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Youths' Preferences for Milk Products at School: How Product Attributes and Perceived Body Image Affect Choices

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ABSTRACT

Snacks and lunches offered at school can decisively influence children's dietary habits.
In order to counteract the current trends of increasing obesity in children, children's preferences for foods with lower calorie content are becoming increasingly important. Based on the outcomes of an online survey with a choice experiment, we estimated the probability that young people benefit from different milk products as well as varying sugar and fat contents. The results suggest inter alia that young people who consider themselves to be overweight are more likely to choose products with reduced sugar and/or fat contents.

Keywords: school milk; youths; preferences; choice experiment; body image

1 Introduction

Childhood is the time when dietary habits are decisively formed or when food preferences can be modified, e.g. by the availability of food within families, role modelling or nutrition education. The development of healthy eating patterns during childhood is of particular importance, as childhood obesity has become one of the most serious public health challenges of the 21st century (WHO, 2007). Studies show that eating habits and nutrition behaviour are almost resistant to dietary changes attempted after adolescence (Kelder et al., 1994, p. 1121; Kemm, 1987, p. 210; Köster, 2009; Lien et al., 2001, p. 217). Healthy food should therefore be a part of a balanced diet and correspond to children's tastes and preferences. In addition to a healthy diet, calorie-reduced foods might be helpful for overweight children and youths.

In addition to family meals, snacks and lunches offered at school can decisively influence children's dietary habits (Crawford et al., 2008; Story et al., 2002; Vereecken et al., 2008, p. 723). These offerings can be regarded as one of the most important vehicles for influencing the development of childhood obesity (Crawford et al., 2008). For this reason, the German Nutrition Society (DGE) in Germany stresses that school catering should focus on creating an environment for optimal concentration and learning as well as on providing a balanced diet. Such measures can help shape or change the nutritional preferences of children, preserve health and prevent chronic diseases (DGE, 2013, p. 10). Children are freer in deciding what they want to eat at school than they are at home. At home, children's food choices are strongly influenced by what their parents buy or prepare, although children often make suggestions. At school, children can make their own food choices. They can trade food with friends, decide whether and how much food to buy at school, or even dispose of food they do not want to eat. Thus, it is assumed that children reveal their real food preferences at school as long as peer influence is limited.

Milk and dairy products are regularly offered at school. Since the end of the Second World War, milk has been provided in German schools. It is an important part of a child's diet for several reasons: milk contains significant amounts of calcium, milk protein has high biological value and milk fat is easily digestible (Biesalski et al., 1999; DGE, 2008). The importance of milk consumption during childhood for sufficient calcium intake and thus for optimal bone development and good health in general was emphasised (Jacobson, 1961; Promar International, 2002). Although the dairy consumption of younger children tends to be nearly sufficient in Germany, consumption often decreases with increasing age and often becomes insufficient (Mensink et al., 2007a). Moreover, girls consume fewer dairy products than boys. With regard to milk, yoghurt and similar products, the so-called "Eskimo study" indicates higher dairy consumption by boys aged 6 to 11 years and 12 to 17 years than girls of the same age (Mensink et al., 2007a). Gender-specific differences in the breakfast behaviour of German pupils were described by Weindlmaier and Fallscheer (1997). Approximately 10% more boys than girls drink milk as part of breakfast. On average, the calcium consumption of German children under 18 years of age is insufficient, and it is particularly low for girls (Mensink et al., 2007b; DGE, 2008), with 74% of girls and 51% of boys aged 14 and 18 failing to consume the recommended amounts (MRI, 2008, p. 259). Several studies have analysed various factors that influence the consumption of school food or school milk (e.g. Promar International, 2002, Vereecken et al., 2008, Yon et al., 2012) especially in primary school children. Weible et al. (2013) focused on factors influencing school milk consumption of primary school children in Germany. The following study is a satellite project of the above-mentioned project of Weible et al. (2013) to analyse further important research questions regarding German school milk consumption. Against the background of increasing childhood obesity, milk and especially flavoured milk products are often criticized to be high in fat, sugar and calories (DGE, 2013). Therefore, it is important to focus on children's preferences for products with reduced calorie content and factors that make children choose those products. Furthermore, children who consider themselves to be overweight should be analysed in detail as they could benefit most from calorie-reduced products.

Against this background, the following research questions will be examined:

RQ1: Do the school milk products offered at German primary schools still meet the preferences of pupils in secondary schools?

RQ2: If they do not, what changes should be made to the products? Can a modification in product attributes be helpful?

RQ3: Do youths who consider themselves to be overweight choose calorie-reduced products more often than others?

RQ4: Why are some pupils open to new products while others are not willing to try them?

Knowledge of the preferred products and the reasons for tasting or not tasting new products will help policy-makers to expand the German school milk programme where appropriate. In addition, the findings will help manufacturers to develop appropriate foodstuff.

The article is structured as follows: Section 2 provides additional information showing why it is questionable whether the dairy products currently available in schools actually meet the needs of pupils. Section 3 discusses the paper's theory and method. In section 4 the results are presented and in section 5 their implications are discussed. The final section gives a brief conclusion.

2 Background

Limited product range within the EU School Milk Programme and within schools

The provision of subsidised milk and milk products to educational institutions through specific programmes, such as the EU School Milk Scheme and the National School Lunch Program (NSLP) in the US, is one option for increasing milk consumption among young people. The EU School Milk Scheme has been part of the market price support within the Common Agriculture Policy since 1977. Although the original programme was implemented as a marketing tool, its objective was subsequently broadened. Thus, the EU Commission aims to improve the nutrition of children and to educate them about food (EC, 2007; EC, 2008; EEC, 1977). The EU School Milk Scheme strictly regulates which products may be sold as subsidised school milk (EC 2007; EC 2008). "School milk" comprises a range of subsidised dairy products provided in schools and other educational institutions including plain milk, flavoured milk [*], yoghurt and cheese. Some

[*] Milk flavoured with chocolate or fruit juice or aromatised with 90% milk and an additive of maximum 7% sugar and/or honey (Commission of the European Union, 2008).

EU member states, such as Germany, restrict the number of permitted milk products[†]. Although artificially sweetened dairy products have been allowed in the EU School Milk Scheme since 2008 (EC, 2008), the German School Milk Programme does not permit them. Milk and flavoured milk drinks with a fat content of 1.5% or 3.5% and varying sugar content are currently offered to German school children (Salamon et al., 2012). In general, schools are supplied by only one dairy company and only that company's products are offered. Although milk with varying contents of fat or sugar can be distributed in schools, children often cannot choose which milk fat or sugar content to buy because the distributor normally does not supply school milk with different fat contents. The same applies to the flavour. The reasons for this restriction are high production and distribution costs with relatively low profit margins. For more information on other relevant issues related to school milk supply and demand, see Weindlmaier and Fallscheer (1997), Wietbrauk (1976) and Salamon et al. (2012).

General nutrition guidelines for German children differing from observed children's preferences

In Germany, dietary recommendations for school catering are provided by the German Nutrition Society (DGE) and supported by the German Federal Ministry of Food and Agriculture (BMEL). These bodies recommend daily consumption of milk and dairy products as part of meals and snacks. Although milk and dairy products are important in children's diets, the DGE points out that they can be high in fat and sugar and consequently recommends the consumption of only half-fat and unsweetened dairy products (DGE, 2013). However, sales of plain milk drinks in schools are low. Examining children's preferences and real milk demand, a German study on school milk showed that only 3.8% of pupils aged between 7 and 10 choose plain milk, while 26.5% choose flavoured milk despite the lower cost of plain milk (Salamon et al., 2010).

A similar picture emerges among children in the US: Although plain milk is available, it is usually the most unpopular choice (Johnson et al., 2002). A frequently discussed question is the health status of children who consume different kinds of dairy products. Studies in the US and Australia have led to ambiguous results: Children who drink only plain milk do not achieve the daily recommendation for milk consumption, whereas children who drink flavoured milk do meet the daily recommendation. There was no difference in BMI between children who consumed flavoured milk and children who consumed soft drinks. However, children who consumed flavoured milk had a greater supply of micronutrients than children who consumed plain milk or soft drinks and they were the only ones to achieve the values of the micronutrient recommendations (Fayet et al., 2013; Johnson et al., 2002; Murphy et al., 2007; Murphy et al. 2008). The studies sum up that whether a child consumes plain milk, flavoured milk or soft drinks does not affect BMI. The result of the lack of a positive effect on BMI when soft drinks are not consumed should be seen in the context of the products under consideration: All products (soft drinks, plain milk and flavoured milk) are quite high in calories. Substituting one product with another hardly affects BMI. The results regarding BMI will be different when a high-calorie product is substituted with a low-calorie product. In this case, BMI of school children (Ebbeling et al., 2006) and consumers in general were frequently found to be affected (Thow et al., 2014).

Changing preferences during adolescence

There is considerable evidence that children like dairy products. The great variety of dairy products (from low to high-sugar, from skimmed milk to full-fat, various flavours) ensures that many children are reached as consumers. However, changing preferences during adolescence require a well-adapted product range. Satisfying the preferences of secondary school children is particularly difficult. Compared with younger children, adolescents are more likely to try out new foods, to expand the range of products that they consume and to change their preferences. This observed difference fuels the on-going discussion that school milk no longer satisfies children's preferences and that primary school children require different products than secondary school children (Louie et al., 2011).

However, it is unclear which products children actually want to consume at school. Weible et al. (2013) showed that out of a sample of 7,336 surveyed children attending primary schools, 43% consume school milk at regular prices and 81% consume milk if it is free of charge. Do the remaining 19% of children dislike dairy products? Would they consume other dairy products that are currently not available in schools? Would these children like more sugar or artificially sweetened dairy products, or do they prefer fatty or skimmed milk products? Do they want to drink milk or do they prefer yoghurt? In order to increase the demand for milk and dairy products in schools, children's preferences must be matched with the products offered because the level of consumption is influenced by individual preferences (Baxter et al. 2000), especially by taste and convenience (Noble et al., 2003).

[†] For details on the German programme, see BMELF (1985).

3 Theory and Method

3.1 Theoretical Background

A choice experiment was chosen to simulate the situation of school milk choice in the questionnaire. Within this kind of experiment, just a limited product range is offered to the respondents. The same situation exists at school. Children at school also have to choose one product out of all offered ones, like respondents have to do in the context of the experiment. Another advantage of choice experiments is the fact that utility of different product attributes can be analysed (Hanley et al., 1998b). Since a research question (RQ2) is precisely focused on product attribute modification, it was decided to carry out a choice experiment.

The method proceeds from the assumption that preferences for different products and product attributes can be determined by analysing choice behaviour. When products are affordable, consumers, in this case pupils, generally choose the product that satisfies them most. In order to measure this product utility, a choice experiment is applied in this paper. Further, a nested logit model is used to compare children who always choose conventional school milk with those who choose new products.

Utility analysis

The starting point for the utility analysis is the consumer preferences and the concept of Lancaster, who was the first to establish the concept of attributes and levels as a new approach to consumer theory in the 1960s (Lancaster, 1966). McFadden extended this approach in the 1970s, using his random utility model (McFadden, 1974). Both Lancaster and McFadden described the alternatives chosen by using a number of attributes, k. Individual n chooses alternative i, resulting in utility $U_{ni} = U(X_{ki})$, where X_{ki} is a vector describing the attributes embedded in alternative i. Applying random utility models, utility is composed of a deterministic and a random part:

$$U_{ni} = V_{ni} + \varepsilon_{ni} \tag{1}$$

Here, $V_{ni} = f(X_{ni})$ is deterministic and depends on the product attributes, whereas ε_{ni} represents the random component. Total product utility is the sum of all single utilities that result from different attributes:

$$U_{ni} = \sum_{k=1}^{K} (\beta_{nk} * X_{nk}) + \varepsilon_{ni} \tag{2}$$

β presents a weighting of the regarded attribute. A larger β indicates a higher attribute utility (Hensher et al., 2006, p. 74 ff; Louviere, 2001).

The models for analysing choice experiments calculate the probability that an individual chooses a certain product out of the presented products. Additionally, it is assumed that the individual selects the product with the highest degree of utility[‡].

Measurement of product utility is one of the major purposes of choice experiments (CEs). CEs are not the only method for measuring product utility, but they have several advantages compared to other methods: (i) it is easier for respondents to choose the preferred product than to rank many different alternatives, as in a conjoint analysis (Adamowicz et al., 1998; Hair et al., 1998, p. 394); (ii). CEs are less susceptible to respondents' strategic behaviour, which is a major problem in contingent valuation method applications (Breyer et al., 2005, p. 61); and (iii) compared with the alternative methods, it is easier to check for internal consistency, to compute single attribute parameters, to detect substitutive relationships between different attributes and to take into account the heterogeneity among respondents using different econometric models (Hanley et al., 1998a). Following Hanley et al. (1998b), choice experiments should be the favoured method to assess particular attributes. As one of the research objectives is to explain why some children are very open-minded about new products and other children even refuse to buy them, a nested logit model was chosen to analyse the data set[§].

[‡]Due to space limitations economic equations are almost completely cut out. Please read Hensher et al., 2006 (p.82) for further information.

[§]Latent Class Analysis was also carried out to identify different groups. Results are published in Christoph-Schulz et al., (2016).

Nested Logit Model

The following analysis is based on the assumption that different product alternatives can be divided into different segments. In our case, one segment contains no novel product and another segment contains both novel products and conventional school milk. Thus, the purchase of a product is based on two different decisions: the first decision is the general decision to buy or not to buy a novel product. If this question is answered positively, then the next question is the selection of the preferred product based on the product attributes. For further information please read Hensher et al. (2006, p. 479), Louviere et al., (2000, p. 186); Tutz, (2000, p. 194) and Urban (1993, p. 141).

3.2 Practical implementation of the choice experiment

The attributes selected for this study are listed in Table 1. As this paper will evaluate whether there is a need to broaden the range of dairy products sold in schools, the content levels were chosen based on widely available products in Germany. Milk drinks are the most prevalent dairy products sold in schools, but yoghurt is also available. The types of products are two novel school milk products (one milk drink and one yoghurt representing those products that are not currently sold as school milk) and one conventional school milk drink. The latter was a type of school milk that is widely offered in German schools and was provided as a constant "opt-out" option in all choice sets.

The fat content of the products is 0.3%, 1.5% and 3.5%. These levels are the typical fat content levels for milk and yoghurt in Germany. The sweetening agent was chosen as an attribute as children may already be accustomed to this attribute. Furthermore, sweetening agents are permitted within the EU school milk scheme but not in the German school milk programme. One aim of this study is to evaluate whether there is a need for sweetened products within school catering. The price was included as an attribute to simulate a shopping situation. The average price of school milk in Germany is 35 cents for 250 ml. In order not to excessively strain the respondents, no other attributes were chosen. As previously mentioned, schools are typically catered by only one dairy company. Consequently, we did not include attributes such as brand or type of packaging. For more information on relevant factors influencing school milk consumption in general please read Weible (2013) and Weible et al. (2013).

Table 1.
Attributes and attribute levels.

Attribute	Levels
Products	Novel school milk, yoghurt, conventional school milk
Price (in cents)	30, 35, 40
Fat content	0.3%, 1.5%, 3.5%
Sweetening agent	Sugar, artificial sweetener

Source: Own illustration.

Choice scenarios were constructed using orthogonal main-effects designs in SPSS (compare Hensher et al., 2006, p. 116), which led to 27 product combinations. To facilitate respondents' decision-making process, these 27 product combinations were segmented into nine blocks with three choice sets each. A sample of a choice set from the CE is provided in Table 2. Each respondend got three of these sets. To ensure a real life decision process, the possibility not to choose any of the offered products was included. Please note that the conventional school milk is always sugar sweetend, with 3.5% fat content and a price of 35 Cents. The novel products vary in their attribute values, as shown in Table 1.

Table 2.
Sample choice experiment question.

Please check the option (A, B, or C) that you would most likely purchase.			
Product attribute	**Novel school milk** **250 ml**	**Novel yoghurt** **150 ml**	**Conventional school milk** **250 ml**
Price in cents **Fat content** **Sweetening agent**	40 0.3% sweetener	30 1.5% Sugar	35 3.5% sugar
I would choose.....	☐	☐	☐

I would not choose any of these products ☐ because _____

Source: Own illustration.

4 Results

4.1 Questionnaire and data

The data used in the analysis were collected from an online survey completed by 509 German youths aged 15 to 18 years. Because cognitive pretesting showed that children under the age of 15 were overstrained by the CE, these children will not be considered in this analysis[**]. This finding is not surprising considering that Ward and Wackman (1972) and John (1999) published similar outcomes regarding children's competence in making purchasing decisions and judging various product attributes. But it also has to be noted that Hartmann et al. (2017) found that already children aged 8 to 11 years are able to handle CEs if they had experience with handling money.

Youths were recruited by a market research agency. Quotas concerning age (25% each), gender (50 % male, 50 % female), and region (25 % in North, South, East and West) were given in advance. Unfortunately, quota concerning age was not met. Youths of eighteen years of age were underrepresented. One reason for this could be that children under the age of 18 need their parents' permission to fill in a questionnaire. It is possible than parents even told their children to answer the questions, while youths of full age are more likely to decide for themselves. It is possible that the topic was not interesting enough for them. Altogether, the sample is a convenience sample and not representative for German youths of 15 to 18 years of age except for gender. Due to the fact that the sample was stratified, we cannot exclude that our analysed variances may under- or overestimate the actual variances.

The questionnaire consisted of three parts. The first part included information on regularly consumed milk products, preferred product attributes and general attitudes towards dairy products and nutrition. Additionally, the question was asked whether the youths felt overweight or too thin. The second part consisted of a CE in which the respondents had three options in each choice set, as described above.

The third part of the questionnaire contains socio-demographic variables such as age, gender, household size, migration background, school year and type of school.

Table 3 shows some descriptive characteristics of the data set. Because of space limitations, only those variables are presented which have a proven significant influence on choice behaviour or which have been classified as significant after a literature search. Further information is available on request.

A total of 31% of the youths assessed themselves as overweight and 9% as underweight. It is important to note that it cannot be determined whether these youths are actually overweight based on their self-assessment. In the beginning of the analysis, correlation coefficients and cross tables were used to check variables for possible associations and to detect possible relationships between variables that could

[**] Children aged 10 to 14 years completed a pair comparison.

influence the probability of choosing novel school milk products. Several significant but weak relationships (< 0.1 to 0.23 using Pearson's contingency coefficient) were found. Further information on the cross-tables is available on request.

Table 3.
Sample characteristics.

Variable	Youths
Gender (1 if male, 0 if female)	50.0 %
Mean age (in years)	16.28 years
Mean household size (in persons)	3.64 persons
Number of brothers and sisters (in persons)	0.73 persons
Immigration background (1 if appropriate)	7.0 %
My figure is ok (1 if appropriate)	60.0 %
Think I'm too corpulent (1 if appropriate)	31.0 %
Think I'm too thin (1 if appropriate)	9.0 %
Low fat content is important (1 if appropriate)	47.0 %
Low sugar content is important (1 if appropriate)	55.0 %
Low calorie content is important (1 if appropriate)	44.0 %
Low price is important (1 if appropriate)	73.0 %
Product brand is important (1 if appropriate)	23.0 %
I like milk products (1 if appropriate)	92.0 %
Would like to eat milk products daily (1 if appropriate)	78.0 %
I'm interested in a healthy nutrition (1 if appropriate)	67.0 %
Care about good nutrition (1 if appropriate)	63.0 %
My parents take care that I consume enough milk products (1 if appropriate)	68.0 %
Might buy milk products at school (1 if appropriate)	76.0 %
Consume milk product at school (1 if appropriate)	56.0 %
Given a range of flavoured and plain milk products, I would choose a plain milk product (1 if appropriate)	7.3 %

Source: Own calculations.

5 Econometric results

In the choice experiment, calculated using NLOGIT, 24 youths (4.7%) refused to choose any of the three presented products. Their main reasons were the ingredients (because of sugar, fat, artificial sweetener or lactose) or a general rejection of (the presented) dairy products. Hence, the NL estimation was conducted with 485 youths (a total of 1,419 choices). A product with artificial sweetener was chosen 278 times, and a low-fat product was chosen 663 times. The results are shown in Table 4.

The model explains 25% of the total variance. R^2 derived from choice models cannot be directly compared with the R^2 statistics of linear regression models. According to Hensher et al. (2006, p. 338), R^2 can be translated into an R^2 of a linear regression model between 0.55 and 0.60.

The IV parameter remains within the [0,1] bound, but is not significant. According to Hensher et al. (2006:547), the Wald test, a one-sample t-test, must be subsequently performed in this case. This method tests the hypothesis whether the IV-Parameter is statistically equal to zero. The critical value is ± 1.96 for the 95% confidence interval.

$$\frac{\text{IV} - \text{Parameter}}{\text{Standard deviation}} = \frac{-0.007}{0.383} = -0.018 \tag{3}$$

With a value of -0.018, the statistic is below the critical value of 1.96. This result implies that the null hypothesis cannot be rejected. The IV-Parameter remains within the [0,1] bound, and two different choice models can be identified. Thus, youths who always chose conventional school milk made two independent decisions.

They first decide whether to buy a novel school milk product and then select a specific product based on its attributes (in our case, they had no choice between different products).

Thus, the decision to buy the conventional product or one of the novel products was not influenced by the expected product utility. According to Ryan and Skåtun (2004) we conclude the following: when deciding on whether to choose novel school milk products, youths make this decision based on factors that are not related to the product attributes but to their individual characteristics.

Table 4.
Results of NL Estimation.

Parameter	Scale	Coefficient	Standard Deviation
Utility from school milk			
Constant of novel school milk utility	Metric	0.776***	0.098
Constant of novel yoghurt utility	Metric	0.256**	0.103
Price	Categorical	-0.086***	0.011
Artificial sweetener as sweetening agent	Dummy	-0.280***	0.093
Fat content	Categorical	-0.050	0.033
Factors that influence the probability of choosing novel school milk			
Constant	Metric	1.191***	0.714
Number of brothers and sisters	Metric	-0.249***	0.084
Perceived overweight	Dummy	0.733***	0.216
Low fat content is important	Dummy	0.561**	0.222
Low sugar content is important	Dummy	0.860***	0.212
Low price is important	Dummy	-0.425**	0.196
Like milk products	Dummy	0.935***	0.344
Would like to eat milk products daily	Dummy	-0.660**	0.269
Care about good nutrition	Dummy	-0.493***	0.181
Given a range of flavoured and plain milk products, I would choose a plain milk product	Dummy	-0.958***	0.267

* Significance Level = 0.1; ** Significance Level = 0.05; *** Significance Level = 0.01.
IV-Parameter non-refusers: -0.007; R^2: 0.248
Source: Own calculations.

Variables that explain the utility of school milk

Both novel products have a positive constant, implying that the product utility is, on average, higher for youths who consume the novel products than for those who consume the conventional products (the constant of the conventional product is normalised to zero). The constants' coefficient of the novel milk is higher than the coefficient of the novel yoghurt. Thus, on average, novel milk is preferred over novel yoghurt.

Furthermore, the estimated price parameter is negative, which means that utility decreases with increasing price. The dummy for artificial sweetener is also significantly negative. This result indicates that product utility declines with the use of an artificial sweetener. Artificial sweeteners are not preferred by the majority of respondents.

The attribute of increasing fat content is not significant; thus, the fat content is generally not relevant for the decisions of the respondents.

Variables that influence the probability of choosing novel school milk

The lower part of Table 4 shows the factors that significantly influence the probability of choosing one of the novel school milk products. The likelihood of choosing a novel product was greater among those youths who considered themselves overweight and agreed that a low fat and sugar content is important for the selection of dairy products. Further, youth who stated that they liked dairy products more often chose a novel school milk product. However, the likelihood of choosing a novel product was lower when the product price was regarded as important.

In general, the probability of choosing a novel product is lower among those youths who stated that they would like to eat dairy products daily, who care about good nutrition and who would choose a plain milk product if they were allowed to choose only one product. These respondents also had fewer siblings compared with youths who always chose the conventional product.

6 Discussion

Variables that explain the utility of school milk

With respect to **RQ1,** the study clearly shows that most respondents explicitly prefer novel dairy products over conventional milk, as novel products have a positive constant and 421 youths chose a novel product at least once. With regard to **RQ2** milk drinks appear to be preferred over yoghurt for consumption at school. This preference may arise because of students' familiarity with this type of product in the context of school consumption. In addition, milk drinks are easier for children to handle than yoghurt and the likelihood of staining clothes with milk is lower due to the straw[††]. Christoph et al. (2012) conducted a pair comparison with children aged 10 to 14, and some respondents explicitly explained that they were afraid of making a mess when eating yoghurt and preferred milk for that reason. In another study conducted by Stead et al. (2011), British youths between 13 and 16 explained in focus groups that a spoon is "not cool" and that yoghurt is thus not accepted for consumption at school. Because the novel yoghurt still has a higher level of utility compared with the conventional milk, this finding of Stead et al. (2011) appears to be less relevant to the respondents of this study.

Still considering **RQ2,** the study encourages policy makers to allow artificial sweeteners for school milk products although the parameter for artificial sweeteners is negative. Although youths in general do not prefer artificially sweetened milk, this product was chosen 278 times although a sugar-sweetened product was available. From this it can be concluded that these products are interesting for at least a minority of students and are not rejected by the entire group. By carrying out a latent class analysis we were able to identify such a group (compare Christoph-Schulz et al., 2016). The youths who consider themselves as overweight appeared to have general interest in lower-calorie dairy products, such as low-fat and low-sugar products as well as products containing artificial sweeteners. But it has to be noted that the negative parameter is consistent with public discussions regarding artificial sweeteners in Germany. This ingredient is often considered unhealthy and unnecessary (Focus, 2011). The arguments put forward in this context are that artificial sweeteners cause ravenous appetite, may trigger cancer and may promote attention deficit hyperactivity disorder (ADHD). Nevertheless, there is a lack of serious scientific studies proving these arguments (Academy of Nutrition and Dietetics, 2012, Shankar et al., 2013). The parameter for fat content is negative. A reduced-fat product was chosen 663 times (out of 1,419 choice sets) although a product with 3.5% fat was available. Nevertheless, the parameter is not significant. Although the parameter is not significant within this study, it is worth discussing because other studies show the relevance of different fat levels. Analysing a latent class model, we were also able to identify a group of 118 pupils who were significantly in favour of the low fat alternatives (Christoph-Schulz et al., 2016).

Porubcan and Vickers (2005) found that one reason that people do not like milk in general is the perceived "sour" taste. The perception of sourness increases with higher fat content and decreases with increasing sucrose content. Babicz-Zielinska (1999) found that Polish students increasingly prefer low-fat dairy products over full-fat products. The same author found that fat content is an important factor in food choice in general, with low fat content being preferred (Babicz-Zielinska, 1998). Additionally, Kim et al. (2013) found that fat content in chocolate milk is important to consumers. Conducting a conjoint analysis, these authors found that 1% and 2% fat content is the most popular, followed by fat-free and whole milk. In summary, lower-fat milk drinks may help increase milk consumption for people who do not like milk because of its sourness. Pupils preferring lower-fat milk products for nutritional reasons will also benefit from such an offering.

Various reasons discussed in the literature could explain why some respondents never chose novel products. Lien et al. found that the majority of 14- to 21-year-olds prefer to maintain their eating habits with regard to fruit and vegetables, sweets and soft drinks. In the present study it can be interpreted that those youths do not consume artificially sweetened or reduced-fat dairy products at home and maintain this behaviour at school. It is also possible that habit-forming processes are already completed within this group of youths, which would support the claim for the need to initiate nutrition education early. However, it is also possible that these youths attempt to avoid unfamiliar food as Loewen and Pliner (1999) found a correlation between age and the rejection of an unfamiliar food.

As expected, children care about prices, as younger children already exhibit economic behaviour and understanding (Strauss, 1952; Webley, 2005; Weible et al., 2013). Hence, in this study, the price parameter is close to zero (-0.086). This result may be interpreted as an indication of low price sensitivity due to the small differences between the three product prices (30, 35 and 40 cents).

[††] Children in Germany are typically provided with packages of school milk and a straw. They do not receive the milk in a glass.

Variables that influence the probability of choosing novel school milk

With regard to **RQ3,** the study shows that those respondents who considered themselves as overweight are more likely to choose novel milk products. These products largely have reduced calorie contents because of artificial sweeteners and/or fat reduction. There is an obvious reason that youths who consider themselves to be overweight choose these products. This result is in line with previous studies that have reported that overweight children tend to choose products with lower calorie content (Zinnecker et al., 1996). Snoek et al. (2013) found that youths aged 13 to 15 with higher BMIs demonstrated restricted eating behaviour. In a broader sense, artificially sweetened or reduced-fat food products can be viewed as part of a restricted eating behaviour.

In this regard it is noted that 31% of the respondents considered themselves as overweight. In reality, 25.5% of German youths aged 14-17 were obese or overweight between 2003 and 2006 (Kurth and Schaffrath-Rosario, 2010). Thus, more respondents describe themselves as overweight than the average values actually reflect. Although this inconsistency could have emerged by accident, it should be considered that disordered body perception is a frequently observed phenomenon, particularly during adolescence. A German study on the health behaviour of school-aged children, that asked children about their body perceptions, reported that 49.8% of girls and 34.2% of boys regarded themselves as overweight. Only 37.6% of girls and 48.2% of boys described themselves as having a normal weight (HSBC-Team Deutschland, 2011).

With respect to **RQ4,** the study was able to identify the following characteristics for youths in favour of novel products: they consider themselves to be overweight, consider low-fat and low-sugar products important and/or prefer dairy products in general. The results regarding respondents' preferences for low-fat and low-sugar dairy products are consistent with the above-mentioned findings of body perceptions. Incorporating low-fat and low-sugar foods into one's diet is a key to reducing obesity (Jensen et al., 2013). For school milk, MRI (2011) found that low sugar content is more important than low fat content. Parents and teachers of primary school children often ask for school milk containing less sugar. Even some children report that they don't drink school milk because of the sweet taste (MRI, 2011). However, the effects should not be overestimated, as Yon et al. (2012) found that slight changes in fat and sugar content have no significant effect on consumption. The results of Kim et al. (2013), who analysed the influence of different sugar contents in chocolate milk, are largely comparable to those of Yon et al. (2012). Although there was no difference between regular and reduced-sugar products, products with "sugar free" printed on their labels were less likely to be chosen. Additionally, Chollet et al. (2013) found that sugar content cannot be decreased infinitely. Although flavoured yoghurt with 10% sugar was significantly more liked than yoghurt with 5% or 7% sugar, yoghurt with 7% sugar was still tolerated. However, yoghurt with 5% sugar was not accepted. Products with reduced fat levels were more preferred than whole-fat products. Finnish consumers appear to prefer reduced-fat milk, particularly for health reasons. Those respondents who switched from regular to reduced-fat milk indicated nutrition or health as their main reasons for the change (Tuorila, 1987).

Youths who report that a low price is important for them have a decreased probability of choosing novel products. This result is comprehensible, as some of the novel products were more expensive than the conventional school milk (40 cents versus 35 cents, respectively).

At first glance, it is surprising that youths have an increased probability of choosing novel products if they like dairy products, but a decreased probability if they like to eat dairy products daily. Of course, it is possible that the first statement ("like milk products", with which 92% of the respondents agreed) is influenced by social desirability. The first statement likely represents a preference for the taste of milk but does not automatically indicate that these products are frequently consumed. The second statement could be influenced by a possible focus on calories. Perhaps such youths do not consume milk products daily and restrain their eating behaviour because they are afraid of excessive calorie intake. This explanation would also match the finding that the respondents in this group considered themselves to be overweight, and the results of the aforementioned study by Snoek et al. (2013) examining the restrained eating habits of overweight youths.

Considering the other results of this study, it is not surprising that children who stated that they would choose a plain milk product among several alternatives had a lower probability of belonging to the group who chose a novel product at least once. The same holds true for those respondents who stated that they care about good nutrition. There is an ongoing discussion in Germany as to whether artificial sweeteners and low-fat products are regarded as unhealthy for children and by those who pay attention to nutrition (Focus, 2011).

Youths with more siblings have a decreased probability of choosing novel products, although household size was not found to have a significant influence. Thus far, the following explanation is only a

presumption: it is possible that children with fewer siblings are more involved in family shopping decisions. This greater involvement could result in a tendency to choose a broader set of new products, such as novel school milk.

Some variables that were expected to have a significant influence on decisions did not do so: Surprisingly, there were no gender effects. Cross tables conducted before the NL analysis indicated strong gender effects. Compared with boys, girls considered themselves as overweight more often (significance level: 0.01). Girls indicated significantly greater preference for artificial sweetener (significance level: 0.1), low-fat milk products (significance level: 0.1) and skimmed milk products (significance level: 0.05). Additionally, low calorie, fat and sugar contents were more important to girls (for all three, significance level: 0.05). One possible conclusion may be that the gender effect is masked by other variables and is therefore not observable within the NL analysis. However, gender effects have been detected by other researchers. Boys have been found to be more likely to choose meals because of taste or flavour, whereas girls are more likely to choose meals for health reasons (Noble et al., 2003). Because girls appeared to focus more on their size, they were also more likely to choose reduced-calorie products (Berg et al., 2000; Nu et al., 1996). Some studies indicated that brands were important in the food choices of adolescents and adults (Kim et al., 2013; Stead et al., 2011). This variable was also tested but did not lead to any significant results. In general, it appears that children's preferences and food choices are determined by attitudes and habits and that variables such as gender, age, migration background and household size are less likely to explain consumption behaviour. Additionally, other studies have only found few or no socioeconomic variables significantly influencing consumption (Chapman and Boor, 2001; Yon et al., 2012).

It has to be critically noted that it is likely that respondents may have occasionally answered the survey according to how their parents would have answered, although they themselves would have acted differently in reality. The role of parents must be viewed as one of the key factors in children's nutrition at home and in related attitudes. Dennison et al. (2001) found that parents' beliefs about the healthiness of specific types of milk are essential drivers of their consumption. With respect to school milk or to children's nutrition in general, family-based measures are strongly required to achieve sustainable changes in child and adolescent milk consumption and in nutrition in general.

7 Conclusion

School milk choice is driven by various factors, but the results of this paper are valid only for the limited product range tested. Other products, such as kefir and curd and products with various flavours, should be considered in future studies of school milk products. With regard to **RQ1 and RQ2,** the study clearly showed that most youths preferred novel school milk products. This finding implies that a wider range of products, including drinking yoghurt, and varying fat and sugar contents could be useful. These products already exist in the market but not yet in the EU School Milk Scheme. Therefore, it is recommended to adapt the Scheme to the recent findings. Also additional school-based intervention programmes that allow children to choose between different milk products have a good opportunity to increase school milk consumption. An active choice among several options is essential to creating an environment in which habit formation can occur. Policymakers can promote a wider range of products with other, preferably healthier options so that children and youths can develop behaviours beneficial to health. If they do so it is important to guide children's choices subtly to ensure that they are unaware of being guided and thus do not feel forced (compare Just and Wansink, 2009).

With respect to **RQ3,** the study shows the existence of a distinct group within the age group considered. Children who perceive themselves as being overweight appeared to have attitudes and to make choices that differed from the average youth. These children had a greater tendency to choose novel products, particularly artificially sweetened products or lower-fat products. These children chose products that appeared to be healthier because they contained fewer calories. It seems obvious that for this group, self-perception rather than actual BMI affected their behaviour. Hence, if these findings can be supported by further research, the development of special programmes for this group will be important. Moreover, because children that perceive themselves as overweight have different attitudes and choice behaviours, this finding can be viewed as an opportunity to specifically address this distinct group with appropriate products that satisfy their preferences and that "nudge" children and youths towards healthier choices.

In conclusion, the findings presented indicate that modifying (different fat or sugar levels or artificial sweeteners) or widening the range of milk products offered in schools will be useful to increase school milk consumption in general. Consideration of nutritional aspects (low sugar content, artificial sweetener and low fat content) and taste aspects are important to ensure successful modifications. If children

neither enjoy (specific) milk products nor perceive them as "healthy", interventions to increase milk consumption will have limited success.

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