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Attitudes Toward Safety Regulations questionnaire (ATSR) for professional drivers

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Título: Cuestionario de Actitudes hacia las Normas de Seguridad (ATSR) para Conductores Profesionales.

Resumen: *Antecedentes:* El objetivo de este estudio fue adaptar al español el cuestionario sobre Actitudes hacia las Regulaciones de Seguridad (ATSR, por sus siglas en inglés) para conductores profesionales (Douglas & Swartz, 2009) y analizar las propiedades psicométricas de la escala. *Método:* Se administró una versión adaptada al español a 507 participantes, de los cuales el 91,2% eran hombres y el 8,8% mujeres. *Resultados:* Se realizó un análisis factorial confirmatorio (ESEM), y los resultados replicaron el mismo número de ítems que la versión original. Las subescalas resultantes mostraron buena fiabilidad. Al relacionar las puntuaciones obtenidas en estas subescalas con diversos correlatos externos y otras escalas, se evidenció una buena validez concurrente y de criterio. *Conclusiones:* La versión en español del cuestionario ATSR, para todo tipo de conductores profesionales de diferentes áreas, es un instrumento fiable y válido para evaluar actitudes hacia las normas de seguridad vial. Investigaciones futuras podrían emplear el ATSR como una herramienta de cribado en combinación con otros instrumentos para seleccionar conductores que muestren comportamientos seguros al conducir. Esto podría dar como resultado una reducción de colisiones de tráfico y de sanciones por infracciones viales.
Palabras Clave: Conductores profesionales. Seguridad vial. Actitudes hacia las normas de seguridad. Reducción de colisiones. Reducción de infracciones.

Abstract: *Background:* The aims of this study were to adapt the Attitudes Toward Safety Regulations (ATSR) questionnaire for professional drivers (Douglas & Swartz, 2009) to Spanish and analyze the scale's psychometric properties. *Method:* A version adapted to Spanish was administered to 507 participants, 91.2% of whom were men and 8.8% were women. *Results:* Confirmatory factor analysis (ESEM) was applied. The results were replicated with the same number of items and the resulting subscales showed good reliability. When we related the scores obtained on these subscales to various external correlates and other scales, they showed good concurrent and criterial validity. *Conclusions:* The Spanish version of the ATSR questionnaire, designed for all types of professional drivers from various sectors, is a reliable and valid instrument for assessing attitudes towards driving safety regulations. Future research could use the ATSR as a screening tool in combination with other instruments to select drivers who exhibit safe driving behaviors. This would result in fewer traffic collisions and fewer penalties for traffic violations.
Keywords: Professional drivers. Road safety. Attitudes Toward Safety Regulations. Reduction in collisions. Reduction in penalties.

Introduction

Volumes of traffic are constantly increasing. Also increasing are the incidence of traffic collisions and the number of road deaths and injuries that result from them (WHO, 2015). It is therefore increasingly necessary to have tools to improve road safety for both vehicles and drivers. Many transport companies have implemented measures such as controlling the levels of alcohol or other drugs in the blood of their drivers (Gjerde et al., 2012). Some companies even perform spot checks as a preventive measure and as a way to promote certain safety behaviors (Chamorro Vargas, 2019; Rojas Cruz, 2020).

López-Muñiz Goñi (2000) determined that the elements that intervene when driving are vehicles, roads, traffic intensity, and drivers' psychotechnical and physical conditions. Drivers' attitudes to traffic regulations have seldom been explored, though their attitudes are direct predictors of their intentions and behaviors (Ajzen, 2011; Eagly & Chaiken, 1993; Oyanedel et al., 2015). In this context, Douglas and Swartz (2009) developed a scale for measuring the attitudes of truck drivers to safety standards. Their groundbreaking study was based on the general theory of marketing ethics (Hunt & Vitell, 2006) and the theory of planned behavior (Ajzen 1991, 2011), which maintains that an attitude does not reflect behavior precisely but is mediated by subjective norms and perceived control of behavior. It is important, therefore, to consider attitude as the association between a situation, person or group and its corresponding evaluation. This is because attitude as a psychosocial variable combines underlying beliefs and emotions that influence one's motivation towards the achievement of certain goals (Morales et al., 1994). These attitudes become important when considering safety regulations behind the wheel since they may be considered an analogy of the social norms behind the wheel, i.e., what drivers should do or how they should behave when driving (Mejza & Corsi 1999). Moses and Savage (1997) demonstrated that higher levels of driving safety are achieved when carriers follow safety standards and enforce regulatory compliance.

Douglas and Swartz (2009) began by considering attitude as a psychological tendency that evaluates a particular entity with a certain degree of favor or dislike (Eagly & Chaiken, 1993) and created a three-dimensional scale. The first dimension is Enforcement, which refers to drivers' perceptions of the effectiveness and consistency of regulatory enforcement for censuring dangerous truck drivers and preventing them

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from operating in an unsafe manner. The second dimension is General Attitudes, which refers to drivers' general perceptions of safety standards. The third dimension is Effectiveness, which refers to drivers' perceptions of the effectiveness of specific driver-centered safety standards for maintaining safe roads.

The questionnaire by Douglas and Swartz (2009) was configured to check the attitudes of truck drivers towards safety standards. The adaptation of this scale to Spanish, in which only exploratory factor analysis was performed, was also applied only to truck drivers (Oyanedel et al., 2015). In this study, we go one step further and adapt the items on the (Douglas & Swartz, 2009) scale for use with any professional drivers (not just truck drivers).

In this study we also used a set of external correlates to show the concurrent validity of the scale adapted to Spanish. These were age (Johnstone & Johnston, 2005), seniority as a transport driver, and weekly hours worked (Fletcher & Dawson, 2001; Serge et al., 2018). We also took into account four constructs to test the evidence of validity (DF-8, SOFI, Trans-18 and burnout).

The practical implications of this scale are as follows. First, it provides valuable real-time information about the attitudes of professionals from any sector of transportation. Second, and among other uses, it offers the scientific and academic community a validated tool in Spanish for future research conducted in Spanish-speaking countries. Third, the information derived from this assessment scale can be used by Human Resources departments in, for example, recruitment and internal promotion processes. Finally, it can be applied in traffic-collision prevention efforts.

The general aim of this study was to explore the internal consistency of the Attitudes Towards Driving Standards questionnaire adapted to a sample of professional drivers. This study therefore reports on the psychometric properties of the Spanish version of the (Douglas & Swartz, 2009) scale adapted for use with any type of professional driver. Our objectives are: (1) to check whether the Spanish version maintains the same internal three-factor consistency as the original English questionnaire; (2) to analyze whether the factors derived from the adaptation of the scale have sufficient reliability; and (3) to provide evidence of the concurrent validity of the Spanish scale through correlations with other variables.

Method

Participants

The participants in this study were 507 professional drivers who are resident in Spain and currently active. Table 1 shows the sociodemographic characteristics of these participants. The study was conducted in accordance with the Declaration of Helsinki, and the protocol followed the guidelines of the Ethics Committee of the participating universities.

Table 1
Sociodemographic characteristics of the participants.

Variable		Participants (N = 507)
Gender (%)	Men	91.2 %
	Women	8.8 %
Age (years)		M = 41.2 (SD =11.95)
Years of experience		M = 12.93 (SD = 11.7)
Marital status (%)	Married or in a relationship	68.5 %
	Single	21.7 %
	Divorced / Separated	8.5 %
	Widowed	1.3 %
Educational level	Without studies. No academic qualifications	22.3%
	Completed primary education	50.3 %
	Completed secondary education	21.8 %
	University studies	5.6 %
Professional group	Transport of merchandise	48.8 %
	Machinery transport	5.1 %
	Passenger transportation	20.6 %
	Ambulance and healthcare drivers	9.0 %
	Taxi drivers	14.7 %
	Others	1.8 %

Instruments

The Attitudes Toward Safety Regulations questionnaire (ATSR; (Douglas & Swartz, 2009). The original English version of this questionnaire comprises 13 items and measures three dimensions of drivers' attitudes towards safety regulations. The ATSR was adapted by following the steps shown in the literature. First, the items were translated from English into Spanish using the back-translation method (Hambleton, 1994; Hambleton et al., 2005; Muñiz & Bartram, 2007)

Muñiz et al. (2013) and also following the method outlined by Balluerka et al. (2007) by research experts (university lecturers), and by language experts belonging to the University's Linguistic Service. Second, a focus group was held to discuss the translated items (equivalence of meaning, for example). Third, the language experts back-translated the items into English. Fourth and lastly, the equivalence of meaning of the original and adapted versions was checked. The response format is a 7-point Likert scale (ranging from 1 = *Totally disagree* to 7 = *Totally agree*). The original English version has three factors: F1. Effectiveness of Enforcement (5 items; α = .81; e.g., "1. The existing safety regulations are consistently applied across states"); F2. General Regulatory Attitudes (4 items; α = .80; e.g., "8. Safety regulations in general have placed unfair burdens on truckers"); and F3. Regulatory Effectiveness (4 items; α = .70; e.g., "13. Regulations that do not let truckers perform certain maneuvers help keep roads safe"). Items on this scale are answered using a seven-point Likert format (ranging from 1 = *Strongly disagree* to 7 = *Totally agree*).

Driver Fatigue (DF-8; Tàpia-Caballero et al., 2021). This is an eight-item unifactorial scale that specifically measures

fatigue in professional drivers and is answered also using the Likert response format of one to five (1 = *never*; 5 = *always*): α = .88; e.g., "5. I feel tired as soon as I start the workday on the bus, truck, combi, van, taxi, etc."

The Spanish version by González-Gutiérrez et al. (2005) of the Swedish Occupational Fatigue Inventory (SOFI) (Åhsberg et al., 1997). This consists of five subscales, each of which has three items: "F1. Lack of energy", which describes the general feelings of a decrease in strength (α = .92; e.g.: "4. Exhausted (for example, tired of everything)"); "F2. Physical exertion", which describes bodily sensations that may be the result of strenuous work and indicate metabolic exhaustion (α = .87; e.g.: "1. With palpitations (for example, in the heart)"); "F3. Physical discomfort", which represents more localized bodily sensations that may result from a static or isometric workload (α = .81; e.g.: "8. With stiff joints (for example, elbows, knees, etc.)"); "F4. Lack of motivation", which describes the feeling of not being involved or excited (α = .92; e.g.: "5. Apathetic (for example, feeling left out)"); and "F5. Sleepiness", which describes the feelings of drowsiness (α = .89; e.g.: "6. Falling asleep (for example, feeling sleepy)"). The items are answered using a Likert scale ranging from 0 = *Not at all* to 10 = *To a high degree*).

The Trans-18 scale (TRANS-18; Boada-Grau et al., 2012) detects safety behaviors (personal and in-vehicle) and psychophysiological disorders. It comprises 18 items (3 subscales) with a five-point evaluation scale: "F1. Psychophysiological disorders of the driver" (α = .81; e.g.: "11. My job has at some time caused me depression problems"); "F2. Personal safety behaviors" (α = .80; e.g.: "7. I avoid driving while smoking and I don't hold the cigarette or cigar in my hand"); and "F3. Safety behaviors in the vehicle" (α = .70; e.g.: "3. I use work gloves when I handle and load freight, change a tire, etc.").

The Maslach Burnout Inventory-General Survey (MBI-GS; Salanova et al., 2000) evaluates burnout. It comprises 15 items that are divided into three subscales and answered using a 7-point Likert scale ranging from 0 = *Never* to 6 = *Always/Every day)*. This instrument measures: F1. Exhaustion, which comprises five items (α = .87; e.g., "3. I am tired when I get up in the morning and then I have to face another day at my job"); F2. Cynicism, which consists of four items (α = .85; e.g., "8. I have lost interest in my work since I started in that position"); and F3. Professional efficiency, which comprises six items (α = .78; e.g., "10. In my opinion I am good at my job").

Procedure

Non-probability sampling, also called random-accidental sampling, was used to obtain the sample (Kerlinger & Lee, 2004). The participants answered voluntarily and did not receive any form of reward. They were issued a protocol that included a cover letter and a questionnaire comprising all the research variables. Confidentiality of the data provided by the participants was fully guaranteed. The response rate was approximately 85%. An expert psychologist was present to answer any questions from the participants as they completed the questionnaire. The questionnaire was completed in a quiet place and with sufficient time.

Data analysis

First, all cases with missing data were excluded from the analysis (listwise deletion) and a preliminary analysis was conducted to obtain means, standard deviations, and bivariate correlations among the study variables. Second, Cronbach's alpha was calculated to check reliability of the scales. Third, validity was assessed by examining the Pearson correlations between the ATSR scale and demographic variables (age, seniority, and hours worked per week), as well as four correlates and four additional scales (DF8, SOFI, Trans-18, and Burnout). Finally, a series of confirmatory factor analyses were performed to evaluate the factor structure of the study variables. The ESEM structural equation model was used for Confirmatory Factor Analysis (CFA) (Asparouhov & Muthén, 2009). Mplus (Version 6.12) was also used. We chose ESEM because it is suitable for analyzing typical measurements. It is also a semi-restricted model that is suitable for this type of data and provides reasonable adjustments (Ferrando & Lorenzo-Seva, 2000; Hopwood & Donnellan, 2010). We analyzed reliability and correlations of the indications of validity using the SPSS 25.0 program.

Results

The CFA indices we calculated were the root mean squared error of approximation (RMSEA ≤ .06), the comparative adjustment index (CFI ≥ .95), and the Tucker-Lewis index (TLI ≥ .95). Our results showed a good fit for the three-factor model since the values for all three indices (RMSEA = .06; CFI = .95 and TLI = .94) were within the appropriate range. The items of the scale are shown in Table 2. This table contains a statistical analysis of the scale, including the factor each item belongs to, the mean of the scale if the element is deleted, the corrected total correlation of elements, and Cronbach's alpha if the element is deleted.

Table 2
Statistical analysis of the scale.

Items	Factor	Min-Max	*M* Scale if element is deleted	*SD* Scale if element is deleted	Corrected total correlation of elements	Cronbach's alpha if the element has been deleted
1. Las normas de seguridad existentes son aplicadas a toda la población [Existing safety standards are applied to the entire population].	ENF	7-49	18.05	25.08	.620	.828
2. Las autoridades encargadas de la seguridad retiran del camino a los conductores peligrosos [Safety authorities remove dangerous drivers from the road].	ENF	7-49	19.44	26.81	.568	.840
3. La interpretación de las normas de seguridad es consistente por parte de las autoridades [Interpretation of the safety rules by the authorities is consistent].	ENF	7-49	18.76	26.80	.688	.808
4. Las normas de seguridad existentes se aplican bien [The existing safety regulations are well enforced].	ENF	7-49	18.52	26.21	.725	.798
5. Las autoridades cuidan que los conductores cumplan las leyes [Authorities make sure drivers follow laws].	ENF	7-49	18.48	26.41	.703	.804
6. Las normas de seguridad en general se han vuelto demasiado complicadas [Safety regulations in general have gotten too complicated].	ATT	7-49	11.83	24.91	.680	.889
7. A menudo las normas de seguridad hacen que sea difícil ganarse la vida [Often safety regulations make it difficult to earn a living].	ATT	7-49	11.99	21.48	.779	.853
8. Las normas de seguridad han impuesto una carga excesiva a los conductores [Safety regulations have imposed an excessive burden on drivers].	ATT	7-49	11.82	21.35	.833	.832
9. Las normas de seguridad en general se han vuelto demasiado estrictas los últimos años [Safety regulations in general have gotten too strict in recent years].	ATT	7-49	11.54	22.49	.756	.862
10. Las normas que limitan la cantidad de conductores ayudan a mantener la seguridad de los caminos [Regulations that limit the number of drivers help maintain road safety].	EFF	7-49	15.13	14.27	.450	.797
11. Los reglamentos que certifican las autoridades son buenos para la seguridad vial [Regulations certified by authorities are good for road safety].	EFF	7-49	14.55	13.27	.663	.694
12. Las regulaciones para las normas de salud de los conductores mejoran la seguridad de las carreteras [Regulations for driver health standards improve highway safety].	EFF	7-49	14.20	12.29	.678	.680
13. Las normas que impiden a los conductores realizar ciertas maniobras son buenas para la seguridad vial [Rules that prevent drivers from performing certain maneuvers are good for road safety].	EFF	7-49	14.02	12.61	.578	.735

To provide evidence of discriminant validity, we compared correlations between factors (using composite factor scores) (Table 3). The three correlation estimates were significantly less than 1.00, which indicates that the factors were different from each other and provides evidence of discriminant validity (Martínez-García & Martínez-Caro, 2009). Table 3 shows the mean, standard deviation, reliability coefficients, and confidence intervals. The reliability coefficients obtained in the three subscales are: F1. Effectiveness of Enforcement (α=.84), F2. General Regulatory Attitudes (α=.95), and F3. Regulatory Effectiveness (α=.94),

Validity was calculated using the correlations between the ATSR scale with demographic variables (age, seniority and hours worked per week), four correlates and four scales (DF8, SOFI, Trans-18 and Burnout). A total of 14 associations were found to be significant for Effectiveness of Enforcement. Of these, six were positive, including Safety behaviors in the vehicle ($r = .47$, $p < .01$) and Professional efficiency ($r = .41$, $p < .01$), while eight were negative, including Number of traffic collisions for which the driver was responsible ($r = -.21$, $p < .01$) and Cynicism ($r = -.20$, $p < .01$). A total of 15 associations were found to be significant for General Regulatory Attitudes. Of these, 13 were positive, including Psychophysiological disorders ($r = .18$, $p < .01$), Driver Fatigue (DF-8) and Hours worked per week ($r = .17$, $p < .01$) and two were negative, i.e., Number of traffic collisions for which the driver was responsible ($r = -.09$, $p < .05$) and Personal safety behaviors ($r = -.09$, $p < .01$). Finally, a total of 12 associations were found to be significant for Regulatory Effectiveness. Of these, six were positive, including

professional efficiency (r = .48, p < .01) and safety behaviors in the vehicle (r = .42, p < .01), and six were negative, including Number of traffic collisions for which the driver was responsible (r = -.26, p < .01) and Number of traffic collisions in which the driver has been involved (r = -.16, p < .01).

Table 3
Descriptive statistics, reliability, confidence intervals, socio-demographic aspects, external correlates, correlations between factors. F1. *Effectiveness of Enforcement,* F2. *General Regulatory Attitudes and* F3. *Regulatory Effectiveness and contrast scales.*

		F1	F2	F3
Average		**23.31**	**15.73**	**19.30**
SD		**6.28**	**6.22**	**4,66**
Reliability		**.84**	**.89**	**.78**
Confidence interval		**.82-.86**	**.87-.90**	**.75-.81**
Socio-demographic	Age (years)	**.29****	**.14****	**.31****
	Seniority as a passenger transport driver	**.15****	.03	**.10***
	Hours worked per week	**.22****	**.17****	**.21****
External Correlates	How many traffic collisions have you been involved in due to another driver?	**-.10***	-.07	**-.16****
	How many traffic collisions have you been responsible for?	**-.21****	**-.09***	**-.26****
	How many times have you been fined for ignoring a traffic signal?	**-.09***	**.09***	**-.12****
	How many times have you thought that a traffic rule is useless?	-.06	.05	**-.13****
Fatigue	Driver fatigue (DF-8)	-.05	**.17****	.05
	Lack of energy (SOFI.1)	-.06	**.13****	.03
	Physical exertion (SOFI.2)	**-.09***	**.12****	**-.11***
	Physical discomfort (SOFI.3)	-.03	**.13****	.04
	Lack of motivation (SOFI.4)	**-.12****	.08	-.04
	Sleepiness (SOFI.5)	-.05	**.11****	-.01
Trans-18	trans.1.Psychophysiological disorder	**-.09***	**.18****	-.06
	trans.2.CS. Personal safety behaviors	**.31****	**-.09***	**.37****
	trans.3.CV. Safety behaviors vehicle	**.48****	**.12****	**.42****
Burnout	Exhaustion (MBI.E)	**-.14****	**.13****	-.01
	Cynicism (MBI.C)	**-.20****	**.12***	**-.12****
	Professional efficiency (MBI.3)	**.41****	**.13****	**.48****
Correlation between factors	ENF	-	-	-
	ATT	**.13****	-	-
	EFF	**.58****	.04	-

*p < .05; **p < .01

Discussion

In this study we have presented the psychometric properties of the Attitudes Toward Safety Regulations questionnaire for professional drivers (Douglas and Swartz, 2009). This instrument, which identifies drivers' attitudes towards safety regulations, has been adapted into Spanish for use with a sample of truck drivers (Oyanedel et al., 2015). We have adapted the items to enable this scale to be used with any type of professional driver (not just truck drivers). The study by (Oyanedel et al. 2015) is limited to an exploratory analysis using EFA and does not provide evidence of external validity.

Our first objective was met since ESEM analysis supported the three-factor model and the adapted scale had the same number of items as the original scale in English. This was corroborated by the indices obtained, which presented a good fit for the model (RMSEA = .06; CFI = .95 and TLI = .94). The first factor, Enforcement, refers to drivers' perceptions of the effectiveness and consistency of applying the regulations to convict drivers and prevent them from operating in an unsafe manner. This factor had the greatest variance (39.53 %) and was made up of five items (1 to 5). The second factor, General Attitudes, refers to drivers' general perception of safety regulations. This factor had four items (6 to 9) that explained 38.70% of the variance. The third factor, Effectiveness, refers to drivers' perceptions of the effectiveness of specific driver-centered safety rules in keeping roads safe. It is made up of four items (10 to 13) that explained 21.74% of the variance.

The scale had optimum reliability, so the second objective was also met. The reliability coefficients (Table 3) were high for all three subscales: F1 Effectiveness of Enforcement (α = .84), F2 General Regulatory Attitudes (α = <.95), and F3 Regulatory Effectiveness (α = .94). In fact, they were higher than for the original scale (Douglas and Swartz 2009), the results for which were F1. ENF (α = .81), F2. ATT (α = .80) and F3. EFF (α = .70), and for the scale adapted to Spanish for Chilean truck drivers (Oyanedel et al. 2015), the results for which were F1. ENF (α = .77), F2. ATT (α = .72) and F3. EFF (α = .69).

The third objective, which was to provide evidence of validity, was also met. Our data show that the factors of the scale were significantly associated with those of other scales

and external correlates (Table 3). Studies of the previous scales, on the other hand, did not show indications of validity. Note that the three dimensions of the attitudes towards driving questionnaire correlated positively with safety behaviors in the vehicle and negatively with the number of traffic collisions for which the driver was responsible. Also, enforcement and effectiveness correlated negatively with the number of traffic collisions in which the driver was involved and the number of times they have been fined for ignoring traffic signs.

Implications

Our results show that the Spanish adaptation of the Attitudes Toward Safety Regulations questionnaire for professional drivers presents acceptable psychometric properties and enables drivers' attitudes towards safety regulations to be determined. First, the Spanish version of the ATSR is a three-factor scale with the same number of items as the original version. Second, the reliability coefficients of the three factors are adequate and higher than those of both the English (Douglas and Swartz, 2009) and the Chilean version (Oyanedel et al., 2015). And third, we found external indicators of the ATSR, which confirm that they can be used to determine the validity of the scale.

This questionnaire is useful for identifying individuals with better driving safety behaviors. This should be taken into account to promote the proper strategic management of human resources and decrease the number of collisions in the sector analyzed. The negative relationship should be noted between this questionnaire and the number of traffic collisions in which the driver was involved and the number of times they have been fined for violating traffic signals.

Limitations and future lines of research

One limitation of this study is the low representation of the female population, which was due to the fact that very few women are professionally engaged in transportation. It would be interesting, however, to know whether gender differences exist in drivers' attitudes to safety standards. Second, our data was obtained via self-reports, which can lead to biases ranging from social desirability to lack of sincerity (Razavi, 2001). Moreover, probabilistic sampling should be used to increase external validity, while different groups of drivers should be included to take into account different cultural backgrounds. Third, assessment should be made of the possible relationship between the present scale and relevant aspects of the transportation sector, such as lack of motivation regarding safety issues, long working hours, and the aging of professional drivers. Finally, it would be interesting to evaluate the relationship between certain personality traits (impulsivity, locus of control, extraversion, etc.) and the attitudes assessed among professionals in this sector. Other limitation of the current study is that internal consistency was assessed using Cronbach's Alpha only; Future research will include McDonald's Omega for a more robust reliability assessment.

Complementary information

Conflict of interest.- The authors declare no conflict of interest.
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Data Research Availability Statement.- The data used for this study are available upon reasonable request to the corresponding author.

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