



Research review

Picky/fussy eating in children: Review of definitions, assessment, prevalence and dietary intakes

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ABSTRACT

Picky eating (also known as fussy, faddy or choosy eating) is usually classified as part of a spectrum of feeding difficulties. It is characterised by an unwillingness to eat familiar foods or to try new foods, as well as strong food preferences. The consequences may include poor dietary variety during early childhood. This, in turn, can lead to concern about the nutrient composition of the diet and thus possible adverse health-related outcomes. There is no single widely accepted definition of picky eating, and therefore there is little consensus on an appropriate assessment measure and a wide range of estimates of prevalence. In this review we first examine common definitions of picky eating used in research studies, and identify the methods that have been used to assess picky eating. These methods include the use of subscales in validated questionnaires, such as the Children's Eating Behaviour Questionnaire and the Child Feeding Questionnaire as well as study-specific question(s). Second, we review data on the prevalence of picky eating in published studies. For comparison we present prevalence data from the UK Avon Longitudinal Study of Parents and Children (ALSPAC) in children at four time points (24, 38, 54 and 65 months of age) using a study-specific question. Finally, published data on the effects of picky eating on dietary intakes (both variety and nutrient composition) are reviewed, and the need for more health-related data and longitudinal data is discussed.

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1. Introduction

Picky eating, also known as fussy, faddy or choosy eating, is sometimes seen as being on the spectrum of 'feeding difficulties', where picky eating is the most common form at one end, with severe eating disorders at the other (McCormick & Markowitz, 2013). Others, however, view picky eating as having characteristics that are completely distinct from feeding disorders (Kerzner et al., 2015). Food preferences and suspicion of new foods in infancy may have had evolutionary benefits in reducing the risk of consuming toxins, but in the modern world these behaviours can

provide a barrier to the acceptance of some food items. Picky eating and food neophobia (reluctance to eat or avoidance of new foods) can prevent an increase in dietary variety, and this lack of variety can lead to concern about the nutrient composition of some children's diets (Carruth et al., 1998; Jacobi, Agras, Bryson, & Hammer, 2003; Northstone & Emmett, 2013).

The development of picky eating may be affected by factors such as pressure to eat, personality factors, and parental practices/feeding styles, including parental control and social influences (Jani Mehta, Mallan, Mhrshahi, Mandalika, & Daniels, 2014; Moroshko & Brennan, 2013), as well as specific factors, such as the absence of exclusive breastfeeding, the introduction of complementary foods before 6 months (Shim, Kim, Mathai, & Team, 2011), and the late introduction of chewy foods (Northstone, Emmett, Nethersole, & ALSPAC Study Team, 2001). Picky eating appears to affect girls and boys equally (Moroshko & Brennan, 2013), but the presence of siblings seems to be protective against the development of picky eating, as does greater maternal age (Hafstad, Abebe, Torgersen, & von Soest, 2013). Maternal healthy eating behaviour has been

List of abbreviations: ALSPAC, Avon Longitudinal Study of Parents and Children; CEBQ, Children's Eating Behaviour Questionnaire; CFQ, Child Feeding Questionnaire; RNI, Reference Nutrient Intake.

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associated with lower child food fussiness (Gregory, Paxton, & Brozovic, 2010). Although some studies report a higher intake of energy (Finistrella et al., 2012) or energy-dense foods such as savoury snacks and sweets (Tharner, Jansen, Kiefte-de Jong, Moll, & van der Ende, 2014) among children who are picky eaters, most report that picky eating is likely to lead to a reduction in overall food consumption and a distortion of the nutrient composition of the diet through lack of variety [reduced energy intake (Cardona Cano et al., 2015; Carruth, Ziegler, Gordon, & Barr, 2004; Jacobi et al., 2003; Volger et al., 2013); lower intake of fruits and vegetables (Dubois, Farmer, Girard, & Peterson, 2007; Galloway, Fiorito, Lee, & Birch, 2005; Haszard, Skidmore, Williams, & Taylor, 2014; Horodyski, Stommel, Brophy-Herb, Xie, & Weatherspoon, 2010; Jacobi et al., 2003; Tharner et al., 2014); lower intake of vitamins and minerals (Cardona Cano et al., 2015; Carruth et al., 2004; Galloway et al., 2005); and lower intakes of whole grain products and dietary fibre (Galloway et al., 2005)]. This can lead to a higher risk of being underweight and having poor growth (Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Ekstein, Laniado, & Glick, 2010; Jansen et al., 2012; Kwok, Ho, Chow, So, & Leung, 2013; Sleddens, Kremers, & Thijs, 2008; Viana, Sinde, & Saxton, 2008; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009), or of being overweight (Finistrella et al., 2012), or of developing eating disorders (Marchi & Cohen, 1990). Caregiver stress and effects on family relationships are likely (Goh & Jacob, 2012).

There is no single widely accepted definition of picky eating, although most definitions include an element of restricted intake of familiar foods, sometimes with a further degree of food neophobia (Dovey, Staples, Gibson, & Halford, 2008). This is further complicated by the use of a variety of terminology, including picky eating, fussy eating, choosy eating and faddy eating. As a result of this, several different measures have been developed to assess picky eating, ranging from a single item question to more complex multi-item sub-scales in larger questionnaires. In this review, we first examine the range of definitions and assessment measures used in current research and assess how these can affect the prevalence of picky eating. For comparison we report on the prevalence obtained using a study-specific measure of picky eating in a longitudinal cohort of children from the UK (the Avon Longitudinal Study of Parents and Children, ALSPAC) and investigate the changes in prevalence of picky eating found when using the same measure in the cohort at four ages between 2 and 5.4 years. Last, we review the current literature relating picky eating to dietary intake.

2. Definition, assessment method and prevalence

2.1. Identification of studies on picky eating

Literature searches were made with PubMed, Google Scholar, Web of Science, Medline and Embase using the keywords 'picky eating', 'picky eater', 'picky', 'fussy eating', 'fussy eater', 'fussy', 'fussiness', 'choosy', 'choosiness', 'neophobia', 'slow eating' and 'slow eater' in June 2015. Further studies were identified by checking the reference lists of papers identified in the searches. From these searches, 65 papers and abstracts were found that described studies in which the authors used questionnaires to identify picky eating in groups of children, published from 1990 to 2015 (see Table 1).

2.2. Definition of picky eating

At present there is no single widely accepted definition of picky eating, and therefore little consensus on the appropriate measure of assessment.

The range of definitions of picky eating used in research

settings, include, for example:

- Consumption of an inadequate variety of food through rejection of a substantial number of foods that are familiar, as well as unfamiliar; this may include an element of food neophobia, and can be extended to include rejection of specific food textures (Dovey et al., 2008).
- Restricted intake of food, especially of vegetables, and strong food preferences, leading parents to provide a different meal from the rest of the family (Mascola, Bryson, & Agras, 2010).
- Unwillingness to eat familiar foods or try new foods, severe enough to interfere with daily routines to an extent that is problematic to the parent, child, or parent–child relationship (Lumeng, 2005, cited in Ekstein et al., 2010).
- Consumption of an insufficient amount or inadequate variety of food through rejection of food items (Hafstad et al., 2013).
- Limited number of food items in the diet, unwillingness to try new foods, limited intake of vegetables and some other food groups, strong food preferences (likes/dislikes), and special preparation of foods required (Horst, 2012; Horst et al., 2014).

Other studies have developed definitions of aspects of picky eating from analysis of responses to questions on eating behaviour. For example, Northstone and Emmett (2013) used a questionnaire item that was part of a series of questions on feeding. Using a focus group approach for parental definition of picky eating, Boquin et al. developed four categories of picky eating in which the overarching characteristics were unwillingness to try new foods and consuming a limited type and amount of foods (Boquin, Moskowitz, Donovan, & Lee, 2014). Tharner et al. used a latent profile approach with data from the Child Eating Behaviour Questionnaire (CEBQ) (Wardle, Guthrie, Sanderson, & Rapoport, 2001) to identify a fussy eating profile comprising high food fussiness, slowness on eating and high satiety responsiveness, combined with low enjoyment of food and food responsiveness (Tharner et al., 2014). Some studies have identified slow eating as a feature of picky eating (e.g. Mascola et al., 2010; Reau, Senturia, Lebailly, & Christoffel, 1996). 'Flags' for identification of picky eaters are: child eats only preferred food, drinks most of his/her energy intake, uses distractions when eating, eats food camouflaged in other foods or liquids, and has lengthy meal-times (McCormick & Markowitz, 2013).

It is important that an understanding of the definitions used in studies is reached in order to enable comparison of studies. This is necessary to facilitate the identification of children at risk and to identify any adverse health outcomes that may be associated with being a 'picky eater'. A consensus around a definition would enable the development of interventions to avert poor health outcomes. We support the definition of Lumeng (2005) cited in Ekstein et al. (2010) as it includes elements of lack of dietary variety, neophobia and persistent behaviour: 'unwillingness to eat familiar foods or try new foods, severe enough to interfere with daily routines to an extent that is problematic to the parent, child, or parent–child relationship'.

2.3. Assessment methods used in research studies

The methods used to identify picky eating in research studies fall into two broad categories (see Table 1): the use of item(s) from existing validated questionnaires (with a range of different questionnaires being used) and the use of a study-specific question(s). The investigation usually involves the mother as the primary caregiver. The items range in complexity from a simple single question (e.g. 'Is your child a picky eater?' (Mascola et al., 2010)) to multi-item questionnaires in which individual items are more complex (e.g. 'My child is interested in tasting foods s/he hasn't

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