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## Behaviour Determinants in the Research for Health-Related Quality of Life and Physical Activity of Urban Adults from Single-Person Households

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### **Abstract:**

**Purpose:** The aim of the study is to identify the relationships between quality of life and physical activity levels in urban adults from single-person households.

**Design/Methodology/Approach:** The cross-sectional study involved 1828 single respondents, 1000 women and 828 men, from Wrocław, Poland. The diagnostic tools included the World Health Organization Quality of Life-BREF and International Physical Activity Questionnaire - Short Version. Respondents' physical activity was assessed following WHO recommendations. The main statistical method was logistic regression analysis.

**Findings:** Most respondents assessed their overall quality of life, perceived health condition and quality of life in the physical, psychological, social, and environmental domains as average or above average. The majority of single female (73.2%) and male (77.3%) respondents also met the WHO physical activity recommendations. The level of physical activity had a statistically significant impact on men's overall quality of life, women's perceived health condition, and men's quality of life in the psychological and environmental domains.

**Practical Implications:** The study results suggest that the assessment of quality of life and physical activity in people of different marital status should be continued. This will make it possible to take effective preventive and therapeutic measures in relation to groups at the highest risk of hypokinesia, which can also be important for their quality of life.

**Originality/value:** The results of the conducted research make it possible to diagnose and forecast human behaviors, especially those related to psychophysical activity.

**Keywords:** Human behaviour, quality of life, physical activity, single adults.

**JEL classification:** I12, J12, N34, O18, R29.

**Paper Type:** Research study.

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## **1. Introduction**

In the past quarter of a century, the number of single-person households worldwide has increased from 118 million to about 300 million. Currently, single-person households remain the most common type of households in Europe (32.9%). In 2019 in Poland alone they amounted to 24.1% of all household types (Eurostat, 2019).

This tendency has many social and economic implications because, according to research, people living alone tend to behave differently from those in relationships in terms of consumer behaviors (Dąbrowska, Janoś-Kresło, Lubowiecki-Vikuk, and Słaby, 2018), healthcare expenditure (Tur-Sinai, Magnezi, and Grinvald-Fogel, 2018), food-related lifestyles (Kim, Lee, and Lee, 2018), transportation behaviors (Young and Lachapelle, 2017), physical activity (Bassett, Wyatt, Thompson, Peters, and Hill, 2010; Del Duca, Nahas, Garcia, Mota, Hallal, and Peres, 2013; Garcez, Canuto, Paniz, Olinto, Macagnan, Henn, Pattussi, and Olinto, 2015; Park, Castaneda-Gameros, Park, and Oh, 2019), and quality of life (Brown, Carroll, Workman, Carlson, and Brown, 2014; Kim and Kim, 2020; Perales, Pozo-Cruz and Pozo-Cruz, 2014).

Despite the growing number of single-person households there have been no studies examining the impact of physical activity on the quality of life of single adults. Earlier studies on the relationships between quality of life and physical activity have been conducted on entire populations or groups separated by such characteristics as gender, age, wealth, or health status (Pucci, Reis, Rech, and Hallal, 2012; Cash, Duncan, Beresford, McTiernan, and Patrick, 2013; Brown, Carroll, Workman, Carlson, and Brown, 2014; Perales, Pozo-Cruz, and Pozo-Cruz, 2014; Kim, Im, and Choi, 2017; Bullock, Collins, Peirce, Nigel, Arden, and Filbay, 2019; Pengpid and Peltzer, 2019; Su, Azzani, Adewale, Thangiah, Zainol, and Majid, 2019; Xiao, Wang, Zhang, and Ren, 2019; Kim and Kim, 2020; Oviedo, Tamulevicius, Onagbiye, Phidza, Sedumedi, Cameron, and Moss, 2020).

The aim of this paper was to identify relationships between the quality of life and physical activity in urban single adults from the city of Wrocław, Poland. The following research questions were addressed:

- 1) What is respondents' assessment of their overall quality of life, perceived health condition and quality of life in the physical, psychological, environmental, and social domains?
- 2) What is the level of physical activity of respondents from single-person households?
- 3) Is the assessment of quality of life associated with respondents' physical activity levels?

## **2. Methodology of Research**

*Participants:*

The study was conducted in Wrocław, the fourth largest city of Poland, with a population of about 632,000. The sample selection was random using a three-level stratification. First, with the use of a random number table, ten residential areas were selected from all alphabetically ordered Wrocław neighborhoods. Secondly, three streets from each selected residential area were chosen using a random number table. In the last stage, every fourth person asked to participate in the survey was selected from among passers-by in the selected streets. The following criteria were adopted for the inclusion of participants in the study: address of residence – on one of the selected streets; working age – 18-64 years; and no chronic diseases such as cancer, diabetes, hypertension, arthritis or osteoporosis. All respondents were informed about the aim and course of the study, and about their voluntary participation in the study, and were asked to give their consent to its conduct. The study design received a positive evaluation from the ethics committee. The mean refusal rate was approximately 46%. The sample size was calculated following the formula (Brzeziński, 2011):

$$n = \frac{N}{1 + \frac{e^2(N-1)}{z_{\alpha}^2 pq}}$$

where:  $N$  – number of Wrocław residents on December 31, 2013 ( $N = 632\,067$ );  $p$  – fraction of working-age Wrocław residents aged 18-64 years on December 31, 2013 ( $p = 0.63$ );  $q$  – constant calculated as  $1-p$  ( $q = 0.37$ ),  $e$  – standard error of estimate of the fraction ( $e = 1.5$ ),  $z_{\alpha}$  – value of standardized normal distribution  $N(0,1)$  for confidence interval of  $1 - \alpha$  ( $z_{\alpha} = 1.96$  for  $\alpha = 0.05$ ).

The total study material consisted of 4332 persons, including 2331 women and 2129 men. For the purpose of the study only adults from single-person households were considered (1828 including 1000 women and 828 men). The definition of people living alone was based on the *de facto* marital status as defined in European and Polish public statistics (Główny Urząd Statystyczny, 2011). and it included single, widowed, divorced, separated, and legally separated persons as well as persons not living in a consensual union with another person, legally married persons but not forming a *de facto* marriage, and persons not living in a consensual union with another person. The respondents' characteristics are shown in Table 1.

*Measures:*

The study was based on cross-sectional research. The diagnostic survey - direct interview method was applied. The two research questionnaires were WHOQOL BREF and Physical Activity Questionnaire – Short Version (IPAQ-SF).

*WHOQOL:*

WHOQOL BREF was used to assess respondents' quality of life (World Health Organization, 1996). The questionnaire consisted of 26 closed questions with answers

on a five-level Likert scale. Answers to questionnaire items were used in accordance with the accepted data processing key to determine the following indicators: overall quality of life (1-5 pts.); perceived health condition (1-5 pts.); and health-related quality of life in four domains: physical (7-35 pts.), psychological (6-30 pts.), social (3-15 pts.), and environmental (8-40 pts.). For quality-of-life indicators in the physical, psychological, social, and environmental domains, the raw scores were transformed into a 4–20-point scale.

**Table 1.** Socio-demographic characteristics of single adults from Wrocław ( $n = 1828$ ).

Variable	Total		Women		Men	
	f	p	f	p	f	p
Sex						
Woman	1000	54.7	–	–	–	–
Man	828	45.3	–	–	–	–
Age						
18-24 years	508	27.8	257	25.7	251	30.3
25-34 years	818	44.7	423	42.3	395	47.7
35-44 years	190	10.4	75	7.5	115	13.9
45-54 years	133	7.3	100	10.0	33	4.0
55-64 years	179	9.8	145	14.5	34	4.1
Education						
Primary	651	35.6	170	17.0	173	20.9
Secondary	834	45.6	507	50.7	327	39.5
Higher	343	18.8	323	32.3	328	39.6

*Note:* f frequency, p percent of participants.

*Source:* Own research.

#### *IPAQ:*

The International Physical Activity Questionnaire – Short Version (IPAQ-SF) (International Physical Activity Questionnaire, 2014). was used to provide information about the frequency (day/week) and time/duration (min/day) of physical activity at three intensity levels (vigorous, moderate, light). Based on the above data, weekly energy expenditure of physical activity (MET min/week) was estimated at different intensity levels and in total. IPAQ-SF is used for assessment of total physical activity and physical activity in four domains: leisure time, work-related activities, transport-related activities, and domestic activities.

#### *Statistical analyses:*

The obtained data were subjected to statistical analysis, which resulted in determining the number (n) and percent (%) in empirical distributions of respondents within the categories of dependent (quality of life) and independent variables (socio-demographic factors). Medians (Me) and quartile deviation (QD) for quality of life were also calculated. The quality-of-life indices were also expressed on a nominal

scale, i.e., categorized. The median values of these indices, where a result below the median meant lower than average quality of life and, and equal to or higher than the median – at least an average level of quality of life, were used as conventional division points in the classification.

The respondents' physical activity levels were assessed using the WHO recommendations (World Health Organization, 2010), according to which the respondents were divided into:

1. Persons meeting WHO recommendations, who were engaged for at least 150 minutes per week in moderate-intensity physical activity; or for at least 75 minutes per week in vigorous-intensity physical activity if none of particular physical activities was shorter than 10 minutes.
2. Persons not meeting WHO recommendations, who were engaged for less than 150 minutes per week in moderate-intensity physical activity; or for less than 75 minutes in vigorous-intensity physical activity; or despite meeting the recommendations none of their physical activity sessions lasted longer than 10 minutes.

Backward stepwise elimination logistic regression analysis for independent variables was used to assess the relationships between dependent variables: overall quality of life, perceived health condition, and health-related physical activity in the physical, psychological, social, and environmental domains expressed on a nominal scale; and the independent variable: meeting/not meeting WHO physical activity recommendations. The level of statistical significance was set at  $\alpha = 0.05$ . All statistical calculations were made using the IBM SPSS Statistics 26 software package (IBM Corporation, Armonk, NY, USA).

### **3. Empirical Results**

The average overall quality of life in respondents of both genders was 3.7 pts., while the assessment of perceived health condition amounted to  $3.6 \pm 0.9$  pts. in women and  $3.8 \pm 0.9$  pts. in men. The respondents rated their quality of life as lowest in the following domains: physical ( $12.0 \pm 1.9$  pts. in women and  $12.4 \pm 1.8$  pts. in men) and environmental ( $12.8 \pm 2.3$  pts. in women and  $13.4 \pm 2.5$  pts. in men); and highest in the social ( $14.8 \pm 2.8$  pts. in women and  $15.1 \pm 3.0$  pts. in men) and psychological ( $13.4 \pm 2.2$  pts. in women and  $13.8 \pm 2.1$  pts. in men).

The average metabolic equivalent of task for total physical activity in women was  $3114.2 \pm 2359.8$  METmin/week, and in men -  $3419.1 \pm 2527.3$  METmin/week. The average metabolic equivalent of task was the highest for vigorous-intensity physical activity:  $1895.8 \pm 1482.5$  METmin/week in women and  $2127.3 \pm 1493.4$  METmin/week in men, and the lowest for moderate-intensity physical activity:  $958.6 \pm 688.5$  METmin/week in women and  $1087.5 \pm 780.6$  METmin/week in men (Table 2).

**Table 2.** *Quality of life and physical activity of urban single adults from Wrocław (n = 1828).*

Variable	Total		Women		Men	
	Me	QD	Me	QD	Me	QD
OQOL [pts.]	4.0	0.5	3.7	0.8	3.7	0.9
PHC [pts.]	4.0	0.5	3.6	0.9	3.8	0.9
PHYD [pts.]	12.0	1.0	12.0	1.9	12.4	1.8
PSYH [pts.]	14.0	1.5	13.4	2.2	13.8	2.1
SD [pts.]	16.0	2.0	14.8	2.8	15.1	3.0
ED [pts.]	13.0	1.5	12.8	2.3	13.4	2.5
EEPA [METmin/week]	2772.0	1413.0	3114.2	2359.8	3419.1	2527.3
FVPA [day/week]	3.0	1.0	3.2	1.4	3.4	1.4
TVPA [min/day]	60.0	15.0	71.5	36.5	77.0	40.4
EEVPA [METmin/week]	1440.0	960.0	1895.8	1482.5	2127.3	1493.4
FMPA [day/week]	3.0	1.5	3.4	1.4	3.4	1.5
TMPA [min/day]	60.0	15.0	70.4	38.0	78.0	39.1
EEMPA [METmin/week]	800.0	480.0	958.6	688.5	1087.5	780.6
FLPA [day/week]	5.0	0.5	4.8	1.3	4.6	1.5
TLPA [min/day]	60.0	22.5	67.7	40.1	69.0	38.9
EELPA [METmin/week]	990.0	396.0	1132.4	884.5	1108.2	841.5

**Note:** *Me* median, *QD* quartile deviation, *OQOL* overall quality of life, *PHC* perceived health condition, *PHYD* physical domain of quality of life, *PSYH* psychological domain of quality of life, *SD* social domain of quality of life, *ED* environmental domain of quality of life, *EEPA* energy expenditure of total physical activity, *FVPA* frequency of vigorous-intensity physical activity, *MVPA* time of vigorous-intensity physical activity, *EEVPA* energy expenditure of vigorous-intensity physical activity, *FMPA* frequency of moderate-intensity physical activity, *TMPA* time of moderate-intensity physical activity, *EEMPA* energy expenditure of moderate-intensity physical activity, *FLPA* frequency of light-intensity physical activity, *TLPA* time of light-intensity physical activity, *EELPA* energy expenditure of light-intensity physical activity.  
**Source:** *Own research.*

Table 3 shows respondents' quality of life and physical activity indicators expressed on a nominal scale. Most respondents of both genders rated their overall quality of life, health status, and quality of life in the physical, psychological, social, and environmental domains as average or above average. Most single women (73.2%) and men (77.3%) under study also met the WHO physical activity recommendations.

**Table 3.** *Quality of life and physical activity assessment by single adults from Wrocław (n = 1828).*

Variable	Total		Women		Men	
	f	p	f	p	f	p
Overall Quality of Life (OQOL)						
Average and above	1165	63.7	624	62.4	541	65.3
Below average	663	36.3	376	37.6	287	34.7
Perceived Health Condition (PHC)						

Average and above	1235	67.6	639	63.9	596	72.0
Below average	593	32.4	361	36.1	232	28.0
Physical Domain (PHYD)						
Average and above	1293	70.7	664	66.4	629	76.0
Below average	535	29.3	336	33.6	199	24.0
Psychological Domain (PSYD)						
Average and above	1079	59.0	545	54.5	534	64.5
Below average	749	41.0	455	45.5	294	35.5
Social Domain (SD)						
Average and above	999	54.6	522	52.2	477	57.6
Below average	829	45.4	478	47.8	351	42.4
Environmental Domain (ED)						
Average and above	1103	60.3	556	55.6	547	66.1
Below average	725	39.7	444	44.4	281	33.9
Physical activity level by WHO						
Meeting recommendations	1372	75.1	732	73.2	640	77.3
Not meeting recommendations	456	24.9	268	26.8	188	22.7

*Note:* *f* - frequency, *p* - percent of participants.

*Source:* Own research.

Among the single respondents' physical activity significantly affected the overall quality of life in men, perceived health condition in women, and psychological and environmental quality of life domains in men (Table 4). The odds of at least average overall quality of life were almost 50% higher in male respondents meeting the WHO physical activity recommendations compared to respondents not meeting these recommendations (OR = 1.46). In 95% the odds ratio ranged from 1.05 to 2.04. The conditional probability of at least an average level of perceived health condition was more than 50% higher in sufficiently physically active women (OR = 1.56) than in insufficiently physically active respondents. The lower limit of the confidence interval for odds ratio was 1.17, while the upper limit was 2.08. Sufficiently physically active men were also almost twice as likely as insufficiently active men to report at least an average level of quality of life in the psychological (OR = 1.80, CI: 1.2 - 2.51) and environmental (OR = 1.87, CI: 1.34 - 2.61) domains.

**Table 4.** *Quality of life and physical activity in single adults from Wrocław. Likelihood modelling of at least average quality of life level (n = 1828).*

Variables	Independent Variables	Category	B	SE	$\chi^2$	p	OR	CI	
								-95%	+95%
OQOL	Woman (LR=3.22, df=1, p=0.073)								
		Intercept	0.32	0.1	6.53	0.011			
	PAL by WHO	Meeting	0.26	0.1	3.24	0.072	1.30	0.98	1.73
		Not meeting	0 <sup>a</sup>						
	Man (LR=4.92, df=1, p=0.027)								
		Intercept	0.34	0.1	5.39	0.020			
	PAL by WHO	Meeting	0.38	0.1	4.98	0.026	1.46	1.05	2.04

		Not	meeting	0 <sup>a</sup>							
		Woman (LR=.11, df=1, p=0.738)									
		Intercept			0.53	0.1	17.85	<0.001			
PHC	PAL by WHO	Meeting			0.05	0.1	0.11	0.738	1.05	0.79	1.41
		Not	meeting	0 <sup>a</sup>							
	Man (LR=2.32, df=1, p=0.128)										
	Intercept				0.73	0.1	22.16	<0.001			
PHYD	PAL by WHO	Meeting			0.28	0.1	2.36	0.125	1.32	0.93	1.87
		Not	meeting	0 <sup>a</sup>							
	Woman (LR=8.92, df=1, p=0.003)										
	Intercept				0.36	0.1	8.50	0.004			
PSYC	PAL by WHO	Meeting			0.44	0.1	9.03	0.003	1.56	1.17	2.08
		Not	meeing	0 <sup>a</sup>							
	Man (LR=1.25, df=1, p=0.263)										
	Intercept				0.99	0.1	36.29	<0.001			
H	PAL by WHO	Meeing			0.21	0.1	1.27	0.259	1.24	0.85	1.79
		Not	meeting	0 <sup>a</sup>							
	Woman (LR=2.47, df=1, p=0.116)										
	Intercept				0.35	0.1	7.82	0.005			
SD	PAL by WHO	Meeting			-	0.1	2.46	0.117	0.80	0.60	1.06
		Not	meeting	0 <sup>a</sup>							
	Man (LR=12.02, df=1, p=0.001)										
	Intercept				0.15	0.1	1.04	0.308			
ED	PAL by WHO	Meeting			0.59	0.1	12.15	<0.001	1.80	1.29	2.51
		Not	meeting	0 <sup>a</sup>							
	Woman (LR=.00, df=1, p=0.988)										
	Intercept				0.09	0.1	0.54	0.464			
SD	PAL by WHO	Meeting			0.00	0.1	0.00	0.988	1.00	0.75	1.32
		Not	meeting	0 <sup>a</sup>							
	Man (LR=1.93, df=1, p=0.164)										
	Intercept				0.13	0.1	0.76	0.382			
ED	PAL by WHO	Meeting			0.23	0.1	1.94	0.164	1.26	0.91	1.75
		Not	meeting	0 <sup>a</sup>							
	Woman (LR=2.49, df=1, p=0.114)										
	Intercept				0.06	0.1	0.24	0.625			
ED	PAL by WHO	Meeting			0.23	0.1	2.50	0.114	1.25	0.95	1.66
		Not	meeting	0 <sup>a</sup>							
	Man (LR=13.40, df=1, p<0.001)										
	Intercept				0.19	0.1	1.72	0.190			
ED	PAL by WHO	Meeting			0.63	0.1	13.58	<0.001	1.87	1.34	2.61
		Not	meeting	0 <sup>a</sup>							

**Note:** a - set to zero because it is redundant, LR - likelihood ratio tests, B - assessment value of model parameters, SE - standard error  $\beta$ ,  $\chi^2$  - chi-squared Wald test, p - chi-squared Wald test probability value, OR - odds ratio, CI - confidence interval for OR, OQOL - overall quality of life, PHC - perceived health condition, PHYD - physical domain of quality of life, PSYH - psychological domain of quality of life, SD - social domain of quality of life, ED - environmental domain of quality of life.

**Source:** Own research.



#### **4. Discussion**

Most of the studied single respondents living in Wrocław met the WHO physical activity recommendations. High levels of physical activity among people living alone, mainly in their leisure time, were also observed by Aliyas (2019), Del Duca *et al.* (2013), and Malambo *et al.* (2016). Drygas *et al.* (2013) also demonstrated that single women have on average higher levels of physical activity compared to women in relationships. On the other hand, Rapp and Schneider (2013) after adjusting the results of their study for participants' age, measurement period, and having children, found a negative effect of relationships on physical activity levels in men and women.

Among women who were sufficiently physically active, the likelihood of at least average perceived health condition was higher than in women who were insufficiently physically active. In men, their level of physical activity was associated with quality of life. The odds of at least average overall quality of life and quality of life in the psychological and environmental domains were higher for men meeting the WHO physical activity recommendations than for men not meeting them.

Previous studies have not addressed the question of the relationship between quality of life and physical activity in single adults. However, some results of earlier studies conducted on whole populations confirm the correlations noted in the present study. Kim and Kim (2020), and Krzepota *et al.* (2015) also observed positive correlations between self-rated health condition and physical activity levels. It should be assumed that this is mainly due to the positive effects of physical exercise of appropriate duration, frequency, and intensity on adults' health condition, which is confirmed by empirical studies (Drygas, Kostka, Jegier, and Kuński, 2000).

Improvements in overall quality of life with increasing levels of physical activity, and thus decreased sedentary lifestyle, were also noted in an American population by Kim and Kim (2020), and in a Vietnamese population by Pengpid and Peltzer (2019). Similar observations were made by Cash *et al.* (2013), who, however, reported particularly strong associations of quality of life with physical activity in a group of overweight women.

Positive associations of quality of life in the psychological domain with physical activity were noted among Australians by Perales *et al.* (2014), Colombians by Gomez *et al.* (2013), Croatians by Jurakić *et al.* (Greblo, 2010), Malaysians by Su *et al.* (Su, 2019), and the Chinese by Tao *et al.* (2019). Also, Wang *et al.* (2019) in their study of working people from Shanghai found positive associations of quality of life in its psychological domain with physical activity. These correlations were particularly pronounced when respondents received social support from others, which led to increased self-efficacy and lowered stress levels. Earlier studies also indicated an important role of physical exercise in affecting such components of quality of life in the psychological domain as sense of joy and meaning in life, concentration, self-

acceptance, and low levels of anxiety or depression (Marlier, Van Dyck, Cardon, De Bourdeaudhuij, Babiak, and Willem, 2015).

The weakest empirical evidence to date has been found for associations between quality of life in the environmental domain and physical activity levels. However, Pucci *et al.* (2012) in their study of Brazilian men found positive relationships of quality of life in the environmental domain with walking for leisure. On the other hand, Pengpid and Peltzer (2019) noted that moderate to high levels of physical activity were associated with increased quality of life in the environmental domain. In addition, it has been previously demonstrated that the engagement in sufficient health-enhancing physical activity is facilitated by such components of quality of life in the environmental domain as a healthy environment, financial resources, and the opportunity to pursue personal interests (Santos, Silva, Santos, Ribeiro, and Mota, 2008).

An interesting observation made in the present study is also the occurrence of stronger associations of quality of life with physical activity in the studied men than in women. Although this is still an open research question, similar findings in adults have been made by Huang-tz *et al.* (2017). In addition, Kim and Kim (2020) noted a significantly worse assessment of quality of life, mainly in the psychological domain, by single women compared to those in relationships, which may also indirectly confirm the results of the present study.

The study has its strengths and weaknesses. The strength of the study is the structure of the research sample, as the relationships between quality of life and physical activity of single adults have been rarely examined in previous studies. The main shortcomings of the study are its cross-sectional character and the limitation of its spatial scope to the residents of one city only. Consequently, the research results cannot be interpreted as representative of the total population of single adults. In future research the spatial scope should be extended to the whole populations of Poland and other countries of Central and Eastern Europe. Prospective studies should also be continuous and consider the effects of changes in physical activity levels on quality-of-life assessment.

## 5. Summary and Concluding Comments

Most single urban respondents under study pursued enough health-related physical activity. Among the women, there were positive correlations between perceived health condition and physical activity levels. In single men meeting the WHO physical activity recommendations was associated with a higher assessment of overall quality of life and quality of life in its psychological and environmental domains.

The results of the present study suggest that the evaluation of quality of life and physical activity in single persons should be continued. This will make it possible to

undertake effective prophylactic and therapeutic actions in relation to groups at the highest risk of hypokinesia. Programs aimed at improving physical activity appear to be particularly important. In addition to exercise-related physical activity the use of active transportation should also be promoted. These two areas of physical exercise performance are likely to be key to the attainment of better overall levels of physical activity in the future. Taking steps to make adults physically active may not only improve their health condition but also have positive implications for their quality of life.

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