School children preferences for fish formulations: the impact of child and parental food neophobia

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Abstract

Child food preferences influence food choice and consumption. Thus, understanding the factors leading to the development of food likes and dislikes is important for enhancing nutritional healthy diets. This study was aimed to investigate children's acceptance of, and preferences for, three different trout formulations served at school lunch. Liking and preference were studied in relation to age, gender and neophobic traits. Parental food neophobia, fish-eating habits and frequency of seafood consumption in family life conditions were also investigated. The results indicated that children's liking was strongly dependent on cooking methods, and the proper choice of recipes is likely able to minimize children neophobic attitudes. Parental food neophobia was related to child neophobic behaviour and to how fish is prepared at home, with neophilic parents more prone to cook fish in healthy ways.

Keywords: school menu, preferences, fish, food neophobia, parents

Practical application

Children fish liking is strongly dependent on product preparation and cooking methods, and the proper choice of recipes could minimize neophobic attitudes. Nutritionists, dieticians and product developers should consider the sensory aspects to promote more sustainable and appealing refectory meals in order to increase acceptability and consumption at school and at home.

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Introduction

Food preferences are recognised to play a central role in food choice and consumption, especially among children (Laureati, Pagliarini, Toschi, & Monteleone, 2015a). Thus, understanding food preferences and the factors leading to the development of food likes and dislikes is important for enhancing nutritional healthy diets. Moreover, food preferences in childhood can strongly influence eating behaviour in adult life, and early preferences may predict later food consumption (Drewnowski, 1997). On that basis, the need to improve dietary patterns and health status is fundamental for an early age group because younger children appear to be more likely to change their food consumption behaviour than adults (Laureati, Bergamaschi, & Pagliarini, 2014).

In this context, the nutritional benefits of including fish in an individual's diet have become increasingly clear, and guidelines suggest the consumption of seafood at least twice a week for both children and adults (WHO, 2010). Fish is an important food source of energy, high biological value proteins and significant levels of other potentially protective nutrients (Mozaffarian & Rimm, 2006). The principal biologically active components of fish are omega-3 fatty acids, vitamin D, vitamin B12, selenium, iodine, choline and taurine (Lund, 2013). The benefits of fish consumption in the adult population have been associated with a reduced risk of developing coronary heart disease (CHD), high blood pressure, stroke, some cancers, rheumatoid arthritis and other inflammatory diseases. Research has demonstrated that specific types of seafood could exert a positive effect on conditions such as dementia (Lim, Gammack, Van Niekerk, & Dangour, 2006), allergies (Chandra, 2002), being overweight and obese (Trondsen, Braaten, Lund, & Eggen, 2004). Moreover, convincing evidence of beneficial health outcomes in the development of the brain, nerves and eyes has been reported for infants and young children (Mozaffarian & Rimm, 2006). Despite these findings, adult intake of fish remains substantially below the dietary recommendation, and fish consumption in children appears to be even lower (WHO, 2010). In a recent survey conducted among Italian children, 6 out of 10 children were found to eat less than 2 servings of fish per week (Censi, D'Addesa, Galeone, Andreozzi, & Spinelli, 2012).

There are several reasons explaining low fish consumption among children (Altintzoglou et al., 2015). The most important issue is likely to be that fish is not part of a child's regular diet during the development of his/her food preferences. Many prejudices also contribute to low fish liking, including an aversion to the

taste, smell and texture of fish, as well as the fear of ingesting bones (Bi et al., 2011). Furthermore, behavioural factors such as familial preference and neophobia shape the development of fish acceptance and liking. Several studies indicate that parents influence children's eating behaviour in a variety of ways (Birch, Savage, & Ventura, 2007; McManus, Burns, Howat, Cooper, & Fielder, 2007). Parents are typically the reference model for dietary choices because children learn about food by observing the eating behaviours of others (Birch et al., 2007; Laureati et al., 2014). Another interesting barrier seems to be the dominance of paternal, rather than maternal, preferences in the meals prepared. Evidence suggests that when the male parent does not eat seafood, then fish is rarely prepared at home (McManus et al., 2007). In addition, fish is an animal-origin food that is reported to elicit high neophobic reactions in both adults and children (Knaapila et al., 2011).

Food neophobia is an adaptive characteristic defined as the rejection of unknown foods that permits the avoidance of potentially toxic compounds (Dovey, Staples, Gibson, & Halford, 2008; Laureati et al., 2015b). Such behaviour is low at the time of weaning, reaching a peak between 2 and 6 years of age. Because of an association with low liking and reduced consumption of fruits, vegetables (Coulthard & Blissett, 2009; Laureati et al., 2015c; Maratos & Staples, 2015) and protein foods (Reverdy, Chesnel, Schlich, Köster, & Lange, 2008; Siegrist, Hartmann, & Keller, 2013), food neophobia is associated with a less varied diet (Falciglia, Couch, Gribble, Pabst, & Frank, 2000). However, the relationship between food neophobia and fish intake has been rarely investigated (Knaapila et al., 2011), and even fewer studies on the topic have focused on children (Mustonen, Oerlemans, & Tuorila, 2012; Siegrist et al., 2013).

In a study by Bi et al. (2011), seafood lunches were the least appealing serving option for both children and their families. Accordingly, most of the surveys conducted involving Italian children indicated that fish dishes are not liked (Donadini, Spigno, Fumi, & Vanoni, 2009; Vigliotti, Peris, & Venturi, 2008). However, Caporale, Policastro, Tuorila, & Monteleone (2009) reported opposing results, and a more recent study (Donadini, Fumi, & Porretta, 2013) found that liking varied significantly across fish dish preparations.

The improvement of fish recipes served at school lunches could be a viable strategy for increasing fish liking and consumption at home (Birch & Fischer, 1998; Lowe, Horne, Tapper, Bowdery & Egerton, 2004; Tuorila, Palmujoki, Kytö, Törnwall, & Vehkalahti, 2015). The school environment can help children to understand, appreciate and consume healthy food to improve dietary patterns and eating behaviours (Pagliarini,

Gabbiadini, & Ratti, 2005).

Thus, the aim of this study was to investigate children's acceptance of and preferences for three different formulations of freshwater fish served as school lunches. Liking was studied in relation to specific variables that are known to influence children's food acceptance, including age, gender and neophobic traits. Parental food neophobia, fish eating habits and frequency of seafood consumption in family life conditions were also investigated. We focused our attention on a local freshwater product to support short food supply chains and the sustainable development of the Lombardy region's economy. The future goal is to improve refectory menu quality to promote the use of healthy and tasty recipes.

Materials and methods

Samples

The trout species (*sp. Oncorhymchus Mykiss*), a freshwater fish commonly bred in Lombardy (Italy), was chosen with the aim of promoting a short supply chain and a more sustainable economy for the region. Trout fillet without bones was used to prepare three fish recipes: 1) trout in breadcrumbs of almonds and sage (T.almonds), 2) trout cooked in orange sauce (T.orange), and 3) trout hamburger with herbs and spices (T.hamburger). Each formulation was prepared in a central kitchen of the school catering company on the same day of the test, one hour before delivery. The formulations were stored in food-grade containers and dispatched via road transport to the school canteen. The dishes were part of the usual daily menu and were served to children as a starter.

Participants

One hundred and four children (48 girls and 56 boys) from a public school in the Milan area were recruited for the experiment. As reported in **Table 1**, a total of six classes were enrolled: two 2nd grades (7-8 years), two 4th grades (9-10 years) and two 5th grades (10-11 years). Initially, also children from 3rd grades were invited to take part to the experiment but for practical constraints, they were not able to participate.

One hundred and eight parents received full information about the research study and provided written informed consent for their children's participation. Only 4 children who suffered from food allergies and/or followed specific dietary restrictions were excluded from the study. The teachers were thoroughly informed

about the study, which was approved by the school board. The study was performed in adherence with the principles established by the Declaration of Helsinki. The protocol was approved by the Institutional Ethics Committee at the study site.

Procedure

All of the evaluations were performed at the school on the same day. Food neophobia evaluation was performed in the classrooms during mid-morning break, in the presence of a teacher and an experimenter. During the evaluation, each child was seated at his or her own table and received the food neophobia questionnaire. Before testing, the experimenters explained to the children how to complete the questionnaire. To increase ecological validity, the liking and preference assessments were performed during lunchtime in a familiar environment, i.e. the school canteen. Children of the same class were seated at the same table. Before the tests, the children received a booklet with a brief explanation on how to complete it and on the use of the scales. The three formulations were served simultaneously to each child immediately prior to the meal. A portion of approximately 100 g of each recipe preparation was served to the children in plastic dishes encoded with three-digit numbers. Each of the three formulations was randomly presented to each class. The participants were instructed not to share food with each other, and the experimenters monitored the children to ensure that they did not influence each other.

Food neophobia evaluation

To investigate the children's food neophobia, the participants received the Italian Children Food Neophobia Scale (ICFNS), which was previously validated by Laureati et al. (2015b) with a large sample of school-aged children. The ICFNS is a simplification of the original Food Neophobia Scale (FNS) of Pliner & Hobden (1992) in that items, vocabulary and response format are modified to be suitable for Italian primary school children. The ICFNS consists of 8 items, 4 related to neophilic and 4 related to neophobic attitudes. The reduction of the items from 10 to 8 relies on the fact that we had concerns that children would not properly understand the term ''ethnic''. Thus, the items "Ethnic food looks too weird to eat", "I like trying new ethnic restaurants" and "I like foods from different countries", which were present in the original FNS, were removed and replaced by the item "I like trying new food and tastes from other countries". The number of

response options of the agreement scale was also reduced from 7 to 5 since children may have difficulty discriminating between 7 response options. Additionally, each response on the 5-point scale is represented by a facial expression, in order to help the child to better understand the level of agreement or disagreement for each item (from left to right: “Very false for me”, “False for me”, “So-so”, “True for me”, “Very true for me”). This resulted in a food neophobia score ranging from 8 to 40, which was calculated for each child (neophilic item scores were reversed). Higher scores represent greater food neophobia.

Liking and preferences evaluation

All of the children tasted the three fish formulations. After tasting each formulation, children were asked to perform a hedonic test. A 7-point facial hedonic scale from super good (7) to super bad (1) was chosen to rate liking for the three dishes, as described by Pagliarini, Ratti, Balzaretti, & Dragoni (2003). With the aim to obtain more differentiating data, a preference test (ranked liking by elimination) was performed immediately after the liking test by asking the children to rank the formulations from the favourite one (score 1) to the least favourite dish (score 3).

Parental questionnaires

The parent questionnaire investigated family and children seafood consumption. The frequency of consumption was investigated through the following questions: “How many times do you eat fish at home?” (Q1), “How many times does your child eat fish at home?” (Q2). The answers ranged from 0 “never” to 4 “every day”. Children seafood liking “Does your child like fish?” (Q3), as determined by the parents, was assessed through a 7-point hedonic scale. A 3-point scale (“no”, “sometimes”, “yes”) was used to assess children involvement in meal preparation: “Is your child present during meal preparation?” (Q4) and “Does your child take part in the meal preparation?” (Q5). Fish cooking habit questions were also included: “How do you usually cook fish?” (Q6) (answers: “as ingredient”, “with sauce”, “oven baked”, “fried”, “grilled”). Finally, the parents were asked to answer a question about what they perceived as barriers that may lead to low consumption of fish (answers: “convenience”, “price”, “ethics and cultural reasons”, “familial liking”) (Q7).

Moreover, parental food neophobia was measured using the Food Neophobia Scale (FNS; Pliner & Hobden, 1992). The parents completed a 10-item questionnaire and rated the items on a scale from 1 ("Disagree strongly") to 7 ("Agree Strongly"). A score ranged from 10 to 70 (neophilic items scores were reversed) was calculated for each parent.

Data Analysis

GLM ANOVA was used to analyse the liking data. *Children* were considered as random factor in the model, whereas *Fish formulation, Gender*, *Age, Food Neophobia* (neophobia scores categorized by quartile distribution) and their 2-way interactions were considered as fixed factors. When the ANOVA results indicated a significant effect, the Least Significant Difference (LSD) was applied as post hoc test. The preference data were compared by chi-squared tests. Pearson's correlation coefficient was calculated to investigate the relationship between the liking and preference data as well as between liking and the 9 background variables (including child neophobia, parent neophobia and the 7 parent questionnaire variables). Results were considered statistically significant for $p<0.05$. Data analysis was performed using the SAS/STAT statistical software package version 9.3.1 (SAS Institute Inc., Cary, USA).

Results

Liking and preference evaluation

Overall, the three formulations were well-accepted, with a mean value of 5.6 across the various formulations. The ANOVA results revealed a significant effect of the main factor *Fish formulation* ($F=27.0$, $p<0.001$) on the liking scores (**Fig. 1**). T.almonds (M=6.4, SEM=0.2) received significantly higher liking scores, followed by T.orange (M=5.6, SEM=0.2) and then T.hamburger (M=4.9, SEM=0.2), the least liked formulation.

An effect of the main factor *Age* ($F=15.0$; $p<0.001$) was found, as the 7 y.o. children (M= 6.3, SEM=0.2) liked the products more than the 9 y.o. (M=5.5, SEM=0.1) and 10 y.o. children (M=5.1, SEM=0.2), who generated comparable results. The interaction *Fish formulation* by *Age* was also significant ($F=4.6$; $p<0.001$); the 7 y.o. children liked the three formulations equally, whereas in the older children, the ability to discriminate products according to liking increased (**Fig. 2**).

No differences were found for the main factor *Gender*, although the interaction *Gender* by *Fish formulation*

191 was significant (F=3.75; p<0.05), due to the higher liking for the T.orange formulation by girls, compared to
192 boys.
193 The preference data evaluated through ranking by elimination of the three formulations were in accordance
194 with the liking results. The three formulations were clearly discriminated (χ^2=30.7; p<0.001). The rank sums
195 preference scores of the three different trout formulations indicated that T.almonds was chosen as the
196 preferred formulation by a significantly higher proportion of the children than T.orange, which was in turn
197 selected more often than the T.hamburger dish.
198 The liking and preference scores were found to be significantly and positively correlated (T.almonds: r=0.49,
199 p<0.001; T.orange: r=0.56, p<0.001; T.hamburger: r=0.52, p<0.001).
200
201 *Child food neophobia evaluation and relationship with liking*
202 Satisfactory internal consistency was observed among the ICFNS items, as calculated through Cronbach's
203 alpha test (α =0.71). The child food neophobia mean value was 18.8.
204 To investigate the relationship between food neophobia traits and trout formulation liking, the children were
205 divided according to their neophobia scores into 3 groups, after verifying that data were normally distributed
206 (Laureati et al., 2015b): low neophobia (children with scores in the lower 25th percentile of ICFNS scores,
207 score ≤ 15, n=25), medium neophobia (children with scores between the 25th and 75th percentiles, 15 ≤
208 ICFNS score ≤ 22, n=56) and high neophobia (children with scores in the upper 25th percentile, ICFNS
209 score ≥ 23, n=23).
210 The ANOVA results indicated a significant effect of the main factor *Food Neophobia* (low, medium and
211 high) on the children's trout liking scores (F=3.51; p<0.05). Liking decreased significantly from low
212 (M=6.0) to high (M=5.3) food neophobia levels, indicating that the children's neophobic attitude influenced
213 their hedonic response.
214 The interaction *Food Neophobia* by *Fish formulation* was also significant (F=3.14; p<0.05). To compare
215 children with very different levels of neophobia scores, only the effect of low and high neophobia levels on
216 the liking of each trout formulation was considered (**Fig. 3**). No differences were found between the low and
217 high neophobia level groups for the most liked formulation (T.almonds). In contrast, for the other two

218 formulations (T.orange and T.hamburger), the high neophobic children generated significantly lower liking
219 scores ($M_{T.orange}$=4.9; $M_{t.hamburger}$=4.5) than did the low neophobic children ($M_{T.orange}$=6.3; $M_{t.hamburger}$=5.2).
220
221 *Parental questionnaire*
222 Questionnaire answers from 97 parents were collected and reported in **Table 2**.
223 A total of 44% of the parents indicated a fish consumption of 2-3 times per week, and 55% reported eating
224 fish 2-3 times per month. Child fish consumption reported by the parents was 2-3 times per week for 42% of
225 the respondents and 2-3 times per month for 50%. Half of the parents declared that their child liked seafood
226 dishes (very good=9%; good=41%). Many families (more than 70%) expressed good involvement and
227 participation of their child in meal preparation. The families' cooking habits were mainly characterized by
228 using fish as a principal meal (87%), whereas only the 13% respondents made use of it as an ingredient in the
229 first course. Among the factors perceived as barriers to fish consumption, convenience of preparation and
230 price were indicated as the first and second most common issues, respectively, followed by familial liking.
231 The parents' food neophobia mean score was 26.4.
232 Overall actual liking of the fish formulations was negatively related to the child food neophobia ($r=-0.23$,
233 $p<0.05$) and positively related to the child fish liking reported by the parent ($r=0.20$, $p<0.05$). Child food
234 neophobia was positively related to parental food neophobia ($r=0.25$, $p<0.05$) and consumption of fish as
235 ingredient ($r=0.30$, $p<0.01$), whereas a negative relation was found with the involvement (Q4 and Q5) of the
236 children in meal preparation ($r=-0.20$, $p<0.05$; $r=-0.28$, $p<0.01$, respectively) and the consumption of fish as
237 main dish (cooked with sauce: $r=-0.24$, $p<0.05$; oven-baked: $r=-0.28$, $p<0.01$; grilled: $r=-0.25$, $p<0.05$).
238 Parent food neophobia was positively associated with unhealthy fish preparations (fried: $r=0.24$, $p<0.05$).
239 Familial liking perceived as a barrier (Q7) was negatively related to fish consumption at home ($r=-0.27$,
240 $p<0.01$).
241
242 **Discussion**
243 This study investigated children's liking of and preferences for a freshwater trout from the Lombardy
244 Region, which was prepared using different recipes. The three trout formulations were well-appreciated by
245 the children, as they all obtained hedonic responses well above the middle value of the scale, even in the case

246 of the least favourite sample. This result agrees with those of Pagliarini et al. (Pagliarini et al., 2005), who
247 reported a good evaluation of different seafood preparations proposed for the school canteen menu.
248 Accordingly, Caporale et al. (2009) reported a high hedonic rating for seafood second courses by pre-
249 schoolers. Donadini et al., (2013) also found that liking scores were strongly influenced by the fish dish
250 preparation. The high hedonic responses obtained could be partially explained by the presence of the
251 experimenters during the tests, which may have positively influenced the children and their responses.
252 In the present study, clear hedonic differences between the three formulations were observed. This variability
253 was probably due to the different recipes and cooking methods used. Self-reported comments by the children
254 suggest that T.almonds, which was prepared with a coating of bread and almonds crumbs and cooked in the
255 oven, was the most liked dish because of its crunchiness. This result is consistent with other studies reporting
256 that texture properties are important in children's food acceptance (Zeinstra, Koelen, Kok, & De Graaf,
257 2007; Donadini et al., 2013; Werthmann et al., 2015; Alm, Olsen, & Honkanen, 2015). This hypothesis was
258 further confirmed by the reasons reported by the children for selecting T.hamburger as the least liked
259 formulation. Indeed, this dish was found to be too hard and dry and, thus, was probably too difficult for the
260 children to chew and swallow (Zeinstra et al., 2007).
261 The dish preferences (ranked liking) were proven to be in accordance with liking (rated liking). This finding
262 is not surprising because food preference and liking evaluation are known to be related (Olsen, Kildegaard,
263 Gabrielsen, Thybo, & Møller, 2012; Altintzoglou et al., 2015; Bergamaschi et al., 2016). The preference
264 evaluation forces the children to rank the products and not necessarily to provide information about liking
265 (Kildegaard, Tønning, & Thybo, 2011). In the present study, the ranking method was used as an additional
266 hedonic assessment to obtain more differentiating results, since we hypothesized that the recipes would have
267 been disliked by children, obtaining low ratings on the hedonic scale with consequent reduced
268 discriminability. However, this was not the case as formulations were appreciated and clearly discriminated
269 with both methods.
270 Age-related differences in fish formulation liking were observed. The ability of younger children (7 y.o.) to
271 discriminate between the products was less pronounced than that of their older counterparts (9 and 10 y.o.).
272 Therefore, children may be assumed to become increasingly critical and conscious in their food choices with
273 age (Pagliarini et al., 2005; Cooke & Wardle, 2005). This finding was confirmed by Laureati et al. (2014)

and Russell and Worsley (2013) who explained this attitude as a consequence of exposure to a more varied diet with increasing age.

The results of the present study suggest that food neophobia influenced children's preferences and liking (**Figure 3**). Children with lower food neophobia scores liked the formulations more, compared with their neophilic counterparts. Various studies confirmed these findings (Laureati et al. 2015c; Wardle, Carnell, & Cooke, 2005; Cooke, 2007; Russell & Worsley, 2008; Johnson et al., 1991) and reported the direct effect of food neophobia traits on food consumption. In particular, food neophobia exerts a negative effect on pleasantness and the frequency of consumption of certain categories of food, including seafood (Cooke, Wardle, & Gibson, 2003; Knaapila et al., 2011; Siegrist et al., 2013).

Moreover, in the present experiment, strong neophobic attitudes were associated with low score of liking for the less preferred formulations, whereas for the most appreciated formulation neophobic children were comparable to the neophilic peers. We hypothesize that optimization of fish formulations targeted to children could considerably increase product acceptance, even in more neophobic subjects.

The parents' questionnaire responses indicated family and child fish consumption levels that were in line with international guidelines (WHO, 2010), although the children's fish consumption was slightly lower than the recommended twice weekly servings (Welch, Lund, Amiano, Dorransoro, Brustad, Kumle, et al. 2002; Scientific Advisory Committee on Nutrition, 2004; WHO, 2010).

An encouraging result is that the children were usually involved in meal preparation at home, as meal preparation is recognized to be the starting point for guiding children towards good feelings about food (Kimmel, Sigman-Grant, & Guinard, 1994).

An interesting finding was the association between parental food neophobia and fish cooking methods at home. The effect of parental influences on food neophobia regarding food modelling and meal structuring has been reported in an earlier research study (Nicklaus et al., 2004). In the present study, fried fish and seafood used as an ingredient in the first course (e.g., pasta with tuna sauce) seemed to be more often used by neophobic subjects, suggesting that neophobic behaviour could lead to less healthy preparations or preparations in which fish is partially visible and the fish flavour is less pronounced. Accordingly, fish presented as a whole fillet (grilled fillet, fillet with sauce, oven-baked fillet) was negatively related to children's food neophobia, indicating that the less neophobic children were more familiar with those

302 preparations.

303 Price, convenience and familial liking were perceived as the main drivers of low fish consumption. Price and
304 convenience could be hypothesised to be relevant barriers for parents but not for children, while familial
305 hedonic attitudes are strong predictors of a child's preferences (Bi et al., 2011).

306 A strength of the present study was the ecological condition, as the experiment was conducted in a school
307 mealtime situation. The naturalistic environment is an important point to consider when studying factors
308 linked to food behaviour, especially with children (Donadini et al., 2013).

309 One clear limitation is that we did not measure the children's actual consumption; thus, we cannot conclude
310 that the liking of fish translated to an actual higher intake. Another limitation is that the sample was limited
311 in the number of children studied, and all of the children were from a metropolitan area. Whether the results
312 can be generalized to different sample groups is unknown.

313 In conclusion, the present study focused on the acceptability of, and preferences for, a regional fish with the
314 aim to promote more sustainable and appealing school meals. The formulations proposed were suitably
315 appreciated by the children. Liking was found to be strongly dependent on product preparation and cooking
316 methods, thus the proper choice of recipes could minimize neophobic attitudes. This finding highlights the
317 importance of recipes and cooking methods to increase children fish acceptance and consumption in the
318 school lunch refectory. Finally, further investigations are needed to better understand how parental habits
319 influence child hedonic acceptance and eating behaviour.

320

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443 **Table** 1. Number of participants by gender and grade.

Gender	2nd graders (7-8 years)	4th graders (9-10 years)	5th graders (10-11 years)
F	10	23	15
M	19	18	19
Total	29	41	34

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446 **Table 2.** Parental questionnaire.

QUESTIONS	ANSWERS
Q1: how many times do you eat fish at home?	Every day: **0%** 2-3 times per week: **44%** 2-3 times per month: **55%** 2-3 times per year: **1%** Never: **0%**
Q2: how many times does your child eat fish at home?	Every day: **0%** 2-3 times per week: **42%** 2-3 times per month: **50%** 2-3 times per year: **5%** Never: **3%**
Q3: does your child like fish?	He/She thinks fish is very good: **9%** He/She thinks fish is good: **41%** He/She thinks fish is not good not bad: **32%** He/She thinks fish is bad: **14%** He/She thinks fish is very bad: **4%**
Q4: is your child present during meal preparation?	Yes: **25%** Sometimes: **59%** No: 1**6%**
Q5: does your child take part in the meal preparation?	Yes: **11%** Sometimes: **64%** No: **25%**
Q6: how do you usually cook fish?	As an ingredient in the first course: **13%** As a principal meal: **87%** - Fillet with sauce: **23%** - Oven-baked fillet: **23%** - Fried fish fingers: **32%** - Grilled fillet: **22%**
Q7: which are the barriers that may lead to a low consumption of fish?	Familial liking: **26%** Convenience: **36%** Price: **35%** Ethics and cultural reasons: **3%**

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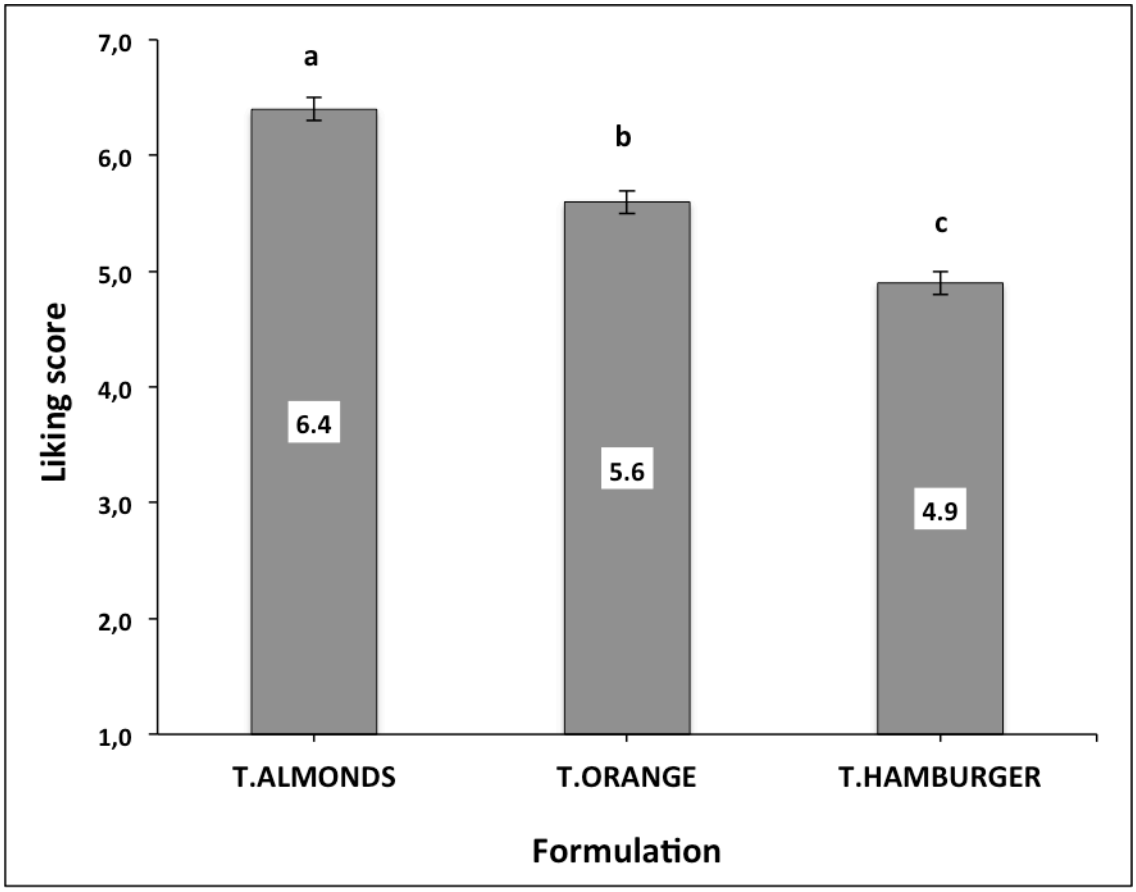

Figure 1. Mean liking scores (ranged 1-7) ± SEM (standard error of the mean) for the three trout formulations (T.hamburger, T.orange, T.almonds) (different letters denote significant differences, $p<0.05$).

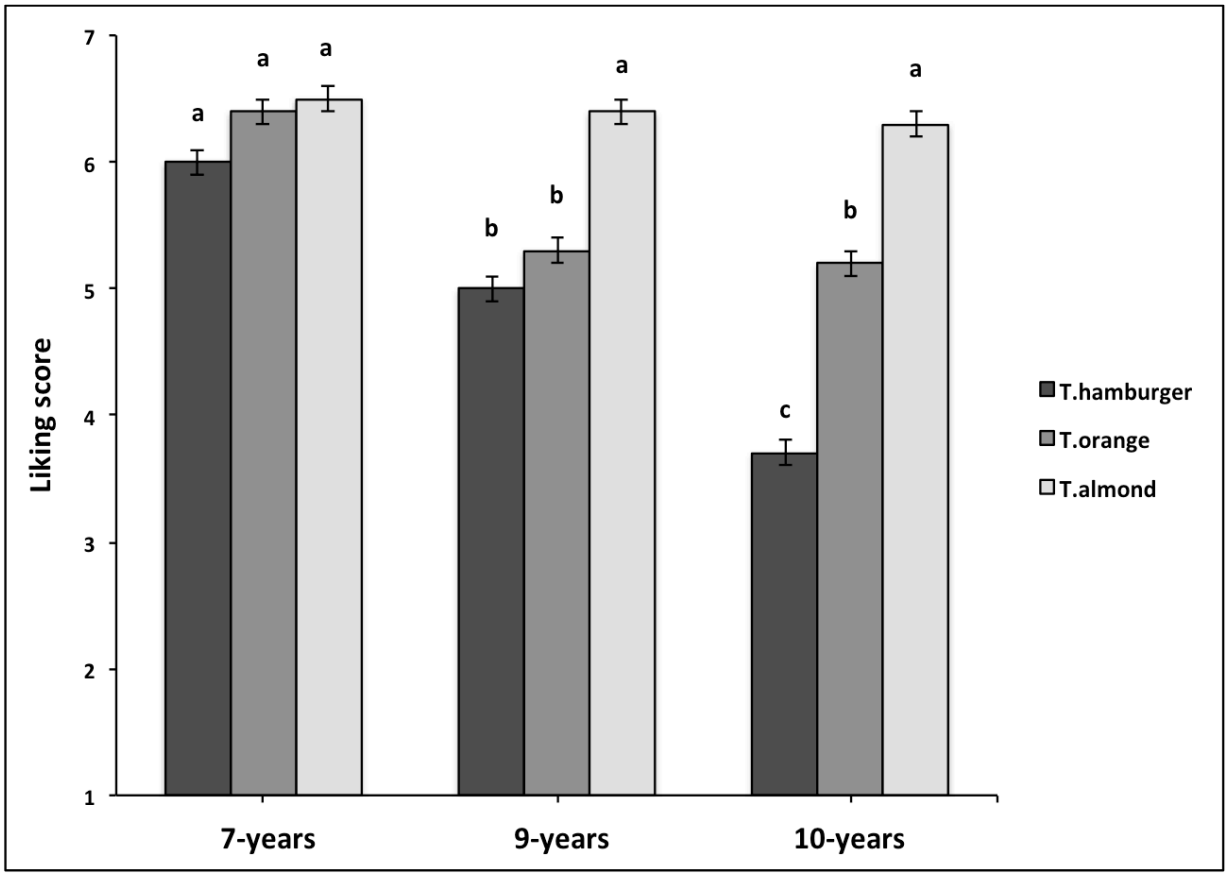

Figure 2. Mean liking scores (ranged 1-7) ± SEM (standard error of the mean) according to age (7-9-10 years) and trout formulations (T.hamburger, T.orange, T.almonds) (different letters denote significant differences between and within different ages, $p<0.05$).

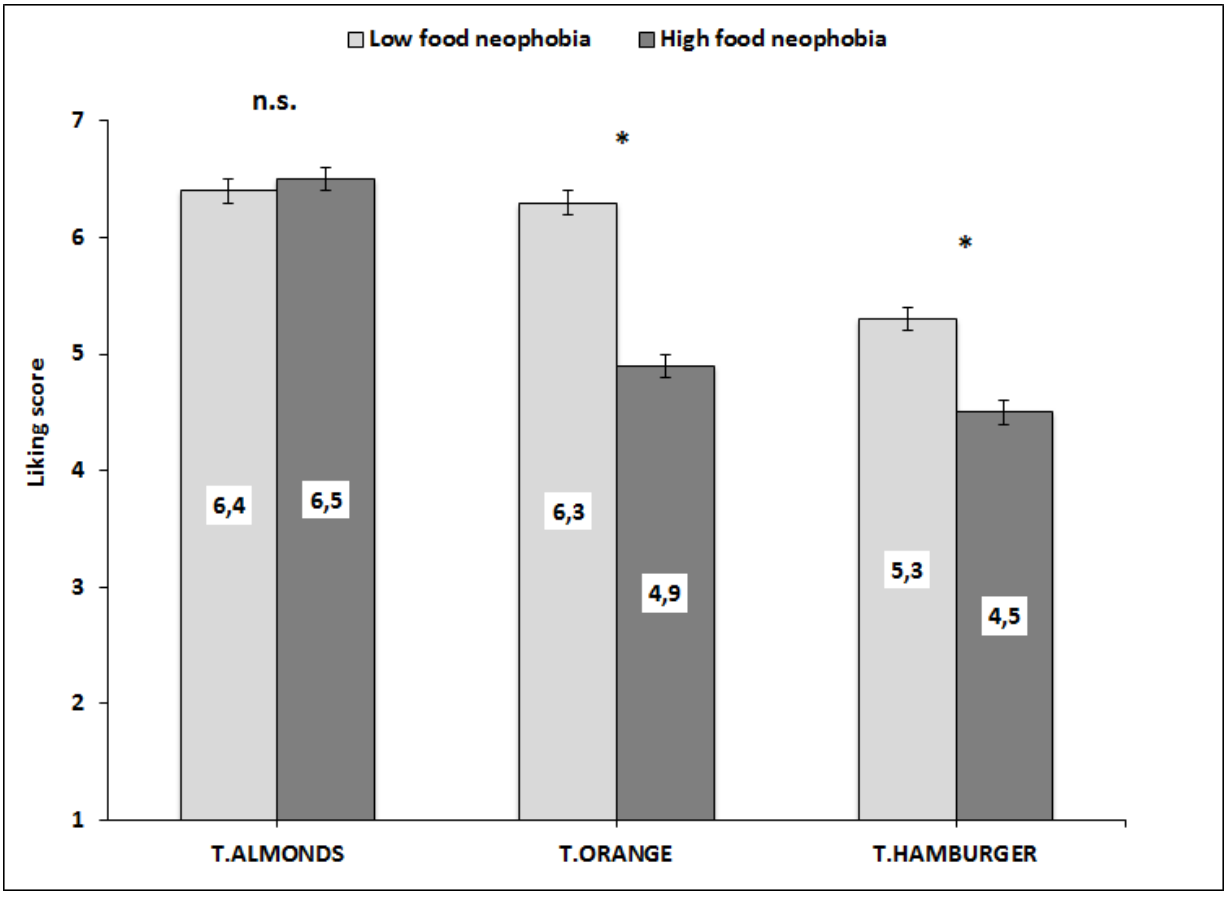

Figure 3. Mean liking scores (ranged 1-7) ± SEM (standard error of the mean) for the trout formulations (T.hamburger, T.orange, T.almonds), according to low and high child neophobia levels (n.s.=non-significant difference; * = significant difference at $p<0.05$).