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Extending the Risk Perception Attitude Framework to Predict Individuals' Engagement in Collective Actions Against Cancer

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Abstract

To identify the psychosocial determinants of individuals' intention to engage in collective actions against cancer, we extended and tested the risk perception attitude (RPA) framework at the level of social perceptions. The results of a large online survey of Hong Kong citizens ($N = 1,005$) revealed that perceived societal risk and perceived collective efficacy directly and jointly influenced respondents' intention to engage in collective actions against cancer, namely donating to cancer charities, volunteering at cancer-prevention organizations, and supporting public policies for cancer prevention. However, the interaction between perceived societal risk and perceived collective efficacy occurred in a direction opposite to the direction in the initial RPA framework. As suggested by the framework, we also categorized individuals into four attitudinal groups based on their perceptions of societal-level risk as well as efficacy and compared their demographic and psychological characteristics. Among the findings, the four groups significantly differed in their perceptions of individual-level risk as well as efficacy, in their family cancer history, and in their intentions to engage in individual-level behaviors to prevent cancer. Altogether, our findings contribute to the literature by extending the RPA framework to individuals' societal-level perceptions and by providing evidence that the framework can benefit the development of health communication campaigns to promote engagement in collective actions to support cancer prevention.

Keywords: risk perception attitude framework, perceived societal risk, perceived collective efficacy, collective actions, cancer prevention

Extending the Risk Perception Attitude Framework to Predict Individuals' Engagement in Collective Actions Against Cancer

Although a pressing public health risk worldwide, cancer especially threatens Asia, which shoulders half of the global burden of cancer (World Health Organization, 2018). Cancer presents a particularly serious problem in Hong Kong, an extremely densely populated area in Asia where cancer incidence is forecast to increase by 35% by 2030 (Center for Health Protection, 2019). According to the Hong Kong Cancer Registry (2019), 33,075 new cases of cancer were diagnosed in Hong Kong in 2017, for a record 1,607 more cases than in the previous year and a percentage increase of 5.1%. In the future, the social burden imposed by cancer treatment and health care will also increase in Hong Kong due to its growing aging population (Center for Health Protection, 2019). To reduce Hong Kong's burden of cancer, it is therefore crucial to promote the public's engagement in cancer prevention behaviors as well as collective actions against cancer.

Although researchers have evaluated communication strategies for cancer prevention campaigns in community settings (e.g., Kreuter et al., 2012), research and health communication campaigns about preventing cancer have largely focused on individual-level preventive behaviors (e.g., Kim & Lwin, 2020). In addition to individual-level risk-preventing behaviors, *collective actions*, defined as actions by a large number of people to change the social conditions threatening their group as a whole, have long been regarded as another critical means to avert societal threats, including public health risks (Cho & Kuang, 2014; Tajfel, 1981; Wright et al., 1990). Indeed, certain collective actions—donating to cancer care institutions, supporting public policies to prevent cancer, and volunteering at nonprofit organizations—have been identified as critical to preventing cancer at the societal level (Center for Health Protection, 2019). However,

little attention has been paid to understanding individuals' engagement in such collective actions against cancer, much less their sociopsychological determinants. To partly close that gap, we sought to not only examine individuals' motivation and intention to engage in those collective actions but also profile each audience segment according to demographic and psychological characteristics. We expected that both efforts would provide valuable insights into planning communication campaigns designed to promote engagement in collective actions against cancer.

To achieve those aims, we consulted the risk perception attitude (RPA) framework (Rimal & Real, 2003), a model widely employed to understand intention to perform preventive behaviors and to segment audiences for health communication campaigns. Although the RPA framework was initially proposed to explain how individual-level risk perception and efficacy beliefs predict intention to engage in individual-level preventive behaviors, its components—perceived risk and efficacy—have also been conceptualized as societal-level perceptions to predict individuals' intention to engage in collective actions as well (Cho & Kuang, 2014; Roberto et al., 2009). Guided by that conceptualization, we sought to extend the individual-level components of perception within the RPA framework to the societal level in order to clarify individuals' intention of engaging in collective actions against cancer. By conducting a large-scale online survey in Hong Kong, we expected that our findings would extend the RPA framework to societal-level perceptions and inform theory-driven communication strategies to promote individuals' participation in collective actions geared toward supporting cancer prevention.

The RPA Framework

The RPA framework suggests that individuals' intention to perform a behavior is determined by their perceived risk and perceived efficacy as well as the combined effects of

those components (Rimal & Real, 2003). Whereas *perceived risk* refers to individuals' estimation of a health threat's severity or magnitude and their evaluated likelihood of being affected by the threat, *perceived efficacy* refers to their confidence and ability in performing preventive behaviors to avert the threat, as well as the perceived effectiveness of those behaviors to reduce it. At its core, the RPA framework proposes an interaction effect between perceived risk and perceived efficacy on individuals' intention to perform self-protective behaviors; the effect maintains that individuals are more likely to act on their perceived risk when coupled with strong perceived efficacy. Along similar lines, the framework conceptualizes risk perception as a motivator of action, and efficacy beliefs as facilitators of action (Rimal et al., 2003; Rimal et al., 2009). In other words, among individuals with low perceptions of risk, efficacy beliefs should exercise little impact. By contrast, individuals with high perceptions of risk coupled with strong efficacy beliefs are motivated and able to engage in self-protective behaviors (Rimal et al., 2009).

The interplay between perceived risk and perceived efficacy in the RPA framework also offers a means to categorize individuals into one of four attitudinal groups (Rimal et al., 2009; Rimal & Real, 2003). Among those groups, the *responsive group*, exhibiting high perceived risk and high perceived efficacy, is expected to show the highest behavioral intention, whereas the *indifference group*, with low perceived risk and low perceived efficacy, is expected to show the lowest behavioral intention. The other two groups—the *avoidance group* (i.e., high perceived risk and low perceived efficacy) and the *proactive group* (i.e., low perceived risk and high perceived efficacy)—are proposed to have intermediate behavioral intentions.

Although studies guided by the RPA framework have tended to produce inconsistent findings, research has generally shown that perceived risk and perceived efficacy, along with

their interplay, influence intentions to perform behaviors to prevent cancer, including engaging in healthy lifestyle behaviors, receiving cancer screening, and applying skin-protection measures to avoid skin cancer (e.g., Rimal & Juon, 2010; Wong, 2009). Moreover, the RPA framework has been recommended as a theoretical guide for segmenting the audiences of health communication campaigns, including ones to promote diabetes screening (Rains et al., 2019) and HIV testing (Rimal et al., 2009).

Despite being a fruitful theoretical model for investigating self-protective behavior, the RPA framework has not been examined in relation to intention to engage in collective actions to prevent a public health issue currently threatening a larger group of people, including entire communities and societies. For that reason, in the current study, we adapted the RPA framework for societal-level perceptions and tested its ability to predict individuals' intention of participating in collective actions against cancer.

Extending the RPA Framework to Societal-Level Perceptions

Perceived Societal Risk

Perceived societal risk refers to the perception of how a phenomenon threatens a community and its residents (Roberto et al., 2009; Tyler & Cook, 1984). Perceived societal risk is theorized to stimulate societal processes and practices among the general public that can generate changes in political, economic, and societal conditions involving risk (Cho & Kuang, 2014). It is also highlighted as a predictor of individuals' intention to engage in collective actions to reduce or avert the foreseeable risk to their group or community, especially in response to environmental crises and public health threats (Roberto et al., 2009). For example, Bord et al. (2000) found that individuals' perceived risk of global warming for society significantly predicted their intention to support public policies to mitigate climate change.

To date, research on public health threats has primarily involved experiments to examine how induced perceptions of risk to society impact people's intention to support collective efforts, particularly implementing public policies, to reduce those threats. For example, a study on antismoking messages revealed that adolescents exposed to a message highlighting smoking's threat to society were more likely to support smoke-free environments than ones exposed to the message presenting the individual and health-related threats of smoking (Dickinson-Delaporte & Holmes, 2011). Similarly, Slater et al. (2015), who studied the effects of exposure to news stories about alcohol consumption, found that perceived societal-level risks of drinking alcohol induced by reading such stories positively impacted readers' support for public policies to control the alcohol consumption.

Other than those experiments, however, researchers have rarely investigated how perceived societal risk as a psychosocial motivation affects individuals' intention to engage in collective actions to support public health efforts. Considering the RPA framework's propositions and findings in the literature, we predicted that when individuals face a public health threat, its perceived risk to society motivates them to engage in collective actions to support public health efforts aimed at averting the threat. Thus, we proposed Hypothesis 1 (H1):

H1: Perceived societal risk of cancer is positively related to intention to engage in collective actions against cancer.

Perceived Collective Efficacy

Bandura (1994, 1997) has defined *perceived collective efficacy* as one's beliefs about a group's combined ability to solve a problem. Perceived collective efficacy plays a crucial role in predicting individuals' engagement in risk-reducing actions when they face large-scale or social-level risks or crises that require collective efforts in order to be resolved (Bandura, 1997). In

those instances, people perceive collective efficacy by evaluating the capacity of families, communities, organizations, social institutions, and even entire nations to solve the problems facing them and improve their lives through unified effort (Bandura, 1997). In other words, perceived collective efficacy affects people's decision-making about how to act as group members and how much effort they can or should devote to collective efforts.

The positive relationship between perceived collective efficacy and individuals' engagement in collective actions has been documented in situations such as performing pro-environmental behaviors (Bamberg et al., 2015) and supporting water conservation policies (Thaker et al., 2019). For instance, a recent study on climate change revealed that when individuals believed that the government's and community's actions were effective to those purposes, they were more likely to support public policies geared toward mitigating climate change (Bostrom et al., 2019). In addition, Smith et al. (2007) found that when individuals perceived their community as efficacious in helping people living with HIV, they were more willing to provide social support for and adopt orphans affected by HIV. Based on such theoretical and empirical evidence, we speculated that individuals who perceived a high level of collective efficacy would be more likely to engage in collective actions against cancer, as stated in Hypothesis 2 (H2):

H2: Perceived collective efficacy in preventing cancer is positively related to intention to engage in collective actions against cancer.

Interaction Between Perceived Risk and Efficacy

The RPA framework's core premise is the interaction effect of perceived risk and perceived efficacy on the intention to engage in preventive behaviors (Rimal & Real, 2003). Consistent with the framework's scope, however, such an interaction effect is proposed only at

the individual level of perception. In our study, by extending that interaction effect to societal-level perceptions, we aimed to investigate whether the framework's core premise is also valid at that level. As suggested by the framework, we assumed that individuals would be more likely to react to a perceived societal risk when they perceive their in-groups as being highly efficacious (Rimal & Real, 2003). Therefore, we proposed Hypothesis 3 (H3):

H3: The interaction of perceived societal risk and perceived collective efficacy affects the intention to engage in collective actions against cancer, such that the relationship between perceived societal risk and behavioral intention becomes stronger as perceived collective efficacy becomes stronger.

As mentioned, the RPA framework categorizes individuals into four attitudinal groups according to their levels of perceived risk and efficacy, which are expected to affect their behavioral intentions differently (Rimal et al., 2009; Rimal & Real, 2003). In line with that premise, we extended that audience segmentation approach to the level of social perceptions by categorizing individuals according to their perceived societal risk and perceived collective efficacy, as proposed in Hypothesis 4 (H4):

H4: Individuals in the responsive group show the highest level of intention to engage in collective actions against cancer, whereas ones in the indifference group show the lowest.

As also suggested by the RPA framework, segmenting individuals into the four attitudinal groups offers an approach to profile audience members according to their demographic and psychological characteristics, which can offer valuable guidance in planning campaigns and designing messages (Rimal et al., 2009). Considering that possibility, we formulated our first research question (RQ1) as follows:

RQ1: Do the four attitudinal groups differ in their demographic characteristics?

Although our study chiefly focused on intention to participate in collective actions against cancer, individuals' engagement in cancer prevention behaviors and collective actions are not mutually exclusive. An individual's perceived risk and efficacy at the societal level, along with their behavioral intentions of engaging in collective actions, could be associated with their individual-level perceptions and intentions of performing cancer prevention behaviors as well. Despite the scarcity of research on that relationship with reference to the RPA framework, empirical evidence suggests that perceived risk to oneself and perceived personal efficacy can positively or negatively relate to perceived risk to society and perceived collective efficacy (e.g., Snyder & Rouse, 1995). Therefore, we sought to investigate how the four attitudinal groups categorized by societal-level perceptions are associated with individual-level perceptions of risk and efficacy, as well as their intention to perform cancer prevention behaviors. To that end, we developed a second research question (RQ2):

RQ2: Do the four attitudinal groups differ in their individual-level psychological factors relevant to cancer prevention, namely (a) perceived personal risk of contracting cancer, (b) perceived personal efficacy in preventing cancer, and (c) intentions to engaging in cancer prevention behaviors (i.e., consuming fruits and vegetables, exercising regularly, and avoiding smoking) to prevent cancer?

Method

Participants and Procedure

We conducted an online survey with 1,005 Hong Kong citizens, 555 of whom were women, all more than 18 years old and without any personal history of cancer. From August 10 to September 25, 2018, we recruited the respondents via Qualtrics online panels with quotas for

age, gender, and monthly income, which were determined with reference to census statistics. After indicating their consent, respondents were given a paragraph-long description about individual-level behaviors to prevent cancer. It briefed the respondents on the definition of each behavior according to the Center for Health Protection in Hong Kong (2016). For example, *consuming fruits and vegetables* refers to having five or more cups of fruits or vegetables, including 100% pure fruit or vegetable juice, per day (e.g., 1 cup of fruit = 1 small apple = 1 large banana; 1 cup of vegetables = 1 cup of cooked leafy greens).

Respondents were 42 years old on average ($M = 42$, $SD = 12.38$, $range = 19-78$) and had a median monthly income between 20,000 and 29,999 HKD (approx. 2,500 to 3,900 USD). By level of education, 54% of respondents ($n = 543$) held at least a bachelor's degree, and concerning family cancer history, 38% ($n = 386$) reported having at least one family member who had been diagnosed with cancer. The institutional research ethics committee approved the questionnaire and procedure.

Measures

RPA Variables: Societal-Level Perceptions and Intention of Engaging in Collective Actions

Intention to Engage in Collective Actions Against Cancer. On a scale from 1 (*very unlikely*) to 7 (*very likely*), respondents rated how likely they would be to perform three behaviors in the next 6 months: (a) donate to cancer charities, (b) volunteer at organizations for preventing cancer, and (c) support public policies for cancer prevention (Smith et al., 2007). We averaged the three items to create a scale for intention to engage in collective actions against cancer ($M = 4.31$, $SD = 1.22$, $\alpha = .73$).

Perceived Societal Risk. We measured respondents' perceived societal risk using two items to be rated on 7-point scales (Rimal & Real, 2003)—(a) “Do you agree that cancer is a

major public health issue in Hong Kong?” (1 = *strongly disagree*, 7 = *strongly agree*) and (b) “How serious do you think cancer is in Hong Kong?” (1 = *not a problem at all*, 7 = *a very serious problem*). We averaged the two items to create a scale for perceived societal risk ($M = 4.82$, $SD = 1.13$, $\alpha = .68$, $r = .52$, $p < .001$).

Perceived Collective Efficacy. To assess perceived collective efficacy, we asked respondents to rate their agreement to four items from 1 (*strongly disagree*) to 7 (*strongly agree*) that we adopted from Johnson-Young and Magee (2014). The items were “Society can create solutions to prevent cancer together,” “People working together to tackle cancer can change society,” “The best way to deal with cancer problems is for communities to come together,” and “When a group of people work together to solve cancer problems, the results will spread out and benefit others.” We averaged the four items to create a scale for perceived collective efficacy ($M = 5.35$, $SD = 1.10$, $\alpha = .91$).

RPA Variables: Individual-Level Perceptions and Intention of Engaging in Cancer

Prevention Behaviors

Intention to Engage in Cancer Prevention Behaviors. According to the recommendations from the Center for Health Protection in Hong Kong (2016), we assessed respondents’ intention to engage in three cancer prevention behaviors: consuming fruits and vegetables, exercising regularly, and avoiding smoking. Such behaviors also are largely volitional and, unlike other cancer prevention behaviors (e.g., mammography), do not require any special assistance from the medical system (Maibach et al., 1996). On a scale from 1 (*very unlikely*) to 7 (*very likely*), respondents indicated how likely they were to engage in three specific behaviors in the next week: (a) consume five servings of fruits and vegetables every day ($M =$

5.28, $SD = 1.47$), (b) exercise regularly (i.e., 150 min of moderate-intensity aerobic physical activity per week, $M = 4.49$, $SD = 1.68$), and (c) avoid smoking ($M = 6.41$, $SD = 1.55$).

Perceived Personal Risk. Adopted from Rimal and Juon (2010), we measured perceived personal risk as a combination of perceived susceptibility and perceived severity. Respondents first rated their perceived likelihood (i.e., perceived susceptibility) of getting cancer in their lifetime from 1 (*very unlikely*) to 7 (*very likely*) in response to the single-item question, “How likely are you to get cancer in your lifetime?” ($M = 4.09$, $SD = 1.28$). Next, they assessed the severity of that risk (i.e., perceived severity) by rating how serious they believed that their (a) physical health, (b) mental health, and (c) life would be impacted if they were to develop cancer from 1 (*not at all serious*) to 7 (*extremely serious*), $M = 6.16$, $SD = 0.98$, $\alpha = .92$. We averaged the values of perceived susceptibility and perceived severity to create a scale for perceived personal risk ($M = 5.12$, $SD = 0.84$).

Perceived Personal Efficacy. For each individual-level behavior to prevent cancer, respondents rated three items about self-efficacy: “I am certain that I have the ability to engage in [the behavior]” and “I am sure that I know how to engage in [the behavior],” from 1 (*strongly disagree*) to 7 (*strongly agree*), and “How confident are you that you will be able to engage in [the behavior]?” from 1 (*not at all confident*) to 7 (*extremely confident*). Thus, a total of nine items assessed self-efficacy in performing the three individual-level behaviors to prevent cancer ($M = 5.57$, $SD = 0.90$, $\alpha = .82$). Response efficacy was measured by having respondents answer “How likely do you think it is that [performing the behavior] will help you prevent cancer?” on a scale from 1 (*very unlikely*) to 7 (*very likely*). Three items were used to assess response efficacy in performing the three behaviors ($M = 6.04$, $SD = 0.86$, $\alpha = .73$). Following Pask and Rawlins

(2016), we averaged the values of self-efficacy and response efficacy to create a scale for perceived personal efficacy ($M = 5.81$, $SD = 0.76$).

The correlations of the variables studied appear in Table 1.

Analytic Procedure

To test the hypotheses, we first conducted a hierarchical regression analysis with individuals' intention to engage in collective actions against cancer as the dependent variable with three blocks of independent variables. The blocks of predictors were entered into the regression in three steps: (1) the control variables age, gender, education, monthly income level, and family cancer history; (2) perceived societal risk and perceived collective efficacy; and (3) perceived societal risk \times perceived collective efficacy. The interaction term was mean-centered to reduce potential multicollinearity (Cohen et al., 2003). To answer RQ1 and RQ2, we divided the respondents into four attitudinal groups by employing medians of perceived societal risk and perceived collective efficacy as cutoff points (Rimal & Real, 2003). Last, chi-square analyses and analyses of variance (ANOVA) were conducted to compare differences in demographics, individual-level perceptions, and intention of engaging in cancer prevention behaviors between the groups.

Results

H1 and H2 predicted the direct effects of perceived societal risk and perceived collective efficacy on intention to engage in collective actions against cancer. As presented in Table 2, the results of regression analysis showed that perceived societal risk ($\beta = .10$, $p = .002$) and perceived collective efficacy ($\beta = .30$, $p < .001$) were positively associated with intention to engage in the collective actions, as consistent with H1 and H2.

H3 predicted interaction effects between perceived societal risk and perceived collective efficacy on intention to engage in the collective actions against cancer, namely that the relationship between perceived societal risk and intention becomes stronger as perceived collective efficacy becomes stronger. The results indicated an interaction effect between perceived societal risk and perceived collective efficacy on intention to engage in the collective actions ($\beta = -.07, p = .029$). To probe that significant interaction, we estimated simple slopes at 1 *SD* above and below the mean perceived collective efficacy. As presented in Figure 1, perceived societal risk was significantly and positively associated with the intention when perceived collective efficacy was low ($\beta = .15, t = 3.56, p < .001$). However, the association between perceived societal risk and the intention was not significant when perceived collective efficacy was high ($\beta = .04, t = 1.08, p = .28$). Thus, because the interaction's direction was opposite to what H3 predicted, the data were partly consistent with H3.

Next, we categorized the respondents into four groups based on their perceived societal risk and perceived collective efficacy scores using a median split—responsive ($n = 326$), avoidance ($n = 183$), proactive ($n = 227$), and indifference ($n = 269$)—as shown in Table 3. H4 predicted that members in the responsive group show the highest level of intention while ones in the indifference group show the lowest. To examine H4, we conducted ANOVAs to compare the difference in intention to engage in collective actions against cancer between the four attitudinal groups. The results of ANOVA showed a significant difference in intention across the groups, $F(3, 1001) = 35.05, p < .001, \eta^2 = .10$. Post hoc analyses using Tukey's HSD indicated that the responsive group ($M = 4.70, SD = 1.10$) and the proactive group ($M = 4.51, SD = 1.15$) did not differ from each other; however, their degrees of intention were significantly higher than the

avoidance group's ($M = 4.09, SD = 1.20$), which itself was significantly higher than the indifference group's ($M = 3.79, SD = 1.22$). Thus, the data were partly consistent with H4.

RQ1 inquired into the difference in demographic characteristics across four attitudinal groups. To answer RQ1, we conducted chi-square analyses and ANOVAs as a means to examine differences in demographics across the groups. The results indicated a significant difference only in family cancer history, $\chi^2(3) = 12.44, p = .006$. Post hoc tests revealed that the proportion of respondents with family cancer history in the indifference group (30.1%) was significantly less than that in the three other groups, which did not significantly differ from each other.

RQ2 inquired into the difference in individual-level perceptions of risk and efficacy as well as individuals' intention to engage in cancer prevention behaviors across the four attitudinal groups. To answer RQ2, we also conducted ANOVAs to compare perceived personal risk, perceived personal efficacy, and intention to perform cancer prevention behaviors across the four groups. The results showed a significant between-group difference in perceived personal risk, $F(3, 1001) = 32.54, p < .001, \eta^2 = .09$. Post hoc analyses indicated that perceived personal risk between the responsive group ($M = 5.41, SD = 0.77$) and the avoidance group ($M = 5.24, SD = 0.77$) did not differ; however, their perceived personal risk was significantly higher than the proactive group's ($M = 5.00, SD = 0.88$) and indifference group's ($M = 4.80, SD = 0.79$), which did not differ from each other. Regarding perceived personal efficacy, the results revealed another significant between-group difference, $F(3, 1001) = 52.08, p < .001, \eta^2 = .14$. Post hoc analyses indicated that the responsive group ($M = 6.07, SD = 0.58$) and the proactive group ($M = 6.03, SD = 0.65$) did not differ from each other. Moreover, the degrees of those groups' perceived personal efficacy were significantly greater than the avoidance group's ($M = 5.51, SD = 0.72$) and the indifference group's ($M = 5.49, SD = 0.85$), which did not differ from each other.

A significant difference emerged in intention to consume fruits and vegetables, $F(3, 1001) = 6.37, p < .001, \eta^2 = .02$. Post hoc analyses indicated that the responsive group's intention ($M = 5.49, SD = 1.45$) and proactive group's ($M = 5.43, SD = 1.44$) intention did not differ and were both significantly greater than the avoidance group's ($M = 5.07, SD = 1.49$) and the indifference group's ($M = 5.06, SD = 1.46$), which did not differ from each other. For intention to exercise regularly, a significant between-group difference was observed, $F(3, 1001) = 10.08, p < .001, \eta^2 = .03$. Post hoc analyses indicated that intention to exercise regularly did not differ between the responsive group ($M = 4.68, SD = 1.61$) and the proactive group ($M = 4.85, SD = 1.63$), both of whose intention were significantly greater than the avoidance group's ($M = 4.16, SD = 1.69$) and the indifference group's ($M = 4.19, SD = 1.73$), which did not differ from each other. Last, for intention to avoid smoking, another significant between-group difference emerged, $F(3, 1001) = 3.11, p = .026, \eta^2 = .01$. Post hoc analyses indicated that proactive group's intention ($M = 6.64, SD = 1.16$) was significantly greater than the indifference group's ($M = 6.24, SD = 1.81$), albeit those two groups' intention did not significantly differ from the responsive group's ($M = 6.44, SD = 1.46$) or the avoidance group's ($M = 6.31, SD = 1.68$), which did not differ from each other, either.

Discussion

In extending the RPA framework from individual- to societal-level perceptions, we examined how perceived societal risk and perceived collective efficacy directly and jointly affect individuals' intention to engage in collective actions against cancer. Consistent with the RPA framework's predictions for individual-level perceptions, perceived societal risk and perceived collective efficacy were positively associated with that intention to act. Moreover, perceived societal risk positively correlated with perceived personal risk, while perceived collective

efficacy positively correlated with perceived personal efficacy. However, despite an interaction effect between perceived societal risk and perceived collective efficacy on intention, the direction of the interaction was opposite to the direction of the RPA framework's prediction. In detail, perceived societal risk was not significantly associated with the intention to act when perceived collective efficacy was high, whereas perceived societal risk was significantly and positively associated with the intention when perceived collective efficacy was low. Altogether, our findings not only contribute knowledge to literature on RPA by extending the framework to societal-level perceptions but also offer valuable insights into developing communication strategies to promote the public's participation in collective actions for cancer prevention.

Major Findings and Implications

Although the initial RPA framework's scope is limited to individual-level perceptions of risk and efficacy and to intentions of performing self-protective behaviors, our study furnished evidence that the framework is also valid for societal-level perceptions and behavioral intentions to engage in collective actions. Indeed, our findings are largely consistent with the RPA framework's premises. For instance, individuals' perceived societal risk of developing cancer and their perceived collective efficacy in preventing it were positively associated with their intention to engage in collective actions against cancer. Moreover, by categorizing individuals into four attitudinal groups based on their societal-level perceptions of risk and efficacy, we compared their intentions to engage in such actions. Although the responsive group reported an intention that did not significantly differ from the proactive group's, the trend of the data was consistent with the RPA framework's prediction: The responsive group reported the highest level of intention, whereas the indifference group reported the lowest.

Furthermore, we found that individuals' perceptions of individual-level risk and efficacy positively correlated with the same perceptions at the societal level according to their attitudinal group. The groups that perceived a high societal-level risk reported a high individual-level risk, whereas the groups that perceived a low societal-level risk reported a low individual-level risk. The same pattern was documented for perceptions of collective and personal efficacy. Those findings suggest that individuals' perceptions of societal-level risk and efficacy closely relate to their individual-level perceptions, such that individuals may estimate the vulnerability and efficacy of their group or society based on their own situations when facing a public health threat such as cancer. Such a close association between personal- and societal-level perceptions regarding risk and efficacy has previously been documented. For example, Snyder and Rouse (1995) reported a moderate-level correlation between individuals' personal and societal risk judgments about AIDS. Similarly, Beaudoin and Hong (2012) reported a positive association between the perceived societal risk and perceived personal risk of marijuana use.

Nevertheless, such a close relationship between personal- and societal-level perceptions may depend on context. For instance, compared with public health threats that primarily involve certain groups (e.g., occupational injury), threats that can easily affect the general public, including cancer and viruses, may likely induce consonance between perceptions of personal- and societal-level risk and efficacy. In addition, the personal- and societal-level perceptions that we observed in our study, similar to those observed by others (e.g., Snyder & Rouse, 1995), were assessed using data from individual-level surveys. Because the two levels of perception were observed from the same source, the non-independent nature of the data could also explain why the individual- and societal-level perceptions were correlated. However, assessing the

relationship between personal- and societal-level *beliefs* about cancer (e.g., risk and efficacy), not individuals' perceptions of those beliefs, requires aggregate-level data.

In examining the RPA framework's core premise—that is, the interaction effect between perceived risk and perceived efficacy on behavioral intention—at the societal level, we also detected an interaction effect between perceived societal-level risk and perceived collective efficacy on intention to engage in collective actions against cancer, albeit in a direction opposite to the prediction of the RPA framework. Whereas the framework proposes that individuals are more likely to act upon their perceived risk when equipped with a greater sense of personal efficacy (Rimal & Real, 2003), our study revealed that individuals were more likely to act upon their perceptions of societal risk in engaging in collective efforts against cancer when they perceived less collective efficacy. Put differently, the interaction effect indicated that when individuals perceived a low level of perceived collective efficacy, higher levels of perceived societal risk served as a motivator for action, whereas the same motivation was less consequential when perceived collective efficacy was high. Alternatively, the opposite direction of the interaction effect may be attributed to the nature of the target behavior examined, which has been as proposed as a boundary condition for the RPA framework (Rimal & Turner, 2009; Shi & Kim, 2020), such that whether the target behavior's purpose is related to the individual or group may act as a boundary condition for the interaction effects proposed by the framework. Although that potential explanation needs to be investigated more thoroughly, such research stands to substantially refine the RPA framework.

Last, comparisons of the profiles of the four attitudinal groups revealed significant differences in their family cancer history and intentions to engage in cancer prevention behaviors. In particular, the indifference group had the smallest proportion of respondents with

family cancer history, meaning that individuals without such direct, personal experiences with cancer were likely to report perceiving low risk and efficacy at both the personal and societal levels, as well as minimal intention to engage in cancer prevention behaviors and collective actions against cancer. Those findings suggest that personal experience with cancer, including having a family member diagnosed with the disease, could increase individuals' involvement in the fight against cancer, heighten their perceptions of risk and/or efficacy, and motivate them to perform preventive behaviors and join the collective actions. The findings are consistent with some of the previous research conducted in the United States shows that having a family history of cancer increased individuals' engagement in cancer prevention behaviors (Bostean et al., 2013). Furthermore, our findings also suggest that assessing individuals' family cancer history could provide valuable information and implications for cancer prevention efforts.

We also observed a different pattern in the four groups' intentions in engaging in self-protective behaviors to prevent cancer. In particular, among the responsive and proactive groups (i.e., with high efficacy), the intentions to consume fruits and vegetables and to exercise regularly were greater than those in the avoidance and indifference groups (i.e., with low efficacy). When it comes to avoiding smoking, however, only the intention between the proactive group and the indifference group differed significantly. The nature of the cancer prevention behaviors may thus have contributed to the different pattern between the four groups. In particular, maintaining a healthy diet and exercising regularly are health maintenance behaviors that require skill and effort and have also been found to be primarily determined by one's efficacy beliefs (e.g., Smith-McLallen & Fishbein, 2008). Such factors may explain why the intention to perform such behaviors was significantly higher in the groups with higher perceived personal efficacy in our study. Nonetheless, neither smoking behavior nor smoking

status is easily changed in the short term, which may explain the rather slight variance in the intention to avoid smoking in the next week among the four groups. On top of that, social desirability bias cannot be ruled out in the self-reported scores for avoiding smoking, because the mean values for all four groups exceeded 6 on the 7-point scale. Therefore, although avoiding smoking is often recommended as a critical means to reduce the risk of cancer, it could qualitatively differ from other health maintenance behaviors and, as such, requires special attention from researchers and practitioners seeking to promote activities that prevent cancer.

Practical Implications

Our study provides several important implications for health communication campaigns aiming to promote cancer prevention. First, we found that individual-level perceptions of cancer-related risk and efficacy positively correlated with those same perceptions at the societal level. Thus, a cancer prevention campaign likely promotes individuals' engagement in cancer prevention behaviors and in collective actions against cancer at the same time, meaning that communication strategies should be targeted to the four attitudinal groups segmented by either personal- or societal-level perceived risk and efficacy. Likewise, campaign messages should concurrently address individual- as well as societal-level risk and/or efficacy in order to increase the target audience's perceived risk and/or efficacy at both individual and societal levels of perception. For example, messages targeted at those with indifferent attitudes toward cancer should highlight the social burden or health threat caused by cancer and one's own risk to the disease. For individuals, the messages should also provide the means to prevent cancer in order to improve individual-level efficacy and at once indicate what the community and the society have already done for cancer prevention in order to increase one's perception of collective efficacy. Furthermore, given that people with low perceptions of collective efficacy (i.e., the

avoidance and indifference groups) are motivated by their perceived societal risk to engage in collective actions, providing information and statistics about the burden of cancer in the community and society could strengthen their will to participate in those actions.

In the meantime, to effectively target different attitudinal groups and best disseminate persuasive messages, health communication practitioners should use computational technologies and digital marketing strategies in their health communication campaigns (Shi et al., 2018). In particular, individuals' user-generated content online and other aspects of their digital footprints, including content posted on social media as well as exercise and dieting records in fitness-tracking apps, could be used to predict attitudinal groups with the power of well-designed algorithms. With such predictions, tailored messages could be delivered via digital marketing tools—for instance, in personalized advertising on digital platforms such as Google, Facebook, Twitter, and other mobile apps.

Second, because individuals without any family cancer history were likely to report minimal intention to engage in cancer prevention behaviors and collective actions, health communication professionals should pay particular attention to them. Narrative persuasion and the use of communication technologies could be deployed to provide them with a vicarious experience of cancer. For instance, reading stories or engaging in role-playing video games could allow people without family cancer history to vicariously engage in behaviors made necessary by cancer, including serving as caregiver for family members with cancer or seeking medical treatment for loved ones. Such vicarious experiences may increase their intention to engage in actions designed to prevent cancer.

Third and last, our findings indicate different patterns of intention to engage in cancer prevention behaviors among four attitudinal groups, which suggests that communication

strategies promoting such cancer-preventive behaviors should vary across different groups. For example, health communication campaigns to promote the intake of fruits and vegetables as well as regular exercise should target the avoidance and indifference groups, and providing instruments to improve personal efficacy could be a promising strategy. Alternatively, antismoking interventions should target the indifference group, who indicated the lowest intention to avoid smoking among the four groups. On that topic, antismoking messages should address perceptions of both risk and efficacy, along with efficacy beliefs, in order to help the campaign to achieve its goals. At the same time, because smoking is an addictive behavior, efforts other than the means of communication, including community health services, medication, and policy enforcement, are also required to reduce smoking among people with indifferent attitudes toward preventing cancer.

Limitations and Future Research

Our study had several major limitations. First, we measured respondents' intention to engage in collective actions to support efforts in preventing cancer, not their actual behavior. Nevertheless, engaging in the collective actions—for example, donating to cancer charities—is not immediate behavior that can be quickly assessed after measuring antecedent variables. As such, we considered using intention as the dependent variable to be acceptable. Of course, subsequent research could adapt our study by imposing a longitudinal design to avoid the limitations of cross-sectional designs and to examine the RPA framework at the level of societal perceptions.

Second, we conducted our study in Hong Kong, where collective culture plays a significant role in shaping their social identity. Individuals with such cultural backgrounds are more likely to see themselves as members of a group than their peers from individualistic

cultural backgrounds (Hofstede, 1980). Future investigations on engagement in collective actions should therefore explore whether culture matters when applying the RPA framework at the level of societal perceptions.

Third, in extending the RPA framework, our study involved investigating how individuals' perceived risk and efficacy at the societal level affect their intention to engage in collective actions against cancer. Even so, the study involved addressing perceptions and behavioral intentions at the individual level, not the collective level, because it used individual-level survey data only. To assess cancer-related beliefs shared by a certain group, community, or society, however, researchers should consider collecting data beyond the individual level and aggregating the data according to different units, including household, community, and state.

Conclusion

By extending and testing the RPA framework, we assessed the framework's utility regarding perceptions at the societal level. Our results clarify that the framework's premises, initially proposed exclusively for individual-level perceptions, are largely valid for societal-level perceptions as well. Such findings indicate that the RPA framework, along with its recommendations for audience segmentation, can be a fruitful theoretical model for developing health communication campaigns geared toward promoting engagement in collective actions aimed at supporting public health efforts and countering threats to public health.

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Table 1*Correlations Between the Study Variables (N = 1,005)*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	–												
2. Gender (Man = 1)	.33***	–											
3. Education	-.22***	.15***	–										
4. Monthly income	.19***	.34***	.34***	–									
5. Family cancer history? (Yes = 1)	.10**	-.06	-.02	.05	–								
6. Perceived societal risk	.06	.00	-.02	-.00	.10**	–							
7. Perceived collective efficacy	.07*	-.01	.04	.05	.07*	.24***	–						
8. Perceived personal risk	-.06	-.06*	.05	.01	.14***	.34***	.17***	–					
9. Perceived personal efficacy	.07*	.02	.07*	.02	.05	.13***	.43***	.08*	–				
10. Intention to engage in collective actions against cancer	.05	-.11**	.03	.04	.14***	.17***	.34***	.08*	.42***	–			
11. Intention to consume fruits and vegetables	.03	-.01	.07*	.04	.00	.06	.15***	-.00	.45***	.26***	–		
12. Intention to exercise regularly	.04	.08**	.08**	.07*	.04	.03	.21***	-.01	.48***	.36***	.36***	–	
13. Intention to avoid smoking	-.11**	-.08*	.14***	-.02	.03	.03	.13***	-.00	.35***	.10**	.14***	.07*	–

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2*Hierarchical Regressions of the Intention to Engage in Collective Actions Against Cancer*

	Intention to engage in collective actions against cancer (<i>N</i> = 1,005)	
	β	<i>t</i>
Block 1		
Age	.06	1.72
Gender (Man = 1)	-.14***	-4.22
Income	.05	1.58
Education	.04	1.19
Family cancer history? (Yes = 1)	.09**	3.04
	$\Delta R^2 = .039^{***}$	
Block 2		
Perceived societal risk	.10**	3.17
Perceived collective efficacy	.30***	9.85
	$\Delta R^2 = .108^{***}$	
Block 3		
Perceived societal risk \times Perceived collective efficacy	-.07*	-2.19
	$\Delta R^2 = .004^*$	
Total adjusted R^2	.144***	

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3*Characteristics of the Four Attitudinal Groups (N = 1,005)*

	Responsive (n = 326)		Avoidance (n = 183)		Proactive (n = 227)		Indifference (n = 269)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Intention to engage in collective actions against cancer	4.70 _c	1.10	4.09 _b	1.20	4.51 _c	1.15	3.79 _a	1.22
Demographics								
Woman, %	56.7	-	51.9	-	54.6	-	56.1	-
Age (in years)	43.4	11.8	40.6	12.4	42.3	13.0	41.0	12.3
Bachelor's degree or higher, %	52.5	-	55.2	-	57.7	-	52.0	-
Monthly income >20,000 (in HKD), %	52.5	-	46.4	-	54.6	-	52.4	-
With family cancer history, %	42.9 _b	-	43.2 _b	-	37.9 _b	-	30.1 _a	-
Perceived personal risk	5.41 _b	0.77	5.24 _b	0.77	5.00 _a	0.88	4.80 _a	0.79
Perceived personal efficacy	6.07 _b	0.58	5.51 _a	0.72	6.03 _b	0.65	5.49 _a	0.85
Intention to engage in cancer prevention behaviors								
Consuming fruits and vegetables	5.49 _b	1.46	5.07 _a	1.49	5.43 _b	1.44	5.06 _a	1.46
Exercising regularly	4.68 _b	1.61	4.16 _a	1.69	4.85 _b	1.63	4.19 _a	1.73
Avoiding smoking	6.44 _{ab}	1.46	6.31 _{ab}	1.68	6.64 _b	1.16	6.24 _a	1.81

Note. Responsive = high perceived societal risk and high perceived collective efficacy; Avoidance = high perceived societal risk and low perceived collective efficacy; Proactive = low perceived societal risk and high perceived collective efficacy; Indifference = low perceived societal risk and low perceived collective efficacy. Cells in the table show means and standard deviations compared across the four groups. Entries sharing the same subscripts are not different at $p < .05$.

Figure 1

Interactions Between Perceived Societal Risk and Perceived Collective Efficacy That Predict Intention to Engage in Collective Actions Against Cancer

