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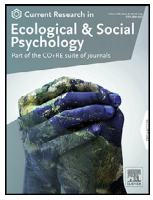

Lay theories about emotion recognition explain cultural differences in willingness to wear facial masks during the COVID-19 pandemic

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ABSTRACT

Given that mask-wearing proved to be an important tool to slow the spread of infection during the COVID-19 pandemic, investigating the psychological and cultural factors that influence norms for mask wearing across cultures is exceptionally important. One factor that may influence mask wearing behavior is the degree to which people believe masks potentially impair emotion recognition. Based on previous research suggesting that there may be cultural differences in facial regions that people in Japan and the United States attend to when inferring a target's emotional state, we predicted that Americans would perceive masks (which cover the mouth) as more likely to impair emotion recognition, whereas Japanese would perceive facial coverings that conceal the eye region (sunglasses) to be more likely to impair emotion recognition. The results showed that Japanese participants reported wearing masks more than Americans. Americans also reported higher expected difficulty in interpreting emotions of individuals wearing masks (vs. sunglasses), while Japanese reported the reverse effect. Importantly, expectations about the negative impact of facial masks on emotion recognition explained cultural differences in mask-wearing behavior, even accounting for existing social norms

In March 2020, the spread of the COVID-19 virus was declared a global pandemic, changing the lives of billions of people around the world. Many precautionary measures were proposed to help reduce the spread of COVID-19, including calls for social distancing and for wearing facial coverings over the nose and mouth. In the United States, advice from the Centers for Disease Control (CDC) issued in April 2020[1] encouraged Americans to wear face masks when in public in conjunction with social distancing guidelines (CDC, 2020). This advice was consistent with existing guidelines provided by the Japanese Ministry of Health, Labour, and Welfare of Japan (MHLW) as well as the World Health Organization (WHO), which both issued guidelines in response to mounting evidence of the effectiveness of facial coverings to prevent the spread of disease (Japanese Ministry of Health 2020; WHO, 2020).

Despite the general consensus regarding the effectiveness of masks and facial coverings in preventing the spread of COVID-19, people in countries around the world varied greatly in their willingness to wear face masks. In East Asian countries, where norms promoting mask wearing as a way to prevent the spread of illnesses such as colds and the flu or as protection from allergies were in place even prior to the COVID-19 pandemic for at least 100 years (Horii, 2014), mask-wearing in public spaces became nearly ubiquitous. By contrast, in the United States, many people were (often, extremely) reluctant to incorporate mask wearing into their daily lives.[2] Given that mask-wearing proved to be an important tool to slow the spread of COVID-19, investigating the psychological and cultural factors that influence norms for mask wearing across cultures is exceptionally important.

Previous research has demonstrated that cultural and ecological factors such as relational mobility (Freeman and Schug, 2021; Kito and Maeda, 2021; Salvador et al., 2020) and individualism/collectivism (English et al., 2022; Kemmelmeier, and Jami, 2021; Lu et al., 2021) played a role in health behaviors during the COVID-19 pandemic, influencing both mask-wearing and social distancing. Another cross-cultural

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[1] Official guidance from the United States government regarding the use of facial coverings to prevent the transmission of COVID-19 had been largely inconsistent up until this point, with early guidance actively discouraging the American public from purchasing face masks in order to reserve limited supplies for medical professionals (Netburn, 2021).

[2] We will note that the tradition of mask wearing originated Western medical contexts, and was widespread in North America during the 1918 flu (Pan et al., 2020). Norms promoting the usage of facial masks in daily life persisted in Japan following the 1918 flu (Horii, 2014).

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factor that has yet to be empirically examined is people's lay theories about whether face masks may hinder accurate emotion recognition. Indeed, previous research has shown that wearing masks can impede the ability to correctly identify emotional expressions to some degree (Carbon, 2020; Grundmann et al., 2021; Marini et al., 2021; Mheidly et al., 2020; Saito et al., press; Williams et al., 2021). However, some evidence suggests that there may be cultural differences in the degree to which obscuring the lower part of the face, as opposed to other facial regions, may impede recognition of facial expressions of emotion. In particular, Yuki and colleagues (2007) investigated the difference in emotion recognition in Americans versus Japanese by examining whether participants made their judgments primarily based on cues from the mouth or eyes of a face. They proposed that some cues may be more informative than others in inferring a target's emotional state, particularly in Japan where context-dependent cultural norms (display rules) regulate the expression of emotion (e.g., Safdar et al., 2009; Rychlowska et al., 2015). Given that facial musculature in the eye regions is more difficult (although not impossible) to consciously control than musculature in the mouth region (see Ekman and Friesen, 1982; Gunnery, Hall & Ruben, 2013), they found that Japanese judgments of emotion (both of emoticons and digitally altered real faces) were affected more strongly by facial cues around the eyes (which would more accurately indicate internal state) vs. the mouth than were American judgments. Similar results were found in subsequent studies showing that East Asian participants spend a significant amount of time fixating on the eyes vs. the mouth (Jack et al., 2009), and on the center of the face relative rather than specific facial components (Blais et al., 2008; Caldera et al., 2010) relative to Western/European participants. This increased attention to the eyes vs. the mouth may allow for more accuracy in understanding the emotions of masked individuals. Consistent with this notion, one recent study found that Japanese were better than Americans at accurately recognizing positive emotions of masked targets (Saito et al., press).

The present study

In the present study, we examine whether cultural differences in lay theories regarding the degree to which masks impede one's ability to recognize emotion in others may help explain why Americans have been generally reluctant to embrace mask-wearing relative to those in East Asian cultures such as Japan. In addition, if Japanese are more sensitive to emotional expressions in the eyes, then face coverings that obstruct the eyes, such as sunglasses, may have a similar effect among Japanese. We did not examine cultural differences in the degree to which facial coverings actually impact the ability to infer facial expressions of emotion as has been examined in previous studies (Saito et al., press), but rather focus on the role that lay theories about the degree to which facial coverings impact emotion recognition impact mask-wearing behavior.

We attempted to address the following questions: First, to what extent do people in Japan and the United States believe that facial coverings obscuring the mouth or eye regions, such as masks or sunglasses, decrease their ability to understand emotional expressions? Based on previous research suggesting that Japanese participants were more likely to use information from eye (vs. mouth) regions in inferring facial expressions of emotion (Yuki et al., 2007), we expected that American participants would expect difficulty inferring the emotion expressions of individuals wearing masks compared to Japanese participants. At the same time, we predicted that this cultural difference would reverse when asking participants about the degree to which facial coverings obscuring the eye region (i.e., sunglasses) would impede emotion recognition, with Japanese reporting greater difficulty than Americans would.

Next, we sought to examine whether beliefs regarding the emotion recognition impairment would explain cultural differences to the degree to which people actually wear face masks. We expected that Americans would report wearing face masks to a lesser extent than Japanese, given norms encouraging the use of masks to prevent infectious disease and block allergens (i.e., tree pollen) are widespread in Japanese culture (Horii, 2014). However, we expected that cultural differences in beliefs about the degree to which masks impair emotion recognition would explain cultural differences in mask-wearing, above and beyond existing differences in cultural norms related to mask-wearing.

Method

Participants and procedure

Two hundred and sixty-six (94 male, 169 female, 3 undisclosed) Japanese and 348 (195 male, 153 female, 0 undisclosed) Americans participated in the study. The ages of both Japanese (M = 39.4, SD = 10.3) and American (M = 39.6, SD = 12.2) participants were comparable. Participants were recruited via popular crowdsourcing platforms (Lancers.jp in Japan; Amazon's Mechanical Turk in the United States) to fill out a brief survey containing questions about mask wearing behaviors, mask wearing norms, difficulty of reading emotions, and demographic information such as age, gender, and education level. Data and materials can be found at https://osf.io/p6vw3/.

Measures

Beliefs about emotion recognition impairment

Anticipated difficulty of reading emotions of others was measured using a four-item questionnaire gauging how difficult participants believed it is to read emotions of others when others are wearing face masks or sunglasses (two items each). A sample question from this measure is, "It is difficult for me to interpret feelings of other people when they wear [a mask / sunglasses]?" and responses were rated on a scale of "1″ (Strongly Disagree) to "5″ (Strongly Agree). The measures had acceptable internal consistency in both Japan (mask α = 0.73; sunglasses α = 0.68) and the United States (mask α = 0.87; sunglasses α =0.85).

Existing cultural norms related to mask-wearing

Mask wearing norms were measured using a five-item questionnaire with the aim of gauging participants' personal and intersubjective norms about mask wearing. Sample items included, "At the moment, I think people should wear masks in public spaces." and, "people in my community think everyone should wear masks when in public spaces." The items in this measure were rated from "1″ (Strongly Disagree) to "5″ (Strongly Agree). This measure had acceptable internal consistency in both Japan (α = 0.64) and the United States (α = 0.83).

Mask-wearing behaviors

Mask-wearing behaviors were measured using a six-item questionnaire with the aim of gauging how likely participants were to wear a mask in different situations, such as in a crowded outdoor space and an uncrowded indoor environment. Participants rated how often they wore masks in these settings from "1″ (Never) to "5″ (Always). This measure had high internal consistency in both Japan (α = 0.73) and the United States (α = 0.79).

Results

Summary analyses

First, we conducted a 2 (country: Japan vs. United States) x 2 (type of facial covering: mask vs. sunglasses) mixed-model ANOVA examining participants' expected difficulty recognizing emotional expression.[3]

[3] No significant effects of any demographic variables, including gender, age, or educational attainment were found and thus we omit these variables from further analysis

Table 1
Descriptive statistics and correlations among study variables for Japanese and American participants.

	JP	US			Correlations								
	Mean (SD)	Mean (SD)	*t*	*d*	1		2		3		4		
1. Mask-wearing behavior	4.55 (0.56)	4.11 (0.94)	6.67***	.54	—		−0.21	***	−0.01		.49	***	
2. Belief that masks impair emotion recognition	1.67 (0.77)	3.09(1.09)	−17.95***	−1.46	−0.16	**	—		.58	***	−0.12	*	
3. Belief that sunglasses impair recognition	2.30 (0.95)	2.89(1.09)	−7.03***	−0.57	−0.09		.49	***	—		−0.02		
4. Mask-wearing norms	4.30 (0.47)	3.98 (0.78)	5.95***	.48	.32	***	−0.26	***	−0.22	***	—		

Note. Correlations for Japanese are presented below the diagonal; correlations for American participants are reported above the diagonal. *$p<.05$,**$p<.01$,***$p<.001$.

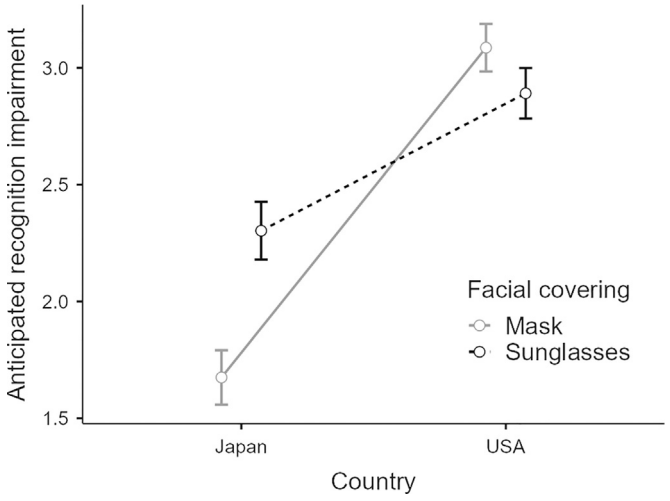

Fig. 1. Anticipated difficulty reading emotions expressed by people wearing a mask or sunglasses, by country. Error bars represent 95% confidence intervals.

Results showed significant main effects for country, $F(1, 612) = 196.0$, $p < .001$, $\eta^2 = 0.190$, and for facial covering type (mask vs. sunglasses) on the expected difficulty of reading emotions reading emotion $F(1, 612) = 31.3$, $p < .001$, $\eta^2 = 0.009$. These effects were qualified by a significant interaction between country and facial covering type $F(1, 612) = 113.3$, $p < .001$, $\eta^2 = 0.032$. As shown in Fig. 1, and in support of the predictions, Americans overall were more likely than Japanese to expect difficulty reading the emotions of those wearing a mask, while Japanese were more likely to expect difficulty reading emotions of those wearing sunglasses. Post-hoc tests with Tukey adjustment for multiple comparison showed that each of these groups were significantly different from each other at $p < .001$. Descriptive statistics and intercorrelations among variables, by country, are presented in Table 1.

Willingness to wear a face mask and mask wearing norms

Using independent samples t-tests, we also compared American and Japanese participants' willingness to wear a face mask, and mask wearing norms of their societies at the time of data collection (October/November of 2021). Overall, Japanese participants ($M = 4.55$, $SD = 0.561$) were more likely to report that they wore a face mask in various situations when compared to American participants ($M = 4.11$, $SD = 0.940$), $t(612) = 6.67$, $p < 0.001$, $d = 0.54$. Also supporting predictions, Japanese participants ($M = 4.30$, SD = 0.467) reported stronger mask wearing norms in their society when compared to American participants ($M = 3.98$, SD = 0.776), $t(612) = 5.95$, $p < 0.001$, $d = 0.48$.

Mediation analyses

Next, in order to determine whether cultural differences in beliefs regarding the difficulty to interpret emotional expression when wearing a mask and cultural norms account for cultural differencing in mask-wearing behaviors, we conducted a mediation model using the jAMM package in Jamovi (Galluci, 2020). In the mediation model, we included the two mediators, 1) anticipated difficulty reading emotions of masked individuals, and 2) existing mask-wearing norms, and estimated parameters for indirect effects using 5000 bootstrapped samples. As there was no significant correlation between mask wearing behaviors and the anticipated difficulty of reading emotions of people wearing sunglasses in either country, we did not include lay theories regarding sunglasses in the mediation model.

Results, shown in Table 2, show significant indirect effects of anticipated difficulty in interpreting emotions of those wearing masks and pre-existing mask wearing norms on the country difference in mask-wearing behavior. These results support the hypothesis that cultural differences in lay theories about the degree to which masks impair emotion recognition help to explain differences in mask wearing behavior in Japan and the United States, beyond pre-existing norms for mask wearing in each country.

Discussion

In this study we examined whether differences in beliefs about the degree to which mask wearing impairs recognition of facial expressions of emotion account for differences in mask-wearing behavior between Japan and the United States. Compared to Japanese participants, American participants expected that they would have more difficulty interpreting the emotions of people who wore a face mask. In comparison, Japanese participants reported greater expected difficulty in interpreting the emotional expressions of people wearing sunglasses than did Americans.

The findings from this study align with previous research on cultural differences in attention the eyes and mouth as cues to recognize emotions. Previous research has found that when asked to rate emotions of a target, American participants were more likely to use information from expressions around the mouth, while Japanese participants were more likely to use focus on emotion-related information around the eyes (Yuki et al., 2007; Jack et al., 2009). Furthermore, face masks have been shown to impair the recognition of positive emotion for participants in the United States, but not in Japan (Saito et al., press).

Importantly, we found that differences in the degree to which people in Japan and the United States felt that masks would impair emotion recognition explained cultural differences in mask wearing behavior in these countries, even when taking norms related to mask wearing into account. These results suggest that while overall norms related to wearing face masks are important in driving cultural differences in mask-wearing behavior following the onset of the global COVID-19 pandemic, beliefs regarding the ability to recognize emotional expression also play a significant role.

Implications

The results of this study also help us better understand factors that increase or decrease mask wearing appeals. Although increased mask

Table 2
Summary of effects from mediation model examining indirect effects of country via anticipated difficulty of recognizing emotions of masked individuals and existing mask-wearing norms in Japan and the United States.

Effect	Estimate (se)		95% C.I. (LL – UL)			β	z
Component Effects							
Country → Mask-wearing norms	−0.32	(0.05)	−0.42	–	−0.22	−0.23	−6.36***
Mask-wearing norms → Mask Wearing Behavior	0.53	(0.07)	0.40	–	0.66	.44	7.93***
Country → Expected difficulty reading emotion (mask)	1.41	(0.08)	1.27	–	1.56	.59	18.80***
Expected difficulty (mask) → Mask Wearing Behavior	−0.11	(0.04)	−0.18	–	−0.04	−0.16	−3.20**
Indirect Effects							
Country → Norms → Mask Wearing Behavior	−0.17	(0.04)	−0.24	–	−0.10	−0.10	−4.77***
Country → Expected difficulty (mask) → Mask Wearing Behavior	−0.16	(0.05)	−0.26	–	−0.06	−0.10	−3.14**
Direct							
Country → Mask Wearing Behavior	−0.11	(0.07)	−0.25	–	0.04	−0.07	−1.46
Total							
Country → Mask Wearing Behavior	−0.43	(0.07)	−0.56	–	−0.31	−0.26	−6.68***

Note. Confidence intervals computed with parametric bootstrapping using 5000 samples. Betas are standardized effect sizes. ***$p<.001$ **$p<.01$.

wearing limits the spread of disease, understanding what factors increase peoples' likelihood to wear a mask in public in turn sheds light on deterring factors in the actual wearing of masks. Thus, when addressing factors deterring mask-wearing, results from this study suggest an important factor in determining the effectiveness of public health guidelines that may contradict existing cultural norms and beliefs.

Limitations and future directions

This study is not without limitations. First, these data were collected in the fall of 2021, but attitudes toward mask wearing around the world remained in continual flux over the course of the COVID-19 pandemic. Thus, these results may only present a brief snapshot of a single point in time, and future studies should examine whether factors such as the acceptance of mask wearing across cultures, or even the ability of individuals to recognize emotional expression, change over time. Furthermore, there are certainly many other reasons why people in various countries may choose to (or not to) wear face masks that were not measured in this study. We do not claim that anticipating impairment to emotion recognition is the sole or even predominant factor that drives cultural differences in mask-wearing behavior. Additionally, given the correlational and quasi-experimental nature of this study, we cannot conclusively determine causality, and thus results should be interpreted with caution. This is particularly true for the mediation analysis (see Kline, 2015). Although we believe our choice to structure the mediation model to examine the indirect effect of beliefs (lay theories regarding emotion recognition impairment) on the cultural difference in behavior is theoretically justified, future studies should employ experimental or longitudinal examinations to demonstrate true mediation effects.

Another limitation of this study is that we relied on self-reports when assessing difficulty in reading emotions. Although a previous study found that face masks impaired recognition for American, but not Japanese, pariticpants (Saito et al., press), future studies should examine whether emotional recognition is differentially impacted by the presence of face masks or sunglasses that obscure the mouth or eye regions. Future studies should also examine what factors may promote attention to different facial regions when individuals attempt to interpret a target's emotional state. While basic facial expressions of emotion are shared across human populations (Matsumoto and Hwang, 2019), people also regulate their emotional expressions in accordance to cultural norms in order to promote positive social relationships in the context of their society (e.g., Matsumoto et al., 2018; Rychlowska et al., 2015). These cultural differences in display rules may also allow people to more accurately interpret modified emotions displayed by those from their own cultural ingroup (e.g., Elfenbein & Ambady, 2003). Future research should examine whether display rules that regulate emotional expression may impact the specific cues that people in different cultures use when inferring a target's emotional state, and whether these display rules may change as mask-wearing becomes more or less common in a society.

The COVID-19 pandemic was arguably the worst public health crisis in a century. However, illness and mortality rates were highly variable across countries, and likely influenced by differences in governmental policies as well as cultural norms around the utility of mask-wearing. The current study demonstrates that lay theories about emotion recognition may have influenced the usage of masks in different countries.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Joanna Schug reports financial support was provided by National Science Foundation. Corresponding author is an Associate Editor at Current Research in Ecological and Social Psychology (Joanna Schug)

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