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Validation of the revised Food Neophobia Scale (FNS-R) in the Italian context

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ABSTRACT

Measuring individuals' level of food neophobia, i.e., the reluctance to eat novel food, is a critical task since it negatively affects diet variety and quality. Using structural equations models, the revised Food Neophobia Scale (FNS-R) was validated with a sample of 711 Italian adults. After deleting 4 items characterized by both low face validity and a suboptimal association with the other items, and after correcting statistically for the acquiescent response-set, the resulting 6-item, fully balanced FNS-R showed a good construct validity. Moreover, it showed the expected positive correlations with General Neophobia and with Disgust Sensitivity. Finally, it resulted invariant across participants' genders, age classes, and levels of education, and across methods of administration (paper-and-pencil and on-line). Strong points and possible developments of the study are discussed.

1. Introduction

Market globalization, migration flows, and the spread of new lifestyles involving food have considerably increased the availability of novel foods in Western society. This historical and structural evolution puts individuals at the crossroads between, on the one hand, trying these novel foods and enlarging their eating repertoire, and on the other hand, limiting their consumption to familiar foods. Psychologists have termed this latter orientation as food neophobia.

Food neophobia, the reluctance to eat unfamiliar foods, is a universal predisposition among humans and, more generally, omnivores (Rozin & Millman, 1987; Rozin & Vollmecke, 1986). From an evolutionary perspective, each new food represents both an opportunity and a risk: the opportunity to expand the nourishment source set, but also the risk to ingest something dangerous or even life threatening. According to Rozin (1976), food neophobia arises from this 'omnivore dilemma.'

Notwithstanding the universality of food neophobia, there is room for inter-individual and intra-individual variability. Although serving a protective function in a potentially dangerous environment, in contemporary Western cultures characterized by high levels of food safety, food neophobia can be problematic, because it dramatically constrains individuals' food choices, limiting consumption variety and worsening diet quality (e.g., Siegrist, Hartmann, & Keller, 2013; Skinner, Carruth, Bounds, & Ziegler, 2002). Therefore, it is important to measure food neophobia in humans in order to identify its antecedents and consequences, as well as effective intervention strategies to reduce it and change unhealthy consumption behavior. Many instruments have been developed for this purpose (for a review, cf. Damsbo-Svendsen, Frøst, & Olsen, 2017), but the Food Neophobia Scale (FNS, Pliner & Hobden, 1992) is still the most used measure of food neophobia in adults, probably because it is very specific. Indeed, the other measures are not specifically devoted to quantifying food neophobia, but rather more general or similar constructs (e.g., the Variety Seeking, or VARSEEK, Scale by Van Trijp & Steenkamp, 1992) or a combination of constructs including food neophobia as a subscale (e.g., the Food and Eating Questionnaire by Raudenbush, Van Der Klaauw, & Frank, 1995). The FNS is also the only measure originally validated with a behavioral test, and it has been repeatedly shown to predict actual responses to novel food (e.g., Hobden & Pliner, 1995; Raudenbush & Frank, 1999; Raudenbush, Schroth, Reilley, & Frank, 1998). Furthermore, the FNS is the only food neophobia measure that is completely balanced.

However, the FNS dates back to 1992, and its validation through confirmatory factor analysis dates back to 2003 (Ritchey, Frank, Hursti, & Tuorila, 2003). For this reason, Damsbo-Svendsen et al. (2017) suggested that some items in the FNS may no longer be relevant, stating that a novel test of the FNS, focused on the critical assessment of the validity of its items and on the unidimensionality of its structure, should be performed.

This is why, the present study aimed at testing the validity of the

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FNS in a wide convenience sample of Italian adults. The validity of this scale nowadays was tested going through three steps. First, its construct validity was tested using a confirmatory factor analysis (CFA), and thus the unsatisfactory items have been deleted. A 6-item Revised Food Neophobia Scale (FNS-R) resulted from this initial step. Second, the concurrent validity of the FNS-R was analyzed by taking into consideration the relation with the general neophobia and disgust sensitivity. Indeed, as neophobic individuals tend to display a general reluctance to experience new situations, people and activities (i.e., high level of general neophobia; Pliner & Hobden, 1992; Raudenbush et al., 1995), and a dispositional inclination to experience the emotion of disgust (i.e., high disgust sensitivity; Al-Shawaf, Lewis, Alley, & Buss, 2015; Björklund & Hursti, 2004; Nordin, Broman, Garvill, & Nyroos, 2004), positive correlations between the FNS-R and both the General Neophobia Scale (GNS; Pliner & Hobden, 1992) and the Contamination Disgust subscale of the Revised Disgust Scale (DS-R; Olatunji et al., 2007, 2009) were expected. Finally, as a third step, the structural invariance of the FNS-R across genders, age groups, levels of education, and method of administration (online vs. paper-and-pencil questionnaire)was tested.

2. Method

2.1. Participants and procedure

Data for the present study were gathered along with data for other research purposes. Overall, 711 adults (69.6% females, aged 18–73 years, M_{age} = 34.34, SD = 11.90) took part in this research (an overview of their sociodemographic characteristics is displayed in Table 1). They were recruited mainly through snowball sampling on Facebook, but also through students' mailing lists. In addition, the present data included pre-school children's parents recruited through school principals and teachers. As data from different studies were merged, not all participants completed the same measures, except for the FNS. Every study, however, included some sociodemographic questions (age and gender) and psychological scales (based on the study, participants were asked about their personality, general neophobia, disgust sensitivity, death anxiety, sociopolitical attitudes, parenting styles, and willingness to taste a list of novel foods). The full questionnaires are available from the corresponding author. Most participants (n = 603) completed an online questionnaire, whereas the others (n = 108) filled in a paper-and-pencil questionnaire.

2.2. Measures

After giving their informed consent, the participants completed the FNS (Pliner & Hobden, 1992). Respondents were asked to report the extent to which each of the 10 items described them, using 5 response categories labeled at their extremes as 1 = *not at all descriptive of me* and 5 = *very descriptive of me*. The items of the original scale and their Italian translations are reported in Table 3, in the Results section.

In the original scale answers were given on a 7-point agreement scale, but a 5-point scale was preferred in the present study, as analyses based on the Item Response Theory (IRT; e.g., Lambert et al., 2013; Pallant & Tennant, 2007; Tennant & Conaghan, 2007) consistently show that using 7 categories leads to the inclusion of non-discriminant response options, thus reducing the validity of the scale (e.g., Roccato, Rosato, Mosso, & Russo, 2014). In addition, the usual agreement response options was replaced with the above-reported anchors that fit better with the items content and make the questions less ambiguous (Schuman & Presser, 1981).

A subsample of 448 respondents (73.0% females, M_{age} = 34.80 years, SD = 12.81, range = 18–73) also filled in the other two scales used to test the concurrent validity of the FNS: the General Neophobia Scale (GNS; 8 items; Pliner & Hobden, 1992) and the Contamination Disgust subscale from the DS-R (5 items; Olatunji et al., 2007, 2009). Only the latter subscale was administer based on preliminary analyses conducted on a subsample of 264 participants who completed the whole 25-item DS-R, showing that when the three factors (core disgust, animal-reminder, and contamination disgust) of the DS-R were entered as predictors in a linear regression predicting food neophobia, only contamination disgust reached statistical significance ($\beta = 0.29$, $p < .001$, $R^2 = 0.11$).

Both the GNS and the Contamination Disgust subscale were administered with a 5-category format. For the GNF and the first 2 items of the Contamination Disgust subscale, participants had to report the extent to which each item described them, using the same response scale used for the FNS. For the remaining 3 items of the Contamination Disgust subscale, participants had to rate how disgusting each described situation would be on a 5-response scale labeled at its extremes as 1 = *not at all disgusting* and 5 = *extremely disgusting*. Finally, for all participants, a standard sociodemographic form followed, asking about their gender and age (70.3% females, M_{age} = 35.71 years, SD = 11.79, range = 18–73). The level of education was asked to 555 participants, and recoded into years of formal education.

2.3. Data analyses

The validity of the FNS was analyzed via a threefold procedure. First, its construct validity was analyzed via a confirmatory factor analysis (CFA), performed using AMOS 20.0 (extraction: ML). The scale would have been considered valid only if it was unidimensional. Second, after ascertaining its construct validity, the concurrent validity of the scale was tested via two structural equations models (SEMs) aimed at analyzing its correlation with the GNS (Pliner & Hobden, 1992) and the Contamination Disgust subscale from the DS-R (Olatunji et al., 2007, 2009). All of these constructs were measured as latent variables, using the items of the questionnaires as their manifest indicators. The scale would have been considered valid only if it showed positive, significant correlations with general neophobia and sensitivity to contamination disgust. The a priori α level to evaluate the significance of these associations was set to 0.05. The sample size was large enough to conduct a factor analysis on each scale, in that the participants-to-item ratio was much higher than the 12:1 usually considered as the standard threshold (see Byrne, 2012). Consistent with Hu and Bentler's (1998) suggestions, different indexes were combined to evaluate the fit of these models. Based on Schreiber, Nora, Stage, Barlow and King (2006), the Tucker–Lewis coefficient (*TLI*: Tucker & Lewis, 1973), the comparative fit index (*CFI*: Bentler, 1990), and the root mean square error of approximation (*RMSEA*: Steiger, 1980) were chosen. Based on Bentler (1990) and Browne (1990), the *CFI* and the *TLI* were considered as satisfactory if higher than 0.90. Moreover, based on Browne and Cudeck (1993), the *RMSEA* was considered good if lower than 0.05 and fair if ranging between 0.05 and 0.08. With the exception of the test of the structural invariance of the FNS-R (see below), even if it was reported the χ^2 of the models was not taken into consideration, because such an index heavily depends on the N of the dataset.

After ascertaining the validity of the FNS-R, its structural invariance across genders, age groups, levels of education, and method of administration was tested employing Reise, Widaman, and Pugh's (1993)

Table 1
Overview of participants' sociodemographic characteristics.

		18–39 years old	40–73 years old	Total
Education not asked	Males	43	8	51
	Females	88	17	105
Low education	Males	56	50	106
(≤13 years)	Females	145	65	210
High education	Males	32	27	59
(> 13 years)	Females	118	62	180
Total		482	229	711