Original Article

Students' Nutrition Literacy and the Existence of Health Care Providers in Iranian Schools

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ABSTRACT

Background: The objective of this study was to investigate the relationship between Students’ nutrition literacy and the existence of health care providers in Iranian schools.

Study design: A cross-sectional study.

Methods: This study was conducted on 504 students in Ardebil City, northwestern Iran from Oct 2017 to Jan 2018. The FLINT questionnaire was used to assess the food and nutrition literacy. Socio-demographic characteristics and the existence of health care providers were collected using demographic questionnaire.

Results: Nearly 75% of students had not a health care provider. Most students had a low FNLIT (62% males and 58.1% females). The probability of low FNLIT was lower in students with health care providers than those without them (OR=0.46, CI 95%; 0.10, 0.91).

Conclusion: One of the reasons for the low nutritional literacy of students may be due to the lack of health care providers in schools. Health educational administrators employ specialized health care providers in Iranian schools.

Introduction

The UNESCO has set one of its goals in planning elementary education, improving the growth and development of potential talents, and establishing proper health behaviors in children1, 2. These behaviors can provide the foundation for a healthy lifestyle3. In Iran, some factors may endanger the health of students. The prevalence of obesity and metabolic syndrome is high in Iranian adolescents4, and students’ knowledge of different aspects of nutrition is also inadequate5. Besides, the prevalence of overweight in the world is 5.6% and in Iran is between 5% and 10%6, 7, which may increase in the future and threaten future adolescent health. Moreover, 73% of adolescents aged 14-18 yr were consuming fruits and vegetables below the recommended guideline amounts and consumed high amounts of fatty foods. On the other hand, more than 50% of them had fewer than 1.5 servings of fruit and vegetables daily, and 41% consume less than one serving/d8.

One of the essential aspects of literacy that affects student’s health is food and nutrition literacy (FNLT). FNLT is a degree of ability for individuals to acquire, process, understand information and skills necessary to make appropriate nutrition decisions9. Studies suggested a positive association between food literacy and adolescents’ dietary intake10, 11 and adolescents with better food knowledge, and frequent food preparation behaviors were shown to have healthier dietary practices12.

The existence of health care providers in schools can affect students’ nutritional literacy and health13. A school health nurse performs school health activities in many countries that this role was first started by Lilian Wald in the US and gradually expanded14. The health care provider in schools is tasked with educating and providing health, nutrition, and psychological counseling to enhance literacy, enhance self-care, and improve health behaviors15, 16. The existence of health care providers in schools has a significant positive impact on health-related behaviors, especially on elementary school students17-19. For example, for dental and oral hygiene, studies claimed that the existence of health care providers in
schools causes health behaviors improvement. Iranian Parliament’s laws have required the Ministry of Education to apply health care in all schools. According to the Ministry of Education’s job classification, graduates with hygiene, nutrition, nursing, and midwifery degrees can work in schools as health care providers. Despite legal requirements, many schools in Iran still lack health care providers with academic health sciences degree. On the other hand, students in schools that have health care providers are subject to specialized health monitoring and evaluation, and in schools without specialized health care, students may not be considered for health concepts such as nutrition and health literacy.

However, based on our knowledge, there is no study of the relationship between student nutrition literacy and the existence of health care providers to produce the necessary scientific document for health and education policymakers in Iran. We aimed to assess the relationship between nutrition literacy and the existence of school health care in Iranian schools.

**Methods**

**Study Design and Participants**

This cross-sectional study was conducted from Oct 2017 to Jan 2018 and included 504, 13-15 yr students in Ardebil, a city placed in the northwest of Iran. The General Office of Education in Ardebil groups educational districts into two groups based on socioeconomic status; District One (north of Ardebil) and District two (south of Ardebil). The recruited students were selected from each of these two groups. A weighted sampling was conducted from six clusters (three from every two educational districts), according to their student’s population density. Then a probability proportional to the size of the target population method was used to select 25 students from each of these two groups. A weighted sampling was conducted from six clusters (three from every two educational districts), according to their student’s population density. Then a probability proportional to the size of the target population method was used to select 25 students from each of these two groups. A weighted sampling was conducted from six clusters (three from every two educational districts), according to their student’s population density. Then a probability proportional to the size of the target population method was used to select 25 students from each of these two groups.

**Table 1:** List of some questions in each subscale

| Domain/subscale                           | Questions                                                                                                                                                                                                 |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cognition                                 | I can easily understand the nutritional content that is printed in magazines and brochures.                                                                                                               |
|                                           | When shopping for food, the date of manufacture and expiration on the packaging is essential to me, and I can understand it.                                                                         |
| Nutritional health knowledge              | Salty snacks such as chips and muffins are harmful to health.                                                                                                                                              |
|                                           | Consuming sausage and fast food increases the risk of cancer.                                                                                                                                              |
| Skill                                     | If I have questions about nutrition, I ask my parents or my teacher.                                                                                                                                       |
|                                           | I wash and prepare the fruits and vegetables myself.                                                                                                                                                       |
| Interactive FNLIT                         | I can and will not resist fast food and fatty foods.                                                                                                                                                      |
|                                           | I can easily say no to my friends’ suggestions for unhealthy food.                                                                                                                                          |
| Critical FNLIT                            | I usually try new foods I haven't eaten yet.                                                                                                                                                              |
|                                           | I can, for my pocket money, buy foods from the buffet that are useful.                                                                                                                                    |
| Food choice literacy                      | Have you ever seen the nutritional information table on food packaging?                                                                                                                                   |
|                                           | Do you choose your food based on the information on the packaging?                                                                                                                                         |
| Food label literacy                       | Is the red color on the nutrition information of any food packaging above the limit?                                                                                                                     |
|                                           | If the amount of salt in the food information in the food packaging is green, what is the limit?                                                                                                           |

**Baseline characteristics**

Baseline characteristics including age, family size (<4, 4 and >4), father’s age tertile (T1: 30–45, T2: 45–60 and T3: ≥60 yr old), mother’s age tertile (T1: 30–45, T2: 45–60 and ≥ 60 yr old), parents’ education (illiterate or ≤5yr, 6–9 yr or diploma and associate degree or higher), father’s job status (worker, employee, self-manager, unemployed), mother’s occupation status (housewife and work outside the home), house ownership status (owner, tenant), and school type (governmental, non-governmental), age (13, 14, and 15) and the existence health care provider (yes, no) were collected by questionnaire alongside with interviewing with students and approval of their mother.

**Statistical analysis methods**

At each school, the health care providers do not cover all students. Some school classes have a health care provider, and some do not. For this reason, a comparison of student literacy...
between students with and without health care provider was performed at the individual level. Mean, and the standard deviation were reported for describing quantitative variables with normal distribution and counts and percentages for categorical variables. A Chi-square test was used to analyze the differences in baseline characteristics and FNLT between girls and boys. A logistic regression model was fit to measure the effect size of the independent variables on FLINT (dependent variable) prediction. All analyses were performed by Stata ver. 14.0.

**Ethical considerations**

The Ethics Committee of Ardebil University of Medical Sciences approved this study with the ethics code of IR.ARUMS.VCR.REC.1398.012. Verbal consent was obtained from students to participate in the study. Parents also verbally consented their child to participate in the study. The confidentiality of the obtained data was also guaranteed.

**Results**

**Demographic and socioeconomic characteristics of the study participants**

The baseline characteristics of the sample are summarized in Table 2. Overall, 504 students (253 boys and 251 girls) participated in the study. The mean age was 13.77 ±0.71 years. Nearly two-thirds of students have not health care provider (75%). The girls and boys significantly differ in some demographic and parental related factors, including mother age ($P=0.021$), family size ($P=0.038$), father’s education ($P=0.043$), and existing health care provider ($P=0.001$). About 69% of schools in boys and 76.5% of schools in girls were governmental.

**Table 2: Baseline characteristics of the participants (n=504)**

| Variables                   | Boys, n=253 | Girls, N=251 | Total, n=504 | $P$-value |
|-----------------------------|-------------|--------------|--------------|-----------|
| Age (yr)                    | Number      | Percent      | Number      | Percent   | Number      | Percent   |         |
| 13                          | 96          | 37.9         | 102         | 40.6      | 198         | 39.3      | 0.421    |
| 14                          | 121         | 47.8         | 101         | 40.2      | 222         | 44.0      |          |
| 15                          | 36          | 14.2         | 48          | 19.2      | 84          | 16.7      |          |
| School type                 |             |              |             |           |             |           | 0.216    |
| Governmental               | 174         | 68.8         | 192         | 76.5      | 366         | 72.6      |          |
| Non-government             | 79          | 31.2         | 59          | 23.5      | 138         | 27.4      |          |
| Father age (yr)            |             |              |             |           |             |           | 0.132    |
| 30-45                      | 147         | 58.1         | 167         | 66.5      | 314         | 62.3      |          |
| 45-60                      | 94          | 37.2         | 81          | 32.3      | 175         | 34.7      |          |
| ≥60                        | 12          | 4.7          | 3           | 1.2       | 15          | 3.0       |          |
| Mother Age (yr)            |             |              |             |           |             |           | 0.021    |
| 30-45                      | 14          | 5.8          | 7           | 2.8       | 21          | 4.3       |          |
| 45-60                      | 199         | 82.2         | 167         | 80.8      | 426         | 86.6      |          |
| ≥60                        | 29          | 12.0         | 7           | 7.2       | 45          | 9.1       |          |
| Family size                |             |              |             |           |             |           | 0.038    |
| <4                         | 236         | 93.3         | 243         | 96.8      | 479         | 95.0      |          |
| 4                          | 8           | 3.2          | 7           | 2.8       | 15          | 3.0       |          |
| >4                         | 9           | 3.6          | 1           | 0.4       | 10          | 2.0       |          |
| Father's job               |             |              |             |           |             |           | 0.614    |
| Employee/clerk             | 88          | 34.8         | 75          | 29.9      | 163         | 32.3      |          |
| Worker                     | 33          | 13.0         | 35          | 13.9      | 68          | 13.5      |          |
| Self-manager               | 123         | 48.6         | 134         | 53.4      | 257         | 51.0      |          |
| Unemployed                 | 9           | 3.6          | 7           | 2.8       | 16          | 3.2       |          |
| Mother employment          |             |              |             |           |             |           | 0.481    |
| working                    | 23          | 9.1          | 24          | 9.6       | 47          | 9.3       |          |
| Housewife                  | 230         | 90.9         | 227         | 90.4      | 457         | 90.7      |          |
| House ownership status     |             |              |             |           |             |           | 0.341    |
| Owner                      | 222         | 87.7         | 217         | 86.5      | 439         | 87.1      |          |
| Tenant                     | 31          | 12.3         | 34          | 13.5      | 65          | 12.9      |          |
| Father's education years   |             |              |             |           |             |           | 0.043    |
| ≤5                         | 86          | 34.0         | 89          | 35.5      | 175         | 34.7      |          |
| 6-12                       | 74          | 29.2         | 94          | 37.5      | 168         | 33.3      |          |
| Academic                   | 93          | 36.8         | 68          | 27.1      | 161         | 31.9      |          |
| Mother's education years   |             |              |             |           |             |           | 0.301    |
| ≤5                         | 98          | 38.7         | 98          | 39.0      | 196         | 38.9      |          |
| 6-12                       | 86          | 34.0         | 98          | 39.0      | 184         | 36.5      |          |
| Academic                   | 69          | 27.3         | 55          | 22.0      | 124         | 24.6      |          |
| Existence Health care provider |        |              |             |           |             |           | 0.001    |
| No                         | 190         | 75.1         | 122         | 48.6      | 312         | 61.9      |          |
| Yes                        | 63          | 24.9         | 129         | 51.4      | 192         | 38.1      |          |

**Total food and nutrition literacy (FNLT) and its subscales characteristics:**

Total FNLT in two domains (cognitive and skills) and nine subscales are reported in Table 3. Most students had a low FNLT (62% in boys and 58.1% in girls). In terms of the FNLT cognitive domain, the high proportion of students also had moderate status (61% in boys and 65.3% in girls). Moreover, most students were at a low level in Nutritional health knowledge (87.7% in boys and 86.1% in girls), and
only 1.6% of all students had a high level of FNLIT skill. Most students had a high level in Food Choice Literacy (75.4%), but a high proportion of students had a low level in Food label literacy (66.4% in boys and 59.8% in girls). Gender differences were significant in Understanding food and nutrition info, Functional FNLIT, and Interactive FNLIT subscales (P<0.05).

**FNLIT and existence health care provider:**

In Table 4, multiple logistic regression was used to assess the relationship between students’ demographic variables. Moderate and high levels were considered as a group. Overall, the probability of low FNLIT was lower in students with health care provider than those without health care provider (OR=0.46, CI 95%=0.1 to 0.91). In addition, odds of low FNLIT adjust for other variables was lower in student with Health care provider than without health care provider in nutritional health knowledge (OR=0.61, CI 95% 0.29 to 0.83), functional literacy (OR=0.32, CI 95% 0.11 to 0.79), food choice literacy (OR=0.89, CI 95% 0.13 to 0.98) and critical literacy subscales (OR=0.24, CI 95% =0.09 to 0.63). There was no relationship between the existence of health care providers and food labeling literacy, interactive literacy, and understanding food and nutrition info subscales.

**Table 3:** The status of FNLIT in 13–15-year-old participants (n=504)

| FNLIT and its subscales | Boys, n=253 | Girls, n=251 | Total, n=504 | P-value |
|-------------------------|-------------|--------------|--------------|---------|
| **Total FNLIT**         |             |              |              | 0.902   |
| Low                     | 157         | 146          | 303          | 60.0    |
| Moderate                | 61          | 62           | 123          | 24.4    |
| High                    | 35          | 43           | 78           | 15.6    |
| **FNLIT cognitive domain** |           |              |              | 0.081   |
| Low                     | 83          | 70           | 153          | 30.1    |
| Moderate                | 153         | 164          | 317          | 63.1    |
| High                    | 15          | 19           | 34           | 6.8     |
| **FNLIT cognitive domain subscales** | |              |              | 0.012   |
| Understanding food and nutrition info |     |              |              |         |
| Low                     | 55          | 79           | 134          | 26.6    |
| Moderate                | 177         | 162          | 339          | 67.3    |
| High                    | 21          | 10           | 31           | 6.2     |
| Nutritional health knowledge |         |              |              | 0.842   |
| Low                     | 222         | 216          | 438          | 86.9    |
| Moderate                | 26          | 30           | 56           | 11.1    |
| High                    | 5           | 2.0          | 10           | 2.0     |
| **FNLIT skill domain**  |             |              |              | 0.331   |
| Low                     | 136         | 116          | 252          | 50.0    |
| Moderate                | 23          | 44           | 67           | 13.3    |
| High                    | 94          | 91           | 185          | 36.7    |
| **FNLIT skill domain subscales** | |              |              | 0.014   |
| Functional FNLIT        |             |              |              |         |
| Low                     | 61          | 42           | 103          | 20.4    |
| Moderate                | 187         | 206          | 393          | 78.0    |
| High                    | 5           | 3            | 8            | 1.6     |
| Interactive FNLIT       |             |              |              | 0.001   |
| Low                     | 43          | 85           | 128          | 25.4    |
| Moderate                | 136         | 107          | 243          | 48.2    |
| High                    | 74          | 59           | 133          | 26.4    |
| Critical FNLIT          |             |              |              | 0.241   |
| Low                     | 34          | 35           | 69           | 13.7    |
| Moderate                | 79          | 96           | 175          | 34.7    |
| High                    | 140         | 120          | 206          | 51.6    |
| **Food choice literacy**|             |              |              | 0.874   |
| Low                     | 17          | 15           | 32           | 6.3     |
| Moderate                | 48          | 44           | 92           | 18.3    |
| High                    | 148         | 192          | 380          | 75.4    |
| **Food label literacy** |             |              |              | 0.011   |
| Low                     | 168         | 150          | 318          | 63.1    |
| Moderate                | 67          | 92           | 159          | 31.5    |
| High                    | 18          | 9            | 27           | 5.4     |

Discussion

We aimed to investigate the relationship between students’ nutritional literacy and the existence of health care providers in Iranian schools. Our results showed that six out of every ten students had low FNLIT, and about quarter students had moderate FNLIT. In our study, the difference in FNLIT between cognitive and skill domains was also examined, and as the results showed, third of the students had low FNLIT in

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Table 4: Adjusted odds ratios (95% CI) of FNLIT scale and subscale for socioeconomic factors of 13–15 year old students in Ardebil (n=504)

| Variables                      | Total scale | Cognitive domain                          | Skill domain          |
|--------------------------------|-------------|--------------------------------------------|-----------------------|
|                                | Low FNLIT   | Low understanding food and nutrition info | Low functional literacy | Low food choice literacy | Low interactive literacy | Low critical literacy | Low food labeling literacy |
| Gender                         |             | Low nutritional health knowledge            |                       |                       |                         |
| Boy                            | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Girl                           | 0.60 (0.24, 0.72) | 2.00 (0.87, 4.61) | 1.10 (0.66, 2.01) | 0.44 (0.24, 0.78) | 1.07 (0.47, 2.36) | 0.37 (0.23, 0.58) | 1.03 (0.60, 2.64) | 1.41 (0.97, 2.23) |
| School type                    |             |                                            |                       |                       |                         |
| Governmental                   | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Non-government                 | 0.80 (0.32, 0.85) | 1.02 (0.37, 2.82) | 0.47 (0.22, 0.85) | 1.52 (0.47, 3.22) | 3.74 (1.11, 12.60) | 0.98 (0.95, 1.67) | 1.48 (0.75, 2.95) | 0.82 (0.52, 1.36) |
| Father’s job                   |             |                                            |                       |                       |                         |
| Employee/clerk                 | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Worker                         | 5.91 (0.94, 6.7) | 0.76 (0.17, 3.34) | 1.50 (0.43, 2.12) | 1.53 (0.47, 4.31) | 1.09 (0.25, 4.81) | 0.52 (0.19, 1.36) | 0.66 (0.22, 1.93) | 0.79 (0.37, 1.71) |
| Self-manager                   | 3.64 (1.43, 4.92) | 0.90 (0.29, 2.71) | 0.53 (0.21,1.87) | 2.32 (0.86, 2.63) | 1.13 (0.35, 3.46) | 1.33 (0.73, 2.49) | 0.65 (0.31, 3.36) | 0.83 (0.48, 1.44) |
| Unemployed                     | 2.77 (1.64, 3.51) | 1.03 (0.17, 2.48) | 0.31 (0.12, 1.14) | 3.04 (1.03, 4.27) | 3.36 (1.02, 4.93) | 0.75 (0.14, 3.92) | 2.36 (1.23, 3.02) | 1.01 (0.32, 3.74) |
| Mother employment              |             |                                            |                       |                       |                         |
| Working                        | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Housewife                      | 0.36 (0.12, 0.60) | 1.41 (0.25, 4.34) | 0.24 (0.06, 0.93) | 1.18 (0.41, 3.50) | 0.88 (0.19, 4.41) | 1.21 (0.49, 2.92) | 0.66 (0.21, 0.74) | 0.44 (0.02, 0.87) |
| House ownership status         |             |                                            |                       |                       |                         |
| Owner                          | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Tenant                         | 2.67 (0.45, 3.9) | 1.34 (0.36, 3.26) | 1.08 (0.48, 2.44) | 1.54 (0.62, 3.85) | 1.36 (0.37, 4.96) | 1.68 (0.82, 3.47) | 1.58 (0.64, 2.39) | 1.43 (0.80, 2.52) |
| Father’s education years       |             |                                            |                       |                       |                         |
| 0-5                            | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| 6-12                           | 5.94 (0.74, 8.12) | 0.76 (0.24, 2.34) | 0.71 (0.23, 2.27) | 1.07 (0.31, 2.31) | 0.31 (0.10, 1.95) | 0.80 (0.32, 2.63) | 0.75 (0.35, 1.63) | 1.19 (0.63, 1.88) |
| Academic                       | 0.37 (0.12, 0.71) | 0.92 (0.17, 3.10) | 0.52 (0.34, 1.68) | 1.05 (0.87, 1.62) | 0.39 (0.01, 0.98) | 0.79 (0.41, 3.63) | 0.40 (0.14, 1.17) | 1.16 (0.54, 2.23) |
| Mother’s education years       |             |                                            |                       |                       |                         |
| 0-5                            | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| 6-12                           | 0.64 (0.24, 2.81) | 0.24 (0.37, 2.47) | 1.63 (0.78, 2.24) | 1.05 (0.49, 2.48) | 0.36 (0.21, 0.79) | 1.66 (0.64, 2.69) | 1.95 (0.68, 2.91) | 1.33 (0.77, 2.03) |
| Academic                       | 0.38 (0.13, 0.76) | 0.67 (0.24, 0.93) | 0.71 (0.23, 0.84) | 0.65 (0.21, 0.82) | 0.42 (0.21, 0.78) | 2.15 (0.71, 3.63) | 0.32 (0.13, 0.64) | 0.58 (0.21, 0.69) |
| Existence health care provider  |             |                                            |                       |                       |                         |
| No                             | 1.00        | 1.00                                       | 1.00                  | 1.00                  | 1.00                     | 1.00                  |
| Yes                            | 0.46 (0.12, 0.91) | 0.81 (0.36, 2.34) | 0.61 (0.29, 0.83) | 0.32 (0.11, 0.79) | 0.89 (0.13, 0.98) | 1.32 (0.83, 2.90) | 0.24 (0.09, 0.63) | 0.60 (0.21, 2.67) |

A study by analyzing the educational content available in Iranian schools, 27 have also shown that more focus was on theoretical content rather than practical skill-based topics. Although FNLIT alone is not enough factor in improving health and nutritional behaviors in students, practical education and increasing FNLIT should be considered.

Our results showed that students with health care provider had better nutritional literacy than students without health care provider. This difference was also observed in nutritional health knowledge, functional literacy, food choice literacy and critical literacy subscales. There are limited studies of the relationship between the existence of health care providers and nutritional literacy. The existence of a school health nurse as a school health provider was important for enhancing health literacy and nutrition interventions 28. Another study 29 has shown the need for specialized health care providers to implement programs that promote proper nutritional behaviors and oral health. Other similar studies have also shown a relationship between the existence of specialized health care providers in schools and rising in students’ health and nutrition aspects 30,31. Increasing the health literacy of school health care provider had a positive impact on students’ health literacy 32. Since student nutrition is a proxy for health, it can affect their nutrition literacy. Although our study only examined students’ nutritional literacy, a study of 300 students in Tehran showed that students with better health behaviors regarding physical activity and oral health 21. The existence of health care providers in Iranian schools can play an essential role in improving the student’s health and nutritional literacy.
In terms of the limitations of this study, the information was measured as a self-report. It can lead to under-reporting or over-reporting. Although there are many social, cultural, and economic factors affecting students' nutrition literacy, only some of these factors were investigated in this study, which requires further studies to investigate other factors.

Conclusion

Although the relationship between the existence of health care providers in schools and the improvement of various aspects of health in students has been partially confirmed, the existence of this specialized force has not been addressed in Iranian schools yet. Overall, 75% of students in Ardebil city did not have health care. One of the reasons for the low nutritional literacy of students, especially in the skill domain, maybe due to the lack of health care providers in schools. Health policymakers and educational administrators employ specialized health care providers in schools to improve student health and implement specialized health care and self-care education interventions.

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Conflict of interest

None.

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None.

Highlights

- Nearly 75% of students had not health care provider.
- Most students had low food and nutrition literacy (62% males and 58.1% females).
- Moreover, most students were at a low level of nutritional health knowledge (87.7% males and 86.1% females).
- Probability of low food and nutrition literacy was lower in students with health care providers than those without them.

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