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Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

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Abstract

Breakfast is necessary because it contributes 15-30% of the total daily energy needs to support the maintenance of physical endurance, energy balance and increase work productivity. This study aims to analyze the relationship of breakfast pattern to nutritional status and dietary intake in 5th-grade students of Kartika Elementary School, Banyu Urip, Surabaya. Descriptive correlational research with a cross-sectional design using the subjects of fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya using total sampling (n=57 students aged 10-13 years). Statistical test analysis of data using Spearman's Correlation Test. The results showed that most of the subjects were male (56.11%). The subjects' Body Mass Index is between 13.71 – 33.47 kg/m2, and the nutritional status (BMI for age) of research subjects ranged from -2.46 SD to 3.73 SD. The correlation analysis results showed that the breakfast pattern is not significantly related to nutritional status (p=0.913). Breakfast pattern are also not significantly related to energy and nutrient adequacy levels (p=0.655; 0.347; 0.999; 0.760; and 0.235). It can be concluded that breakfast pattern is not related to nutritional status and daily dietary intake.

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

40

Kata Kunci:	Abstrak
Asupan, makanan, kebiasaan sarapan, status gizi	Kegiatan sarapan dibutuhkan oleh manusia karena mampu memberikan kontribusi sebesar 15-30% dari total kebutuhan energi harian sehingga dapat menyokong pemeliharaan ketahanan fisik, keseimbangan energi dan meningkatkan produktivitas kerja. Penelitian ini bertujuan untuk menganalisis hubungan kebiasaan sarapan terhadap status gizi dan tingkat kecukupan energi dan zat gizi pada siswa kelas V SD Kartika, Banyu Urip, Penelitian correlational deskriptif dengan rancangan cross sectional ini menggunakan subjek penelitian siswa kelas V SD Kartika, Banyu Urip, Surabaya dengan metode total sampling (n=57 siswa berusia 10-13 tahun). Analisis uji statistik menggunakan Spearman's Correlation Test. Hasil penelitian menunjukkan bahwa sebagian besar subjek penelitian berjenis kelamin laki-laki (56.11%). Indeks Massa Tubuh subjek penelitian bervariasi antara 13.71 – 33.47 kg/m2 dan status gizi (IMT/U) subjek penelitian berkisar antara -2.46 SD sampai dengan 3.73 SD. Berdasarkan hasil analisis korelasi diperoleh hasil bahwa kebiasaan sarapan tidak berhubungan secara signifikan dengan status gizi (p=0.913). Kebiasaan sarapan juga tidak berhubungan secara signifikan terhadap tingkat kecukupan energi dan zat gizi (p=0.655; 0.347; 0.999; 0.760; dan 0.235). Dapat disimpulkan bahwa kebiasaan sarapan tidak berhubungan dengan status gizi dan asupan makan harian.

A. Introduction

Elementary school-age children are children aged 6-12 years who take primary school education (Adriyani & Wirjatmadi, 2012). The most prominent characteristics of school-age children include having a very high physical activity(Ahmad, 2019), but not followed by adequate energy and nutrient intake. In this phase, the child is still growing, and the high level of physical activity is often the main factor that causes school-age children to be prone to malnutrition. Besides that, the high activity at school takes up time with the most significant proportion of the total daily activities of children, including eating. Based on the results of the Nutritional Status Assessment (PSG) in 2016, it is known that the percentage of school children aged 5-12 years in East Java Province who has low BMI for age index is 2.2% and who is underweight is 7.8% (Ministry of Health, Republic of Indonesia, 2017). In addition, in this phase, children also have the habit of leaving breakfast, which will impact fulfilling nutritional intake and consuming excessive snack foods (Pakhri et al., 2018). Research conducted in the United States shows that school-age children and adolescents who have skipped breakfast have a three times higher risk of consuming snacks and experience disorders controlling their appetite, causing obesity (Kral et al., 2011).

Breakfast is an activity to eat in the morning, around 6 to 9 am. Humans need breakfast activity because it can contribute 15-30% of the total daily energy to support physical endurance, regulate energy balance, and even increase work productivity (Hardinsyah & Aries, 2016). School-age children are one age group who often skip breakfast for various reasons. This condition will affect the performance of children in participating in the learning process at school. Children who are used to breakfast will focus more on lessons and do activities well and vice versa. The intake of energy and nutrients that are less than breakfast consumed can cause children

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of
Kartika Elementary School, Banyu Urip, Surabaya)

41

to lack energy so that the child becomes weak, lacks concentration, and even faints (Damayanti, 2010; Jannah et al., 2017; Rohmah et al., 2020).

Research conducted by Rosyidah and Andrias (2013), regarding the relationship between the amount of pocket money and the habit of skipping breakfast with the nutritional status of the fourth and fifth-grade students of Ploso I-172 Elementary School, Tambaksari Subdistrict, Surabaya, shows that 32.7% of respondents skip breakfast. Besides, this study also stated that breakfast habits were significantly related to the nutritional status of respondents. The important thing that needs attention at breakfast is the nutritional content in the breakfast menu, which must meet 15-30% of daily nutritional needs and contain calories of + 460 kcal (aged 7-9 years) or + 500-525 kcal (aged 10-12 years old) (Ministry of Health, Republic of Indonesia, 2014). Therefore, there is a need for a study to examine the relationship between breakfast habits on nutritional status and the level of energy and nutrient sufficiency in fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya. This study examines the adequacy of energy and nutrition levels and their relationship with breakfast habits in fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya.

B. Methodology

This research is correlational descriptive research using a cross-sectional design conducted in April - December 2018. This research is located at Kartika Elementary School, Jl. Simo MT. Kramat Barat No.42, Banyu Urip, Sawahan Regency, Surabaya City, East Java 60254. The population in this study was the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya. The research subjects were selected using the total sampling method according to specific characteristics, among others, students in fifth-grade (A and B class) of Elementary School Kartika, Banyu Urip, Surabaya, aged 11-13 years, were not sick when the research was taking place, and willing to be the subject of research. The subjects in this study amounted to 57 people.

The breakfast habit is the habit of doing eating activities in the morning before doing daily activities. Breakfast habits data were obtained from interviews using a questionnaire about daily breakfast habits. The answers to the subjects from the interview results were categorized into 3, namely: never having breakfast (breakfast 1-2x / week), sometimes (breakfast 3-4 times/week), and always having breakfast (5-7x / week).

Determination of the nutritional status of research subjects using the Body Mass Index (BMI) based on age (BMI / U). BMI is calculated from the weight of weighing (kg) and measurement of height squared (m2). Bodyweight is measured by digital scales (Omron), with an accuracy level of 0.1 kg, and height is measured with a digital stature meter (GEA) with an accuracy level of 0.1 cm. The results of the BMI measurement were then associated with the respondent's age parameter assessed based on the Z-score. The Z-score was then categorized into 5 groups (Ministry of Health, 2010): very skinny (<-3SD); skinny (> -3 to -2 SD); normal (> -2 SD to 2SD); overweight (> 1 SD to 2 SD); and obesity (> 2 SD).

Nutritional intake was determined based on interviews with respondents using a 24-h Recall questionnaire about the amount of energy and macronutrients (carbohydrates, fats, and protein) consumed calculated from the conversion of daily food intake. The amount of energy consumed is expressed in units of calories/day. The number of macronutrients (carbohydrates, fat, and protein) consumed is expressed in units of grams/day. The conversion of food intake is then compared with the Nutritional Adequacy Rate (RDA) for energy and macronutrients and

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

42

multiplied by 100%. The level of energy and nutrient adequacy was then categorized into several groups (WNPG, 2012): deficit (<80% RDA); adequate (80-110% RDA); and excess (> 110% RDA).

All data collected were analyzed using SPSS 16 for Windows software. Descriptive analysis was used to describe the respondent's age, the nutritional status of BMI / age, and the level of energy sufficiency and macronutrients (carbohydrates, proteins, and fats). After all, data were analyzed univariately or descriptively, then proceed with bivariate analysis using the correlation test to examine the relationship of the independent variables to the dependent variable. The independent variable is the habit of breakfast, while the nutritional status (BMI for age) and the level of energy and nutrient adequacy are the dependent variables. The statistical test used was the nonparametric bivariate correlation test, namely the Spearman's Correlation test with a significance level (α) of 0.05 and a confidence level of 95% (Dahlan, 2011).

C. Result and Discussion

Subjects involved in this study amounted to 57 people. During the study, all grade V students were observed for general characteristics including age, gender, education and parental occupation, parents' income, and anthropometric measurements, including weighing and measuring height. The complete data on the characteristics of the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya are presented in Table 1.

Table 1 Characteristics of Research Subjects

No.	Characteristics	Total (N = 57)	
		n	%
1.	Age (11.46 ± 0.629 years)		
2.	Gender		
	- Man	32	56.11
	- Women	25	43.9
3.	Father's education		
	- Graduated from Elementary School	12	21.1
	- Graduated from Junior High School	16	28.1
	- Graduated from Senior High School	25	43.9
	- Graduated from Diploma/Bachelor	4	7
4.	Father's occupation		
	- Government employees	2	3.5
	- Private employees	13	22.8
	- entrepreneur	16	28.1
	- Labor	5	8.8
	- Other	21	36.8
5.	Father's income		
	- < Minimum Fee	39	68.4
	- > Minimum Fee	17	29.8
6.	Bodyweight (35.01 ± 10.016 kg)		
7.	Height (140.05 ± 7,482 cm)		
8.	Body Mass Index (BMI) (17.65 ± 3.965 kg / m2)		
9.	Body Mass Index for Age (BMI for Age) (-0.275 ± 1.488 SD)		

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

43

No.	Characteristics	Total (N = 57)	
		n	**%**
	- Skinny	6	10.5
	- Normal	39	68.4
	- Overweight	7	12.3
	- Obesity	5	8.8
10.	Energy and Nutrient Intake Level		
	- Energy (1946.3 ± 194.21 kcal)		
	• Deficit	20	35.1
	• Adequate	23	40.4
	• Excessive	14	24.6
	- Carbohydrates (194.9 ± 37.35 grams)		
	• Deficit	43	75.4
	• Adequate	11	19.3
	• Excessive	3	5.3
	- Protein (73.0 ± 13.2 grams)		
	• Deficit	2	3.5
	• Adequate	23	40.4
	• Excessive	32	56.1
	- Fat (96.7 ± 22.98 grams)		
	• Deficit	4	7.0
	• Adequate	13	22.8
	• Excessive	40	70.2
	- Iron (7.2 + 1.79 mg)		
	• Deficit	56	98.2
	• Adequate	1	1.8
	• Excessive	0	0

Based on Table 1, it can be seen that the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya have quite varied characteristics of age, body weight, height, BMI, and nutritional status. It is known that the age of fifth-grade students at Kartika Elementary School ranges from 10-13 years. Respondents' body weight is also known to vary widely, ranging from 23-75.30 kg. Respondents' height ranged from 125.30-155.50 cm. The respondents' Body Mass Index (BMI) also varies widely, where the range is extensive, namely between 13.71-33.47 kg / m2. The nutritional status of respondents studied using the BMI / U indicator and seen according to the standard deviation value (SD) shows that fifth-grade Kartika Elementary School students have varying nutritional status, from very thin to obese category, which is described with a value range of -2.46 - 3, 73 SD.

In addition to measuring the anthropometric status and nutritional status of the fifth-grade students of Kartika Elementary School, Banyu Urip, interviews were also conducted with respondents to explore gender, education level, occupation of parents, and the amount of parents' income. Complete data on fifth-grade students of Kartika Elementary School characteristics, Banyu Urip, Surabaya based on gender, education level, occupation, and parental income level. It is known that the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya have quite varied characteristics of gender, education level, occupation, and income level of their parents. It is known that most of the respondents were male (56.11%). Most of the respondents 'parents (43.9%) have graduated from Higher School education level, while the respondents' parents work as civil servants, private employees, self-employed, and laborers. Meanwhile, most of the respondents' parents have a middle to a lower level of the economy because most of them have an income that is still less than the minimum fee of their regency (64.8%).

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of
Kartika Elementary School, Banyu Urip, Surabaya)

44

**Table 2. The Relationship between Breakfast Habits and Nutritional Status of Fifth-Grade Students
of Kartika Elementary School Banyu Urip Surabaya**

Breakfast habits	BMI for Age (Z-score) N = 57								Amount	
	Skinny		Normal		Overweight		Obesity			
	n	%	n	%	n	%	n	%	n	%
Always have breakfast	2	33.3	15	38.5	3	42.9	1	20.0	21	36.8
Sometimes	1	16.7	12	30.8	1	14.3	2	40.0	16	28.1
Never / rarely have breakfast	3	50.0	12	30.8	3	42.9	2	40.0	20	35.1

The relationship test uses Spearman's Correlation, which is significant at the 0.05 level.
The ns notation indicates the insignificant test result ($p= 0.913$)

School-age children are children who are in the age range 7-12 years. This phase requires a relatively higher intake of nutrients because this phase is a phase of rapid growth, especially body weight and height (BPOM RI, 2013). One of the essential nutritional intakes for school-age children is intake in the morning or breakfast. Breakfast is included in the 10 General Guidelines for Balanced Nutrition, which is food eaten in the morning before activities consisting of staple foods and side dishes or snack foods.

It has been mentioned earlier that school-age children need good food intake in terms of quantity and quality to support children's performance in learning. One of the most critical food intakes for school-age children is the intake of morning food or breakfast. This study seeks to examine the relationship between breakfast habits and the nutritional status of elementary school students. The research subject is the fifth-grade student of Kartika Elementary School, Banyu Urip, Surabaya.

Based on the results of statistical tests using Spearman's Correlation with a confidence level of 95%, it shows that breakfast habits are not related ($p = 0.913$) with the nutritional status of the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya. have normal nutritional status even though they only occasionally or never have breakfast. This condition can also be related to the composition and portion of food consumed by respondents at breakfast which is not following the recommended composition and portion of food. Respondents with normal nutritional status who have breakfast only occasionally or even never have breakfast consume a larger composition and portion of food at breakfast. Other than that,

The results of this study contradict previous research conducted by Rosyidah and Andrias(2013)about the relationship between the amount of pocket money and the habit of skipping breakfast with the nutritional status of the fourth and fifth-grade students of Ploso I-172 Elementary School, Tambaksari District, Surabaya, which shows that breakfast habits are significantly related to the nutritional status of respondents. Some of the literature also states that the habit of having breakfast at school-age children has more of an impact on children's performance while participating in learning activities at school. Children who are used to skipping breakfast will experience physical problems, especially a lack of energy for activities. Children who do not eat breakfast will experience a lack of energy and motivation to do activities. In addition, malnutrition and micronutrient deficiencies can impact physical, mental health and reduce cognitive function (Perdana & Hardinsyah, 2013).

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

45

Another impact was also felt in the teaching and learning process; namely, the children became less concentrated, quickly tired, easily drowsy, and other physical disorders. Glycogen stores from dinner will run out 2-4 hours after the child wakes up in the morning. In children who do not eat breakfast, depletion of muscle glucogen preparations is irreplaceable. In order to keep blood sugar at an average, the body will compensate by breaking down glycogen stores in the liver into blood sugar. If the help of this blood sugar supply eventually runs out, the body will experience difficulty with blood flowing into the brain, which ultimately results in the body trembling, fatigue, and decreased desire to learn, making the body weak. Children who are used to skipping breakfast will experience physical problems, especially a lack of energy for activities. Children who do not eat breakfast will experience a lack of energy and motivation to do activities (Perdana & Hardinsyah, 2013).

This study examines the relationship between breakfast habits and the nutritional status of school-age children. It analyzes the relationship between breakfast habits and the energy and nutrient sufficiency level of the fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya, totaling 57 students. The nutrients analyzed include macronutrients and micronutrients. Macronutrients that focus on discussion in this study are carbohydrates, fats, and proteins, while the micronutrients discussed are iron (Fe). Kartika Elementary School students were interviewed using a 24-h recall questionnaire to get an overview of each student's daily intake. The intake data of respondents were then compared with the RDA of school-age children who were specific according to gender, age, and bodyweight of each respondent. The result of this comparison is the adequacy level of energy and nutrient intake. A complete description of the energy and nutritional adequacy levels of a fifth-grade student of Kartika Elementary School, Banyu Urip, Surabaya, is presented in Table 3.

Table 3 Description of Adequacy Level of Energy and Nutrient Intake of Fifth-Grade Students of Kartika Elementary School, Banyu Urip Surabaya

Nutrients	Intake[a]	Adequacy Level of Intake (% RDA)[b]
Energy (kcal)	1946.3 ± 194.21	95.7 ± 31.97
Carbohydrates (grams)	194.9 ± 37.35	69.7 ± 26.29
Protein (grams)	73.0 ± 13.2	126.7 ± 42.98
Fat (grams)	96.7 ± 22.98	142.4 ± 57.77
Iron (mg)	7.2 ± 1.79	47.0 ± 15.76

Based on Table 3, the adequacy level of energy intake for fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya varies widely, ranging from 53.6 - 234.0%. The level of adequacy of carbohydrate intake ranges from 24.8 - 175.3%. The adequacy level of protein and fat intake also showed varied results ranging from 55.9 - 308.9% and 58.3 - 347.7%. The intake of micronutrients Fe (iron) ranged from 19.5 to 81.5%.

The data on the adequacy level of energy and nutrient intake were then categorized into three categories: deficit, adequate, and excessive. The results of the categorization of the adequacy level of energy and nutrient intake were then statistically analyzed to determine whether there was a relationship between breakfast habits and adequate levels of energy and nutrient intake.

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of
Kartika Elementary School, Banyu Urip, Surabaya)

46

**Table 4.The Relationship between Breakfast Habits and Sufficient Level of Energy and Nutritional
Substances for Fifth-Grade Student of Kartika Elementary School, Banyu Urip Surabaya**

No.	Adequacy Level of Intake	Breakfast habits (N = 57)						P-value
		Always have breakfast		Sometimes		Never		
		n	%	n	%	n	%	
1.	Energy							
	- Deficit (<80% RDA)	7	12.3	4	7.0	9	15.8	0.655
	- Adequate (80 - 110% RDA)	10	17.5	6	10.5	7	12.3	
	- Excess (> 110 AKG)	4	7.0	6	10.5	4	7.0	
2.	Carbohydrate							
	- Deficit (<80% RDA)	18	31.6	10	17.5	15	26.3	0.347
	- Adequate (80 - 110% RDA)	3	5.3	5	8.8	3	5.3	
	- Excess (> 110 AKG)	0	0	1	1.8	2	3.5	
3.	Protein							
	- Deficit (<80% RDA)	1	1.8	1	1.8	0	0	0.999
	- Adequate (80 - 110% RDA)	8	14.0	6	10.5	9	15.8	
	- Excess (> 110 AKG)	12	21.1	9	15.8	11	19.3	
4.	Fat							
	- Deficit (<80% RDA)	2	3.5	1	1.8	1	1.8	0.76
	- Adequate (80 - 110% RDA)	4	7.0	3	5.3	6	10.5	
	- Excess (> 110 AKG)	15	26.3	12	21.1	13	22.8	
5.	Iron (Fe)							
	- Deficit (<80% RDA)	21	36.8	16	28.1	19	33.3	0.235
	- Adequate (80 - 110% RDA)	0	0	0	0	1	1.8	
	- Excess (> 110 AKG)	0	0	0	0	0	0	

The relationship test uses Spearman's Correlation, which is significant at the 0.05 level.
The test result is not significant (p> 0.05)

Based on the results of statistical tests using Spearman's Correlation with a confidence level of 95%, it shows that breakfast habits are not significantly related to the level of energy and nutrient adequacy as indicated by a p value> 0.05. In total, the relationship between breakfast habits and the energy and nutritional adequacy levels of fifth-grade students of Kartika Elementary School, Banyu Urip, Surabaya is presented in Table 4.

The absence of a significant relationship between breakfast habits and adequate levels of energy intake and macro micronutrients is associated with a mismatch in the composition and portion of food consumed at breakfast with the recommended composition and portion of food. Based on the description of energy and nutrition intake, it can be seen that the intake of fats, carbohydrates, and protein of respondents in a day is very high on average. This result means that even though the respondent does not have breakfast, the respondent changes the lack of this intake at snacking hours, lunchtime, or dinner. In addiction, research data also shows that although most of the respondents never or rarely have breakfast, the adequate level of energy and nutrition, especially macronutrients (carbohydrates and protein).

Breakfast should have the best quality of food and choice of food sources and meet as much as 20-35% of the daily energy intake. Based on the Ministry of Health (2014), types of food for breakfast consist of staple foods, side dishes, vegetables, and fruit. Breakfast in the form of food or drinks that provide energy and other nutrients consumed in the morning and can be done between 06.00-08.00 WIB. Breakfast is crucial because school time is an activity that requires energy and calories, which are pretty significant. Breakfast can positively impact attendance, academic achievement, nutritional intake, fitness, and a healthy weight (Saragi et al., 2015).

Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

47

School-age children who are not used to eating breakfast will result in weight loss and endurance, malnutrition, and iron nutritional anemia. In children who skip breakfast, depletion of muscle glycogen availability is irreplaceable. So that to keep blood sugar levels, the body will breaks down glycogen stores in the liver into blood sugar. If the help of this blood sugar supply runs out, the body will have difficulty distributing blood sugar to the brain. As a result, the child becomes restless, confused, dizzy, nauseous, sweats, stomach cramps, and even faints. This condition is a symptom of hypoglycemia or reduced blood sugar levels (Purnamasari, 2013).

D. Conclusion

Based on the results and discussion, the conclusion drawn from this study is that most respondents have normal nutritional status and come from families with Senior High School education levels and middle to lower economic levels. There is no relationship between breakfast habits and nutritional status, and there is no relationship between breakfast habits with adequate levels of energy, carbohydrates, protein, fat, and iron. Further research can examine the relationship between the quantity and quality of breakfast on the fulfillment of energy and daily nutrients and its effect on iron status and learning productivity.

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Yanesti Nuravianda Lestari, et al.
Breakfast Pattern, Nutritional Status and Nutritional Intake of School-Age Children (Studies in Fifth-Grade Students of Kartika Elementary School, Banyu Urip, Surabaya)

48

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