

## ARTICLE

# Development, psychometric assessment, and predictive validity of a breastfeeding subjective norms scale among an Australian prospective cohort of first-time parents

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## Abstract

**Objectives:** Breastfeeding has a number of benefits for both mothers and their infants. Research has examined the psychosocial influences on breastfeeding, yielding important findings in relation to particular constructs that play a significant role in this vital health behaviour. One such construct is subjective norms. However, there are mixed findings in relation to the role of subjective norms in breastfeeding behaviours. This may be due to the lack of consistent measure of subjective norms across studies. Further, the influence of fathers' subjective norms on breastfeeding continuation remains unclear due to a lack of measurement. Thus, the aim of the current study was to develop and assess a reliable and valid subjective norms scale specific to breastfeeding for use among both mothers and fathers.

**Design/Methods:** Subjective norms items were developed by researchers in the domain and were tested among 949 couples.

**Results:** Findings indicated that both subjective norms scales had excellent reliability, construct validity, and predictive validity. It was also found that both the mothers' and fathers' subjective norms scales tapped into two key structures: breastfeeding in general, and breastfeeding in public.

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Further, maternal subjective norms were predictive of breastfeeding behaviours but not paternal subjective norms.

**Conclusions:** These findings indicate that the developed subjective norms scales are reliable and valid and capture key elements of breastfeeding subjective norms among both mothers and fathers. Use of this measure in future research can help better understand the role of both mothers' and fathers' subjective norms in influencing breastfeeding behaviours.

#### KEYWORDS

breastfeeding, psychometric assessment, reliability, scale, subjective norms

### Statement of Contribution

#### *What is already known on this subject?*

- Psychosocial factors, such as attitudes, self-efficacy, beliefs, and subjective norms, are important influences on breastfeeding continuation; However, findings related to the role of subjective norms in relation to breastfeeding continuation are inconsistent.
- While scales to measure these psychosocial factors have been developed and implemented, a consistent, reliable, and valid subjective norms scale, specific to breastfeeding, is needed to better understand the influence of this construct on breastfeeding continuation.

#### *What does this study add?*

- This study developed and tested a breastfeeding subjective norms scale for use among both mothers and fathers.
- The scale is reliable and valid and captures key elements of subjective norms among mothers and fathers.

## INTRODUCTION

The importance of breastfeeding for the short- and long-term health of infants and mothers is undisputed, with longer duration of breastfeeding providing greater benefits (Chowdhury et al., 2015; Victora et al., 2016). While most mothers are familiar with these benefits, and nine in ten Australian women initiate breastfeeding (Australian Institute of Health and Welfare, 2011), relatively few exclusively breastfeed their infants to six months of age, as recommended (National Health and Medical Research Council, 2012; World Health Organization/UNICEF, 2003). Breastfeeding, like other health behaviours, is influenced by a complex mix of socio-demographic, biomedical, cultural, and psychosocial factors, which may conspire to prevent a woman from achieving these recommendations or her own breastfeeding goals.

Psychological constructs are important predictors of breastfeeding behaviour. For instance, maternal infant feeding attitudes are a stronger predictor of breastfeeding outcomes among Australian women than more commonly reported socio-demographic predictors such as maternal age, education, and socio-economic status (Cox et al., 2015; Scott et al., 2006). Similarly, breastfeeding self-efficacy predicts breastfeeding duration and exclusivity in diverse populations (Dai & Dennis, 2003; Ip et al., 2012; Oliver-Roig et al., 2012; Wheeler & Dennis, 2013; Wutke & Dennis, 2007), including Australian women (Blyth et al., 2002). Beliefs about breastfeeding have also been found to predict more positive experiences with breastfeeding among new mothers in the United Kingdom (Davie et al., 2021).

The theory of planned behaviour has been used to understand and predict breastfeeding (Guo et al., 2016; Lau et al., 2018; Zhang et al., 2018) and to inform the design of breastfeeding interventions (Giles et al., 2014; Gu et al., 2016). The theory of planned behaviour posits that intentions are the principal determinant of behaviour (Ajzen, 1991). However, intention to perform a behaviour is predicted by three key constructs: attitudes (i.e., positive and negative perceptions of the behaviour), perceived behavioural control (i.e., the extent to which one believes they have control over the behaviour), and subjective norms (i.e., the perception that others think the behaviour is important; Ajzen, 1991). Demographic factors (e.g., age, education, ethnicity) are also said to influence intentions, which in turn influence attitude, subjective norms, perceived behavioural control, and subsequent behaviour (Ajzen, 1991). The theory has been useful in predicting a number of health behaviours, such as sleep hygiene (Kor & Mullan, 2011), physical activity (MacCann et al., 2015), safe food-handling (Mullan et al., 2013), and diet-related behaviours (Ding et al., 2014; Kothe et al., 2011; Sainsbury et al., 2013).

Research on the determinants of breastfeeding has increasingly focussed attention on the assessment of attitudes and behavioural control as predictors of breastfeeding behaviours. Two instruments, the Iowa Infant Feeding Attitude Scale (IIFAS; De La Mora et al., 1999) and the Breastfeeding Self-efficacy Scale – Short Form (BSES-SF; Dennis, 2003) are widely used to assess breastfeeding attitudes and behavioural control, respectively. Both tools have been translated into multiple languages and shown to be reliable and valid at predicting breastfeeding (Cox et al., 2015; Iliadou et al., 2019; Inoue et al., 2013; Ip et al., 2012; Oliver-Roig et al., 2012; Scott et al., 2004; Tuthill et al., 2016; Wutke & Dennis, 2007).

Fewer studies have investigated the association of subjective norms with breastfeeding, and findings have been less consistent (Lau et al., 2018). Subjective norms capture an individual's perceived social pressure to either perform or not perform a particular behaviour (Ajzen, 1991). For instance, in the context of breastfeeding, this would be the social pressure felt by mothers to breastfeed their baby, likely stemming from a number of social referents. While all studies investigating the influence of subjective norms on breastfeeding have examined the reliability and predictive validity of their scales, none have used the same number or examples of social referents. For instance, the Breastfeeding Attrition Prediction Tool (BAPT) developed by Janke (1994) included a subjective norms subscale comprising 12 items representing seven sources of family and friend support and five sources of professional support. Zhang et al. (2018) used a modified version of the BAPT subjective norms subscale which deleted the five sources of professional support that do not exist in the Chinese health system. Swanson and Power (2005) measured subjective norms using a scale composed of five social referents including the woman's partner, own mother, closest female friend, midwives/nurses, and 'people in general'. Lawton et al. (2012) measured subjective norms, with four injunctive norms items related to family and friends and two descriptive norms items related to a woman's own mother and other parents known to her. This prior research shows that there is a lack of consistency in the measurement of subjective norms in the breastfeeding domain, with uncertainty around which social referents should be included in measures of subjective norms for breastfeeding. Consequently, little is known about the influence of subjective norms on breastfeeding, indicating a gap in the literature for further investigation. Thus, a consistent, reliable, and valid instrument to measure subjective norms for breastfeeding, similar to the widely used IIFAS and the BSES-SF tools, is needed to better understand the influence of this psychosocial construct on this vital health behaviour.

The aim of this study, therefore, was to develop and assess a scale with the potential to be widely used to reliably measure breastfeeding subjective norms and predict breastfeeding intention and subsequent behaviours.

## METHOD

### Study design

These data were collected as part of the Parent Infant Feeding Initiative (PIFI), a factorial, randomized controlled trial which investigated the impact of two father-focused breastfeeding interventions, singly and in combination, on breastfeeding outcomes. The protocol (Maycock et al., 2015) and evaluation

(Scott et al., (2021) of the initiative have been reported in detail elsewhere, but briefly, participants included couples expecting a child, recruited directly from antenatal classes and was conducted between August 2015 and December 2016 at three public and three private hospitals in Perth. Couples were eligible to participate if they were considering breastfeeding their baby, intended to participate in the rearing of their child, resided in Perth, and had sufficient English to engage with the intervention. Fathers also needed to own a smartphone with internet access. As per the protocol for the intervention study, couples were ineligible to participate in the intervention if the mother had an existing medical condition which was likely to inhibit the initiation of breastfeeding or exclusive breastfeeding, was expecting a multiple birth, or if they were a same sex couple.

Once recruited, fathers were randomized to either the control group (usual care) or one of three interventions consisting of: (1) a face-to-face father-focused antenatal breastfeeding class facilitated by a male peer (Maycock et al., 2015), (2) "Milk Man" - a breastfeeding smartphone app designed specifically for fathers (White et al., 2016), or (3) a combination of both interventions. Data were collected from mothers and fathers at three time points. Baseline data were collected via surveys in the antenatal period (*mean gestational age at recruitment* = 32.4 weeks, *range* = 18–39) which were returned at time of recruitment or in a prepaid envelope. Follow-up data were collected via online surveys at six weeks and 26 weeks postpartum. Ethical approvals were obtained prior to data collection, and members of the research team attended each antenatal class to provide a verbal and written description of the study prior to recruitment. Participation in the study was voluntary, and all participants provided informed consent. For the purposes of this analysis, the data from the control and intervention groups were pooled.

## Participants

In total, 1426 couples were recruited into the study. To be included in this secondary analysis, couples had to be first-time parents. Nineteen couples did not meet these criteria and were excluded from the analyses. Couples did not receive any incentives for participation in the study.

## Development of the subjective norms scale

Items for the scale were developed using the foundational procedures set out by Ajzen (1991). This involved producing multiple-choice, Likert scale items to capture participants' level of agreement with statements relating to how much they believe other people think they should be breastfeeding. As these standardized procedures are not specific to breastfeeding, but rather, are designed to be applied to health behaviour in general, an extensive literature review was conducted in April 2015 to determine the key social referents who influence breastfeeding behaviour among parents. The PubMed, Embase, and OVID databases were searched for published studies related to breastfeeding and social norms or the theory of planned behaviour, and the search was limited to studies published in English.

For mothers, the literature review suggested that key social influences were their own mother, their partner, their closest female friends, their family, and other mothers. For fathers, their own mother, partner, closest friends, and family were key social influences. Based on this, eight items were developed for the mothers' scale and eight similar items were developed for the fathers' scale. These items were phrased based on the procedures set out by Ajzen (1991) to determine the extent to which mothers and fathers felt that significant others thought they should breastfeed their baby, e.g., for mothers 'My mother thinks I should be breastfeeding' and for fathers 'My mother thinks my partner should be breastfeeding'.

The literature search also suggested that these influences differ depending on whether an infant was breastfed in relative privacy (i.e., in a couples' own home or the home of a close family member or friend), or in public. Thus, in addition to presenting items for support of breastfeeding as a general concept, items are also presented for breastfeeding in a public context, e.g., for mothers 'My closest female friend(s) think(s) that I should be able to breastfeed my baby in public places such as cafes, restaurants, parks etc',

and for fathers 'My closest friend(s) think(s) that my partner should be breastfeeding in public places such as cafes, restaurants, parks etc'.

A full list of the items for mothers can be found in Table 1 and for fathers in Table 2. Mothers and fathers responded to each of the eight items using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale was scored by summing the eight items to create a total score, with higher scores indicating higher perceived subjective norms favouring breastfeeding.

## Explanatory measures

In addition to the subjective norms scales, other measures collected in the baseline questionnaire were included in the analyses to assess the validity of the scales.

**TABLE 1** Oblimin rotated factor loadings for the eight-item mothers' subjective norms scale (pattern matrix), and correlations between factors and variables for the eight-item mothers' subjective norms scale (structure matrix).

	Pattern matrix		Structure matrix	
	1	2	1	2
1. My mother thinks I should be breastfeeding	.048	.833	.427	.855
2. My partner thinks I should be breastfeeding	-.041	.902	.369	.884
3. My closest female friend(s) think(s) I should be breastfeeding	.008	.818	.379	.822
4. My family thinks that I should be able to breastfeed my baby in public places such as cafes, restaurants, and parks	.857	.031	.871	.420
5. My partner thinks that I should be able to breastfeed my baby in public places such as cafes, restaurants, and parks	.798	.091	.839	.454
6. My mother thinks that I should be able to breastfeed my baby in public places such as cafes, restaurants, and parks	.869	.010	.873	.405
7. My closest female friend(s) think(s) that I should be able to breastfeed my baby in public places such as cafes, restaurants, and parks	.889	-.017	.881	.386
8. Other mothers that I know are breastfeeding their babies in public places such as cafes, restaurants, and parks	.735	-.066	.705	.268

**TABLE 2** Oblimin rotated factor loadings for the eight-item fathers' subjective norms scale (pattern matrix), and correlations between factors and variables for the eight-item fathers' subjective norms scale (structure matrix).

	Pattern matrix		Structure matrix	
	1	2	1	2
1. My mother thinks my partner should be breastfeeding our baby	-.054	.901	.303	.879
2. My partner thinks she should be breastfeeding our baby	.060	.578	.289	.602
3. My closest friend(s) think(s) my partner should be breastfeeding our baby	.001	.839	.334	.839
4. My family thinks that my partner should be breastfeeding our baby	-.014	.927	.353	.922
5. My family thinks that my partner should be able to breastfeed our baby in public places such as cafes, restaurants, and parks	.885	.031	.898	.382
6. My partner thinks that she should be able to breastfeed our baby in public places such as cafes, restaurants, and parks	.866	-.053	.845	.290
7. My mother thinks that my partner should be able to breastfeed our baby in public places such as cafes, restaurants, and parks	.852	.039	.867	.376
8. My closest friend(s) think(s) that my partner should be breastfeeding our baby in public places such as cafes, restaurants, and parks	.911	-.001	.911	.360

## Demographics

Participants indicated their age and highest level of education. The Index of Relative Socio-economic Advantage and Disadvantage (Australian Bureau of Statistics, 2018) was used to determine socio-economic status based on postcode.

## Intention

A single item ‘How do you intend to feed your baby when you first leave hospital?’ was used to measure how mothers intended to feed their baby at baseline. Mothers selected from three response options (1) ‘mainly bottle-feeding (formula) but also breastfeeding’, (2) ‘mainly breastfeeding but “topping up” with bottle-feeding (formula)’, and (3) ‘breastfeeding only’.

## Attitude

The Iowa Infant Feeding Attitude Scale (De La Mora et al., 1999) was used to assess attitudes towards breastfeeding at baseline. Participants indicated their level of agreement with 17 statements using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). After reverse scoring nine items, a total attitude score was calculated. Higher scores indicated more favourable attitudes towards breastfeeding. Reliability of the scale was acceptable among mothers ( $\alpha = .75$ ) and fathers ( $\alpha = .70$ ).

## Perceived behavioural control

The Breastfeeding Self-Efficacy Scale – Short Form (Dennis, 2003) was used to assess breastfeeding perceived behavioural control among mothers. Mothers indicated how confident they felt in relation to 14 items related to breastfeeding and rated their level of confidence for each using a five-point Likert scale ranging from 1 (not at all confident) to 5 (very confident). Items were summed with higher scores indicating greater perceived behavioural control for breastfeeding. Among mothers, the scale had excellent reliability ( $\alpha = .93$ ). An adapted version was used among fathers. Items from the original scale were tailored to suit fathers, with minor changes to wording and inapplicable items removed. The modified scale consisted of eight items and was scored the same as for mothers. The scale had good reliability ( $\alpha = .86$ ).

## Outcome measures

Breastfeeding behaviour was measured at 6- and 26-weeks follow-up. ‘Any’ and ‘exclusive’ breastfeeding were assessed using one question ‘How are you currently feeding your baby?’ to which mothers could select from five options: (1) breastfeeding exclusively, (2) breastfeeding fully (with occasional water and juice), (3) formula-feeding only, (4) combination of breastfeeding and formula-feeding, and (5) other. For analyses, ‘any’ breastfeeding was coded dichotomously with responses 3 and 5 coded as 0 (not breastfeeding) and responses 1, 2, and 4 coded as 1 (currently breastfeeding). ‘Exclusive’ breastfeeding was also coded dichotomously with response options 2–5 coded as 0 (not exclusively breastfeeding) and option 1 was coded as 1 (exclusive breastfeeding). To determine if mothers breastfed in public, they were asked ‘On approximately how many days in the past month have you breastfed in public places such as shopping centres or cafes?’ with a free text response option. To best interpret this data, a breastfeeding in public



variable was created which coded any indication of breastfeeding in public as 1, and no indication of breastfeeding in public coded as 0.

## Statistical analyses

IBM SPSS Statistics version 27 was used to conduct all analyses. First, data were screened for missing values. Three-hundred and seventy-six cases were excluded due to incomplete baseline data. A further seventy-six cases were removed as the entire subjective norms scale was missing for fathers' data. A missing values analysis was conducted for the fathers' subjective norms scale and data were missing completely at random (*Little's MCAR test* = 43.62,  $df = 42$ ,  $p = .402$ ). A further six cases had more than 20% of the scale missing and were subsequently removed from the data set. No missing data were found for the mothers' subjective norms scale. Missing values analyses were then conducted among the variables of interest (subjective norms, attitudes, perceived behavioural control), and data were found to be missing completely at random for both (*mothers: Little's MCAR test* = 1085.26,  $df = 1024$ ,  $p = .090$ ; *fathers: Little's MCAR test* = 1465.13,  $df = 1436$ ,  $p = .290$ ).

## Assessment of psychometric properties

### Exploratory factor analysis

The first stage of psychometric assessment of the scale involved conducting factor analyses to determine whether the factor structure of the scales aligned with the intended structure (i.e., a two-factor structure for each scale distinguishing between breastfeeding in general and breastfeeding in public). This involved first determining sample adequacy using Kaiser–Meyer–Olkins coefficients (a value between 0 and 1, with higher values indicating better sample adequacy) for each scale. The significance of Bartlett's tests for each scale was also used as an assessment of sampling adequacy (i.e., if the test was significant, the sample was adequate). Assessments of the inter-item correlations for each scale were then conducted to determine if they were suitable (i.e., above .3) for factor analysis. A principal components analysis was then conducted for each scale to determine the underlying factor structure. Once determined, Oblimin rotations were performed to interpret the factors in each scale.

### Reliability analyses

The second stage of psychometric assessment for the scales involved conducting a reliability analysis for each. Cronbach's alpha values were used to ascertain the reliability of each, with higher values indicating greater reliability of the scale. The items in each scale were also examined individually to detect whether this value could be improved by removing any items.

### Concurrent validity

The final stage of psychometric assessment of the scales involved analyses to examine the concurrent validity of the scales. Concurrent validity of the scales was determined by examining the relationships between the subjective norms scales and other variables in the theory of planned behaviour with which subjective norms is expected to be associated. Pearson's correlations were examined to determine the relationship between the subjective norms scales and both attitude and perceived behavioural control. Point-biserial correlations were examined to assess the relationship between subjective norms and the measure of intention.

## Assessment of predictive validity

Predictive validity of the scales was assessed through a series of binary logistic regressions to determine if mothers and fathers' subjective norms predicted each of the six dichotomously coded behaviour measures. A total of twelve binary logistic regressions were performed, one for each of the six behaviours (any breastfeeding, exclusive breastfeeding, and breastfeeding in public, at both at six weeks and 26 weeks) for both mothers and fathers. As part of these analyses, age, education, socio-economic status, and country of birth were controlled for. Although none of the interventions were shown to have a significant effect on breastfeeding outcomes (Scott et al., 2021), intervention group was also controlled for.

## RESULTS

### Participants

The final sample consisted of 949 couples. Mothers were between 20 and 49 years of age ( $M$  age = 31.76,  $SD$  = 3.99) and fathers were between 21 and 72 years of age ( $M$  age = 33.76,  $SD$  = 5.11). The majority of participants were born in Australia or New Zealand (64.4% of mothers, 68.6% of fathers) and had completed some university study (74.8% of mothers, 62.0% of fathers). Over half of the couples scored in the 'least disadvantaged' quintile (50.4%) for the measure of socio-economic advantage and disadvantage (Australian Bureau of Statistics, 2018).

### Exploratory factor analysis

Overall, the sample was adequate for conducting factor analysis for both the mothers' (Kaiser–Meyer–Olkins coefficient = .83, Bartlett's test,  $\chi^2$  = 3562.10,  $df$  = 28,  $p$  < .001) and the fathers' subjective norms scale (Kaiser–Meyer–Olkins coefficient = .81, Bartlett's test,  $\chi^2$  = 2737.65,  $df$  = 28,  $p$  < .001). However, among both there were inter-item correlations that were below the recommendation for sampling adequacy (.30). The decision was made to retain these items for analysis due to the limited number of items in the scale. See Supporting Information (Tables S1 and S2) for the inter-item correlations.

Principal components analysis for the mothers' scale suggested a two-factor structure with eigenvalues exceeding 1. Inspection of the scree plot confirmed this two-factor structure with a clear break after the second component. It was thus decided to retain the two-factor structure, which explained 71.25% of the variance, of which factor-one explained 53.78% and factor-two explained 17.47% of the variance. An Oblimin rotation was performed to interpret these two factors. This revealed a simple structure, with several strong loadings and each variable loading substantially on only one factor. This interpretation was consistent with the predicted structure of the scale, whereby subjective norms related to breastfeeding in public loaded strongly on factor-one, and subjective norms related to breastfeeding in general loaded strongly onto factor-two. Table 1 shows the factor loadings for each component of the scale and the correlations between factors and variables. The two factors had a moderate positive correlation ( $r$  = .45).

Principal components analysis for the fathers' scale also suggested a two-factor structure with eigenvalues exceeding 1. This two-factor structure was confirmed after inspecting the scree plot which indicated a clear break after the second component. It was decided to retain the two-factor structure which explained 72.52% of the variance, of which factor-one explained 50.67% of the variance and factor-two explained 21.85% of the variance. To interpret the two factors, an Oblimin rotation was performed, which revealed a simple structure with several strong loadings with each variable loading strongly onto one factor. This interpretation was consistent with the suggested structure of the scale, whereby subjective norms items related to breastfeeding in public loaded strongly onto factor-one and subjective norms items related to breastfeeding in general loaded onto factor-two. Table 2 shows the factor loadings for each component of the scale and the correlations between factors and variables. The two factors had a moderate positive correlation ( $r$  = -.40).



## Internal consistency

For the mothers' scale, the mean was 32.36 ( $SD = 5.31$ ). The item means ranged from 3.87 to 4.23, with a mean item variance of .82, which ranged from .75 to .91. The mean inter-item correlation of the scale was .47, which ranged from .22 to .78. The scale had good internal reliability ( $\alpha = .88$ ), which could not have been improved by deleting items.

For the fathers' scale, the mean was 31.96 ( $SD = 5.07$ ). The item means ranged from 3.71 to 4.59 with a mean item variance of .80, which ranged from .54 to .87. The mean inter-item correlation was .45, which ranged from .18 to .80. The scale had good internal reliability ( $\alpha = .86$ ), which could not have been improved by deleting items.

## Concurrent validity

To test whether the subjective norms scales were related to other theory of planned behaviour constructs, correlations between the variables of interest were calculated. In line with the theory, subjective norms were positively and significantly associated with perceived behavioural control and attitude for both mothers and fathers; however, only mothers' subjective norms were positively and significantly associated with intention (see Table 3). Mothers' subjective norms were positively and significantly associated with breastfeeding in public at both six weeks and 26 weeks, any breastfeeding at six weeks and 26 weeks, and exclusive breastfeeding at six weeks (and not at 26 weeks). Fathers' subjective norms were only significantly associated with exclusive breastfeeding at six weeks.

## Predictive validity

Table 4 shows the independent association between mothers' and fathers' subjective norms and exclusive, any, and public breastfeeding at 6 and 26 weeks (see Tables S3–S14 for full results from the logistic regressions). These findings show that, when controlling for age, education, country of birth, socio-economic status, and intervention group, mothers' subjective norms significantly predicted exclusive breastfeeding

**TABLE 3** Correlations between subjective norms scale and intention, attitude, perceived behavioural control, and breastfeeding behaviour.

	Mothers' subjective norm	Fathers' subjective norm
1. Mothers' subjective norm	–	.243***
2. Fathers' subjective norm	.243***	–
3. Mothers' attitude	.310***	.100**
4. Fathers' attitude	.196***	.226***
5. Mothers' perceived behavioural control	.170***	.112**
6. Fathers' perceived behavioural control	.109***	.163***
7. Mothers' breastfeeding intention <sup>a</sup>	.114***	.041
8. Any breastfeeding (6 weeks)	.095**	.027
9. Any breastfeeding (26 weeks)	.150***	.065
10. Exclusive breastfeeding (6 weeks)	.152***	.082*
11. Exclusive breastfeeding (26 weeks)	.058	–.012
12. Any breastfeeding in public (6 weeks)	.094*	.007
13. Any Breastfeeding in public (26 weeks)	.122**	.061

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

<sup>a</sup>Intention was coded as (1) 'mainly bottle-feeding (formula) but also breastfeeding', (2) 'mainly breastfeeding but 'topping up' with bottle-feeding (formula)', and (3) 'breastfeeding only'.

at six weeks (OR = 1.04), any breastfeeding at six weeks (OR = 1.05) and 26 weeks (OR = 1.04), and both breastfeeding in public at six weeks (OR = 1.05) and 26 weeks (OR = 1.06). The findings of the logistic regression analyses also found that, when controlling for fathers' age, education, country of birth, socio-economic status, and intervention group, fathers' subjective norms only significantly predicted exclusive breastfeeding at six weeks (OR = 1.02).

## DISCUSSION

The current study found that both the mothers' and fathers' subjective norms scale clearly distinguishes between subjective norms related to both breastfeeding in public and in general. These findings suggest there are two key components of subjective norms among mothers and fathers in relation to breastfeeding initiation and duration. This is consistent with literature which suggests that subjective norms around breastfeeding in general are important influences on breastfeeding (Swanson & Power, 2005; Zhang et al., 2018), and literature that suggests that others' perceptions around breastfeeding in public may impact on decisions to breastfeed in public (Carlin et al., 2019; Spurles & Babineau, 2010; Villalobos et al., 2021). Thus, the inclusion of two components (in general and public breastfeeding) in the subjective norms scales will allow for a more nuanced understanding of the influence of significant others' perceptions of breastfeeding on a mothers' breastfeeding behaviour.

The current study also demonstrated the reliability of the subjective norms scales was high among both mothers and fathers. This is comparable to previous measures (Janke, 1994), and similar to other established theory of planned behaviour scales widely used, such as the Iowa Infant Feeding Attitude Scale (De La Mora et al., 1999) and the Breastfeeding Self-efficacy Scale – Short Form (Dennis, 2003). Thus, both scales are reliable measures for use in future research examining breastfeeding behaviours.

The scales were also associated with theory of planned behaviour variables as expected showing that the content of the subjective norms scales are in line with the theory of planned behaviour (Ajzen, 1991) and tap into the elements of subjective norms as outlined in the theory.

Similarly, the mothers' scale independently predicted public breastfeeding at both 6 and 26 weeks, exclusive breastfeeding at 6 weeks, and any breastfeeding at 6 and 26 weeks. This is an interesting finding given that the literature related to the role of subjective norms in breastfeeding duration is somewhat mixed. For instance, a review of the literature found that subjective norms were not associated with breastfeeding continuation at 6 or 26 weeks (Lau et al., 2018), and that subjective norms predicted intention rather than behaviour (Guo et al., 2016). Conversely, research has suggested that subjective norms were associated with breastfeeding at eight weeks postpartum (Janke, 1994), and that higher rates of subjective norms were associated with exclusive breastfeeding up to four months postpartum (Zhang

TABLE 4 Independent association between mothers' and fathers' subjective norm score and exclusive, any, and public breastfeeding at 6 and 26 weeks.

	Mothers' subjective norms		Fathers' subjective norms	
	aOR <sup>a</sup>	95% CI	aOR <sup>b</sup>	95% CI
Exclusive breastfeeding at 6 weeks	<b>1.036***</b>	<b>[1.015, 1.059]</b>	<b>1.019*</b>	<b>[1.001, 1.036]</b>
Exclusive breastfeeding at 26 weeks	1.061	[.995, 1.130]	.992	[.951, 1.034]
Any breastfeeding at 6 weeks	<b>1.045*</b>	<b>[1.009, 1.083]</b>	1.008	[.976, 1.041]
Any breastfeeding at 26 weeks	<b>1.044***</b>	<b>[1.021, 1.068]</b>	1.014	[.995, 1.034]
Public breastfeeding at 6 weeks	<b>1.053*</b>	<b>[1.005, 1.103]</b>	1.006	[.966, 1.047]
Public breastfeeding at 26 weeks	<b>1.063**</b>	<b>[1.017, 1.111]</b>	1.032	[.990, 1.076]

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval.

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

<sup>a</sup>Adjusted for intervention group, mothers' age, mothers' level of education, mothers' country of birth, and socio-economic status.

<sup>b</sup>Adjusted for intervention group, fathers' age, fathers' level of education, fathers' country of birth, and socio-economic status.

et al., 2018). Additionally, subjective norms are an important influence on both breastfeeding initiation and continuation among mothers who breastfed and mothers who bottle fed (Swanson & Power, 2005). Taken together, this suggests that subjective norms play an important role in breastfeeding duration, and that the developed subjective norms scale is capable of predicting breastfeeding duration. It is also important to note that there is limited literature related to subjective norms and public breastfeeding, with many studies exploring the role of attitudes on public breastfeeding rather than subjective norms. This may be, in part, due to the lack of a subjective norms measure.

While the mothers' scale predicted the majority of breastfeeding behaviours examined, it did not predict exclusive breastfeeding at 26 weeks. While this may seem a limitation of the scale, this may be due to mothers following breastfeeding recommendations. For instance, in line with recommendations (World Health Organization, 2022), many mothers begin to incorporate some bottle feeding and solid food at 26 weeks, and thus exclusive breastfeeding rates are low by this time (Odar Stough et al., 2018). Consequently, subjective norms are less likely to be impacting this behaviour and may instead be guided by other psychological constructs such as intention and self-efficacy (i.e., confidence in being able to breastfeed; Esquivel et al., 2022; Jakaitė et al., 2021; Xu et al., 2022). This demonstrates that the subjective norms scale seems to accurately predict breastfeeding behaviour and is likely to be a reliable and valid measure to explore the role of subjective norms on breastfeeding duration.

Through assessing the predictive validity of the subjective norm scales, it was also found that fathers' subjective norms was only independently predictive of exclusive breastfeeding at six weeks and no other breastfeeding behaviours investigated. While this may suggest a limitation of the scale, it may indeed be the case that fathers' subjective norms do not have much of an influence their partner's breastfeeding behaviour. There is literature to suggest that other constructs may be important in their partner's breastfeeding behaviour, such as attitudes towards breastfeeding (Al Namir et al., 2017). The role of fathers' subjective norms in their partners' breastfeeding behaviour is sparse; however, there is some literature to suggest that fathers' subjective norms may influence their involvement in breastfeeding (Leng et al., 2019; Ng et al., 2019), demonstrating some potential for fathers' subjective norms to influence their partner's breastfeeding behaviour. Nonetheless, further research is needed to determine the role of fathers' subjective norms and their partner's breastfeeding behaviour. The current subjective norms scale may assist in accurately measuring breastfeeding subjective norms of fathers for future research.

The development of a subjective norms scale specific to breastfeeding has a number of practical applications. First, the scale can be used in breastfeeding research to better understand the role of subjective norms in breastfeeding initiation and duration. This will help clarify findings related to the social influences on mothers' decisions to begin and continue breastfeeding. Second, the scale can be used in research examining the role of fathers' subjective norms in their partner's breastfeeding behaviour. This will allow for a deeper understanding of the construct in relation to fathers' social perceptions around their partners breastfeeding behaviour, and the impact of this on their partners' breastfeeding subjective norms and behaviour. These applications have important implications for gaining a deeper insight into the social influences among both mothers and fathers on breastfeeding to help inform future interventions for improving this behaviour.

## Strengths, limitations, and future directions

The current study has a number of strengths. The first of these is the examination of subjective norms among fathers. This allowed for the development of a subjective norms scale for fathers, for use in future research to help clarify the role of this construct in their partner's breastfeeding initiation and continuation. Additionally, this is the first study to explore subjective norms in relation to breastfeeding in public. As this is an under researched area, the findings of the current study provide insight into the role of this construct in breastfeeding in public. Another strength is the large sample size. This allowed for the subjective norms scales to be assessed among a broad range of parents. Thus, the findings of the study are generalizable to the wider population. A third strength of the current study was the variety of

behaviour measures. The current study determined predictive validity of the subjective norms scale, not only for any breastfeeding at 6 and 26 weeks but also for public breastfeeding and exclusive breastfeeding at 6 and 26 weeks. This provided a greater understanding of the role of subjective norms in breastfeeding duration in general, and in public. Consequently, this contributes important findings in relation to the role of subjective norms among breastfeeding behaviours over time and in different contexts.

While the current study had some strengths, there are some limitations to the study for consideration in future research. First, while the current study explored the influence of subjective norms on breastfeeding continuation among a sample of couples, who by virtue of their co-attendance at antenatal classes were assumed to be married or in a de facto relationship, the study did not determine differences in the influence of subjective norms on breastfeeding continuation by marital status. As prior research has indicated that the influence of subjective norms on breastfeeding continuation may differ among mothers who are married and those who are not (Bai et al., 2010), future research may wish to explore this further. Additionally, while the sample was broad, the scale was tested only among residents of Australia. This may limit the generalizability of the findings across cultures. Future research would benefit from conducting further psychometric validation of the subjective norms measures in both a single group and multigroup analyses to determine and compare the utility of the measures among various populations. The literature review which underpins the development of the social norm scales was conducted in 2015, and, while it is unlikely that the key social referents will have changed, it is possible that social media and associated 'influencers' have become important social influences of breastfeeding outcomes in the intervening period. However, as the popularity of social media platforms and 'influencers' rapidly change it will be challenging to measure their influence.

## CONCLUSION

This study developed and assessed subjective norms scales for use among both mothers and fathers, indicating that the two subjective norms scales developed assess important aspects of both mothers' and fathers' subjective norms in relation to breastfeeding. Additionally, the two scales have excellent reliability, and demonstrate good concurrent validity through their relation to other theory of planned behaviour variables. Further, the mothers' scale was useful for predicting mothers breastfeeding; however, future research using the fathers' scale to explore the role of fathers' subjective norms in predicting mothers' breastfeeding is needed. These findings are promising and fill a gap in the literature by providing reliable and valid subjective norms scales to assess the influence of this construct on breastfeeding initiation and duration to help better understand the influence subjective norms has on this vital health behaviour.

## AUTHOR CONTRIBUTIONS

**Jessica Charlesworth**: Methodology; data curation; formal analysis; writing – original draft. **Thomas McAlpine**: Methodology; Writing – review & editing. **Annegret Martin**: Conceptualization; methodology; data curation; writing – review & editing. **Jane Scott**: Conceptualization; methodology; data curation; project administration; supervision; writing – original draft; writing – review & editing. **Barbara Mullan**: Conceptualization; methodology; project administration; supervision; writing – review & editing.

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## CONFLICT OF INTEREST STATEMENT

None.

## DATA AVAILABILITY STATEMENT

Data available on request due to privacy/ethical restrictions.

## ETHICAL APPROVAL

PIFI was approved by the Curtin University Human Research Ethics Committee (HR 82/2014; 14 May 2014) and the Human Research Ethics Committees responsible for the public (SCGG HREC No 2014–111; 18 Sept 2014; SMHS HREC Ref: S/15/25; 27 Aug 2015; WNHS HREC No 2016037EW; 4 May 2016) and private (SJGHC Ref: 777; 8 April 2015) hospital sites.

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