

## DIETARY HABITS AND LOCUS OF CONTROL ASSESSED IN MIDDLE-SCHOOL PUPILS FROM THE MALOPOLSKA REGION OF POLAND

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### ABSTRACT

**Background.** The formative years of adolescence are a crucial time for developing eating habits which, amongst other factors, are determined by personality traits.

**Objective.** The aim of the study was to estimate eating behaviour in a group of middle school pupils according to gender and locus of control (LOC).

**Materials and methods.** Subjects were n=200 boys and n=200 girls, aged 14-16 living in the Malopolska region of Poland who were surveyed by questionnaire about their eating habits. A standardised Delta questionnaire, by *Drwal*, was used to assess LOC. Based on the median from the raw LOC scale scores, groups of boys and girls were thereby identified as having high internal (below the median) or high external (above the median) loci of control. The *Chi*<sup>2</sup> test assessed the dependence between LOC and eating habits using PQStat software ver. 1.4.2.324 adopting values of p<0.05 as being statistically significant.

**Results.** Boys were found to consume dairy products significantly more frequently than girls (P<0.001), and likewise for sugary fizzy drinks (P<0.05). Dairy products were consumed daily by 51% girls and 70% boys (P<0.001), whilst fizzy drinks by 32% girls and 43% boys (P<0.05). Girls with an external LOC consumed breakfast (P<0.01) and second breakfast (P<0.001) less regularly, with a less frequent consumption of fruit (P<0.001) and dairy products (P<0.01). Boys having an external LOC consumed meals less frequently (P<0.01), whereas sweets and confectionery products (P<0.001) and fizzy drinks (P<0.05) were consumed more often, compared to boys with an internal LOC.

**Conclusions.** Numerous irregularities in diet and differences in certain eating behaviour have been found in middle school students that relate to their gender and LOC. The more rational and appropriate choices were taken by subjects with an internal LOC.

**Key words:** *locus of control, dietary habits, school children*

### STRESZCZENIE

**Wprowadzenie.** Okres dojrzewania ma szczególne znaczenie w kształtowaniu się zwyczajów żywieniowych, uwarunkowanych między innymi cechami osobowości.

**Cel.** Celem badań była ocena zachowań żywieniowych grupy młodzieży gimnazjalnej w zależności od płci i umiejscowienia poczucia kontroli (LOC).

**Materiał i metoda.** Badania przeprowadzono w grupie 200 dziewcząt i 200 chłopców w wieku 14-16 lat w Małopolsce, z zastosowaniem przygotowanego kwestionariusza zachowań żywieniowych oraz standaryzowanego kwestionariusza Delta *Drwala* do oceny umiejscowienia poczucia kontroli (LOC). Na podstawie mediany wyników surowych w skali LOC wyodrębniono grupy dziewcząt i chłopców, o wyższym wewnętrznym (poniżej mediany) i wyższym zewnętrznym (powyżej mediany) umiejscowieniu kontroli. Zależności między umiejscowieniem poczucia kontroli a zwyczajami żywieniowymi oceniono za pomocą testu *Chi*<sup>2</sup> w programie PQStat ver. 1.4.2.324, na poziomie istotności P<0,05.

**Wyniki.** Analiza zachowań żywieniowych w zależności od płci wykazała, że chłopcy istotnie częściej niż dziewczęta spożywali produkty mleczne (P<0.001) oraz słodkie napoje gazowane (P<0.05). Produkty mleczne codziennie spożywało 51% dziewcząt i 70% chłopców (P<0.001), a słodkie napoje gazowane odpowiednio: 32% i 43% badanych (P<0.05). Analiza zachowań żywieniowych w zależności od umiejscowienia poczucia kontroli wykazała, że dziewczęta o zewnętrznym LOC mniej regularnie spożywały pierwsze (P<0.01) i drugie śniadanie (P<0.001) oraz rzadziej jadły owoce (P<0,001) i produkty mleczne (P<0.01). Chłopcy o zewnętrznym umiejscowieniu kontroli mniej regularnie spożywali posiłki (P<0.01), a częściej słodkie i wyroby cukiernicze (P<0.001) oraz słodkie napoje gazowane (P<0.05) niż chłopcy o wewnętrznym LOC.

**Wnioski.** Stwierdzono liczne nieprawidłowości w sposobie żywienia młodzieży gimnazjalnej oraz zróżnicowanie niektórych zachowań żywieniowych w zależności od płci i umiejscowienia poczucia kontroli, ze wskazaniem na bardziej racjonalne wybory u osób o wewnętrznym LOC.

**Słowa kluczowe:**  *umiejscowienie poczucia kontroli, zachowania żywieniowe, młodzież szkolna*

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## INTRODUCTION

Amongst those factors determining attitudes and behaviour towards health and nutrition are personality traits as well as culture and socio-economics [29, 41]. A measure by which personality traits affect a person's behaviour is the LOC. This can be defined as a person being convinced, for a moderately, long lasting time, that the factors determining how they act are part of an external-internal continuum of control. An internal LOC is a given subject's general conviction that one's own actions are effective in controlling their lives, as opposed to an external LOC, which reflects the subject's lack of confidence in being able to effectively control their life through one's own actions; instead attributing this control to outside environmental factors [6]. Studies confirm that persons with an internal LOC take more responsibility for their health than those with an external LOC [8]. To achieve a state of healthy wellbeing, a conscious and active effort is required which includes making rational and appropriate choices for nutrition. It is suggested that adolescent development is the key period that shapes nutritional behaviour. This study therefore aims to determine nutritional behaviour in adolescents subjects (middle school pupils) set against the aforementioned considerations and focused on gender and LOC.

## MATERIAL AND METHODS

Studies were performed on 400 schoolchildren attending middle school in urban centres of the Malopolska region of Poland, aged 14-16 years (mean 14.8) of which exactly half were boys and half girls. Samples were selected on pupil availability from schools in Cracow and other district towns. The survey was anonymous and voluntary, having previously received permission of the school authorities and parents. The questionnaire on nutritional habits was devised by the study authors that included the standard Delta *Drwal* procedure. As a measure of nutrition, the frequency and regularity of eating meals was assessed together with eating breakfast and how often were certain chosen foodstuffs consumed; these included wholegrain cereal products, vegetables, fruit, dairy products, fish, white meat, sweets and confectionery, fast food, sweet fizzy drinks and energy drinks. The LOC was assessed by the Delta *Drwal* questionnaire which was so constructed, that the higher the raw results obtained for the LOC scale (1-14) indicate the greater external LOC [6]. The numerical basis by which subjects were classified according to the LOC scale was by their median values. Those being greater than 6 were taken as having a higher external LOC whilst those less than 6 showed a

greater internal LOC. Statistical analyses was performed by means of the chi<sup>2</sup> test using PQStat ver. 1.4.2.324 statistical package. A  $p < 0.05$  was taken as the critical value for statistical significance.

## RESULTS

Nutritional behaviour of the schoolchildren under study is presented in Table 1 according to gender. The vast majority daily consumed at least 3 main meals (85% girls and 83% boys), whereas respectively only 47% and 53% did so on a regular basis. Wholegrain cereal products were eaten daily by 1/4 of subjects. Several daily portions of vegetables were found to be consumed by 23% girls and 21% boys; the respective amounts for fruit being 38% and 42%. At least 1/3 subjects, on average, ate fish once per week. Sweets and confectionery were eaten daily by 46% girls and 40% boys. Dairy products were significantly eaten more by boys than girls ( $p < 0.001$ ) and likewise for fizzy drinks ( $p < 0.05$ ). Consumption of dairy products in daily portions was observed in 19% girls and 37% boys ( $p < 0.001$ ).

Table 2 presents the subject's nutritional behaviour according to LOC as well as gender.

The daily numbers of meals eaten had no effect on the LOC, however significant differences between how regularly they were consumed was noted in boys with an internal LOC, compared with those having an external LOC; 64% vs 42% respectively,  $p < 0.01$ . Girls

Table 1. A selection of nutritional habits amongst pupils according to gender (% by occurrence)

| Parameters assessed                                | Girls<br>n=200 | Boys<br>n=200 |
|----------------------------------------------------|----------------|---------------|
| Eating $\geq 3$ meals daily                        | 85.0           | 83.0          |
| Having regular meals                               | 47.0           | 53.0          |
| Snacking in between meals                          | 70.0           | 72.0          |
| Eating first breakfast daily                       | 62.0           | 68.0          |
| Eating second breakfast daily                      | 56.0           | 64.0          |
| Daily consumption of wholegrain cereal products    | 25.0           | 25.0          |
| Consuming several daily portions of vegetables     | 23.0           | 21.0          |
| Consuming several daily portions of fruit          | 38.0           | 42.0          |
| Consuming dairy products daily                     | 51.0           | 70.0***       |
| Consuming several daily portions of dairy products | 19.0           | 37.0***       |
| Eating fish every week                             | 33.0           | 35.0          |
| Preference for poultry meat                        | 70.0           | 61.0          |
| Eating sweets and confectionery daily              | 46.0           | 40.0          |
| Having fast food several times a week              | 26.0           | 20.0          |
| Drinking sweetened fizzy drinks daily              | 32.0           | 43.0*         |
| Drinking energetic drinks                          | 14.0           | 15.0          |

E-LOC; External locus of control

I-LOC; Internal locus of control

Significant differences between genders; \* $p < 0.05$  . \*\*\* $p < 0.001$

Table 2. A selection of nutritional habits amongst pupils according to gender and locus of control (LOC); (% by occurrence)

| Parameters assessed                                | Girls (n=200)    |                  | Boys (n=200)     |                  |
|----------------------------------------------------|------------------|------------------|------------------|------------------|
|                                                    | I - LOC<br>n=100 | E - LOC<br>n=100 | I - LOC<br>n=100 | E - LOC<br>n=100 |
| Eating $\geq 3$ meals daily                        | 89.0             | 81.0             | 84.0             | 82.0             |
| Having regular meals daily                         | 50.0             | 44.0             | 64.0             | 42.0**           |
| Snacking in between meals                          | 72.0             | 68.0             | 70.0             | 74.0             |
| Eating first breakfast daily                       | 72.0             | 52.0**           | 70.0             | 66.0             |
| Eating second breakfast daily                      | 72.0             | 40.0***          | 65.0             | 63.0             |
| Daily consuming of wholegrain cereal products      | 28.0             | 22.0             | 26.0             | 24.0             |
| Consuming several daily portions of vegetables     | 28.0             | 18.0             | 20.0             | 22.0             |
| Consuming several daily portions of fruit          | 51.0             | 25.0***          | 48.0             | 36.0             |
| Consuming dairy product daily                      | 62.0             | 40.0**           | 72.0             | 68.0             |
| Consuming several daily portions of dairy products | 25.0             | 13.0*            | 39.0             | 35.0             |
| Eating fish every week                             | 35.0             | 31.0             | 38.0             | 32.0             |
| Preference for poultry meat                        | 71.0             | 69.0             | 66.0             | 56.0             |
| Eating sweets and confectionery daily              | 48.0             | 44.0             | 26.0             | 54.0***          |
| Having fast food several times a week              | 20.0             | 32.0             | 15.0             | 25.0             |
| Drinking sweetened fizzy drinks daily              | 30.0             | 34.0             | 36.0             | 50.0*            |
| Drinking energetic drinks                          | 10.0             | 18.0             | 14.0             | 16.0             |

E-LOC; External locus of control

I-LOC; Internal locus of control

Significant differences according to LOC between girls and boys; \* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$

with an internal LOC more frequently ate first breakfast ( $p < 0.01$ ) or second breakfast ( $p < 0.001$ ) than those with an external LOC. The low numbers of subjects eating wholegrain cereal products or vegetables were independent of LOC. However, girls with an internal LOC significantly ate much more fruit; 51% vs 25%,  $p < 0.001$ . Likewise, girls with an internal LOC consumed dairy products more often than those with an external LOC (62% vs 40%,  $p < 0.01$ ), the same being true for the numbers of portions eaten; 25% vs 13% respectively,  $p < 0.05$ . Boys with an external LOC, compared to those with an internal LOC more frequently ate sweets and confectionery (54% vs 26%,  $P < 0.001$ ), and in analogous fashion, for fizzy drinks the numbers were 50% vs 36%,  $p < 0.05$ .

## DISCUSSION

Comprehensive irregularities/shortcomings in nutrition were clearly observed in the studied subject group of middle-school pupils, differentiated according to gender and LOC. The principal shortcomings were the non-regular consumption of meals, treating breakfast as trivial and also a low intake of those foodstuffs recommended as being healthy, such as wholegrain cereal products, vegetables, fruit, dairy products, and fish, coupled with a high consumption of foodstuffs of little nutritional value like sweets, confectioneries, sweetened fizzy drinks as well as fast food. These findings are consistent with similar studies conducted by the authors as well as many others in Poland [5, 7, 9, 14, 16, 23, 28, 33-36, 45]. Equally extensive international studies report likewise; Slovakia [44], Brazil [4, 17, 18], Italy [22], Norway [42], Finland [13], Africa [26], Palestine [20], Iran [24], China [19], Afro-American [39], American [12], and Canada [10]. In particular, aspects of nutritional shortcomings, which the present study confirms, include the irregular eating of breakfast [4, 17, 20, 22, 44, 45], insufficient intake of dairy products [4, 28, 34, 38, 39, 44] and of fruit and vegetables [4, 13, 17, 24, 26, 28, 34, 42, 44] or of fish [28, 34]. This is coupled to an over-consumption of products such as sweets [16, 18, 34, 43, 45], sweetened drinks [10, 12, 13, 16, 22, 33, 39, 45], salty snacks [13, 17, 39, 44, 45], fast food [16, 45] or energy drinks [2, 27, 30, 31]. In the young, such dietary shortcomings may cause a nutritional imbalance, limit the potential for development and health, and increase the risk of developing many degenerative diseases [12, 37]. A diet deficient in dairy products is especially harmful to girls, where an insufficient uptake of calcium may result in not attaining peak bone mass density, thus giving rise to osteoporosis at the post-menopause. The low consumption of low-ground wholegrain cereal products together with vegetables and fruit results in uptake deficiency of various fibre fractions, minerals and nutritional antioxidants that negatively affect blood lipid profiles and increase the risk of atherogenic changes. Frequent dietary consumption of high calorific foodstuffs, including confectionery and sweetened fizzy drinks or fast food lead to an excessive body mass and blood lipid profile disorder, thus increasing the risk of circulatory/cardiovascular disease, as confirmed by studies on adolescents [1, 12, 19, 21, 30]. Other studies have also indicated an imbalance of nutritional ingredients in the diets of children and youth, showing abnormal consumption of macro-ingredients [33, 35], vitamins [33] and minerals including calcium and magnesium intake [33, 40]. Such deficiencies may have arisen from consuming a diet that is insufficient in foodstuffs of high nutritional value, as observed by

the current study of the Malopolska schoolchildren. The short and long term consequences of irregular breakfasts in youth has been described by *Agostoni* and *Brighenti* [1] however, as opposed to other studies [9, 14, 34], the present study does not show any gender differences in this respect. Nevertheless, the latter observation has been reported by another study by *Stefańska* et al. [34], where similar numbers of meals consumed were recorded as being independent of gender.

Further studies on middle-school pupils show differences in nutritional behaviour according to personality traits as demonstrated by the LOC. Those with an external LOC showed a greater tendency for making irrational choices for their nutrition compared with pupils with an internal LOC; some being statistically confirmed. Girls with an external LOC ate breakfasts and second breakfasts less regularly,  $P < 0.01$  and  $P < 0.001$  respectively, compared to those with an internal LOC; likewise there was a reduced consumption of fruit ( $P < 0.001$ ) and dairy products ( $P < 0.01$ ) when the same groups were compared. Boys with a high external LOC compared to an internal LOC, also showed irregular consumptions of meals ( $P < 0.01$ ), as well as higher consumption of sweets ( $P < 0.001$ ) and sweetened fizzy drinks ( $P < 0.05$ ). More rational nutritional choices were made by subjects with internal LOC than external LOC, consistent with the premise that an internal LOC indicates that a healthy wellbeing (including nutrition) is dependent on individual decisions, choices and actions that a subject makes. These findings are confirmed by other studies [3, 8, 24] which likewise show that a more healthier lifestyle, that includes appropriate diet, is adopted by those with an internal LOC. An association between an external LOC and the perception that one's own actions being ineffective has been demonstrated by decreased consumption of fruit and vegetables in a group of Iranian teenagers from Tehran [24], with similar trends found by other studies [3]. Furthermore, the influence of personality traits, especially self-control in teenagers, upon the consumption of vegetables, fruit and fats has been shown by various USA, Dutch and Hungarian studies [11, 15]. An Australian study [25] has also showed that a sense of being able to act effectively, regarding nutrition, is positively correlated with an internal LOC where increases in eating fruit and vegetables is seen coupled with limiting the consumption of junk food. Findings from these cited studies were confirmed by the presented investigation on the middle-school pupils, where girls with internal LOCs more often ate fruit, and boys with an external LOC consumed more sweets and sweetened fizzy drinks. Other studies indirectly show the positive influence of effective individual management of nutrition, for example, the taking of calcium in preventing osteoporosis by girls in Texas [32]; this also being consistent with the current study where more

frequent consumption of dairy products is observed in girls with a high internal LOC. A study on personality traits in the nutrition of graduates [8] has equally shown that a greater internal LOC leads to having the correct attitude towards appropriate nutrition and in making rational nutritional choices, as particularly highlighted by the frequent consumption of fish;  $P < 0.01$ .

The widespread occurrence of nutritional irregularities and the differences seen in the extent of taking individual control over one's actions ie. LOC, points towards the need of adequate health education, including the nutritional aspect, targeted at adolescent youth; taking into account personality traits [3, 18, 20, 22, 26, 44].

## CONCLUSIONS

1. The assessment of nutritional quality in middle-school pupils has demonstrated numerous shortcomings, that include having irregular meals, low consumption of wholegrain cereal products, vegetables, fruit, dairy products and fish coupled with high consumption of sweets, confectionery, fast food and sweetened fizzy drinks.
2. Some differences in nutrition behaviour were dependent on gender where boys more frequently than girls consumed more dairy products and sweetened fizzy drinks.
3. Pupils with a high external LOC took less rational decisions for their nutrition as demonstrated in girls by less frequent breakfasts and eating less fruit and dairy products, whilst boys took irregular meals and often consumed sweets and sweetened fizzy drinks.
4. Assessing nutritional habits in pupils and their psychological conditioning may be an introduction to health education, thereby necessary for rationalising appropriate nutrition.

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