Evidence for the Validity of the Children's Attraction to Physical Activity (CAPA) Scale in Iranian Preschool Children

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ABSTRACT

Purpose: The escalating trend of overweight and obesity is a major global health challenge and needs particular attention. There are a number of reasons for this increase, but the dominant one appears to be the pandemic of physical inactivity. It is now clear that children's attraction to physical activity is an important promising factor in children's physical activity involvement. In this study, we aimed to cross-validate the long version of children's attraction to physical activity (CAPA) scale in Iranian preschool children.
Design and Methods: Evidence for the validity of the scale was based on face validity, content validity, and internal consistency. The scale was translated into Persian and underwent forward translation, synthesis of the translation and backward translation. Face and content validity were subsequently assessed on individuals and expert panels. A sample of 30 preschool children (5–6 years of age) were randomly selected from three kindergartens. Children were interviewed by their kindergarten teachers.
Results: Internal consistency for each of the five subscales of the CAPA scale was evaluated through Cronbach's alpha. The internal consistency was acceptable for most of the subscales when negative statements were excluded from the analyses.
Conclusions: The results supported the use of modified version of Persian-language long CAPA scale for Iranian preschool children, with the deletion of negatively worded items.
Practice Implications: Health care professionals may use the CAPA when assessing the attraction of children toward physical activity and its potential involvement in childhood obesity.

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Introduction

A dramatic increase has been observed in the global prevalence of overweight and obese preschool children since 1990 (De Onis, Blössner, & Borghi, 2010). This upward trend has been reported as a major global health challenge (Ng et al., 2014). Similarly, the escalating trend of overweight and obesity among young children has become an alarming public health issue in Iran (Kelishadi, Haghdoost, Sadeghirad, & Khajehkazemi, 2014). There are a number of reasons for this increase, but the dominant one appears to be the pandemic of physical inactivity (Kohl et al., 2012). Many studies have highlighted the epidemic of physical inactivity among children (Cale & Almond, 1992; Kohl et al., 2012; Troiano et al., 2008). Recent studies suggest that physical inactivity during childhood and adolescence are predictors of physical inactivity in adulthood (Malina, 2001; Tammelin, Näyhä, Laitinen, Rintamäki, & Järvelin, 2003). It is estimated that >31% of the world's adult population are physically inactive and do not meet the minimum recommendations for physical activity (Hallal et al., 2012). In this context, there is a need to develop national health intervention programs in Iran in order to promote the knowledge and attitude of children toward physically active and healthy lifestyles (Kordi, Nourian, Ghayour, Kordi, & Younesian, 2012). However, it is important to understand the motivational factors that contribute to an active lifestyle in children in order to maximize the effectiveness of such programs.

Numerous investigations have examined and identified several psychosocial and environmental physical activity correlates in children and

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youth (Ferreira et al., 2007; Sallis, Prochaska, & Taylor, 2000; Strauss, Rodzilsky, Burack, & Colin, 2001). Biological and sociocultural factors, as well as parents, siblings, and peers, are among the most important determinants of physical activity in children (Gustafson & Rhodes, 2006; A. F. Seabra, Mendonça, Thomis, Anjos, & Maia, 2008; Welk, Wood, & Morss, 2003). Although there is a need for more prospective studies to gain more insight in the correlates of change into physical activity levels, it is now clear that children's attraction to physical activity is an important promising factor in children's physical activity involvement (Paxton, Estabrooks, & Dzewaltowski, 2004; Welk & Schaben, 2004). Children's attraction to physical activity can be defined as children's intrinsic interest and desire to voluntarily participate in a task involving physical exertion or movement, through play, games or sport (Brustad, 1996; Paxton et al., 2004).

The Children's Attraction to Physical Activity (CAPA) scale is a valid and reliable method to measure the extent of children's interest in physical activity (Brustad, 1993, 1996). The CAPA sacle was developed by Brustad et al. for use with elementary school children (9–12 years) in order to identify characteristics of the physical activity experience that would either attract or repel them from involvement (Brustad, 1993, 1996). During the development process of the scale, elementary school children discussed aspects of physical activity involvement that they liked or disliked (Brustad, 1993, 1996). According to these discussions, the items were grouped in five subscales. Brustad et al. noted that there is a need for further examination of CAPA in different populations to ensure that this scale is suitable for more widespread use (Brustad, 1993, 1996). In this regard, both short version (15-item) and long version (25-item) of the questionnaire have been previously validated for use in different countries such as Portugal, China, and Australia (Lau, Lee, & Ransdell, 2007; Ries, Granados, & Galarraga, 2009; Rose, Larkin, Hands, Howard, & Parker, 2009; Seabra et al., 2014). Although the original scale was developed and validated for use with children 9–12 years old, Rose et al. validated the CAPA scale with a sample of Australian children aged 6–8 years, using the longer version of CAPA with a Likert-type format (Rose et al., 2009). Neither this questionnaire nor any other similar ones have been previously validated in Iran.

Considering the increasing trend of overweight and obesity in Iranian preschool children and high prevalence of physical inactivity, the primary objective of the present study was to cross-validate the longer version of the CAPA scale in a sample of Iranian preschool children.

Materials and Methods

We conducted the cross-validation study of the longer version of CAPA scale in two different phases. A detailed explanation of this process is described as follows.

Phase 1

This step aimed to establish a preliminary Persian version of the long CAPA scale (25-item) and to conduct a pilot study assessing face and content validity.

The CAPA Scale

The original scale is comprised of 15 items (shorter version) or 25 items (longer version) designed to measure the extent of children's interest in physical activity for children aged 9–12 years (Brustad, 1993, 1996). This questionnaire was developed through open-ended interviews with children regarding different aspects of their participation in physical activity, physical exercise, games, and sports. The CAPA scale assesses children's attraction to physical activity in five main subscales including 1) liking of games and sports (positive experiences through fun games and sports), 2) liking of physical exertion and exercise (certain aspects of the exertional properties of physical activity such as breathing hard and getting sweaty), 3) liking of vigorous physical activity (child's favorable feelings related to their involvement in vigorous activities), 4) peer acceptance (the popularity of the children with their peers while participating in games and sport), and 5) importance of exercise (child's desire to be physically active for health reasons). The shorter version of the CAPA scale contains the three most relevant items from each of the five subscales of the longer version (Brustad, 1993). In the longer version (CAPA-25), each of these subscales includes five items. All items are scored from one (low) to four (high), with a higher score indicating that children are more interested in physical activity and have greater perceived competence relative to physical activity. The term "negatively worded items" are items that are called reversals. Negatively worded reversal items are those phrased in the opposite semantic direction from the majority of the items on a measure (Roszkowski & Soven, 2010). The rationale for reversals in a scale is to prevent participants from anticipating answers to the next items, and to help focus their attention on the questions, which helps increase reliability (Barnette, 2000, 2001). The 25-item version of the questionnaire was used in the current study.

Persian Translation and Backward Translation

After obtaining permission to translate the CAPA into Persian from the author, the forward-backward translation method was applied to translate CAPA-25 (Brislin, 1970). In this regard, three bilingual translators whose native language was Persian independently translated the English version of the questionnaire into Persian. In the next step, the three translations were merged, and the discussions among translators continued until consensus was reached. This procedure resulted in a Persian version of the questionnaire, which was then back-translated by another bilingual translator who had never seen the English version of CAPA-25. Both versions of the questionnaire (original CAPA-25 and the back-translated one) showed no significant differences in meaning and were recognized to be equal.

Face Validity

The face validity of the pre-final CAPA-25 was assessed qualitatively. The first version of the translated questionnaire was presented and discussed with two kindergarten teachers and two physicians. Further, they were asked to comment on the questionnaire regarding its ease of use, comprehension, sentences, and phrases, misinterpretations of and/or ambiguous items. This feedback was incorporated into a second version. Thereafter, the second version of the instrument was presented to a group of eight children aged 5 to 6 years in order to obtain feedback regarding their understanding of each item's wording. The items were revised into a third version based on the children's feedback.

Content Validity

An expert panel of four physicians, two nutritionists, one physical activity expert, one psychologist and three PhD students participated in the content validity test of the third version of CAPA-25. The panel rated each item for relevancy (1-not relevant, 2-item need some revision, 3-relevant but need minor revision, and 4-very relevant); clarity (1-not clear, 2-item need some revision, 3-clear but need minor revision, 4-very clear); and simplicity (1-not simple, 2-item need some revision, 3-simple but need minor revision, 4-very simple). The content validity index (CVI) was computed using the proportion of experts who rated the item as relevant, clear and simple (a rating of 3 or 4). A CVI of at least 0.79 was considered acceptable. If the item scored between 0.70 and 0.78, it was revised. If the CVI was equal to or less than 0.69, the item was eliminated (Abdollahpour, Nedjat, Noroozian, & Majdzadeh, 2011; Lynn, 1986).

The expert panel also evaluated each of the CAPA items and classified them as "essential", "useful, but non-essential" or "not necessary". The content validity ratio (CVR) was computed for each of the items

following Lawshe's procedure (Lawshe, 1975). The formula for the CVR are as follows: CVR = $(n_e - (n/2)) / (n/2)$, in which "n_e" is the number of experts indicating the item as "essential" and "n" is the total number of experts. A CVR of at least 0.59 was considered acceptable (Lawshe, 1975). In the present study, content validity was confirmed with acceptable CVI and CVR scores, along with the kappa statistic, which is a consensus index of inter-rater agreement. This measure of content validity is an important supplement to CVI due to providing additional information about degree of agreement beyond chance. According to the agreement criteria for kappa, the values above 0.74, between 0.60 and 0.74, and the ones between 0.40 and 0.59 are considered as excellent, good, and fair, respectively (Cicchetti & Sparrow, 1981; Polit & Beck, 2006; Polit, Beck, & Owen, 2007).

Phase 2

In this phase, the internal consistency and factor structure of the Persian version of CAPA were analyzed.

Participants

The data were collected from a cross-sectional sample of 30 children (17 boys and 13 girls) aged 5 to 6 years selected from three randomly chosen kindergartens located in Mashhad, northeastern Iran (ten children from each kindergarten). Parents provided written informed consent and children provided verbal assent. The protocol was approved by Ethics Committee of Mashhad University of Medical Sciences (MUMS).

Procedures

The purposes and methods of the current study were explained at a meeting with teachers at each of the kindergartens. We also informed children of the general purpose of the study. We conducted some workshops for three selected teachers who were responsible for interviews. Each teacher was randomly assigned to one of three kindergartens. Thus, each teacher was responsible for interviewing ten children. All the children were waiting behind the door and teachers asked them to enter the classroom one by one. The teacher read each question aloud and the child only answered to that question and waited until the next question was read. It took approximately 20 to 30 min for each interview to be completed. Once all the interviews were completed, the questionnaires were collected by researchers.

Data Analysis

Data analysis was carried out using SPSS-18 software (SPSS Inc., IL, USA). The normality of data was evaluated using Kolmogorov–Smirnov test. Descriptive statistics including mean, frequency, and standard deviation (SD) were determined for all variables and expressed as mean ± SD for normally distributed variables. Internal consistency reliabilities of the scale and subscales were obtained using Cronbach's alpha with a level of acceptability >0.60 (Wasserman & Bracken, 2003). To test the construct validity of the Persian version of the CAPA, a principal components factor analysis using eigenvalue-one procedure was performed. Using Pearson's correlation coefficient, intercorrelations of the subscales were obtained to examine the degree of overlap among the subscales. All tests were two-tailed and P-value <0.05 was considered significant.

Results

The baseline characteristics of the study population are reported in Table 1. A total number of 30 children were included in the analysis, seventeen (56.7%) of whom were boys and thirteen (43.3%) were girls. The mean age was 65.7 ± 3.2 months. The mean BMI percentile of the participants was 61.3 ± 30.1.

Table 1
Demographic and anthropometric characteristics of the study population.

	Total subjects (N = 30)
Age (month)	65.7 ± 3.2
Height (cm)	114.1 ± 5.3
Weight (kg)	21.8 ± 4.4
BMI (percentile)	61.3 ± 30.1
Sex n(%)	
Boy	17 (56.7)
Girl	13 (43.3)

Values are expressed as mean ± SD. Categorical data are expressed as number (percentage). BMI: body mass index.

Quantitative Content Validity

Based on the results obtained from examining CVR by 11 experts, a score of at least 0.63 was given to each of the 25 items, which means that they approved the necessity of all items (Table 2). Moreover, all 25 items gained a CVI of higher than 0.80, and thus were identified as suitable. In fact, the mean CVI for all items was 0.94. The kappa statistic values are also shown in Table 2 and vary from 0.79 to 1.00, indicating that no item needed to be revised.

Internal Consistency Reliability

The mean (±standard deviations) values of all CAPA items and internal consistency reliabilities of each subscale are presented in Table 3. Internal consistency reliabilities for the subscales used in the current study were acceptable for three of the dimensions (Cronbach's alpha >0.60); liking of games and sports (Cronbach's alpha = 0.81), liking of vigorous activity (Cronbach's alpha = 0.73) and importance of exercise (Cronbach's alpha = 0.80). However, the reliability coefficient of liking of vigorous activity subscale further improved after removing the negatively worded reversal item (item 15) (Cronbach's alpha = 0.87). The internal consistency reliability of the remaining two subscales, liking physical exertion and exercise and peer acceptance were

Table 2
The content validity index and content validity ratio of CAPA-25 Persian version.

No.	Items	CVI	CVR	Kappa for relevancy
1	I like playing outdoor games and sport	1.00	1.00	1.00
2	I like getting sweaty when I exercise or play hard	0.91	0.82	0.90
3	I have more fun playing games and sports than anything else	1.00	0.82	1.00
4	I like to exercise lots	1.00	1.00	1.00
5	I am told that I'm good at games and sports	0.91	1.00	0.90
6	I feel really tired after I play games and sports	1.00	0.63	1.00
7	I get nervous and tired about playing games and sports	0.82	0.82	0.79
8	I get teased by other kids when I play games and sports	0.82	0.63	0.79
9	I think that the more exercise you get, the better	1.00	1.00	1.00
10	I make a lot of friends when I play games and sports	0.82	0.82	0.79
11	I enjoy exercise a lot	1.00	1.00	1.00
12	I try to stay in good shape	1.00	0.82	1.00
13	I wish I could play more games and sports	0.91	1.00	0.90
14	I think that I will feel really good after I play hard	1.00	1.00	1.00
15	I don't mind getting out of breath after I play hard	0.82	0.82	0.79
16	I think it is very important to always be in good shape	1.00	0.82	1.00
17	Playing games and sports is my favorite thing	0.91	0.82	0.90
18	I really like to run a lot	1.00	0.82	1.00
19	I think exercise is very important for my health	1.00	1.00	1.00
20	I look forward to playing games and sports	1.00	1.00	1.00
21	I like to burn lots of energy by playing hard	0.91	0.82	0.90
22	I think that exercise is the most important thing for good health	1.00	1.00	1.00
23	I really like to exercise	0.91	0.82	0.90
24	I feel good when I run hard	0.91	1.00	0.90
25	I am popular when I play games and sports	1.00	1.00	1.00

CVI: content validity index; CVR: content validity ratio.

Table 3
Descriptive statistics of responses to CAPA items.

Subscales	Items	Mean	SD	Cronbach's alpha	
				Present study	Brustad (1996)
Liking of games and sports	1. I like playing outdoor games and sport	3.23	0.61		
	3. I have more fun playing games and sports than anything else	3.55	0.51		
	13. I wish I could play more games and sports	3.50	0.59	0.81	0.70
	17. Playing games and sports is my favorite thing	3.45	0.51		
	20. I look forward to playing games and sports	3.55	0.59		
Liking physical exertion and exercise	2. I like getting sweaty when I exercise or play hard	2.73	0.76		
	4. I like to exercise lots	3.14	0.71		
	6. I feel really tired after I play games and sports (reversed)	2.36	0.72	0.68 (0.51)[a]	0.74
	11. I enjoy exercise a lot	3.41	0.50		
	23. I really like to exercise	3.50	0.59		
Liking of vigorous activity	14. I think that I will feel really good after I play hard	3.50	0.59		
	15. I don't mind getting out of breath after I play hard (reversed)	2.91	0.97		
	18. I really like to run a lot	3.18	0.79	0.87 (0.73)[a]	0.74
	21. I like to burn lots of energy by playing hard	3.45	0.67		
	24. I feel good when I run hard	3.41	0.59		
Peer acceptance	5. I am told that I'm good at games and sports	3.05	0.37		
	7. I get nervous and tired about playing games and sports (reversed)	1.45	0.67		
	8. I get teased by other kids when I play games and sports (reversed)	1.55	0.73	0.58 (0.55)[a]	0.72
	10. I make a lot of friends when I play games and sports	3.09	0.61		
	25. I am popular when I play games and sports	3.09	0.42		
Importance of exercise	9. I think that the more exercise you get, the better	3.27	0.63		
	12. I try to stay in good shape	3.36	0.49		
	16. I think it is very important to always be in good shape	3.32	0.64	0.80	0.44
	19. I think exercise is very important for my health	3.41	0.73		
	22. I think that exercise is the most important thing for good health	3.59	0.59		

[a] Number in the parenthesis is the internal consistency reliability prior to the removal of the negatively worded questions.

low to moderate in their initial forms (Cronbach's alpha = 0.51 and 0.55, respectively); however, removal of negatively worded reversal items (item 6, 7 and 8) resulted in higher reliability coefficients for liking physical exertion and exercise (Cronbach's alpha = 0.68) but peer acceptance remained moderate (Cronbach's alpha = 0.58). Comparisons of internal consistency reliabilities observed in this study and those reported by Brustad et al. (Brustad, 1996) are reported in Table 3.

Construct Validity

The item to total correlations and item loadings resulted from the factor analysis are reported in Table 4. In the un-rotated solution, most items loaded on a single factor. A varimax rotation indicated that five factors should be retained, accounting for 80% of the variance. All of

Table 4
Results of the factor analysis.

Subscales	Item	Item to total correlation	Factor loading
Liking of games and sports	1	0.46	0.78
	3	0.58	0.79
	13	0.74	0.69
	17	0.74	0.61
	20	0.86	0.87
Liking physical exertion and exercise	2	0.31	0.75
	4	0.63	0.85
	11	0.64	0.87
	23	0.85	0.90
Liking of vigorous activity	14	0.59	0.87
	18	0.80	0.91
	21	0.88	0.90
	24	0.69	0.92
Peer acceptance	5	0.24	0.78
	10	0.56	0.78
	25	0.63	0.52
	9	0.71	0.79
	12	0.45	0.76
Importance of exercise	16	0.45	0.85
	19	0.74	0.85
	22	0.72	0.76

Negatively worded reversal items 6, 7, 8, & 15 were not included in the analysis.

the 25 items had factor loadings higher than 0.40, and the lowest and highest loadings were 0.52 (item 25) and 0.92 (item 24), respectively.

Inter-scale correlations

The overlap among the subscales of the present study was examined by calculating scale intercorrelations. As reported in Table 5, all correlations between pairs of subscales were statistically significant. Lower correlations were observed between "peer acceptance" and all other subscales (0.46–0.66). Higher correlations were observed between "liking of games and sports" and other subscales (0.62–0.77). The lowest correlation ($r = 0.46$) was reported between peer acceptance, and liking of vigorous activity and the highest correlation ($r = 0.77$) was between liking of games and sports and liking of physical exertion and exercise (Table 5).

Discussion

The present study cross-validated a Persian translation of the long version of CAPA scale in a sample of Iranian preschool children. The process of forward-backward blind translation was done to correct potential errors in translation that are known to affect reliability and validity in measurement (Sperber, 2004). Face and content validity were subsequently assessed using individuals and expert panels. The results suggest that four of the five subscales have acceptable internal consistency reliability. Twenty-one out of 25 items were retained in the final version.

Brustad et al. validated the original version of the CAPA scale with acceptable internal consistency for each the CAPA subscales with Cronbach's alphas ranging from 0.62 to 0.78 (Brustad, 1993) and 0.70 to 0.74 (Brustad, 1996). We also previously validated the longer version of CAPA scale in a sample of Australian children aged 6 to 8 years with alphas between 0.55 and 0.75 (Rose et al., 2009). Interestingly, similar to current results, both Brustad et al. (1996) and Rose et al. (2009) improved the internal consistency of the peer acceptance subscale after deleting two items. However, the final Cronbach's alpha reported by Brustad et al. (0.72) for this subscale was considerably higher than that reported by us (alpha = 0.58 in current study and alpha = 0.55

Table 5
Intercorrelations of the subscales.

	Liking of games and sports	Liking physical exertion and exercise	Liking of vigorous activity	Peer acceptance
Liking physical exertion and exercise	0.77***			
Liking of vigorous activity	0.76***	0.66***		
Peer acceptance	0.62**	0.50*	0.46*	
Importance of exercise	0.68***	0.59**	0.70***	0.66**

* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

in previous study). This can partly be explained by the older sample used by Brustad et al. (10–12 years) in comparison to the younger sample used by us (5–6 years in current study and 6–8 years in previous study). It has been reported that younger children are less able to respond appropriately to negative items (Marsh, 1986). Furthermore, Brustad et al. did not observe a sufficient level of reliability (alpha = 0.44) for the importance of exercise subscale and excluded this construct from further analysis (Brustad, 1996). In contrast, we found an acceptable level of reliability for this subscale in current and previous (Rose et al., 2009) research (alpha = 0.80 and 0.72, respectively). Similarly, we previously improved the reliability of liking of vigorous physical activity subscale after deletion of negative items due to cognitive-developmental issues (Rose et al., 2009). As mentioned earlier, these similarities between two studies are probably due to the relatively similar age range of the study populations. The reversed items (items 6, 7, 8, & 15) generally focus on getting tired or getting out of breath after playing as well as getting teased by peers while playing games and sports. It seems that these items failed to measure the children's attraction to physical activity. Thus, it should be noted that the Persian CAPA is recommended in children aged 5–6 years with the reversed items deleted.

Several investigators also validated the shorter version (15-item) of the CAPA scale in different populations (Ries et al., 2009; Seabra et al., 2014). Seabra et al. cross-validated a Portuguese translation of the CAPA short version in a sample of elementary school children aged 7 to 10 years (Seabra et al., 2014). Interestingly, similar to the present study and those with Australian children (Rose et al., 2009), results of the Seabra et al. showed a low internal consistency on the subscale peer acceptance (alpha = 0.20), which was suggested to be due to the presence of item 11 in the shorter version. After elimination of this item, the Cronbach's α increased from 0.20 to 0.48 (Seabra et al., 2014). Moreover, Ries et al. translated the short version of the questionnaire into French, German and Spanish for use with Luxembourgish and Spanish adolescents (14–15 years) (Ries et al., 2009). After rephrasing and scoring items on a 5-point Likert type format that ranged from 1 (strongly disagree) to 5 (strongly agree), the internal consistency for all initial subscales greatly enhanced (French: 0.59–0.90; German: 0.52–0.90; Spanish: 0.57–0.90). Overall, it seems that the internal consistency and other issues of the scale may vary between different studies due to methodological and cultural aspects as well as the characteristics of the sample used.

Our study has several strengths. First, no studies have previously cross-validated the CAPA scale in Iranian population. Second, we focused on preschool age children who have been recognized as the most amenable population to interventions addressing physical inactivity risk factors (Golan, 2006) and can be achieved by improving children's attitude toward physical activity and active life. However, we also acknowledge some limitations. Our sample size was small (n = 30) and the CAPA scale was originally designed for 10–12 years old children. Despite these limitations, we validated this scale in a younger group of children (5 to 6 years). It is important to note that these younger children may have difficulty in understanding the meaning inherent in negatively worded reversal items in the CAPA, which can affect the reliability of a measure. In general, the similarities between this study and the results of Rose et al. (Rose et al., 2009) suggest that CAPA can be used across a wider age range.

Conclusion

The results support the use of modified version of Persian-language long CAPA scale for preschool children aged 5 to 6 years, with the deletion of negatively worded items. Further examination of the scale is needed with larger sample sizes and other age groups.

Declaration of Interest

None.

CRediT authorship contribution statement

Atieh Mehdizadeh: Conceptualization, Methodology, Data curation. **Mojtaba Shafiee:** Data curation, Writing - original draft. **Majid Khadem-Rezaiyan:** Software, Validation. **Mohammad Ali Sardar:** Visualization, Investigation. **Hassan Vatanparast:** Writing-Review & Editing, Supervision. **Elizabeth Rose:** Writing - review & editing. **Masoomeh Rajabzadeh:** Data curation. **Mohsen Nematy:** Supervision.

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