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Nutritional status and Mediterranean diet quality among Spanish children and adolescents with food neophobia

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ABSTRACT

Food neophobia is a personality trait that can influence children's food preferences and, therefore, their intake of different food groups. The association between food neophobia and nutritional status (both anthropometric and body composition measures) remains unclear. The purpose of this study was to determine whether Spanish children and adolescents with food neophobia show a different Mediterranean diet quality and different body composition measures compared with their non-neophobic peers. A community sample of 831 participants (368 males and 463 females) aged between 8 and 16 years were classified into three groups based on scores obtained on the Spanish Child Food Neophobia Scale. The results showed that food neophobia was not related to either BMI or body fat percentage, although neophobic children did have slightly lower weight and skeletal muscle mass than their neophilic counterparts. The KidMed index showed that neophobic children and adolescents presented a poorer quality of Mediterranean diet, due to a lower intake of fruit, vegetables, and fish, a higher intake of sweets or candy, and by reason of having an unbalanced breakfast. Neophobia was more common among females than males, but its occurrence was similar across age groups. These findings support previous research suggesting that neophobia impacts on diet quality. However, no relationship between diet and BMI was found.

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1. Introduction

Food neophobia refers to the unwillingness to eat—or avoidance of—new foods (Pliner & Hobden, 1992). Rozin (1976) explained the omnivore's dilemma in terms of adaptation, highlighting the need for every omnivore to be neophobic so as to avoid eating food that could be poisonous. The behavior of avoiding new foods is a typical stage of children's development (Dovey, Staples, Gibson, & Halford, 2008). When they are between two and three years old, children are usually averse to trying new foods, although their neophobia frequently diminishes around age five. This could be explained by the fact that exposure to food increases over time and, as a result, fewer foods are new. Neophobia usually continues to decrease across childhood, adolescence, and adulthood. However, correlations between age and food neophobia during childhood and adolescence are inconsistent (Nicklaus, Boggio, Chabanet, & Issanchou, 2005). Furthermore, little research has been carried out about the effect of neophobia on diet variety in preadolescents and adolescents (Nicklaus et al., 2005; Rigal et al., 2006). Conflicting findings regarding the relationship between food neophobia and gender in children have also been found (Frank & Van der klaauw, 1994; Koivisto-Hursti & Sjoden, 1997; Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001). It should also be noted that a child experiencing food neophobia shows signs of distress and anxiety, and this neophobic behavior may be maintained even into adulthood (Sarría & Fleta, 2009). This could explain why Milton (1993) identified food neophobia as an intrinsic and adaptive personality trait that has been observed to be heritable (Knaapila et al., 2007). In a study carried out with monozygotic and dizygotic twin pairs, Faith, Heo, Keller, and Pietrobelli (2013) found that genes played a consistent role in children's behavior of avoiding new foods. However, they also observed that unique life experiences that were not shared by siblings made children differ in the trait. It has been observed that parents' largest influence on children's food neophobia may dwell in how parents treat their children differently rather than similarly, which is very typical of child development (Rowe, 1994). In addition, child development, including eating behavior, is influenced by siblings and peers (Salvy, Kieffer, & Epstein, 2008). The foregoing led us to think that the level of food neophobia may differ between children who are only children and those that have siblings.

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The association between food neophobia and nutritional status is still unclear. Most studies that have analyzed children's eating behaviors and body mass index (BMI) have focused solely on picky/fussy eating behaviors, mainly measured by the Children's Eating Behaviour Questionnaire (CEBQ; Wardle, Guthrie, Sanderson, & Rapoport, 2001). However, the original validation study for the CEBQ showed that meticulous behavior towards food was a single factor that encompassed both picky/fussy eating and food neophobia (Wardle et al., 2001). Having said that, in some studies picky eating and the rejection of new foods have been associated with lower BMI (Antoniou et al., 2015; Jansen et al., 2012; Kwok, Ho, Chow, So, & Leung, 2013; Shariff & Yasin, 2005; Viana, Sinde, & Saxton, 2008; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009), while other studies have found no such relationship (Carruth & Skinner, 2000; Carruth et al., 1998; Gregory, Paxton, & Brozovic, 2010; Laureati, Bertoli, et al., 2015). Interestingly, food neophobia and pickiness have also been associated with overweight (Finistrella et al., 2012; Knaapila et al., 2011; Shariff & Yasin, 2005).

To the best of our knowledge, very few studies have investigated the relationship between food neophobia and body fat mass. In some studies, lower body fat percentages were observed in picky eaters (Galloway, Fiorito, Lee, & Birch, 2005), whereas other authors found no difference in fat mass or fat-free mass between children with selective eating and reference children (Faith et al., 2013; Nicholls, Wells, Singhal, & Stanhope, 2002).

The most widely used measure of body composition is the BMI. Body mass index is a valuable screening tool for obesity (Prentice, 1998), where it shows high specificity but poor sensitivity (Reilly, Wilson, & Durnin, 1995), as well as for chronic protein-energy malnutrition (James, Ferro-Luzzi, & Waterlow, 1988). However, its specificity and sensitivity for detecting undernutrition have yet to be ascertained (Nicholls et al., 2002). Moreover, BMI does not necessarily have a direct association with fat, and its relationship with fatty weight is not stable across development. It should also be taken into account that the large musculoskeletal variations that occur during adolescence, and which affect boys and girls differently, involve alterations in height-weight relationships, such as BMI, independent of adiposity (Marrodán et al., 2006). Therefore, measuring both body fat mass and skeletal muscle mass with valid and reliable body composition analyzers (Jensky-Squires et al., 2008) could lead to better diagnoses of nutritional status in childhood and adolescence. It is also important to note that the fat mass indicates energy reserves and is strongly associated with endocrine dysfunction, whereas low-protein diets are related to a decrease in skeletal muscle mass. As far as we know, the skeletal muscle mass has not yet been well studied in relation to food neophobia. Therefore, we have included both body fat mass and skeletal muscle mass as indicators of nutritional status.

Food neophobia has been associated with the development of food preferences and at the same time, with inadequate diet variety (Howard, Mallan, Byrne, Magarey, & Daniels, 2012). Food neophobia has a direct impact on the consumption of different foods (Cooke, Wardle, & Gibson, 2003; Cooke et al., 2004; Galloway, Lee, & Birch, 2003). In particular, neophobic children consume less fruit and vegetables, and they have less varied diets than do their neophilic peers (Cooke, Carnell, & Wardle, 2006; Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Falciglia, Couch, Gribble, Pabst, & Frank, 2000; Maiz, Maganto, & Balluerka, 2014; Nicklaus et al., 2005). Given that a low consumption of fruit and vegetables has been related to higher fat intake (Dennison, Rockwell, & Baker, 1998), some authors have proposed that food neophobia could be linked to childhood overweight (Fisher & Birch, 1995). This would mean that neophobic children have, on average, less healthy diets than do their neophilic peers. In recent years, unhealthy diets have been linked to various cardiovascular risk factors, including obesity (Bradlee, Singer, Qureshi, & Moore, 2010), high blood pressure (Niinikoski et al., 2009), diabetes (Davis et al., 2007), and raised cholesterol (Royo-Bordonada et al., 2006). Relevant to this is the fact that childhood is the optimal period in which to develop healthy eating habits that could reduce the likelihood of suffering from chronic diseases in adulthood (Dietz, 1998; Kelder, Perry, Klepp, & Lytle, 1994; Mikkilä, Räsänen, Raitakari, Pietinen, & Viikari, 2005). Furthermore, the Mediterranean diet, which is generally followed by people in Spain, has been recognized as one of the healthiest dietary models. Specifically, the traditional Mediterranean diet protects against myocardial infarction, certain forms of cancer (breast, colorectal, and prostate), diabetes, and other diseases linked with oxidative stress (Bonaccio et al., 2015; Cases, Romain, Dallas, Gerbi, & Cloarec, 2015; Martínez-González et al., 2002; Prinelli et al., 2015; Trichopoulou, Costacou, Bamia, & Trichopoulos, 2003). General characteristics of the Mediterranean diet have been extensively accepted (Keys, 1995).

In light of the above, the aim of this study was to examine whether children and adolescents with food neophobia differed from their neophilic counterparts in anthropometric and body composition measures, as well as in Mediterranean diet quality. Taking into account the large musculoskeletal variations that occur during adolescence, as well as the fact that peer pressure happens mainly during this period, a cut-off of 12 years of age was used to establish two broad categories (childhood and adolescence). We hypothesized that children with food neophobia would present lower BMI and lower skeletal muscle mass, as well as a poorer quality Mediterranean diet. We also studied differences in food neophobia according to being an only child or having siblings. We hypothesized that participants who were only children would present a higher level of food neophobia comparing those participants with siblings. Finally, age- and gender-related differences in food neophobia were also investigated in the whole sample, although given the lack of agreement in the literature on this aspect, no specific hypothesis was proposed.

2. Methods

2.1. Participants

The study sample comprised 831 participants (368 males and 463 females) aged between 8 and 16 years ($M = 12.22$; $SD = 2.38$), 189 of them were only children and 642 of them had siblings. They were recruited from five schools in the Basque Country (northern Spain), and during the academic year 2011–2012 they were enrolled in either elementary education (48.7%) or secondary education (51.3%).

2.2. Procedure

Parents or legal guardians of children in years 3–6 of elementary education and adolescents in years 1–4 of secondary education were sent a letter inviting their son/daughter to take part in the study. Parental consent to gather the anthropometric, body composition, and questionnaire data was initially obtained for 864 children and adolescents, and when the young person was over the age of 12 and had agreed to participate, his or her informed consent was also obtained. Data for 33 students (3.82%) could not be obtained due to absence on the days of testing, and hence the final sample consisted of 831 participants. The study was approved by the Ethics Committee for Research Involving Human Subjects (CEISH) of the University of the Basque Country/Euskal Herriko Unibertsitatea.

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