Appetite 56 (2011) 674–681

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Predicting mothers' decisions to introduce complementary feeding at 6 months. An investigation using an extended theory of planned behaviour☆

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ARTICLE INFO

Article history:
Received 28 July 2010
Received in revised form 26 January 2011
Accepted 5 February 2011
Available online 21 February 2011

Keywords:
Complementary feeding
Introduction to solids
Theory of planned behaviour
Group norms

ABSTRACT

In Australia and other developed countries there is poor adherence to guidelines recommending the introduction of complementary feeding to infants at 6 months of age. We aimed to investigate, via adopting a theory of planned behaviour framework and incorporating additional normative and demographic influences, mothers' complementary feeding intentions and behaviour. Participants were 375 primiparas who completed an initial questionnaire (infant age 13 ± 3 weeks) that assessed the theory of planned behaviour constructs of attitude, subjective norm, and perceived behavioural control, as well as group norm and additional maternal and infant variables of mothers' age, education level, weight status perception, current maternal feeding practices, and infant birth weight. Approximately, 3 months after completion of the main questionnaire, mothers completed a follow-up questionnaire that assessed the age in months at which the infant was first introduced to solids. The theory of planned behaviour variables of attitude and subjective norm, along with group norm, predicted intentions, with intention, mothers' age (older more likely), and weight status perception (overweight less likely) predicting behaviour. Overall, the results highlight the importance of attitudes, normative influences, and individual characteristics in complementary feeding decision-making which should be considered when designing interventions aimed at improving adherence to current maternal feeding guidelines.

Introduction

Currently in Australia and other developed countries there is a lack of research examining the decision-making processes of complementary feeding practices (otherwise termed introduction of solids). The theory of planned behaviour (TPB; Ajzen, 1991) is a well-validated behavioural decision-making model that has been used to predict social and health behaviours (Armitage & Conner, 2001), including maternal breastfeeding practices (e.g., McMillan et al., 2008). The aim of the current study was to investigate, using a TPB framework, mothers' complementary feeding intentions and behaviour.

A key developmental and nutritional milestone for infants is commencement of complementary feeding, whereby an infant previously fed only breast milk or formula is introduced to a wide variety of foods (National Health and Medical Research Council, 2003). In 2003 the World Health Organisation adopted a '*global public health recommendation [that] infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health*'. Exclusive breastfeeding is defined as no other fluids including water or food (World Health Organisation, 2003). Australian guidelines were modified accordingly to also recommend exclusive breastfeeding for the first 6 months of life (National Health and Medical Research Council, 2003). Following from this recommendation is the reciprocal guideline that the introduction of complementary foods (i.e., any solid or liquid food additional to breast milk or formula; Agostoni et al., 2008), should be delayed until 6 months of age (National Health and Medical Research Council, 2003). Given that the introduction of complementary feeding prior to 6 months precludes adherence to the recommendation to exclusive breastfeeding for 6 months, it is difficult to independently verify outcomes and, hence, establish evidence separately for either of these recommendations. Generally, the evidence for the complementary feeding guidelines focuses on the benefits of exclusive breastfeeding rather than potential independent negative outcomes of introduction of solids between 4 and 6 months (Arden, 2010). Although the benefits of exclusive breastfeeding are well established, particularly in

☆ The authors would like to thank Sierra Van Wyk for her research assistance on this project and extend appreciation to all the mothers who volunteered to participate in this study. This recruitment of participants in this study was funded by the National Health and Medical Research Council. Nicole Murray was supported by doctoral scholarship from Queensland University of Technology.

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0195-6663/$ – see front matter.
doi:10.1016/j.appet.2011.02.002

developing countries, there are few studies that have examined independent outcomes of delaying introduction of solids to 6 months in formula fed infants who, by definition, are not exclusively breastfed.

Australian guidelines recommend the introduction of solids '*at around*' 6 months to meet the increased nutritional and developmental needs of infants (National Health and Medical Research Council, 2003). It is argued that earlier solid introduction shows no benefits and, particularly prior to 4 months, may be associated with negative outcomes such as inadequate nutrient and energy intake due to displacement of breast milk and formula and stress on immature gastrointestinal, immune, and renal systems (Arden, 2010; Kaye, Patterson, Croaker, Norton, & Lewis, 2008; Naylor & Morrow, 2001). Despite these clear recommendations to the contrary, many mothers introduce solids before their child reaches 6 months of age. A 2003 telephone survey of 1201 children under 5 years in Queensland, Australia reported that 18% and 67% of infants started complementary foods before the ages of 4 and 6 months, respectively (Gabriel, Pollard, Suleman, Coyne, & Vidgen, 2005). A recent representative United States study reported 51% of mothers had introduced solids by 4 months (Grummer-Strawn, Scanlon & Fein, 2008). Similar prevalence rates have been found in other developed countries (Bolling, Grant, Hamlyn, & Thornton, 2007; Hetzner, Razza, & Brooks-Gunn, 2009).

Despite the importance of timely introduction of solids and the widespread poor adherence to the guidelines, studies examining the potentially modifiable behavioural factors influencing complementary feeding decisions in developed countries are scarce. Most studies (e.g., Alder et al., 2007; Scott, Binns, Graham, & Oddy, 2009; Wright, Parkinson & Drewett, 2004) have examined factors associated with weaning prior to 4 months of age which was consistent with the old guidelines. Only a single recent study (N = 140 well educated mothers) from the United Kingdom (UK) has explicitly examined a range of factors important to the decision to introduce solids at 6 months of age (see Arden, 2010). Even fewer studies have used an established theoretical framework to explore maternal enablers and barriers to timely solid introduction (Brophy-Herb, Silk, Horodynski, Mercer, & Olson, 2009) or considered potential infant and maternal covariates. A systematic review of 33 studies, 7 of which were from developed countries, identified a range of interrelated social factors such as young maternal age, lower socioeconomic status, lower educational achievement, ethnicity, and formula feeding that are associated with early complementary feeding (see Lanigan, Bishop, Kimber, & Morgan, 2001). While these largely demographic maternal and infant characteristics are important, the majority is not readily modifiable and do not explain the complexity of social and psychological influences that underpin decisions about complementary feeding. Given the reciprocal relationship between the breastfeeding and complementary feeding guidelines, understanding these factors is also important in improving duration of exclusive breastfeeding. Understanding psychosocial predictors will allow us to assess if current messages accurately target the beliefs and behaviours that contribute to poor adherence to both the breastfeeding and complementary feeding guidelines.

Theory of planned behaviour

The theory of planned behaviour (TPB; Ajzen, 1991) is a well-validated behavioural decision-making model, widely employed to examine the psychosocial influences on behaviour. The TPB proposes the most proximal determinant of behavioural outcomes is intention to perform a given behaviour which is, in turn, predicted by three belief-based constructs: attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Attitudes are the positive or negative evaluations by an individual about the consequences of performing a particular behaviour. Subjective norms refer to the perceived pressure from important others to perform or not to perform an action. Perceived behavioural control, which is similar to the concept of self-efficacy, refers to one's perceived ease of performing a given behaviour and is also proposed to influence behaviour directly. The TPB has been used to examine a wide range of behaviours, including nutritional and dietary practices (e.g., Blanchard et al., 2009; Verbeke & Vackier, 2005). A meta-analysis (Armitage & Conner, 2001) found that the TPB accounted for an average of 39% of the variance in people's intentions and 27% of the variance in behaviour.

Theory of planned behaviour and the prediction of maternal feeding behaviours

A small number of studies have applied the TPB model to examine maternal feeding practices, most of which are related to breastfeeding behaviours. McMillan et al. (2008) investigated breastfeeding uptake in primiparas (N = 248) experiencing material hardship. Consistent with the specifications of the TPB, attitudes, subjective norm, and perceived behavioural control were all significant predictors of mothers' intentions to breastfeed (explaining 56% of the variance after controlling for age, ethnicity, education, and deprivation), with intention and perceived behavioural control predicting breastfeeding behaviour 6-weeks later (explaining 44% of the variance after controlling for age, ethnicity, education, and deprivation). Other researchers (e.g., Khoury, Moazzem, Jarjoura, Carothers, & Hinton, 2005; Swanson & Power, 2005) have found attitudes and subjective norms, but not perceived behavioural control, to predict breastfeeding initiation and continuation. Given the success of the TPB model in predicting other maternal feeding behaviours, it is plausible that this framework would be useful in examining complementary feeding practices.

One of the few studies to use TPB to explore complementary feeding behaviour is from Horodynski et al. (2007) who used the TPB framework in a qualitative thematic analysis from six focus groups (N = 23) with low income mothers in the United States. The aim was to examine knowledge and attitudes regarding introduction of solids in the context of the recommendation of introduction no earlier than 4–6 months. Mothers knew and approved of the recommendation but infant factors such as sleep patterns and satiety weakened their intention to delay introduction. They also identified subjective norms based on social pressure from families, avoiding negative effects of early solid introduction (rather than positive outcomes of later introduction), and low perceived behavioural control (e.g., diagnosis of acid reflux) as important influences on complementary feeding behaviour. However, these conclusions were based on qualitative rather than quantitative analyses.

Despite the success of the TPB in predicting maternal breastfeeding behaviours, as is the case for most studies using the TPB as a predictive model, there still remains a proportion of unaccounted variance. Ajzen (1991) supports the inclusion of additional predictors to the model to improve its prediction of people's intentions and/or behaviour. However, there should be a strong theoretical justification for inclusion of additional predictors and they should capture a significant portion of unique variance in intentions or behaviour. Increasingly, researchers have recognized the importance of normative influences from relevant referent social groups and have included an assessment of group norms in the model (see e.g., Hamilton & White, 2008; White, Smith, Terry, Greenslade, & McKimmie, 2009), including in studies investigating food choice behaviours (e.g., Carrus, Nenci, & Caddeo,