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Article

Cross-Cultural Adaptation of the Turkish and Kuwaiti Teacher–Student Relationship Questionnaire in Physical Education (TSRQ- PE Teacher Version): Testing for Measurement Invariance

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Abstract: Background: Within the 3Cs (closeness, commitment, and complementarity) theoretical framework of the quality of two-person relationships, a coach–athlete relationship quality questionnaire (CART-Q) was developed and validated to assess the nature of the coach–athlete relationship. In this study, a modified version of the CART-Q for physical education (PE) was adapted to assess the teacher–student relationship quality in the PE context in Turkey and Kuwait. The purpose of this study was to examine the factorial validity of the teacher–student relationship quality questionnaire (TSRQ-PE) within a sample of Turkish and Kuwaiti physical education teachers. **Methods:** Multigroup confirmatory factor analysis (MGCFA) was used to test the measurement of cultural invariance between these two groups. A total of 175 teachers from Turkey (n = 73) and Kuwait (n = 102) completed the TPRQ-PE. **Results:** MGCFA supported the factorial validity of the TPRQ-PE in a three first-order factor model across the two countries. Overall, these results add evidence to the psychometric properties of the TPRQ-PE and suggest that this instrument can be applied to measure the quality of the teacher–student relationship within Turkey and Kuwait, although caution may be required when applied to drawing comparisons between these two countries. **Conclusions:** The results of the present study could help physical educators and researchers in this field to understand the reasons and methods that lead to a quality teacher–student relationship.



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Keywords: teacher-student relationship; physical education; measurement invariance; multigroup confirmatory factor analysis; cross-cultural

1. Introduction

In education, the teacher–student relationship has been a line of research that has attracted psychologists, sociologists, and pedagogists over the past 30 years. The quality of the teacher–student relationship has been found to affect student learning processes, discipline strategies, motivation, and academic achievement [1–4]. Collectively, the findings suggest that a positive relationship with a teacher is associated with better than expected or improved outcomes [5–9], while a negative teacher–student relationship is linked to negative outcomes [10–12]. Subsequently, children's relationships with their teachers can be a crucially important influence, affecting students' connection to the school, including motivation and academic performance, as well as psychosocial wellbeing [13].

While the quality of the teacher–student relationship has been shown to have strong links to students' outcomes, the relationship quality seems to be affected by some factors.

Such factors include the child/student temperament [14], grade level [15,16], teachers' teaching experience [12,17,18] and culture [19]. Cultural backgrounds create differences in communication and attitudes [20,21]. For example, den Brok, Van Tartwijk, Wubbels, and Veldman [22] examined Dutch and non-Dutch students' attitudes relevant to their perceptions and attitudes about the role and significance of the teacher–student relationship. It was found that the teacher–student interpersonal relationship is more important for students with a non-Dutch background than for students with a Dutch background, highlighting the potential differences that may exist depending on students' cultural background. Moreover, Spilt, Koomen, and Jak [23] found that female teachers reported better (i.e., more close, less conflictual, and less dependent) relationships with students than male teachers did, and less close relationships with boys than with girls.

Several studies in the educational context have viewed the quality of the teacher–student relationships as a protective versus risk factor for children's social and academic development [9,10,24,25]. Pianta [26] has described that good quality relationships are low in conflict and dependency and high in closeness. It has been found that higher levels of teacher–student closeness predicted good work habits and fewer internalizing and externalizing problems in classroom settings [1,10]. Fredriksen and Rhodes [13] have stated that for good student–teacher relationships, it is also important to support children's motivation as well as their growing ability to regulate social, emotional, and cognitive skills. They have also emphasized that these relationships should be seen as dynamic, ever-changing, and growing [13]. Based on the self-determination theory [27], humans' motivation can vary from amotivation to intrinsic motivation (with various types of extrinsic motivation regulations between those two ends of the continuum). Importantly, recent research has highlighted that it is specifically intrinsic motivation that is significantly and positively related to students' adaptive outcomes such as adolescents' daily physical activity [28].

It has been advocated [5,29,30] that a good relationship is essential for effective teaching and for creating an environment conducive to learning. The relationship is powerful enough to create an environment where both teachers and students feel safe, happy, and rewarded, and hence both teaching and learning become a pleasant, gratifying, and sociable experience. Hattie [31] has shown that when students, parents, teachers, and heads/principals were asked about what aspects are likely to influence students' achievements, they all emphasized that it is down to the relationship teachers and students develop. According to Hattie's findings, characteristics of good quality relationships include listening, being empathetic, caring, and having positive regard for others. It was emphasized that these are key interpersonal skills that teachers need to build effective and desirable relationships with their students in the school context [31].

Although the quality of the teacher–student relationship has obtained a growing interest over the years, there are only a few studies that directly focus on the teacher–student relationship in physical education (PE) settings. In PE, there is a considerable amount of empirical work around the perceived climate. The climate is seen as a factor most related to positive or negative outcomes within the PE context as it can influence the effort, persistence, cognitions, emotions, and behavior of individuals in physical activity contexts [32]. The climate is thought to be created by the teacher. Ames [33] stated that perceptions of a mastery-oriented (versus an ego or performance-oriented) climate in classrooms have been associated with adaptive motivational patterns, such as the use of effective learning strategies, positive attitudes towards the activity, and increased effort [34]. Ntoumanis and Biddle [32] have acknowledged that the variability in physical ability may be greater than in sport, and as a result, more students may feel a lower competency level. Therefore, the relationship quality between the teacher and the student may be key to students' perceptions of competence and other outcomes within the PE context. Ennis et al. [35] ascertained that teachers who establish a personal connection with the students are more likely to engage their students in PE lessons. However, what does a good quality relationship or personal connection look like?

In the broader education research, the quality of the teacher–student relationship is typically measured by teachers’ reports or perceptions across three dimensions of closeness, dependency, and conflict through the Student–Teacher Relationship Scale (STRS; [36]) within typical preschool classroom settings. However, STRS has been used with teachers including grade 6 and above (4–12 years of age; see [4]). Closeness reflects the degree of openness, warmth, and security in the relationship according to the teacher; conflict refers to the degree to which a teacher perceives teacher–student interactions as negative, discordant, unpredictable, and unpleasant; and dependency denotes the developmentally inappropriate degree of overreliance and possessiveness of the child in the relationship, as perceived by the teacher [36]. Closeness is viewed as a positive factor of the relationship, while dependency and conflict as negative relational factors. The latter two often have been collapsed in research to create a single factor [37]. The psychometric properties of validity and reliability of the STRS items have been found to be weak, and criticisms have been leveled as a result (e.g., [38,39]).

According to Pianta [26], “adult-child relationships are critical regulators of development”; in fact, these relationships “form and shape it [development]” (p. 17). Thus, it is paramount to understand how relationships with teachers can intersect students’ development and, in turn, influence young people to develop in a manner that is holistic, positive, and beneficial within the physical education context. To understand how to best meet student (especially young teenagers) developmental needs using the teacher–student relationship as a mechanism (intervention) involves a sound assessment method of the quality of this relationship. In the sport context, the quality of the coach–athlete relationship has the capacity to create a social situation within which athletes thrive or fail. This quality of the relationship comprises three interpersonal constructs (and characteristics): closeness (trust, respect, appreciation, liking), commitment (intentions or willingness to maintain a strong relationship over time), and complementary (responsiveness, friendliness, receptiveness, easiness) (e.g., [40]). The coach–athlete relationship questionnaire (CART-Q) [41,42] measures the quality of the relationship through closeness, commitment, and complementarity (3Cs). The CART-Q was used extensively across the world, for example, in Brazil [43], China [44], Belgium [45], seven other countries [46] and Turkey [47]. A modified version of the CART-Q was employed to measure the quality of the teacher–student relationship in a group of Turkish and Kuwaiti teachers. The main purpose of this study was to determine the extent to which the teacher–student relationship questionnaire is psychometrically sound (factorial validity and reliability) and equivalent (i.e., invariant) across the two cultures.

2. Materials and Methods

2.1. Participants

Participants were composed of 175 Turkish ($n_{total} = 73$; $n_{female} = 32$; $n_{male} = 41$) and Kuwaiti ($n_{total} = 102$; $n_{female} = 69$; $n_{male} = 33$) physical education teachers. Turkish teachers’ means of experience in teaching were $M = 12.26$; $SD = 7.34$ ($M_{age} = 37.24$; $SD = 6.99$; range = 25–58 years), while Kuwaiti teachers’ were $M = 11.24$; $SD = 6.58$ ($M_{age} = 34.35$; $SD = 6.27$; range = 25–51 years). The teachers from Turkey teach in a co-education system, teaching both male and female students simultaneously. The Kuwaiti male teachers teach male students only, and the Kuwaiti female teachers teach female students only. All teachers participating in this study teach at a secondary education level in public schools. The data collected from these participants were examined in terms of the basic assumptions of multivariate statistics. Following these assumptions (e.g., data supplied was incomplete, outliers), 4 Kuwaiti participants’ data were excluded from further analysis.

2.2. Measures

The Coach-Athlete Relationship Quality (CART-Q)

The original form of the CART-Q was developed by Jowett and Ntoumanis [42] and is a self-assessment tool that consists of 11 items. The CART-Q has two versions, which

are for both coaches and athletes separately. The questionnaire is based on the 7 level response system (1: strongly disagree–7: strongly agree) and has three subscales that contain closeness (4 items, e.g., “I am close to my coach”/“I am close to my athlete”), commitment (3 items, e.g., “I am attached to my coach”/“I am bound to my athlete”) and complementarity (4 items, e.g., “I approach my coach as a friend during training”/“I approach my athlete as a friend during training”). Closeness is defined as the effective link between the coach and the athlete and consists of trust, respect, and mutual value. Commitment is defined as showing continuous positive intentions towards each other. Complementary is defined as taking responsibility, the desire to win together, and to be friendly with each other. The reliabilities of the direct version of the CART-Q were 0.87 for closeness, 0.82 for commitment, and 0.88 for complementarity [42]. The CART-Q items were rewritten and adapted for PE context in both the Turkish and Arabic languages. It was called the teacher–student relationship quality (TSR-Q).

2.3. Translation Procedures

To conduct the validity and reliability study of the teacher–student relationship questionnaire, translation processes were performed. In the process of translating the tools (both for Turkey and Kuwait), the translation-back translation method recommended by Brislin [48] was used. The original measurement tool, which is English, was independently translated into Turkish and Arabic by three sport science experts who were fluent in the English language. Furthermore, the three translated tools for both cultures (Turkish and Arabic) were compared to each other, and the items that had the same translation were identified and included. Identified different translations were translated back to English by giving them to the experts again. After evaluating the reliability of the translation by comparing the rejected form with the original, in terms of semantic and construct, the final form was obtained. In the process of translating into Turkish and Arabic, no new statements were developed, so it fully adhered to the original form of the questionnaire. After this stage, the application phase was started, and the “personal information form” and “teacher–student relationship questionnaire” were applied to the participants. For both Turkey and Kuwait, ethical approval from institutions was obtained. Furthermore, permission from the provincial directorate for national education in Turkey was needed, while in Kuwait, only the permissions of the schools’ managers were needed.

2.4. Data Analysis

The data obtained were analyzed through descriptive statistics, including mean and standard deviations. Pearson’s correlation coefficients and Cronbach’s alphas were computed for Kuwait and Turkey separately (Table 1). In order to determine the appropriate method of analysis, the data set was computed to determine whether or not it provided the multivariate normality assumption.

Meredith [49] proposes a hierarchical four-stage (configural, metric, scalar, and strict invariance) process for examining measurement invariance. In the configural invariance, which is the most basic level of invariance tests, the hypothesis that the factor structure of the measurement tool is equal/invariant between the groups is tested. There was an attempt to gather evidence indicating that the items that make up the measurement tool represent the same psychological structure in different subgroups. The suitability of a meaningful comparison of scores obtained from different subgroups is investigated by the metric invariance. At this stage, the hypothesis that the factor-loadings (regression slopes) of the constituent of the instrument are equal/unchanged between the groups are tested. In the scalar invariance level, the hypothesis that the constant number in the regression equations for the items constituting the measurement tool is equal/unchanged between the groups is tested. There was an attempt to determine whether the measurement tool is biased towards the scalar invariance studies [50]. Scalar invariance is not tested if the metric invariance is not provided [51]. In strict invariance, it is tested whether the error terms of the items in the measurement tool are equal/unchanged in the subgroups. These

hypotheses for measurement invariance are tested in order. These hypotheses in invariance tests are examined by comparing the levels of compliance of the model before it. In this research, the invariance of the scale items in different cultures, on the basis of the subscales of the scale and the whole scale, was examined by using the teacher–student relationship questionnaire (TSRQ) in physical education (PE) settings between two different cultures; the Turkish culture and the Kuwaiti culture.

Table 1. Means and standard deviations across 3Cs, Cronbach’s alpha, and Pearson’s correlation coefficients of the 3Cs for the Kuwaiti and Turkish sample (separately).

		M	SD	Cronbach’s Alpha	1	2	3
Kuwait (n = 102)	1. Closeness	5.87	1.04	0.84	1		
	2. Commitment	6.07	0.90	0.83	0.76 **	1	
	3. Complementarity	6.26	0.76	0.82	0.77 **	0.71 **	1
Turkey (n = 73)	1. Closeness	5.84	0.85	0.75	1		
	2. Commitment	5.47	0.96	0.65	0.62 **	1	
	3. Complementarity	6.36	0.61	0.67	0.72 **	0.57 **	1

Note: ** $p < 0.01$; M: mean; SD: standard deviation.

The cross-cultural measurement invariance of the factor structure of the model constructed within the scope of TSRQ was examined by means of multigroup confirmatory factor analysis (MGCFA). MGCFA, which is a method commonly used in group comparisons with more than one group, provides a comparison of the implicit factor averages, which are considered as more sensitive techniques and where group parameters are equal [52,53]. In the framework of the basic model determined in this study, comparative fit index (CFI) differences were used in examining the hierarchical sequence following invariance tests since it was suggested to be more appropriate for evaluating the goodness of fit and the relationship between latent and observed scores [51,54]. The hypotheses included in the invariance tests, which were examined in a hierarchic manner, were examined within the criterion of “ $0.01 \geq CFI \geq -0.01$ ”. To obtain information about the model data, compatibility of the indices of CFI, chi-squared/df ratios, and the root-mean-square error of approximation (RMSEA) was covered. Within the framework of the criteria proposed by Çokluk et al. [55], RMSEA values for the model fit value are less than 0.05, CFI values are higher than 0.90, and $\chi^2/df < 5$ limit values are taken as the basis. Lisrel 8.7 program was used to analyze the data.

3. Results

Before the measurement invariance, the fit indices of the teacher–student relationship questionnaire (i.e., the items of the 3Cs) were examined separately for Turkish and Kuwaiti PE teacher samples (see Table 2). Overall, the fit indices of the two models tested were found to be acceptable.

Table 2. Fit indices for all measurement models of the teacher–student relationship quality questionnaire (TPRQ-PE).

Turkey	Kuwait	Acceptable Criteria [56]
Degrees of freedom = 41	Degrees of freedom = 41	$2 \leq \chi^2/df \leq 3$
Chi-square = 77.42	Chi-square = 71.24	$2df \leq \chi^2 \leq 3df$
(RMSEA) = 0.11	(RMSEA) = 0.087	$0.05 \leq RMSEA \leq 0.10$
(NFI) = 0.89	(NFI) = 0.96	$0.90 \leq NFI \leq 0.95$
(CFI) = 0.95	(CFI) = 0.98	$0.95 \leq CFI \leq 0.97$
(GFI) = 0.84	(GFI) = 0.88	$0.90 \leq GFI \leq 0.95$

Subsequently, the cross-cultural invariance of the measurement model was tested step-by-step. Findings related to the invariance steps are shown in Table 3. Model A represents the model that explored the similarity of the factor number and factor-loading pattern in

subgroups, with no limitations. Model B represents a model where factor loads are limited, and factor correlations and error variances are released. Model C represents a model where factor loads and factor correlations are limited, but error variances are released. Finally, model D represents the model in which factor loadings, factor correlations, and error variances are limited. As a result of the above-mentioned limitations, the difference values for the fit statistics and the fit coefficients obtained are shown in Table 3.

Table 3. Fit statistics relation measurement invariance steps for the whole measurement model in terms of the countries.

Steps	χ^2	df	CFI	NFI	GFI	RMSEA	Δ CFI
Model A (configural invariance)	75.79	85	0.97	0.94	0.88	0.097	-
Model B (metric invariance)	79.83	96	0.97	0.93	0.88	0.095	0.00
Model C (scalar invariance)	121.32	115	0.88	0.84	0.85	0.18	0.09

Table 3 shows that the fit indices obtained for the two subgroups in this study were used to test the configural invariance. This finding indicates that the measured structures are the same in the investigated subgroups. In other words, it can be concluded that groups use the same conceptual perspectives in responding to scale items. The fit indices obtained for the metric invariance are at the accepted criteria level. The difference in CFI between the scalar invariance and the metric invariance revealed that there was bias in subgroups. In other words, the hypothesis showing that the constant in the regression equations for the scale items are equal between the groups is rejected because the result is greater than 0.001. This means that, in the measurement model, the latent factor averages in terms of the country cannot be compared. Since the scalar invariance could not be achieved, no further steps were taken, and the analysis was terminated. Since the scalar invariance is not provided, the following hypothesis of the strict invariance is directly rejected by taking into consideration the principle of progressivity. The error terms for the items that make up the measurement tool are invariant between the comparison groups. In summary, only the configural and metric invariance conditions show satisfaction from the invariance conditions for the established modeling. Therefore, comparisons between countries with the TSRQ should be carried out with caution. Following the measurement model testing on the total score, the measurement invariance was tested for the three subfactors (i.e., 3Cs) that formed the scale and the established models associated with these factors. The results of the fit indices for each of the three subfactors are presented in Table 4.

Table 4. Fit indices relation with invariance steps for countries in terms of subgroups.

	χ^2	df	χ^2/df	CFI	GFI	RMSEA	Δ CFI
CLOSENESS							
Model A (configural invariance)	1.60	4	0.40	0.99	0.99	0.05	-
Model B (metric invariance)	3.25	8	0.41	1.00	0.98	0.04	0.00
Model C (scalar invariance)	18.59	15	1.24	0.78	0.97	0.19	0.21
COMMITMENT							
Model A (configural invariance)	0.08	1	0.082	1.00	1.00	0.00	-
Model B (metric invariance)	1.34	3	0.45	0.96	0.99	0.13	0.04
COMPLEMENTARITY							
Model A (configural invariance)	0.01	4	0.00	1.00	1.00	0.049	-
Model B (metric invariance)	1.34	8	0.17	0.99	0.99	0.03	0.00
Model C (scalar invariance)	9.67	15	0.64	0.93	0.98	0.13	0.06

Table 4 shows that the chi-squared/df, RMSEA, CFI, GFI fit indices obtained for the configural invariance are within the acceptable range for all subgroups [49]. Obtaining evidence of the configural invariance means that measurement tools represent the same psychological structure between groups (see [57]). In other words, latent variables are the same structure for both Turkey and Kuwait. When the difference of the CFI compliance coefficients between the metric model and the configural model were examined, the difference was in the appropriate range except for the commitment factor. In other words, the meaning of the items may be similar to the countries in this study [58]. In terms of the closeness and complementarity factors, it can be said that the units of measurement in the latent variable are equivalent. It can also be said that the items belonging to the factors in which metric invariance is provided for comparison groups do not contain bias in terms of the countries studied. Therefore, for these two factors, it was concluded that countries (subgroups) responded to the items in a similar way, and thus the comparison of scores from the groups was significant. It is concluded that the items belonging to the commitment factor are biased according to countries, and the relationship between factors and substances are dissimilar for countries. The overall results of the invariant stages are presented in Table 5.

Table 5. Results of the invariant stages of measurements of the investigated variables.

	Configural Invariance	Metric Invariance	Scalar Invariance	Strict Invariance
Total point	Yes	Yes	No	No
Closeness	Yes	Yes	No	No
Commitment	Yes	No	No	No
Complementarity	Yes	Yes	No	No

As it is seen from Table 5, configural invariance is provided both on total scores as well as in terms of all subfactors constituting the measurement model; however, none of them have met the strict conditions. In this respect, based on the scores obtained from these scale items, it is concluded that it is not appropriate to compare the results of the items employed to measure the quality of the teacher–student relationships by country. Nonetheless and according to these results, the questionnaire is suitable and can be used to measure relationship quality within its own cultural setting.

4. Discussion

The main aim of this study was to examine the psychometric properties, structural validity, and measurement equivalence of the TSRQ across two countries, namely, Turkey and Kuwait. The results of the measurement invariance tests in this study showed that the psychometric characteristics of the measurements obtained for the total score and sub-dimensions of 3Cs define the teacher–student relationship quality, and the measurements obtained from the measurement models contained bias in terms of cultures and cannot be fully generalized within cultural samples utilized in this study. As the subfactors in the measurement model were gradually limited, decreases in the model-data compatibility became evident. When the Δ CFI differences for the scalar invariance were examined, no scalar invariance condition could be achieved for any factor. This finding suggests that some sort of bias exists in the cultural groups. Therefore, comparisons of items describing the subfactors of the 3Cs would not be meaningful for these countries. Due to being unable to satisfy the scalar invariance condition, the next stage of a strict invariance stage was not reached.

Nonetheless, in this study, it was found that the fit indices obtained for the metric invariance were acceptable, while the CFI differences value was calculated as zero. According to this result, the associations between the items measured by the scale items and the sub-dimensions of the TSRQ scale can be interpreted as similar within each country examined. Invariance analysis has been recommended, especially if instruments are used

for the cross-cultural type of research [59]. There is a need for additional evidence to understand the equivalence of the measurement tool in question if cross-cultural research was to be conducted. The lack of scalar and strict invariance may be both methodological or research design-based (e.g., size of the sample, translations of items in the respective countries), but also purely cultural, perceptual, or value-laden.

While Turkey and Kuwait share some cultural similarities, such as both belonging to the collectivist culture (see [60]) and share family and social values, there are also dissimilarities to note. For instance, the education system between these two countries is extremely different [61,62]. In Kuwait, only female teachers teach female students, and only male teachers teach male students in secondary education, which is where our sample was taken from. In Turkey, the educational system is typically a co-educational system across sectors (private and state) and levels (grades). Education in an Islamic country like Kuwait is based on the Quran, the Islamic Holy book, and the educational system works in accordance with the Islamic orientation [63]. Subsequently, education in Kuwait is embedded within religious beliefs and their manifestations. Turkey's educational system, on the other hand, has been reformed and may be seen to have moved away from religious orientations, and thus, an Islamic orientation does not apply to school education [64,65]. These reforms were brought about by Turkey's former President, Mustafa Kemal Atatürk, who established the Republic of Turkey in 1920, with a new and modern education system resembling that of the United Kingdom, Switzerland, or the USA [65]. These apparent cultural, gender, political, and religious differences between the two countries may provide a reason for the different interpretation attached to the items of the questionnaire that then may lead to the reason for the statistical inequivalence of measurements that was subsequently found.

The quality of the teacher–student relationship creates a social situation or a relational environment [66]. The substantive differences noted above can impact the quality of the relationship and, in turn, how teachers and students relate, communicate, and interact with one another. While it would appear that in both countries, teachers perceive good quality relationships with the students, the meaning they may attach to a “good quality relationship” and the ways they view the 3Cs may be different in Turkey and Kuwait. Given the important role that the teacher–student relationship plays, it is reassuring to find that in both countries, this relationship is valued, e.g., [26]. Teachers from the samples examined in this study seem to work hard to develop effective relationships with their students. Examining relationships over time and especially “risky” relationships may provide more food for thought in terms of achievement and wellbeing in education. Furthermore, exploring students' perceptions of the relationship, both independently from the teacher and as a dyad, would help us unravel the complexity that naturally exists in dyadic relationships. The TSRQ provides a valid method to measure this central educational relationship and understand both its antecedents and consequences.

5. Conclusions

Over the years, the teacher–student relationship has attracted considerable research from a variety of perspectives. Evidence suggests that the quality of teacher–student relationships can have a significant impact on children's development, e.g., [6,26,67–70]. However, researchers seem to disagree on the best way to conceptualize, operationalize, and measure the quality of the teacher–student relationship [71]. In this study, the relationship quality was conceptualized through the constructs of 3Cs [66] and measured through an adapted version of the CART-Q [42] that we called the TSRQ. An accurate conceptualization and measurement would provide better (valid and reliable) research findings. Although our study suggests preliminary evidence that TSRQ is a sound psychometric tool that can provide useful information in the physical education context, more research is warranted.

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