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Predicting Breastfeeding in Women Living in Areas of Economic Hardship:

Explanatory Role of the Theory of Planned Behaviour

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Predicting Breastfeeding in Women Living in Areas of Economic Hardship:

Explanatory Role of the Theory of Planned Behaviour

Abstract

This study employed the theory of planned behaviour (TPB) and additional variables (descriptive norm, moral norm, self-identity) to investigate the factors underlying breastfeeding intention and subsequent breastfeeding at four time points (during hospital stay, at hospital discharge, 10 days postpartum, and six weeks postpartum) in a sample of women selected from defined areas of economic hardship ($N = 248$). A model containing the TPB, additional variables and demographic factors provided a good prediction of both intention ($R^2 = .72$; attitude, perceived behavioural control, moral norm and self-identity significant predictors) and behaviour – breastfeeding at birth (88.6% correctly classified; household deprivation, intention, attitude significant), at discharge from hospital (87.3% correctly classified; intention, attitude significant), 10 days after discharge (83.1% correctly classified; education, intention, attitude, descriptive norm significant), and 6 weeks after discharge (78.0% correctly classified; age, household deprivation, ethnicity, moral norm significant). Implications for interventions are discussed, such as the potential usefulness of targeting descriptive norms, moral norms, and PBC when attempting to increase breastfeeding uptake.

Key Words: Theory of Planned Behaviour, Breastfeeding, Economic Deprivation, Beliefs.

Introduction

The substantial health gains associated with prolonged, exclusive breastfeeding are widely established and universally acknowledged (Butte, Lopez-Alarcon, & Garza, 2002; Heinig & Dewey, 1996, 1997; Quigley, Cumberland, Cowden, & Rodrigues, 2006; Standing Committee on Nutrition of the British Pediatric Association, 1994). Despite the profound short-term and long-term health gains for both mothers and their infants associated with prolonged, exclusive breastfeeding, fewer than 70% of mothers in the UK breastfeed their baby at birth, with only 21% still doing so 6 months after birth (Hamlyn, Brooker, Oleinikova, & Wands, 2002). While there is a growing body of literature on the determinants of breastfeeding as the chosen infant feeding method, there has been comparatively little research on women experiencing material deprivation who may be more likely to formula-feed than breastfeed. Significantly lower rates of breastfeeding initiation and duration are found among women from low income groups (Bolling 2006; Hamlyn et al., 2002; Misra & James, 2000), yet relatively little is known about the factors influencing their choice of infant feeding method. This is of concern because children of women from deprived backgrounds, who are most at risk of ill health, are least likely to gain the protective benefits of breastfeeding and are most likely to be exposed to the hazards of artificial feeding (Renfrew, Ansell, & Macleod, 2003). There is a further tendency for women to feed their own infants in the same way that they themselves were fed (Bolling 2006; Hamlyn et al., 2002); this will have a trans-generational effect, with poorer health being visited on infants born into a culture where bottle-feeding is the norm.

This study examined the usefulness of the Theory of Planned Behaviour (TPB: Ajzen, 1991; Ajzen & Madden, 1986) in understanding intention to breastfeed and breastfeeding practice in a prospective sample of women living in areas of economic hardship. We also investigated the predictive role of three additional variables (descriptive norms, moral norms, and self-identity) within the TPB. In addition, we investigated whether this extended version of the TPB mediated

the impact of demographic variables (social deprivation, ethnicity, education and age) on behaviour.

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB; Ajzen, 1991) has commonly been employed by health psychologists to examine the influences on intention and behaviour. The TPB asserts that behaviour is determined by the intention to engage in that behaviour and perceived behavioural control (PBC). The Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980) is the predecessor to the TPB and differs only in the absence of PBC. Intention reflects an individual's decision to exert effort to perform the behaviour. The extent to which an individual perceives that the performance of a behaviour is within their control is encompassed by the PBC component of the model, which has much in common with Bandura's (1986) concept of self-efficacy. Intention is held to be determined by attitudes, subjective norms, and PBC. Attitudes are conceptualized as the overall evaluation of the behaviour. Subjective norms (SN) reflect the perceived pressure from significant others to perform or not perform a particular behaviour. The TPB has been successfully applied to the prediction of a wide range of health behaviours (Conner & Sparks, 2005; Godin & Kok, 1996). A meta-analysis (Armitage & Conner, 2001) of 154 applications of the TPB found that behavioural intention was normally well predicted by the three components (mean $R^2 = .39$), while behaviour was well predicted by PBC and intention across 63 applications (mean $R^2 = .27$), although the power to predict objectively assessed behaviour was more modest (mean $R^2 = .20$).

The TRA has been operationalized in a number of studies concerned with mother's infant feeding intention and behaviour (e.g., Humphreys, Thompson, & Miner, 1998a; Kloebe, Thompson, & Miner, 1999; Manstead, Plevin, & Smart, 1984; Manstead, Profitt, & Smart, 1983; Martens & Young, 1997; Quarles, Williams, Hoyle, Brimeyer, & Williams, 1994). These studies have provided reasonable support for the TRA. Manstead et al. (1983; 1984), for example, showed the TRA predicted intention well (23-60% of the variance explained) and Manstead et al. (1984)

found 65% of the variance in breastfeeding behaviour to be predicted by intention. Several studies have also applied models loosely-based on the TPB to predicting breastfeeding intention or behaviour (e.g., Dick et al., 2002; DiGirolamo, Thompson, Martorell, Fein, & Grummer-Strawn, 2005; McKinley & Hyde, 2004; Rempel, 2004; Ryser, 2004; Saunders-Goldson & Edwards, 2004; Swanson & Power, 2005). Several full tests of the TPB in relation to breastfeeding have been conducted (Avery, Duckett, Dodgson, Savik, & Henley, 1998; Dodgson, Henley, Duckett, & Tarrant, 2003; Wambach, 1997). Avery et al. (1998) reported intended duration of breastfeeding to be most strongly predicted by attitudes and PBC (36% explained variance), while demographic variables, intention and attitude all significantly predicted breastfeeding duration among a sample of primiparous women from urban areas in the midwestern USA. Using similar measures, Dodgson et al. (2003) reported PBC to be the only significant predictor of intended duration of breastfeeding (19% explained variance), while intention and PBC were both significant predictors of breastfeeding duration among a sample of primiparous women from Hong Kong. Both these studies can be criticized for employing an intention measure focusing on duration of breastfeeding rather than a measure of intention strength that would be more consistent with the TRA/TPB (see Conner & Sparks, 2005). In contrast, Wambach (1997) reported attitudes and PBC to explain 23% of the variance in breastfeeding intention (i.e. strength of intention to breastfeed), and intention strength to explain a modest, but significant, 4% of the variance in breastfeeding duration. All three of the above studies can also be criticized for employing self-report measures of breastfeeding.

A particular focus of the present research was to explore the determinants of breastfeeding intention and behaviour among a sample of women from areas of economic hardship. It is known that such groups show lower rates of breastfeeding initiation and duration (Hamlyn et al., 2002; Misra & James, 2000), although comparatively little is known about the mediating variables. Wambach and Koehn (2004), in a qualitative study of economically disadvantaged American adolescents, reported ambivalence toward breastfeeding in this group. Mitra, Khoury, Hinton, and Carothers (2004) reported self-efficacy and perceived social support were significant predictors of

intention to breastfeed in a sample of women from Mississippi. In an application of the TRA, Kloeblen-Tarver, Thompson, and Miner (2002) reported attitudes and previous breastfeeding experience to be the strongest predictors of breastfeeding intention in a sample of low income women from the southern USA. Finally, in one of the few studies examining (self-reported) behaviour in low income women, Khoury, Moazzem, Jarjoura, Carothers, and Hinton (2005) reported that breastfeeding initiation was determined by attitudes towards breastfeeding and social support in addition to other demographic variables such as ethnicity and education level (see also Humphreys, Thompson, & Miner, 1998b).

Ethnicity has also been noted to influence breastfeeding in a number of studies. For example, in the USA, African American women are less likely to breastfeed (McKee, Zayas, & Jankowski, 2004), while in the UK women of South Asian origin show higher tendency to initiate breastfeeding but are less likely to sustain it (Thomas & Avery, 1997). Again few studies have examined the factors explaining these ethnic differences (but see Saunders-Goldson & Edwards, 2004 for one exception in relation to intention). In the present research we also sought to distinguish the impact of age, social deprivation, education, and ethnicity on breastfeeding and through the use of the TPB to explore the variables that mediate the impact of these factors on breastfeeding intention and behaviour.

Additional variables in the TPB

Ajzen's (1991) suggestion that the TPB is open to further expansion, if further predictors can be identified, has led to consideration of a number of additional predictors within the context of the TPB. The present study sought to examine the role of three additional predictors of intention and behaviour in relation to breastfeeding: descriptive norms, moral norms, and self-identity.

Although Goksen (2002) found that intention alone was not a strong determinant of breastfeeding unless conditioned by subjective norms (SN) regarding breastfeeding, the majority of

studies employing the TRA have found SN to be the weakest predictor of breastfeeding intention (Manstead et al., 1983, 1984; Humphreys et al., 1998a). Studies employing the TPB have echoed these findings, with SN consistently not predicting breastfeeding intention (Duckett et al., 1998; Wambach, 1997). Indeed, studies applying the TPB to other behaviours report that subjective norms are the weakest predictor of intention (see Armitage & Conner, 2001 for a review). Several authors have suggested that the conceptualization of the normative component within the TPB does not account for all the various ways that social influence can be exerted (e.g., Conner & Armitage, 1998; Terry, Hogg, & White, 1999). The impact of normative influences may vary depending on their source. Cialdini, Kallgren, and Reno (1990) distinguish injunctive norms (perceptions of what others think you should do; i.e. subjective norms) from descriptive norms (DN; which describe perceptions of what others do). Recent descriptions of the TPB (Ajzen & Fishbein, 2005; Conner & Sparks, 2005) have emphasized that both injunctive and descriptive norms might legitimately be considered components of social norms and independently impact on intention. Perceptions of other people's behaviour have been found to contribute to the prediction of intention independently of perceived injunctive norms (see Rivas & Sheeran, 2003 for a review). Although it is widely accepted that cultural influences play a large role in infant feeding choice (cf. Ramirez, Bravo, & Katsikas, 2005) no studies have investigated the impact of social culture on infant feeding choice. Descriptive norms represent one measure of such social cultural influences. In line with previous research we expected descriptive norms to be predictive of intention to breastfeed, over and above the variables in the TPB.

Moral norms reflect "personal feelings of ...responsibility to perform, or refuse to perform a certain behavior" (Ajzen, 1991, p. 199) and can be regarded as an individual's perception about the moral correctness of performing a behaviour. Moral norm was a significant predictor of intention after TPB variables were controlled for in nine out of the ten studies reviewed by Conner and Armitage (1998), adding an average of 4% to the prediction of intention. It has been suggested that moral norms should have an especially important influence on the performance of behaviours with a moral or ethical dimension (Beck & Ajzen, 1991; Gorsuch & Ortberg, 1983; Kurland, 1995;

Manstead, 2000). There is evidence that perceptions of the morality of breastfeeding play a role in influencing decisions to breastfeed. Chabrol, Walburg, Teissedre, Armitage, and Santrisse (2004) found three of ten factors to be significant predictors of feeding method choice: 'breastfeeding physiological advantages for mothers', 'fear of dependency' and 'moral reasoning'. Breastfeeding constitutes an interesting moral choice, since choosing to breastfeed helps determine the health of another. We expected that in line with the findings of Boissonneault and Godin (1990), moral norms would be predictive of intention over and above the TPB variables, but we hypothesized that the influence of moral norm on behaviour would be mediated by intention and did not expect moral norms to be directly predictive of behaviour (c.f. Beck & Ajzen, 1991).

According to Sparks (2000) self-identity may be interpreted as "...the relatively enduring characteristics that people ascribe to themselves, which take the form of (or incorporate) socially given linguistic categorizations" (p.35). Women may intend to breastfeed because being a breastfeeding woman has become an important part of their self-identity. Although not explicit tests of the TRA, Biddle, Bank, and Slavings (1987) and Charng, Piliavin, and Callero (1988) found evidence to suggest that self-identity predicts intention independently of other attitudinal and normative variables. Sparks and Shepherd (1992) later found that self-identity as a green consumer predicted intention to consume organically grown vegetables independently of other TPB variables. Self-identity has also been found to have an independent effect on intention to eat a low fat diet (e.g., Armitage & Conner, 1999), exercise intention and behaviour (Theodorakis, 1994), and engage in household recycling (Terry et al., 1999). Although it has been suggested that self-identity may simply be a proxy for past behaviour, Sparks and Shepherd (1992) found that the ability of self-identity to predict intention to consume organic vegetables persisted after past consumption of organic vegetables was controlled for. Terry et al. (1999) also found that self-identity accounted for a significant increment of the variance in intention after controlling for past behaviour and the other components of the TPB. In line with previous research we therefore expected self-identity to have an independent effect on intention over and above the TPB variables.

Together these three additional variables (descriptive norms, moral norms, and self-identity) may represent important additional influences on breastfeeding intention and behaviour. As far as we are aware, the present study represents the first attempt to examine the simultaneous role of these variables with respect to breastfeeding within the context of the TPB.

Focus of Present Study

The present study examined the application of the TPB to understanding intention to breastfeed and subsequent breastfeeding (at four time points) in a sample of women living in areas of economic hardship. We also examined the additional predictive power afforded by two measures reflecting normative pressures (descriptive and moral norms) and one reflecting self-identity in an additive model with other TPB variables. Unlike previous studies the present study specifically examined the power of the TPB to mediate the impact the demographic variables of social deprivation, ethnicity, education level and age on breastfeeding intention and behaviour.

Method

Participants

Participants were pregnant women, with no previous live births, living in areas of economic hardship. Midwives identified and approached 449 eligible participants¹ and 411 agreed to take part (91.5%). Of the 411 eligible women who agreed to participate, 303 returned completed questionnaires during their pregnancy (73.7%). Two of these women had moved outside the study areas and so were excluded from the analyses. A total of 248 women completed all behaviour measures (60.3% of those originally agreeing to participate).

Measures

All measures except behaviour were assessed by means of a confidential questionnaire. Participants were asked for their name and contact details to enable matching of questionnaires.

Breastfeeding was defined on the front cover of the questionnaire as feeding a baby any breast milk, including feeding expressed breastmilk from a bottle.

Demographic variables

Participants were asked for their date of birth and age of leaving full time education. Ethnicity was measured by asking: “To which of these groups do you consider you belong?”. Response options were; ‘white’, ‘Indian’, ‘Pakistani’, ‘Bangladeshi’, ‘Chinese’, ‘black-Caribbean’, ‘black-African’, ‘black British’, ‘black other’, and ‘other (please specify)’. Due to the small numbers in some groups, participants in the first group were coded as ‘white’ (1) and all others were coded ‘non-white’ (0). Items were included in the questionnaire which enabled individual Household Deprivation scores to be calculated. A score of 1 was added for each of the following that applied; anybody in the household was unemployed, the household contained more than one person per room, the household lived in a flat with children under 16, the household consisted of a lone parent not in full time work, the household included children under 16 with no adults in work, the household did not have the use of a car or a van, the household did not own it’s accommodation, the household had no private telephone, at least one household member was in receipt of income support or Job Seekers Allowance, the household was in receipt of housing benefit, the accommodation had no central heating, and the household shared a bathroom or toilet with another household. This index correlated significantly ($r = .22$, $p < .01$) with a measure of geographical deprivation derived from postcode (zipcode) data (Robson, Bradford, & Tomlinson, 1998).

Theory of Planned Behaviour and Additional variables

Intention was measured using 5 items, e.g. ‘Do you intend to breastfeed your baby?’, ‘Definitely do not - definitely do’, scored 1 to 5. The remaining items asked participants how strongly they wanted to breastfeed, how likely they thought it was that they would breastfeed, how committed they were to breastfeeding, and how determined they were to breastfeed (Cronbach’s α = .96).

Attitudes were assessed by seven semantic differentials; 'For me to breastfeed my baby would be...', 'unpleasant-pleasant', 'embarrassing-not embarrassing', 'unhealthy-healthy', 'repulsive-attractive', 'inconvenient-convenient', 'unnatural-natural', 'bad-good'. The items were scored between 1 and 5 and averaged ($\alpha = .85$), higher scores representing a more positive attitude towards breastfeeding.

Subjective norm was measured using two items; 'People who are important to me think that I: 'definitely should not breastfeed' (1) – 'definitely should breastfeed' (5), and 'People who are important to me would approve of me breastfeeding my baby: 'strongly disagree' – 'strongly agree'. The items were scored between 1 and 5 and averaged ($\alpha = .79$), higher scores representing greater perceived approval of breastfeeding.

Perceived behavioural control (PBC) was assessed by three items ('For me breastfeeding my baby would be...', 'difficult' (1) – 'easy' (5); 'If I breastfed my baby, things might get in the way that would stop me from doing it', 'unlikely' (5) – 'likely' (1); 'How confident are you that you could breastfeed your baby if you wanted to', 'not at all confident' (1) – 'very confident' (5). These items were summed and averaged ($\alpha = .67$), higher scores representing greater PBC over breastfeeding.

Descriptive norms were assessed in relation to; brothers and sisters, nieces and nephews, and close friends' children. For example, the descriptive norm item for brothers and sisters was; 'How were your brothers and sisters fed?', with response options of: 'all bottle fed' (0), 'most bottle fed' (1), 'some of each' (2), 'most breastfed' (3), 'all breastfed' (4), 'don't know', and 'don't have any brothers/sisters' (0). Participants were also asked: how did your own mother feed you when you were a baby? 'Bottle' (0), 'mixed' (1) 'or breast' (2). An additional question was included to tap into exposure to breastfeeding: 'Have you seen other women breastfeeding?' 'never' (0) to 'frequently' (4). Responses to these questions were standardized and added together to form a *descriptive norm* measure ($\alpha = .80$).

Moral norms were measured using items similar to those used by Beck and Ajzen (1991)

and consisted of four questions: 'It would feel right for me to breastfeed my baby', 'I would feel guilty about bottle feeding my baby', 'It would go against my principles to bottle feed my baby', and 'It would feel right for me to bottle feed my baby'. Responses options ranged from 'strongly disagree' (1) to 'strongly agree' (5) and were coded so that higher scores indicated a stronger moral norm to breastfeed (i.e. the final item was reversed). These scores were then summed and averaged ($\alpha = .77$).

Self-identity was measured using two items; 'Breastfeeding would be an important part of who I am', 'strongly disagree' (1) - 'strongly agree' (5); and 'I would feel upset if I was not able to breastfeed', 'strongly disagree' (1) - 'strongly agree' (5) ($\alpha = .75$). Two other items originally in the scale were removed due to their detrimental impact on internal consistency ('I wouldn't like other people to see me as the sort of woman who would breastfeed', and 'I wouldn't like other people to see me as the sort of woman who would bottle feed').

Behaviour was measured at several time points. Patient records included a form for medical staff to indicate if a participant had breastfed after birth while in hospital, method of feeding at discharge from hospital, and method of feeding 10 days after discharge. Behaviour was also measured at six weeks after discharge via a self-report questionnaire posted to participants. Responses were coded into 'no breastfeeding' (0) and 'any breastfeeding' (1) at each time point².

Design and Procedure

In order to recruit women living in areas of economic hardship, enumeration districts with an Index of Local Deprivation score of 6 and above (c.f. Robson et al., 1998) were mapped to their corresponding post code districts in four major English cities (using software written by the School of Geography, University of Leeds, UK). Complete lists of all postcodes corresponding to 'deprived' enumeration districts were produced for each locality. Agreement to participate in the

project was obtained from key stakeholders and from Research and Development Directorates in each of the maternity hospitals providing care to women living in the areas identified. Ethical approval was obtained from the Multi-centre Research Ethics Committee and the Local Research Ethics Committee for each hospital in each site. NHS Trusts responsible for maternity care in that area were asked to support the study by enabling their midwifery staff to inform and recruit women. Identified postcode lists were supplied to community midwives, who were asked to recruit eligible women into the study on our behalf.³ Participation in the study was sought by midwives when eligible primiparous women were approximately 20 weeks gestation, at which point pregnancy is more likely to reach successful completion with minimal risk to mother and baby. The midwife described the study to each eligible participant and provided an information leaflet about the project in English or one of 10 other languages. Midwives emphasized that taking part in the study was purely voluntary and that their responses would be treated in the strictest confidence. Potential participants were also informed that if they did not wish to take part, or they wished to withdraw at any time, this would have no affect on their future care. These points were reiterated in the information leaflet.

This process was carried out for primiparous women on each midwife's existing caseload and new bookings throughout the data collection phase (8-10 months in each city). Each participant was asked to provide written consent (in any of the 11 available language forms) and to choose her preferred method for completion for the questionnaire at a later stage in her pregnancy. The questionnaire could be self-completed (in any of the 11 available language forms) or with the assistance of a trained, independent and paid interviewer who would visit the participant at an agreed time and location of her choice. In order to minimize socially desirable responding, confidentiality was assured, and participants were informed that we were interested in their views, 'even if they were different from what they may have been told by anyone else'.

Midwives completed a feedback form for each eligible participant invited into the study and forwarded these to the researchers. The general practitioner for each participant was notified in writing about that woman's involvement in the study. Non-responders were followed-up with a reminder every 10 days during the remaining weeks of the pregnancy and, where requested, an interviewer with the relevant language skills was appointed from the pool of previously trained interviewers. Completed questionnaires were returned to the researchers by the woman ($N=283$) or interviewer ($N=18$) in a 'Freepost' envelope. On average, questionnaires were completed and returned 8.7 weeks before birth ($SD = 7.4$).

Eligible women who had agreed to take part, and who gave birth to a live baby, were sent a subsequent one-page follow up questionnaire approximately six weeks after their estimated delivery date (irrespective of whether they had completed and returned the main questionnaire)⁴. Completed follow up questionnaires were returned by 'Freepost' envelope, and as before, participants who did not return completed questionnaires were contacted at regular intervals. Feeding method data were also sought for all participants from hospital records in each hospital and from health visitors attending the home of each participant.

Results

We first assessed whether there were differences between respondents who had complete questionnaire and feeding data at all time points ($N = 248$) and those who had missing data on feeding data ($N = 53$). MANOVA revealed no significant multivariate differences on the measured variables ($F(11,281) = 1.19$, ns). Therefore in all analyses we used the 248 respondents for whom we had complete data.

--- Table 1 about here ---

The mean scores for each variable and the correlations among the variables are shown in Table 1. A total of 74% of our sample initiated breastfeeding after birth, although breastfeeding had dropped

to 65% at discharge from hospital, which was on average, 2.6 days later ($SD = 2.4$). Ten days after discharge the breastfeeding rate was 61% and this had further dropped to 44% at 6 weeks after discharge. On average this was a young sample (Mean = 24 years) who were relatively deprived (Mean Household Deprivation score (HDS) = 2.84; compared to a mean HDS of 2.70 for Social Class 5 households in UK) and who had left full time education after 17.6 years of age. The mean intention, attitudes, subjective norms, descriptive norms and self-identity scores were around the mid-point of the scale, while mean PBC and moral norms were somewhat below the mid-point.

The zero-order correlations indicated breastfeeding at each time point to be significantly positively associated with age and years in education and significantly negatively correlated with household deprivation and ethnicity (i.e., higher rates of breastfeeding in the non-white portion of the sample). With the exception of the correlation between age and breastfeeding at 6 weeks, the social cognitive variables were consistently more strongly related to breastfeeding than were the demographic variables (Table 1). Table 2 shows the ethnic breakdown of the sample.

--- Table 2 about here ---

Regressions to Predict Intention

Results of the regression of intention onto the demographic variables, TPB variables and additional variables are shown in Table 3. Age, household deprivation, ethnicity, and education were entered first (Step 1, Table 3) and explained 12.1% of the variance in intention ($F(4,242) = 8.21$, $p < .001$). Age and ethnicity were significantly associated with intention. Being older was associated with a stronger intention to breastfeed, whereas being in the white group was associated with a weaker intention to breastfeed. Attitudes, subjective norm, and PBC were entered next (Step 2, Table 3) and significantly increased the amount of variance in intention explained ($\Delta R^2 = .44$; $F(3,238) = 78.70$, $p < .001$), together all variables at this step explained 56.2% of the variance in intention ($F(7,238) = 43.02$, $p < .001$). Attitudes, subjective norms and PBC were each significantly positively associated with

intention, with attitudes having the greatest influence on intention. More positive attitudes, perceived approval of breastfeeding, and perceived control over breastfeeding were associated with stronger intention to breastfeed. We next entered (Step 3, Table 3) the additional variables (descriptive norms, moral norms, self-identity); these significantly increased the amount of variance in intention explained ($\Delta R^2 = 0.15$; $F(3,235) = 41.95$, $p < .001$), resulting in a total of 71.6% of the variance in intention being explained ($F(10,235) = 58.42$, $p < .001$). Moral norms ($p < 0.001$) and self-identity ($p < 0.001$), but not descriptive norms had significant beta weights; higher levels of moral norms and self-identity were associated with stronger intention to breastfeed. At this final step breastfeeding intention was significantly positively associated with attitudes, PBC, moral norms and self-identity, with no other variables being significant.

--- Table 3 about here ---

Regressions to Predict Behaviour

Table 4 reports logistic regression analyses to predict breastfeeding based on records of behaviour (if a participant had breastfed after birth, feeding method at discharge from hospital, and feeding method 10 days after discharge) and self reported behaviour (6 weeks after hospital discharge). Demographic variables were entered first (Step 1, Table 4), followed by intention and PBC (Step 2, Table 4), and other variables (Step 3, Table 4).

--- Table 4 about here ---

For predicting *ever having breastfed whilst in hospital* (Table 4, left-hand column), demographic variables correctly classified 76.3% of participants ($\chi^2(4) = 37.61$, $p < .001$; Nagelkerke $R^2 = .21$) with household deprivation, ethnicity, and education being significant (i.e., higher breastfeeding rates were found among the less deprived, non-white and more educated portions of the sample). Addition of intention and PBC (Step 2, Table 4) significantly improved the fit of the model ($\Delta\chi^2(2) = 79.42$, $p < .001$) and correctly classified an additional 8.6% of participants,

resulting in 84.9% of participants being correctly classified ($\chi^2(6) = 117.03$, $p < .001$; Nagelkerke $R^2 = .56$). Only intention significantly added to prediction at this step and this reduced the impact of ethnicity and education to non-significance. Addition of attitude, subjective norm, descriptive norm, moral norm and self-identity (Step 3, Table 4) significantly improved the fit of the model ($\Delta\chi^2(5) = 18.32$, $p < .001$) and correctly classified an additional 3.7% of participants, resulting in 88.6% of participants being correctly classified ($\chi^2(11) = 135.35$, $p < .001$; Nagelkerke $R^2 = .63$) with household deprivation, intention and attitude significant. Higher levels of breastfeeding were associated with lower household deprivation, stronger intention to breastfeed and more positive attitudes towards breastfeeding.

For predicting *breastfeeding at discharge from hospital* (Table 4, second column from left), demographic variables correctly classified 73.5% of participants ($\chi^2(4) = 43.63$, $p < .001$; Nagelkerke $R^2 = .23$) with age, household deprivation and ethnicity being significant (i.e., higher breastfeeding rates among the older, less deprived and non-white participants in the sample). Addition of intention and PBC (Step 2, Table 4) significantly improved the fit of the model ($\Delta\chi^2(2) = 77.27$, $p < .001$) and correctly classified an additional 10.2% of participants, resulting in 83.7% of participants being correctly classified ($\chi^2(6) = 120.90$, $p < .001$; Nagelkerke $R^2 = .54$). Only intention significantly added to prediction at this step, while the impact of age and household deprivation were reduced to non-significance. Addition of other variables (Step 3, Table 4) significantly improved the fit of the model ($\Delta\chi^2(5) = 20.43$, $p < .001$) and correctly classified an additional 3.6% of participants, resulting in 87.3% of participants being correctly classified ($\chi^2(11) = 141.33$, $p < .001$; Nagelkerke $R^2 = .61$) with intention and attitude significant at this step. Higher levels of breastfeeding were associated with stronger intention to breastfeed and more positive attitudes towards breastfeeding.

For predicting *breastfeeding 10 days after discharge from hospital* (Table 4, third column from left), demographic variables correctly classified 71.3% of participants ($\chi^2(4) = 44.87$, $p < .001$; Nagelkerke $R^2 = .54$). Only intention significantly added to prediction at this step and this reduced the impact of ethnicity and education to non-significance. Addition of attitude, subjective norm, descriptive norm, moral norm and self-identity (Step 3, Table 4) significantly improved the fit of the model ($\Delta\chi^2(5) = 18.32$, $p < .001$) and correctly classified an additional 3.7% of participants, resulting in 88.6% of participants being correctly classified ($\chi^2(11) = 135.35$, $p < .001$; Nagelkerke $R^2 = .63$) with household deprivation, intention and attitude significant. Higher levels of breastfeeding were associated with lower household deprivation, stronger intention to breastfeed and more positive attitudes towards breastfeeding.

.001; Nagelkerke R^2 = .23) with age, ethnicity and education being significant (i.e., higher breastfeeding rates were found among the older, non-white and more educated participants in the sample). Addition of intention and PBC (Step 2, Table 4) significantly improved the fit of the model ($\Delta\chi^2(2) = 66.57, p < .001$) and correctly classified an additional 9.5% of participants, resulting in 80.7% of participants being correctly classified ($\chi^2(6) = 111.45, p < 0.001$; Nagelkerke R^2 = .50), although only intention significantly added to prediction, displacing age from the equation. Addition of other variables (Step 3, Table 4) significantly improved the fit of the model ($\Delta\chi^2(5) = 26.62, p < .001$) and correctly classified an additional 2.4% of participants resulting in 83.1% of participants being correctly classified ($\chi^2(11) = 138.06, p < .001$; Nagelkerke R^2 = .59) with education, intention, attitude and descriptive norms achieving significance at this step. Higher levels of breastfeeding were associated with more education, a stronger intention to breastfeed, more positive attitudes towards breastfeeding, and greater perceived descriptive norms of breastfeeding.

For predicting self-reported *breastfeeding 6 weeks after discharge from hospital* (Table 4, right-hand column), demographic variables correctly classified 70.9% of participants ($\chi^2(4) = 61.40, p < .001$; Nagelkerke R^2 = .28) with age, household deprivation and ethnicity being significant (i.e., higher breastfeeding rates were found among the older, less deprived and non-white portions of the sample). Addition of intention and PBC (Step 2, Table 4) significantly improved the fit of the model ($\Delta\chi^2(2) = 46.12, p < .001$) and correctly classified an additional 5.2% of participants, resulting in 76.1% of participants being correctly classified ($\chi^2(6) = 107.53, p < .001$; Nagelkerke R^2 = .44) with both variables significantly adding to predictions. Addition of other variables (Step 3, Table 4) significantly improved the fit of the model ($\Delta\chi^2(5) = 14.43, p < .001$) and correctly classified an additional 1.9% of participants resulting in 78.0% of participants being correctly classified ($\chi^2(11) = 121.95, p < .001$; Nagelkerke R^2 = .49) with age, household deprivation, ethnicity and moral norms significant at this step. Higher levels of breastfeeding were

associated with older, less deprived, non-white participants in the sample, and those who perceived stronger moral norms to breastfeed.

Discussion

This study was novel in examining the predictors of breastfeeding shortly after birth, at discharge from hospital and at 10 days and 6 weeks after birth among a sample of women living in areas of social deprivation. The rates of breastfeeding in this deprived sample were high at birth (74% any breastfeeding), but had dropped to 44% at 6 weeks. The data are not directly comparable to the rates reported for the general population at birth in the UK (~70%; Hamlyn et al., 2002) potentially because these focus on exclusive breastfeeding. In addition, breastfeeding rates were significantly lower in our study among the younger, more deprived, white, and less educated portions of the sample (Table 1). Interestingly, while intentions to breastfeed were also significantly lower in the younger, more deprived, white and less educated portions of the sample (Table 1), these differences due to demographic factors were non-significant when taking account of TPB and additional variables (Table 3; i.e., evidence of mediation of demographic variables on intentions). The significant predictors of strong intention to breastfeed were having positive attitudes, high PBC, high moral norms to breastfeed, and a strong self-identity as a 'breastfeeder'. Together these variables explained an impressive 72% of the variance in intention to breastfeed. This is higher than the values reported in previous studies using the TRA (e.g., Manstead et al., 1983, 1984) or TPB (e.g., Avery et al., 1998; Dodgson et al., 2003), although these studies similarly reported attitudes and also PBC for the TPB studies to be significant predictors of intention. The present study particularly identified moral norms and self-identity from the additional variables examined to be strong predictors of intention to breastfeed in this sample of women living in areas of economic hardship (Table 3), although descriptive norm failed to add to predictions.

Analysis of the predictors of breastfeeding at the different time points revealed a more differentiated pattern of findings. Among the demographic variables only ethnicity was

consistently related to breastfeeding at each time point when controlling for other demographic influences (Table 4, step 1), with higher breastfeeding rates in the non-white portion of the sample. Previous studies have also found that white women in England are much less likely to breastfeed than women who are Asian, Black or mixed ethnicity (e.g. Griffiths, Tate, & Dezateux, 2005). Future studies could usefully seek to determine the characteristics of these different ethnic groups that lie behind the differential breastfeeding rates, and information of this kind may be able to inform future interventions.

Breastfeeding was also independently positively related to age (at each time point except the first), negatively related to household deprivation (at 3 out of 4 time points), and positively related to education (at 2 out of 4 time points). Intention to breastfeed consistently emerged as a significant and strong predictor of breastfeeding at birth, discharge from hospital, and 10 days, partially mediating the effects of demographic factors (Table 4, step 2). The fact that intention was not significantly predictive of breastfeeding at six weeks may be an item correspondence issue, i.e. participants were asked about their strength of intention to breastfeed, rather than their strength of intention to breastfeed *for six weeks*. PBC only emerged as a significant independent predictor of breastfeeding at 6 weeks. It may be the case that control becomes a more relevant issue as time progresses and women potentially encounter an increasing number of obstacles to breastfeeding. These findings are consistent with previous studies using the TRA (Manstead et al., 1984) and TPB (Dodgson et al., 2003; Wambach, 1997) and indicate these findings extend to breastfeeding in a sample of women living in areas of economic hardship.

Of the other variables, attitudes independently added to predictions of breastfeeding at each time point except 6 weeks, while descriptive norms were a significant independent predictor at 10 days, and moral norms were a significant independent predictor at 6 weeks (Table 4, step 3). In each case higher levels of breastfeeding were associated with more positive attitudes towards breastfeeding, knowing more individuals who breastfeed, or having a strong moral norm about the

need to breastfeed. These latter findings are novel to the present study and might usefully be assessed in studies of non-deprived women. From a theoretical perspective, they are counter to Ajzen's (1991) assertion that attitudinal and normative influences on behaviour are mediated by intentions.

The current findings also indicate that while intention and attitudes are strong predictors of breastfeeding and appear to partly mediate the influence of demographic factors in the early stages of breastfeeding (of the demographic variables only the effects of household deprivation at birth and education at 10 days remain unmediated), by 6 weeks of age, deprivation, and ethnicity re-emerge as predictors of breastfeeding independently of the TPB and additional variables. However, this probably underestimates the effects of deprivation given the restricted range on this variable in our study due to the selective nature of the sample (i.e., recruited from defined areas of deprivation). Nevertheless the findings are encouraging in indicating the power of intention to breastfeed reported during pregnancy in predicting later breastfeeding even in a sample of women living in areas of economic hardship. Attitudes towards breastfeeding reported during pregnancy also appear important, at least in predicting initiation of the behaviour (up to 10 days), while descriptive norms, moral norms, and PBC may be important in relation to later breastfeeding in this sample. Future studies could usefully investigate issues associated with breastfeeding maintenance. It is possible for example that interventions need to target issues relating to breastfeeding efficacy both before birth and post-natally to deal with problems associated specifically with maintenance. All these variables constitute useful targets for intervention designed to increase breastfeeding in this group of women. Fishbein and Ajzen (1975) suggest that persuasive communications targeting beliefs about the salient outcomes of a behaviour are the best way to change attitudes (see Hardeman et al., 2002 for examples in health domain). Descriptive norms might be changed by messages highlighting examples of women who are 'breastfeeders' from everyday life and the celebrity world (i.e., role models). In contrast moral norms may be more difficult to change, although persuasive messages focusing on the importance of considering others' needs (Godin,

Conner, & Sheeran, 2005) may represent one possibility. Further research is required here, although messages emphasizing the infant's needs and the role of breastfeeding in protecting his/her future health and the hazards of formula feeding, for example, might be one means of strengthening moral norms in relation to breastfeeding. In relation to PBC or self-efficacy, Bandura (1986) outlines four ways in which perceptions of control over a behaviour can be enhanced; through personal mastery experience by the setting and achieving of sub-goals (e.g., trying breastfeeding), through observing other's success, through standard persuasive techniques, and through the use of relaxation techniques (e.g., to control feelings of stress or anxiety when breastfeeding).

There are a number of methodological limitations to the reported research that should be acknowledged. Self-report studies carry a risk of socially desirable responding. Attempts were made to minimise this by assurances of confidentiality, and stressing to participants that we were interested in their views, irrespective of how they feel others might wish them to behave. Secondly, the short period of time over which behaviour was observed does not allow us to examine the predictors of longer term breastfeeding. Longer term follow-up would have been preferable given the health benefits of breastfeeding increase up until at least 6 months after birth (Butte et al., 2002). Nevertheless in the present research we placed the focus on getting observational (i.e., non-self-report) data even though this limited us to obtaining data on any, rather than exclusive, breastfeeding and limited us to the period shortly after birth when contact with health professionals who could observe the method of feeding was frequent. It would be useful for future research to test the observed relationships over longer durations of breastfeeding in samples of economically deprived women. Third, in only examining primiparous women we were unable to generalize our results to women having their second and subsequent children. However, previous research suggests that method of feeding with the first child, and its duration, has the strongest influence on choice of feeding with subsequent children (Bolling, 2006; De Vanzo, Starbird, & Leibowitz, 1990; Hamlyn et al., 2002). Fourth, there is a need to develop, and test the validity and reliability of

additional measures, such as self-identity, to the same extent as the traditional TPB measures (c.f. Sparks, 2000). Finally, it would be important for future research to test the efficacy of interventions targeting the variables identified here in actually changing breastfeeding rates in women from different backgrounds.

In conclusion, the present research demonstrated the value of the TPB and the additional variables studied in helping to understand breastfeeding in women living areas of economic hardship. The present research would appear to indicate that like women living in less deprived areas, these women's intention to breastfeed are based on their attitudes to breastfeeding and their PBC about breastfeeding (Avery et al., 1998). It also indicated the importance of moral norms and self-identity in relation to breastfeeding in determining intention, a finding yet to be tested with other women. In relation to predictors of breastfeeding, like other studies of non-deprived women, intention emerged as a significant predictor of breastfeeding; unlike other studies attitudes also emerged as independent significant predictors of early breastfeeding (up to 10 days), while descriptive norms (at 10 days), moral norms (6 weeks) and PBC (6 weeks) emerged as significant predictors of later breastfeeding (see Dodgson et al., 2003 for a similar finding for PBC). Further research might usefully test the effectiveness of interventions targeting such variables in increasing breastfeeding uptake and increased duration.

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Footnotes

1. Eligible participants were defined as those living in an area of high deprivation (Index of Local Deprivation scores ≥ 6 ; Robson et al., 1998). Eleven percent of all households in England and Wales are defined by this cut-off, in which 14% of first births occur.
2. We only obtained hospital records of breastfeeding at 6 weeks from 95 participants, therefore self-report data were employed. The results for this time point were not substantively changed by using the hospital record data.
3. In one site, a local coordinator was appointed to screen hospital maternity records to identify women who: (a) were 20-36 weeks pregnant, (b) had not had any previous live births, and (c) lived in an area with an eligible postcode. Midwives were informed if they had eligible women on their caseload, and were provided with the details of these eligible women, and the materials necessary to recruit them into the project.
4. Any woman recruited into the project who had a stillbirth, an early neonatal death or whose baby had congenital malformations, was not contacted by project staff to collect infant feeding data. The placement of a sticker on a woman's notes when recruited into the project, combined with internal systems for notification of relevant staff in the event of severe problems, ensured the project was informed at the earliest possible opportunity of any such eventualities.

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Table 1. Correlations Amongst Measured Variables and Descriptive Statistics (Means and SDs) ($N = 248$).

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	Mean	SD
1. Breastfeed at birth	.80	.72	.51	.21	-.26	-.22	.23	.67	.58	.49	.45	.41	.52	.51	.74	.44
2. Breastfeed at discharge		.77	.61	.27	-.24	-.22	.25	.65	.56	.50	.46	.42	.49	.48	.65	.48
3. Breastfeed at 10 days			.70	.25	-.17	-.26	.28	.58	.52	.44	.43	.47	.51	.47	.61	.49
4. Breastfeed at 6 weeks				.33	-.22	-.20	.26	.46	.42	.33	.42	.39	.46	.38	.44	.50
5. Age					-.28	.09	.32	.22	.09	.04	.16	.22	.19	.13	24.02	5.37
6. Household deprivation						-.06	-.17	-.16	-.11	-.08	-.10	-.10	-.13	-.07	2.84	1.98
7. Ethnicity							-.15	-.20	-.32	-.28	-.26	-.28	-.23	-.25	.40	.49
8. Education								.22	.18	.22	.10	.17	.16	.13	17.62	2.54
9. Intention									.67	.57	.63	.44	.75	.67	3.81	1.38
10. Attitudes										.58	.65	.41	.57	.50	4.12	.89
11. Subjective norms											.50	.42	.51	.51	4.06	1.03
12. PBC												.38	.57	.49	3.53	1.06
13. Descriptive norms													.45	.41	-.03	.80
14. Moral Norms														.61	3.03	1.00
15. Self-identity															3.75	1.21

Note $r > .13$, $p < .05$; $r > .16$, $p < .01$; $r > .21$, $p < .001$. Behaviour measures are from hospital records except at 6 weeks where data is self-report (at 6 weeks $r_{\text{hospital-self-report}} = .59$, $p < .001$, $N = 95$).

Table 2: Ethnicity of sample

	Frequency	Percent
White	96	38.7
Indian	6	2.4
Pakistani	80	32.3
Bangladeshi	24	9.7
Chinese	1	.4
Caribbean	8	3.2
African	11	4.4
Black - British	15	6.0
Black - other	1	.4
British Indian	1	.4
Mixed race	3	1.2
Missing	2	.8
Total	248	100.0

Table 3: Multiple Regression of Behavioural Intention onto TPB and Additional Variables ($N = 248$).

Independent Variable		ΔR^2	R^2	B	SE B	β
Step 1						
<u>Step 1</u>	Age	.12***	.12***	.04	.02	.16**
	Household Deprivation			-.07	.04	-.10
	Ethnicity			-.60	.17	-.22***
	Education			.06	.03	.12
<u>Step 2</u>	Age	.44***	.56***	.02	.01	.09
	Household Deprivation			-.03	.03	-.04
	Ethnicity			.10	.13	.04
	Education			.03	.03	.05
	Attitude			.52	.10	.34***
	Subjective Norm			.31	.07	.23***
	PBC			.37	.08	.28***
<u>Step 3</u>	Age	.15***	.72***	.01	.10	.04
	Household Deprivation			-.02	.03	-.03
	Ethnicity			.19	.11	.07
	Education			.03	.02	.05
	Attitude			.33	.08	.22***
	Subjective Norm			.09	.06	.07
	PBC			.17	.07	.13**
	Descriptive Norm			.03	.07	.02
	Moral Norm			.49	.07	.36***
	Self-Identity			.29	.05	.25***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 4. Logistic Regressions of Behaviour onto TPB Variables and Additional Predictors (*N* = 248).

Independent Variable	<u>Breastfeed at birth</u>				<u>Breastfeed at discharge</u>				<u>Breastfeed at 10 days</u>				<u>Breastfeed at six weeks</u>			
	R ²	B	SE B	Wald	R ²	B	SE B	Wald	R ²	B	SE B	Wald	R ²	B	SE B	Wald
<u>Step 1</u>	.21***				.23***				.23***				.28***			
Age		.06	.04	3.26		.10**	.03	8.09		.09**	.03	7.56		.14***	.03	18.98
Household Deprivation		-.23**	.08	7.43		-.18*	.08	5.13		-.09	.08	1.46		-.21**	.08	7.02
Ethnicity		-1.04**	.33	10.09		-1.07***	.31	12.07		-1.22***	.30	16.00		-1.18***	.32	13.21
Education		.16*	.08	3.89		.14	.07	3.70		.17*	.07	6.01		.11	.06	3.53
<u>Step 2</u>	.56***				.54***				.50***				.44***			
Age		.03	.05	.34		.08	.04	3.40		.07	.04	3.39		.13***	.04	12.95
Household Deprivation		-.29**	.11	6.90		-.19	.10	3.76		-.05	.09	.31		-.20*	.09	5.45
Ethnicity		-.71	.43	2.77		-.88*	.39	5.10		-1.02**	.37	7.60		-1.03**	.37	7.90
Education		.10	.11	.85		.10	.09	1.29		.17*	.08	4.25		.11	.06	2.71
Intention		1.17***	.19	35.96		1.05***	.18	34.45		.91***	.17	27.65		.59***	.17	11.56
PBC		.07	.24	.09		.18	.21	.73		.29	.21	1.95		.54**	.19	7.64
<u>Step 3</u>	.62***				.60***				.55***				.46***			
Age		.03	.05	.46		.09	.05	3.82		.08	.04	3.19		.14**	.04	12.36
Household deprivation		-.29*	.12	5.82		-.16	.10	2.54		-.01	.10	.01		-.20*	.09	5.54
Ethnicity		-.24	.49	.24		-.46	.44	1.09		-.50	.42	1.41		-.77*	.39	3.87
Education		.07	.12	.37		.08	.10	.68		.20*	.09	4.48		.11	.07	2.68
Intention		.85***	.27	10.26		.83***	.24	12.06		.45*	.23	3.99		.12	.22	.33
Perceived Behavioural Control		-.55	.31	3.04		-.36	.27	1.71		-.24	.27	.85		.26	.22	1.32
Attitude		1.16**	.39	8.71		1.17**	.39	8.86		1.00**	.38	6.89		.50	.35	2.08
Subjective Norm		.19	.27	.47		.42	.25	2.79		.13	.24	.28		.11	.23	1.32
Descriptive Norm		.42	.33	1.62		.39	.28	2.04		.78**	.27	8.29		.32	.23	1.92
Moral Norm		.03	.36	.01		-.16	.33	.24		.52	.31	2.79		.55*	.25	4.91
Self-Identity		.32	.23	2.01		.17	.20	.66		.16	.21	.57		.17	.19	.74

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.