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Original article

The Child Food Rejection Scale: Development and validation of a new scale to assess food neophobia and pickiness among 2- to 7-year-old French children

L'échelle de rejets alimentaires pour enfant : développement et validation d'une nouvelle échelle pour mesurer la néophobie et la sélectivité alimentaire chez les jeunes enfants français de 2 à 7 ans

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ABSTRACT

Introduction. – The two strongest obstacles to extend children's consumption of fruit and vegetables are food neophobia and pickiness, assumed to be the main kinds of food rejection in children. Accordingly, psychometric tools that provide a clear assessment of these kinds of food rejections are greatly needed. **Objective.** – To design and validate a new scale for the assessment of food neophobia and pickiness, thus filling a major gap in the psychometric assessment of food rejection by French children.

Method. – We concentrated on French children aged 2–7 years, as no such scale exists for this young population, and on the two known dimensions of food rejection, namely food neophobia and pickiness, as the nature of the relationship between them is still unclear. The scale was tested on two samples ($N_1 = 168$; $N_2 = 256$) of caregivers who responded for their children. Additionally, a food choice task was administered to 17 children to check the scale's predictive validity.

Results. – The resulting scale, called the Child Food Rejection Scale (CFRS), included six items relating to food neophobia and five items relating to pickiness. A factor analysis confirmed the two-dimensional structure of the scale. Internal consistency, test–retest reliability, and convergent and discriminant validity were all satisfactory. Moreover, results from the food choice task showed that scores on the CFRS accurately predicted children's attitudes toward new and familiar foods.

Conclusion. – Taken together, these findings suggest that the CFRS, a short and easy-to-administer scale, represents a valuable tool for studying food rejection tendencies in French children.

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R É S U M É

Introduction. – La néophobie et la sélectivité alimentaire, responsables d'une réduction de la variété du régime alimentaire, sont présentées comme les deux facteurs principaux des rejets alimentaires chez les enfants. Par conséquent, afin de pouvoir étudier ces formes de rejets, il est important de disposer d'outils robustes permettant de les mesurer.

Objectif. – Développer et valider une nouvelle échelle pour évaluer la néophobie et la sélectivité alimentaire, comblant ainsi une lacune importante dans l'évaluation psychométrique des rejets alimentaires chez les enfants français.

Méthode. – Nous nous sommes concentrés sur les enfants français âgés de 2 à 7 ans, comme il n'existe pas d'échelle pour cette jeune population, et sur les deux dimensions connues des rejets alimentaires, à savoir la néophobie et la sélectivité alimentaire, comme la nature de leur relation est encore inconnue.

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L'échelle a été testée sur deux échantillons ($n_1 = 168$; $n_2 = 256$) de parents qui ont répondu pour leurs enfants. De plus, une tâche de choix d'aliments a été administrée à 17 enfants pour vérifier la validité prédictive de l'échelle.

Résultats. – L'échelle finale, appelée *Échelle de rejets alimentaires pour enfant* (CFRS), comprend six questions relatives à la néophobie alimentaire et cinq relatives à la sélectivité. Une analyse factorielle a confirmé la structure bidimensionnelle de l'échelle. La cohérence interne, la fiabilité temporelle et la validité convergente et discriminante sont satisfaisantes. De plus, les résultats de la tâche de choix ont montré que les scores à la CFRS prédisent avec précision les attitudes des enfants à l'égard des aliments nouveaux et familiers.

Conclusion. – Les résultats suggèrent que la CFRS, une échelle courte et facile à administrer, représente un outil adapté pour l'étude des rejets alimentaires chez les jeunes enfants français.

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1. Introduction

Despite increasing wealth and purchasing power in the Western world, there is an alarming deterioration in dietary habits, including the increased consumption of foods rich in saturated fatty acids at the expense of foods rich in fibers, vitamins and minerals, such as fruit and vegetables (Carruth, Skinner, Houck, Moran, Coletta, & Ott, 1998; Cashdan, 1998; Jacobi, Agras, Bryson, & Hammer, 2003). Indeed there is a wide gap between recommended intake and actual consumption of fruit and vegetables (Cockroft, Durkin, Masding, & Cade, 2005; WHO, 2003). The two strongest obstacles to extend children's intake of fruit and vegetables are *food neophobia* and *pickiness*, assumed to be the main kinds of food rejection in children (Birch & Fisher, 1998; Dovey, Staples, Gibson, & Halford, 2008; Falciglia, Couch, Gribble, Pabst, & Frank, 2000). Accordingly, psychometric tools that provide a clear assessment of food neophobia and pickiness are greatly needed as they are important to the study of childhood food habits and the effectiveness of interventions or programs designed to expand children's intake of fruit and vegetables. In the present paper, we describe how we developed and validated a new and much needed scale to assess the food neophobia and pickiness dimensions of food rejection in young children.

Food neophobia is defined as a fear of new food (Pliner & Hobden, 1992), and appears as children become mobile, but there is a contention in the literature as to whether it increases thereafter (Birch, McPhee, Soba, Pirok, & Steinberg, 1987; Cashdan, 1994; Harper & Sanders, 1975) or remains stable during early childhood (Addessi, Galloway, Visalberghi, & Birch, 2005; Cooke, Wardle, & Gibson, 2003; Koivisto & Sjöden, 1996). In 1992, Pliner and Hobden (1992) designed the Food Neophobia Scale (FNS), which ask adult to specify the extent to which they approve or not ten declarations about eating practices, like "If I don't know what is in a food, I won't try it". Originally devised to measure adults' neophobia, the FNS was subsequently adapted to assess children's neophobia (Children Food Neophobia Scale [CFNS]; Pliner, 1994). Both of Pliner's scales have since been widely used to measure food neophobia, adapted and translated into several languages, including French (Adapted Food Neophobia Scale; Reverdy, Chesnel, Schlich, Köster, & Lange, 2008) and Italian (Italian Children Food Neophobia Scale; Laureati, Bergamaschi, & Pagliarini, 2015).

Food pickiness is characterized as a rejection of a certain amount of familiar and new foods to children (Birch, Johnson, Andresen, & Peters, 1991; Galloway, Fiorito, Lee, & Birch, 2005; Smith, Roux, Naidoo, & Venter, 2005; Taylor, Wernimont, Northstone, & Emett, 2015). Pickiness also includes the intake of inadequate quantities of food (Rydell, Dahl, & Sundelin, 1995), or may relate to the rejection of certain food textures (Smith et al., 2005). A contention concerns the developmental path of pickiness (Taylor et al., 2015). According to Dubois, Farmer, Girard, Peterson, and Tatone-Tokuda (2007) the prevalence of pickiness remains relatively stable

during early childhood (2.5–4.5 years), whereas a recent longitudinal study by Mascola, Bryson, and Agras (2010) showed that the highest prevalence of pickiness arises in toddlerhood, and subsequently decreases to very low levels by the age of 6 years. A further contention exists concerning the relationship between food pickiness and neophobia. In their review, Dovey et al. (2008) supposed that the two constructs are behaviorally distinct, as dissimilar factors foresee their extend and manifestation. However, other researchers have argued that these two kind of food rejections are undoubtedly linked (Potts & Wardle, 1998; Raudenbush, van der Klaauw, & Frank, 1995) or even indistinguishable (Wardle, Guthrie, Sanderson, & Ropoport, 2001). Up to now, a controversy exists concerning the relationship between food pickiness and neophobia, which arguably can be partly explained because there is clearly still some confusion surrounding the very concept of pickiness (Potts & Wardle, 1998; Taylor et al., 2015). While neophobia is usually assessed through Pliner's scales (Pliner & Hobden, 1992; Pliner, 1994) or adapted versions, there is no such widely recognized scale for pickiness measurement. It has usually been assessed through various tools such as scales on eating practices that include subscales for pickiness, food neophobia, low enjoyment when eating, and so forth. Notable questionnaires include the Children's Eating Behavior Questionnaire (CEBQ see Wardle et al., 2001; Tharner et al., 2014), and Children's Eating Difficulties Questionnaire (CEDQ see Rigal, Chabanet, Issanchou, & Monnery-Patris, 2012). Other researchers have measured pickiness by merely questioning caregivers if their children are picky (Carruth, Ziegler, Gordon, & Barr, 2004; Jacobi et al., 2003; Jacobi, Schmitz, & Agras, 2008).

In a recent review of methods to assess preschool children's eating behavior, De Lauzon-Guillain et al. (2012) pointed out that most of existing scales measuring children's food neophobia and/or pickiness are not entirely psychometrically sound. Indeed only the French Questionnaire pour Enfant de Neophobie Alimentaire (QENA, Rubio, Rigal, Boireau-Ducept, Mallet & Meyer, 2008) and the CEBQ (Wardle et al., 2001) achieved all validity and reliability criterion (other questionnaires such as the widely used FNS and CFNS failed to validate construct validity and/or temporal reliability). However, the QENA is a self-assessment questionnaire designed to measure neophobia for at least 5 years old children, while it would be of interest to measure neophobia for 2 years old children because it is the onset of food rejections. Additionally, the CEBQ does not differentiate between food neophobia and pickiness, while recent reviews and researches have proposed that they are two latent variables (Dovey et al., 2008; Galloway, Lee, & Birch, 2003; Rigal et al., 2012). Therefore there is a need for further development of tools to measure both neophobia and pickiness as two possible dimensions of food rejections in critical period (2–7 years old) in French toddlers.

In the present study, we adapted and validated a new scale for the assessment of food neophobia and pickiness, both thought

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