

OPOLSKIE VOIVODESHIP SECONDARY SCHOOL STUDENTS' KNOWLEDGE ABOUT FETAL ALCOHOL SYNDROME AND ITS DETERMINANTS

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A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Alcohol consumption during pregnancy may result in a wide range of morphological and neurodevelopmental abnormalities, most notably fetal alcohol syndrome (FAS).

Aim of the study: To evaluate: (1) Opolskie Voivodeship high school students' level of knowledge on the subject of FAS (2) the factors contributing to this level of knowledge (3) sources of information about FAS which are accessible and preferred by secondary school students.

Material and methods: The study was conducted in 2018 among 228 adult students of Opole secondary schools. The authors used a diagnostic survey based on original questions they developed for the study. The students' knowledge was assessed using a four-level scale (very good, good, sufficient, and insufficient).

Results: Only 37.28% (85) of students surveyed had ever heard of FAS. A total of 135 people (59.21%) had sufficient knowledge, 57 respondents (25.00%) had a good level of knowledge, 28 respondents (12.28%) had insufficient knowledge, and 8 respondents (3.51%) had very good knowledge. The level of women's knowledge was higher than that of men ($p=0.001$). The majority claimed that there was a need to raise awareness of FAS (77.19%; 176). Respondents indicated they believe teachers (51.75%; 118) and family members (50.88%; 116), followed by health care workers (42.11%; 96) should be primarily responsible for this education.

Conclusions: A definitive minority of those surveyed had a good or very good level of knowledge about FAS, which indicates the necessity of increasing the education level of this group on this specific topic. Taking into account students' expectations that teachers aid in such education, FAS educational programs should be implemented at schools.

KEYWORDS: fetal alcohol spectrum disorders, adolescents, knowledge, fetus

BACKGROUND

Alcohol is one of the most popular psychoactive substances worldwide and the most common teratogen. Alcohol consumption during pregnancy may result in a wide range of morphological and neurodevelopmental abnormalities, most notably fetal alcohol syndrome (FAS) [1,2]. A new study from the Centre for Addiction and Mental Health (CAMH) shows that the global prevalence of alcohol use during pregnancy was estimated to be 9.8%, and the estimated prevalence of FAS in the general population was 14.6 per 10,000 people. Every year, there are about 119,000 children born with FAS worldwide. That means that every 67 women who con-

sumed alcohol during pregnancy would deliver a child with FAS. In Europe, FAS prevalence is 2.6 times higher than the global mean. The five countries with the highest prevalence of FAS per 10,000 people were Belarus (69.1), Italy (82.1), and Ireland (89.7) [3]. It is estimated that approximately 900 children with full-blown FAS are born in Poland every year [4].

According to data from the Centers for Disease Control and Prevention, one in 10 (10.2%) pregnant women in the United States between the ages of 18 and 44 years reports drinking alcohol in the past 30 days [5]. In other research conducted in the US, it was found that 55% of the 5,036 women who participated reported

using alcohol in their first trimester, with 6% continuing use at the time of the first trimester interview [6]. Popova et al. states that Russia, the United Kingdom, Denmark, Belarus and Ireland are the five European countries with the highest alcohol use during pregnancy [3]. Other studies showed that the prevalence of maternal alcohol consumption during pregnancy is 5.5 % in Sweden, 13.6 % in Germany, between 19% and 22% in the Netherlands, and between 12 % and 63 % in France [1,7–9]. Surveys conducted in 2017 by order of the Central Sanitary Inspectorate to diagnose the level of risky health behaviors of pregnant women in Poland showed that three months before pregnancy, 23.04% of respondents drank alcohol once a month or less, 10.81% drank alcohol 2 to 4 times a month, 2.72% drank alcohol 2 to 3 times a week, and 0.61% drank 4 to 5 times a week. 4.84% of the respondents said they consumed alcohol during pregnancy [10]. However, in another Polish study, it was found that every third woman who participated tested positive for the presence of alcohol breakdown indicators (found through examining urine samples) while pregnant [4].

As we mentioned above, FAS is defined by congenital malformations caused by alcohol use during pregnancy. The term FAS was first used by Jones and Smith in 1973 [11]. A diagnosis of full FAS is made if there is documentation of the characteristic facial abnormalities, such as smooth philtrum, thin vermilion border, and short palpebral fissures, documentation of prenatal and postnatal growth deficits and documentation of central nervous system abnormalities [12]. FAS is the most serious and complex complication caused by the effects of alcohol on the fetus [13]. People with FAS typically have low birth weight, small body size, delayed speaking ability, hearing difficulties, difficulty interpreting visual stimuli, developmental anomalies in the heart, liver, kidney and genitals. Individuals with FAS may have communication and linguistic problems, attention, learning and memory problems, as well as difficulties coping with social situations and the need for spontaneous problem solving. Moreover, they typically experience a delay in social, emotional and cognitive functioning [14]. All of these factors contribute to the child's eventual ability to function in society as an adult.

The consumption of alcohol by pregnant women is particularly dangerous during the first trimester. During this period of time, serious brain damage, cell development disorders, facial deformations, heart, kidney or liver damage, or even miscarriages can occur. It has been found through many years of research on the harmful effects of alcohol during pregnancy that there is no minimum dose that can be considered safe for the fetus [15]. Women who plan to become pregnant and those who are already pregnant should avoid drinking alcohol. That is because 40–60 minutes after drinking alcohol, the concentration of the substance in the fetal blood is similar to that in the mother's [13]. The only way to prevent FAS is to avoid alcohol consumption

entirely during pregnancy and in the pre-conception period by both mothers and fathers [16].

According to studies conducted in Poland in 2008 and 2009, young people have little knowledge about FAS and its risks, and they admit to frequent consumption of alcoholic beverages [17,18]. Having considered the importance of the subject and the lack of up-to-date data concerning students' level of knowledge on FAS in Poland, the authors decided to study it and look into any determining factors.

AIM OF THE STUDY

The aim of the study was to establish: (1) the level of Opolskie Voivodeship high school students' knowledge on the subject of FAS (2) the factors contributing to this level of knowledge (3) sources of knowledge about FAS which are appropriate and accessible for secondary school students.

MATERIAL AND METHODS

Study population

The study was conducted with a group of 228 students from 5 secondary schools located in the city of Opole (Opolskie Voivodeship, Poland). The inclusion criteria were: age of majority (age ≥ 18 years), secondary school attendance, and consent to participate in the study. Minors, non-secondary students, and those who did not agree to participate in the survey were excluded from it. The majority of the respondents were people aged 18 (56.11%; 128), male (61.84%; 141), self-identified as financially and materially secure (61.40%; 140) and living in large cities (35.53%; 81) or villages (38.60%; 88) (Tab. 1).

Data collection

The study was conducted in December 2018 after obtaining permission from the Institutional Review Board at the Opole Medical School, No. KB-5/PI/2019. Before the study, the students were informed about its purpose and methodology as well as the possibility for them to withdraw from it at any stage. The respondents were also assured of full anonymity and voluntary participation in the survey. The students understood that returning a completed questionnaire was tantamount to agreeing to participate.

Questionnaires

The authors used a diagnostic survey based on original questions they developed for the purpose of the study. It consisted of 6 demographic category questions regarding sociodemographic data and 20 questions concerning the students' knowledge about FAS. All of the survey questions were closed single-choice or multiple-choice questions. 1 point was given for each correct answer to a single-choice question, and 0 points for an incorrect answer. In the case of mul-

Table 1. Sociodemographic variables of the surveyed students.

Variable	n	%
Age		
18 years	128	56.14%
19 years	81	35.53%
20 years	18	7.89%
21 years	1	0.44%
Sex		
Women	87	38.16%
Men	141	61.84%
Number of persons living together in the household		
0–2	14	6.14%
3–4	148	64.91%
5–6	59	25.88%
7–8	3	1.32%
9–10	1	0.44%
No answer	3	1.32%
Material status and financial security of the family		
Very poor	0	0.00%
Poor	4	1.75%
Medium	30	13.16%
Good	140	61.40%
Very good	50	21.93%
No answer	4	1.75%
Place of residence		
Large city	81	35.53%
Medium-sized town	15	6.58%
Small town	43	18.86%
Countryside	88	38.60%
No answer	1	0.44%
Grade point average obtained in the previous school year		
6.0–5.1	26	11.40%
5.0–4.1	128	56.14%
4.0–3.1	63	27.63%
3.0–2.1	11	4.82%

tiple-choice questions, where multiple answers could be correct, points were awarded for each of the correct answers selected. Question 10 of the survey comprised 9 different true and false statements (marked from “a” to “i”), and the respondent’s task was to answer these statements using a 5-point Likert scale (a, c, d, e, g). They were awarded 1 point for the reply “I completely agree”, 0.75 points for the reply “I agree”, 0.5 points for the reply “Neither agree nor disagree”, 0.25 points for the reply “I disagree”, and 0 points for the reply “I completely disagree”. On the other hand, for points b, f, h and i, the scores were reversed. This way, each question was weighted equally. In each question, students could potentially obtain a score of 0 to 1 point. The questionnaire included, among other things, the following questions: Is there a safe amount of alcohol that can be consumed by a pregnant woman (if so, how much)? What health problems can children of

mothers who drink alcohol during pregnancy have? In which trimester of pregnancy is drinking alcohol the most harmful?

In total, a maximum of 20 points could be obtained (this was the total number of questions). A five-level scale was used to assess the students’ knowledge. Scoring from 0–10 (0–50% of possible points) meant the student had an insufficient level of knowledge; scoring from 10.1–15 (50–75% of possible points) indicated a sufficient level of knowledge; scoring from 15.1–18 (75–90% of possible points) indicated a good level; scoring from 18.1–20 (90–100% of possible points) indicated a very good level.

Statistical analysis

A comparison of qualitative variables in groups was performed using a chi-square test (with a Yates correction for tables 2x2) or Fisher’s exact test, where low expected numbers appeared in the tables. A comparison of quantitative variables in two groups was performed using a Student’s t-test (when the variable had a normal distribution in these groups) or a Mann-Whitney U test, otherwise. The values of quantitative variables in three or more groups were compared using ANOVA (Analysis of Variance) when the variable had a normal distribution in these groups, or a Kruskal-Wallis test, if not. After the detection of any statistically significant differences, *post-hoc* analysis with Fisher’s LSD test, in cases of distribution normality, or Dunn’s test, in cases where there was a lack of normality, was performed in order to identify the statistically significantly different groups. The normality of the distribution of variables was studied using the Shapiro-Wilk test. The analysis assumed a significance level of 0.05. Thus, all p-values below 0.05 were interpreted as indicating significant dependencies. The analysis was performed in R software, version 3.5.3 [19].

RESULTS

The majority of the students who participated (94.30%; 215) said they had consumed alcohol in the past. The respondents said they had consciously used alcohol for the first time between the ages of 17–18 years (42.33%; 91), 15–16 years (34.42%; 74), 13–14 years (14.42%; 31), 11–12 years (3.26%; 7), 9–10 years (1.40%; 3). Others did not reply.

Students’ level of knowledge about FAS

Only 37.28% (85) of respondents had ever heard of FAS. Most correctly stated that FAS occurs in the child (67.98%; 155), but there were also those who claimed that FAS occurs in the mother (24.12%; 55), in the father of the child (4.39%; 10) or did not know about it at all (3.51%; 8). Most of the respondents did not doubt that FAS could trigger health problems (86.84%; 198), mental problems (76.32%; 174), emotional problems (53.07%; 121) and social problems (50.00%; 5). When asked how much alcohol a pregnant woman can safely

consume, 74.56% (170) correctly answered that a pregnant woman cannot safely consume any alcohol at all, 10.09% (23) stated that a pregnant woman can safely consume one glass of wine, 10.96% (25) did not know anything about the safety of drinking alcohol during pregnancy. Other respondents claimed that a safe consumption level could be one beer (0.88%; 2), several beers (0.88%; 2), one weak drink (0.88%; 2), or several drinks (0.44%; 1). Just 1.32% (3) of the group did not answer this question. Answers to some of the survey questions are presented in Tab. 2.

Tab. 3 shows how the survey participants responded to true and false statements about FAS.

When self-assessing their level of knowledge about FAS, young people most often had the opinion that their level of knowledge was very bad (39.04%; 89), average (29.39%; 67), bad (28.95%; 66), good (2.19%; 5) or very good (0.44%; 1). In actuality, 135 respondents (59.21%) had sufficient knowledge, 57 respondents (25.00%) had good knowledge, 28 respondents (12.28%) had insufficient knowledge, and 8 respondents (3.51%) had very good knowledge.

Factors determining the level of knowledge about FAS

Knowledge about FAS was significantly higher in 18-year-olds, than in 19-year-olds ($p=0.046$). Women's knowledge was greater than men's ($p=0.001$). Their material status/security, place of residence, number of people living together in a household and average academic grades did not affect the level of students' knowledge about the study subject (Tab. 4).

Most of the young people surveyed had the opinion that spreading knowledge about FAS was necessary (77.19%; 176). Respondents also indicated that they believed teachers (51.75%; 118) and family members (50.88%; 116), followed by health care workers (42.11%; 96), should be primarily responsible for education. 21.49% of the students said it was the youth themselves who should be educated on the harmfulness of alcohol consumption both before and during pregnancy.

Table 2. Answers of the surveyed youth to questions concerning FAS.

Content of the question	n	%
Do you think that there is a safe amount of alcohol that can be consumed during pregnancy that will not affect the development of the child?		
Definitely yes	3	1.32%
Yes	20	8.77%
It's hard to say	41	17.98%
No	70	30.70%
Definitely no	92	40.35%
No answer	2	0.88%
Can a pregnant woman:		
Consume foods with added wine	59	25.88%
Use alcohol-based herbal liqueurs	11	4.82%
Take medications with (little) alcohol added	52	22.81%
Any quantity of alcohol is prohibited	128	56.14%
The consumption of alcohol by a pregnant woman in the first weeks may cause:		
Fetal brain damage	176	77.19%
Fetal face deformity	82	35.96%
Fetal heart damage	142	62.28%
Fetal liver damage	129	56.58%
Miscarriage	170	74.56%
Fetal weight gain retardation	114	50.00%
Preterm birth	103	45.18%
None of the above	7	3.07%
In infancy, children whose mothers drank alcohol during pregnancy may suffer from:		
Convulsions	108	47.37%
Sleep disturbances	116	50.88%
Weak or high muscle tension	129	56.58%
Problems with sucking and eating food	113	49.56%
Hypersensitivity to light and sound	103	45.18%
Abstinence syndrome	82	35.96%
None of the above	13	5.70%
People with FAS may have problems with:		
Learning	167	73.25%
Memory	158	69.30%
Focusing attention	179	78.51%
Communication	130	57.02%
Vision	96	42.11%
Hearing	87	38.16%
None of the above	10	4.39%

Table 3. Distribution of participants' responses concerning FAS.

Scale of responses	A		B		C		D		E		F		G		I		J	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
I completely agree	205	89.91%	3	1.32%	12	5.26%	21	9.21%	67	29.39%	6	2.63%	34	14.91%	4	1.75%	1	0.44%
I agree	16	7.02%	0	0.00%	10	4.39%	38	16.67%	74	32.46%	9	3.95%	41	17.98%	13	5.70%	0	0.00%
Neither agree nor disagree	1	0.44%	8	3.51%	68	29.82%	113	49.56%	65	28.51%	63	27.63%	134	58.77%	87	38.16%	15	6.58%
I disagree	2	0.88%	40	17.54%	51	22.37%	33	14.47%	10	4.39%	65	28.51%	13	5.70%	67	29.39%	36	15.79%
I completely disagree	2	0.88%	174	76.32%	83	36.40%	16	7.02%	9	3.95%	82	35.96%	2	0.88%	54	23.68%	172	75.44%
No answer	2	0.88%	3	1.32%	4	1.75%	7	3.07%	3	1.32%	3	1.32%	4	1.75%	3	1.32%	4	1.75%

Legend: A - Drinking alcohol during pregnancy may affect the development of a fetus in the womb, B - Drinking alcohol during pregnancy does not affect the development of a baby after birth, C - Alcohol is a substance, the characteristic of which is the difficulty of transmission through the placenta to a fetus, D - Alcohol consumption may lead to a failure of contraceptives, E - Exposing a fetus to alcohol may lead to disturbances in the child's bond with parents and peers later in life, F - A pregnant woman should regularly consume small amounts of red wine for her health, G - FAS is an incurable disease, I - FAS does not apply to children of mothers who drink occasionally (i.e., women who are pregnant, women who have been pregnant or who have been pregnant for a long time and who drink once in a while), J - Alcohol consumed by a pregnant woman has no effect on the fetus (i.e. it only affects the woman, not the child).

Table 4. Analysis the level of knowledge of the respondents and selected variables.

Age				
Level of knowledge (score)	18 years (N=128) - A	19 years (N=81) - B	20–21 years (N=19) - C	p *
mean±SD	13.82±2.81	12.95±2.68	13.09±2.35	0.046
Median	13.94	13.33	13.24	
Quartiles	12.41–15.76	11.09–14.9	11.75–14.71	
Sex				
Level of knowledge (score)	Women (N=87)	Men (N=141)		p **
mean±SD	14.26±2.34	12.95±2.87		0.001
Median	14.1	13.39		
Quartiles	12.77–15.95	11.29–14.9		
Number of persons living together in the household				
Level of knowledge (score)	Up to 4 persons (N=162)	More than 4 persons (N=63)		p **
mean±SD	13.5±2.57	13.22±3.19		0.948
Median	13.64	13.74		
Quartiles	11.82–15.13	11.72–15.18		
Material status				
Level of knowledge (score)	Bad, Medium (N=34)	Good (N=140)	Very good (N=50)	p *
mean±SD	12.67±3.28	13.53±2.51	13.8±3.04	0.175
Median	13.27	13.61	14.01	
Quartiles	10.14–15.04	11.77–15.12	12.86–15.75	
Place of residence				
Level of knowledge (score)	Large city (N=81)	Medium-sized or small town (N=58)	Countryside (N=88)	p *
mean±SD	13.33±2.87	13.34±2.83	13.59±2.59	0.74
Median	13.57	13.41	13.8	
Quartiles	11.48–15.23	11.8–14.96	12.29–15.23	
Mean scores				
Level of knowledge (score)	6.0–5.1 (N=26)	5.0–4.1 (N=128)	4.0 or less (N=74)	p *
mean±SD	14.11±2.75	13.45±2.79	13.21±2.67	0.248
Median	14.2	13.77	13.46	
Quartiles	13.24–15.77	11.77–15.1	11.33–15.13	

* No normality of distribution in groups, Kruskal-Wallis test + results of post-hoc analysis (Dunn's test).

** No normality of distribution in groups, Mann-Whitney U test.

DISCUSSION

Key results

In our study, we showed that a small group of surveyed students (28.51%) possess a very good or good level of knowledge about FAS. The age and gender of the respondents were the two factors that significantly contributed to their level of knowledge. Most young people pointed to the need for more FAS education and said the best source for this is teachers and family.

Interpretation

When asked about the amount of alcohol that a pregnant woman can safely consume, the majority (74.56%) correctly answered that a pregnant woman cannot safely consume alcohol at all, and 10.96% (25) said they had no knowledge about it. However, among students in the graduating classes at secondary school in Poznań, 53% correctly answered that no amount of alcohol is safe during pregnancy, and 57% believed

that no type of alcohol is safe for a pregnant woman and her child. In a study in Poznań, 9% of women and 28% of men described wine as a safe alcohol for pregnant women and their children [20]. Our respondents also claimed (10.09%) that a pregnant woman can consume one glass of wine. It turns out that myths about the beneficial effects of red wine on the development of the fetus still exist. This is likewise shown in a study that was carried out in Australia. In the Crawford-Williams et al. (2015) study, some participants claimed that certain midwives had, in fact, endorsed drinking during pregnancy, suggesting wine was safe to drink if a pregnant woman was craving it [21]. The results of the aforementioned studies clearly show that these beliefs need further examination. As young people are shown to be using alcohol and beginning sexual intercourse earlier and earlier, it would be reasonable for this topic to be discussed as early as primary school.

The decreasing age at which youth begin to use alcohol is explored by Hołyst, who used data from police

statistics. The data collected by the author show that the age limit for alcohol initiation is 11 years [22]. Our study confirms this fact. We showed that the vast majority of respondents said they started drinking alcohol before reaching the age of majority (18), and 3 people said they were first exposed to alcohol before the age of 10. The latest HBSC report shows that in 2018, the percentage of people who tried drinking alcohol increased, compared to 2014. Scientists claim that 11-, 13- and 15-year-olds who have already consumed alcohol constitute 11.4%, 28.0% and 63.4% of the studied population, respectively. While it was mainly boys in the group of 11–13-year-olds who tried to drink, in the group of 15-year-olds, as many as 63.3% were girls. The report states that the percentage of respondents who attempt to drink increases with age. The authors of the report indicate that the model of alcohol substance use by boys and girls is changing, to the disadvantage of girls [23].

Previous studies have shown that there is a need for public health initiatives providing information on the relationship between alcohol consumption and reproductive health [24]. In the authors' own study, almost all of the respondents were aware that drinking alcohol during pregnancy may affect the development of the fetus in the mother's womb. Similarly, in the study of Beretta et al., 89.5 % of students were aware that drinking alcohol during pregnancy can cause health problems in the fetus [25]. Despite the fact that young people notice the harmful effects of alcohol on the fetus, they do not know much about the FAS itself, as our results showed. It should be noted that in our study, only 37.28% (85) of the respondents had ever heard of FAS. Other authors have also confirmed this. For example, in the Traverso et al. study conducted among 1,321 students in Italy, only 17.5% confirmed knowing about fetal alcohol spectrum disorders. The authors indicated that 76.4% of the students knew that drinking alcohol during pregnancy damages the fetus, but only 23.5% knew that this damage is permanent, and only 43.5% knew that this damage is preventable [26]. In a Swedish study of women of fertile age (15–35 years) who were neither pregnant nor mothers, most women agreed that abstaining from drinking alcohol during pregnancy was beneficial, although their knowledge on the specific consequences of alcohol use during pregnancy was scant and they expressed a desire for more information [24]. In a qualitative study of pregnant women, mothers who just gave birth, and their partners, the majority of participants were aware that alcohol could cause harm to their developing baby. Nevertheless, several participants declared that they had access to limited information [21]. The Polish study conducted by Kayak and Olejniczak affirms the results of our own study. In the study, 51% of respondents said they had heard about FAS, but the authors, like us, demonstrated that young people's knowledge of FAS is insufficient. The sources of information on FAS most frequently indicated by youth in that study included: school (34%), the Internet (32%), and the media (29%). In this study,

only 5% of students indicated that a gynecologist or other physician could be a source of information on FAS. The authors showed that as many as 77% of girls who had previously had gynecological examinations did not receive information about the harmful effects of alcohol on the fetus during pregnancy [20]. In the Brems et al. (2014) study of 1,035 college students at a northwestern university in America, the authors achieved different results. In this study, their overall findings showed adequate FASD knowledge among students. The authors claimed that minor differences emerged when comparing students' and professionals' responses, but most respondent groups answered with an 85% accuracy rate or higher [27]. The study by Brems et al. is one of the few studies showing results different from our own.

Generalizability

It is necessary to provide clear and consistent information to the public, and in particular, to people of reproductive age, on the effects of alcohol use on fetal development, as well as on FAS. The results of our own research also showed that gender was a factor that significantly determined the level of knowledge about FAS; women's knowledge was greater than men's. Exactly the same result was obtained by Berretta [25]. This indicates a greater need to supplement the knowledge about FAS among men. 51.75% of our research group indicated that teachers should provide FAS information and education and that educational programs concerning FAS should be implemented in schools. Because of that, further studies should focus on the level of teacher preparation to act as educators on the topic.

Limitations of the study

The survey was limited by a small study sample group, as well as the fact that participants were limited to 18- and 19-year-olds from the Opolskie Voivodeship only. Ultimately, it would be worthwhile to conduct a similar survey on a larger sample of young people living in different regions of the country. It would also be worth including participants older than those in our study, of reproductive age, and to develop or adapt a standardized tool based on Polish cultural conditions for studying the level of knowledge about FAS.

CONCLUSIONS

1. Due to the fact that a definitive minority of the surveyed young people had a good or very good level of knowledge about FAS, this indicates the need to educate this group on the topic.
2. Young male adults, more so than young women, need to supplement their knowledge about FAS, and should therefore be a separate target group for education.
3. Most young people pointed to the need for more FAS education and specifically, FAS educational programs in schools.

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