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Short communication: Patterns of dairy consumption in free-living children and adolescents

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ABSTRACT

According to national survey data, dairy food consumption has fallen in recent years and declines further with age, especially from childhood to adolescence. Dietary surveys typically rely on retrospective dietary assessment methods and use broad age groupings (4–10 yr; 11–18 yr), making it challenging to differentiate between middle-childhood and adolescence. Consequently, there is a need to assess dairy food consumption during middle-childhood and adolescence using more robust dietary assessment tools. Therefore, the present study aimed to describe and compare patterns of dairy consumption throughout middle-childhood and adolescence. Dairy food consumption was assessed during school term-time over 4 consecutive days, including 2 weekdays and 2 weekend days, in a sample of free-living children (9–11 yr, n = 40) and adolescents (15–18 yr, n = 35). For children, free-living dairy intake was evaluated through parental-weighed food records, and for adolescents, a combined weighed self-reported food record and 24-h dietary recall technique was utilized. Food records were explored to determine types, amounts, and frequency of dairy food consumption, and were analyzed for differences between middle-childhood and adolescence using a between group 2 × 2 (age × sex) ANOVA. Descriptive data suggested that milk was the most popular dairy product consumed by both children and adolescents. Statistical analysis revealed a main effect for sex on total milk consumption (mL) and number of daily milk portions consumed. No interaction or main effect was present for any other variable. The present study indicates that independent of age, boys consumed greater amounts of milk compared with girls. Contrary to existing literature, findings suggest no difference in milk-based dairy consumption between middle-childhood and adolescence.

Key words: dairy, milk, adolescents, children

Short Communication

Milk-based dairy foods represent a nutrient-dense foodstuff. Housing an extensive assortment of nutrients, milk-based dairy foods contribute significantly to intakes of high-quality proteins, micronutrients, and numerous bioactive constituents. Consequently, milk-based dairy foods exert the potential to affect human health (Fiorito et al., 2006), and their inclusion as a component of a healthy balanced diet is widely recognized.

Despite the acknowledged benefits of dairy foods, per capita consumption has declined in recent years and declines further with increasing age, particularly throughout adolescence (Bates et al., 2014). Nonetheless, much of our knowledge concerning dairy consumption is centered on national surveillance data. Originally established in 1992, the National Diet and Nutrition Survey remains the only surveillance program in the United Kingdom that provides a nationally representative assessment of dietary habits of the general population (1.5–3 yr, 4–10 yr, 11–18 yr, 16–64 yr, and ≥65 yr). Dietary surveys typically rely on retrospective assessment methods, which pose complications of misreporting error and are not therefore entirely robust. Furthermore, the wide-ranging age groupings (e.g., 4–10 yr, 11–18 yr) make it difficult to differentiate between consumption in middle-childhood and adolescence. It is therefore important to assess dairy consumption throughout this period, exercising more finite age boundaries and more robust dietary assessment tools. Accordingly, the present study aimed to examine and compare patterns of free-living dairy food consumption among a sample of children (9–11 yr) and adolescents (15–18 yr).

This study comprised a convenience sample of participants aged 9 to 11 yr (15 boys and 25 girls) and 15 to 18 yr (20 males and 20 females), recruited from a local primary and secondary school, respectively, in northeast England. The study was conducted according to the guidelines laid down in the 2013 Declaration of Helsinki (WMA, 2013), and all procedures involving human subjects were approved by the Faculty of Health and Life Sciences Ethics Committee at the University

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of Northumbria (Newcastle upon Tyne, UK). All participants provided parental written informed consent before data collection.

Free-living dietary intake was evaluated during school term-time over 4 consecutive days, including 2 weekdays and 2 weekend days. Adolescent (15–18 yr) free-living dietary intake was evaluated by using a combined weighed self-reported food record and 24-h dietary recall technique, used previously with adolescent populations (Rumbold et al., 2011). The reporting accuracy of this approach has been demonstrated to be an effective method for dietary assessment in adolescents (confidence intervals for bias ranging from 0.00 to 0.95 megajoules; Rumbold et al., 2011). For children (9–11 yr), free-living dietary intake was evaluated through parental-weighed food records. During periods of dietary data collection, a parent or guardian was requested to report all food and drink items consumed, with assistance from the participating child where necessary. Parental food records have successfully been used when reporting dietary habits of children (4–10 yr) and are comparable to measures of energy expenditure using doubly labeled water (Bates et al., 2014).

During periods of dietary data collection, adolescent participants and parents or guardians of the participating child were requested to give comprehensive recordings of all food and drink items consumed, weighing items before and after consumption (if leftovers were present). Additional information deemed necessary included methods of preparation and cooking, names of branded products, and condiment use. For homemade dishes, participants were asked to record individual ingredients and quantities for the whole dish, along with a brief description of cooking method and how much of the dish they consumed. Reported dietary intakes were subsequently explored to determine types, amounts, and frequency of dairy food consumption.

Trained research staff examined all food records, which were subsequently analyzed using the nutritional software package Nutritics (Nutritics Professional v3.09, Nutritics, Dublin, Ireland). Food records were explored to determine types, amounts, and frequency of dairy food consumption. Dairy food categories in the present study included milk (whole, reduced-fat, fat-free, and flavored milk), yogurt (all yogurt types), cheese (all cheese types), butter, ice cream, cream, and custard. For the present study, a serving of dairy equated to 150 mL of milk, 25 g of cheese, 120 g of yogurt, 5 g of butter, 75 g of ice cream, 15 mL of cream, and 75 g of custard. Patterns of dairy consumption were dichotomized according to overall consumption and average daily servings.

The statistical software package SPSS (version 21.0; SPSS Inc., Chicago, IL) was used for all data analysis. Descriptive data are presented as means and standard deviations (SD). Results are presented by groups according to sex and age (boys 9–11 yr; boys 15–18 yr; girls 9–11 yr; girls 15–18 yr). Differences in overall consumption and average daily servings of milk, cheese, yogurt, butter, ice cream, cream, and custard were analyzed using a between group 2 × 2 (age × sex) ANOVA. Following a significant interaction, the least significant difference (LSD) post hoc test was used to determine the location of variance, and all P-values reported were adjusted for multiple comparisons. Statistical significance was accepted at $P < 0.05$ for all analysis.

In total, data are presented for 75 participants [9–11 yr (n = 15 boys and 25 girls) and 15–18 yr (n = 18 males and 17 females)]. Three participants were excluded because of unsatisfactory food record completion, and 2 withdrew their interest in participating during data collection. Age, stature, body mass, and body mass index for participating children were 9.4 (SD 0.5) yr, 1.41 (SD 0.07) m, 33.49 (SD 7.46) kg, and 16.8 (SD 3.1) kg/m^2, respectively, and 16.1 (SD 1.0) yr, 1.71 (SD 0.1) m, 66.2 (SD 15.1) kg, and 22.6 (SD 3.5) kg/m^2 for adolescents, respectively. The body mass index for participating children and adolescents indicates that participants were classified as normal weight according to the UK 1990 age and sex reference population (Cole et al., 1995). Data concerning types, amounts, and frequencies of consumed dairy foods are presented in Table 1 by age and sex, dichotomized according to overall consumption and average daily servings.

Statistical analysis revealed a main effect for sex on overall milk consumption ($F_{1,71} = 7.07$, $P = 0.010$) and daily milk portions ($F_{1,71} = 6.79$, $P = 0.011$), indicating that independent of age, boys consumed greater amounts of milk compared with girls (Table 1). No interaction or main effect for any other variable (cheese, yogurt, butter, ice cream, cream, or custard) was evident. Total daily dairy servings did not differ significantly between ages ($F_{1,71} = 2.12$, $P = 0.150$) or sexes ($F_{1,71} = 2.48$, $P = 0.120$), and conformed with current dietary recommendations (Dror and Allen, 2014). Patterns of milk and dairy food consumption remained widely stable among girls and female adolescents (Table 1). For boys and adolescent males, we noted a downward trend of milk and dairy food consumption with increasing age, although differences were not significant (Table 1). The major contributing source of dairy was milk, consumed by 91% of participants (across all ages and sexes), followed by cheese and yogurt consumption, at 60 and 56%, respectively.

The main observations of this study were that, independent of age, boys consumed greater amounts of milk compared with their female counterparts. This was apparent for both overall milk consumption and daily