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International Journal of Health Promotion and Education

ISSN: 1463-5240 (Print) 2164-9545 (Online) Journal homepage: http://www.tandfonline.com/loi/rhpe20

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To cite this article: David B. King, Shanmukh Kamble & Anita DeLongis (2016) Coping with influenza A/H1N1 in India: empathy is associated with increased vaccination and health precautions, International Journal of Health Promotion and Education, 54:6, 283-294, DOI: 10.1080/14635240.2016.1174950

To link to this article: https://doi.org/10.1080/14635240.2016.1174950

Published online: 03 May 2016.

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International Journal of Health Promotion and Education, 2016
Vol. 54, No. 6, 283–294, http://dx.doi.org/10.1080/14635240.2016.1174950

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Coping with influenza A/H1N1 in India: empathy is associated with increased vaccination and health precautions

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(Received 29 July 2014; accepted 3 April 2016)

In previous research on severe acute respiratory syndrome (SARS) and West Nile virus, empathic responding has been associated with higher perceived threat during a pandemic as well as the implementation of recommended health precautions. The goal of the current study was to investigate the role of empathic responding outside of a Western context by examining the endorsement of specific health precautions during the 2009–2010 H1N1 pandemic in India. Responses to questions about Centers for Disease Control recommended health precautions, perceived threat and empathic responding were collected from 100 individuals living in the city of Dharwad in India's Karnataka state. Analyses revealed that individuals who responded to the threat of H1N1 with greater empathy were more likely to endorse recommended health behaviours (i.e. vaccination, handwashing and disinfectant use). These effects remained when controlling for gender, perceived threat of H1N1 and other disease-relevant coping responses of denial and wishful thinking. In addition, a synergistic effect of empathic responding and perceived threat emerged for vaccination and disinfectant use. When empathic responding was high, increased threat perception was associated with an increased likelihood of endorsing these key health precautions. When empathy was low, however, perceived threat displayed no significant effect. Findings confirm the important role of empathy in coping with the threat of infectious disease. In light of previous research suggesting a similar pattern, the potential universal nature of this model is considered. Future directions for research and implications for policy and education are also discussed.

Keywords: empathy; health behaviours; vaccination; handwashing; infectious disease

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Introduction

In 2009, the world witnessed the emergence of its first influenza pandemic of the twenty-first century – influenza A/H1N1. What began as a series of small outbreaks of severe flu-like illness in February 2009 soon grew to nearly 1000 unconfirmed cases and 59 deaths in Mexico in less than two months. It was soon verified by the US Centers for Disease Control (CDC), in cooperation with international authorities, that the illness was a new strain of the influenza A virus, subtype H1N1. Despite early efforts, the virus continued to spread globally, and on 11 June 2009, the World Health Organization (WHO) Emergency Committee on H1N1 raised the alert level to pandemic (WHO 2011). Over the course of the following year, H1N1 was reported in over 214 countries, with approximately 18,500 confirmed deaths and up to 200 million projected cases worldwide (WHO 2011). It was not until August 2010 that the alert level was lowered to post-pandemic, as H1N1 succumbed

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to the ebbs and flows of seasonal influenza. Today, influenza A/H1N1 remains a part of the annual seasonal flu medley (CDC 2014).

Despite a relatively effective and rapid international response to the 2009 H1N1 pandemic, the world's preparedness for such flu outbreaks is not without its shortcomings. Of major concern to health officials is the public's response during these heightened threats. Although it has been demonstrated that individuals frequently change their behaviours in order to reduce their risk of infection during an outbreak, the degree of change varies greatly from person to person depending on a multitude of factors (Lio et al. 2013). As concluded by the WHO (2011) report on the 2009 pandemic, an improved understanding of personal protective measures such as handwashing is needed in order to limit the extent of flu pandemics. Implicated here is a demand for more effective mitigation strategies aimed at changing behaviour and improving response (WHO 2011; Del Valle, Mniszewski, and Hyman 2013). The mobilization of antiviral drugs and vaccines is largely reliant on the attitudes and behaviours of individuals (Kraut, Graff, and McLean 2011; WHO 2011).

Previous research on severe acute respiratory syndrome (SARS) and West Nile virus has underscored the importance of psychosocial factors in understanding individual response to the threat of infectious disease (Lee-Baggley et al. 2004; Puterman et al. 2009). Empathic responding, a coping response involving perspective-taking and efforts to empathize with, understand and respond sensitively to others (O'Brien and DeLongis 1996), has been associated with the implementation of recommended health precautions during a pandemic, including handwashing and disinfectant use (Lee-Baggley et al. 2004). Involving efforts to understand what others are feeling by adopting their perspective and responding in supportive ways (DeLongis and O'Brien 1990; O'Brien and DeLongis 1996), empathic responding has been associated with benefits for both recipients (O'Brien and DeLongis 1997) and providers (Kramer 1993; Brown et al. 2003). Long considered a way of coping (Haan 1977), empathy has been established as a key determinant of prosocial behaviour, facilitating more caring and supportive interactions among people (Eisenberg and Miller 1987; Clark 1991; Penner et al. 2004). In the case of disease threat, empathic individuals may be more likely to engage in recommended health behaviours in order to minimize the spread of infection to others (Puterman et al. 2009). To date, little is understood regarding empathy's role in health behaviours more generally or in vaccination behaviour specifically, though research has identified concern over family safety as one motivating factor in flu vaccine uptake among health care workers (Kraut, Graff, and McLean 2011).

In their investigation of the 2002–2003 SARS epidemic, Lee-Baggley et al. (2004) proposed a model in which the threat of infectious disease is conceptualized as a stressor. Accordingly, relevant behaviours like handwashing and vaccination may be best understood by examining individuals' coping responses to this looming threat, reflecting previous models of coping with disease (DeLongis and O'Brien 1990). Consistent with this, an empathic response to the threat of SARS was found to predict increased engagement in recommended health precautions, independent of the level of perceived viral threat (Lee-Baggley et al. 2004). This finding was replicated in a study of response to West Nile virus (Puterman et al. 2009). To date, however, this model has not been applied to a pandemic during which a vaccine was produced and distributed.

In line with models of health behaviour and belief (Rosenstock 1974; Glanz and Bishop 2010), perceived threat of disease has also been demonstrated as an important predictor of taking health precautions in response to SARS (Lee-Baggley et al. 2004) and West Nile (Puterman et al. 2009). Attitudes and beliefs regarding personal threat and vulnerability to infection have been similarly associated with vaccination uptake (Wooten et al. 2012), including vaccination against H1N1 (Bish et al. 2011).

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The current study

This study was undertaken to replicate and extend previous work demonstrating a role of empathic responding in coping with the threat of infectious disease. Within the context of the 2009–2010 H1N1 pandemic, it was our goal to examine the interaction between empathic responding and perceived threat in predicting the endorsement of three key behaviours recommended by the CDC: (1) getting vaccinated for H1N1, (2) increased handwashing and (3) using disinfectants (CDC 2010).

An additional goal of this study was to examine whether previous findings regarding the role of empathy in response to threat of infectious disease could be extended outside a Western context. By exploring the applicability of the model cross-culturally, we hoped to gain additional insights into the universality of empathy's role in implementing protective measures during disease threat. The first case of H1N1 in India was reported on 13 May 2009, shortly after the outbreaks in Mexico and the United States. By January 2010, India had confirmed over 27,000 cases of H1N1, of which 1035 resulted in death (Government of India 2010).

Hypothesis 1

Consistent with health belief models that underscore the importance of perceived threat in engaging in health-promoting behaviours (Glanz and Bishop 2010), it was expected that perceived threat of H1N1 would be associated with an increased likelihood of endorsing CDC recommended health precautions. This hypothesis was supported by previous findings with other viral threats (e.g. Puterman et al. 2009).

Hypothesis 2

Controlling for perceived threat of H1N1, it was expected that higher scores on empathic responding would also be associated with an increased likelihood of endorsing CDC recommended health precautions. This hypothesis was based on previous findings by Lee-Baggley et al. (2004) and Puterman et al. (2009), and was further supported by Lee-Baggley et al.'s (2004) conceptualization of viral threat as a stressor with which individuals must cope, reflecting previous transactional models of coping with disease (DeLongis and Holtzman 2005).

Hypothesis 3

Based on the pandemic-as-stressor model proposed by Lee-Baggley et al. (2004), we further expected a synergistic relationship between empathic responding and perceived threat of H1N1 in predicting health behaviours. Specifically, it was expected that perceived threat would be associated with an increased likelihood of endorsing CDC recommended health behaviours when empathic responding scores were also high. In consideration of the nature of empathy (Eisenberg and Miller 1987; Clark 1991; Penner et al. 2004), greater perspective-taking and concern for others were expected to produce more prosocial responses to perceived viral threat, including increased endorsement of precautionary health behaviours.

In all models, we examined and controlled for two additional key responses to disease threat, wishful thinking and denial. Wishful thinking has been associated with engaging in fewer health precautions during both SARS and West Nile pandemics (Lee-Baggley et al.

2004; Puterman et al. 2009), while denial has long been suggested to play a complex role in illness and disease threat (Wiebe and Korbel 2003).

Method

Recruitment

Data in the current study were collected in the city of Dharwad in India's Karnataka state between the months of February and March, 2010, during the height of the global H1N1 pandemic. Participants were 100 university students (40 males and 60 females) enrolled at Karnatak University with a mean age of 22.5 years (SD = 1.70, range = 20–28 yeas). The large majority of participants were of Hindu faith (93.1%), and all were permanent residents of India. Compared to females, male participants were significantly older [$t(98) = 5.87$, $p < .001$] and scored significantly higher on perceived threat of H1N1 [$t(98) = 1.11$, $p = .043$] and denial [$t(98) = 4.30$, $p < .001$]. Given these differences, gender was included as a control in all regression models.

Measures and procedures

All participants were volunteers and recruited in graduate courses at Karnatak University. Given that participants were fluent in English, the questionnaire was written in English to avoid potential mistranslation. The questionnaire was completed in paper format and took approximately 30 min.

Health precautions

Participants were asked to endorse behaviours in which they planned to engage in order to avoid getting H1N1. Health behaviours included in the current study were based on primary CDC recommendations at the time of the pandemic (CDC 2010), including 'get the H1N1 vaccine', 'wash hands more often' and 'use disinfectants'. Participants responded to the question, 'To avoid getting the H1N1 virus, I will personally', by placing a checkmark next to the behaviours they endorsed, resulting in three dichotomous outcome variables.

Perceived threat of H1N1

Participants were asked to rate the extent to which the following statements were true at the time of participation on a four-point scale ranging from 'not at all' to 'a great deal'. The five items included: 'I don't think I could get H1N1', 'I feel nervous about getting H1N1', 'H1N1 is threatening my health', 'I don't feel worried about getting H1N1' and 'My daily routine has been disrupted due to thoughts about H1N1'. Internal reliability of the scale was moderate ($\alpha = 0.62$).

Empathic responding

A brief form of the Relationship-Focused Coping Scale (O'Brien and DeLongis 1996) was included to assess empathic responding. Participants were asked, 'To what extent have you done each of the following to help others you know who might be concerned about getting the H1N1 virus?' Responses were recorded on a four-point scale ranging from 'not

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Table 1. Means (***M***) and standard deviations (SD) for endorsement of recommended health precautions.

Variable (Range)	Vaccination		Handwashing		Disinfectant Use	
	Yes (n = 74)	No (n = 26)	Yes (n = 69)	No (n = 31)	Yes (n = 35)	No (n = 65)
	M (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)
Perceived Threat (1–4.2)	2.34 (.89)	1.87 (.47)	2.38 (.84)	1.85 (.67)	2.54 (.94)	2.04 (.71)
Empathic Responding (1–5)	3.58 (1.05)	2.90 (.81)	3.65 (.96)	2.87 (1.02)	3.99 (.98)	3.09 (.93)
Wishful Thinking (1–5)	4.05 (1.26)	3.77 (1.24)	4.00 (1.28)	3.94 (1.21)	4.06 (1.21)	3.94 (1.29)
Denial (1–5)	1.97 (1.25)	2.35 (1.41)	2.03 (1.44)	2.16 (.93)	1.69 (1.30)	2.28 (1.26)

at all' to 'a great deal'. The four items included: 'Tried to understand the other person's concerns about H1N1', 'Tried to understand how the other person felt about H1N1', 'Tried to help the other person(s) by listening to their concerns about H1N1' and 'Tried to help the other person(s) by doing something for them'. Consistent with past research (O'Brien and DeLongis 1996), internal reliability of the scale in the present study was high (α = 0.85).

Ways of coping

Items were chosen from the brief form of the Ways of Coping Questionnaire (Folkman et al. 1986; Lee-Baggley, Preece, and DeLongis 2005) that tapped additional coping responses of interest. Participants were asked, 'To what extent have you managed whatever concerns or fears you might have about H1N1 in each of the ways listed below?'

Wishful thinking subscale. Participants were asked the extent to which they had managed their concerns or fears about H1N1 through 'wishing H1N1 would go away or somehow be over with' on a four-point scale ranging from 'not at all' to 'a great deal'.

Denial subscale. Participants were asked the extent to which they had managed their concerns or fears about H1N1 through 'refusing to believe it was happening' on a four-point scale ranging from 'not at all' to 'a great deal'.

Results

Preliminary analyses

Descriptive statistics for all study variables are presented in Table 1 by endorsement of recommended health precautions. According to bivariate analyses, perceived threat was significantly correlated with empathic responding (r = .51, p < .001), but neither wishful thinking nor denial. A significant but low correlation was observed between empathic responding and wishful thinking (r = .21, p = .04), perhaps reflecting overall effort to cope with disease threat (Vitaliano et al. 1987). These preliminary analyses support our inclusion of additional coping responses as controls.

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Table 2. Hierarchical logistic regression models of recommended health precautions ($N = 100$).

	Model 1: Vaccination				Model 2: Handwashing				Model 3: Disinfectant Use			
Step variable	*B*	*SE*	Wald	OR	*B*	*SE*	Wald	OR	*B*	*SE*	Wald	OR
1 Perceived Threat	.69*	.28	6.06	1.99	.81**	.27	8.76	2.24	.66**	.23	8.17	1.93
	Nagelkerke's $R^2 = .10$				Nagelkerke's $R^2 = .16$				Nagelkerke's $R^2 = .12$			
2 Perceived threat	.49	.32	2.32	1.63	.50	.31	2.57	1.64	.52†	.31	2.87	1.68
Empathic responding	.52†	.30	3.07	1.68	.79**	.30	6.82	2.20	1.26**	.37	11.49	3.52
Wishful thinking	.06	.24	.07	1.06	−.18	.25	.52	.84	−.43	.28	2.41	.65
Denial	−.39	.28	2.03	.68	−.08	.27	.10	.92	−.89**	.34	8.83	.41
	Nagelkerke's $R^2 = .19$				Nagelkerke's $R^2 = .26$				Nagelkerke's $R^2 = .38$			
3 Perceived threat	.51	.36	2.07	1.67	.47	.32	2.12	1.60	.19	.34	.32	1.21
Empathic responding	.93*	.37	6.23	2.54	.92**	.34	7.38	2.50	1.46***	.40	13.67	4.31
Wishful thinking	−.02	.25	.01	.98	−.20	.24	.66	.82	−.42	.27	2.40	.66
Denial	−.60	.31	3.78	.55	−.16	.28	.30	.86	−1.21**	.42	8.40	.30
Perceived threat x Empathic responding	.72*	.36	3.97	2.04	.28	.31	.81	1.32	.84*	.38	4.89	2.32
	Nagelkerke's $R^2 = .25$				Nagelkerke's $R^2 = .27$				Nagelkerke's $R^2 = .42$			

Note: *B* = unstandardized beta coefficient; *SE* = standard error; Wald = Wald chi-squared test; OR = odds ratio. For all continuous variables, higher scores reflect higher standing on the variable; all continuous predictor variables are standardized. All models control for gender at each step, which was non-significant in all cases.
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

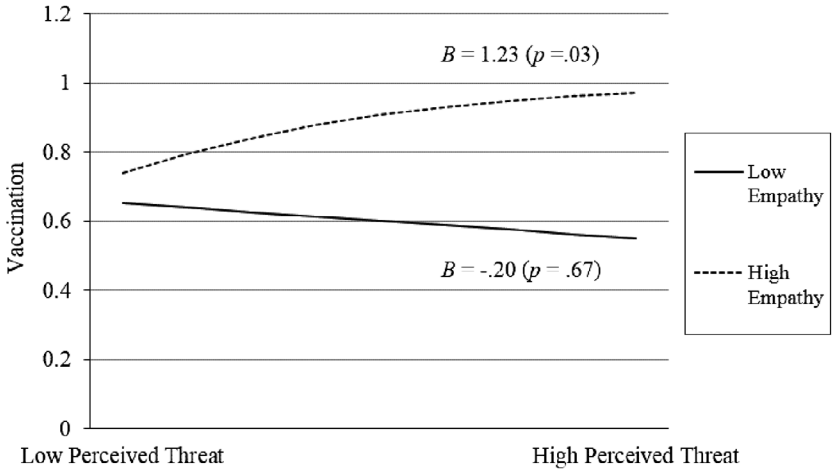

Figure 1. Interaction between perceived level of threat and empathic responding (moderator) predicting motivation to get vaccinated for H1N1 (***N*** = 100).

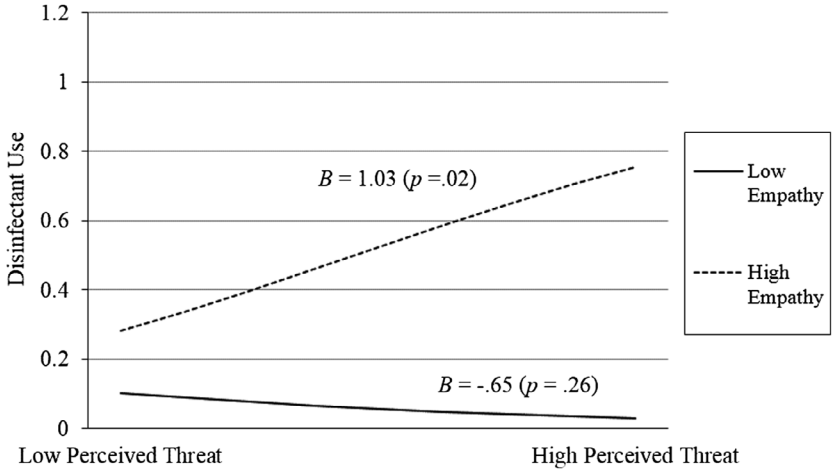

Figure 2. Interaction between perceived level of threat and empathic responding (moderator) predicting motivation to use disinfectants in response to H1N1 threat (***N*** = 100).

Multivariate analyses

A series of hierarchical logistic regressions were conducted in order to determine whether perceived threat of H1N1, empathic responding or the interaction between the two were significant predictors of endorsing recommended health precautions (see Table 2). In all models, gender and perceived threat were entered in Step 1, followed by empathic responding, wishful thinking and denial in Step 2, and finally the interaction between empathic responding and perceived threat in Step 3.

The inclusion of gender and perceived threat in Step 1 significantly improved all null models, χ^2s (2) > 7.22 (p < .05). Supporting our first hypothesis, perceived threat was associated with an increased probability of endorsing each health precaution in Step 1.

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Across models, the main effect of perceived threat was not significant in subsequent steps. Although controlled at each step, gender did not display a significant predictive effect in any of the models examined.

The addition of coping responses in Step 2 significantly improved models of handwashing and disinfectant use only, χ^2s (3) = 7.96 ($p < .05$) and 22.63 ($p < .001$), respectively. Here, empathic responding was associated with an increased likelihood of endorsing handwashing and disinfectant use. In the third step, however, the main effect of empathic responding significantly predicted endorsement of all three health precautions, offering support for our second hypothesis. Of the two additional coping responses included, denial was associated with a significant decrease in the likelihood of using disinfectants in Steps 2 and 3. Wishful thinking displayed no significant associations with health precautions.

The inclusion of the interaction between empathic responding and perceived threat contributed to significant improvement in models of vaccination and disinfectant use only, χ^2s (1) = 4.86 ($p < .01$) and 36.81 ($p < .001$), respectively. The interaction emerged as a significant predictor of these two health precautions, offering partial support for our third hypothesis. In order to interpret these interactions, tests of simple slopes were calculated according to procedures by Aiken and West (1991). See Figures 1 and 2 for graphs of these simple slopes. When both perceived threat of H1N1 and empathic responding were high, we observed higher endorsement of getting vaccinated for H1N1 ($p = .03$) as well as using disinfectants ($p = .02$). Patterns were such that as perceived threat increased, higher empathic responding was associated with a greater likelihood of adopting recommended health precautions. No significant relationships were observed between perceived threat and either health precaution when empathic responding was low.

Discussion

Supporting our first hypothesis, higher perceived threat of H1N1 was associated with an increased likelihood of endorsing all three primary CDC recommended health precautions (CDC 2010). This is in line with health belief models (Glanz and Bishop 2010) as well as research on vaccination behaviour specifically (Bish et al. 2011; Wooten et al. 2012), and further underscores the importance of perceived threat in taking health precautions during a pandemic. In support of our second hypothesis, and replicating findings of Lee-Baggley et al. (2004) and Puterman et al. (2009), empathic responding was associated with a greater likelihood of getting vaccinated for H1N1, handwashing and using disinfectants.

In examining the interaction between perceived threat and empathic responding, it was found that threat perception was associated with vaccination intention and disinfectant use only when empathy was high. This offers support for our third hypothesis and facilitates a more dynamic understanding of the role of empathy in disease prevention and control. Building on Lee-Baggley et al.'s (2004) conception of viral threat as a stressor with which individuals must cope, empathic responding may be modifying the effect of the stressor itself to facilitate preventative health behaviours. Underscored here is the importance of examining threat appraisal within the context of coping during a viral outbreak, reflecting transactional models of coping with disease (DeLongis and Holtzman 2005). Empathic responding may be altering the quality of perceived threat such that it is dependent not only on the well-being of oneself, but also on that of others. Given that threat was conceptualized as perceived threat *to oneself*, future studies should examine perceived threat *to others* in order to elucidate this question.

Perceived threat may be a necessary, but not sufficient, prerequisite to engaging in health precautions in the face of disease outbreak. Our findings indicate that perceived

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threat is associated with more adaptive outcomes during a pandemic only in the presence of high empathic responding. Although health agencies often focus on raising threat level to implement health precautions during a pandemic (Bish et al. 2011; WHO 2011), our findings underscore the importance of considering the interplay between threat and empathy. Indeed, this may be most relevant in scenarios where vaccines are available, as the success of vaccination programs relies largely on the development of herd immunity. Much like previous research demonstrating greater smoking cessation efforts among mothers who believe that second-hand smoke poses a risk to their children (Hovell et al. 2009), encouraging people to consider the impact of infectious disease on others (e.g. family; Kraut, Graff, and McLean 2011) may increase the likelihood of those people getting vaccinated.

Interestingly, the synergistic effect between perceived threat and empathic responding was not significant in our model of handwashing. This suggests that empathy and perceived threat may operate more independently in their contributions to this health behaviour (supported by significant main effects in both cases). Although difficult to determine in the current study, this may be due to the ease with which handwashing is engaged, and the extent to which it is a health habit, compared to vaccination and disinfectant use. In the former instance, endorsement would require travel to a clinic or hospital; in the latter, it may require the purchase of cleaning products and/or more frequent cleaning in the home. By comparison, handwashing is a more time efficient and easily integrated response to viral threat. Given that research has shown cross-cultural differences in handwashing frequency (Curtis et al. 2003; Hoque 2003), the precise nature of these relationships should be examined in other populations.

Although wishful thinking displayed no association with the endorsement of health precautions in the current study, denial was associated with lower endorsement of disinfectant use. Those who can respond empathically and consider the well-being of others (Eisenberg and Miller 1987; Clark 1991; Penner et al. 2004), rather than deny and avoid the presence of the threat, appear motivated to more effectively support the recommendations of public health authorities. At the bivariate level, empathic responding was the only coping response to be associated with perceived threat of H1N1. It is possible that the prosocial quality of empathy is further increasing perceived threat due to greater social concern. Alternatively, increased threat may be leading to greater empathic responding due to the social relevance of the threat.

Given that this study confirms an association between empathy and intended pandemic-relevant behaviour in an Eastern cultural context, it may be that our model reflects universal features of human response to disease threat. A cross-cultural perspective emphasizes the importance of fostering a sense of empathy during a global outbreak or pandemic. With the role of empathic responding documented within the contexts of SARS, West Nile, and H1N1, it may be especially effective to encourage perspective-taking during large-scale threats of disease via mass media campaigns. At the very least, it is an important consideration for federal and international public health agencies whose primary goal is to minimize the spread of infection. Given that influenza A/H1N1 is now included in the seasonal flu vaccine (CDC 2014), these findings may have additional implications for the annual seasonal flu threat and flu vaccine uptake.

Regarding the cultural context of the study, it is worth noting that many important differences remain between Eastern and Western cultures that may require further consideration in the relationships of interest. For instance, individualism-collectivism (Singelis 1994) may be worth examining for its association with empathy in response to disease threat. In particular, some studies have shown a greater propensity for empathy among collectivistic cultures (Duan, Wei, and Wang 2008). Such considerations would be especially

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relevant in the implementation of mass media campaigns or educational appeals aimed at fostering empathy; however, in combination with past research, this study suggests that empathic responding may be an effective response to disease threat despite cultural perspective or self-construal. To our knowledge, this is the first confirmation of the potential utility of empathy during a pandemic in a non-Western context. Further research should aim to replicate this in larger, non-Western populations.

Although the theory of planned behaviour (Ajzen 1985) would suggest a strong association between intention and outcome, it has been found that intentions and behaviour are not always strongly related (Rhodes and Dickau 2012). Future research would be strengthened by assessing actual vaccination and health behaviours post-pandemic, rather than relying solely on self-reported intentions to engage in such behaviours which may be susceptible to social desirability and other self-reporting biases. Given the evolution of the H1N1 pandemic over time (WHO 2011), a richer understanding of the role of empathic responding would be gained by prospective research. The media's portrayal of disease threat, the changing availability of vaccines, and the prevailing control of the pandemic over time are all factors that may have influenced the variables under investigation. Consequently, a more intensive longitudinal design (Bolger and Laurenceau 2013) during a pandemic would be advantageous. In light of the current sample size, there arise further concerns over power and potential model overfitting (Harrell 2001); as such, the current findings should be considered preliminary in nature. The homogeneous education level of the participants in the current study is also worth noting. All respondents were enrolled in graduate school at the time of the study, yet the spread of an infectious disease is equally dependent on the behaviours of low-income and poorly resourced members of the population, in India or elsewhere.

As noted in the WHO's (2011) post-pandemic report on H1N1, public health agencies are often faced with the difficult task of raising threat while also minimizing the economic and social impact of a disease. Such economic and social costs were never as evident as during the 2002–2003 SARS epidemic (WHO 2003). The additional benefit of empathic responding is its potential capacity to dampen the societal costs of disease threat via prosocial behaviour. Future research may benefit from a consideration of empathic responding's original conception within a dyadic context (DeLongis and O'Brien 1990). Indeed, to understand precisely how this response unfolds on a day-to-day and person-to-person basis, such nuanced social transactions should ultimately be investigated.

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