suicide-related thoughts (OR 5.99, $p<0.01$, girls OR 5.18, $p<0.01$, boys OR 0.78, $p=0.78$)[S44], whilst two reported non-significant findings[S45,S46].

Possible mediating effects of child cognitive, temperamental and interpersonal vulnerabilities were considered in three reviews[5,6,11], yielding few relevant studies. Both maternal EUPD reviews[5,6] identified a single paper (n=140 children; n=102 parents), which found that offspring cognitive problems (rumination, negative attributions, dysfunctional attitudes, self-criticism, excessive reassurance seeking and insecure attachment) appeared to mediate between maternal EUPD and child depression[S1]. Mendes et al[11] found one study incorporating children's 'verbal competence' (n=164 dyads)[S47]

and one children's temperament (n=337 dyads)[S41], which provided modest evidence that these were associated with more depressive symptoms in the children of depressed mothers.

The complexity of relationships was highlighted by two reviews[10,11], which suggested that if offspring developed psychiatric disorder, this could precipitate more maladaptive mother-child interactions, which in turn, may worsen offspring outcomes. The first of these reviews[10] evidenced such a pathway towards suicide-related behaviours in adolescents and young adults from four supporting studies, two of which focused on our parental diagnoses of interest[S48,S49]. Although the second review[11] included two relevant longitudinal studies[S50,S51], pathway analyses were not done.

Parenting and parent support

Three reviews[5,6,11] examined parenting style, finding that it is an important mediator. Mendes et al[11], found that five studies showed that 'negative parenting' mediates between maternal depression and the severity and duration of offspring depression [S31,S43,S52,S53,S54]. Eyden et al[5] used the term 'maladaptive parenting', and found two studies evidencing its mediation of the association between maternal personality disorder and negative child outcomes[S7,S55]. Petfield et al[6] also concluded that the 'few' (unspecified) studies examining this all found evidence of a mediating role for parenting style.

Two reviews[10,11] considered family dynamics. One reported that 'family functioning' partially mediated associations between maternal depression and offspring suicide-related behaviours[S56,S57]. The other found that marital conflict could be related directly to

maternal depression and indirectly to child depression[S41,S54,S58], but could also follow a pathway from maternal depression through family dynamics, affecting child emotional security and raising the risk of child depressive symptoms[S17,S18].

Three reviews[7,10,11] considered the other parent's presence and health, with two finding offspring problems associated with single parenthood[10,11], and one finding no enhanced risks[7]. Mendes[11] observed, from three studies, that being a single mother with a 'low level of education' was associated with both maternal depression and child emotional problems[S33,S35,S53], and from one study that the father's presence could reduce the risk of child depression[S59]. Goodday et al[10] cited one study showing that the risk of suicide-related behaviours among offspring of a psychiatrically unwell parent was further elevated when that parent was single[S25]. Connell and Goodman[7] however found no such enhanced risk and speculated that a higher risk of intra-familial conflict in intact families might balance the risk of higher exposure to the troubled parent in single parent families.

Genetic factors

Six reviews[5,7,8,9,10,11] acknowledged a genetic component to offspring susceptibility to adverse outcomes, although none offered evidence or discussed heritability or genetic mechanisms at length.

CONCLUSIONS AND CLINICAL IMPLICATIONS

This is the first review of systematic reviews examining quantified offspring outcomes when a parent has major mental disorder. Seven high quality reviews including almost 300 studies were identified. Three general conclusions follow. First, the weight of evidence appears to indicate an increased risk of offspring psychiatric disorder or behavioural, emotional,

cognitive or social difficulties. Second, such conclusions, with the exception of an increased risk of offspring psychiatric disorder, tend to be based on a small number of original studies, and thirdly, potential child strengths, such as enhanced coping skills, were not explored. Material predominantly involved dependent children, suggesting a paucity of quantitative studies involving adult offspring, although qualitative research makes no such omission[12].

The reviews provided useful pointers for future research, highlighting individual studies which suggest the relevance of the severity of parental illness and of comorbidities. The nearest any review came to considering parental violence (other than self-harm), which may accompany these serious psychiatric disorders, was Petfield et al[6], which reported that children of mothers with EUPD were more likely to witness violence than children of parents with other personality disorder(s), although it is unclear who perpetrated this violence.

None of the reviews sought studies evaluating potential positive correlates of experiencing parental psychiatric disorder, although three referred to this in their discussion[5,9,11]. There are studies of children with psychiatrically unwell parents in which the children desire recognition and acknowledgement of any positives their situation presents (e.g. Cooklin 2010[13]), and those demonstrating offspring protective factors (e.g. Collishaw et al 2016[14]), but this requires further research.

Our review identifies the potential value of intervention. One review[11] found evidence of improvements in child psychiatric disorder when the parent's disorder remitted, as demonstrated in their included papers from STAR*D[S32,S33,S34], which suggests that effective parental treatment may itself have offspring benefits. Indications that parenting

may mediate between parental and child disorders, highlights an opportunity for intervention, and parenting programmes are effective[15,16]. Family processes also mediate the relationship between parental psychiatric disorder and child psychiatric disorder[17] or other variations in child functioning[18].

Our review has several limitations. Only 22 of the 291 original studies featured in more than one of the included reviews, which presents difficulties in making generalizable findings; findings from studies focusing on offspring of a parent with first episode depression will not necessarily apply to offspring of a parent with chronic psychosis. Generalizable findings were also challenged by terms such as 'externalising' being variously defined and alternative terms being used without definition, for example 'disruptive behaviour disorder' in Eyden[5]. However, the large number of unique original studies extends the range of findings. We included only systematic reviews which survived quality appraisal, but excluding material, even justifiably, risks loss of pertinent findings. Furthermore, the time lag between original papers being published and being included in a review, means potential loss of recent relevant evidence.

In conclusion, this review of reviews consolidates evidence indicating that offspring of a parent with psychiatric disorder(s) are at increased risk of diagnosed psychiatric disorder and/or subthreshold symptoms. It highlights that even when explicitly sought by reviews, studies rarely examined the potential moderating effects of parental disorder timing, severity, chronicity, and/or comorbidity[10,11], nor offspring experience in adulthood[5]. It also highlights that research questions concerning offspring social outcomes emerge readily when a parent has EUPD but less readily when a parent has mental illness. Associated features,

such as violence, and mediating effects, such as parenting support and offspring protective factors, were minimally considered.

Recommendations encompass exploration of why some offspring experience greater adversity, including examination of the moderating roles of aspects of parental disorder, and examination of offspring protective factors and resilience. Examination of offspring outcomes in adulthood and interest in a broader range of outcomes irrespective of parental disorder, would enable a more complete understanding of the impact of parental psychiatric disorder on offspring.

Required statements

Competing interests: none

Contributorship statement: The concept was initially developed by Sarah Argent and Pamela Taylor but all four authors were then involved in designing, drafting, and amending the protocol until the final version was agreed upon. The search terms and databases to be searched were agreed in the protocol. Sarah Argent generated the searches and the first 100 titles and, where necessary, abstracts, were rated by Sarah Argent and Natasha Kalebic. Due to a satisfactory interrater reliability the remaining title/abstract screening was completed by Sarah Argent. Full text examination was completed by Sarah Argent and Natasha Kalebic. Quality Assessment was performed by Sarah Argent. Sarah Argent and Natasha Kalebic extracted data from all reviews which were retained for inclusion. Data generated in extraction was discussed extensively on numerous occasions by all authors. Sarah Argent drafted the manuscript and all authors were involved in revising this and in providing detailed critical comments. All authors have approved the final version which we are submitting and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Data sharing statement: data sharing is not applicable as no datasets were generated or analysed for this study, and the only data used in this review were the texts of the included systematic reviews, each of which has been published and is referenced in this manuscript.

REFERENCES

1 Argent SE, Riddleston L, Warr J, et al. A period prevalence study of being a parent in a secure psychiatric hospital and a description of the parents, the children and the impact of admission on parent–child contact. *Crim Behav Ment Health* 2018;28:85-99.

2 Coid J. The co-morbidity of personality disorder and lifetime clinical syndromes in dangerous offenders. *J Forens Psychiatry Psychol* 2003;14:341-66.

3 Maniglio R. The impact of child sexual abuse on health: A systematic review of reviews. *Clin Psychol Rev* 2009;29:647-57.

4 Centre for Reviews and Dissemination. CRD's guidance for undertaking reviews in healthcare. York Publ. Services; 2009.

5 Eyden J, Winsper C, Wolke D, et al. A systematic review of the parenting and outcomes experienced by offspring of mothers with borderline personality pathology: Potential mechanisms and clinical implications. *Clin Psychol Rev* 2016;47:85-105.

6 Petfield L, Startup H, Droscher H, et al. Parenting in mothers with borderline personality disorder and impact on child outcomes. *Evid Based Ment Health* 2015;18:67-75.

7 Connell AM, Goodman SH. The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: a meta-analysis. *Psychol Bull* 2002;128:746.

8 Rasic D, Hajek T, Alda M, et al. Risk of mental illness in offspring of parents with schizophrenia, bipolar disorder, and major depressive disorder: a meta-analysis of family high-risk studies. *Schizophr Bull* 2013;40:28-38.

9 Lau P, Hawes DJ, Hunt C, et al. Prevalence of psychopathology in bipolar high-risk offspring and siblings: a meta-analysis. *Eur Child Adolesc Psychiatry* 2018;27:823-37.

10 Goodday SM, Shuldiner J, Bondy S, et al. Exposure to parental psychopathology and offspring's risk of suicide-related thoughts and behaviours: a systematic review. *Epidemiol Psychiatr Sci* 2017;28:179-190.

11 Mendes AV, Loureiro SR, Crippa JA, et al. Mothers with depression, school-age children with depression? A systematic review. *Perspect Psychiatr Care* 2012;48:138-48.

12 Murphy G, Peters K, Jackson D, et al. A qualitative meta-synthesis of adult children of parents with a mental illness. *J Clin Nurs* 2011;20:3430-3442.

13 Cooklin A. ‘Living upside down’: being a young carer of a parent with mental illness. *Adv Psychiatr Treat* 2010;16:141-6.

14 Collishaw S, Hammerton G, Mahedy L, et al. Mental health resilience in the adolescent offspring of parents with depression: a prospective longitudinal study. *Lancet Psychiatry* 2016;3:49-57.

15 Bunting L. Parenting programmes: The best available evidence. *Child Care Pract* 2004;10:327-43.

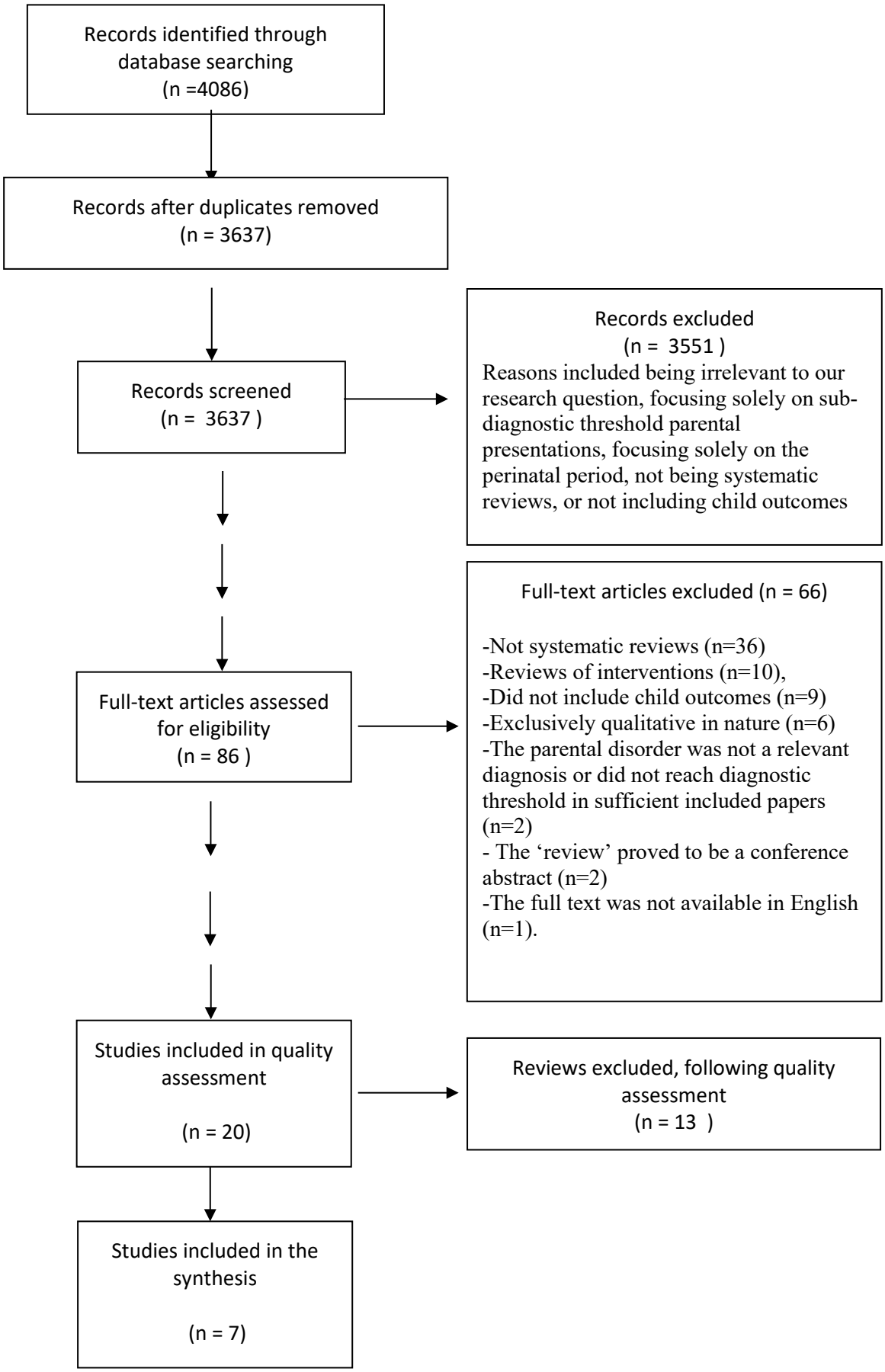
16 Scott S, Gardner F. Parenting programs. In: Rutter M, Bishop D, Pine D, et al, eds. Rutter's child and adolescent psychiatry. Oxford: Wiley 2015;483–495

17 Van Loon LM, Van de Ven MO, Van Doesum KT, et al. The relation between parental mental illness and adolescent mental health: The role of family factors. *J Child Fam Stud* 2014;23:1201-14.

18 Cummings EM, Keller PS, Davies PT. Towards a family process model of maternal and paternal depressive symptoms: Exploring multiple relations with child and family functioning. *J Child Psychol Psychiatry* 2005;46:479-89.

Figure legends

Figure 1. Search and selection process


Records identified through database searching (n =4086)
Records after duplicates removed (n = 3637)
Records screened (n = 3637)
Records excluded (n = 3551) Reasons included being irrelevant to our research question, focusing solely on sub-diagnostic threshold parental presentations, focusing solely on the perinatal period, not being systematic reviews, or not including child outcomes
Full-text articles assessed for eligibility (n = 86)
Full-text articles excluded (n = 66)
-Not systematic reviews (n=36)
-Reviews of interventions (n=10),
-Did not include child outcomes (n=9)
-Exclusively qualitative in nature (n=6)
-The parental disorder was not a relevant diagnosis or did not reach diagnostic threshold in sufficient included papers (n=2)
- The 'review' proved to be a conference abstract (n=2)
-The full text was not available in English (n=1).
Studies included in quality assessment (n = 20)
Reviews excluded, following quality assessment (n = 13)
Studies included in the synthesis (n = 7)

Supplementary Text1. Complete key word search strategy applied across electronic databases

Key words search terms:

((father* or mother* or parent* or maternal* or paternal*) AND (mental* disorder* or mental* illness* or psychosis or psychotic* or schizo* or personality disorder* or borderline personality or emotional* unstable or emotional* instab* or complex post-trauma* or psychiatr* disorder* or psychiatr* illness* or severe depress* or bipolar affective or manic or mania or affective psycho*))

Full electronic search strategy for Joanna Briggs database

1. ((father* or mother* or parent* or maternal* or paternal*) and (mental* disorder* or mental* illness* or psychosis or psychotic* or schizo* or personality disorder* or borderline personality or emotional* unstable or emotional* instab* or complex post-trauma* or psychiatr* disorder* or psychiatr* illness* or severe depress* or bipolar affective or manic or mania or affective psycho*)).mp. [mp=text, heading word, subject area node, title]

2. limit 1 to ("systematic review protocols" or systematic reviews)

Supplementary Text2. Supplementary references

S1 Abela JR, Skitch SA, Auerbach RP, et al. The impact of parental borderline personality disorder on vulnerability to depression in children of affectively ill parents. *J Pers Disord* 2005;19:68-83.

S2 Weiss M, Zelkowitz P, Feldman RB, et al. Psychopathology in offspring of mothers with borderline personality disorder: A pilot study. *Can J Psychiatry* 1996;41:285-90.

S3 Barnow S, Aldinger M, Arens EA, et al. Maternal transmission of borderline personality disorder symptoms in the community-based Greifswald Family Study. *J Pers Disord* 2013;27:806-19.

S4 Cheng HG, Huang Y, Liu Z, et al. Associations linking parenting styles and offspring personality disorder are moderated by parental personality disorder, evidence from China. *Psychiatry Res* 2011;189:105-9.

S5 Conway CC, Hammen C, Brennan PA. Adolescent precursors of adult borderline personality pathology in a high-risk community sample. *J Pers Disord* 2015;29:316-33.

S6 Stepp SD, Whalen DJ, Pilkonis PA, et al. Children of mothers with borderline personality disorder: identifying parenting behaviors as potential targets for intervention. Personality Disorders: Theory, Research, and Treatment 2012;3:76.

S7 Macfie J, Swan SA, Fitzpatrick KL, et al. Mothers with borderline personality and their young children: adult attachment interviews, mother–child interactions, and children's narrative representations. *Dev Psychopathol* 2014;26:539-51.

S8 Macfie J, Swan SA. Representations of the caregiver–child relationship and of the self, and emotion regulation in the narratives of young children whose mothers have borderline personality disorder. *Dev Psychopathol* 2009;21:993-1011.

S9 White H, Flanagan TJ, Martin A, et al. Mother–infant interactions in women with borderline personality disorder, major depressive disorder, their co-occurrence, and healthy controls. *J Reprod Infant Psychol* 2011;29:223-35.

S10 Zalewski M, Stepp SD, Scott LN, et al. Maternal borderline personality disorder symptoms and parenting of adolescent daughters. *J Pers Disord* 2014;28:541-54.

S11 Gratz KL, Kiel EJ, Latzman RD, et al. Maternal borderline personality pathology and infant emotion regulation: Examining the influence of maternal emotion-related difficulties and infant attachment. *J Pers Disord* 2014;28:52-69.

S12 Herr NR, Hammen C, Brennan PA. Maternal borderline personality disorder symptoms and adolescent psychosocial functioning. *J Pers Disord* 2008;22:451-65.

S13 Hobson RP, Patrick M, Crandell L et al. Personal relatedness and attachment in infants of mothers with borderline personality disorder. *Dev Psychopathol* 2005;17:329-47.

S14 Marantz S, Coates S. Mothers of boys with gender identity disorder: a comparison of matched controls. *J Am Acad Child Adolesc Psychiatry* 1991;30:310-5.

S15 Barnow S, Spitzer C, Grabe HJ, et al. Individual characteristics, familial experience, and psychopathology in children of mothers with borderline personality disorder. *J Am Acad Child Adolesc Psychiatry* 2006;45:965-72.

S16 Bertino MD, Connell G, Lewis AJ. The association between parental personality patterns and internalising and externalising behaviour problems in children and adolescents. *Clin Psychol* 2012;16:110-7.

S17 Joormann J, Talbot L, Gotlib IH. Biased processing of emotional information in girls at risk for depression. *J Abnorm Psychol* 2007;116:135.

S18 Silk JS, Shaw DS, Forbes EE, et al. Maternal depression and child internalizing: The moderating role of child emotion regulation. *J Clin Child Adolesc Psychol* 2006;35:116-26.

S19 Meyer TD, Blechert J. Are there attentional deficits in people putatively at risk for affective disorders? *J Affect Disord* 2005;84:63-72.

S20 Salloum IM, Thase ME. Impact of substance abuse on the course and treatment of bipolar disorder. *Bipolar Disord* 2000;2:269-80.

S21 Wilde A, Chan HN, Rahman B, et al. A meta-analysis of the risk of major affective disorder in relatives of individuals affected by major depressive disorder or bipolar disorder. *J Affect Disord* 2014;158:37-47.

S22 Ljung T, Lichtenstein P, Sandin S, et al. Parental schizophrenia and increased offspring suicide risk: exploring the causal hypothesis using cousin comparisons. *Psychol Med* 2013;43:581-90.

S23 Agerbo E, Nordentoft M, Mortensen PB. Familial, psychiatric, and socioeconomic risk factors for suicide in young people: nested case-control study. *Bmj* 2002;325:74.

S24 Cheng CC, Yen WJ, Chang WT, et al. Risk of adolescent offspring's completed suicide increases with prior history of their same-sex parents' death by suicide. *Psychol Med* 2014;44:1845-54.

S25 Niederkrotenthaler T, Floderus B, Alexanderson K, et al. Exposure to parental mortality and markers of morbidity, and the risks of attempted and completed suicide in offspring: an analysis of sensitive life periods. *J Epidemiol Community Health* 2012;66:233-9.

S26 Jellinek MS, Bishop SJ. Screening for dysfunction in the children of outpatients at a psychopharmacology clinic. *Am J Psychiatry* 1991;148:1031.

S27 Schacht R, Hammond L, Marks M, et al. The relation between mind-mindedness in mothers with borderline personality disorder and mental state understanding in their children. *Infant Child Dev* 2013;22:68-84.

S28 Feldman RB, Zelkowitz P, Weiss M, et al. A comparison of the families of mothers with borderline and nonborderline personality disorders. *Compr Psychiatry*. 1995;36:157-63.

S29 Loeber R, Hipwell A, Battista D, et al. Intergenerational transmission of multiple problem behaviors: prospective relationships between mothers and daughters. *J Abnorm Child Psychol* 2009;37:1035-48.

S30 Pilowsky DJ, Wickramaratne PJ, Rush AJ, et al. Children of currently depressed mothers: a STAR* D ancillary study. *J Clin Psychiatry* 2006;67:126-136.

S31 Dietz LJ, Birmaher B, Williamson DE, et al. Mother-child interactions in depressed children and children at high risk and low risk for future depression. *J Am Acad Child Adolesc Psychiatry*. 2008;47:574-82.

S32 Pilowsky DJ, Wickramaratne P, Talati A, et al. Children of depressed mothers 1 year after the initiation of maternal treatment: findings from the STAR* D-Child Study. *Am J Psychiatry* 2008;165:1136-47.

S33 Talati A, Wickramaratne PJ, Pilowsky DJ, et al. Remission of maternal depression and child symptoms among single mothers. A Star*D-Child report. *Soc Psychiatry Psychiatr Epidemiol* 2007;42:962-71.

S34 Weissman MM, Pilowsky DJ, Wickramaratne PJ, et al. STAR* D -Child Team. Remissions in maternal depression and child psychopathology. *J Am Med Assoc* 2006;295:1389-98.

S35 Campbell SB, Morgan-Lopez AA, Cox MJ, et al. A latent class analysis of maternal depressive symptoms over 12 years and offspring adjustment in adolescence. *J Abnorm Psychol* 2009;118:479.

S36 King CA, Kerr DC, Passarelli MN, et al. One-year follow-up of suicidal adolescents: Parental history of mental health problems and time to post-hospitalization attempt. *J Youth Adolesc* 2010;39:219-32.

S37 Kuramoto SJ, Stuart EA, Runeson Bet al. Maternal or paternal suicide and offspring's psychiatric and suicide-attempt hospitalization risk. *Pediatrics* 2010;126:e1026-32.

S38 Lewinsohn PM, Olino TM, Klein DN. Psychosocial impairment in offspring of depressed parents. *Psychol Med* 2005;35:1493-503.

S39 Cortes RC, Fleming CB, Catalano RF, et al. Gender differences in the association between maternal depressed mood and child depressive phenomena from grade 3 through grade 10. *J Youth Adolesc* 2006;35:810-21.

S40 Kiss E, Gentzler AM, George C, et al. Factors influencing mother–child reports of depressive symptoms and agreement among clinically referred depressed youngsters in Hungary. *J Affect Disord*. 2007;100:143-51.

S41 Leve LD, Kim HK, Pears KC. Childhood temperament and family environment as predictors of internalizing and externalizing trajectories from ages 5 to 17. *J Abnorm Child Psychol* 2005;33:505-20.

S42 McNaughton DB, Cowell JM, Gross D, et al. The relationship between maternal and child mental health in Mexican immigrant families. *Res Theory Nurs Pract* 2004;18:229.

S43 Silk JS, Ziegler ML, Whalen DJ, et al. Expressed emotion in mothers of currently depressed, remitted, high-risk, and low-risk youth: Links to child depression status and longitudinal course. *J Clin Child Adolesc Psychol*. 2009;38:36-47.

S44 Tsypes A, Gibb BE. Peer victimization mediates the impact of maternal depression on risk for suicidal ideation in girls but not boys: A prospective study. *J Abnorm Child Psychol* 2015;43:1439-45.

S45 Geulayov G, Metcalfe C, Heron J, et al. Parental suicide attempt and offspring self-harm and suicidal thoughts: results from the Avon Longitudinal Study of Parents and Children (ALSPAC) birth cohort. *J Am Acad Child Adolesc Psychiatry* 2014;53:509-17.

S46 Lieb R, Bronisch T, Höfler M, et al. Maternal suicidality and risk of suicidality in offspring: findings from a community study. *Am J Psychiatry* 2005;162:1665-71.

S47 Corapci F, Smith J, Lozoff B. The role of verbal competence and multiple risk on the internalizing behavior problems of Costa Rican youth. *Ann N Y Acad Sci* 2006;1094:278-81.

S48 Hammerton G, Zammit S, Mahedy L, et al. Pathways to suicide-related behavior in offspring of mothers with depression: the role of offspring psychopathology. *J Am Acad Child Adolesc Psychiatry*. 2015;54:385-93.

S49 Kerr DC, Owen LD, Capaldi DM. Suicidal ideation and its recurrence in boys and men from early adolescence to early adulthood: An event history analysis. *J Abnorm Psychol* 2008;117:625.

S50 Hipwell A, Keenan K, Kasza K, et al. Reciprocal influences between girls' conduct problems and depression, and parental punishment and warmth: A six year prospective analysis. *J Abnorm Child Psychol* 2008;36:663-77.

S51 Tompson MC, Pierre CB, Haber FM, et al. Family-focused treatment for childhood-onset depressive disorders: Results of an open trial. *Clin Child Psychol Psychiatry* 2007;12:403-20.

S52 Elgar FJ, Mills RS, McGrath PJ, et al. Maternal and paternal depressive symptoms and child maladjustment: The mediating role of parental behavior. *J Abnorm Child Psychol* 2007;35:943-55.

S53 Riley AW, Coiro MJ, Broitman M, et al Mental health of children of low-income depressed mothers: Influences of parenting, family environment, and raters. *Psychiatr Serv* 2009;60:329-36.

S54 Shelton KH, Harold GT. Interparental conflict, negative parenting, and children's adjustment: Bridging links between parents' depression and children's psychological distress. *Journal of family psychology* 2008;22:712.

S55 Reinelt E, Stopsack M, Aldinger M, et al. Longitudinal transmission pathways of borderline personality disorder symptoms: from mother to child? *Psychopathology* 2014;47:10-6.

S56 Garber J, Little S, Hilsman Ret al. Family predictors of suicidal symptoms in young adolescents. *J Adolesc* 1998;21:445-57.

S57 Hammerton G, Zammit S, Thapar A, Collishaw S. Explaining risk for suicidal ideation in adolescent offspring of mothers with depression. *Psychol Med* 2016;46:265-75.

S58 Low SM, Stocker C. Family functioning and children's adjustment: associations among parents' depressed mood, marital hostility, parent-child hostility, and children's adjustment. *Journal of family psychology* 2005;19:394.

S59 Chang JJ, Halpern CT, Kaufman JS. Maternal depressive symptoms, father's involvement, and the trajectories of child problem behaviors in a US national sample. *Arch Pediatr Adolesc Med* 2007; 161:697-70

Supplementary Table 1. Offspring outcomes, including their problems, needs or strengths, when a parent experiences major psychiatric disorder: review inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Study design	Systematic reviews[1] of quantitative data, which used meta-analysis or narrative synthesis	Qualitative reviews Reviews which were not systematic in methods[1] Original research papers/conference papers/grey literature/books/book chapters/dissertations/editorials
Study style	Full text available in English Published in a peer reviewed journal	Full text not available in English Not apparently peer reviewed
Parent definition	Biological father or mother, adoptive parent, stepparent or other adult in an enduring/legal parenting role Any parent age or gender	No enduring parental role with the child/offspring
Parental mental illness/disorder	The parent had, or had had, a major mental disorder defined by either ICD[2]/DSM[3] categorical approaches or a recognised assessment/screening tool with a threshold indicative of mental disorder[4]. Reviews in which at least 50% of papers followed this pattern were included[5]	Reviews in which over 50% of papers examined parental symptoms, or traits of mental disorder, not reaching diagnostic threshold Reviews in which over 50% of papers *only* included parents whose *only* disorder was: - Substance misuse related - Intellectual disability - Post-traumatic stress disorder as the primary diagnosis - Mild depression and/or anxiety
Timing of the parental mental illness/disorder	The parental mental illness/disorder occurred when the child was aged 1 year or older (no maximum offspring age) - reviews which included some papers which studied the perinatal period, but in which at least 50% of included papers examined children older than one year	Reviews including over 50% of papers which *only* consider parental mental illness/disorder confined to perinatal period (children up to one year of age)
Offspring demographics	Any (but see age exclusion)	Reviews including over 50% of papers which *only* consider the perinatal period (children up to one year of age)
Offspring outcomes	At least one of the outcome measures sought in the selected review must have been of child experience(s), or child problem(s), or need(s) or strength(s)	Reviews which *only* reported the effects of parental mental disorder on parenting behaviours, and reported no child measures/outcomes Reviews focussing *only* on interventions

[1] Our threshold for what constituted 'systematic' in methods was very inclusive at the title/abstract and full text screening stage, and any review which had any indication of systematic methods, whether by detailing any methods at all, or by organising results in a systematic way, such as in a table, were included. The quality assessment process then discerned which reviews' methods were sufficiently systematic to be included. For further information on the quality assessment process please see supplementary table 2.

[2] ICD Classification of Mental and Behavioural Disorders

[3] Diagnostic and Statistical Manual of Mental Disorders

[4] Scoping searches sought to examine indicators of severity and duration of parental illness. However, authors were not found to have included these aspects of parental disorder/illness as criteria for inclusion in their review. We had to infer severity from the nature of the illness/disorder – so all reviews considering diagnosed major mental illness or personality disorder were included, except any which fell within the exclusion criteria, for example intellectual disability with no comorbid mental illness or disorder. As, by definition, children of secure hospital residents were also separated from their parent by reason of the mental disorder, as well as the offending, we secondly sought to establish, through scoping searches, the extent to which we could set hospital admission as a criterion, but this also proved impossible.

[5] A cut off, of at least 50% of papers following this pattern was agreed as we wanted to avoid excluding reviews which had included a minority of papers in which parent participants had not met the diagnostic threshold for major mental disorder, but which also included a majority of papers in which parent participants did meet the diagnostic threshold for major mental disorder. We also sought to avoid including reviews which primarily focussed on parental presentations which did not meet diagnostic threshold for major mental disorder.

Supplementary Table 2. Quality Assessment of reviews which met the inclusion and exclusion criteria after examination of the full text. Each criterion was either adequately met 'YES' (score = 1), not adequately met 'NO' (score = 0), or met in as many respects as it was not met 'EQUIVOCAL' (score = 0.5)

Review[1]	Evidence identification[2]	Study Selection[3]	Data Extraction[4]	Quality Assessment[5]	Data Synthesis and Analysis[6]	Total (out of 5)[7]
Beardslee	NO	NO	EQUIVOCAL	NO	EQUIVOCAL	1.0
Connell	YES	YES	YES	NO	YES	4.0
DelBello	YES	NO	NO	NO	NO	1.0
Downey	NO	NO	EQUIVOCAL	NO	NO	0.5
Eyden	YES	YES	YES	YES	YES	5.0
Frias	YES	NO	EQUIVOCAL	NO	EQUIVOCAL	2.0
Goodday	YES	YES	YES	YES	YES	5.0
Gunlicks	YES	NO	EQUIVOCAL	NO	YES	2.5
Hameed	NO	EQUIVOCAL	YES	NO	YES	2.5
Jones	YES	NO	EQUIVOCAL	NO	NO	1.5
Klimes-Dougan	YES	NO	EQUIVOCAL	NO	YES	2.5
LaPalme	NO	NO	EQUIVOCAL	NO	YES	1.5
Lau	YES	YES	YES	YES	YES	5.0
Leijdesdorff	YES	NO	NO	NO	NO	1.0
Mendes	YES	YES	YES	YES	YES	5.0
Narayan	YES	EQUIVOCAL	EQUIVOCAL	NO	EQUIVOCAL	2.5
Petfield	YES	YES	YES	YES	YES	5.0
Rasic	YES	YES	YES	NO	YES	4.0
Van Santvoort	YES	EQUIVOCAL	YES	NO	EQUIVOCAL	3.0
Webb	YES	NO	NO	NO	YES	2.0

[1] Reviews are identified in the table by the first author and listed alphabetically. For the full reference please see below:

Beardslee WR, Bemporad J, Keller MB, Klerman GL. Children of parents with major affective disorder: a review. *Am J Psychiatry* 1983;140:825-832.

Connell AM, Goodman SH. The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: a meta-analysis. *Psychol Bull* 2002;128:746.

DelBello MP, Geller B. Review of studies of child and adolescent offspring of bipolar parents. *Bipolar Disord* 2001;6:325-34.

Downey G, Coyne JC. Children of depressed parents: an integrative review. *Psychol bull* 1990;108:50-76.

Eyden J, Winsper C, Wolke D, et al. A systematic review of the parenting and outcomes experienced by offspring of mothers with borderline personality pathology: Potential mechanisms and clinical implications. *Clin Psychol Rev* 2016;47:85-105.

Frias A, Palma C, Farriols N, Salvador A. Characterizing offspring of bipolar parents: a review of the literature. *Actas Esp Psiquiatr* 2015;44:221-34.

Goodday SM, Shuldiner J, Bondy S, et al. Exposure to parental psychopathology and offspring's risk of suicide-related thoughts and behaviours: a systematic review. *Epidemiol Psychiatr Sci* 2017;28:179-190.

Gunlicks ML, Weissman MM. Change in child psychopathology with improvement in parental depression: a systematic review. *J Am Acad Child Adolesc Psychiatry* 2008;47:379-89.

Hameed MA, Lewis AJ. Offspring of parents with schizophrenia: a systematic review of developmental features across childhood. *Harv rev Psychiatry* 2016;24:104-17.

Jones SH, Bentall RP. A review of potential cognitive and environmental risk markers in children of bipolar parents. *Clin Psychol Rev* 2008;28:1083-95.

Klimes-Dougan B, Jeong J, Kennedy KP, Allen TA. Intellectual functioning in offspring of parents with bipolar disorder: a review of the literature. *Brain Sci* 2017;7:143.

Lapalme M, Hodgins S, LaRoche C. Children of parents with bipolar disorder: a metaanalysis of risk for mental disorders. *Can J Psychiatry* 1997;42:623-31.

Lau P, Hawes DJ, Hunt C, et al. Prevalence of psychopathology in bipolar high-risk offspring and siblings: a meta-analysis. *Eur Child Adolesc Psychiatry* 2018;27:823-37.

Leijdesdorff S, van Doesum K, Popma A, Klaassen R, van Amelsvoort T. Prevalence of psychopathology in children of parents with mental illness and/or addiction: an up to date narrative review. *Curr Opin Pychiatry* 2017;30:312-7.

Mendes AV, Loureiro SR, Crippa JA, et al. Mothers with depression, school-age children with depression? A systematic review. *Perspect Psychiatr Care* 2012;48:138-48.

Narayan AJ, Allen TA, Cullen KR, Klimes-Dougan B. Disturbances in reality testing as markers of risk in offspring of parents with bipolar disorder: a systematic review from a developmental psychopathology perspective. *Bipolar disord* 2013;15:723-40.

Petfield L, Startup H, Droscher H, et al. Parenting in mothers with borderline personality disorder and impact on child outcomes. *Evid Based Ment Health* 2015;18:67-75.

Rasic D, Hajek T, Alda M, et al. Risk of mental illness in offspring of parents with schizophrenia, bipolar disorder, and major depressive disorder: a meta-analysis of family high-risk studies. *Schizophr Bull* 2013;40:28-38.

van Santvoort F, Hosman CM, Janssens JM, van Doesum KT, Reupert A, van Loon LM. The impact of various parental mental disorders on children's diagnoses: a systematic review. *Clin child fam Psychol Rev* 2015;18:281-99

Webb R, Abel K, Pickles A, Appleby L. Mortality in offspring of parents with psychotic disorders: a critical review and meta-analysis. *Am J Psychiatry* 2005;162:1045-56.

[2] Evidence identification: we examined whether the review authors stated that they had searched two or more electronic databases, whether any databases searched were named, whether the years between which studies were searched for was stated, whether search keywords and/or MESH terms were stated, and whether authors documented that they had used one or more supplemental search method(s) such as reference searching or contacting experts.

[3] Study selection: we examined whether the authors had searched for unpublished material, whether their inclusion and exclusion criteria were available, whether they had stated how many researchers had screened results for inclusion/exclusion, and whether there was a PRISMA diagram or equivalent information otherwise available.

[4] Data extraction: we examined whether the data extraction procedure was reported, whether the authors had stated how many researchers had completed data extraction procedures, whether study characteristics such as participants, interventions and outcomes were reported, and whether the ranges of characteristics in the studies were reported, such as participant age and gender.

[5] Quality assessment: we examined whether the studies in each review were formally quality assessed, and if so, whether the criteria were described, and whether the number of researchers who completed this was stated? If reviews were not formally quality assessed, we examined whether the inclusion/exclusion criteria were sufficiently detailed to have in part at least have ensured the calibre of included studies.

[6] Data synthesis and analysis: we examined whether the quality of the studies was given weight in the forming of conclusions, whether the methods used to form the conclusions were described, whether the synthesis considered the strength and/or consistency of evidence across the studies, whether there was a statement regarding conflict of interest, whether the method used to synthesise the studies was appropriate and whether it could be bettered? If the method of synthesis employed was meta-synthesis, then was the approach rigorous and transparent? If the method of synthesis employed was meta-analysis then were the effect size and odds ratio reported, was heterogeneity explored, were any subgroup analyses explored, was investigation of publication bias described and were confidence intervals and levels of statistical significance described?

[7] A score of 4 or more was required for inclusion in the review

Supplementary Table 3a. Offspring findings of emotional (including suicide and suicide-related behaviours), behavioural, cognitive and social outcomes when a parent has major mental disorder, with detail as to the number of studies which were cited as supporting a finding, or being used in a calculation which supports a finding, within the reviews.

Offspring outcome	Parental mental disorder	Parental gender	Offspring finding	Comparison group(s) in the study	Number of studies within the reviews, or (indicated by '2'), the number within a calculation (e.g. meta-analyses), which individually or overall, show evidence for/ against/ or are inconclusive, re the offspring finding			Rv Auth-ors
					For	Against	Inconclusive	
Suicide related behaviours (SRB) including suicide related thoughts (SRT) and suicide attempts (SA)	Schizophrenia	Mother	Significant association between maternal schizophrenia and offspring SRB (OR 1.98)[1]	Offspring of well mothers	N=1 Mittendorfer-Rutz	N=0	N=0	G
		Father	Significant association between paternal schizophrenia and offspring SRB (OR 1.44)[1]	Offspring of well fathers	N=1 Mittendorfer-Rutz	N=0	N=0	G
	Bipolar/ Depression	Mother	Significantly higher rate of SRT and SA in adolescent offspring of mothers with depression or bipolar	Offspring of well mothers	N=2 Klimes-Duggan Weissman	N=0	N=0	G
			Significant association between maternal mood disorder and offspring SRB (NOS) OR 1.43[1]	Offspring of well mothers (n=1)	N=1 Mittendorfer-Rutz	N=0	N=0	G
			Significant association between maternal mood disorder and offspring: SRT (persistent) OR 1.9[1] SRT (with plan) OR 1.8[1]	Offspring of mothers without mood, alcohol or substance use disorders	N=1 Glowinski Glowinski	N=0	N=1	G

			SRT (without plan) Association between maternal mood disorder and offspring SA	As above Offspring of well mothers (n=1)/ mothers without mood, alcohol or substance use disorders (n=2)	 N=0	 N=0	Glowinski N=3 Lewinsohn Glowinski Reyes	 G
		Father	Significant association between paternal mood disorder and offspring SRB OR 2.2[1] (offspring suicide attempt) OR 2.65[1] (offspring suicide attempt) OR 1.4[1] Association between paternal mood disorder and offspring SRT	Offspring of fathers without mood or alcohol use disorders (n=1)/ Offspring of well fathers (n=2) Offspring of fathers without a mood or alcohol use disorder	N=3 Glowinski Lewinsohn Mittendorfer-Rutz N=0	N=0 N=0	N=0 N=1 Glowinski	G G
		Parent NOS	Significant association between parental mood disorder and offspring SA OR 3.2[1] Significant association between parental mood disorder and SA, and offspring SA OR 6.0[1] OR 4.8[1] OR 4.1[1] Significant association between parental mood disorder and offspring SRT OR 5.1[1,5]	Offspring of well parents Offspring of parents with mood disorder but no SA (n=3) Offspring of well parents	N=1 Santana N=3 Brent 2002 Brent 2015 Burke N=1 Sanatana	N=0 N=0 N=0	N=0 N=0 N=0	G G G

	Personality disorder	Mother	Offspring of mothers with EUPD had a significantly higher rate of SRT	Offspring of well mothers	N=1 Barnow 2006	N=0	N=0	E, P
			Significant association between maternal PD NOS and offspring SRB (OR 2.14)[1]	Offspring of well mothers	N=1 Mittendorfer-Rutz	N=0	N=0	G
		Father	Significant association between paternal PD NOS and offspring SRB (OR 2.94)[1]	Offspring of well fathers	N=1 Mittendorfer-Rutz	N=0	N=0	G
		Parent	Significant association between parental personality disorder and offspring SRT OR 3.2[1,5]	Offspring of well parents	N=1 Santana	N=0	N=0	G
			Association between parental PD and offspring SA	Offspring of well parents	N=0	N=0	N=1 Santana	G
	Psychopathology other/ NOS/ combined	Mother	Significant association between maternal SRT and offspring SRT: OR 1.95[1] OR 1.6[1]	Offspring of mothers without SRT (n=1)/ SRT or SA (n=1)/	N=2 An Lieb	N=0	N=1	G
			Association between maternal SRT and offspring SRT	SRT or depression (n=1)			Min	
			Significant association between maternal SA and offspring SRT: OR 4.4[1] without plan OR 2.17[1] without plan OR 5.04[1] with plan	Offspring of mothers without SRT or SA (n=1)/ without SA (n=1)	N=2 Lieb Geulayov Geulayov	N=0	N=0	G
			Significant association between maternal suicide and offspring SRB (NOS):		N=3	N=0	N=0	G

			OR 1.79[1] OR 1.80[1] OR 3.51[1]	Offspring of well mothers (n=1)/ offspring of mothers who died accidentally(n=1)/ offspring of alive mothers (n=1)	Mittendorfer-Rutz Kuramoto Jakobsen			
			Significant association between maternal SRB and offspring SRB: OR 2.75[1] (maternal SRB and offspring SRB) OR 2.94[1] (maternal SA and offspring SA) OR 5.4[1] (maternal SA and offspring SA)	Offspring of well mothers (n=1)/ offspring of mothers who have no SA (n=1)/ no SA or SRT (n=1)	N=3 Mittendorfer-Rutz Geulayov Lieb	N=0	N=0	G
			Significant association between any maternal psychopathology and offspring suicide attempt OR 2.4[1]	Offspring of mentally well parents	N=1 King	N=0	N=0	G
			Association between maternal SRT and offspring SA	Offspring of mothers who have no SA or SRT	N=0	N=1 Lieb	N=0	G

		Father	Significant association between paternal suicide and offspring SRB OR 1.91[1] OR 2.42[1]	Offspring of well fathers (n=1)/ alive fathers (n=1)	N=2 Mittendorfer-Rutz Jakobsen	N=0	N=0	G
			Significant association between paternal SRB and offspring SRB OR 1.88[1]	Offspring of well fathers (n=1)	N=1 Mittendorfer-Rutz	N=0	N=0	G
			Association between paternal SA and offspring SRB	Offspring of fathers who have no SA (n=1)/	N=0	N=0	N=1 Geulayov	G
			Association between paternal psychopathology and offspring SA	Offspring of well parents (n=2)	N=0	N=0	N=1 King	G
			Association between paternal SRT and offspring SRT	Offspring of fathers without SRT (n=1)	N=0	N=0	N=1 An	G
			Association between paternal suicide attempt and offspring SRT (with or without a plan)	Offspring of fathers without SA (n=1)	N=0	N=0	N=1 Geulayov	G
			Association between paternal suicide and offspring SRB	Offspring of fathers who died accidentally (n=1)	N=0	N=0	N=1 Kuramoto	G

		Parent	Significant association between parental psychopathology and offspring SA OR 2.63[1]	Offspring of well parents	N=1 King	N=0	N=0	G
			Significant association between parental SRB and offspring SRB OR 1.5[1]	Offspring of fathers who have not had a hospital admission for mental disorder or SRB (n=1)/	N=2 Christiansen	N=0	N=0	G
			OR 2.56[1]	not had SRB or completed suicide (n=1)	Niederkrotenthaler			
			Significant association between parental suicide and offspring SRB OR 1.75[1]	Offspring of parents with no SRB or suicide	N=1 Niederkrotenthaler	N=0	N=0	G
			Association between parental psychopathology and offspring SRT	Offspring of mentally well parents	N=0	N=0	N=1 Mortier	G
			Association between parental psychopathology and offspring SRB (offspring SRB not otherwise detailed)	Offspring of parents who have not had inpatient treatment for SRB or psychopathology	N=0	N=1	N=2 Christiansen	G
			(offspring SA)	Offspring of mentally well parents			Mortier	
			(offspring SA)	Offspring of mentally well parents with no substance use problems		Isohookana		

			No significant association between parental SA/SRT and offspring SA	Offspring of parents with no SA/SRT	N=0	N=0	N=1 Mercy	G

Completed suicide	Schizophrenia	Mother	Significant association between maternal schizophrenia and offspring suicide (OR 2.1)	Offspring of mothers without schizophrenia	N=1 Ljung	N=0	N=0	G
		Father	Significant association between paternal schizophrenia and offspring suicide (OR 1.92)	Offspring of fathers without schizophrenia	N=1 Ljung	N=0	N=0	G
	Bipolar/ Depression	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Personality disorder	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Psychopathology other/ NOS/ combined	Mother	Significant association between any maternal SMI/MD and offspring suicide (OR 1.73)[1]	Offspring of mothers who are alive and have not had a psychiatric admission	N=1 Agerbo	N=0	N=0	G
			Significant association between maternal suicide and offspring suicide OR 6.59[1] OR 4.75[1]	Offspring of mothers who are alive (n=1)/ who are alive and have not had a psychiatric admission (n=1)	N=2 Cheng Agerbo	N=0	N=0	G
		Father	Significant association between any paternal SMI/MD and offspring suicide: OR 1.56[1]	Offspring of fathers who are alive and have not had a psychiatric admission	N=1 Agerbo	N=0	N=0	G
			Significant association between paternal suicide and offspring suicide: OR 2.3[1] OR 5.38[1]	Offspring of fathers who are alive and have not had a psychiatric admission (n=1) /who are alive (n=1)	N=2 Agerbo Cheng	N=0	N=0	G

		Parent	Significant association between parental suicide and offspring suicide OR 2.5[1]	Offspring of parents without SRB/suicide	N=1 Niederkotenthaler	N=0	N=0	G
Emotional problems (not including SRT/SRB/SA /completed suicide)[3]	Schizophrenia	Mother	Maternal schizophrenia is significantly related to children's internalizing problems. Weighted mean effect size (*r)* 0.11 (95% CI 0.04-0.17) Q_w 21.84*	Details of the exact comparison groups were not given in this review[4]	N=6[2]			C&G[3]
		Father	Paternal schizophrenia is related to children's internalizing problems. Weighted mean effect size (*r*) 0.02 (95% CI -0.07-0.11) Q_w 0.23	Details of the exact comparison groups were not given in this review[4]			N=3[2]	C&G[3]
	Bipolar	Mother	Maternal bipolar affective disorder is related to children's internalizing problems. Weighted mean effect size (*r*) 0.03 (95% CI -0.09 -0.15) Q_w 15.28*	Details of the exact comparison groups were not given in this review[4]			N=4[2]	C&G[3]
		Father	NK	NA	NA	NA	NA	None
		Parent	Significant differences in the CBCL (parent rating) scores for offspring internalizing disorders between the group of offspring with a parent with bipolar/schizoaffective disorder and the group of offspring with parents with no mental disorder. (SMD = 0.73, SE = 0.27, p < 0.01)	Offspring of mentally well parents	N=3[2] Wilde Meyer and Blechert Salloum and Thase			L
	Depression	Mother	'More problems in emotional regulation' Maternal depression is significantly related to children's internalizing problems. Weighted	Offspring of mothers without depression Details of the exact comparison groups	N=2 Joorman Silk N=78[2]	N=0	N=0	M C&G[3]

			mean effect size (*r*) 0.16 (CI 0.15-0.17) Q_w 255.64* Maternal depression more strongly related to children's internalizing problems than paternal depression (g =0.02, p <.05)	were not given in this review[4] Offspring of fathers with depression	 N=109[2,5]			 C&G[3]
		Father	Paternal depression is significantly related to children's internalising problems. Weighted mean effect size (*r*) 0.14 (CI 0.12-0.16) Q_w 79.29*	Details of the exact comparison groups were not given in this review[4]	N=31[2]			C&G[3]
	Personality disorder (EUPD unless specified otherwise)	Mother	Maternal anti-social PD is significantly related to children's internalising problems. Weighted mean effect size (*r*) 0.10 (CI 0.05-0.15) Q_w 21.71* "Significantly increased 'emotional problems' in adolescents of mothers with BPD"/EUPD compared to adolescents in the comparison group 'Association' with offspring insecure attachment style	Details of the exact comparison groups were not given in this review[4] Offspring of mothers with depression or well mothers Offspring of well mothers n=1 Offspring of mothers with depression n=2 of mothers without EUPD n=1 offspring of well mothers n=1	N=4[2] N=1 Barnow 2006 N=5 Hobson et al 2005 Herr Abela Gratz Macfie and Swan	 N=0 N=0	 N=0 N=0	C&G[3] E N=3 in E,P N=1 in E N=1 in P

			'Significantly lower self-esteem' (in 11-18 year olds) compared to offspring in the comparison group	Evidence for: Offspring of mothers with depression, cluster C PD or well mothers Evidence against:	N=1 Barnow 2006	N=1	N=0	E
			'Significant association' with offspring self-criticism but not with lower self esteem	offspring of mothers with depression		Abela		E, P
			'Significantly more parents' (78% mothers) with EUPD had offspring with high total scores on Paediatric Symptom checklist[2]	Parents with other PD or well parents	N=1 Jellinek	N=0	N=0	E (not P)
			Mothers of sons (daughters not examined) with gender identity disorder significantly more likely to have EUPD than comparison group mothers	Mothers of sons without gender identity disorder	N=1 Marantz and Coates	N=0	N=0	E (not P)
			'Significantly higher harm avoidance scores' (adolescents) than comparison group offspring	Offspring of well mothers or mothers with depression	N=1 Barnow 2006	N=0	N=0	E, P
			Significant association with offspring emotional dysregulation	Offspring of well mothers (n=1)/ No separate control group (n=1)/ offspring of mothers with depression or EUPD and depression or well mothers (n=1)/	N=4 Macfie and Swan Zalewski White	N=0	N=0	E

				offspring of 'comparison' mothers (n=1)	Macfie 2014			
			Significant association with offspring 'symptoms' (as described in the text) of EUPD (described as 'offspring outcome: psychopathology BPD' in Eyden et al's table)	Offspring of comparison mothers (n=1)/ no control/comparison group described (n=3)	N=4 Cheng Barnow 2013 Conway Stepp	N=0	N=0	E
			Association between maternal EUPD and offspring unstable self-image	Offspring of mothers without EUPD	N=2 Macfie 2009	N=0	N=0	E
				Offspring (sons) whose mother does not have EUPD	Marantz and Coates			
			Association between parental (mixed gender sample) EUPD traits and child emotional problems[2]	None described	N=0	N=1 Bertino	N=0	E,P
		Father	Significantly more parents (22% fathers) with EUPD had offspring with high total scores on Paediatric Symptom checklist[2]	Parents with other PD or well parents	N=1 Jellinek	N=0	N=0	P
			No significant association between parental (mixed gender sample) EUPD traits and child emotional problems[2]	None described	N=0	N=1 Bertino	N=0	E
			Paternal anti-social PD is not significantly related to children's internalising problems.	Details of the exact comparison groups			N=4[2]	C&G[3]

			Weighted mean effect size (*r*) 0.05 (CI -0.04-0.15). Q_w 4.70	were not given in this review[4]				
	Psychopathology other/ NOS/ combined	Mother	The association between maternal mental disorder and child internalizing problems generated a population weighted mean effect size (*r*) 0.18 (95% CI 0.17-0.19) N= 94 studies N= 38,839 participants This was a significantly stronger association than that for fathers p<0.05	Details of the exact comparison groups were not given in this review[4] Offspring of fathers with mental disorder	N=94[2] N=153[2,5]			C&G[3] C&G[3]
		Father	The association between paternal mental disorder and child internalizing problems generated a population weighted mean effect size (*r*) 0.14 (95% CI 0.13-0.15) N= 59 studies N= 25,186 participants	Details of the exact comparison groups were not given in this review[4]	N=59[2]			C&G[3]
Behavioural problems	Schizophrenia	Mother	Maternal schizophrenia is not significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.06 (95% CI -0.03-0.15) Q_w 0.41	Details of the exact comparison groups were not given in this review[4]			N=3[2]	C&G
		Father	Paternal schizophrenia is not significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.00 (95% CI -0.11-0.11) Q_w 0.00	Details of the exact comparison groups were not given in this review[4]			N=1[2]	C&G
	Bipolar	Mother	Significant differences in the CBCL (parent rating) scores for offspring externalizing disorders between the group of offspring with a parent with bipolar/schizoaffective disorder and the group of offspring with parents with no mental disorder (SMD = 0.81, SE = 0.20, p < 0.001)	Offspring of mentally well parents n=3	N=3[2] Wilde Meyer and Blechert Salloum and Thase	N=0	N=0	L

			Maternal bipolar affective disorder is not significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.01 (95% CI -0.08-0.10) Q_w 15.30*	Details of the exact comparison groups were not given in this review[4]			N=6[2]	C&G
		Father	Significant differences in the CBCL (parent rating) scores for offspring externalizing disorders between the group of offspring with a parent with bipolar/schizoaffective disorder and the group of offspring with parents with no mental disorder (SMD = 0.81, SE = 0.20, p < 0.001) Paternal bipolar affective disorder is not significantly related to children's externalizing problems. Weighted mean effect size (*r*) -0.13 (95% CI -0.27-0.01) Q_w 0.12	Offspring of mentally well parents n=3 Details of the exact comparison groups were not given in this review[4]	N=3[2] Wilde Meyer and Blechert Salloum and Thase	N=0	N=0 N=2[2]	L C&G
	Depression	Mother	Maternal depression is significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.14 (95% CI 0.13-0.15) Q_w 223.90*	Details of the exact comparison groups were not given in this review[4]	N=79[2]			C&G
		Father	Paternal depression is significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.10 (95% CI 0.06-0.13) Q_w 53.44*	Details of the exact comparison groups were not given in this review[4]	N=26[2]			C&G
	Personality disorder	Mother	Significantly higher rates of behavioural problems	Offspring of mother with another PD n=1/ Offspring of well mothers or mothers with depression n=1/ None described n=1/	N=4 Weiss Barnow 2006 Bertino	N=0	N=0	E, P (n=2) E (n=2)

			Maternal anti-social PD is significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.13 (95% CI 0.09-.017) Q_w 23.51*	Offspring of parent with another PD or well parent n=1 Details of the exact comparison groups were not given in this review[4]	Jellinek N=10[2]			C&G
		Father	Paternal anti-social PD is significantly related to children's externalizing problems. Weighted mean effect size (*r*) 0.19 (95% CI 0.14-0.25) Q_w 18.23*	Details of the exact comparison groups were not given in this review[4]	N=9[2]			C&G
	Parental psychopathology other/ NOS/ combined	Mother	The association between maternal mental disorder and child externalizing problems generated a population weighted mean effect size (*r*) 0.17 (95% CI 0.16-0.18) N=90 studies N=27,199 participants	Details of the exact comparison groups were not given in this review[4]	N=90[2]			C&G
		Father	The association between paternal mental disorder and child externalizing problems generated a population weighted mean effect size (*r*) 0.16 (95% CI 0.15-0.18) N=56 studies N= 14,729 participants	Details of the exact comparison groups were not given in this review[4]	N=56[2]			C&G
Cognitive problems	Schizophrenia	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Bipolar	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Depression	Mother	Offspring of depressed mothers have more: - difficulty recognising positive bases - focus more on negative stimuli - decreased flexibility concerning their focus of attention	Offspring of mother without depression (n=2)	N=2 Joorman Silk et al 2006	N=0	N=0	M

		Father	NK	NA	NA	NA	NA	None
	Personality disorder	Mother	Significantly higher scores on the social problem scale (adolescents)	Offspring of mothers with depression, cluster C PD, or well mothers (n=1)	N=4 Barnow 2006	N=0	N=0	E, P
			Poorer theory of mind (pre-school) Significantly poorer labelling of emotions	Offspring of well mothers (n=1)	Schacht			E, P
			'Significantly poorer self-representations (incongruent and shameful)'	Offspring of well mothers	Macfie and Swan			E, P
			Significant association with decreased self-perception of social acceptability and ability to make friends	Offspring of mothers with depression	Herr			E, P
		Father	NK	NA	NA	NA	NA	None
	Parental psychopathology other/ NOS/ combined	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
Social problems	Schizophrenia	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Bipolar	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Depression	Mother	NK	NA	NA	NA	NA	None
		Father	NK	NA	NA	NA	NA	None
	Personality disorder	Mother	Children of mothers with EUPD were significantly more likely than comparison-group children to	Offspring of mothers with other personality disorders	N=1 Feldman	N=0	N=0	E, P

			-experience changes in household composition and/or school, - experience more non-maternal care, -to 'witness' more violence and/or parental suicide attempts (24% of the children (average age 11-years) had witnessed a maternal attempt and 19% a paternal attempt) - experience verbal, and/or physical abuse - witness violence Children and adolescents experienced 'higher general impairment in areas of home, school and social life' Higher rate of single parenthood in mothers with EUPD	Offspring of mothers with other personality disorders Offspring of mothers with depression or cluster C PD or well mothers (n=1)/ offspring of well mothers (n=1)	N=1 Weiss 1996 N=2 Barnow 2006 Crittenden	N=0 N=0	N=0 N=0	E P
		Father	NK	NA	NA	NA	NA	NA
	Parental psychopathology other/ NOS/ combined	Mother	NK	NA	NA	NA	NA	NA
		Father	NK	NA	NA	NA	NA	NA

[1] The Goodday et al review provided supplementary online figures showing the odds ratios and confidence intervals for the individual studies. The odds ratios could be ascertained precisely by hovering over the box on the figure, but the confidence intervals could only be approximated. We have therefore included the odds ratios but have not tried to approximate the confidence intervals beyond whether they crossed the line of no effect and therefore do not represent a significant finding.

[2] This is the number of studies in the meta-analysis/ other calculation, and not the total number which individually are for/ against/ inconclusive with regards to a finding. For findings from meta-analyses which were not showing a significant association, whether they were considered inconclusive or

considered to show evidence against a finding, was decided by the current authors based on assessment of the effect size, the confidence interval, the sample size and the homogeneity of the samples involved. Where the number of studies in one column is the total number included in an analysis, and we are unable to discern how many of those studies individually supported (or did not support) a finding, we have not indicated numbers of studies in the other columns, for that particular calculation, as we do not know.

[3] Connell and Goodman are included here, but the offspring within the samples may have experienced some suicide related behaviours as part of a depressive episode or as sub diagnostic threshold presentations of depression.

[4] Although the individual studies' comparison groups were not detailed, by obtaining some (n=5) of the original papers, we can advise that comparison groups were various, with some comparing offspring with internalising problems, with healthy offspring, and then examining their parents for psychopathology, whilst others compared children of mentally unwell/disordered mothers/fathers to children of mothers/fathers who had a different mental illness/disorder, and/or children of mothers who were mentally well.

[5] The total number of studies in these analyses were not presented within the Connell and Goodman review, so we have calculated this number by adding together the number of studies which were included in the analysis of the relationship between the maternal pathology and the child internalising/externalising behaviour and the number of studies which were included in the analysis of the relationship between the paternal pathology and the child internalising/externalising behaviour.

Explanatory notes:

ASPD= antisocial personality disorder
CI = confidence interval
EUPD= Emotionally unstable personality disorder
NA= not applicable
NK= not known from the information presented in the reviews
NOS= not otherwise specified
OR = odds ratio
Psychopathology combined = this refers to analyses/studies where the parental sample includes a number of different diagnoses across the parents, so some of the parents may have had depression whilst others had schizophrenia, for example.
Psychopathology "other': This refers to any psychopathology that would be relevant to our population of interest such as completed suicide. It does not encompass diagnoses which were explicitly excluded in the inclusion/exclusion criteria, such as alcohol use disorder(s) without comorbid major mental disorder.
PD= personality disorder
Q_w= This is the within group homogeneity estimate provided by Connell and Goodman. If this is significant ($p<0.05$), indicated by an *, this shows that this group of effect sizes is not homogenous.

Review authors: C&G = Connell and Goodman, R=Rasic et al, L=Lau et al, P=Petfield et al, E=Eyden et al, M=Mendes et al, G=Goodday et al.

Rv=review
SA= Suicide attempts are defined as any self-inflicted, potentially injurious behaviour with some intent to end one's life.
SE = Not further explained in Lau et al (2017). Thought to represent standard error.
SMD= Not further explained in Lau et al (2017). Thought to represent standardized mean difference.
SRB = suicide related behaviours, measures that were irrespective of suicidal intent were labelled as SRB
SRT=suicide related thoughts, defined by Goodday as any thoughts/ideas pertaining to ending one's life, suicide threats and plans

NB

- If the review included the paper, but the particular finding listed was not included in that review, then the review authors are not listed

- Only the first author of any individual study is given. The year is additionally stated if there is more than one study by the first author. Full references for those studies listed in this table, but which are not referenced in the main text can be obtained from the reviews indicated in the review authors column.

Supplementary Table 3b. Additional detail regarding the studies listed in supplementary table 3a (listed in the order in which they appear in table 3a), including the sample size, the study design and the risk of bias/quality assessment as performed by the review authors, where such detail was available in the citing reviews.

Rv(s)[1]	First author (year of publication)	Sample size[2] and sample age where available	Study design	Quality/risk of bias (ROB) assessment of the study by the review(s)
G	Mittendorfer-Rutz et al (2008)	158840 (14440 cases)	Case-control	ROB: Serious[3]
G	Lewinsohn et al (2005)	711	Cohort	ROB: Moderate[3]
G	Klimes- Duggan et al (2008)	192	Cohort	ROB: Serious[3]
G	Weissman et al (1986)	220	Cross sectional	ROB: Serious[3]
G	Glowinski et al (2001)	1252	Cross sectional	ROB: Serious[3]
G	Reyes et al (2011)	691	Cohort	ROB: Moderate[3]
G	Santana et al (2015)	2942	Cross sectional	ROB: Serious[3]
G	Brent et al (2002)	299	Cross sectional	ROB: Serious[3]
G	Brent et al (2015)	701	Cohort	ROB: Serious[3]
G	Burke et al (2010)	449	Cross sectional	ROB: Serious[3]
E, P	Barnow et al (2006)	23 offspring of mothers with borderline personality disorder (BPD) 47 offspring of mothers with depression 31 offspring of mothers with cluster C personality disorder (PD) 156 offspring of healthy mothers 11–18 years	Case-control	7/9 E[4] 4/5 P[5]
G	King et al (2010)	352	Cohort	ROB: Serious[3]
G	An et al (2010)	2965	Cross sectional	ROB: Serious[3]
G	Lieb et al (2005)	933	Cohort	ROB: Moderate[3]
G	Min et al (2012)	707	Cross sectional	ROB: Serious[3]
G	Geulayov et al (2012)	6580	Cohort	ROB: Moderate[3]
G	Kuramoto et al (2010)	38440	Cohort	ROB: Serious[3]

G	Jakobsen et al (2011)	3465	Case-control	ROB: Serious[3]
G	Christiansen et al (2011)	403341	Case-control	ROB: Serious[3]
G	Niederkrotenthaler et al (2012)	18566 cases (matched up to 10 controls)	Case-control	ROB: Moderate[3]
G	Mortier et al (2017)	2042	Cohort	ROB: Serious[3]
G	Isohookana et al (2013)	508	Cross sectional	ROB: Critical[3]
G	Mercy et al (2001)	666	Case-control	ROB: Serious[3]
G	Ljung et al (2013)	235,395	Case-control	ROB: Moderate[3]
G	Agerbo et al (2002)	25296 (496 cases)	Case-control	ROB: Moderate[3]
G	Cheng et al (2014)	2000 (500 cases)	Case-control	ROB: Moderate[3]
L	Wilde et al (2014)	These three papers were used to identify 145 high-risk and 148 control offspring, which were then analysed as a single group	Not stated (from the reference this appears to be a meta-analysis)	ROB/quality assessment was not performed by Lau et al for these papers as far as the current authors can ascertain
L	Meyer and Blechert (2005)		Not stated	
L	Salloum and Thase (2000)		Not stated	
M	Joorman et al (2007)	41	Cross-sectional	20/24[6]
M	Silk et al (2006)	78	Longitudinal	22/24[6]
E, P	Hobson et al (2005)	32 infants: 10 of mothers with BPD 22 of mothers with no psychiatric disorder (12 months: 47–57 weeks)	Case-control	8/9 E[4] 4.4/5 P[5]
E, P	Herr et al (2008)	110 youths with current or past diagnosis of major depressive disorder (MDD) or dysthymic disorder (DD) 15 years	Cross sectional	9/10 E[4] 4.2/5 P[5]
E, P	Abela et al (2005)	120 children of parent with MDD 20 children of parents with MDD/BPD 6–14 years	Case-control	7/9 E[4] 3.6/5 P[5]
E, P	Gratz et al (2014)	23 infants of mothers with BPD (mean 17.4 months) 78 infants of mothers without BPD (mean 16.2	Case-control	7/9 E[4] 4.4/5 P[5]

		months) 12–23 months		
P	Macfie and Swan (2009)[7]	30 children of mothers with BPD 30 children of healthy mothers Ages 4-7 years	Case-control	4.4/5 P[5]
E	Jellinek et al (1991)	100 children of parents with affective disorders 351 children of parents with no disorder Interview: 19 children above PCS[8] cut off (6 of mothers with BPD) 18 children below PCS[8] cut off 6–12 years	Cross sectional	8/10 E[4]
E	Marantz and Coates (1991)	16 boys with gender identity disorder (GID) 17 boys without GID 8 years	Case-control	7/9 E[4]
E	Zalewski et al (2015)	1598 adolescent girls ages 15-17 years	Cross sectional from cohort	8/10 E[4]
E, P	White et al (2011)	87 infants. Mean age 3.5 months	Case-control	8/9 E[4,9] 4.2/5 P[5]
E	Macfie et al (2014)	31 children of mothers with BPD 31 children of comparison mothers 4–7 years	Case-control	8/9 E[4]
E	Barnow et al (2013)	323 offspring T0 15 years T1 20 years	Cohort (2 time points)	7/9 E[4]
E	Conway et al (2015)	T1 815 offspring age 15 T2 700 offspring age 20	Cohort (2 time points)	7/9 E[4]
E	Stepp et al (2013)	T1: 360 adolescents with depressive disorder, 284 with non-mood disorders, 457 no psychiatric history; 14–18 years T2: 1507	Cohort longitudinal	7/9 E[4]

		T1 adolescents 15–19 years T3: 644 adolescents history psychiatric illness 457 without, 24 years T4: 816 T3 participants, 30 years		
E	Macfie (2009)	30 children of mothers with BPD 30 children of mothers without BPD Aged 4-7 years	Case-control	8/9 E[4]
E	Bertino et al (2012)	30 children 4–8 years 29 adolescent 12–18 years	Cross sectional	7/10 E[4]
E, P	Weiss et al (1996)	21 children of mothers with BPD 23 children of mothers with non-borderline PD 4+ years, mean BPD group: 12 years, control group: 9.5 years	Case-control	7/9 E[4] 4/5 P[5]
E, P	Schacht et al (2013)	39 children ages 3-5 years	Case-control	9/9 E[4] 4.2/5 P[5]
E, P	Feldman et al (1995)	21 children of mothers with BPD 4+ years (mean 12 years) 23 of mothers with other PDs 4+ years (mean 9.6 years)	Case-control	8/9 E[4] 3.8/5 P[5]
E, P	Crittenden and Newman (2010)	32 infants ages 3-36 months	Case-control	8/9 E[4] 3.8/5 P[5]

[1] Rv(s): this column indicates the review(s) which featured a particular study. Reviews are denoted by the first letter of the first author of the review, hence G= Goodday et al, E= Eyden et al, P= Petfield et al, L= Lau et al, M= Mendes et al. Where more than one review featured a study and where each provided a quality rating, the same review author abbreviations are used to indicate who reported each quality rating.

[2] Sample size is given as reported in the relevant reviews, hence the differing level of detail. Often the sample size indicates the overall sample size rather than the number of offspring or the number of participants which feature in any particular finding/calculation. However, where detail about the number of offspring is given by the review this is shown in the table. The information relating to

papers which are included in both the Eyden et al and the Petfield et al reviews, is taken from the Eyden et al review.

[3] Goodday: Risk of bias (ROB) was systematically assessed using criteria from the Cochrane Risk of Bias Assessment Tool: for Non-Randomised Studies of Interventions (ACROBAT-NRSI) (Sterne et al. 2014)[1]. Each study was assigned a rating of one of low, moderate, serious or critical risk of bias.

[4] Eyden: The quality of each study was assessed using the Newcastle–Ottawa Scale (Wells et al., 2000)[2].

[5] Petfield: the quality assessment was based on The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) checklist[3].

[6] Mendes: Assessment of the methodological quality of the studies was based on a modification of the checklist developed by Mirza and Jenkins (2004)[4].

[7] Macfie and Swan does also feature in the Eyden et al review and we have included their findings in our results, however Eyden et al[5] do not include this in their table of included studies and thus provide no quality assessment nor details re participants etc. These details are thus taken solely from Petfield et al.

[8] Eyden et al have written 'PCS' in their table, but the only close explanatory note is for 'PSC' which refers to the Pediatric Symptom Checklist. Given the main text of the Eyden et al review discusses this paper's findings in relation to the Pediatric Symptom Checklist, we assume that this is the instrument referred to.

[9] White et al is listed in the supplementary table from Eyden et al as being from 2014, however the reference in the main text refers to White et al 2011 and we have therefore concluded that this is most likely a typo in the supplementary material and attributed the quality rating from Eyden et al to this paper.

References:

[1]Sterne JA, Higgins JP, Reeves BC. On behalf of the development group for ACROBAT-NRSI, 2014. A Cochrane Risk of Bias Assessment Tool: for Non-Randomized Studies of Interventions (ACROBAT-NRSI), Version 1.0. 0.

[2]Wells GA, Shea B, O Connell D, et al. The Newcastle Ottawa Scale (NOS) for assessing the quality if nonrandomized studies in meta-analyses. 2014. Unpublished manuscript. http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp

[3]Von Elm E, Altman DG, Egger M, et al. The strengthening the reporting of observational studies in epidemiology [STROBE] statement: guidelines for reporting observational studies. *Gac Sanit* 2008; 22:144–50.

[4]Mirza I, Jenkins R. Risk factors, prevalence, and treatment of anxiety and depressive disorders in Pakistan: systematic review. Bmj. 2004; 328:794.