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CHILDHOOD OBESITY

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giuseppe de nicola
editore

I.S.B.N. 88-7327-035-2

I edition: september 2004

© GIUSEPPE DE NICOLA EDITORE - NAPOLI

80121 Napoli – 33, via del Parco Margherita

Tel./Fax 081.409.469

Web site: www.denicolaeditore.it

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Childhood obesity prevention programme in North Backa Region in Serbia

Mirjana Pavlovic



A Majority of nutritive risk factors leading to or linked with obesity are connected with lifestyle and eating patterns adopted in early childhood and youth. A tracking of this phenomenon is the most important consideration for its primary prevention^[1,2]. The quality of nutrition and the nutritive risk factors leading to a high frequency of excess weight and obesity in children^[3-6] in our country points out the need for prompt preventive measures like early detection, continuous monitoring, intervention and treatment in order to improve their health and nutrition. The prevalence of excess-weight and obesity in schoolchildren (age 6-18) in North Backa Region from the period 1995-2002 was 17% in girls and 19% in boys (BMI > P85 NHANES I). Using the IOTF cut-off points equivalent to BMI ≥ 25 in adults indicated that 16% of the boys and 15% of the girls were overweight and obese in the same sample^[7].

Therefore, we started with a Regional Primary Prevention Program for the prevention of Obesity along with its Cardiovascular risks “My Heart, Healthy Heart” with a parallel study of high risk populations, their nutrition and a health promotion strategy according to actual recommendations with the aid of several software programs^[8-18] (Figure 1).

At the population level management started from the second year of life, by attempting to harmonize life style and nutritional habits with recommendations made. The main characteristics were changing nutritional habits and lifestyles in a whole population over a 2 years period – by following the quality of family nutrition along with recommendations for changing it,

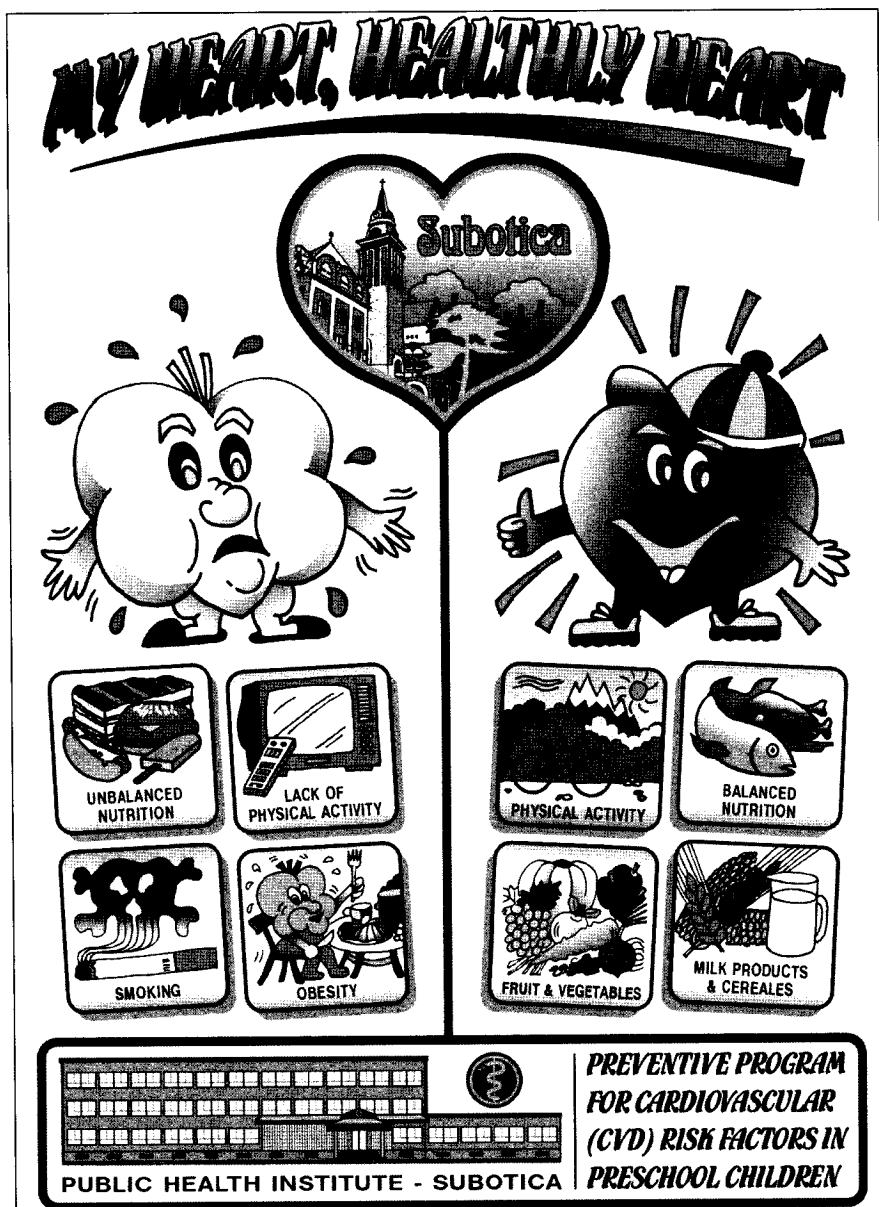


Figure 1

- by following the quality of social nutrition with the planning and correcting of menus,
- by providing education on healthy nutrition to cooks, pedagogues, children, parents and the whole society through the mass-media
- and by organizing the celebration of World Food Day, a Festival on healthy nutrition and physical activity for preschool and school age children.



The main aim of the World Food Day Celebration (WFD) was the promotion of healthy lifestyle and nutrition from childhood, in order to prevent nutritive disorders and improve health through mobilizing the whole society with multidisciplinary activities. WFD activities were carried out with the help of the Food and Agriculture Organization's Sub regional office in Budapest (FAO SEUR) with assistance at local, national, regional and international levels through governmental coordination, as well as through the participation of various health and educational institutions, NGO's and individuals.

Education and Promotion of healthy nutrition and lifestyle in childhood is important because it is a period of learning habits that last throughout life. For the effective promotion of nutrition in Subotica, the year 1999, marked the first celebration of World Food Day (WFD) on the 16th of October, with the commencement of the Festival on Healthy Nutrition and Physical Activity.

In 2001 in the Republic of Serbia, October was determined as the Month for promoting healthy nutrition and the existing model of the WFD celebration was accepted as a national model. In 2002/2003 a WFD Network had been initiated for Central and Eastern European Countries with the support of the FAO SEUR in Budapest^[17]. These series of events linked the creation of a "*healthy nutrition promotion month*". The formation of such an alliance envisages that all partners work in concert, starting from the government level (Ministry of Agriculture, Ministry of Health and Education) to food producers and consumers, from international organizations to private firms, from scientists, academics, individuals, to non government organizations. It may also include donors and policymakers.

All events should include the main WFD theme as its basis, and local and national events would aim to call attention to healthy lifestyle, nutrition and good health promotions. Based upon a proposal put forward by WFD Programme Coordinator around the 16th of October 2003, WFD events were organized in Hungary, Serbia, Czech Republic, Slovak Republic, Poland, Azerbaijan, Croatia, Macedonia and Georgia. These initiatives were aimed towards the public promotion of different events and to act as a forum to share and exchange ideas.

The new WFD portal site has been created within the FAO SEUR website <http://www.fao.org/Regional/SEUR> along with an Agro Web Network <http://www.zzzsu.org.yu/aw> as a virtual meeting place to promote WFD and TeleFood to see, as well as to collectively display the activities of the countries involved in the celebrations, i.e. the organization of competitions for best fine arts, literary works, performances for children related to healthy nutrition, healthy lifestyle, physical activity, obesity, hunger and so forth. These celebrations end, in some countries, with the end of the Festival, an exhibition of the awarded works and performances, a food exhibition with testing, and a quiz on healthy nutrition. These activities engage the whole



community and contribute towards a healthy lifestyle and to the promotion of healthy nutrition.

We further promote the importance of healthy nutrition by organizing campaigns providing free nutritional evaluation and status, festivals, workshops, seminars, lectures and education through the media, press conferences, internet communications, video clips and brochures with nutritional recommendations and guidelines and other educational materials. Movement towards the promotion of healthy life style and nutrition to prevent childhood obesity can be made in other ways, but the WFD celebrations are important contributions as they create awareness, as well, as further develop WFD networks in the European countries.

At the individual level management involved continuous longitudinal growth and nutritional status monitoring at health centers, identification of children with nutritive risk factors (overweight, obesity, hypertension or unhealthy nutrition based on anthropometrics physiological parameters, and a food questionnaire) or with a positive family history, for selective screening of their biochemical parameters. Children with such risk factors were invited along with their parents to nutrition departments for counseling on healthy lifestyle and nutrition recommendations with seven day planned menus based along nutritional and health guidelines.

This Regional primary prevention programme for controlling obesity and other CVD risk factors in childhood was proposed in 2002 for implementation on a national level in "National Guidelines for clinical practice in health institutions in Serbia"^[18].

REFERENCES

1. WHO TECHNICAL REPORT SERIES 916. *Diet, nutrition and the prevention of chronic diseases*. Report of the Joint WHO, FAO Expert Consultation, Geneva, Switzerland, 2003
2. LOBSTEIN T, BAUR L, UAUY R. *Obesity in children and young people: a crisis in public health*. *Obes Rev* 2004; 5 (suppl 1): 4-85.
3. PAVLOVIC M. *Nutritional status of children in the North Backa Region based on body mass index*. *Med Pregl* 2000; LIII (9-10): 493-501
4. PAVLOVIC M, MAJKIC SN, BOLITS Z, BJELOGLAV D, KADVAN A. *Nutrition as a potential nutritive atherosclerosis risk factor, Yugoslav*. *Med Biochem* 2001; 20: 107-15
5. PAVLOVIC M. *Time for action in prevention by nutrition and health promotion interventions in schoolchildren*. Proceedings 9th World Congress on Clinical Nutrition Evidence Based nutrition in Care, Performances and Prevention, London, UK, 2002; June 24-26th, p 169
6. PAVLOVIC M, BRANCA F. *Nutrition and Nutritional Status in Schoolchildren as Indicators for Implementation of Dietary Guidelines*. 9th European Nutrition Conference, 2003; October 1-4, Rome, Italy. *Ann Nutr Metab, Abstracts* 2003; 47: p 585
7. PAVLOVIC M, LOBSTEIN T. *Assessment and monitoring of nutritional status in child-*



were to change nutrition and lifestyle in a whole population over a 2 years period, by following the quality of family and social nutrition with recommendations for changing nutrition, the planning and correcting of menus, education on healthy nutrition to cooks, pedagogues, children, parents and by all available means to the whole society with the help of the mass-media, as well as through organizing the celebration of the World Food Day Festival on healthy nutrition and physical activity for preschool and schoolchildren in order to promote a healthy nutritional life-style.

The individual level program management involves continuous longitudinal growth and nutritional status monitoring, identification of children with nutritive risk factors or with positive family history for selective screening of biochemical parameters, and healthy lifestyle and nutrition counseling.

Key words:

Childhood obesity; Primary prevention; Programme

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Assessment and monitoring of nutritional status of children and adolescents in North Backa Region, Serbia

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INTRODUCTION

Assessment and monitoring the nutritional status of children on a population level can help to expose the influence of factors such as diet and exercise which are responsible for the development of obesity. Previous studies of obesity in children in Serbia found a high prevalence rate and a clustering of obesity with other risk factors like hypertension and hyperlipoproteinemia^[1-5]. The present work describes the body mass index (BMI kg/m²) of more than 40.000 school children in the North Backa Region in Serbia.

METHODS AND MATERIALS

In a cross-sectional anthropometric study examining body weight and height during a mass screening of children in health centers in the North Backa Region^[6], 40 824 children aged 6-18 (20.694 boys and 19.860 girls) were examined in the period 1995 - 2002 Height and weight data were processed using the software "CHILD"^[7] to determine BMI status according to the American NHANES I criteria^[8] and also according to the International Obesity Task Force (IOTF) recommendations for international reference values for child BMIs equivalent to adult BMI values of 25 and 30 kg/m²^[9].

RESULTS

Analyzing the BMIs of children age 6-18 according to the NHANES I criteria (Table 1), we found 5.7% of boys and 6.5% of girls were underweight

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2 International Obesity Task Force - London, UK



Table 1. BMI status of children age 6-18 in North Backa Region, 1995-2002, according to NHANES I criteria [reference 8].																						
Age year	BMI < P5		BMI P5-P15		BMI P15-P85		BMI P85-P95		BMI > P95		Total											
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls										
	n	%	n	%	n	%	n	%	n	%	n	%	n	n								
6	72	2.71	101	3.98	81	3.05	113	4.45	1804	68.02	1594	62.83	399	15.05	362	14.27	296	11.16	367	14.47	2652	2537
7	163	4.61	218	6.62	217	6.13	291	8.84	2514	71.04	2178	66.14	380	10.74	340	10.32	265	7.49	266	8.08	3539	3293
8	67	7.45	70	8.74	75	8.34	87	10.86	579	64.40	486	60.67	111	12.35	95	11.86	67	7.45	63	7.87	899	801
9	85	6.08	123	8.74	144	10.31	186	13.22	898	64.28	862	61.27	176	12.60	147	10.45	94	6.73	89	6.33	1397	1407
10	127	8.20	162	11.81	187	12.07	170	12.39	956	61.72	810	59.04	175	11.30	149	10.86	104	6.71	81	5.90	1549	1372
11	109	6.87	176	11.08	204	12.86	171	10.77	945	59.58	1010	63.60	207	13.05	152	9.57	121	7.63	79	4.97	1586	1588
12	138	8.10	197	11.90	219	12.86	180	10.88	1011	59.37	1053	63.63	228	13.39	130	7.85	107	6.28	95	5.74	1703	1655
13	142	9.36	89	6.27	178	11.73	109	7.68	928	61.17	1027	72.37	172	11.34	123	8.67	97	6.39	71	5.00	1517	1419
14	97	6.90	54	4.01	169	12.03	82	6.10	917	65.27	1031	76.65	149	10.60	101	7.51	73	5.20	77	5.72	1405	1345
15	77	4.99	34	2.14	173	11.20	74	4.65	1031	66.77	1274	80.03	173	11.20	147	9.23	90	5.83	63	3.96	1544	1592
16	60	4.22	27	2.29	174	12.23	45	3.82	982	69.01	970	82.27	145	10.19	102	8.65	62	4.36	35	2.97	1423	1179
17	44	3.82	19	1.60	112	9.72	53	4.45	853	74.05	980	82.35	97	8.42	111	9.33	46	3.99	27	2.27	1152	1190
18	17	2.84	12	2.49	68	11.37	27	5.60	436	72.91	408	84.65	56	9.36	26	5.39	21	3.51	9	1.87	598	482
T.	1198	5.71	1282	6.46	2001	9.54	1588	8.00	13854	66.08	13683	68.90	2468	11.77	1985	9.99	1443	6.88	1322	6.66	20964	19860



(BMI < P5 NHANES); 9.5% of boys and 8.0% of girls showed moderate underweight (BMI P5-15); whereas normal weight (BMI P15-85) was found in 66.1% boys and 68.9% girls.

Overweight (BMI P85-95) was found in 11.8% of boys and 10.0% of girls, and obesity (BMI > P95) in 6.9% of boys and 6.7% of girls. Using the IOTF-recommended criteria, overweight (BMI equivalent to adult BMI > 25) was found in 16.5% boys and 15.2% girls, of which 4.3% of boys and 3.7% of girls were obese (BMI equivalent to adult BMI > 30) (Table 2).

Table 2. BMI status of children age 6-18 in North Backa Region, 1995-2002, according to IOTF criteria [reference 9].

Age year	Overweight including obese				Obesity				Total		
	Boys		Girls		Boys		Girls		Boys	Girls	Total
	n	%	n	%	n	%	n	%	n	n	
6	124	11.80	157	16.46	40	3.81	59	6.18	1051	954	2005
6.5	264	11.35	315	13.60	84	3.61	94	4.06	2327	2316	4643
7	269	13.32	242	13.29	78	3.86	74	4.06	2020	1821	3841
7.5	126	15.35	136	17.82	26	3.17	27	3.54	821	763	1584
8	94	20.13	55	15.03	25	5.35	25	6.83	467	366	833
8.5	35	12.46	58	18.71	6	2.14	23	7.42	281	310	591
9	115	17.75	104	17.69	30	4.63	27	4.59	648	588	1236
9.5	172	15.91	196	17.30	41	3.79	43	3.80	1081	1133	2214
10	151	17.89	137	19.60	44	5.21	33	4.72	844	699	1543
10.5	67	15.30	68	15.93	13	2.97	10	2.34	438	427	865
11	139	19.52	110	15.60	50	7.02	23	3.26	712	705	1417
11.5	236	20.24	220	18.05	60	5.15	52	4.27	1166	1219	2385
12	200	20.70	132	14.98	41	4.24	33	3.75	966	881	1847
12.5	89	19.69	86	19.72	28	6.19	18	4.13	452	436	888
13	109	15.77	88	14.01	26	3.76	19	3.03	691	628	1319
13.5	205	18.69	155	15.72	43	3.92	36	3.65	1097	986	2083
14	115	16.11	101	13.93	32	4.48	18	2.48	714	725	1439
14.5	82	20.76	66	16.84	11	2.78	10	2.55	395	392	787
15	135	17.53	122	14.82	43	5.58	15	1.82	770	823	1593
15.5	223	21.46	135	13.66	58	5.58	29	2.94	1039	988	2027
16	130	17.26	67	12.45	29	3.85	16	2.97	753	538	1291
16.5	80	18.22	61	13.44	16	3.64	9	1.98	439	454	893
17	79	14.01	87	13.66	22	3.90	11	1.73	564	637	1201
17.5	113	17.63	60	10.64	27	4.21	14	2.48	641	564	1205
18	52	17.81	17	7.46	13	4.45	2	0.88	292	228	520
Total	3404	16.46	2975	15.19	886	4.28	720	3.67	20669	19581	40250



DISCUSSION

These results indicate that the levels of underweight are equivalent to those found in the US reference group, while the levels of overweight tend to exceed the levels expected, and indicate that obesity prevalence may be rising in the North Backa Region^[10].

The use of the US NHANES I standards gives slightly higher values of overweight and obesity than the IOTF method, but this discrepancy is not consistent: a study of the prevalence of obesity and overweight in schoolchildren (boys= 3243; girls= 3045) age 9-10 from the "Yugoslav Study of precursors of atherosclerosis in schoolchildren" in 1998 found 10-13% overweight using NHANES I criteria and 16-17% overweight using IOTF criteria^[11]. Although neither method provides an ideal standard for monitoring of populations, the IOTF method is increasingly being used for comparing the prevalence of excess body weight between child populations internationally and for monitoring child populations over time.

Trends towards excess weight gain among children and adolescents are being found in many parts of Europe and North America, linked to high-energy, low-nutrient diets and reduced physical activity levels. Based on collected data by IOTF, the numbers of overweight children have increased in Europe over the past two to three decades^[12,13]. The highest prevalence levels have been observed in children aged 7-10 in southern European Union member states: in Italy and Sicily 36%, Greece 31%, Crete 33%, Cyprus 27% and Spain 34%. Northern European Union member states tend to have lower prevalence rates for childhood overweight for this age group: in Sweden 18%, Denmark 15% and the Netherlands 12%.

The results described in this paper establish the BMI status of school children in the North Backa Region based on a large sample of children aged 6-18 measured around the turn of the century. The data can be used to monitor trends in the health of child populations in the region in future years. Further monitoring of the nutritional status of school children has now been established in order to detect at an early stage the development of rising obesity and associated risk factors. This in turn can lead to individual and/or population level interventions to prevent childhood obesity and improve the nutritional status of children and adolescents^[14].

REFERENCES

1. PAVLOVIC M. *Nutritional status of children in the North Backa Region based on body mass index*. Med Pregl 2000; LIII (9-10): 493-501
2. PAVLOVIC M. *Nutritional status of children in North Backa Region*. Public Health Institute, Subotica, Yugoslavia, 1999; 1-272.
3. PAVLOVIC M. *Body mass index of children in North Backa region in Yugoslavia*. European Childhood Obesity Group, 10th Workshop, Pecs (Hungary), 10-11 November, 2000.
4. PAVLOVIC M, VUKOTIC M, MAJKIC N, DIMITRIJEVIC D. *Obesity as a risk factor in*



- schoolchildren. Book of Abstract. 10th European Congress Obesity. Antwerp, Belgium 2000, May 24-27. *Inter J Obesity* 2000; 24 (Suppl 1): S153.
5. PAVLOVIC M, VUKOTIC M, MAJKIC NS, SIMEUNOVIC S, BOLITS Z, RAPIC D. *Nutritional status and lipid parameters in children from Yugoslav study of atherosclerosis precursors in schoolchildren (PASCS)*. Book of Abstract. 12th Workshop European Childhood Obesity Group on Insulin Resistance in Obese Children. Prague, Czech Republic May 23-25, 2002; p 22.
 6. PAVLOVIC M. *Monitoring model of nutritional status of children in Serbia - example in North Backa Region*. In: PAVLOVIC M (ed). *Nutritional status of children*. Monograph, Public Health Institute, Subotica, Yugoslavia, 2000; 71-92
 7. PAVLOVIC M. *Using software for supervision of the growth and Nutritional status and in prevention of cardiovascular (CVD) risk factors in childhood*. Public Health Institute Subotica, Yugoslavia 1997.
 8. MUST A, DALLAL GE, DIETZ WH. *Reference data for obesity: 85th and 95th percentiles of body mass index (w/ht²) and triceps scinfold thickness*. *Am J Clin Nutr* 1991; 53: 839-46.
 9. COLE TJ, BELLIZZI MC, FLEGAL KM, DIETZ WH. *Body mass index in children worldwide: cut-off points for overweight and obesity*. *BMJ* 2000; 320: 1240-3.
 10. PAVLOVIC M. *Tendency of obesity prevalence in children*. Book of Abstract. 10th European Congress Obesity. Antwerp, Belgium 2000, May 24-27. *Inter J Obesity* 2000; 24 (Suppl 1): S158.
 11. PAVLOVIC M. *Nutritional status of schoolchildren in Yugoslavia*. In: PAVLOVIC M, (ed). *The 2nd Food and Nutrition Conference with international participation*. Subotica Palic, 2000, November 17-18. Public Health Institute, Subotica. Book of Abstract 2001; 77.
 12. LOBSTEIN T, BAUR L, UAUY R. *Obesity in children and young people: a crisis in public health*. *Ob Rev* 2004; 5 (suppl 1): 4-85.
 13. PAVLOVIC M, LOBSTEIN T. *Childhood Obesity in North Backa Region in Yugoslavia in comparison with other Southern European Countries*. Book of Abstracts. 1st Balkan Congress on Obesity, 5th Panhellenic Medical Congress on Obesity. Athens (Greece), 2003 February 6-9; 70.
 14. PAVLOVIC M, LOBSTEIN T. *Assessment and monitoring of nutritional status in childhood obesity detection and prevention*. 13th European Childhood Obesity Group Workshop, Mesagne (BR), Italy 2003, 25-27 September. *Inter J Obes* 2003; 27 (S1): 16.

Summary

The present study reports the body mass index (BMI kg/m²) status of a large sample of school children in the North Backa Region of Serbia. Data were obtained from a cross-sectional study of body weight and height recorded during a mass screening of 40 824 children aged 6-18 years in health centers in the North Backa Region in the period 1995 - 2002.

BMI percentiles were compared with the US NHANES I reference population and also with the IOTF reference cut-off points for children equivalent to an adult BMI of 25 and 30. Using the NHANES-I reference we found 6% of children underweight (BMI < P5), 8-10% of children moderately underweight (BMI P5-15) and 19% boys and 17% girls overweight (BMI > P85).

Using the IOTF cut-off points equivalent to BMI>25 in adults indicated that 16% of boys and 15% of girls were overweight, and may be at increased risk of weight-related ill



health. Further monitoring of the nutritional status of school children has been established in the region in order to identify trends in childhood obesity and to determine dietary risk factors and allow for early prevention.

Key words:

Children; Nutritional Status; Obesity; Prevalence.

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