**~~A systematic review examining female body image as an influence to the intention, initiation and duration of postpartum infant feeding methods (Breastfeeding vs. Bottle feeding)~~**

**A systematic review examining the association between female body image and the intention, initiation and duration of postpartum infant feeding methods (Breastfeeding vs. Bottle feeding)**

**Abstract**

A systematic review was conducted to examine female body image in relation to the intention, initiation and duration of postpartum infant feeding methods. A search of 10 databases was conducted to identify studies. A total of nine studies were included in the systematic review. All studies were of a non-randomised control design with a total of 13,046 participants. Findings suggest exclusive breastfeeding is more likely in pregnant women with a higher body image, while those with body concerns had less intention to breastfeed or initiate, with those that start having a shorter duration.

Key Words:

Body Image, Breastfeeding, Feeding, Pregnancy, Systematic Review

**Introduction**

Adjustment to motherhood can bring about changes in all aspects of a new mother’s life, including social, behavioural, biological, and psychological (Devine, Bove & Olson, 2000). With increasing support available and differing parental roles and practices (Raphael-Leff, 2010), women aim to make the most informed choice available regarding their pregnancy and motherhood, especially for preservation of daily normality (Levy, 1999; Sanders & Crozier, 2018). Their choices are derived from a variety of sources: media outlets, professionals (e.g. midwives), books, parenting classes (or “Parentcraft”), friends and family for general and personalised knowledge; each presenting consequences and benefits (Levy, 1999; Sanders & Crozier, 2018; Canicali Primo, de Oliveira Nunes, de Fátima Almeida Lima, Marabotti Costa Leite, Barros de Pontes & Gomes Brandão, 2016).

In the past, pregnant women prioritised information from trusted sources and assessed other information sources for accuracy and validity (Levy, 1999; Sanders & Crozier, 2018); today's access to informal sources via mainstream media has influenced pregnancy and birth decisions, often competing with personalised information from professionals (Sanders & Crozier, 2018). This is further supported by the Tripartite Influence Model (Thompson, Heinberg, Altabe & Tantleff-Dunn, 1999; Keery, van den Berg & Thompson, 2004). A key example of mainstream media influence over information is the expectation of the postpartum body often presented (Hopper & Aubrey, 2016). The socio-cultural pressures (i.e. media portrayal of a postpartum body) can become internalised, resulting in body dissatisfaction, anxiety and depression when expectations fail (Skouteris, Carr, Wertheim, Paxton & Duncombe, 2005), and these feelings can ultimately affect the mothering orientation and decisions. Suggestions that healthcare professionals be made aware of the influences involved can help as a preventative measure in minimising risks and encouraging a more informed decision excluding negative influences (Skouteris et al., 2005; Canicali Primo et al., 2016).

One important area to consider is body image, which is defined as a multidimensional construct referring to perceptions, attitudes and behaviours about the body, specifically but not limited to appearance (Thompson et al., 1999; Tylka, 2018), changes within this area can lead to altering daily functioning. With pregnancy bringing about physical changes (Devine et al., 2000), women experience an increase in bodily size (e.g. stomach and breasts) during pregnancy which can result in their ideal body size adapting positively to a more realistic ideal form (Skouteris et al., 2005). However, some women react negatively to these changes in body size (e.g. depressive symptoms, bodily comparisons, and perceived socio-cultural pressure of the “Thin Ideal”), creating high levels of body dissatisfaction in the later phases of pregnancy and postpartum (Skouteris et al., 2005; Rallis, Skouteris, Wertheim & Paxton, 2007; Lovering, Rodgers, George & Franko, 2018; Gjerdingen, Fontaine, Crow, McGovern, Center & Miner, 2009; Zanardo, Volpe, Giustardi, Canella, Straface & Soldera, 2015; Hodgkinson et al., 2014). Yet some evidence suggests for many women their body image remains stable during the transition of pregnancy and postpartum. The nature of their body image adaption is dependent on the aspect of body image assessed, concern displayed throughout, and the individual (Skouteris et al., 2005; Tiggemann, 2014; Seibold, 2004). This evidence suggests body image plays a psychological part in the adapted daily functioning for pregnant women, and ultimately the information chosen to follow for child-care practices and decisions in postpartum.

Research (Gjerdingen et al., 2009; Zanardo et al., 2015) has suggested body image does play a part in a woman’s choice to breastfeed however to date there has yet to be a systematic review examining first time mothers’ intention, maintenance and duration in infant feeding behaviours while specifically looking at the outcome of body image as the deciding variable. A review of the current literature would have implications in health care settings (Lovering et al., 2018), by enabling women to discuss body image concerns, especially regarding infant feeding choices and enable identification of areas that would benefit from future research. Hence the objective of this review was to examine first time mothers’ intention, maintenance and duration in infant feeding behaviour (Breastfeeding VS Non-Breastfeeding/Bottle feeding) and the influence of body image as the deciding variable, specifically looking at the degree of body image as the influence in the intended infant feeding behaviour, and whether the degree of body image influences the maintenance and duration of the intended infant feeding behaviour.

**Methods**

**Protocol and registration**

The layout of this systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (PRISMA, 2011). See Appendix A for the PRISMA Checklist.

**Eligibility criteria**

The first requirement was that the studies were available in the English language. This was due to time constraints not enabling translation of all non-English studies.

Each study needed to examine the human maternal intent and behaviour (maintenance and duration) of newborn feeding behaviour (paternal or other social influences can be included in the study but were not examined in the context of this review). The feeding behaviours defined were exclusively breastfeeding, partial, or bottle feeding, however emphasis was placed between comparing exclusive breastfeeding and bottle feeding. For definitions of these terms, see Table 1. “Partial” or “Mixed” is a combined definition, where both exclusive breast feeding and bottle feeding occurs simultaneously.

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| --- | --- |
| Table 1: World Health Organization breastfeeding definitions (WHO, 2008). | |
| Label | Definition |
| Exclusive Breastfeeding | The infant receives only breast milk from the mother or wet nurse |
| Bottle feeding | The infant receives liquids (Non-human, formula and breast milk) from a bottle |

Newborn feeding behaviour needed to be examined for at least a one-month time period, as body image is known to change within the nine-months post-partum (Gjerdingen et al., 2009). The minimum of a month enables mothers to initiate their feeding method and potentially stop if desired.

Finally, in quantitative studies, a non-randomised control study design examining the intervention of infant feeding behaviour with the outcome measure of body image will be included. This design ensured placement in conditions was controlled by the mothers’ choice of infant feeding behaviour (breastfeeding or bottle feeding).

**Information sources**

To obtain the studies needed, ten databases were searched: ZETOC, Web of Science, PsychARTICLES, Scopus, Cochrane Library, Medline, ScienceDirect, CINAHL, and Proquest Nursing Journals. The literature search was conducted in May and August 2018. Grey literature databases were not included.

**Search**

For studies to be relevant to the research questions, key terms and words were identified. These key words and terms were selected to examine areas of maternal intent, infant feeding behaviour and body image. Boolean operators were utilised to obtain relevant literature. The search terms used within the databases were:

(mother\* OR  maternal) AND (breastf\*d OR "Newborn Feeding behavi\*r" OR "Newborn Feeding intent" OR "Infant feeding" OR "Exclusive breastfeeding" OR "Artificial milk feeding" OR breast-f\*d OR bottlef\*d) AND ("Body Image" OR "Body Satisfaction" OR "Body Appreciation" OR "Body Dissatisfaction" OR "Positive Body Image" OR "Negative Body Image")

A mixture of manual and automatic exclusions (e.g. “English language only”, “Full text available”) was used where possible. No publication date restrictions were imposed.

**Study selection**

A systematic search covering ten databases was conducted by the first author in May 2018, and this provided a total of 1,295 articles, 40 were removed due to duplication. The 1,255 articles were examined for English language and full text accessibility available. The remaining 586 articles were examined based on title, abstract and full text (if the former two did not identify the details needed to determine relevance). A secondary search was conducted by the first author in August 2018 to identify recent publications during May and August. The relevance was based upon the inclusion criteria and whether standards were met, a total of 9 articles were chosen. Each study was examined in terms of key details (i.e. Measurement of body image), and summarised; information is provided in Tables 2 and 3. See Appendix B for the PRISMA flow diagram.

**Data collection process**

Data was extracted from the articles by the first author. Where a study failed to provide the data required, the authors would contact the authors of the selected study directly via email. A data extraction sheet was developed to select the information required.

**Data items**

The information extracted from the selected studies included: authors, location of study, year, research aims, sample size, age of the participants, the interventions examined (Breastfeeding, partial or bottle feeding), how the outcome was measured, key details of the study and findings.

**Risk of bias in individual studies**

To ensure validity of the eligible interventions and measures, the strict eligibility criteria ensured there would be no grey areas (e.g. outcome measures of BMI but not Body image were not accepted). Procedures were in place should uncertainty on the selection of studies occur.

**Summary measures**

The outcome measure examined was the mother’s perceived body image, this ranged from negative body image/body dissatisfaction to positive body image/body appreciation. A range of measurements were used in detailing body image, as shown in Table 2.

**Synthesis of results**

The data was extracted and synthesised manually to be placed into Tables 2 and 3 to enable comparison of research aims, location, design, sample size, ages, interventions used, outcome measures, and findings.

**Risk of bias across studies**

Only published peer-reviewed articles were included, in an attempt to reduce researcher selection bias. However, this can suggest publication bias as grey literature may have held information relevant to this review.

**Additional analyses**

No additional analyses were conducted in this review.

**Results**

**Study selection**

A total of nine studies met all of the inclusion criteria for the review (See Table 2), out of the 586 full text articles screened and overall 1,295 articles that appeared in the database searches. The original 1,295 articles, reduced to 1,255 after duplicates were removed. These remaining articles were manually and automatically searched for “English” language and that full text was available. This removed 669 articles, leaving 586 to be accessed via title, abstract, and full text if the two former could not establish relevancy. 577 articles were removed based on: 1) Design (E.g. It was not a non-randomised Control study, or it was qualitative) (232 removed); 2) Maternal body image was not measured (216 removed); 3) Intention or initiation to breastfeed was not examined (126 removed); 4) Different participant sample (E.g. Focused on social support provided by immediate family, or Infant body image) (3 removed). See Appendix B for a PRISMA flow diagram.

**Study characteristics**

**Participants and settings**

Table 2 contains the characteristics of the nine studies included in the review. All participants were described as women, pre-, during and post pregnancy. The studies had a total of 13,046 participants, ranging from 38 to 11,856 within each study. A total of two studies provided their sample size based upon results of a power analysis (de Jager et al., 2014; Swanson et al., 2017), while seven studies provided no information on the determinants of sample size (Rodgers, O’Flynn, Bourdeau & Zimmerman, 2018; Hauff & Demerath, 2012; de Jager et al., 2013; Foster et al., 1996; Huang et al., 2004; Barnes et al., 1997; Brown, Rance, & Warren, 2015). Of the two studies which included their power analysis, one met the required sample size (Required 80 participants for Power of 0.8, effect size of 0.3, α=0.05, obtained 118; Swanson et al., 2017), while the second was under the requirement (Required 130 participants for Power of 0.8, effect size of 0.2, α=0.05, obtained 125; de Jager et al., 2014).

Participants were primarily recruited from hospitals, antenatal clinics or resident health district areas (Hauff & Demerath, 2012; Swanson et al., 2017; Foster et al., 1996; Huang et al., 2004; Barnes et al., 1997; de Jager et al., 2014), as well as online (Rodgers et al., 2018; de Jager et al., 2013; Brown et al., 2015) and local mother-infant groups and nurseries (Brown et al., 2015).

A mixture of data was provided for participant data. Only one study examined all age groups (Barnes et al., 1997), whereas 8 studies only allowed over 18’s (Hauff & Demerath, 2012; Rodgers et al., 2018; de Jager et al., 2013; 2014; Brown et al., 2015; Swanson et al., 2017; Foster et al., 1996; Huang et al., 2004).

The six studies listing participant ages and statistics found mean ages between 29 to 32.77 (SD= 4 – 5.52) (Hauff & Demerath, 2012; Rodgers et al., 2018; Swanson et al., 2017; Brown et al., 2015; Foster et al., 1996; de Jager et al., 2013), averaged an age of 29.3 (Huang et al., 2004), had higher participation frequency within the 25-29 age category (Barnes et al., 1997), and a total range of 20 to 44 years old (de Jager et al., 2014).

Studies were located geographically in the UK (Barnes et al., 1997; Brown et al., 2015; Foster et al., 1996; Swanson et al., 2017), Taiwan (Huang et al., 2004), United States (Hauff & Demerath, 2012; Rodgers et al., 2018) and Australia (de Jager et al., 2013; 2014). A total of 4 studies were classed as longitudinal (Hauff & Demerath, 2012; Swanson et al., 2017; de Jager et al., 2014; Brown et al., 2015), and 5 cross sectional (Barnes et al., 1997; de Jager et al., 2013; Foster et al., 1996; Huang et al., 2004; Rodgers et al., 2018). The data of publication for the included studies ranged from 1996 to 2018.

**Postpartum feeding method interventions**

All interventions used questionnaires to examine the intervention used, ranging between a singular question to multiple questions. All interventions examined intention and behaviour of infant feeding method, specifically in terms of exclusive breast feeding and bottle feeding. Table 2 shows which study examines which intervention. The majority of studies examine the intention to initiate and maintain exclusive breastfeeding, compared to non-breastfeeding groups (mixed feeding or bottle feeding) (Rodgers et al., 2018; Barnes et al., 1997; de Jager et al., 2014; 2013; Huang et al., 2004; Brown et al., 2015; Foster et al., 1996); whereas Swanson et al. (2017) examined only the actual behaviour implemented in feeding method.

Brown et al., (2015) and de Jager et al. (2013) examined the duration of breastfeeding, in terms of exclusive breastfeeding ceasing for other feeding methods occurring. De Jager et al. (2014) and Hauff and Demerath (2012) are the only studies which examined intention, behaviour and duration of the feeding method used.

**Body image measure**

All nine studies examined body image as a measure for each study in various forms; specifically, 11 different methods were used to examine body image (see Table 2 for the exact method used in each study). Nine of the 11 methods were already constructed questionnaires which examined various relevant forms of body image (e.g. shape concern, body satisfaction, or appearance orientation), and 2 of the 9 studies used more than one questionnaire for body image measurement (Foster et al., 1996; Swanson et al., 2017). All questionnaires used to measure body image obtained good reliability and validity either from the current or a pre-existing study.

Another body image measure was a questionnaire that was specifically constructed during the study. One was created from combining multiple validated questionnaires used in body image (Hauff & Demerath, 2012), and the second for validated use in examining body image in pregnant women (Brown et al., 2015). This was because prior questionnaires did not specifically look at body image within the context of pregnancy, hence no specific questions were available (e.g. stretch marks gained in pregnancy) .The questionnaire obtained good reliability and validity over multiple prior studies.

**Other measures included**

All of the studies provided further measures of independent variables (e.g. androgyny, demographics, and social support) that were not seen as relevant to body image and choice of infant feeding method postpartum. However, as in a few studies (de Jager et al., 2013; 2014; Foster et al., 1996), some of these variables are seen as having a direct link to feeding method intention and behaviour, with body image as an indirect link through these variables, certain variables will be mentioned within the systematic review where it is seen as a relevant link between the primary measures examined. The measurements used to examine other variables were classified as reliable and a valid form of measurement within the appropriate study.

**Follow up procedures**

All data collection points can be seen in Table 2 for each study, ranging from one data collection time frame for retrospective (Rodgers et al., 2018) to five data collection points (Brown et al., 2015).

**Participant attrition**

Barnes, Stein, Smith, and Pollock (1997) began the study with 11,907 participants, however for the four-month interval measure, only 11,856 participants’ data was complete (99.57%), hence primary focus within this systematic review with this study will be on completed data sets unless specified otherwise for the one week interval.

Hauff and Demerath (2012) recruited 257 participants originally, but due to rejected consent, failed participant return, failure to complete required details, 9.3% of participants were no longer included.

Within the Brown et al. (2015) study, an initial 254 participants were collected, however the final sample dropped to 128 (50.3%). Analysis indicated that mothers with lower education were less likely to participate to completion, but no significant differences were found in the initial samples.

An original sample of 196 participants were recruited in de Jager et al., (2014), however only 125 completed the study, a rate of 63.7%. A response rate of 76% was present for the Foster et al. (1997) study and 84% rate for the Swanson et al. (2017) study.

Only one study had a 100% participation rate (Huang et al., 2004), whereas two studies provided no details regarding participant attrition rates (de Jager et al., 2013; Rodgers et al., 2018).

**Results of individual studies**

Table 3 contains details on the main findings for each of the studies. Out of the nine studies, seven found a direct relationship between body image (at least two subscales) to breastfeeding intention and/or behaviour (Barnes et al., 1997; Huang et al., 2004; Brown et al., 2015; Foster et al., 1997; Swanson et al., 2017; Rodgers et al., 2018; Hauff & Demerath, 2012). The two other studies did not find a direct relationship, rather in one study an indirect relationship was found between body image subscales (Salience of weight and shape, feeling fat, and attractiveness) to attitudes during pregnancy and postpartum that were found to be positively correlated with breastfeeding intention and were significantly correlated with attitudes during and after pregnancy, indicating an indirect link to breastfeeding outcome (de Jager et al., 2013). In the second study, while body image as a whole had no direct relationship to exclusive breastfeeding duration, it was found to be indirectly linked via psychological adjustment at six months, and the subscale “feeling fat” was a predictor of exclusive breastfeeding duration at six months (de Jager et al., 2014).

Authors found women with higher body image (as measured by higher body satisfaction and perceived physical strength, less concerning regarding shape, weight and body postpartum, less dieting/restrictive food intake) were more likely than those with lower body image to intend, initiate and maintain exclusive breastfeeding for a longer duration (de Jager et al., 2013; 2014; Swanson et al., 2017; Foster et al., 1996; Huang et al., 2004; Barnes et al., 1997; Brown et al., 2015; Rodgers et al., 2018; Hauff & Demerath, 2012).

Within body image, a difference was found between pre-pregnancy body image and pregnancy body image in breastfeeding intention and duration (Hauff & Demerath, 2012; Brown et al., 1997; Huang et al., 2004). While body image as an entirety was seen to be linked to breastfeeding intention and duration, pre-pregnancy body image was statistically shown to be a predictor of infant feeding choice postpartum in comparison to perceived body image during pregnancy which found only a relationship (Brown et al., 1997), or no significant difference (Huang et al., 2004).Where a focus on pre-pregnancy body shape/weight was found, individuals were less likely to exclusively breastfeed for a longer duration, especially overweight/obese women (Hauff & Demerath, 2012).

Studies which examined the duration, and reason for ceasing exclusive breastfeeding found women with higher body image concerns were more likely to stop due to emotional factors (i.e. confidence to breastfeed in public), self-objectification and thoughts of breastfeeding impact on their body (Hauff & Demerath, 2012; Brown et al., 2015: Rodgers et al., 2018).

In terms of examining the variable of weight or Body Mass Index (BMI), one study found that weight was not a significant predictor of infant feeding method when body image and other variables were introduced, but that it played a role in the intention of the feeding method (Swanson et al., 2017). This conflicted slightly with another study that found no relationship between BMI and intention towards exclusive breastfeeding (Foster et al., 1996). However Hauff and Demerath (2012) found decreased duration of exclusive breastfeeding for overweight/obese mothers than their normal weight counterparts but similar intentions. These studies could suggest body image is more vital to exclusive breastfeeding intention; yet actual body size could have an association on duration.

Other variables linked to intention and duration to exclusively breastfeed included: child focused-parental attitudes (Barnes et al., 1997); higher education (Barnes et al., 1997; Huang et al., 2004; Swanson et al., 2017); self-objectification (Rodgers et al., 2018); being older (Barnes et al., 1997); breastfeeding self-efficacy (de Jager et al., 2013; 2014; Rodgers et al., 2018); psychological adjustment (de Jager et al., 2014; Rodgers et al., 2018); and higher maternal foetal attachment (Foster et al., 1996; Huang et al., 2004).

**Discussion**

**Summary of evidence**

In summary, body image does appear to have an association with the intention to exclusively breastfeed, in terms of both initiation and duration. However, subsections of body image appear to play a greater role in determining whether a mother has an intention to and carry out exclusive breastfeeding as the infant feeding method postpartum, specifically body satisfaction/dissatisfaction, concern for weight and shape and their perception of feeling fat as a negative thought. With the majority of the studies finding significance in body image with infant feeding method postpartum, the evidence suggests a positive relationship between body image and likelihood of breastfeeding and maintaining exclusive breastfeeding for a longer duration. Other variables such as self-efficacy, education level, and maternal-foetal attachment appear to also play a role in predicting the postpartum feeding method.

Relating these findings to the current understanding of body image and infant feeding method postpartum, the results support the idea of body image as a multidimensional construct (Thompson et al., 1999; Tylka, 2018). Certain subscales of measures had a higher relationship to feeding method intervention, which would suggest that there are multiple dimensions to body image with certain facets adapting the daily functioning and decisions in pregnant women. However, as there was a mixture of measures used between all studies which may examine different aspects of body image, it can be difficult to examine the nature of pregnant woman’s body image (Skouteris et al., 2005; Tiggemann, 2014; Seibold, 2004), so body image in this context will only relate to the subscales found and not the overall view of body image to date.

The evidence supported other research examining intention, maintenance and duration of breastfeeding, where maternal body image is seen as to in feeding behaviours (Hilson et al., 2006; Shloim et al., 2014; Gjerdingen et al., 2009; Clark et al., 2009; Hauff & Demerath, 2012; Keely et al., 2015; Zanardo et al., 2015). It can therefore be suggested this research supports positive or high body image as including the functionality of their body and appreciation of their health rather than solely appearance (Lovering et al., 2018; Welsh & Hoffman, 2009; Fern et al., 2014). The study that included appearance orientation found no significance; appearance evaluation was intercorrelated with body satisfaction and ultimately removed from further analysis (Swanson et al., 2017), suggesting body image is more than just appearance, such as inclusive of functionality, especially in this context of pregnant women.

However perceived appearance barriers to exclusive breastfeeding were found within women, and were positively correlated to body dissatisfaction, suggesting appearance may produce both a direct and indirect influence over intention and duration (Rodgers et al., 2018). This may relate to those with lower or negative body image as it is suggested women with positive or higher body satisfaction focus on the functionality of their body and the health aspects which allow them to appreciate their body, as opposed to appearance-focus (Lovering et al., 2018; Welsh & Hoffman, 2009; Fern et al., 2014), which increases the likelihood of breastfeeding than those with bottle feeding intentions and lower body satisfaction (Huang et al., 2004). Women who had body dissatisfaction postpartum were less likely to decide on breastfeeding (Rodgers et al., 2018; Barnes et al., 2015; Shloim et al., 2014; Clark et al., 2009; Gjerdingen et al., 2009; Hauff & Demerath, 2012; Keely et al., 2015; Zanardo et al., 2015).

When examining maintenance and duration, similar results were found in the current evidence to other research. Negative or low body image is predominately lower overall in obese women to the degree that the obese women who began breastfeeding initially, no longer maintained this feeding behaviour or partially breastfed (Mixture of breastfeeding and bottle feeding) by 6-10 weeks (Keely et al., 2015). Combined body dissatisfaction and poor body image in obese women resulted in shorter duration of breastfeeding compared to other women (Hauff & Demerath, 2012; Turcksin et al., 2014; Zanardo et al., 2015). Whereas women who exclusively breastfed six months postpartum displayed more comfort in breastfeeding publicly, intention to breastfeed in the future, increased perception of strength, and fewer breastfeeding difficulties (de Jager et al., 2013).

It can be suggested that maternal body image plays an influential role in determining infant feeding methods (including intention, initiation and duration); with multiple factors contributing to the overall effect it has on the individual and consequently the infant.

**Quality of the studies**

When conducting a review, not only is the content examined in terms of findings, but also the quality of the study for confidence in the end result. All studies measured body image quantitatively, through questionnaires, with only six of the studies presenting reliability (α =.70-.95)(Huang et al., 2004; de Jager et al., 2013; 2014; Brown et al., 2015; Swanson et al., 2017; Rodgers et al., 2018), and where newly constructed questionnaires were created, test-retest reliability procedures were followed (α =.64-.92)(Huang et al., 2004; de Jager et al., 2013; Brown et al., 2015). Two studies (Foster et al., 1996; Barnes et al., 1997) did not report reliability statistics, but questionnaires used the Eating Disorder Examination Questionnaire (EDE-Q) which has been reported α=.70-.93, however it has been reported as limited in generalisability (Berg, Peterson, Frazier & Crow, 2012). The final study (Hauff & Demerath, 2012) did not report any reliability statistics but stated the body image questions were adapted from previously validated questionnaires, however without specification of which questions were selected from each questionnaire and why, it is difficult to determine reliability.

All studies were non-randomised control studies, four studies were classed as longitudinal (Swanson et al., 2017; de Jager et al., 2014; Brown et al., 2015; Hauff & Demerath, 2012), and five cross sectional (Barnes et al., 1997; de Jager et al., 2013; Rodgers et al., 2018; Foster et al., 1996; Huang et al., 2004). Only two studies provided their sample size based upon results of a power analysis (de Jager et al., 2014; Swanson et al., 2017), while six studies provided no information on the determinants of sample size (Hauff & Demerath, 2012; de Jager et al., 2013; Foster et al., 1996; Huang et al., 2004; Barnes et al., 1997; Brown et al., 2015; Rodgers et al., 2018). Two studies included their power analysis, one met the required sample size (Required 80 participants for Power of 0.8, effect size of 0.3, α=0.05, obtained 118; Swanson et al., 2017), while the second was under the requirement (Required 130 participants for Power of 0.8, effect size of 0.2, α=0.05, obtained 125; de Jager et al., 2014). The sample size within each study was 38 to 11856, a total of 13,046 complete data sets from participants; as a range of sample sizes were present, conclusions based upon these results can be seen as more acceptable for application to the wider population, however specifics within smaller samples may not be as applicable.

Not all studies included in this review did a follow up of the interventions and body image measure, which can impact their quality as a lack of follow up may mean the data collected was due to that specific time, and body image may vary at later stages of pregnancy and postpartum. Time frames of data collection ranged between studies, with some using retrospective questionnaires to examine prior times pre and during pregnancy, but the majority of the studies examined the measures at 32 weeks gestation, followed by at least four to six weeks postpartum. A primary concern with retrospective questionnaires is participants may fail to remember their behaviour, intention and thoughts at the moments listed, for example, participants who were retrospectively asked to talk about their body image prior to pregnancy, may see themselves completely differently due to the biological changes that their body has currently undergone, so may perceive their pre-pregnancy body image as higher. Also, within weeks of postpartum, participants may not think about their body image in depth, as they are more focused on their newborn so do not provide as accurate responses. No details regarding incentives to participate were listed within the studies, so details of why participants chose to take partake is unknown.

Overall, the quality of the studies listed in the review can be seen as good, with some studies that would not be classified as highly in comparison to other studies, but as the majority found similar results, there can be confidence in the summary of evidence.

**Limitations**

The conclusions of this review are based on a relatively small number of studies and it is important to consider possible limitations. The primary limitation of this systematic review is that the measurement of body image varied between almost all studies, which made reliable comparison between body image measures difficult, especially in studies examining body image before the construct of body image was understood to a higher degree.

**Implications**

Despite limitations within individual studies, and within the systematic review, the evidence of this review has implications for multiple contexts. A key conclusion of this review is that body image does have a relationship to postpartum feeding method, whether directly or indirectly.

Within a clinical context, by creating interventions and programmes which focus on improving body image for pregnant women may increase the exclusive breastfeeding outcome for intention, initiation and duration. Interventions should look at increasing the appreciation for functionality of the body and other dimensions of body image as opposed to focus solely on appearance, as results suggest multiple areas of body image play a role in determining postpartum feeding outcome. A vital long-term strategy would be focusing on clinicians, such as mid-wife, helping training them to discuss body image concerns with pregnant mothers, alleviating the concerns and encouraging exclusive breastfeeding, if not increasing body image then for body image to remain stable between bodily changes. This can consume time and resources in terms of clinical training, and allowing time during meetings with the pregnant woman to discuss body image amongst all other discussions; creation of alternative interventions for future study is recommended to combat limitations of time and resources that clinicians may face.

A secondary implication lies within the context of education. As multiple studies found education and age play a role in decisions on postpartum feeding methods, where the higher educational levels and the older the participants related to exclusive breastfeeding intention and behaviour. This implies younger participants at lower education levels require attention to increase exclusive breastfeeding outcomes. Previous studies have found that participants under the age of eighteen may respond to activities that focus on increasing positive body image, such as sports or dance to focus on the health and functionality of the body rather than the concerns of appearance (Frisen & Holmqvist, 2010; Grogan et al., 2014). This could be implemented in schools at multiple levels by encouraging exercise for health purposes rather than to lose weight, especially as one study found pre-pregnancy body image was a predictor of the feeding method (de Jager et al., 2014). This would allow individuals to place importance on functionality over appearance as they develop (e.g. through puberty, pregnancy) by targeting them early instead of the later educational years.

**Future studies**

The results of this systematic review have shown a lack of studies which have examined body image as recently defined to include the multiple dimensions found within negative and positive body image. There were also not multiple quantitative studies examining body image with the same questionnaire to allow for multiple comparison across a range of individuals. A recommended step would be for either a questionnaire examining body image within pregnant women to be constructed and standardised to allow for future comparisons, or for a current questionnaire to be modified to examine body image in the context of pregnant women and non-pregnant women to examine the differences over a period of time to see how pregnancy could ~~influence~~ correlate with any changes in body image.

**Conclusions**

This systematic review indicated that body image has a positive relationship to intention, initiation and duration of postpartum infant feeding methods, breastfeeding vs. bottlefeeding. Certain aspects of body image are seen as predictors of feeding methods used (i.e. pre-pregnancy body image, “feeling fat”), whereas other aspects are only found to have a relationship, direct or indirectly. Other variables have found to be included in the relationship of body image and feeding outcome such as psychological adjustment. As such, this review supports research that claims multiple factors are implemented during the decision and behaviour of exclusive breastfeeding or not.

While there are limitations to the findings of the systematic review, the implications of these findings are seen within clinical and educational contexts and can be implemented in various formats to increase the likelihood of exclusive breast feeding and general positive body image. The review has also indicated where the next step in this area of research is needed, for example the construction of a body image measure for pregnancy women.

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**References**

\* = Studies included in the review

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**Table 2: Summary table of key elements in each study**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Authors | Title | Location of study | Design | Sample size | Age (Mean, SD) | Interventions (Intention, behaviour, duration) | Body Image Measurement | Follow ups |
| Barnes, J., Stein, A., Smith, T., & Pollock, J. (1997) | Extreme attitudes to body shape, social and psychological factors and a reluctance to breast feed | United Kingdom | Cross-sectional | 11907, reduced to 11856 | All ages (19 and under to 35+), most within 25-29 age group | Breastfeeding intention | Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) | 18 weeks and 32 weeks. |
| Brown, A., Rance, J., & Warren, L. (2015) | Body Image concerns during pregnancy are associated with a short breast feeding duration | United Kingdom | Longitudinal | 128 | 18-40 (M= 29.34, SD= 5.52) | Breastfeeding Intention and duration | Specific constructed body image questionnaire | During 12-42 weeks of pregnancy, 2, 6, 12 and 26 weeks post partum |
| de Jager, E., Broadbent, J., Fuller-Tyszkiewicz, M., & Skouteris, H. (2013) | The role of psychosocial factors in exclusive breastfeeding to six months postpartum | Australia | Cross-sectional | 174 | 20-30 (M= 29.3, SD= 4) | Breastfeeding intention and duration | Body Attitude Questionnaire (BAQ, short form; Ben-Tovim & Walker, 1991) | RetrospectivePre-pregnancy, during pregnancy, and 6 months postpartum |
| de Jager, E., Broadbent, J., Fuller-Tyszkiewicz, M., Nagle, C., McPhie, S., & Skouteris, H. (2014) | A longitudinal study of the effect of psychosocial factors on exclusive breastfeeding duration | Australia | Longitudinal | 125 | 22-44 | Exclusive breastfeeding intention, behaviour, and duration at each stage. | Body Attitude Questionnaire (BAQ, short form; Ben-Tovim & Walker, 1991) | Initial at 32 weeks gestation, two months postpartum, six months postpartum |
| Foster, S.F., Slade, P., & Wilson, K. (1996) | Body Image, Maternal-Fetal Attachment, and Breast feeding | United Kingdom | Cross-sectional | 38 | M= 29 (SD= 5.2) | Breastfeeding Intention | Body Satisfaction Scale(BSS), EDE-Q, General satisfaction (GS) | During 32-38 weeks of pregnancy |
| Hauff, L.E., & Demerath, E.W. (2012) | Body Image Concerns and Reduced Breastfeeding Duration in Primiparous Overweight and Obese Women | United States | Longitudinal | 239 | Over 18 (29.7, 4.5) | Exclusive breastfeeding intention, behaviour and duration | Specific constructed body image questionnaire adapted from multiple established questionnaires (Ben-Tovim & Walker, 1991; Cooper & Fair-burn, 1987; Evans & Dolan, 1993) | A prenatal questionnaire during third trimester of pregnancy, 2 week postpartum, and 4 months postpartum |
| Huang, H., Wang, S., & Chen, C. (2004) | Body Image, Maternal-Fetal Attachment, and Choice of Infant Feeding Method: A Study in Taiwan | Taiwan | Cross-sectional | 195 | Average age 29.3 | Breastfeeding, mixed, or bottle feeding intention | Strang and Sullivan's Attitude to Body Image Scale (ABIS) | Retrospective pre-pregnancy body image, and at/or beyond 28th week of pregnancy |
| Rodgers, R.F., O’Flynn, J.L., Bourdeau, A., & Zimmerman, E. (2018) | A biopsychosocial model of body image, disordered eating, and breastfeeding among postpartum women | United States | Cross-sectional | 151 | Over 18 (32.77, 4.47) | Breastfeeding intention | Eating Disorder Inventory 2 (EDI-2) (Garner, 1991) | Retrospective within 6 months postpartum |
| Swanson, V., Keely, A., & Denison, F. (2017) | Does body image inﬂuence the relationship between body weight and breastfeeding maintenance in new mothers? | United Kingdom | Longitudinal | 140 (70 in each group) (Reduced to118 (60 H,58O at time 2)) | Healthy M=32.7 (SD=5.2) Obese M=31.4 (SD=5.5) | Breastfeeding, mixed, or bottle feeding behaviour | The MBSRQ (Multidimensional Body-Self Relations Questionnaire; Cash, 2000; Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002); Appearance Evaluation (seven Items); Appearance Orientation (12 items); Body Areas Satisfaction Scale (nine items) | Within 72-hours of birth and 6-8 weeks postpartum |

**Table 3: Summary table of the chosen studies**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Authors | | Research aim | Summary of procedure and variables examined | Findings |
| Barnes, J., Stein, A., Smith, T., & Pollock, J. (1997) | | 1. To determine whether factors related to actual feeding behaviours can be applied to prenatal decisions of feeding intentions? 2. Investigate relevance of psychological factors to prenatal reluctance to BF | Data was collected from the Avon Longitudinal Study of Pregnancy and Childbirth. Questionnaires were completed at various stages of the pregnancy (between 18-32 weeks) to examine BF intentions (at 1 week, 1 month (later omitted due to similarity at 1 week) and 4 months), demographics, Eating disorder examination (subscales: shape and weight concern), depression, social relationships, and parental attitudes. | The higher the concerns about shape and weight, the less likely the intention to BF.  Body image concern had a significant effect on BF intention, at 1 week intention and in the secondary sample of 4 months.  Age, education and non-smoking related to BF intentions.  Those preoccupied with body shape expressed controlling, less child-centred parental attitudes less likely to intend to BF. |
| Brown, A., Rance, J., & Warren, L. (2015) | | 1. Explore body image concerns in first time pregnant women 2. Examine their association with later BF initiation and duration | During pregnancy, 128 mothers provided questionnaires at two time periods, once during pregnancy, the second 6 months post partum. They examined demographics, pre-pregnancy weight, BF intention, body image (specifically constructed to look at thoughts about pregnancy body, concerns about body appearance postpartum, and dieting during pregnancy), at the second time, they also included infant feeding method, BF duration and if needed cessation. | Intention and actual BF duration were associated with maternal age.  Body image was significantly different in planned BF duration, with lower scores linked to BF.  Higher body image concerns reported shorter duration of intention and actual BF, if at all. All body image factors associated with planned BF duration, but only pre-pregnancy body image and dieting predicted planned duration.  BF at any stage had significantly lower body image concerns.  Women with higher body image concerns postpartum significantly more likely to stop due to dislike of public feeding, impact of BF on body, and found BF difficult/painful. |
| de Jager, E., Broadbent, J., Fuller-Tyszkiewicz, M., & Skouteris, H. (2013) | | 1. Compare a range of psychosocial variables between women who exclusively BF to six months postpartum and those who do not. 2. Evaluate a conceptual model of psychosocial correlated of exclusive BF duration | A retrospective online questionnaire examining a range of variables (Attitude towards pregnancy, attitude towards pregnancy postpartum, body attitude questionnaire, BF difficulties, BF intention, BF self-efficacy scale, Brief COPE (coping strategies), comfort BF in public, Depression Anxiety Stress scale, exclusive BF duration, Foetal Health Locus of Control scale, and Work after pregnancy) was completed by 174 women. Body attitude questionnaire focused on “Feeling fat”, “strength and Fitness”, “Attractiveness” and “Salience of Weight and Shape”. | Women who exclusively BF to six months postpartum had higher intention, self-efficacy, and comfort BF in public, perceived physical strength, less perceived difficulties.  Salience of weight and shape, feeling fat, and attractiveness were significantly correlated with attitudes during and after pregnancy, indicating an indirect link to BF outcome. |
| de Jager, E., Broadbent, J., Fuller-Tyszkiewicz, M., Nagle, C., McPhie, S., & Skouteris, H. (2014) | | 1. Replicate and extend the findings of de Jager et al., (2013) - Aims of this study listed in this table. | A self-report questionnaire was conducted at three points (32 weeks gestation, two months postpartum, and six months postpartum) by 174 women. The variables examined attitudes towards pregnancy, body attitude (“Feeling fat”, “strength and Fitness”, “Attractiveness” and “Salience of Weight and Shape”), exclusive BF intention, BF self-efficacy, psychological adjustment, motivation to exclusively BF, importance to exclusively BF, confidence to exclusive BF, BF at two and six months postpartum, BF duration, and demographic details). | Maternal intention did not predict BF outcome.  BF self-efficacy was a significant predictor of exclusive BF duration at two and six months postpartum.  Body image had no direct relationship to exclusive BF duration, but was directly correlated to psychological adjustment which was a predictor of exclusive BF duration at six months.  Feeling fat, at six months, was directly predictive of exclusive BF duration. |
| Foster, S.F., Slade, P., & Wilson, K. (1996) | | 1. Examine the relationship between body satisfaction, maternal fetal attachment, and BF plans in pregnancy. | 38 women during the later stage completed a set of questionnaires to examine multiple variables (demographics, intent to BF, Shape concern, body satisfaction, general satisfaction, and maternal foetal attachment). | Women intending to bottle feed had higher levels of shape concern, body dissatisfaction, and lower maternal foetal attachment in comparison to women intending to BF.  Age and Body Mass Index did not have a strong relationship to feeding intention, suggesting body image rather than actual size is more predictive but unclearly fully. |
| Hauff, L.E., & Demerath, E.W. (2012) | | 1. Examine the relationship between maternal overweight, body image, and breast feeding duration | A self-report questionnaire was completed during the third trimester of pregnancy, at 2 weeks postpartum, and at 4 months post partum by 239 women. The questionnaire was constructed from established measures to look at maternal body image, and included questions on hospital experience, intended and actual breastfeeding patterns. | Both women in normal and above normal BMI did not maintain breastfeeding duration as intended but overweight/obese women had significantly shorter durations.  Overweight/obese women reporter higher bodily concerns pre-pregnancy and postpartum than their normal BMI counterpart.  Greater body image concerns were associated with shorter lactation duration. |
| Huang, H., Wang, S., & Chen, C. (2004) | | 1. Examine the relationship between body image, maternal-fetal attachment, and choice of infant feeding method among pregnant women in Taiwan | During third trimester, 195 women completed questionnaires examining demographics, infant feeding choice, attitude to body image (pre-pregnancy and current), and maternal-fetal attachment scale. | Pre-pregnancy and current body image was higher in BF intended group. Choice of feeding methods was significantly correlated with pre-pregnancy body image.  Women with higher pre-pregnancy and current body weight tended to have higher negative body image during pregnancy.  No differences found between feeding methods and third-trimester body image. |
| Rodgers, R.F., O’Flynn, J.L., Bourdeau, A., & Zimmerman, E. (2018) | | 1. Examine an integrated biopsychosocial model of the relationship between body image, eating concerns, and breastfeeding self-efficacy among postpartum women | An online survey was completed retrospectively by 151 up to 6 month postpartum women. Body surveillance, body dissatisfaction, appearance barriers to breastfeeding, eating disorder symptoms, breastfeeding self-efficacy, depressive symptoms and desired weight loss were examined. | Appearance barriers to breastfeeding were positively correlated with higher body dissatisfaction and eating disorder symptoms along with lower levels of breastfeeding self-efficacy.  Body dissatisfaction was negatively correlated with breastfeeding self-efficacy.  Women with negative relationships to their body were predicted less likely to breastfeed. |
| Swanson, V., Keely, A., & Denison, F. (2017) | 1. Does body image explain the relationship between body weight and BF maintenance at 6-8 weeks postnatal? 2. How does body weight relate to socio-demographic and biomedical predictors of BF in hospital and maintenance at 6-8 weeks? 3. Does body image mediate or moderate the effect of weight status on BF maintenance? 4. How do aspects of body image change, comparison of obese and healthy weight women from childbirth to 6-8 weeks postpartum? 5. How is post-natal psychological distress related to body image, and to women’s BF maintenance? | | A longitudinal questionnaire examining a range of variables (maternal demographics, biomedical variables, BF status, psychosocial variables, psychological distress, body image (Appearance evaluation, appearance orientation, body areas satisfaction, overweight preoccupation, self-classified weight) was completed at two separate time points. Time 1 had a total of 140 participants, and time 2 had 118 participants. | Healthy weight women were more likely than obese women to exclusively BF at both time periods. Women who had a caesarean were less likely to exclusive BF.  Psychological distress was related to less BF maintenance, lower appearance evaluation scores, body satisfaction and higher weight self-classification.  Body satisfaction is a predictor of BF at 6-8 weeks  Obese women had lower body image scores and higher self-classification in comparison to health weight women at both time points.  All body image variables (except appearance orientation) correlated with BF maintenance. |

**Appendix:**

A:PRIMSA Checklist

| **Selection/Topic** | **#** | **Checklist Item** |
| --- | --- | --- |
| TITLE |  |  |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. |
| ABSTRACT |  |  |
| Structured summary | 1 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. |
| INTRODUCTION |  |  |
| Rationale | 4 | Describe the rationale for the review in the context of what is already known. |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). |
| METHODS |  |  |
| Protocol and registration | 4 | Indicate if a review protocol exists, if and where it can be accessed (e.g., web address), and, if available, provide registration information, including registration number. |
| Eligibility criteria | 4 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. |
| Information sources | 6 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. |
| Search | 6 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. |
| Study selection | 6 | State the process for selecting studies (i.e., screening, eligibility, included in systematic reviews, and, if applicable, included in the meta-analysis). |
| Data collection process | 7 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. |
| Data items | 7 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. |
| [Risk of bias](https://www.ncbi.nlm.nih.gov/books/n/nap13059/ddd00183/def-item/ddd00183.gl20/) in individual studies | 7 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. |
| Summary measures | 7 | State the principal summary measures (e.g., risk ratio, difference in means). |
| Synthesis of results | 7 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis. |
| [Risk of bias](https://www.ncbi.nlm.nih.gov/books/n/nap13059/ddd00183/def-item/ddd00183.gl20/) across studies | 8 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). |
| Additional analyses | 9 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. |
| RESULTS |  |  |
| Study selection | 8 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. |
| Study characteristics | 8 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. |
| [Risk of bias](https://www.ncbi.nlm.nih.gov/books/n/nap13059/ddd00183/def-item/ddd00183.gl20/) within studies | N/A | Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12). |
| Results of individual studies | 13 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group; and (b) effect estimates and confidence intervals, ideally with a forest plot. |
| Synthesis of results | N/A | Present results of each meta-analysis done, including confidence intervals and measures of consistency. |
| [Risk of bias](https://www.ncbi.nlm.nih.gov/books/n/nap13059/ddd00183/def-item/ddd00183.gl20/) across studies | N/A | Present results of any assessment of risk of bias across studies (see Item 15). |
| Additional analyses | N/A | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). |
| DISCUSSION |  |  |
| Summary of evidence | 15 | Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). |
| Limitations | 19 | Discuss limitations at a study and outcome level (e.g., risk of bias) and at review level (e.g., incomplete retrieval of identified research, reporting bias). |
| Conclusions | 21 | Provide a general interpretation of the results in the context of other evidence and implications for future research. |
| FUNDING |  |  |
| Funding | 22 | Describe sources of funding for the systematic review and other support (e.g., supply of data) and the role of funders for the systematic review. |

Liberati, A., Altman, D.G., Tetzlaff, J., Mulrow, C., Gotzsche, P., Ioannidis, J.P., Clarke, M.,Devereaux, P.J., Kleijnen, J., & Moher, D. (2009). The PRISMA Statement for reporting systematic reviews and meta-analysis of studies that evaluate health care interventions: Explanation and elaboration. Annals of Internal Medicine, *151*(4), W11–W30.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine 6(7), 1–6.

B:Prisma Flowchart

**PRISMA 2009 Flow Diagram**

## Identification

Records excluded  
(n = 669)

Additional records identified through other sources  
(n = 0)

Records identified through database searching  
(n = 1295)

Records after duplicates removed  
(n = 40)

## Screening

Records screened   
(n = 1255)

Full-text articles assessed for eligibility   
(n = 586)

## Eligibility

Full-text articles excluded:

1) Design of study: 232

2) Maternal body image was not measured: 216

3) Intention or initiation to breastfeed was not examined: 126

4) Different participant sample: 3

4) Different participant sample

(n = 578)

Qualitative studies included in Systematic review   
(n = 0)

## Included

Studies included in Systematic review   
(n = 9)

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine 6(7), 1–6.