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ORIGINAL RESEARCH

Association Between Risk Perceptions of COVID-19, Political Ideology, and Mask-Wearing Behavior After the Outbreak: A Cross-Sectional Survey in South Korea

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Purpose: After the declaration by the World Health Organization signaling the conclusion of the COVID-19 pandemic, most countries lifted mandatory mask-wearing regulations. This study aimed to investigate factors such as risk perception and political ideology associated with continued adherence to mask-wearing among specific populations, particularly when it is no longer deemed necessary.

Methods: We conducted a cross-sectional study including a sample of 1001 respondents stratified by sex, age (≥ 18 years), and region from January 31 to February 2, 2023, after the mandatory mask regulation was lifted in South Korea. Multivariate logistic regression models were applied to estimate the relationships between risk perceptions, political ideology, and mask-wearing maintenance, adjusting for factors such as sex, age, occupation, and trust in the government.

Results: Our results indicated significant associations between age, self-reported household economic status, political ideology, affective risk perception, and perceived effectiveness of the government's COVID-related measures with indoor mask-wearing. Specifically, liberals were more likely to keep mask-wearing indoors than conservatives (adjusted odds ratio [aOR]: 2.19; 95% confidence interval [CI]: 1.33–3.59); and those who perceived a greater affective risk of COVID-19 (aOR: 2.47; 95% CI: 1.96–3.10), along with those who perceived the government's countermeasures as inadequate, were more inclined to maintain the habit of wearing masks indoors (aOR: 1.90; 95% CI: 1.19–3.03).

Conclusion: Our study highlighted the multifaceted factors influencing mask-wearing behavior in the post-COVID-19 era. Even after adjusting for various confounding factors, such as age, sex, and trust in the government, an association remained between affective risk perception, political ideology, and mask-wearing behavior. However, further research for psychological mechanisms is needed to foster a culture of preventive behaviors proportional to the risk of infection.

Keywords: risk perception, mask-wearing behaviors, political ideology

Introduction

The era of wearing masks because of COVID-19 has ended. With the transition into the post-Covid-19 era, wearing masks has become unnecessary in most countries. In the early stages of COVID-19, most Western countries were reluctant to adopt mask-wearing measures; however, as the disease spread, this became mandatory, and most Eastern countries mandated mask-wearing.[1–4] On May 4, 2023, following the World Health Organization's (WHO)

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announcement of the conclusion of the COVID-19 Public Health Emergency of International Concern (PHEIC),[5] the requirement to wear masks was removed, and there is now a gradual return to activities of daily living.

To restore activities of daily living to the pre-COVID era, institutional measures such as limitations on international travel, requirements for physical distancing, closure of commercial establishments, and directives to stay at home earlier put in place to prevent the spread of the virus were lifted.[6,7] However, there remains a disparity in people's perceptions, behaviors, and cultural practices.[8,9]

While wearing a mask is no longer recommended, maintaining this habit can be an obstacle to recovery in daily life.[10] Moreover, ongoing reviews and evaluations are being conducted regarding the effectiveness of wearing masks[10,11] to prevent COVID-19, in addition to their benefits.[12,13] A Cochrane review has reported uncertainties regarding the effects of face masks,[11] sparking continued debates,[14] at a time when evaluations and opinions on wearing masks are varied. It is deemed desirable to engage in preventive actions proportionate to the magnitude of risk on a population level, rather than overreacting or under-reacting to risks.

In South Korea, the mandatory wearing of masks was implemented during the COVID-19 pandemic.[15] Following the WHO declaration, the outdoor mask mandate was lifted in October 2023,[16] and subsequently, in January 2023, the mandatory indoor mask-wearing was relaxed, excluding public transportation and healthcare facilities.[17] This exemption was further narrowed to include public transportation and pharmacies within large supermarkets,[18] clinics, and pharmacies.[19] As of January 2024, except for medical institutions of hospital grade or higher, all mask-wearing mandates have been lifted.[20] After the WHO declared the end of the COVID-19 PHEIC on May 4, 2023,[5] the South Korean government downgraded the infectious disease crisis alert level from "serious" to "cautious" on May 11, 2023, indicating an endemic situation,[19] (Table A1, in Additional File 1. In addition to the government's aforementioned phased mask-wearing measures, there were no formally recommended additional mask-wearing measures by the government or other public institutions. However, even with the cessation of mask mandates and changes in government policy, according to media report in January 2023, many people continue to wear masks.[21] The period in which mask-wearing is no longer mandatory raises questions about the individuals who continue to wear masks, engaging in excess preventive behavior regarding risk, and prompts inquiries into the reasons for their continued adherence.

In previous studies, risk perceptions,[22–25] negative emotions such as anxiety,[26,27] political ideology,[28–30] and trust in the government[24,26,31–33] have been found to be associated with mask-wearing. Additionally, differences have been reported based on demographic characteristics such as gender, age, and educational level.[22,34–37] Risk perception is an individual's evaluation of specific crisis situations such as a pandemic, which influences preventive behaviors.[22–25] According to the dual-process theory, risk perception is divided into affective and cognitive aspects.[38] Affective risk perception involves instinctive, automatic, and intuitive reactions to danger, whereas cognitive risk perception refers to analytical, rational, and reasoned responses.[39] Emotions often amplify risk perception and sometimes exert a greater influence than factual information.[39,40] Worry and risk perception have been suggested to predict preventive behaviors such as personal hygiene and social distancing.[25] Participants with high levels of anxiety engaged in one or more recommended behaviors, and after controlling for all significant individual variables and anxiety, perceptions related to swine flu were associated with performing one or more recommended behaviors.[24] Concerns about the possibility of contracting infectious diseases increased the likelihood of taking preventive measures.[27] This study distinguishes individuals' risk perceptions of COVID-19 infection into affective and cognitive dimensions based on the dual-process theory of risk perception.

In terms of trust, participants who had higher levels of trust in the government and response agencies during the outbreaks of swine flu,[24] severe acute respiratory syndrome,[41] and COVID-19[31–33] were more likely to adhere to preventive behavior measures. Trust serves as a mechanism to reduce complexity and is utilized to assess benefits and risks in situations of limited knowledge.[42] People perceive technology more positively and as more acceptable in situations of low trust compared to situations of high trust in industries or governmental agencies responsible for risk regulation.[43] Based on theories of social trust and confidence, individuals judge future events to occur as anticipated based on past experiences or evidence, referred to as competence-based trust.[44] This study, grounded in competence-based trust theory and heuristics,[45] defines 'perceived performance of government's countermeasures' as "trust in government" and explores the relationship between government trust and mask-wearing. In addition, while the

association between political ideology and preventive behaviors such as mask-wearing has been reported,[28,29] our study aimed not only to consider political ideology in terms of conservatism or liberalism, but also to examine differences when alignment or misalignment with the government occurs. This was based on previous research in risk perception, which indicated that individuals tend to trust institutions that share similar values to their own.[45,46]

While several studies were conducted during periods when mask-wearing was mandatory,[22,30–36,47–50] there is scarce research on the association between political ideologies, risk perception, and mask wearing in situations where mask wearing was recommended or mandated and then lifted. Furthermore, studies have either solely analyzed affective risk perception or investigated without distinguishing between affective risk perception and cognitive risk perception.[22,24,27] Studies on the association between trust,[31,32] political ideology,[27–29] and mask wearing have mainly been conducted in Western countries such as the United States and Canada. This study aims to investigate the types of people who wore masks immediately after the mandatory wearing of masks was lifted and the factors contributing to this. We hypothesized that liberals would be more likely to continue using masks even when they were no longer required (Hypothesis 1) and that people who perceived the highest risk of COVID-19 would be more likely to continue using masks even when they were no longer deemed necessary (Hypothesis 2). We believe that a comprehensive understanding of the psychological mechanism behind preventive behaviors against the pandemic could help convey more effective messages about health behaviors based on perceived public health risks, such as emerging infectious diseases.

Methods

Participants

We analyzed survey data on COVID-19 infection concerns and indoor mask-wearing from 1001 participants aged 18 years or older from January 31 to February 2, 2023. The survey was conducted using random digit dialing numbers (RDD) via mobile phones (95%) or landlines (5%) in eight regions. The participants were stratified and selected according to sex, age, and region. In the survey, the final results were calculated by weighting to represent the general population, as the actual distribution could have been slightly over- or under-surveyed in detail units. Trained interviewers conducted all interviews using computer-assisted telephone interviewing (CATI). The survey was conducted by Gallup Korea, an affiliate of Gallup International. Detailed information, including the survey period, number of respondents, and survey response rate, is available in Additional file 1, Table A2. The data employed for use were accessed for research purposes on May 22, 2023, and did not include information that could identify individual participants.

The characteristics of the participants included age, sex, occupation, self-reported household economic status, educational attainment, geographic region, and political ideology. Age groups were delineated into five levels (18–29, 30–39, 40–49, 50–59, and ≥ 60 years), and occupation was categorized into three groups (unemployed, employed, and full-time homemaker or student). Household economic status was stratified into upper, middle, and lower tiers, and educational attainment was divided into four tiers (middle school or below, high school, university, or graduate school). Additionally, participants were assigned to one of five regions (Yeongnam, Honam, Capital Metro, Chungcheong, and Gangwon/Jeju) based on the regional voting model, which elucidates local political party support trends in South Korea.[51,52] Political ideology was evaluated through self-identification and sorted into conservative, liberal, moderate, and neutral categories.

Survey Tools

Keeping mask-wearing indoors, the evaluation of the outcome measure was conducted by utilizing the following question: “The obligation to wear masks indoors is lifted. Do you plan to continue wearing masks indoors, or stop wearing them in the future?” The responses were “will keep wearing masks” and “will not wear masks in the future”.

In this study, the independent variables included age, sex, occupation, self-reported household economic status, educational attainment, geographic region, political ideology, perceived risk of COVID-19, and trust in government. The evaluation of the perceived risk of COVID-19 infection was conducted by considering two dimensions of risk perception: affective and cognitive.[53,54] Affective risk perception was evaluated through the following question: “How worried are

you about the possibility of being infected with COVID-19?" and was evaluated as "very worried", "somewhat worried", "not really worried", or "not worried at all". Cognitive risk perception was assessed using the question "How likely do you think it is that you will be infected with COVID-19?" and was evaluated as "very likely", "somewhat likely", "not very likely", or "unlikely at all". To gauge trust in the government's COVID-related measures, participants were questioned about their views on the government's execution of such measures. The evaluation was based on the competence-based trust framework,[44,55] with responses categorized as "neutral", "appropriate action", or "inappropriate action". Additional File 2 contains detailed questionnaire items.

Analysis

An analysis utilizing the chi-squared test was conducted to explore the correlation between indoor mask-wearing and individual demographic variables. Additionally, a *t*-test was applied in the univariate analysis to determine the relationship between wearing masks indoors and COVID-19 risk perception.

Of all independent variables, five exhibited missing values at a rate of ≤ 8.0%, specifically 8.0% of perceived performance of government's countermeasures, 5.4% of cognitive risk perception, 2.0% of self-reported household economic status, 1.5% of affective risk perception, and 1.0% of educational attainment.

Subsequently, we conducted a multivariate logistic regression to examine the determinants of indoor mask-wearing. Our regression model was adjusted for various factors including age, sex, occupation, self-reported household economic status, educational level, geographic region, political ideology, risk perception (both affective and cognitive), and the perceived effectiveness of the government's COVID-related measures. In the logistic regression analysis for indoor mask-wearing, "y = 1" represented "intending to continue wearing masks", while "y = 0" indicated "not planning to wear masks in the future". Among the dependent variables, 2.7% were missing, which included individuals who either did not know or declined to participate in the survey.

Results

Demographic Factors

Table 1 shows the general characteristics of the participants. A statistically significant distinction in indoor mask-wearing was observed across all demographic factors, except for occupation, educational level, and geographic region. Notably, approximately half of the participants were male, under 50 years old, residing in a metropolitan area, and had a middle economic status. We found that keeping mask-wearing indoors was more common in women, older participants, those with lower economic status, liberals, those who perceived higher levels of affective and cognitive risk, and those who perceived the government's COVID-related measures as inappropriate.

Factors Associated with Keeping Mask-Wearing Indoors

Table 2 presents the relationship between the independent variables and adherence to indoor mask-wearing. The findings revealed significant associations between age, self-reported household economic status, political ideology, affective risk perception, and perceived effectiveness of the government's COVID-related measures with the practice of indoor mask-wearing. Specifically, individuals aged 18 to 29 years were less inclined to wear masks indoors (adjusted odds ratio [aOR]: 0.39; 95% confidence interval [CI]: 0.21–0.70) compared to the ≥60 reference group. The association between self-reported household economic status and wearing the mask indoors was also significant. Notably, those who were of upper economic status (aOR: 0.50; 95% CI: 0.29–0.84) and middle economic status (aOR: 0.52; 95% CI: 0.34–0.79) were less likely to wear a mask indoors compared to those of lower economic status. Liberals (aOR: 2.19; 95% CI: 1.33–3.59) were more likely to keep mask-wearing indoors than conservatives. However, the moderate or no opinion political self-identification was not associated with keeping mask-wearing indoors. However, moderate or no-opinion political self-identification was not associated with mask-wearing. Those with moderate political self-identification were more likely to keep masks on, and those with no opinion were less likely, but both relationships were not statistically significant.

Table 1 Respondents' General Characteristics (Weighted)

Variables	Total Respondents (%)	Keeping mask-Wearing Indoors		
		Mask-Wearing (%)	Mask off (%)	*P-value*
Total	974 (100.0)	710 (72.9)	264 (27.1)	
Age (years) *				<0.001
18–29	163 (16.7)	86 (52.8)	77 (47.2)	
30–39	145 (14.9)	104 (71.7)	41 (28.3)	
40–49	178 (18.3)	147 (82.6)	31 (17.4)	
50–59	193 (19.8)	141 (73.1)	52 (26.9)	
≥60	295 (30.3)	232 (78.6)	63 (21.4)	
Sex*				<0.001
Male	482 (49.5)	326 (67.6)	156 (32.4)	
Female	492 (50.5)	384 (78.0)	108 (22.0)	
Occupation				0.964
Employed	622 (63.9)	454 (73.0)	168 (27.0)	
Student or homemaker	244 (25.1)	179 (73.4)	65 (26.6)	
Unemployed	107 (11.0)	77 (72.0)	30 (28.0)	
Self-reported household economic status*				0.001
Upper	171 (17.9)	112 (65.5)	59 (34.5)	
Middle	416 (43.6)	289 (69.5)	127 (30.5)	
Lower	367 (38.5)	291 (79.3)	76 (20.7)	
Educational attainment				0.183
Middle school or below	128 (13.2)	103 (80.5)	25 (19.5)	
High school	225 (23.2)	165 (73.3)	60 (26.7)	
University	531 (54.9)	380 (71.6)	151 (28.4)	
Graduate school	635 (71.6)	58 (69.0)	26 (31.0)	
Region				1.000
Yeongnam	242 (24.8)	176 (72.7)	66 (27.3)	
Honam	96 (9.8)	70 (72.9)	26 (27.1)	
Capital Metro	490 (50.2)	358 (73.1)	132 (26.9)	
Chungcheong	106 (10.9)	77 (72.6)	29 (27.4)	
Gangwon/Jeju	42 (4.3)	30 (71.4)	12 (28.6)	
Political self-identification*				0.003
Conservative	305 (31.3)	206 (67.5)	99 (32.5)	
Liberal	269 (27.6)	217 (80.7)	52 (19.3)	
Moderate	290 (29.7)	212 (73.1)	78 (26.9)	
No opinion	112 (11.5)	76 (67.9)	36 (32.1)	
Affective risk perception**	959 (100.0)	699 (72.9)	260 (27.1)	<0.001
		2.59 ± 0.97	1.73 ± 0.80	
Cognitive risk perception**	925 (100.0)	672 (72.6)	253 (27.4)	<0.001
		2.91 ± 0.82	2.55 ± 0.83	
Perceived performance of government's countermeasures*				<0.001
Appropriate action	559 (62.2)	372 (66.5)	187 (33.5)	
Inappropriate action	259 (28.8)	222 (85.7)	37 (14.3)	
Neutral	80 (8.9)	60 (75.0)	20 (25.0)	

Notes: *$P < 0.05$ calculated by χ^2 test. **$P < 0.05$ calculated by *t*-test.

Individuals who held a stronger affective perception of COVID-19 risk (aOR: 2.47; 95% CI: 1.96–3.10) were more inclined to continue wearing masks indoors. However, cognitive risk perception of COVID-19 was not associated with continuing to wear masks. The correlation between risk perception and continuous mask-wearing was different in affective and cognitive aspects.

Table 2 Association Between Independent Factors and Keeping Mask-Wearing Indoors

Variables	Keeping Mask-Wearing Indoors	*P-value*
	Adjusted Odds Ratio (95% Confidence Interval)	
Age (years)		
18–29	0.39 (0.21–0.70) *	0.002
30–39	0.80 (0.42–1.51)	0.488
40–49	1.12 (0.58–2.16)	0.743
50–59	0.74 (0.41–1.32)	0.301
≥ 60	Reference	
Sex		
Male	0.69 (0.47–1.02)	0.060
Female	Reference	
Occupation		
Employed	0.60 (0.32–1.12)	0.109
Student or homemaker	0.52 (0.25–1.08)	0.081
Unemployed	Reference	
Self-reported household economic status		
Upper	0.50 (0.29–0.84) *	0.009
Middle	0.52 (0.34–0.79) *	0.003
Lower	Reference	
Educational attainment		
Middle school or below	1.54 (0.61–3.92)	0.365
High school	1.30 (0.66–2.58)	0.452
University	1.61 (0.87–2.98)	0.132
Graduate school	Reference	
Region		
Yeongnam	1.08 (0.43–2.71)	0.876
Honam	0.73 (0.26–2.03)	0.543
Capital Metro	1.11 (0.46–2.70)	0.814
Chungcheong	0.92 (0.34–2.50)	0.868
Gangwon/Jeju	Reference	
Political self-identification		
Liberal	2.19 (1.33–3.59) *	0.002
Moderate	1.22 (0.79–1.90)	0.366
No opinion	0.79 (0.40–1.58)	0.508
Conservative	Reference	
Affective risk perception	2.47 (1.96–3.10) *	< 0.001
Cognitive risk perception	1.11 (0.88–1.40)	0.375
Perceived performance of government's countermeasures		
Inappropriate action	1.90 (1.19–3.03) *	0.007
Neutral	1.79 (0.91–3.50)	0.092
Appropriate action	Reference	

Note: *$P < 0.05$.

Those who deemed the government's countermeasures ineffective (aOR: 1.90; 95% CI: 1.19–3.03) were more inclined to continue wearing masks indoors.

Discussion

The findings of this study suggest that even after mandatory mask-wearing regulations were lifted, people's continued mask-wearing was associated with three main factors: affective risk perception, political ideology, and trust in government measures.

Previous studies have established a relationship between preventive behaviors, such as wearing masks during infectious disease outbreaks, and individual risk perceptions.[24,27,31,47] Building on this, in the current study, we found that even after the outbreak ended, the connection between mask-wearing behavior and individual risk perceptions was still strong. Furthermore, both affective[24,47] and cognitive risk perceptions[27,31] during outbreaks have been correlated with wearing masks; however, our findings indicate that the maintenance of mask-wearing is solely associated with affective risk perception. While these results suggest that the emotional aspects of risk perception motivate individuals to engage in preventive behaviors,[47] reflecting feelings of anxiety and vulnerability,[26,27] consistent messaging interventions can alter risk perceptions, leading to changes in health behaviors.[42] Emphasizing the individual and collective benefits of wearing masks and health behaviors during public health crises is essential.

Those with liberal leanings tend to be more inclined toward health-related practices, such as wearing masks during outbreaks,[29,30,56] compared to conservatives, who perceive less risk from viruses and individual vulnerability.[28,29] Compared with the above, our study confirmed that even after the infectious outbreak, liberal political ideology was associated with continued mask-wearing. Furthermore, at the time of the COVID-19 pandemic and the conduct of this study, South Korea was under the governance of the progressive Democratic Party. Political polarization between liberals and conservatives persists in Korea.[57] In addition to previous research indicating a higher likelihood of mask-wearing among liberals, we posit that liberals, who align with the government's political stance due to a theory of trust in institutions sharing similar values,[58] maintained consistent adherence to mask-wearing as a government-endorsed preventive measure while in power as the ruling party. Thus, considering the potential barriers posed by other political ideologies on health behaviors, it is crucial to communicate scientific and neutral messages cautiously.[59] In a nationwide crisis, it is imperative to implement strategies to enhance trust in the government for individuals to collectively respond appropriately.[60] Communicators should emphasize the benefits of government policies addressing the crisis[61] and underscore adherence to scientific norms.[59] Moreover, given that risk perception is influenced by the frequency of risk exposure in the media,[62] caution should be exercised post-pandemic to avoid excessive exposure to threatening messages or dissemination of unsubstantiated news.

During outbreaks, there is a discernible tendency for increased compliance with preventive behaviors when individuals place greater trust in the government's directives.[39,45,46] However, after the outbreak, individuals with low trust in the government had an increased intention to continue wearing masks, irrespective of government guidelines. For instance, individuals with low trust in the government are likely to engage in preventive behaviors for personal health, regardless of official guidelines. This behavior contradicts the government's policies and messages that indicate mask wearing is no longer necessary, suggesting a distrust in these policies and messages.

Additionally, the continued adherence to mask wearing by a majority of people in Korea may be associated with other factors not addressed in this study.[63] For instance, collectivism has been shown to be more effective than individualism in disease response.[64,65] Unlike America and Europe, where individualism is favored, Asian cultures are characterized by strong dedication to groups such as nation and family, and are considered interdependent.[66] People may simply conform to others' behaviors by perceiving a sort of social norm when observing others wearing masks.[67] In a collectivist society like Korea, where there is a strong tendency towards collectivism and heightened awareness of others, there might be reluctance for individuals to remove masks while the majority maintain past mask-wearing behaviors. Furthermore, while the reasons for many people continuing to wear masks remain unclear, further research is needed as there may be additional conscious or subconscious benefits individuals perceive from mask wearing.

This study has some limitations. First, the use of a cross-sectional design precludes the establishment of causality, restricting the observations of associations. Second, our study was conducted in a single Asian country; therefore, caution should be exercised when generalizing our findings to Western populations. Thirdly, self-reported telephone surveys on mask-wearing intention may introduce reporting biases and may not align with actual behaviors.[68,69] Fourthly, a more detailed measurement was not applied as affective and cognitive risk perceptions were assessed using four scales to facilitate intuitive responses from respondents due to the limited time frame. Lastly, we did not explore unknown factors affecting continued mask-wearing further. Regardless of the explanatory factors, the factors contributing to the high mask-wearing rate can be found through continuous and repeated investigation.

Conclusions

This study highlighted the multifaceted factors influencing mask-wearing behavior in the post-COVID-19 era. Our findings revealed that even after mask mandates were lifted, an association remained between risk perception, political ideology, and mask-wearing behavior. Specifically, affective risk perception and liberal political ideology suggest the continued wearing of masks. Consequently, to foster a culture of immediate and collective preventive behaviors proportional to infection risks, it is imperative for the government to precede with trust-building strategies, emphasize scientific messaging, and underscore individual benefits regarding policies. Additionally, further research is needed to understand the as-yet-unexplored psychological mechanisms by which individuals perceive benefits from wearing masks even when they are not required.

Abbreviations

CATI, Computer-assisted telephone interviewing; WHO, World Health Organization; PHEIC, Public Health Emergency of International Concern; RDD, Random digit dialing numbers.

Data Sharing Statement

Data from this study cannot be publicly shared because we used third-party data from Gallup Korea and were not entitled to share the data. Gallup Korea plans for itself, and anyone interested can use the survey results. However, the use of raw data from Gallup Korea is permitted only for researchers conducting joint studies with Gallup Korea researchers. Detailed data approval procedures were performed in accordance with the internal guidelines of Gallup Korea. More information on data sharing can be obtained by contacting press@gallup.co.kr.

Ethics Approval and Consent to Participate

This study was reviewed and approved by the Institutional Review Board (IRB) of the Seoul Metropolitan Government, Seoul National University Boramae Medical Center (IRB no.07-2024-3). The need for informed consent was waived by the IRB because the data were analyzed anonymously.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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