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Biases in the perceived prevalence and motives of severe acute respiratory syndrome prevention behaviors among Chinese high school students in Hong Kong

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In two studies conducted in Hong Kong during and immediately after the outbreak of severe acute respiratory syndrome (SARS), participants displayed several social cognitive biases when they estimated the prevalence of and inferred the motives underlying SARS preventive behaviors. First, participants who practiced preventive behaviors (practicers) consistently estimated that more people practiced such behaviors than did non-practicers (false consensus bias). Second, for some preventive behaviors, participants believed that their own behaviors were more motivated by prosocial concerns (relative to self-interest) than were other practicers (pluralistic ignorance). Finally, non-practicers underestimated the importance of prosocial concerns underlying some preventive behaviors (actor-observer bias). We discussed the relevance of these social cognitive biases to health education and to Hong Kong people's psychological reactions to SARS.

Key words: actor-observer bias, false consensus, pluralistic ignorance, severe acute respiratory syndrome (SARS), social cognitive biases.

Introduction

The outbreak of the severe acute respiratory syndrome (SARS) in Hong Kong in 2003 generated widespread anxiety in the community, which cost severe damage to the economy and people's subjective well-being. Fortunately, the spread of the virus can be contained if the general public takes appropriate preventive measures, such as wearing a face mask and avoiding sharing food and drinks. During the SARS outbreak, health professionals in Hong Kong worked diligently to persuade people to engage in these behaviors.

From the perspective of the theory of reasoned action (Ajzen & Fishbein, 1980), the likelihood that people will engage in such preventive behaviors is jointly determined by two factors: (i) attitudes towards these behaviors, which are a function of the anticipated outcomes of the behaviors and the perceived desirability of such outcomes; and (ii) the subjective norms

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regarding these behaviors, or how socially acceptable the behaviors are perceived to be, and people's motivation to behave accordingly. During the outbreak of SARS, taking the prescribed preventive measures appeared to be the only known means that could effectively mitigate the chance of contracting this potentially fatal disease. Thus, Hong Kong people should have favorable attitudes towards these preventive measures, and been strongly motivated to practice these behaviors. What is less clear is how people subjectively represented the social norms regarding these behaviors at that time.

Prevalence of a behavior provides an important clue about the prevailing norm regarding the behavior. For example, people are more likely to litter in messy environments than in surroundings that are clean and free of trash (Krauss *et al.*, 1978; Cialdini *et al.*, 1990), as heaps of discarded trash probably suggest that littering is widely practiced and acceptable to others. In the case of SARS, the likelihood that people would engage in the recommended preventive behaviors may depend in part on the perceived prevalence of such behaviors. The first goal of the present research was to describe Hong Kong people's subjective representations of the prevalence of SARS preventive behaviors.

Biases in prevalence estimation

People are often biased when they estimate the prevalence of health-related behaviors (Suls *et al.*, 1988), and such biases may, in turn, affect the likelihood of engaging in such behaviors, as the theory of reasoned action (Ajzen & Fishbein, 1980) predicts. For example, people often use their own behavior as an anchor to estimate the prevalence of the same behavior among others (Allport, 1924). One such egocentric bias, which is often referred to as the false consensus bias (or false consensus effect), is the tendency for people to see their own behaviors as more popular than they are perceived by people who do not engage in such behaviors (Ross *et al.*, 1977). Operationally, false consensus bias is defined as the difference between the prevalence estimates given by people who engage in a particular behavior and those given by people who do not.

The false consensus bias is a well-documented perceptual bias (for a review, see Mullen & Hu, 1988), and is evident in several health-related and safety-related behaviors, including smoking marijuana, using a seat belt (Suls *et al*., 1988), smoking (Sherman *et al.*, 1983), and drinking (Wild, 2002). For example, compared to light drinkers, heavy drinkers see the way they drink as more common among their friends, coworkers, and the general public (Wild, 2002). False consensus bias is also evident in the estimation of health risks. For instance, men who view themselves as vulnerable to AIDS tend to assume others to be similarly vulnerable, while men who do not see themselves as vulnerable think that others are also invulnerable (McCall *et al.*, 1996). Aside from the false consensus bias, people also tend to underestimate the prevalence of desirable behavior. This bias, known as the uniqueness bias, is measured by the difference between people's subjective estimation of the prevalence of desirable health-related behaviors and the actual prevalence rates of such behaviors (Suls & Wan, 1987). There is some evidence that regardless of whether people engage in desirable health-related behaviors, they tend to underestimate the actual prevalence of such behaviors (Suls *et al*., 1988).

The false consensus and uniqueness biases have important implications for people's psychological reactions to SARS. First, on the one hand, whether one practices a preventive behavior may influence one's estimation of how prevalent the behavior is (i.e. false consensus bias). On the other hand, perceived prevalence may influence a person's likelihood of engaging in the behavior. Second, to contain the spread of SARS, it is

important to persuade people who are not practicing the preventive behaviors to practice them. However, if these individuals display both false consensus and uniqueness biases, they would underestimate how widely practiced these behaviors are, and would therefore be resistant to the use of normative influence in persuasion (Suls *et al*., 1988). Finally, the uniqueness bias may lead people to underestimate the number of people who actually practice the preventive behaviors and, hence, the probability that the spread of the SARS virus would be under control. This underestimation would understandably further compromise people's subjective well-being. Although many factors influenced people's reactions to SARS, the cognitive account presented in the present paper may shed light on one aspect of this complex phenomenon.

In the present research, we asked participants to indicate: (i) whether or not they themselves practiced these behaviors; and (ii) their estimates of how widely these behaviors were practiced in the community. We hypothesized that the prevalence estimates given by practicers of a preventive behavior would be greater than those given by non-practicers (false consensus bias), and that both practicers and non-practicers would underestimate the actual prevalence of the preventive behaviors (uniqueness bias).

Biases in motive assessment

Not only are people biased in estimating the prevalence of health-related behaviors, they are also biased in assessing the motives behind people's participation in such behaviors. The second goal of the present research was to examine biases in subjective evaluation of the motives behind people's participation in SARS preventive behaviors.

One such bias is pluralistic ignorance, or the belief that the self is different from others, even when the self and others behave in identical ways (Miller & McFarland, 1991). In a demonstration of pluralistic ignorance, Monin and Norton (2003) found that people who showered during a water conservation crisis thought that they were more caring for the community than were other bathers, whereas people who did not shower saw themselves as less caring for the community than were other non-bathers. Pluralistic ignorance is often accompanied by a self-enhancement bias. For example, undergraduates tend to see themselves as being more sympathetic than other undergraduates toward homosexuals (Bowen & Bourgeois, 2001). In the domain of health-related behaviors, people tend to perceive themselves as less agreeable than others to campus drinking (Miller & McFarland, 1991), smoking, sexual behavior, illegal drug use (Hines *et al.*, 2002), and drinking before driving (Bourgeois & Bowen, 2001).

When making attributions for SARS preventive behaviors, participants might also display an actor-observer bias. As originally formulated, the actor-observer bias refers to people's tendency to attribute their own actions to situational causes, but others' actions to dispositional causes (Jones & Nisbett, 1971). Subsequent research revealed a motivational manifestation of this effect – actors tend to attribute their action more to positive motives than do observers (Foster, 2000). For example, performers of a beneficial act tend to attribute their act more to altruistic motives than to self-presentational motives, whereas observers tend to believe that both motives are equally important (Schlenker *et al*., 1983).

In the present research, we asked practicers to attribute their engagement in preventive behaviors to self-protection and other-protection. In addition, both practicers and non-practicers made attribution for other practicers' behaviors. Should pluralistic ignorance be present and be accompanied by a self-enhancement bias, practicers would perceive themselves to be more motivated by prosocial concerns (relative to self-interest) than were

others. Should actor-observer bias be present, non-practicers would underestimate the importance of prosocial concerns to practicers' preventive behaviors (actor-observer bias).

Overview of studies

Two studies were conducted to document the social cognitive biases reviewed above. Study 1 was conducted during the outbreak of SARS in Hong Kong and Study 2 shortly after the disease had been under control. Specifically, these studies examined false consensus bias, uniqueness bias, pluralistic ignorance, and actor-observer bias in Hong Kong students' representation of the prevalence of SARS preventive behaviors as well as Hong Kong students' assessment of the motives behind people's engagement in these behaviors. The preventive behaviors we studied (first column of Table 1) were extracted from the guidelines published in the website of the Department of Health, HKSAR Government (http://www.info.gov.hk/info/sars/index.htm). The participants in the studies indicated whether or not they practiced each of these preventive behaviors, and estimated its prevalence in the community.

For a subset of the nine preventive behaviors we studied, participants also evaluated the extent to which people's participation in these preventive behaviors was motivated by self-protection and other-protection concerns. If the participants practiced a certain preventive behavior (practicers), they also indicated the extent to which their own preventive behavior was motivated by self-protection and by other-protection.

Methods

Study 1

The participants were 55 Chinese secondary school students from a convenient sample. They were recruited from a boys' school in Hong Kong. Their ages ranged from 17 to 19 years. They volunteered to respond to a two-page questionnaire. The questionnaire was written in Chinese, and the study was conducted during a talk held in the first week of June 2003. Schools were resumed after they had been closed from late April to May 2003. SARS was still threatening Hong Kong and new confirmed cases were reported almost every day during this week.

In the questionnaire, we listed the nine SARS preventive measures. For each preventive measure, participants first indicated if they had taken the measure (yes or no) and estimated the percentage of Hong Kong people who had taken it. In addition, for each of the first four preventive measures on the list (wear a face mask; use serving spoons and chopsticks at meal times; avoid sharing food and drinks; avoid sharing towels and utensils), the participants also evaluated the importance of other-protection and self-protection as motives for Hong Kong people to adopt this preventive measure. If the participants themselves adopted this measure, they also indicated the importance of other-protection and self-protection as motives for their adoption of the measure. Participants responded to the four motive questions on a 7-point scale, ranging from 1 (not at all important) to 7 (very important). Participants did not evaluate the motives for the remaining five preventive measures because either other-protection or self-protection was not a relevant motive for adopting these measures. Participants were debriefed after they had completed the questionnaire.

Results

False consensus bias

We compared the prevalence estimates provided by practicers and those by non-practicers on the preventive behaviors. The preventive behavior of covering nose and mouth when sneezing, coughing or clearing throat was excluded because all participants reported practicing this behavior. As shown in Table 1, practicers gave significantly higher prevalence estimates on six of the remaining eight preventive behaviors than did non-practicers. There was also a non-significant trend in the hypothesized direction for the preventive behavior of avoiding sharing food and drinks ($p = 0.22$). False consensus bias was not observed in wearing a face mask probably because the actual prevalence rate of this behavior was widely publicized in the mass media. Taken together, the findings reveal a consistent false consensus bias in participants' prevalence estimation.

Uniqueness bias

We separately analyzed practicers' and non-practicers' underestimation of prevalence of preventive measures. We subtracted the reported prevalence rates of the sample from practicers' (or non-practicers') prevalence estimation. The difference scores indicated the magnitude of underestimation. We compared these scores with the critical value of 0 (perfect accuracy in estimation), and found that practicers displayed a significant uniqueness bias in five of the preventive measures, while non-practicers displayed a significant uniqueness bias in four measures. Table 1 shows that the uniqueness bias was stronger among non-practicers than among practicers. This is not surprising given the robust false consensus effect: non-practicers estimated preventive behaviors to be less prevalent than practicers did.

If we used the prevalence rates in our sample as rough estimates of the actual prevalence rates of these behaviors in the Hong Kong community, these findings are consistent with the hypothesis regarding the uniqueness bias. But unexpectedly, we found significant reverse effects (i.e. overestimation) in three measures among practicers and in two measures among non-practicers. In general, there was a tendency for the participants to overestimate the prevalence of some preventive measures.

Pluralistic ignorance

For each of the four behaviors where motive attributions were available, we subtracted practicers' self-protection attribution score from their other-protection attribution score. The difference score indicated how much the practicers were motivated by prosocial concerns (relative to self-interest). A positive score indicated a person to be more motivated by other-protection than by self-protection, and a negative score indicated the reverse. Following the same procedure, we computed a difference score to indicate how prosocial the practicers thought other practicers were. We then compared the two difference scores. Table 2 shows that for three of the four preventive behaviors, practicers rated themselves as more motivated by prosocial concerns than other practicers were. For the remaining behavior, the comparison was also in the hypothesized direction ($p = 0.12$). These findings reveal a consistent effect of pluralistic ignorance.

Table 1 False consensus bias and uniqueness bias (Study 1, $N = 55$)

Behavior	Estimated prevalence		False consensus bias	Actual prevalence	Underestimation		Uniqueness bias	
	By P	By NP			By P	By NP	By P	By NP
Wear face mask	45.06	42.26	ns	57.4	12.34	15.13	$t(30) = 2.92$**	$t(22) = 3.10$**
Use serving spoons and chopsticks at meal times	43.82	20.92	$t(53) = 4.43$***	54.5	10.68	33.58	$t(29) = 2.62$*	$t(24) = 11.91$***
Avoid sharing food and drink	72.57	63.69	ns	76.4	3.83	12.71	ns	ns
Avoid sharing towels and utensils	76.73	42.78	$t(52) = 3.88$***	83.6	6.87	40.82	$t(44) = 2.08$*	$t(8) = 3.81$**
Put used face masks into plastic bags before disposal	46.43	25.23	$t(51) = 3.87$***	25.9	− 20.53	0.67	SR $t(13) = 3.01$**	ns
Clean household daily with a solution of household bleach, rinse with clean water and wipe dry	59.62	33.23	$t(51) = 4.03$***	24.5	− 35.12	− 8.73	SR $t(12) = 5.79$***	SR $t(39) = 2.75$***
Use liquid soap when washing hands	67.35	47.71	$t(52) = 3.26$**	74.1	6.75	26.39	$t(39) = 2.28$*	$t(13) = 4.65$***
Cover nose and mouth when when sneezing, coughing or clearing throat†	70.22	–	–	100	29.78	–	$t(53) = 11.05$***	–
Wash hands before touching eyes, nose or mouth	53.75	33.38	$t(51) = 2.42$*	15.1	− 38.65	− 18.28	SR $t(7) = 6.49$***	SR $t(44) = 5.42$***

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

†, No non-practicer.

–, data in that cell and the corresponding analysis are not available.

Values are in percentages.

NP, non-practicer; ns, not significant; P, practicer, SR, significant effect opposite to predicted direction.

Table 2 Pluralistic ignorance and actor-observer bias (Study 1, $N = 55$)

Behavior	P self-reported prosocial motivation	P attribution of other P' prosocial motivation	Pluralistic ignorance	P self-reported prosocial motivation	Non-P attribution of P prosocial motivation	Actor-observer bias
Wear a face mask	− 0.13	− 1.78	$t(30) = 4.76$***	− 0.13	− 1.96	$t(22) = -3.90$***
Use serving spoons and chopsticks at meal times	0.27	− 1.3	$t(29) = 5.12$***	0.27	− 1.12	$t(24) = -3.61$***
Avoid sharing food and drink	− 1.07	− 1.55	ns	− 1.07	− 2.08	ns
Avoid sharing towels and utensils	− 1.24	− 1.73	$t(44) = 2.54$**	− 1.24	− 1.44	ns

***$p < 0.001$, **$p < 0.01$.
ns, not significant; P, practicers'.

Actor-observer bias

For each of the four preventive measures where motive attribution data were available, we subtracted non-practicers' inferred importance of self-protection from their inferred importance of other-protection. The difference scores indicated how prosocial the non-practicers thought practicers were. We then compared this difference score with the difference score that indicated how much the practicers were motivated by prosocial concerns. Table 2 shows that for two of the four behaviors, there was a significant actor-observer bias. These findings provided partial support for the hypothesis regarding actor-observer bias in motive assessment.

Discussion

The findings from Study 1 reveal some of the hypothesized social cognitive biases in prevalence estimation and motive assessment of some SARS preventive behaviors. First, there was a robust false consensus effect. Practicers of a preventive measure perceived the measure to be more widely adopted than did non-practicers. Second, the evidence for the uniqueness bias was mixed. Significant uniqueness bias was found in the prevalence estimates of some preventive measures. However, a reverse uniqueness bias was found in the prevalence estimates of other preventive measures. Third, the effect of pluralistic ignorance was evident in the participants' motive assessment. Participants who practiced preventive behaviors felt that their preventive behaviors were more motivated by prosocial concerns (relative to self-interest) than were other practicers' preventive behaviors. In other words, participants who practiced preventive behaviors saw themselves as being different (more altruistic, less self-interested) from other practicers of the same behaviors. Finally, for some preventive behaviors, non-practicers tended to underestimate the importance of prosocial concerns in practicers' preventive behaviors.

One limitation of the present study deserves attention. The use of a small homogeneous sample (boys from the same school) limits the generality of the findings. It also threatens the validity of our assessment of the uniqueness bias and the actor-observer bias, because sample prevalence rates and attribution pattern were taken as proxies for population prevalence rates and attribution pattern in these assessments. To address this problem, in Study 2, we sought to replicate the findings of Study 1 with a slight modification in the research design. Instead of asking participants to estimate prevalence rates among Hong Kong people, we asked them to estimate prevalence rates among Hong Kong secondary school students. In addition, participants were asked to assess the motives of Hong Kong secondary school students who adopted the preventive measures. These changes narrowed the inferential gap from sample information to information about the target group (secondary school students). We tested the same hypotheses in Study 2. Successful replication of the findings in this study will also enhance our confidence in the generality of these findings.

Methods

Study 2

We recruited a more diverse sample in the present study. Seventy-eight students (26 males, 52 females) from several secondary schools in Hong Kong, who joined a summer camp held

at a local university, volunteered to participate. The inclusion of girls in the present study also helped to correct for the gender bias in the sample of Study 1. They completed a two-page questionnaire, which was written in Chinese, in a group session. This session was held in the first week of July 2003, 2 weeks after the World Health Organization removed Hong Kong from the infected area list.

We included only six SARS preventive measures in the present study. The measures related to face masks (wear a face mask; put used face masks into plastic bags before disposal) were not included because most Hong Kong people did not wear face masks after Hong Kong was removed from the infected area list. To shorten the questionnaire, we also randomly removed another measure – avoid sharing towels and utensils. Removing these preventive measures left us with only two (instead of four) preventive measures where motive attribution data were available.

The dependent measures in the present study were identical to those in Study 1, with the exception of the change in the target group mentioned above.

Results

No participant gender effects were found, so we did not include gender in the following analyses. All participants took the preventive measure of covering nose and mouth when sneezing, coughing or clearing the throat. Thus, it was impossible to assess the false consensus bias in the estimated prevalence of this behavior. As shown in Table 3, significant false consensus bias was observed in all the remaining five preventive measures.

Again, we used the sample prevalence rates of the preventive measures as proxies for the actual prevalence rates of these measures among secondary school students. We observed a similar inconsistent effect of uniqueness biases as we did in Study 1. As shown in Table 3, we found significant uniqueness biases in two preventive measures among practicers and three measures among non-practicers. But, as in Study 1, we again found significant reverse effects.

Table 4 reveals that the pluralistic ignorance effect was considerably weaker in the present study than in Study 1. No significant effects were found in both preventive measures. But, for one of the two measures, practicers' self-reported importance of prosocial motivation was higher, although not significantly, than their attribution of other practicers' ($p = 0.19$). Table 4 also reveals that the actor-observer bias among non-practicers was found in one preventive measure. Compared to Study 1, the biases in motivation assessment were weaker. We will explain this finding presently.

Discussion

Most findings in Study 1 were replicated in the present study. As in Study 1, the false consensus effect was robust and consistent. By comparison, the uniqueness bias, pluralistic ignorance effect, and actor-observer bias were less salient and consistent in Study 2 than in Study 1. This may be attributable to the fact that whereas Study 1 was conducted during the SARS outbreak, Study 2 was conducted 2 weeks after the World Health Organization had removed Hong Kong from the infected area list. The success in controlling the spread of SARS in the community might have led the participants to believe that many people in the community had practiced the preventive measures. This belief might mitigate the uniqueness bias in Study 2.

Table 3 False consensus bias and uniqueness bias (Study 2, $N = 78$)

Behavior	Estimated prevalence		False consensus bias	Actual prevalence	Underestimation		Uniqueness bias	
	By P	By NP			By P	By NP	By P	By NP
Use serving spoons and chopsticks at meal times	40.37	18.9	$t(76) = 4.72$***	38.5	− 1.87	19.6	ns	$t(24) = 11.91$***
Avoid sharing food and drink	54.86	33.12	$t(75) = 4.26$***	45.5	− 9.36	12.38	SR $t(34) = 5.51$*	ns
Clean household daily with a solution of household bleach, rinse with clean water and wipe dry	59.9	27.01	$t(75) = 6.39$***	27.3	− 32.6	− 0.29	SR $t(20) = 6.37$***	$t(39) = 2.75$***
Use liquid soap when washing hands	65.83	33.21	$t(76) = 5.77$***	75.6	9.77	42.39	$t(58) = 3.53$***	$t(13) = 4.65$***
Cover nose and mouth when when sneezing, coughing or clearing throat†	78.79	–	–	100	21.21	–	$t(77) = 12.11$***	–
Wash hands before touching eyes, nose or mouth	55	24.74	$t(76) = 4.53$***	12.8	− 42.2	− 11.94	SR $t(9) = 5.33$***	SR $t(67) = 5.20$***

***$p < 0.001$.

–, data in that cell and the corresponding analysis are not available.

†, No non-practicer.

Values are in percentages.

NP, non-practicer; ns, not significant; P, practicer, SR, significant effect opposite to predicted direction.

Table 4 Pluralistic ignorance and actor-observer bias (Study 2, $N = 78$)

Behavior	P self-reported prosocial motivation	P attribution of other P prosocial motivation	Pluralistic ignorance	P self-reported prosocial motivation	NP attribution of P prosocial motivation	Actor-observer bias
Use serving spoons and chopsticks at meal times	− 0.17	− 0.47	ns	− 0.17	− 1.30	$t(46) = -5.11$***
Avoid sharing food and drink	− 1.33	− 1.27	ns	− 1.33	− 1.15	ns

***$p < 0.001$.
ns, not significant.

There are three possible reasons for the weak, non-significant pluralistic ignorance effect and actor-observer bias in Study 2. First, Hong Kong's success in controlling the spread of SARS might have created a positive bias in the participants' attribution bias. Indeed, self-protection attributions for other practicers' preventive behaviors in Study 2 were discernibly lower than those in Study 1 (4.9 *vs* 5.53 for using serving spoons and chopsticks at meal times, and 5.36 *vs* 5.83 for avoiding sharing food and drink). This positive bias could have eliminated the pluralistic ignorance effect in Study 2. Second, as Hong Kong's situation had improved when Study 2 was conducted, the desirability of the preventive behaviors might have become lower. Thus, participants in Study 2 might not view reporting preventive behaviors to be a vehicle for self-enhancement. Third, the target group in the estimation task was changed from general Hong Kong people in Study 1 to Hong Kong secondary school students in Study 2. It is possible that the participants saw secondary school students (their ingroup) more positively than general Hong Kong people (Tajfel, 1981) This intergroup evaluative bias might also attenuate the pluralistic ignorance and actor-observer bias in Study 2.

General Discussion

In the two studies, we documented several social cognitive biases in the prevalence estimation and motive assessment of some SARS preventive behaviors. These biases include the false consensus bias. The prevalence estimates given by people who practiced SARS preventive behaviors were higher than those provided by people who did not practice these behaviors (false consensus bias). In addition, a significant pluralistic ignorance was discerned in Study 1. Practicers of preventive behaviors saw themselves as being different (more motivated by prosocial concerns relative to self-interest) from other practicers of preventive behaviors. Significant actor-observer bias was also discerned. Non-practicers saw practicers as motivated by prosocial concerns to a lesser degree than practicers themselves self-reported.

These findings have important implications for SARS prevention. First, people are susceptible to normative influence (Asch, 1951), and perceived consensus is an important determinant of the likelihood of participating in social action (Sechrist & Stangor, 2001). In estimating social consensus, people often use their own behaviors as estimation anchors. In the present research, this was the case among people who practiced preventive behaviors and those who did not. The biased belief of having strong consensual support for one's own behavioral pattern may insulate a person from persuasive attempts to change behaviors. Non-practicers of preventive behaviors might believe that their behavioral pattern is widely shared and acceptable in the community and, hence, might be less motivated to change their behaviors. In addition, if non-practicers perceive undesirable behaviors (not practicing preventive measures) to be widely shared, they may also underestimate the risks associated with such behaviors (Jemmott *et al.*, 1986). From this perspective, health professionals may want to consider including in public health education campaigns factual information on the prevalence of preventive behaviors, particularly when the prevalence rates of such behaviors are high. In fact, as shown in Table 1, six of the nine recommended preventive behaviors listed in the government websites were practiced by more than of 50% of our participants (see Suls *et al*., 1988; for a similar argument).

The pluralistic ignorance effect and the actor-observer bias observed in some preventive behaviors revealed a tint of social pessimism or even cynicism in the participants' perceptions of other people's health behavior. Our participants seemed to have underestimated the

prevalence of preventive behaviors. Among people who did not practice preventive behaviors, they were skeptical of the motives of those who did. The social reality that emerged from such perceptual styles might lead to heightened anxiety and distrust in collective effort. While heightened anxiety will add to the economic and psychological costs of SARS, distrust in the collective effort may make it costly to implement primary prevention programs that require coordinated effort. A practical suggestion we make here is that health professionals should try to provide realistic feedback on people's perceptions or misperceptions of behavioral norms and motivation. This strategy has been shown to be effective in attenuating undesirable health-related behaviors (Agostinelli *et al.*, 1995).

Several limitations of the present research merits attention. First, given that the participants in the present research were all secondary school students, the generality of the findings to other population segments in Hong Kong is limited. Secondary school students might be different from common Hong Kong people because in school settings, preventive behaviors were more systematically regulated (students had to wear a face mask during classes during the SARS outbreak). Second, there were logistic difficulties in obtaining behavioral measures of the actual prevalence rates of the preventive behaviors. As such, we relied on participants' self-report. Third, as mentioned earlier, there are indications that the social cognitive biases we examined might have changed during the different periods of the epidemic in Hong Kong. Finally, although previous research suggested that the social cognitive biases we examined in the present research have implications for psychological and behavioral reactions to SARS, we did not collect the data that are necessary to establish these links.

Researchers in Singapore (Chang & Sivam, this issue of the Journal), Beijing (Gan *et al.*, this issue of the Journal) and Toronto of Canada (Ji *et al.*, this issue of the Journal) have noted various biases in people's perception of the SARS outbreak in their own regions, which, in turn, influenced their practice of related preventive health behaviors. We also found that Hong Kong people possessed pervasiveness social cognitive biases that might be linked to their psychological and behavioral reactions to the SARS epidemic. We have also identified some interesting directions for further explorations of these phenomena. As research scientists, it is tempting to end this paper with recommendations for further extensions of the present research program, including (i) replication of the present studies with more representative community samples using systematic behavioral sampling techniques to establish actual prevalence rates of preventive behaviors; (ii) analysis of the temporal change in these biases at the different stages of the epidemic; and (iii) in-depth empirical analysis of the implications of these biases for behavioral and psychological reactions to SARS. Similar research strategies may also be applied to understand the social cognitive basis of people's psychological reactions to other diseases. However, out of humanitarian concerns, we would rather close this paper with the wish that these further studies would never have the opportunity to be carried out, and we pay tribute to the health professionals who contributed so much to fight and conquer SARS.

References

Agostinelli, G., Brown, J. & Miller, W. (1995). Effects of normative feedback on consumption among heavy drinking college students. *Journal of Drug Education, 25,* 31–40.

Ajzen, I. & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior.* Englewood Cliffs, NJ: Prentice Hall.

Allport, F. H. (1924). *Social Psychology*. Cambridge, MA: Riverside Press.

Asch, S. (1951). Effects of group pressure upon the modification and distortion of judgment. In: M. H. Guetzkow (ed). *Groups, Leadership and Men*, pp. 117–190. Pittsburgh: Carnegie.

Bourgeois, M. & Bowen, A. (2001). Self-organization of alcohol-related attitudes and beliefs in campus housing complex: An initial investigation. *Health Psychology, 20,* 437.

Bowen, A. & Bourgeois, M. (2001). Attitudes toward lesbian, gay and bisexual college students: The contribution of pluralistic ignorance, dynamic social impact and contact theories. *Journal of American College Health, 50,* 91–96.

Chang, W. C. & Sivam, R. W. (2004). Constant vigilance: Heritage values and defensive pessimism in coping with severe acute respiratory syndrome in Singapore. *Asian Journal of Social Psychology, 7,* 35–53.

Cialdini, R. B., Reno, R. R. & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality Social Psychology, 34,* 907–914.

Foster, C. (2000). Perceptions of power-seekers. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 60* (7-B), 3618.

Gan, Y. Q., Liu, Y. & Zhang, Y. L. (2004). Flexible coping responses to severe acute respiratory syndrome-related and daily life stressful events. *Asian Journal of Social Psychology, 7,* 55–66.

Hines, D., Saris, R. & Throckmorton, B. (2002). Pluralistic ignorance and health risk behaviors: Do college students misperceive social approval for risky behaviors on campus and in media. *Journal of Applied Social Psychology, 32,* 2621–2640.

Jemmott, J. B. III, Ditto, P. H. & Croyle, R. T. (1986). Judging health status: Effects of perceived prevalence and personal relevance. *Journal of Personality Social Psychology, 50,* 899–905.

Ji, L. J., Zhang, Z. Y., Usborne, E. & Guan, Y. J. (2004). Optimism across cultures: In response to the severe acute respiratory syndrome outbreak. *Asian Journal of Social Psychology, 7,* 25–34.

Jones, E. E. & Nisbett, R. E. (1971). The actor and the observer: Divergent perceptions of the causes of behaviour. In: E. E. Jones, D. E. Kanouse, H. H. Kelley, R. E. Nisbett, S. Valins & B. Weiner (eds). *Attribution: Perceiving the Causes of Behavior.* Morristown, NJ: General Learning Press.

Krauss, R. M., Freedman, J. L. & Whitcup, M. (1978). Field and laboratory studies of littering. *Journal of Experimental Social Psychology, 14,* 109–122.

McCall, M., DePalma, M., English, G. & Potts, K. (1996). Perceived self- and other-vulnerability to AIDS: False consensus biases. *American Journal of Health Behavior, 20,* 400–405.

Miller, D. T. & McFarland, C. (1991). When social comparison goes awry: The case of pluralistic ignorance. In: J. Suls & T. A. Wills (eds). *Social Comparison: Contemporary Theory and Research*, pp. 287–313. Hillsdale, NJ: Lawrence Erlbaum.

Monin, B. & Norton, M. (2003). Perceptions of a fluid consensus: Uniqueness bias, false consensus, false polarization, and pluralistic ignorance in a water conservation crisis. *Personality Social Psychology Bulletin, 29,* 559–567.

Mullen, B. & Hu, L. (1988). Social projection as a function of cognitive mechanisms: Two meta-analytic integrations. *British Journal of Social Psychology, 27,* 333–356.

Ross, L., Greene, D. & House, P. (1977). The false consensus effect: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology, 13,* 279–301.

Schelenker, B., Hallam, J. & McCown, N. (1983). Motives and social evaluation: Actor-observer differences in the delineation of motives for a beneficial act. *Journal of Experimental Social Psychology, 19,* 254–273.

Sechrist, G. & Stangor, C. (2001). Perceived consensus influences intergroup behavior and stereotype accessibility. *Journal of Personality Social Psychology, 80,* 645–654.

Sherman, S. J., Presson, L. C., Chassin, L., Corty, E. & Olshavsky, R. (1983). The false consensus effect in estimates of smoking prevalence: Underlying mechanisms. *Personality Social Psychology Bulletin, 9,* 197–207.

Suls, J. & Wan, C. K. (1987). In search of the false uniqueness phenomenon: Fear and estimates of social consensus. *Journal of Personality Social Psychology, 52,* 211–217.

Suls, J., Wan, C. K. & Sanders, G. (1988). False consensus and false uniqueness in estimating the prevalence of health-protective behaviors. *Journal of Applied Social Psychology, 18,* 66–79.
Tajfel, H. (1981). *Human Groups Social Categories*. Cambridge: Cambridge University Press.
Wild, T. (2002). Personal drinking and sociocultural drinking norms: a representative population study. *Journal of Studies on Alcohol, 63,* 469–475.