

Suzana Pustivšek**RISK OF EATING DISORDERS IN SLOVENIAN ADOLESCENT AESTHETIC ATHLETES AND THEIR NON-ATHLETIC COLLEAGUES****TVEGANJE ZA MOTNJE HRANJENJA MED ADOLESCENTI V ESTETSKIH ŠPORTIH IN NJIHOVIMI SOVRSTNIKI V SLOVENIJI****ABSTRACT**

Eating disorders are an emerging problem, especially adolescence is a delicate phase of life. In aesthetic athletes, sport specific factors play an important role in developing eating disorders. The primary goal of study was to compare the prevalence of risk of eating disorders among athletes and non-athletes and secondary to observe the differences in body composition and eating habits. A total of 167 girls and 164 boys, aged 15 – 17 years completed a sick, control, onestone, fat, food (SCOFF) questionnaire for detecting risk for eating disorders. Weight and body composition were measured using a bioelectrical impedance machine. Overall, 34,1 % of athletes and 39,8 % of controls were classified as at risk for eating disorders with higher prevalence among girls and no differences between athletes and non-athletes. There were no significant differences in body composition between at-risk and no risk group, but average values shows tendency in percentage of fat and muscle mass. Skipping breakfast can increase risk of eating disorders. These finding demonstrate that not only BMI, but also specific body composition parameters should be studied in the future when identifying at-risk groups for eating disorders and skipping breakfast can lead to eating disorders which are expressed as low body mass.

Keywords: body composition, eating habits, SCOFF questionnaire

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POVZETEK

Motnje hranjenja so rastoč problem, predvsem v času adolescence, ki je kritično obdobje razvoja. Športniki v estetskih športih so še toliko bolj podvrženi tveganju zaradi posebnih zahtev samega športa. Namen raziskave je bil primerjati prevalenco tveganja za nastanek motenj hranjenja med estetskimi športniki in njihovimi netreniranimi sovrstniki ter ugotoviti razliko v sestavi telesa ter prehranjevalnih navadah med skupinami s tveganjem in brez tveganja za motnje hranjenja. Vzorec je sestavljalo 167 deklet in 164 fantov, starih med 15 in 17 let. Prisotnost tveganja za motnje hranjenja je bila ocenjena s SCOFF vprašalnikom, telesna sestava in masa sta bili izmerjeni z bioimpedančno napravo. Pri 34,1 % športnikov in 39,8 % sovrstnikov je bilo zabeleženo tveganje za motnje hranjenja, z značilno večjo prevalenco med dekleti in neznajčilnimi razlikami med športniki in kontrolno skupino. Sestava telesa se med skupino s tveganjem in brez ni značilno razlikovala, kljub nakazani tendenci, da imata delež maščobne in mišične mase vpliv na tveganje za motnje hranjenja. Izpuščanje zajtrka povečuje tveganje za motnje hranjenja. Rezultati nakazujejo, da je pri nadaljnjih raziskavah potrebno upoštevati tudi specifične parametre telesne sestave in ne le indeks telesne mase ter da lahko izpuščanje zajtrka vodi tudi v motnje hranjenja, ki so izražene kot prenizka telesna masa.

Ključne besede: sestava telesa, prehranjevalne navade, SCOFF vprašalnik

INTRODUCTION

Eating disorders are an emerging problem in many aspects of today's society. Especially adolescence is a delicate phase of life. Their never-ending sequence of physical and psychological adaptations has a remarkable influence on the social and behavioural aspects of their lives (Hetherington, 2000). Athletes constitute a unique population, and the impact of factors such as sport specifics, training volume and intensity, coach attitude, eating pattern and psychopathogenical profile play an important role in developing disordered eating (DE) and eating disorders (ED) (Dosil, 2008). Although females still represents the majority of those who seek medical care for an ED, studies have shown that males make up approximately 25% of patients with anorexia nervosa or bulimia nervosa and 40% of patients with a binge ED (Hudson, Hiripi, Pope, & Kessler, 2007).

Various studies have found controversial results related to ED and DE among adolescent athletes and controls. On one hand, results are showing more common prevalence of ED and DE in high performance sports (female: 18 % - 32,8 %; male: 4 % - 8 %) than the general population (female: 5 % - 21,4 %; male: 0 % - 0,5 %). Particularly so in high performance aesthetic sports, where body composition and body weight are crucial performance variables (Byrne & McLean, 2002; Martinsen & Sundgot-Borgen, 2013; Sundgot-Borgen & Torstveit, 2004; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). On the other hand, researchers reported a higher prevalence of dieting in control subjects and were classified with DE compared with the athletes and no differences in dieting or DE were found between leanness and non-leanness sports athletes (Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010; Suzana Pustivšek, Hadžić, Dervišević, & Carruthers, 2019; Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, & Strauss, 2009). Contradictory results in prevalence can be explained as the lack of standardization procedure related to the assessment of ED and DE.

It is generally accepted that the pathogenesis of EDs is multifactorial with cultural, individual, familial and genetic/biomechanical factors playing roles. Various individual characteristics are associated with ED, such as perfectionism, low self-esteem, body composition and eating habits (Dosil, 2008; Ghaderi, 2001). Unlike perfectionism, but low self-esteem and body dissatisfaction seem to emerge with greater intensity during puberty and develop concurrently in young people of both genders (Mäkinen, Puukko-Viertomies, Lindberg, Siimes, & Aalberg, 2012). A study of female collegiate athletes showed that low levels of self-esteem were associated with higher levels of DE (Trent A. Petrie, Greenleaf, Reel, & Carter, 2009). Some studies show a clear correlation between low body image satisfaction and ED symptoms among athletes (Bettle, Bettle, Neumärker, & Neumärker, 2001; T. A. Petrie, 1993). However, other studies report the absence of this correlation. For example, athletes showed higher levels of ED than non-athletes but similar incidences of body dissatisfaction (De Bruin, Oudejans, & Bakker, 2007).

Body composition and eating habits are crucial for athletes' health and performance but have rarely been investigated in acrobatic and rhythmic gymnasts and in dancers, in correlation with risk of eating disorders. Several studies have already found that being overweight predisposes adolescents towards EDs (Babio, Canals, Pietrobelli, Pérez, & Arija, 2009). Higher levels of physical activity have been associated with lower body mass or body fat (Lohman et al., 2006; Stevens et al., 2004). Some body composition parameters can alter between athletes at risk of an ED or with an ED. To date, no research has reported if there is a difference in body composition parameters between adolescent aesthetic athletes and controls at risk of an ED and without it.

Eating habits play an important role in adolescents health and body composition. Breakfast consumption is associated with a reduced risk of becoming overweight or obese and a reduction in the BMI in children and adolescents in Europe (Croezen, Visscher, Ter Bogt, Veling, & Haveman-Nies, 2009). Also the higher number of meals during the day is associated with lower risk for obesity and binge eating (Krebs et al., 2007; Masheb, Grilo, & White, 2011). As studies were conducted on general population, there is still a lack of knowledge what is the influence of eating habits on risk of ED in athletes, especially in aesthetic sports.

As there is a strong lack of researches on adolescent aesthetic athletes, boys and girls, including acrobatic or rhythmic gymnasts' and dancers in body composition, eating habits and risk of ED, the main purpose of this study is to extend research on the field of ED. To understand the similarities and differences between these athletes in relation to the general adolescent population. What is more, in Slovenia ED and DE are demanding problem with almost no attention from researches and public health authorities.

MATERIALS AND METHODS

Participants

A total of 231 adolescents, 167 females and 164 males, aged from 15 to 17 years, were randomly selected from Slovenian gymnast and dancing clubs and 4 high schools. The female group consisted of 44 athletes (12 acrobatic gymnasts, 7 rhythmic gymnastics and 25 dancers) and 123 controls, the male group consisted of 41 athletes (5 acrobatic gymnastics and 36 dancers) and 123 controls. A common inclusion criterion for athletes and controls was birth in the provided year. Furthermore, athletes had to be active and regular (minimum 3 times per week) trained in a club for a minimum of one year, controls had to be excluded from training at least for 6 months or more (if they had trained in the past). The study was approved by the National Medical Ethic Committee (No. 125/06/13). The respondents gave written consent to participate.

Questionnaire

The participants completed a SCOFF questionnaire, which is a specific document for detecting the risk of ED (Botella, Sepúlveda, Huang, & Gambará, 2013). It contains five yes/no questions concerning eating habits and attitudes towards a person's weight and body shape. A threshold of 2 positive answers was proposed implying an existing risk of ED (Morgan, Reid, & Lacey, 1999). The SCOFF questionnaire appears effective as a screening instrument and has been widely adopted to raise suspicion of an ED (Hill, Reid, Morgan, & Lacey, 2010). Reliability of the Slovene version of SCOFF questionnaire was proved with calculated Cronbach alpha, 0.454, and inter-class correlation, which was 0.892, respectively (S. Pustivšek, Hadžić, & Dervišević, 2015). Results were in line with other studies (Rueda Jaimes et al., 2005; Siervo, Boschi, Papa, Bellini, & Falconi, 2005).

Body composition

Weight and body composition were measured using a portable bioelectrical impedance machine InBody 230 with tetra polar eight point tactile electrodes (Biospace Co., 2008). It had been used in previous studies and proved to be an acceptable device to measure body composition in children and adolescents (Ballesteros-Pomar et al., 2012; Lim et al., 2009; So et al., 2012). Based on the data collected, body mass index calculations have been presented. Cole et al. (2007) have considered age and gender in the use of BMI when defining thinness in adolescents. Hence, in this study, BMI percentiles were classified according to the WHO (World Health Organisation) percentile

graphs (Onis et al., 2007). Athletes were measured prior to training to avoid the possible influence of dehydration and increased body temperature on body composition results.

Eating habits and appearance satisfaction

Eating habits and body appearance were observed with three simple questions, which were added to the SCOFF questionnaire:

1. How many meals per day do you eat? Possible answers were from 1 to 4 or more.
2. Do you eat breakfast? Yes / No.
3. Are you satisfied with your visual appearance? Scale from 1 (not satisfies) to 5 (very satisfied)

Data analysis

The statistical analyses were carried out using SPSS version 17.0. Results were expressed as mean value (M) and standard deviation (SD). The nonparametric Mann-Whitney test was used to evaluate mean differences between athletes and controls. Chi-square tests examined categorical frequencies. A binary logistic regression was performed to observe the predictors of SCOFF questionnaire. Results of questionnaire were set as depended variable and no risk of ED was predisposed as a positive output. Before running the logistic regression, collinearity of predictors was checked.

The significance level for all tests was set at 0.05.

RESULTS

Table 1. Demographic characteristics of athletes and controls.

Variable	Girls		Boys	
	Athletes n = 44 Mean (SD)	Controls n = 123 Mean (SD)	Athletes n = 41 Mean (SD)	Controls n = 123 Mean (SD)
Age	15,86 (0.85)	16.01(0.84)	16.15 (0.85)	16.17 (0.85)
Height	163.40 (6,13) *	166.94 (5.72)	174.64 (6,63) *	178.26 (6.33)
Years of training	7,12 (2.60)		7,34 (3,05)	

SD – standard deviation

* $p < 0,05$

The demographic characteristics of athletes and controls are presented in Table 1. Boys ($p = 0,018$) and girls ($p < 0,001$) in control group were significantly taller than athletes were. Other parameters did not differ significantly between the groups.

Prevalence of risk of eating disorders

Overall, 34.1 % of athletes and 39.8 % of controls were classified as being at risk of ED, showing no statistical significant difference between groups, $p = 0,823$ (Table 2). The number of athletes who were classified as at risk was not significantly different to controls in either group (boys: $p = 0,590$; girls: $p = 0,339$). Comparing genders, there was a significant difference in prevalence of risk of ED, where girls were more prone to ED among athletes ($p = 0,006$) and controls ($p < 0,001$) than boys.

Table 2. Prevalence of risk of ED based on SCOFF questionnaire score.

	Girls		Boys	
	Athletes n (%)	Controls n (%)	Athletes n (%)	Controls n (%)
Risk of ED	21 (47.7)	69 (56.1)	8 (19,5)	29 (23.6)

Body composition

Table 3. Comparison of body composition parameters between groups of athletes and controls with and without risk separated by gender and within groups – athletes or controls, with risk vs. without risk of ED.

		Girls			Boys	
		Athletes Mean (SD)	Controls Mean (SD)		Athletes Mean (SD)	Control Mean (SD)
BMI_WHO	1*	51,28 (19,90)	63,83 (23,99)	1	63,24 (20,79)	63,63 (24,37)
	2	46,27 (26,37)	56,73 (30,59)	2	56,94 (25,73)	51,40 (32,36)
	3b	48,66 (23,38)	60,71 (27,20)	3	58,17 (24,73)	54,29 (31,01)
WHR	1*	0,75 (0,04)	0,77 (0,05)	1	0,83 (0,05)	0,82 (0,05)
	2	0,76 (0,04)	0,77 (0,06)	2	0,83 (0,04)	0,82 (0,05)
	3a	0,75 (0,04)	0,77 (0,06)	3	0,83 (0,04)	0,82 (0,05)
% muscle mass	1**	48,00 (4,39)	47,71 (3,39)	1	48,00 (4,39)	47,71 (3,39)
	2**	50,05 (1,87)	48,03 (3,14)	2**	50,05 (1,87)	48,03 (3,14)
	3b	49,65 (2,62)	47,95 (3,19)	3b	49,65 (2,62)	47,95 (3,19)
% fat mass	1**	21,83 (5,12)	28,41 (5,89)	1	15,01 (7,77)	15,27 (5,77)
	2**	21,27 (5,85)	29,07 (6,50)	2**	11,21 (3,43)	14,51 (5,75)
	3b	21,54 (5,46)	28,70 (6,15)	3b	11,95 (4,72)	14,69 (5,74)

1- group with risk of ED

Athletes girls: N1 = 21, N2 = 23, N3 = 44

2- group without risk of ED

Control girls: N1 = 69, N2 = 54, N3 = 123

3- average of the group

Athletes boys: N1 = 8, N2 = 33, N3 = 41

Controls boys: N1 = 29, N2 = 94, N3 = 123

*p < 0,05 (between athletes and controls with or without risk of ED)

** p < 0,01 (between athletes and controls with or without risk of ED)

ap < 0,05 (between athletes and controls)

b p < 0,01 (between athletes and controls)

The anthropometric characteristics and its comparison of athletes and controls and groups at risk and without it are presented in table 3. Average values of girls' athletes and controls differed significantly in all measured terms of body composition, with athletes having lower BMI according to WHO percentile values, waist to hip ratio and fat mass percentage, but higher values of muscle mass percentage. Among boys, there were significant mean differences regarding percentage of muscle and fat mass, with higher muscle and lower fat mass among athletes than controls. Comparing girls athletes with detected risk of ED to girls athletes without risk of ED, there were no significant differences in body composition values. This significant difference did not occur neither in girls control group or either group of boys ($p > 0,05$). Furthermore, athletes

with risk of ED were compared to controls with risk of ED, separated by gender. Girls athletes with risk of ED had significantly lower BMI and WHR ($p < 0,05$), higher percentage of muscle mass ($p < 0,01$) and lower percentage of fat mass ($p < 0,01$). In the sample of boys, there were no significant differences in body composition parameters between athletes and controls with risk of ED. There were differences in the non-risk group, which were significant in the same parameters as taking into account whole sample of boys athletes and controls. In the girls without risk group, the difference is comparable to boys, they differ in percentage of muscle and fat mass ($p < 0,01$).

Eating habits and appearance satisfaction

In general, girls showed lower satisfaction with body appearance than boys ($p < 0,01$) (Table 4). Comparing girls athletes to controls there is a significant difference in breakfast consumption, where 61 % of athletes and 43 % of controls consume breakfast. There are no significant differences in number of meals eaten per day and general satisfaction in their body appearance. Frequency of boys that eat breakfast is comparable between group of athletes (51 %) and controls (54 %). Insignificant difference was observed also in the body appearance satisfaction. According to the number of meals eaten per day, controls eat more often (3,87 meals/day) than athletes (3,61 meals/day), $p < 0,05$.

Table 4. Comparison of eating habits and appearance satisfaction between groups of athletes and controls with and without risk separated by gender and within groups – athletes or controls, with risk vs. without risk of ED.

		Girls			Boys	
		Athletes Mean (SD)	Controls Mean (SD)		Athletes Mean (SD)	Control Mean (SD)
No breakfast (N (%))	1	11 (52,38)	35 (50,72)	1	3 (7,32)	14 (11,38)
	2**	6 (26,10)	35 (64,81)	2	17 (41,46)	42 (34,15)
	3a	17 (38,64)	70 (56,91)	3	20 (48,78)	56 (45,53)
No. of meals per day	1	3,71 (0,78)	3,67 (0,82)	1*	3,63 (1,19)	3,90 (0,98)
	2	3,74 (0,75)	3,57 (0,88)	2	3,61 (0,93)	3,86 (0,82)
	3	3,73 (0,76)	3,63 (0,84)	3a	3,61 (0,97)	3,87 (0,86)
Appearance satisfaction	1	3,24 (0,70)	2,84 (0,98)	1	3,38 (1,30)	3,14 (0,92)
	2	3,57 (0,90)	3,09 (0,92)	2	3,94 (0,66)	3,56 (0,84)
	3	3,41 (0,82)	2,95 (0,96)	3	3,83 (0,83)	3,46 (0,87)

1- group with risk of ED

Athletes girls: N1 = 21, N2 = 23, N3 = 44

2- group without risk of ED

Control girls: N1 = 69, N2 = 54, N3 = 123

3- average of the group

Athletes boys: N1 = 8, N2 = 33, N3 = 41

Controls boys: N1 = 29, N2 = 94, N3 = 123

* $p < 0,05$ (between athletes and controls with or without risk of ED)

** $p < 0,01$ (between athletes and controls with or without risk of ED)

a $p < 0,05$ (between athletes and controls)

b $p < 0,01$ (between athletes and controls)

Comparing boys athletes with risk of ED and without it, we found no differences in eating habits and appearance satisfaction. Same, insignificant results were observed among girls athletes. In control groups, boys with risk of ED reported significantly lower satisfaction with their appearance than no risk group ($p = 0,005$), but there were no differences among girls.

With further comparison in sample of girls, between athletes and controls with risk of ED, we found no significant differences. In group without risk, more athletes (74 %) consume breakfast than controls (35 %), $p < 0,01$. In the group of boys, the only significant difference between athletes and controls with risk and no risk of ED was in the number of meals eaten per day, where controls with risk of ED consume more meals (3,90 meals /day) as athletes (3,63 meals/day), $p < 0,05$.

With a binary logistic regression we observe the predictors of SCOFF questionnaire. The only significant predictor among represented ones was breakfast consumption among girls ($p = 0,009$). Lack of breakfast increases risk of ED.

DISCUSSION

The primary goal of our study was to compare the prevalence of risk of ED among adolescents athletes involved in aesthetic sports and their colleagues, who does not train any sport. Previous studies have revealed that adolescent athletes do not show higher levels of disordered eating or even have more positive eating behaviour and attitudes than non-athletes (Fulkerson, Keel, Leon, & Dorr, 1999; Smolak, Murnen, & Ruble, 2000). Consistent with those findings, in our study, the prevalence of risk of ED was slightly but insignificantly lower among athletes than controls. This was found in the subsample of boys and girls. Comparable levels of prevalence by athletes and controls can be explained by pressure that each of them feel from the environment. Although athletes have a lower BMI than controls, what can be a protective factor, they, especially girls, are targets of additional pressure in the context of their sport (De Bruin et al., 2007), in addition to the pressures to which most adolescents are already subject. Other study suggested (Fulkerson et al., 1999) that athletes positive outlook of life may serve as a protective factor for ED as well. What is more, lower percentage of athletes are dissatisfied with their bodies. In general, athletes have a higher self-esteem than non-athletes (Armstrong & Oomen-Early, 2009; Hausenblas & Downs, 2001). Researches which use the same methodology to measure risk of ED (SCOFF questionnaire) reported prevalence from 24,7 % - 28,9 % among girls and 17,3 % - 25,2% among boys with no subsample of athletes (Holling & Schlack, 2007; Veses et al., 2011). Further on, higher prevalence of risk of ED in present study, especially among athletes, can be explained by the specifics of sample, where just aesthetic athletes were included. Literature reports, that athletes involved in leanness - depended, weight - depended and aesthetics sports are more prone to ED (Sundgot-Borgen & Torstveit, 2004).

So far, just one study, which was a part of this report, observed the risk of ED among adolescent athletes and non-athletes in Slovenia (Pustivšek et al., 2019). The overall reported prevalence was 38,60 % ($n = 583$), in the subgroup of girls 54,21 % ($n = 273$) and 24,84 % ($n = 310$) in boys, respectively. What is more, medical report of first visits on the primary health care level due to bulimia or anorexia nervosa in Slovenia, showed the highest number of it among adolescents between 15 and 19 years of age (Hafner & Lesjak, 2008). This shows on existing problem of ED in adolescence.

A second goal of this study was to observe the differences in body composition, eating habits and body appearance satisfaction between adolescents with risk of ED and without it among aesthetic athletes and non-athletes. Body composition has a significant relationship with physical activity. Higher levels of physical activity have been associated with lower body mass or body fat in several studies (Lohman et al., 2006; Stevens et al., 2004). Regarding to the anthropometric

measurements used, adolescent girls with risk of ED had higher BMI WHO percentile values and lower percentage of muscle mass. In the subsample of boys, results were comparable to girls. This findings are in a line with other studies, which report, that adolescents classified above the 85th percentile on all the anthropometric measurements, as well as overweight adolescents, were at increased risk of developing an ED (Veses et al., 2011).

As the differences in body composition are present, but not significant within the group of athletes or controls between risk and no risk group, we can conclude, that when observing just a risk of ED in correlation with body composition we can not differ between subjects. The deviations are stronger when ED already exist or bigger samples are taken into account. This is supported by other researches which report, that specific body composition (high percentage of fat and lower muscle mass) have been shown as significant predictors of increased risk of ED or shows on presence of ED (Babio, Canals, Pietrobelli, Perez, & Arija, 2009; Pustivšek et al., 2019). Further more, the lack of differences in body composition indicates, that ED are in fact complex and multi-factorial disease, where family, social status, self-esteem, biological and psychological factors play an important role (Jacobi et al., 2011; Jacobi, Morris, & Zwann, 2004).

Social pressure is the strongest DE predictor in non-elite athletes and controls among adolescents. In elite athletes, the strongest DE predictor is body image dissatisfaction (Francisco, Narciso, & Alarcão, 2013). This can be also seen in subsample of boys, where subjects with risk of ED reported significantly lower satisfaction with their body appearance. Although we found no important differences among girls, results showed lower average values in risk group. Further on, body shame predicted disordered eating in groups of women, which is correlated with body and appearance dissatisfaction (Jankauskiene & Pajaujiene, 2012). Personal characteristics of athletes, as well as their body satisfaction, anxiety, impression motivation and threat perception and coach comments on their weight, represent dimensions that could raise the risk for eating disorders (Gomes, Martins, & Silva, 2011).

Dietary experience and eating habits are significant predictors of DE (Rosendahl et al., 2009). Breakfast has been labelled as the most important meal of the day. In Europe, breakfast skipping is high prevalent (10 % to 30 %) (Rampersaud, Pereira, Girard, Adams, & Metz, 2005). It has been associated with infrequent exercise, dieting and concerns about body weight (Rampersaud et al., 2005). Results of a binary logistic regression analysis revealed that only breakfast is a significant predictor to increase risk of ED among girls athletes. This opens a question if skipping breakfast can be a risk factor not just for being obese, but also for ED where body mass is too low (anorexia nervosa). Furthermore, researchers reported correlation between meal patterns and body composition taking into account satisfaction with body shape. Most of overfat girls (96.6%) wished to be thinner, and an inverse association with number of daily meals and snacks and breakfast habit was found among them. Overfat boys that wished a thinner body shape (82.8%) also were more likely to have ≤ 3 eating occasions per day (50.8%) than their overfat satisfied and normal-fat counterparts (Bibiloni, Pich, Pons, & Tur, 2013).

CONCLUSION

The prevalence of risk of ED is higher among girls than boys, but not different between athletes and non-athletes. Specific body composition parameters and breakfast consumption show tendency to be protective factors in developing eating disorders in adolescence, with no dif-

ferences between athletes and non-athletes. As the researches already reported that athletes under-report DE symptoms, when compared with controls, clinical interview should be included in future studies, to minimize false positive and false negative outcome. The results highlight the importance of studying specific characteristics associated with DE in aesthetic athletes and non-athletes in adolescence.

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