



Employing an extended Theory of Planned Behaviour to predict breastfeeding intention, initiation, and maintenance in White British and South-Asian mothers living in Bradford

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Background. Despite reported differences in breastfeeding rates amongst women of different ethnic groups, little research has investigated whether the thoughts and feelings (social cognitions) of women from these different groups during pregnancy influence their later breastfeeding behaviour.

Objective. This study investigates the extent to which social cognitions (based on the Theory of Planned Behaviour; TPB) predict differences in breastfeeding intentions, initiation, and maintenance between White British (WB) and South Asian (SA) women.

Design and methods. Two hundred and fifty women (predominantly WB or SA) in the last trimester of pregnancy completed a questionnaire based on the TPB. The women were followed up 6 months later and their breastfeeding during the previous 6 months was recorded.

Results. The TPB predicted significant variance in breastfeeding across the sample and was able to account for differences between SA and WB women. Affective attitudes (emotional reactions to breastfeeding) and moral norms (reactions about whether breastfeeding is right or wrong) were the strongest predictors of intentions. Intentions and affective attitudes were predictive of breastfeeding initiation, whilst only affective attitudes were predictive of breastfeeding maintenance.

Conclusion. Stronger intentions to breastfeed led to higher rates of breastfeeding amongst SA women. In turn, intentions were predicted by emotional and moral beliefs about breastfeeding, beliefs that were less positive amongst a WB sample. This suggests that those tasked with encouraging breastfeeding may need to have a different conversation with women about breastfeeding that goes beyond a focus on costs and benefits.

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Statement of Contribution

What is already known on this subject

South Asian women living in Britain are more likely to breastfeed their infants than White British women. The constructs of the Theory of Planned Behaviour have been shown to predict breastfeeding initiation and maintenance. However, few studies measure longer term breastfeeding or test whether TPB constructs from the extended TPB measured before the delivery of the baby predict breastfeeding initiation or maintenance. No studies have explored this amongst a British South Asian population.

What this study adds

This study demonstrates that intentions and affective attitudes are strong predictors of initiation of breastfeeding, but that only affective attitude predicted maintenance of breastfeeding for 6 months. Moreover, we demonstrated that stronger intentions were able to explain the higher breastfeeding initiation rates and affective attitudes were able to explain the greater likelihood of maintenance of breastfeeding amongst South Asian women.

It is well established and universally recognized that breastfeeding infants has immense health benefits for both the mother and her baby (Gartner *et al.*, 2005; McMillan *et al.*, 2008; Quigley, Cumberland, Cowden, & Rodrigues, 2006; Standing Committee on Nutrition of the British Paediatric Association, 1994). Babies who are breastfed are at lower risk of suffering from obesity (Owen, Martin, Whincup, Smith, & Cook, 2005), diabetes mellitus, gastroenteritis, and respiratory infections in childhood (Heinig & Dewey, 1996) and demonstrate decreased rates of sudden infant death syndrome (Gartner *et al.*, 2005). Similarly, babies that are bottle/formula fed are more susceptible to infection resulting in hospitalization (Quigley, Kelly, & Sacker, 2007).

Literature also shows that mothers who breastfeed their infants are at reduced risk of pre-menopausal breast, ovarian, and some other cancers in later life (Heinig & Dewey, 1997). The UK Department of Health (DH) recognized breastfeeding in its 'Priorities and Planning Framework', with a yearly target of 2% increase in breastfeeding initiation rates being set (DH, 2002) and more recently has recommended breastfeeding exclusively for 6 months (DH, 2004) and made breastfeeding an integral part of Child Health Strategy to reduce inequalities (DH, 2009). Regardless of the evidence of health benefits for mother and child associated with breastfeeding and the national priority given to this topic, the United Kingdom continues to have relatively low breastfeeding rates compared to other European countries. For example, Germany and Italy had initial breastfeeding rates of 96% and 89%, respectively (Cattaneo, Yngve, Koletzko, & Guzman, 2005), compared to 78% in the United Kingdom (Bolling, Grant, Hamlyn, & Thornton, 2007). Breastfeeding rates 6 months post-partum were 48%, 62%, and 23% for Germany, Italy, and United Kingdom, respectively (Bolling *et al.*, 2007; Cattaneo *et al.*, 2005). The 2005 survey also concluded that both breastfeeding initiation and maintenance¹ at 6 months was higher overall for Asian or Asian British living in the United Kingdom, when compared to the White mothers. For instance in 2005, the initial breastfeeding rates were 94% for Asian mothers and 37% 6 months post-partum (Bolling *et al.*, 2007). This higher rate of breastfeeding amongst South Asians (SAs) living in the United Kingdom makes them an interesting group to consider, when trying to understand the factors that impact

¹ Initiation refers to baby being put to the breast even if this is only on one occasion; maintenance refers to the occurrence of any daily breastfeeds – it does not mean that breastfeeding is the exclusive means of feeding.

on breastfeeding initiation and maintenance. Moreover, recent qualitative research on breastfeeding attitudes amongst a mostly Pakistani group of SA women living in the United Kingdom suggests that the greater the extent to which their behaviour, thoughts, and feelings have adapted to those of the norms of the second culture (a phenomenon known as acculturation) the less likely they are to breastfeed (Choudhry & Wallace, 2012).

Breastfeeding initiation and maintenance is lower still amongst women from socially disadvantaged groups (Bolling *et al.*, 2007; Glenn & Quillin, 2007; Heck, Braveman, Cubbin, Chavez, & Kiely, 2006). Other factors that have been identified to predict breastfeeding duration include mothers' educational level (Dubois & Girard, 2003; Lande *et al.*, 2003), employment status and maternal age (Dubois & Girard, 2003; Lande *et al.*, 2003; Nolan & Goel, 1995), whilst factors such as previous breastfeeding experience, if the women herself was breastfed as an infant and support for breastfeeding are positively correlated with breastfeeding initiation (Bolling *et al.*, 2007; Scott, Binns, Oddy, & Graham, 2006; Swanson & Power, 2005). Studies also suggest that women often decide how they will feed their infants prior to conceiving or during early stages of pregnancy (Chambers & McInnes, 2006), and intentions to breastfeed are an important predictor of both initiation and duration of breastfeeding (DiGirolamo, Thompson, Martorell, Fein, & Grummer-Strawn, 2005; Kessler, Gielen, Diener-West, & Paige, 1995; Lawson & Tulloch, 1995; O'Campo, Faden, Gielen, & Wang, 1992).

The aforementioned studies have identified predictors of breastfeeding behaviour and have helped to identify the critical period during which interventions to promote breastfeeding might be most effective. Whilst this is useful information, many of these factors are non-modifiable and therefore provide little help to those in the field (e.g., midwives and health visitors) tasked with educating and encouraging mothers to breastfeed. For educational programmes to be effective it is essential to understand what attitudes to target and how these factors work together and affect the outcome behaviour. One theoretical approach that has been extensively used to help understand health behaviours and develop appropriate interventions is the Theory of Planned Behaviour (TPB; Ajzen, 1991). A large number of studies have demonstrated the power of the TPB to predict various behaviours (Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton, 2011).

The TPB suggests that the principal determinant of behaviour is intentions and that intentions are, in turn, predicted by three main constructs: attitudes (based on perceptions of the advantages and disadvantages of performing a behaviour), subjective norms (perceptions of the approval of others of performing the behaviour), and perceived behavioural control (perceptions about how much control a person feels they have to perform the behaviour). Factors such as age, ethnicity, educational status, and personality variables are assumed to have an impact on intentions and therefore behaviour via the other constructs in the model. The assumption of work in this area is that if we are able to identify the cognitions that best predict intentions and behaviour, then it is possible to develop interventions to target these cognitions.

Recent developments in this field have suggested that each of the determinants of intentions in the TPB (i.e., attitudes, norms, and perceived behavioural control) might be better expressed in a two-component model (Conner & Sparks, 2005). For example, Ajzen and Fishbein (2005) noted that when measuring attitudes within the TPB researchers should tap both instrumental (thoughts about the costs and benefits of engaging in breastfeeding) and affective (thoughts about the emotional consequences of breastfeeding) components and there is strong evidence emerging that affective

attitudes (Lawton, Conner, & McEachan, 2009; Lawton, Conner, & Parker, 2007) are more powerful predictors of a variety of health behaviours. Similarly, in this revision of the TPB, subjective norm is split into injunctive norms (perceptions about others approval) and descriptive norms (perceptions of others behaviour) and perceived behavioural control is divided into self-efficacy (perceptions about confidence over performing the behaviour) and perceived control (perceptions of degree of control over the behaviour) components.

Over the last 15 years, a substantial number of studies have used the TPB as a framework for studying breastfeeding. These studies employ a variety of methodologies: interviews, focus groups, surveys, and mixed methods. The majority (e.g., Bai, Wunderlich, & Fly, 2011; Dyson, Green, Renfrew, McMillan, & Woolridge, 2010; Giles *et al.*, 2007; Rempel, 2004) are cross-sectional studies measuring intentions only or using the TPB as a framework for interviews with women post-partum. Others (e.g., Bai, Middlestadt, Peng, & Fly, 2010) are prospective but measure only intentions to breastfeed. However, we did identify seven studies employing a prospective design and measuring breastfeeding behaviour. Of these seven studies, one focused on breastfeeding initiation (McMillan *et al.*, 2009), three had follow-ups of 6 weeks (McMillan *et al.* 2008; Swanson & Power, 2005; Wambach, 1997), and three had follow-ups between 6 and 12 months (Avery, Duckett, Dodgson, Savik, & Henley, 1998; Dodgson, Henly, Duckett, & Tarrant, 2003; Duckett *et al.*, 1998). It is important to note that studies with longer follow-ups all recruited women in hospital post-partum. This means that there is currently limited evidence that TPB variables measured prior to delivery are predictive of breastfeeding maintenance.² However, the findings for studies with shorter follow-ups where TPB variables have been measured antenatally (e.g., McMillan *et al.*, 2008, 2009; Swanson & Power, 2005) provide strong support for their ability to predict breastfeeding intention and behaviour. For example, in a study of 248 women living in areas of economic hardship, McMillan *et al.*, (2008) found that demographic variables and TPB variables together predicted 72% of the variance in intentions and that models including intention, attitude, and descriptive norms were all significant in predicting behaviour at either discharge or 10 days or 6 weeks after discharge. These authors also identified that moral norm was an important additional predictor. Although the work by McMillan and colleagues focuses specifically on mothers experiencing deprivation, no study to date has used the TPB to investigate the predictors of breastfeeding of different ethnic groups.

Thus, the aims of the current study are

- To assess the predictive utility of an extended two-factor version of the TPB to predict breastfeeding intentions, initiation and maintenance of breastfeeding at 6 months.
- To investigate whether there are differences between White British (WB) and SA mothers in their intentions to breastfeed, initiation and maintenance of breastfeeding at 6 months.
- To test whether differences in intentions, initiation, and maintenance of breastfeeding at 6 months for these two ethnic groups are accounted for by differences in the TPB variables.
- To make recommendations about which social cognitions should be targeted to optimize changes in breastfeeding intentions, initiation, and maintenance of breastfeeding at 6 months.

²The search will not have picked up those studies that used the TPB but did not explicitly state this in the Abstract.

Method

Participants and procedure

Participants were recruited in the city of Bradford from a sub-sample of the Born in Bradford (BiB) cohort study known as BiB 1000. Ethical approval for the study was obtained from the Local Research Ethics Committee (REC reference number: 07/H1302/112). Participants in the BiB 1000 cohort were recruited between August 2008 and March 2009 and, at the time of giving informed consent, were asked whether or not they were willing to be contacted regarding participation in further research studies. Thus, separate ethical approval was not obtained for this study, however, the protocol was sent to the BiB manager for approval and all data collection was carried out by the BiB team, ensuring the confidentiality of the participants. Data were collected and stored according to the Data Protection Act, 1998.

The mean age of mothers in BiB 1000 is 27.1 years, 66% of families live in the fifth most deprived quintile of the city and 47% are of SA origin.³ A contact list of women from the BiB 1000 cohort who were in the last trimester of pregnancy and whose babies were due between January and July 2009 were approached for this project by one of four BiB staff (supervised by a lead research nurse). Each person on the list was contacted until total sample of 250 women were recruited.⁴ Potential participants were contacted by telephone during the office hours of 9–5 p.m. weekdays. Each person received only one contact telephone call (no answer phone message was left), and if they did not answer, the next person on the list was contacted. Seven hundred and thirty-six women were approached, 477 could not be contacted on the first attempt, nine declined to take part, and 250 women completed the telephone interview. The sample was representative of the original BiB cohort.⁵ Interviews were conducted by phone either in English (165), Urdu (72), or Mirpuri (13) depending on the stated language of the woman provided as part of the contact list. One member of the BiB research team spoke Urdu and another spoke Mirpuri. Telephone interviews were chosen to increase the response rate for non-English speakers who might not be able to read their spoken language (Urdu) or where no written translation is available (Mirpuri). These languages reflect those most commonly spoken by the local population of Bradford where this research was conducted.

All variables (e.g., TPB constructs) were assessed through standardized items in one of three languages delivered by a BiB study administrator over the telephone. The study administrators were provided with a standardized script to describe the study to each eligible participant and emphasized that taking part in the study was purely voluntary. This script was translated and transliterated into Urdu and Mirpuri for use with non-English speaking mothers. Mothers were assured any information they gave would be anonymized and that their responses would be treated in the strictest confidence and not shared with anyone else. Potential participants were also informed that if they did not wish to take part they could withdraw from the study at any time. Permission to use

³SA women are over-represented in the BiB cohort compared to the local population because more babies are born in this population than in the WB population.

⁴The order of women on the list simply reflected to expected date of delivery. A sample of 250 women were recruited to provide sufficient power (0.8) to conduct a regression analysis with a maximum of 12 predictor variables, predicted average effect size of 0.1, alpha of .05 and anticipating an attrition rate of approximately 20%. A sample of 184 was required to adequately power this analysis.

⁵Comparison of responders and entire BiB cohort revealed no significant differences between responders and non-responders for employment status ($\chi^2 = 0.60$, $df = 2$, $p > .05$), ethnicity ($\chi^2 = 2.05$, $df = 3$, $p > .05$), and deprivation score ($t(1,489) = -0.14$, $p > .05$).

data collected by BiB for this project was also confirmed. Mothers were also informed that the study was being carried out by a team who were independent of their care team.

Measures of breastfeeding initiation and maintenance were collected by the BiB research team who arranged either home or clinic visits with BiB 1000 participants and their infants at 6 months post-partum. As part of the 'BiB 1000 6-month questionnaire' data on parenting practices, the infant's health, behaviour, and feeding were collected. Data were matched with our TPB data using a unique participant identifier. Follow-up visits were successfully arranged for 194 of the 250 participants, representing 78% of our original sample.

Measures

Demographic variables

Demographic data including age, whether or not this was a first child (0 = no, 1 = yes), highest educational qualification (coded into 1 = O level/GCSE highest qualification, 2 = higher qualification), deprivation (http://data.gov.uk/dataset/index_of_multiple_deprivation_imd_2007; higher score = greater level of deprivation)⁶ and ethnicity (to which of these groups do you consider you belong: White, mixed ethnic group, Black or Black British, Asian or Asian British, Chinese, and others) were all collected as part of the BiB cohort study. An error in the recording of the moral norm data for 53 SA women resulted in over-recruitment of SA women to this study to allow for a similar number of complete datasets for each of the two ethnic groups of interest here. Due to the small numbers in some ethnic groups, participants were coded as White (1), SA (2), or others (and were coded as missing and not included in further analysis).

TPB measures

Mothers' intention to breastfeed was measured by three items: 'I intend to breastfeed my baby for the first six months' and 'I want to breastfeed my baby for the first six months' on a scale of 1–5 where (1) 'definitely do' to (5) 'definitely do not' and 'I will try to breastfeed my baby for the first six months ...', 'definitely will' (1) to 'definitely will not' (5). All items were scored so that higher scores indicated greater intention to breastfeed (Cronbach's $\alpha = .96$).

Self-efficacy was assessed by two items: 'For me to breastfeed my baby for the first six months would be ...', 'easy' (1) to 'difficult' (5); 'I am confident that I could breastfeed my baby for the first six months if I wanted to ...', 'agree' (1) to 'disagree' (5). The scores of these items were reversed and averaged to provide a measure of self-efficacy over breastfeeding with higher scores indicating greater efficacy ($r = .51$).

Perceived control was assessed by a single item: 'If I breastfed my baby for the first six months, things might get in the way that would stop me from doing it ...', 'unlikely' (1) to 'likely' (5). Scores for this item were reversed.

Affective attitudes were measured by three semantic differentials: 'For me to breastfeed my baby for the first six months would be ...', 'unpleasant–pleasant', 'un enjoyable–enjoyable', and 'inconvenient–convenient' and were scored on a scale

⁶ The multiple deprivation score is based on the following domains: income, employment, health and disability, education skills and training, barriers to housing and services, and crime. The average multiple deprivation score for the Bradford and Airedale PCT (from where participants for this study were recruited is 32, Yorkshire and Humber Health Observatory).

of 1–5. The items were averaged with higher scores indicating a more positive affective attitude towards breastfeeding ($\alpha = .84$).

Instrumental attitudes were measured by one semantic differential: 'For me to breastfeed my baby for the first six months would be ...', 'unhealthy–healthy' and scored on a scale of 1–5. Higher scores indicated a more positive instrumental attitude towards breastfeeding.

Injunctive norm was measured using four items in relation to family and friends: 'My family think that I should breastfeed my baby for the first six months ...' and 'My friends think that I should breastfeed my baby for the first six months ...', 'definitely should' (1) to 'definitely should not' (5); 'My family would approve of me breastfeeding my baby for the first six months ...' and 'My friends would approve of me breastfeeding my baby for the first six months ...', 'strongly disagree' (1) to 'strongly agree' (5). The scores for the first two items were reversed. The items were averaged with higher scores indicating a stronger injunctive norm supporting breastfeeding ($\alpha = .76$).

Descriptive norm was assessed in relation to one's mother and other parents using two items namely 'My mother breastfed her own babies for the first six months' and 'Other parents I know breastfed their own babies for the first six months', each rated on a 'strongly disagree' (1) to 'strongly agree' (5) response format and averaged so that higher scores indicate greater descriptive norm for breastfeeding ($r = .39$).

Moral norm was assessed by two items: 'It would be right for me to breastfeed my baby for the first six months', and 'I would feel proud if I did breastfeed my baby for the first six months', each rated on a 'strongly disagree' (1) to 'strongly agree' (5) response format. Items were averaged such that higher scores indicate stronger moral norms to breastfeed ($r = .39$).

Behaviour measures

Two measures of behaviour were employed in this study. At 6 months after birth, mothers were asked if they had breastfed their infant at birth (no = 0, yes = 1) and whether they were still breastfeeding at 6 months of age (no = 0, yes = 1).

Results

Descriptives

Although a total of 250 women agreed to participate in this study, after excluding cases that did not respond at follow-up ($N = 56$) and excluding participants who were not White or SA ($N = 10$), the final sample size was 184. Those people who did not respond at follow-up were not significantly different from the final sample on any of the demographic or TPB variables, with the exception of intention, where non-responders at follow-up had significantly lower intentions to breastfeed ($F(1,249) = 4.75, p = .03$). Table 1 provides descriptive statistics on all measured variables and reports the correlations amongst variables. On average the sample were 27.5 years of age, with this being their first child for a little under half the sample. Over half the samples ($N = 115$) were SA and the majority of this group was of Pakistani origin ($N = 100$). The White sample consisted of only one European White participant; the remaining 68 participants were WB and so will be referred to in this way. For approximately two thirds of the sample O level/GCSE was the highest qualification. These statistics are reflected in the average multiple deprivation score (used in the analysis below) of 43 for this sample,

Table 1. Intercorrelations for measured variables (White British above diagonal, $N = 71$; South Asian below diagonal, $N = 113$)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Breastfeed 6 months	—	.35**	.18	.12	.29**	-.23	.24*	.23*	.10	.39**	.14	.20	.14	.12
2. Ever breastfeed	.29**	—	.12	.13	.30**	-.11	.56**	.28*	.31**	.52**	.32**	.46**	.20	.35**
3. Age	.02	.02	—	-.40**	.13	-.39***	-.07	-.17	-.09	.00	-.11	-.12	-.07	-.13
4. First child	-.03	.00	-.34***	—	.21	-.05	.39***	.13	.19	.24*	.28*	.21	.04	.25*
5. Education	.05	.18*	.00	.36***	—	-.23*	.18	-.01	.19	.17	.04	.24*	.21	.18
6. Deprivation	-.12	-.03	-.14	.04	-.06	—	-.23*	.04	-.20	-.27*	-.14	.16	.14	-.17
7. Intention	.23**	.38***	-.01	-.04	-.07	-.05	—	.54***	.73***	.81***	.53***	.54***	.17	.62***
8. Self-efficacy	.26**	.14	.10	-.18*	-.17	.01	.43***	—	.53***	.62**	.37***	.41***	.26*	.23*
9. Perceived control	.14	.10	.07	-.01	.06	.01	.22*	.22*	—	.63***	.37***	.37***	.14	.57***
10. Affective attitude	.28**	.35***	-.03	-.10	-.21*	-.04	.60***	.47***	.10	—	.46**	.52***	.23*	.51***
11. Instrumental attitude	.04	.04	-.04	-.10	.04	.04	.46**	.16	.07	.21*	—	.27*	.02	.03
12. Injunctive norms	.06	.05	.03	-.15	-.08	-.05	.26**	.33***	.27**	.16	.28**	—	.41***	.30**
13. Descriptive norms	.02	-.14	-.08	-.03	-.06	.10	.02	.15	.27**	-.02	.08	.50***	—	.18
14. Moral norms	-.02	.13	.00	-.12	-.13	-.17	.24**	.12	.02	.22*	.02	.11	.04	—

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2. Differences in demographic and TPB variables between White British and British South Asian mothers

	White British (N = 71), mean (SD)	South Asian (N = 113), mean (SD)	F value
Age	26.66 (6.47)	27.66 (5.10)	1.77
Education	1.37 (0.49)	1.30 (0.46)	1.36
Deprivation ^a	35.63 (18.64)	48.82 (16.75)	30.48***
First child	0.59 (0.49)	0.30 (0.46)	21.41***
Behavioural intention	3.77 (1.63)	4.62 (0.89)	26.30***
Self-efficacy	3.78 (1.11)	4.33 (0.90)	17.64***
Perceived control	3.44 (1.48)	3.60 (1.59)	0.64
Affective attitude	3.80 (1.48)	4.45 (0.81)	20.39***
Instrumental attitude	4.71 (0.79)	4.93 (0.39)	7.78***
Injunctive norm	3.90 (0.94)	4.57 (0.71)	38.88***
Descriptive norm	3.12 (1.25)	4.28 (0.98)	63.79***
Moral norm	4.37 (0.98)	4.74 (0.52)	13.99***

Note. ^aA deprivation score of 49 is ranked 2,440 of 34,483 lower layer super output areas (geographical areas based on postcode) in England where 1 is the most deprived. A score of 36 is ranked 5,833 out of 34,483 (www.communities.gov.uk).

* $p < .05$; ** $p < .01$; *** $p < .001$.

which is higher than the average of participants in this region (Bradford and Airedale). This measure of deprivation will be used in all analyses below.

A total of 79% of the sample reported initiating breastfeeding, although only 29% were still breastfeeding at 6 months. A total of 86% of SA and 66% of WB 'mothers to be' intended to breastfeed their infant for the first 6 months. This translated into 85% of the SA and 70% of the WB mothers initiating breastfeeding. However at 6 months, this dropped to 33% of SA mothers and 23% of WB mothers continuing to breastfeed their infants. The indication here is that stronger intentions amongst SA women lead to higher rates of initiation and maintenance of breastfeeding behaviour. Table 2 shows the differences in demographic variables and TPB variables between the SA and WB mothers. Deprivation scores were significantly higher amongst the SA group we sampled and SA women were significantly less likely to be expecting their first child. The two groups were also significantly different across all of the TPB variables with the exception of perceived control. Of particular note are the much stronger intentions and descriptive norms of SA women compared to their WB counterparts. However, it should be noted that the mean scores on the TPB variables indicate a very positive reaction towards breastfeeding for at least 6 months across the entire sample.

Table 1 indicates that the strongest predictors of intentions to breastfeed were affective attitudes, moral norms, instrumental attitudes, and self-efficacy ($r > .50$ in each case). The strongest predictors of breastfeeding initiation were intentions, affective attitudes, and injunctive norms ($r > .30$ in each case), whilst the strongest predictors of breastfeeding maintenance were affective attitudes, self-efficacy, and intentions ($r > .20$ in each case). Amongst the demographic factors ethnicity and education showed the strongest associations with intention, breastfeeding initiation, and breastfeeding maintenance. The positive relationships indicated stronger intentions (White - $M = 3.77$, SA - $M = 4.62$; lower education - $M = 4.24$, higher education - $M = 4.43$), breastfeeding initiation (White 70%, SA 85%; lower education 73%, higher education

Table 3. Multiple regressions of breastfeeding intentions onto predictor variables ($N = 184$)

Step	Predictors	β	SE β	B
1	Age	0.02	.02	.07
	First child	0.37	.20	.14
	Education	0.09	.19	.03
	Deprivation	-0.01	.01	-.12
	White or SA	1.11	.19	.42***
2	Age	0.01	.01	.06
	First child	0.22	.12	.08
	Education	0.06	.11	.02
	Deprivation	0.00	.00	.02
	White or SA	0.28	.12	.10*
	Self-efficacy	0.20	.06	.15***
	Perceived control	0.09	.03	.10**
	Affective attitude	0.48	.06	.42***
	Instrumental attitude	0.41	.09	.19***
	Injunctive norms	0.12	.07	.08
	Descriptive norms	-0.10	.05	-.10*
	Moral norms	0.42	.07	.25*** (.29)

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. For step 1, $R^2 = .15$, $F(5,214) = 7.50$, $p < .001$; step 2, R^2 change = .59, F change (7,207) = 67.29, $p < .001$.

91%), and breastfeeding maintenance (White 23%, SA 33%; lower education 25%, higher education 36%) in the SA and higher educated groups.

Predictors of intention to breastfeed

Table 3 reports a hierarchical multiple regression analysis to predict intentions. At step 1, the demographic variables were entered and explained 14.9% of the variance. Significant effects were apparent for ethnicity. Examination of the simple correlations demonstrated stronger intentions to breastfeed amongst the SA women in our sample. At step 2, addition of the TPB variables explained a further 59.1% of the variance in intentions. The demographic variable from step 1 (ethnicity) remained significant along with affective attitudes, moral norms, instrumental attitudes, self-efficacy, and perceived control. (The significant effect for descriptive norms is likely to be a statistical artefact given the fact that the simple correlation suggests a relationship in the opposite direction.) Stronger intentions were associated with more positive affective attitudes, moral norms, instrumental attitudes, self-efficacy, and perceived control about breastfeeding for at least 6 months.

Of the demographic variables, only ethnicity was identified as a significant predictor of breastfeeding intentions in the correlational and regression analyses (Tables 1 and 2). Therefore, taking intention as the dependent variable, we explored the extent to which the impact of ethnicity was mediated by the breastfeeding cognitions. This analysis was conducted using multiple mediation analysis (Preacher & Hayes, 2008). Five thousand bootstrap samples were taken, as recommended by Preacher and Hayes (2008), in the analysis using the bias corrected and accelerated methods. For each covariate, mediator, and dependent variable, the scores were standardized before analysis. This analysis indicated the direct effect for ethnicity ($B = 1.114$, $SE = .189$, $p < .001$) was reduced

Table 4. Moderated logistic regressions of breastfeeding at birth (initiation) and 6 months (maintenance) onto predictor variables ($N = 184$)

Variable	Breastfeeding			
	Initiation		Maintenance	
	OR	95% CI	OR	95% CI
Step 1				
Age	1.02	0.95–1.10	1.02	0.96–1.09
First child	1.10	0.43–2.79	1.06	0.48–2.34
Education	4.15**	1.53–11.27	1.72	0.84–3.53
Deprivation	0.10	0.97–1.02	0.98	0.96–1.00
White or SA	3.02**	1.29–7.05	2.41*	1.08–5.36
Model χ^2 ($df = 5$)	17.35**		10.07	
–2 log-likelihood	170.07		210.88	
Step 2				
Age	1.03	0.94–1.13	1.02	0.95–1.09
First child	0.56	0.19–1.67	0.96	0.39–2.42
Education	8.27**	2.20–31.06	2.45*	1.04–5.75
Deprivation	1.01	0.99–1.04	0.98	0.96–1.01
White or SA	0.80	0.23–2.80	2.23	0.82–6.07
Intention	2.48**	1.26–4.87	1.41	0.58–3.40
Self-efficacy	0.87	0.48–1.57	1.38	0.77–2.48
Perceived control	0.88	0.61–1.25	1.01	0.77–1.32
Affective attitude	1.90*	1.05–3.43	4.54**	1.70–12.10
Instrumental attitude	0.66	0.30–1.46	0.45	0.12–1.69
Injunctive norms	1.32	0.65–2.70	0.92	0.52–1.62
Descriptive norms	0.81	0.49–1.32	1.10	0.73–1.67
Moral norms	0.80	0.39–1.66	0.57	0.27–1.18
Model χ^2 ($df = 13$)	60.42***		44.81***	
–2 log-likelihood	127.01		176.13	
Step χ^2 ($df = 8$)	43.07***		34.74***	

Note. OR, odds ratio; CI, confidence interval. * $p < .05$; ** $p < .01$; *** $p < .001$.

after controlling for the mediating variables and covariates, $B = .275$, $SE = .124$, $p = .03$. The total indirect effect ($B = .839$, 95% CI = .445–1.218) along with a number of the specific indirect paths was significant in this analysis. In particular, the indirect paths for self-efficacy ($B = .094$, 95% CI = .019–.231), affective attitudes ($B = .408$, 95% CI = .208–.682), instrumental attitudes ($B = .119$, 95% CI = .032–.272), and moral norms ($B = .227$, 95% CI = .099–.511) were significant identifying them as mediators of the relationship between ethnicity and breastfeeding intentions.

Predictors of breastfeeding initiation and maintenance

Table 4 reports the results of the hierarchical logistic regression analyses to predict breastfeeding initiation (left-hand columns) and maintenance (right-hand columns). In relation to breastfeeding initiation, entry of the demographic variables at step 1 was associated with a modest amount of explained variance, Step χ^2 (5, $N = 184$) = 17.35, $p < .01$. Examination of the odds ratios indicated that education and ethnicity were significant predictors of breastfeeding initiation, that is, higher rates of initiation

in the more educated and SA sample. At step 2, the addition of the TPB variables explained a significant amount of additional variance, Step χ^2 (13, $N = 184$) = 43.07, $p < .001$. Examination of the odds ratios indicated education, intentions, and affective attitudes to be the only significant predictors with the impact of ethnicity reducing to non-significance. Higher rates of breastfeeding initiation were associated with being more educated, having stronger intentions to breastfeed, and more positive affective attitudes towards breastfeeding. We explored the potential mediation of the impact of education and ethnicity on breastfeeding initiation by TPB variables again using multiple mediation analysis in a similar way to that in which we explored impacts on breastfeeding intentions. For the impact of education, this analysis indicated the direct effect ($B = 1.548$, $SE = .514$, $p < .01$) was not reduced after controlling for the mediating variables, $B = 2.153$, $SE = .651$, $p < .001$. In addition, neither the total indirect effect ($B = -.098$, 95% CI = $-.613$ to $.541$) nor any of the specific indirect paths were significant in this analysis. This suggests that the effect of education on breastfeeding initiation was not mediated by the TPB variables measured here. In contrast, the analysis of the impact of ethnicity on breastfeeding initiation indicated the direct effect ($B = .685$, $SE = .445$, $p < .05$) was reduced to non-significance after controlling for the mediating variables and covariates, $B = -.119$, $SE = .591$, $p = .84$. The total indirect effect ($B = .649$, 95% CI = $.131$ – 1.632) along with one of the specific indirect paths was significant in this analysis. In particular, the indirect path for intentions ($B = .500$, 95% CI = $.033$ – 1.263) was significant identifying intention as a mediator of the relationship between ethnicity and breastfeeding initiation.

In relation to breastfeeding maintenance, a somewhat similar pattern of results was apparent (Table 3, right-hand columns). Entry of the demographic variables at step 1 was associated with a modest amount of explained variance, Step χ^2 (5, $N = 184$) = 10.07, $p > .05$. Examination of the odds ratios indicated that only ethnicity was a significant predictor of breastfeeding initiation, that is, higher rates of initiation in the SA sample. At step 2, addition of the TPB variables explained a significant amount of additional variance, Step χ^2 (13, $N = 184$) = 34.74, $p < .001$. Examination of the odds ratios indicated affective attitudes and education to be significant predictors with the impact of ethnicity reduced to non-significance. Higher rates of breastfeeding maintenance were associated with higher levels of education and having more positive affective attitudes towards breastfeeding. We explored the potential mediation of the impact of ethnicity on breastfeeding maintenance by TPB variables again using multiple mediation analysis. This analysis indicated the significant direct effect for ethnicity ($B = .879$, $SE = .408$, $p < .05$) was reduced to non-significance after controlling for the mediating variables and covariates, $B = .801$, $SE = .511$, $p = .12$. The total indirect effect ($B = 1.162$, 95% CI = $.470$ – 2.847) along with one of the specific indirect paths was significant in this analysis. In particular, the indirect path for affective attitudes ($B = 1.141$, 95% CI = $.315$ – 2.307) was significant identifying affective attitudes as a mediator of the relationship between ethnicity and breastfeeding maintenance.

For the moral norm measure used in the above analyses there was an error in the translation of the scale endpoints into Urdu. To address this problem, we used the mean value on the moral norm scale for the 53 participants who completed the questionnaire in Urdu. In order to assess whether this mean substitution procedure unduly biased our results, all analyses were re-run excluding these cases. There were no substantive differences in the results for the prediction of either intention or maintenance. In particular, the beta weight changed from .25 to .29 ($ps < .001$) for moral norm as a predictor of intentions, whilst the odds ratio changed from .57 to .51 (ns) for moral norm

as a predictor of breastfeeding maintenance. However, there was a more substantive change in relation to moral norm as a predictor of initiation of breastfeeding. In particular, the odds ratio changed from 0.80 (ns) to 1.15 ($p < .05$) for moral norm as a predictor of breastfeeding initiation. We comment further on these differences in the discussion.

Discussion

This study used a theoretical framework to investigate the social cognitions (thoughts and feelings) of a sample of pregnant women and investigated the extent to which these cognitions influence intentions to breastfeed, initial breastfeeding behaviour, and maintenance of breastfeeding over a 6-month period. The study is also novel in that it attempts to investigate whether previously identified differences in breastfeeding rates amongst WB and SA women can be explained by differences in social cognitions. Finally, the study focuses on a relatively deprived population of women.

Intention to breastfeed was significantly higher for SA compared to WB mothers. As predicted by the TPB, demographic influences on intentions were accounted for by the TPB variables. The strongest predictors of intention to breastfeed were affective attitude and moral norm. Other significant, although less-important predictors of intention were instrumental attitude, self-efficacy, and perceived control. This suggests that those who think it would be pleasant, enjoyable, and convenient to breastfeed and those who thought that it was the right thing to do and that they would feel proud if they were to breastfeed have stronger intentions to breastfeed their infant. Although moral norm has previously been identified as an important predictor of breastfeeding intention no previous study using the TPB has investigated affective and instrumental attitudes separately.

Together the demographic and TPB variables accounted for 74% of variance in intention to breastfeed. This value is higher than the previous studies that used the TPB (e.g., McMillan *et al.*, 2009; Rempel, 2004) with the exception of McMillan *et al.* (2008) and Giles, Connor, McClenahan, and Mallet (2010) where 72% and 73% of variance were predicted, respectively. The findings of this study also identified similar predictors of intentions: attitudes, perceived behavioural control (Avery *et al.*, 1998; Giles *et al.*, 2007; McMillan *et al.*, 2009), and moral norm (McMillan *et al.*, 2008), providing an emerging body of evidence supporting a focus on these three constructs. The role for the views and behaviour of important others (injunctive and descriptive norm) is still unclear. Some studies have found subjective norm and/or descriptive norm to be predictors of intentions (Giles *et al.*, 2007; McMillan *et al.*, 2008), whilst others have not (e.g., Avery *et al.*, 1998; Duckett *et al.*, 1998; Rempel, 2004). In this study we asked about the influence of close family and friends and perhaps, to achieve a greater understanding of the role of others, items measuring these constructs should differentiate between the influences of friends, parents, and partner/husband.

Ethnicity was found to be a significant predictor of intention to breastfeed on the first step of the regression. This effect was partially mediated by self-efficacy and instrumental attitudes but the most important mediators of this effect were affective attitudes and moral norm, suggesting that SA women have a greater sense that breastfeeding is enjoyable and the right thing to do and it is this that underpins their strong intentions. Religious and cultural teachings in the SA community emphasizing the positive psychological benefits of breastfeeding may go some way to explain differences between WB and SA women in these perceptions (Choudhry & Wallace, 2012).

When investigating predictors of breastfeeding initiation, only education and ethnicity were significant on the first step, with better educated and SA mothers being more likely to have initiated breastfeeding than less well educated and White mothers. This is in line with other studies (Griffiths, Tate, Dezateux, & the Millennium Cohort Study Child Health Group, 2005; McMillan *et al.*, 2008) that have found that WB mothers are much less likely to breastfeed than women who belong to other ethnic groups (Asian, Black, or mixed ethnicity). Amongst TPB variables, intention and affective attitude were the only significant predictors for breastfeeding initiation. Thus, women who had strong intentions to breastfeed and also had a positive affective attitude were more likely to initiate breastfeeding than those with weaker intention and affective attitude. When this regression was re-run using the smaller sample (excluding cases where moral norm was not recorded correctly), moral norm became a significant predictor of breastfeeding initiation. An examination of the correlation matrix helps to explain this finding. Those people excluded in this secondary analysis were all SA women. For these women, the correlations between moral norm and initiating breastfeeding are not significant. However, for WB women, there is a significant correlation ($r = .35$) between moral norm and initiation of breastfeeding. Thus, the fact that moral norm becomes significant in the smaller, more WB sample in this analysis is unsurprising. This does suggest that for a WB sample, moral norm may be an appropriate target for intervention when attempting to increase initiation of breastfeeding.

Mediation analyses were based on the entire sample. Intention to breastfeed fully mediated the impact of ethnicity on breastfeeding initiation. In other words, SA women in our sample had stronger intentions, which translated into higher rates of breastfeeding initiation.

Whether or not mothers were still breastfeeding at 6 months was predicted by ethnicity on the first step with SA women more likely to maintain some breastfeeding for 6 months. On the second step affective attitudes and education were significant, but the multiple mediation models found the effect of ethnicity to be fully mediated by affective attitude. Thus, those mothers who are successful in maintaining breastfeeding are more likely to be SA. Moreover, the greater ability to maintain breastfeeding amongst this group appears to be related to stronger beliefs during pregnancy that breastfeeding is a pleasant, enjoyable, and convenient thing to do.

Together these findings suggest that pregnant women with a positive intention to breastfeed in the last trimester of pregnancy are more likely to initiate breastfeeding than those with a weaker intention, and those who feel that breastfeeding is the right thing to do, and that they will find it enjoyable, convenient, and pleasant, will have stronger intentions. These findings also suggest that these beliefs are strongest amongst the SA women (mostly Pakistani) within our sample. Therefore, this study makes an important contribution by suggesting that efforts by health professionals (midwives, GPs, health visitors) to promote strong intentions to breastfeed antenatally should be focused as much on a consideration of the emotional consequences of breastfeeding for the woman as the associated health and economic benefits. Moreover, the findings also suggest that a focus on these emotional consequences may translate into increased maintenance of breastfeeding at 6 months. There is a growing body of evidence for the important role of affective attitudes in predicting a variety of health-related behaviours (e.g., Lawton *et al.*, 2007, 2009) however there is much less certainty about how one might target such attitudes. One recent study (Sirriyeh, Lawton, & Ward, 2010) used persuasive text messages emphasizing the emotional benefits of physical activity to successfully encourage adolescents to do more activity. However, other intervention techniques

such as stress management and coping skills (Michie, Johnston, Francis, Hardeman, & Eccles, 2008) that directly address the emotional experience of breastfeeding are also potential targets for interventions to promote the maintenance of breastfeeding over 6 months.

Research investigating the breastfeeding attitudes of SA women in the United Kingdom is lacking, but two studies help to shed light on these findings. First, Choudhry & Wallace (2010) identified in interviews with SA women in the United Kingdom that particularly for Pakistani women the advice from religious teachings ('breast is best') conflicted with family responsibilities as mother, wife, and daughter-in-law and breastfeeding was least likely where it was perceived as either unpleasant (to do in public) or inconvenient. This might explain why despite the majority of SA women initiating breastfeeding, this falls off considerably by 6 months. There is also some evidence, albeit from a small cross-sectional study, that breastfeeding is related to more positive mood for women of Pakistani and Bangladeshi origin (Noor & Rousham, 2008). It is entirely feasible that those women in our study who believe that breastfeeding will be a positive experience, do find this method of feeding enjoyable and so continue to maintain this behaviour. Recent research also suggests that the extended family may have an important role to play in facilitating these positive feelings about breastfeeding and hence maintenance of this behaviour (Choudhry & Wallace, 2010; Ingram & Johnson, 2004).

It is important to note that there is large unexplained variance in the measure of maintenance of breastfeeding suggesting that factors, other than those measured antenatally in this study, appear to be important in predicting whether mothers will continue to breastfeed their infant for the recommended 6 months. In this study, and previous work, higher levels of education was found to be associated with maintenance of breastfeeding. Although this does not provide information about the nature of interventions to support breastfeeding it does suggest that those more vulnerable to giving up, and therefore those who need more support to maintain breastfeeding, are women with lower levels of education.

This research study has a number of limitations. First, self-reported measures are prone to socially desirable responses. However, in the context of breastfeeding, self-report measures are the only viable and non-intrusive method for collecting data. Second, we did not measure the extent to which mothers were exclusively breastfeeding in our measures to assess maintenance. This means that the measure would not differentiate between two groups of mothers, those who breastfed or gave expressed breast milk only for 6 months and mothers who partially breastfed at 6 months (having introduced formula or any other drinks or solids in addition breastfeeding at any point in time). This is important because international guidelines (WHO, 2002) recommend that 'infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health'. Therefore, future research might also want to consider a more sensitive measure of breastfeeding maintenance that takes into account the degree to which breastfeeding is exclusive (e.g., where mothers are asked how many feeds are bottle and breast and the extent to which solid food has been introduced). Third, two measures, descriptive norm and moral norm showed poor reliability and other constructs were measured by single items only (e.g., instrumental attitude and perceived behavioural control) to reduce participant burden. Thus, we would not want to dismiss the possibility that a more reliable measure of descriptive norm, and multiple item measures of all constructs, would further increase the predictive validity of the TPB model used in this study.

It should also be acknowledged that the majority of the SA women in our sample were of Pakistani origin. This means it is not possible to generalize these findings to other SA groups with different cultural and religious backgrounds (e.g., Indian Sikhs). In fact, one might predict that the Pakistani community living within Bradford is less acculturated than other SA groups of women and hence the differences in beliefs and attitudes amongst our sample compared with the WB group may be more exaggerated. This is an empirical question deserving of further research.

Conclusion

This study provides evidence that the TPB can make a valuable contribution to understanding the factors that predict differences in the breastfeeding intention and initiation amongst different ethnic groups. A strong intention to breastfeed in late pregnancy translates into a greater likelihood of breastfeeding initiation providing support for antenatal breastfeeding interventions that encourage stronger motivation. The findings (for affective attitude as an important predictor of intention and maintenance) further suggest that one way to achieving this goal is to encourage women to think of breastfeeding as enjoyable and convenient and that conversations may need to focus around fundamental values (a consideration of what is 'right'). Further work, perhaps through longitudinal data collection for 6–12 months post-partum, is needed, however, to better understand whether decisions to give up breastfeeding are associated with less-positive breastfeeding attitudes and intentions over time.

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