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The role of exposure to communication channels, institutional trust and moral norm in predicting PM2.5 risk-reduction intention in China: A study of the theory of planned behavior.

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Abstract

Understanding and encouraging people to perform PM2.5 risk-reduction behaviors is essential to reduce the health risks caused by PM2.5 and to promote a healthy lifestyle. This study aims to predict the effects of psychological factors (attitude, perceived behavioral control, subjective norm and moral norm) on individual's PM2.5 risk-reduction intention. It also looks into how contextual factors (exposure to communication channels and institutional trust) can influence behavioral intention and make contributions to the predicting powers of the theory of planned behavior. To achieve this goal, I analyze the secondary survey data that randomly selected residents living in three regions known for heavy air pollution in China. Confirmatory factor analysis (CFA) is conducted to validate the reliability and construct validity for each theoretical concept. Then, I assess the underlying structure of exposure to communication channels to two dimensions (news vs. socially mediated communication) through a principal axis factor analysis. Hierarchical regression analysis indicates that individual's attitudes, perceived behavioral control, and self-efficacy are important factors of individual's PM2.5 risk-reduction intention. Moral norm plays an important role in the study and predicts a significant additional variance in intention. Furthermore, two types of exposure to communication channels have a significant effect on intention to perform risk-reduction behavior. In addition, institutional trust is found to be positively associated with intention and has positive correlations with all of the components of the theory of planned behavior. The study also finds that items regarding behavioral adjustment to external air (pollution) quality are the most helpful and will make the most difference in predicting PM2.5 risk-reduction behavioral intentions.

Keywords: risk-reduction behavior; $PM_{2.5}$; theory of planned behavior; moral norm, institutional trust.

THE ROLE OF EXPOSURE TO COMMUNICATION CHANNELS, INSTITUTIONAL TRUST AND MORAL NORM IN PREDICTING PM2.5 RISK-REDUCTION INTENTION IN CHINA: A STUDY OF THE THEORY OF PLANNED BEHAVIOR

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Table of Contents

The role of exposure to communication channels, institutional trust and moral norm in predicting PM2.5 risk-reduction intention in China: A study of the theory of planned behavior.

Chapter 1: Introduction

Air pollution is a major environmental problem that has driven great public concern in the world (Huang & Yang, 2018; Ru, Qin, & Wang, 2019). In recent years, scientists found that air pollution is an integrative effect of human activities and local climate change conditions (Brandt et al., 2013; Vallero, 2014). Back in the 1950s, some European countries and North America had experienced haze invasion, unfortunately, the same situation has happened in China since 2013 (Ru et al., 2019). The increasing haze occurrences characterized by high fine particulate matter (PM2.5) is the cardinal particle of air pollution and has emerged as the most urgent problem for global megacities (MEP, 2018; Wu et al., 2016). In particular, PM2.5 represents the cardinal particles (smaller than 2.5 μm in diameter) of the air pollution (Xiong et al., 2018), and it is basically "deriving from vehicular exhaust, fuel burning and some industrial activities" (Xiong et al., 2018, p. 2). Studies have found that the major components of air pollution are still unclear and the formulation of adopted policies to reduce the emissions have not had outstanding results in China (Fan, Wang, Wu, Li, & Zhao, 2015). A significant amount of studies has concentrated on both technological perspective and the perspective of household behavior in reducing PM2.5 (Greaves, Zibarras, & Stride, 2013; Shi, Fan, & Zhao., 2017a) but the results show that reducing PM2.5 emission remains poorly constrained and the approaches seemed ineffective when applied to the general public. Considering the long-lasting health issue, Chinese people who are living in air polluted cities generally neglect the issue as they have been exposed to bad air quality regularly. Unlike emerging infectious diseases (EIDs), the risks of PM2.5 are only visible after a considerable amount of time, but the damage to humans is

irreversible. A plethora of studies confirmed that exposure to PM2.5 can cause a variety of health issues, such as increased morbidity and mortality in both respiratory and cardiovascular diseases (Chen et al., 2017). Previous studies suggested that taking appropriate measures can minimize the health risks of PM2.5 exposures (Jiang, Mei, & Feng, 2016). For example, installing indoor air purifiers, wearing professional anti-dust masks and reducing the duration of outdoor activities in hazy days. However, Chinese people's adoption of various intervention measures is still low (Fan et al., 2015). Therefore, there must be additional efforts taken by government and health institutions to foster citizens to engage in PM2.5 risk-reduction behaviors.

Although studies related to PM2.5 risk-reductions are limited, previous research has discussed PM2.5 reduction behaviors and indicated that psychological and policy factors could influence people's PM2.5 reduction intention (Ru et al., 2019; Shi et al., 2017a; Shi, Wang, & Zhao, 2017b). The current study attempts to examine the key determinants of Chinese people's intentions to participate in PM2.5 risk-reduction behaviors based on the theory of planned behavior (TPB). The model assumes that behavioral intention is the best predictor of actual behaviors and it measures the individual's willingness to perform. The original TPB model suggests three components to determine intention - attitude towards the behavior, perceived behavioral control and subjective norm. In extending the TPB model, the current research considers moral norm in addition to the TPB's core variables that are related to cognitive self-regulation. Previous studies have noted that the original TPB model has limitations in explaining people's health behaviors determined by the subjective norm, thus, they have incorporated the role of moral norm into the model to examine what extent normative pressure influences behavioral intentions (Shi et al., 2019). As suggested by Yang & Ren (2020), moral norm should be considered for public health problems for which society needs to take collective actions to

tackle a societal or global problem to prevent and control the spread of disease. The current study is interested in how people's moral obligations about reducing the risks caused by PM2.5 can impact their overall behavioral intention to participate in the recommended risk-reduction behaviors.

The current research also considers two additional sources of influence—levels of exposure to different communication channels (Hu & Zhang, 2014) and institutional trust (Barbosa, Portilho, Wilkinson, & Dubeux, 2014). The media system dependency theory (Ball-Rokeach, 1985) suggests that citizens rely on the available media in the macro system and use different information sources to achieve their intended goals. During a health crisis, people may use different types of media for various purposes. For instance, traditional media are better at helping people obtain behavior cues whereas interpersonal networks are better for emotional support from family and friends. Hu & Zhang (2014) further suggested that individuals' use of and exposure to different communication channels could result in different levels of health knowledge, perceptions about risks and behavioral responses to mitigate the potential risks. Besides, whether or not believing in the government and health organizations' abilities to deal with the risks is also impacting people's behavioral intentions. The current study intends to contribute to the TPB literature by providing new insights to the institutional factors (exposure to different communication channels and institutional trust) on an individual's PM2.5 risk-reduction intention.

The purpose of the current study is threefold: (1) the effects of TPB components and moral norm on intentions to participate in PM2.5 risk-reduction behaviors, (2) the role of exposure to different communication channels in individuals' risk-reduction intention, and (3) the role of institutional trust in risk-reduction intention and the correlations between institutional

trust and TPB components. Through a survey that was sent to urban residents in three heavily air polluted regions in China, the study aims to make the following contributions. First, predict and explain the determinants of individuals' PM2.5 risk-reduction behavioral intention based on the TPB model with additional considerations on moral norm. From the results, I expect to have an objective regulation made based on the psychological factors that can encourage more Chinese citizens to participate in PM2.5 risk-reduction behaviors to protect their health. Second, explore how an individual's intention to participate is influenced by the levels of exposure to different communication channels in relation to PM2.5 risk-related information. With more communication channels becoming available, the results of the current study can help the government and health organizations establish more resources and effective solutions to educate the citizens about the efficient outcomes of engaging in the recommended behaviors. Finally, the study looks into the impact of the level of institutional trust on an individual's intention to participate in PM2.5 risk-reduction behaviors. The results can help the institutions formulate regulations based on citizens' preferences and tendencies toward adopting recommended policies and to create better campaign promotions. The paper is arranged as follows: Chapter 2 describes the TPB model, the moral norm component and related literature review to posit hypotheses. Chapter 3 talks about the data, samples and research methodology. Chapter 4 contains data analysis and results, followed by discussion and implications in Chapter 5. Conclusions and future work will also be discussed.

Chapter 2: Literature Review

The critical review of existing literature is essential to understand how the theoretical framework can help to organize thought, planning the structure of the study and analysis. The current chapter will focus on six concepts that are central to the purpose of the study. These six concepts include attitude towards PM2.5 risk-reduction behaviors, perceived behavioral control, subjective norm, moral norm, exposure to communication channels and institutional trust. Each section will contribute to the interest and purpose of the current research, as well as the development of each hypothesis. In this chapter, I will provide the theoretical framework that establishes the foundation of the study, along with previous studies that connect each concept in the context of predicting PM2.5 risk-reduction behavioral intention. In addition, the current literature review will seek to confirm the predicting power of the theory of planned behavior in the context of risk-reduction behaviors, as well as provide comprehensive explanations of how this study can contribute to the related research.

The Theory of Planned Behavior (TPB)

Among all the behavioral theories that have been used in investigating health-related behaviors, the theory of reasoned action (TRA) and the theory of planned behavior (TPB) are known to conceptualize, measure and identify factors that influence behaviors (Ajzen, 1985; Fishbein, 1967). Both models provide a theoretical framework for studies concerned with individual motivational factors as predictors of the likelihood to engage in a behavior. The two models suggest that the key determinant of behavior is behavioral intention (Montano & Kasprzyk, 2015), which in turn is also determined by an individual's attitude towards the behavior and social normative perceptions of the behavior (Ajezn, 1991). The TPB extended the TRA by incorporating the assumption of incomplete volitional control, also known as perceived

control over the performance of a behavior (Ajezn, 1991). Studies have applied TPB in predicting a vast array of behaviors such that meta-analytic studies exist for diverse behavioral contexts, including smoking cessation (Tseng et al., 2018), alcohol consumption (Cooke, Dahdah, Norman, & French, 2016), condom use (Albarracín, Johnson, Fishbein, & Muellerleile, 2001), dietary behaviors (Hagger et al., 2016), health-related behaviors (Godin & Kok, 1996), sun protection (Gordon, 2018), HIV/STD/AIDS-prevention (Siuki, Peyman, Vahedian-Shahroodi, Gholian-Aval, & Tehrani, 2019) and breastfeeding behavior (Guo et al., 2016). Moreover, TPB has also been adapted to study environment-friendly behaviors, such as pollution reduction preferences and intention (Cordano & Frieze, 2000), modes of transportation (De Groot & Steg, 2007; Haustein & Hunecke, 2007) and energy-saving behaviors (Gao, Wang, Li, & Li, 2017). A great amount of health research using TPB centers around people's health-promoting behavior (Conner & Norman, 2005) for oneself or taking preventive measures to prevent the infection of others (Godin & Kok, 1996). TPB is applied in the current study to examine the determinants of the likelihood to perform PM2.5 risk-reduction behaviors.

Three factors determine behavioral intention that leads to actual behaviors, which include attitudes, subjective norm and perceived behavioral control. These factors are shown to be related to appropriate sets of salient behavioral, normative and control beliefs about the behavior (Ajzen, 1991). The combination of these three variables is categorized as "cognitive self-regulation in the context of a dispositional approach to predict behaviors" (Ajzen, 1991, p. 180). Ajzen (2002) suggested that behavioral intention has the same influencing factors and effects as actual behavior and it indicates an individual's willingness to perform and the amount of effort one is willing to engage in the activity. Not only that, but the behavioral intention is also seen to have stronger predictions than behaviors. Studies suggest that behavioral tendencies are more

closely related to the determinants so that intention has stronger predicting characteristics and statistical significance (Lam & Hsu, 2006). The propaganda regarding PM2.5 risk-reduction behaviors in China still remains in the developing stage, while many citizens haven't had clear ideas of how to reduce the risks caused by air pollution. Hence, the current study is interested in measuring behavioral intention rather than the actual behaviors in terms of reducing PM2.5-related risks.

Components of TPB

The TPB indicates that attitude, subjective norm and perceived behavioral control influence behavioral intention (Ajzen, 1991). Attitude addresses an individual's expectancy beliefs about the likelihood that the behavior will lead to particular results or consequence and overall evaluations of the values and assets of those results and consequences (Ajzen, 2002; Fishbein & Ajzen, 1980). Perceived behavioral control refers to an individual's belief in the capability to perform based on the level of difficulties. Subjective norm refers to individuals' perceived social judgments and pressure to act. These perceptions of expectations from relevant ones (i.e. family, friends, colleagues) will influence the decision-making of whether or not to perform a certain behavior. Below each component of the TPB will be discussed and each corresponding hypothesis will be proposed.

Attitude (AT)

Attitude is an individual's self-evaluation of participating in a behavior (Ajzen, 1991). Some scholars explained that attitudes develop from the beliefs people hold about the object. However, Chan and Fishbein (1993) distinguished between attitude toward an object and attitude toward behavior with respect to that object. They found that attitude towards the behavior (i.e. reducing risks caused by PM2.5) is a better predictor of the behavior than attitude toward the

object (i.e. PM2.5 in this case) at which the behavior is pointed. Previous studies have indicated that attitude is an important factor influencing behavioral intention (Ru et al., 2019), such as people's intention of buying eco-friendly products (Yadav & Pathak, 2017), adapting soil conservation practices in Belgium (Wauters, Bielders, Poeson, Govers, & Mathijs, 2010) and willingness to pay for a suburban park (López-Mosquera & Sánchez, 2012). In this study, attitude towards PM2.5 risk-reduction behavior could be determined by different factors, including prior knowledge and self-experiences that Chinese citizens have been exposed to and concerns about the risks and their expectations of higher air quality. If their attitudes are positive, for example in commuting by public transportation, they will be more willing to participate in the risk-reduction behaviors. Given previous literature on the relationship between attitude and behavioral intention, this study proposes:

H1. Attitudes will be positively associated with people's intentions of participating in PM2.5 risk-reduction behavior.

Perceived Behavioral Control (PBC)

The definition of perceived behavioral control (PBC) refers to the self-evaluation of the level of difficulties and willingness to perform anticipated behaviors (Ajzen, 2002). Generally, it depends on the cost and benefits in the process of performing the behavior, such as financial cost, time and effort (Sparks, Guthrie, & Shepherd, 1997). PBC mostly depends on the external environment, such as controllability and self-efficacy to conduct the behavior (Wang, Fan, Zhao, Yang, & Fu, 2016). Some studies have suggested that PBC is the most significant determinant for pro-environmental behavior (De Leeuw, Valois, Ajzen, & Schmidt, 2015), energy saving behavior (Chen, 2016), and waste recycling intention (Botetzagias, Dima, & Malesios, 2015). Moreover, a study exploring Chinese young people's perceived risks on air pollution and reduction actions during hazy days found that young people who have strong confidence in the

controllability and self-efficacy are more willing to adopt the recommended behavior (Ru et al., 2019). Ajzen (2002, p.666) pointed that PBC also focused on "situations in which people may lack complete volitional control over the behavior of interests." For instance, carrying out the intention of avoiding the health risks caused by PM2.5 is not completely under an individual's control. Thus, the person will be disappointed if he or she still feels uncomfortable breathing the air even wearing a mask or using an air purifier. Furthermore, people who feel a lack of control of the risks may not only be dependent on the part of the individual but is also dependent on the regulation ability of related governmental institutions, the level of maturity regarding specific technologies and overall air quality during the time. For this reason, avoiding the risks is considered as a goal but not actual behavior. Thus, the focus of the current study is individuals' intention of reducing the health risks caused by PM2.5, which may lead to subsequent and sustainable behaviors.

As discussed, perceived behavioral control affects intention in different degrees (Ajzen, & Madden, 1986). When the level of perceived behavioral control is high, the intention of participating in PM2.5 reduction behavior is positive. The current study posits that the more easiness the person perceives, the more he or she will perform PM2.5 risk reduction behaviors. Thus, the following hypothesis is proposed:

H2. Perceived behavioral control will be positively associated with people's intentions of participating in PM2.5 risk-reduction behavior.

Subjective Norm (SN)

Subjective norm was originally referred to as the social pressure that a person received from significant others concerning a behavior (Ajzen, 1991). Fishbein and Ajzen (2011) expanded the scope of subjective norm and indicated that normative beliefs concerning significant others' behaviors are also measured as subjective norm. Generally speaking,

significant others can be friends and family members (Wei, Marthandan, Chong, Ooi, & Arumugam, 2009). Subjective norm is of great importance in environmental risk communication studies (Shi et al., 2017a; Wan, Shen, & Choi, 2017). It says that individuals under greater normative influence from those who are important or significant to them will be more likely to engage in an activity (Harland, Staats, & Wilke, 1999). Fishbei & Ajzen (1980) suggested that subjective norm has a significant impact on an individual's behavioral intention. Numerous studies have examined the relationship between subjective norm and environmental behavioral intention. Greaves et al. (2013) found that subjective norms have strong predictions on the intention to turn off the computer when leaving the desk in the workplace. De Leeuw et al. (2015) proposed that perceived social pressure has a positive impact on people's intentions to participate in pro-environmental behaviors among young people. Some scholars have also noted that subjective norm generally explains a smaller amount of the variance in intention compared to other TPB components but the significance of subjective norm should not be neglected (Moan & Rise, 2011). It is proposed that individuals' behaviors are consistent with their significant ones' expectations and behaviors in many cases, so that the stronger the social pressure a person perceives, the greater the possibility the person will participate in the behavior. Thus, the current study proposes:

H3. Subjective norm will be positively associated with people's intentions of participating in PM2.5 risk-reduction behavior.

Moral Norm (MN)

In many cases, attitudes appear to be a stronger predictor of intention than subjective norm (Smith & McSweeney, 2007), therefore researchers have tried to look into other determinants that can enhance the predictive power of the TPB under different contexts of studies (Harland et al., 1999). Ajzen (1991, p.189) stated that "the personal considerations tended

to overshadow the influence of perceived social pressure," Scholars later examined that the personal considerations include an important concept called personal moral norm (Beck & Ajzen, 1991; Leonard, Cronan, & Kreie, 2004). Moral norm, a personal internal state construct, is considered with the level to which an individual feels a sense of responsibility to perform (or not) morally (or immorally) in a situation containing ethical component (Fishbein & Ajzen, 2011; Yazdanpanah & Forouzani, 2015). Studies proposed that including a person's moral norm in the TPB model can improve the prediction of intention in parallel with attitude, perceived behavioral control and subjective norm (Chen, 2016; Ru et al., 2019). The value of moral norm has also been mentioned by Schwartz's (1968, 1977) norm-activation model, which emphasizes the self-expectations based on internalized values. He stated that moral norm would influence behavioral intention and behaviors when they are activated in certain situations. Later, Schwartz & Howard (1984) proposed this activation could happen when a) the individual is aware of the consequences of his or her current action for the welfare of other people and b) the individual realizes responsibilities for those consequences to himself or herself.

By knowing how moral norm could impact an individual's reaction to contexts, researchers can attempt to understand the likelihood of specific behaviors (Rivis, Sheeran, & Armitage, 2009). For instance, moral norm was found to influence people's intention to reduce air pollution (Ru et al., 2019), the willingness of condom use (Campbell, 2018), recycling intention (Chan & Bishop, 2013) and HPV vaccination (Juraskova, O'Brien, Mullan, Bari, Laidsaar-Powell, & McCaffery, 2012). Moreover, recent studies have also found that moral norm plays an important role in influencing environment-friendly behaviors. Shi et al. (2017a) found that moral norm is positively associated with PM2.5 reduction intention because people are told to have moral obligation of protecting the environment. Chen (2016) found that personal moral

obligation helps to explain pro-environmental behaviors, such as energy savings and carbon reductions. Similar to the findings of these studies, moral norm has also been applied in risk-related behaviors. Moan & Rise (2011) found that moral norm showed a significant impact on intention not to drink and drive and it added 2% to the variance after controlling for the impact of the TPB predictors. Besides the traditional behavioral dispositions, I consider that moral considerations should have an influence on the performance of reducing PM2.5 risks and to add an explanation of the variance in intention. Thus, this study proposes:

H4. Moral norm will be positively associated with people's intentions of participating in PM2.5 risk-reduction behavior.

Media Dependencies in Chinese Media Environment

Information often times is highly controlled in China and some of them are not fully available from the mainstream media, especially during a major public health crisis such as Severe Acute Respiratory Syndrome (SARS) in 2003 (Liu, 2004), dental caries prevalence (Bagramian, Garcia-Godoy, & Volpe, 2009), the prevalence of cardiovascular disease (Visscher, 2012), and the 2019 novel coronavirus (Zhu et al., 2020). Studies adapted the media system dependency theory to explore how individuals' perceptions of governmental institutions and information sources could influence their intentions of participating in the behavior when facing a particular health-related (Hu & Zhang, 2014; Tai & Sun, 2007) or environmental issue (Ho, Liao, & Rosenthal, 2015). The media system dependency theory attempts to explain micro-level individual media use by positing that it is a goal-oriented activity and that "media is a function of how dependent individuals are on mass media as a source of goal satisfaction" (Ball-Rokeach & DeFleur, 1976, p.6). Under the Chinese media system, individuals actively seek mediated messages to satisfy their needs and desires. Hu & Zhang (2014) found that the various types of communication channels, including mass media, interpersonal networks and the Internet, are not

given equal attention from audiences because of the differences in media functionality which can satisfy their desires and needs. According to the media system dependency theory, individuals' dependence on a particular medium is more likely to change under the situation that involves high ambiguity and uncertainty (Ball-Rokeach, Rokeach, & Grube, 1984; Power, 1995). PM2.5-related information is at the time of a public health issue in a highly controlled sociopolitical environment and the essential information regarding its policies is not readily available or clearly stated from the mainstream media. Thus, people's attitudes and feelings in performing a preventive or risk reduction behavior are highly influenced by their beliefs of the regulatory institutions and the news reported by the media.

In Mainland China, media have a special relationship with the ruling group (central government) and the audiences. The media have always been viewed as the "political authority's mouthpiece" (Chan, 1995, p. 51). Though the more freedom of posting information on social network sites has been given, the major information regarding public health issues is still emphasized by the party organs (Pan & Chan, 2003). The *People's Daily*, for example, is the nation's premier newspaper (Swanson, 1996; Tan, 1990) and the leading representative of China's media. When people read news from the *People's Daily*, they are receiving the ideologies and thoughts from the China Communist Party Central Committee (Yao, 2007). In contrast to the mainstream news, people also receive information through socially mediated communication (SMC), such as media blogs, instant messenger applications and interpersonal communication (Tai & Sun, 2007). Hu & Zhang (2014) found that people seek emotional support when they feel threatened about health risks and interpersonal networks, such as talking to family and friends on social media, can relieve their negative emotions and increase the chances of adopting health behaviors. Yang & Wu (2019) found that Chinese people have

become more dependent on receiving health information about PM2.5 from social media. They also found that TPB components mediated the relationship between social exposure to communication channels and PM2.5 risk-reduction behaviors (i.e. wear anti-haze mask). Moreover, Lin, Li, & Bautista (2017) found that attention to traditional media, new media and interpersonal discussion is positively associated with intention to take haze preventive measures.

As PM2.5 health and risk-related information are provided on different communication channels, it is reasonable to expect that individuals' attention to mainstream media and social media will have an impact on Chinese people's behavioral intentions to take risk-reduction measures. More importantly, this study is interested in whether PM2.5 risk-related information exposure on traditional media news and socially mediated media will exert different influences on Chinese people's behavioral intentions. Based on the aforementioned discussion, I address the following research question:

RQ1: What is the role of exposure to communication channels in predicting Chinese people's PM2.5 risk-reduction intentions?

The Role of Institutional Trust on PM2.5 Risk-Reduction Intention

Trust is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the others will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Davis, & Schoorman, 1995, p. 712). Lobb, Mazzocchi, & Traill (2007) found that trust in the agency, government, political groups and authority are generally found to be reassuring and have a positive impact on behaviors.

Trust has also been proposed in various health risk-related models, such as the risk information seeking and processing (RISP) model. In this model, Griffin, Dunwoody, & Neuwirth (1999) indicated that the trust in government agencies or risk management authorities is an important component in influencing risk judgment, emotions and responses to the risk. Scholars addressed this type of trust as institutional trust, in which people rely on information based on experts' risk assessments. Institutional trust reflects the "willingness to rely on others who have the responsibility for making decisions and taking actions related to the management of technology, the environment or other realms of public health and safety" (Huurne & Gutteling, 2008, p. 849). Institutions here can describe the central government, local government, health organizations and risk management agencies that take responsibility for making decisions regarding health issues (Cheng et al., 2013). A handful of studies have suggested individuals' perceptions of institutions are essential factors in influencing their attitudes and emotions, which will possibly lead to the impact on behavioral intention (Griffin et al., 2008; Huurne & Gutteling, 2008). As Walker, Simmons, Wynne, & Irwin (1998) proposed, perceptions of environmental risk are impacted by his or her trustworthiness of controlling or regulatory institutions. More risk communication scientists indicate that when people trust the institutions handling the risk, their risk perceptions are lower and they are more likely to engage in recommended behaviors to mitigate the risk (Allen Catellier & Yang, 2012; Siegrist, Cvetkovich, & Roth, 2000), Slovic (2000) indicated that the limited effectiveness of a risk communication effort can be caused by lack of trust.

Trust is important when risk-related information is highly controlled by the government and the information is not fully readily available from the mainstream media. Individuals' trust in governmental agencies, therefore, are impacting their perceptions of whether or not to follow

policies and taking actions. Institutional trust is shown to enhance confidentiality in cooperating with the suggestions and policies during emergency infectious diseases (EIDS) and pandemics. For example, the outbreak of 2019 novel coronavirus (COVID-19) has been spreading and impacting quickly nationwide. The outbreak first started in Wuhan, China and the prevention policies were quickly released from the Chinese Center for Disease Control and Prevention (China CDC). The majority of citizens have paid serious attention to the news and followed the instructions that the CDC outlined. Recent studies have shown that citizens' trust in the government's ability to prevent the spread of COVID-19 maintained high during the outbreak (Surveillances, 2020). Moreover, Zhang, Li, & Chen (2020) found that the delayed decision making of the government agencies and the limited information disclosure were mainly responsible for ineffective risk communication of COVID-19. As such, it is reasonable to suggest the idea that trusting the information source, such as government and risk management institutions, could lead to the positive intention of engaging in any suggested behaviors (i.e. wearing a breathing mask, washing faces and hands more often). Thus, I address the following research question:

RQ2: What is the role of institutional trust in predicting Chinese people's PM2.5 risk-reduction intention?

Institutional Trust and TPB Components

The correlations between trust and components of TPB have been carried out in various contexts and can be implicated from Bandura's (1986) social cognitive theory. He observed that outcome expectation is a person's estimation that a particular behavior will lead to a certain outcome and this behavioral belief influences the person's attitude towards the behavior. The theory also indicated that trust affects outcome expectations, which is a direct influencer that determines attitudinal behaviors. When we trust another behaves in a way that is essential for a

desirable outcome, we form a favorable attitude toward that behavior. For instance, trust is found positively related to attitudes toward in-app advertisements and intention to watch in-app advertisements (Cheung & To, 2017). Al-Debei, Akroush, & Ashouri (2015) also found that trust is an important predictor for consumer attitudes towards online shopping. Other studies have found that trust influences perceived risk and subsequent behaviors, such as attitudes towards using electronic medical records exchange (Hsieh, 2015) and the intention to seek information about the H1N1 flu vaccine (Allen Catellier & Yang, 2012). Trust is also found to increase perceived behavioral control through manipulative factors of self-efficacy and accelerate favorable conditions (Adewale, Yusuf, Ghani, Meera, & Manap, 2012). From the psychological perspective, Matsushima & Shiomi (2003) found that trust enhances self-efficacy in engaging the behavior especially when the trustee (i.e. information source) is perceived to be authoritative. Therefore, institutional trust in the relationship between citizens and government agencies or risk management authorities should increase citizen self-efficacy then increase perceived behavioral control. Studies have also shown that trust and subjective norm are correlated to one another (Li, Hess, & Valacich, 2008; Hitosugi, 2011). Adewale and the research team (2012, p.3) found that "trust in issuer authority about their reputation, brand name and service may positively influence subjective norm…they may indicate the certain relationship between trust in peers and superiors and trust in government." Thus, under certain contexts, such as when a PM2.5 risk-reduction information source is centralized, people's trust in authority and government will directly or indirectle influence subjective norm, and the trust itself is an important antecedent of subjective norm.

Despite the findings from the previous studies in pinpointing the relationships between different types of trust and the components of TPB, the theoretical standpoint has not been fully

developed and the correlations between trust and the TPB components maintaining questionable. One of the objectives of this study is to test whether there are correlations between institutional trust and TPB components under the context of PM2.5 risk-reduction behavioral intention in China. Based on the foregoing discussion, the following research question is addressed:

RQ3: How does institutional trust correlate with a) attitude, b) perceived behavioral control, c) subjective norm and d) moral norm?

Chapter 3: Methodology

Studies have shown the importance of the methodological tools used to collect the data, thus, the current chapter will outline the study's procedures in detail. It will first justify the methodological decisions, including decisions of adopting and analyzing secondary data source. It will then explain the sampling techniques by describing the recruitment procedures and the sample size. Followed by the questionnaire design, the current chapter will discuss the operationalization of each variable and provide a detailed explanation of the items that were used in this study to test its proposed hypotheses. Finally, it will provide a description of anticipated analyses and the threats to validity.

Secondary Data Source

According to Fowler Jr. (2013), survey research method is widely used to measure perceptions and attitudes. Various studies have used survey questionnaires to measure attitudes, opinions and perceptions on environmental health risk issues (Griffin, Neuwirth, Dunwoody, & Giese, 2004; Huang & Yang, 2018; Yang, Aloe, & Feeley, 2014). As indicated, the goals of the current study are trying to explore 1) whether people's PM2.5 risk-reduction behavioral intention are influenced by the TPB factors (attitude toward the behavior, perceived behavioral control, moral norm and subjective norm), 2) whether exposure to communication channels has an impact on PM2.5 risk-reduction intention and 3) whether institutional trust has an impact on PM2.5 risk-reduction intention and the potential correlations between institutional trust and the TPB determinants. Therefore, survey research method is efficient in this study that aims to discover the relationships between variables and also for model testing and establishing.

This study analyzes the survey data as the secondary data source. It is based upon data collected as part of the Social Science Korea (SSK) Grant project under Grant No. (NRF-

2018S1A3A2074932), which is supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea. For the grant project titled “Integration of communication technologies for community health and environmental justice,” I participated as a research assistant for Dr. Joon Soo Lim, a Co-Investigator of the project. Many studies have discussed the advantages of using secondary data sources (Sørensen, Sabroe, & Olsen, 1996), for instance, the time spent on this study using secondary data sources is likely to be less than the time spent on studies that use primary data collection. Moreover, the costs of the study are reduced significantly and markedly compared with primary data sources. Other advantages include, specifically to the current study, the size of the sample and the quality of the dataset.

Procedure

An online survey in English was first designed to measure all major variables in the hypothesis model. The questionnaire adopted the back-translation method (Brislin, 1970) to ensure accuracy and clarity in translation. The investigator invited a graduate student to translate the questionnaire items from English into Chinese and then invited another graduate student to translate the same items from Chinese back into English. Both of the student researchers are fluent in English and Chinese and have conducted similar context of studies. This procedure allowed the investigator to reduce any discrepancies in the items (Cheung & To, 2017). In addition, the project team manipulated and changed the item characteristics (i.e. contents, wordings, tones) to better fit the purpose of targeting the Chinese population and the study of PM2.5 risk-reduction behavioral intention in China.

Recruitment

Cross-sectional data were collected from October to November 2019. Participants were randomly sampled from the sampling service of a professional online survey company in China,

Sojump (visit http://www.Sojump.com/). Sojump is the most widely used and recognized online sampling service in mainland China. The platform has collaborations with various Chinese and worldwide research institutes. Numerous social scientists have used this service for recruitment purposes (Ru et al., 2019; Lien & Cao, 2014; Spillan, Mintu-Wimsatt, & Kara, 2018). Sojump has more than 2.6 million registered users from various provinces and municipalities in China and researchers can recruit participants from certain areas that match their investigation purposes. These potential participants are invited from different sources, such as collaborators, school institutes, blogs and online search engines. Each user registers for a unique account with the Sojump website and participates in online surveys in exchange for credits from multiple websites which can be used for shopping, gaming, watching online movies, TV shows and other expenditures.

Sampling and sample size

Based on the recent reports published by the Chinese government (MEP, 2018; MEP, 2017), the questionnaire was sent to three regions in China known for heavy air pollution. The regions included the Beijing-Tianjin-Hebei region, Yangtze River Delta (Shanghai, Jiangsu, Zhejiang), and the Cheng-Yu area (Sichuan, Chongqing). These cities suffered from serious haze and are identified as severe haze-polluted areas. The sampling procedure is as follows, which has been employed in previous studies (Chen, Cheng, & Urpelainen, 2016; Huang & Yang, 2018; Lien & Cao, 2014; Zhou et al., 2013). Studies have shown that sample size was set adequately to the consideration in cost (i.e. time, financial support, effort) of obtaining additional participants and weighted against the benefits of having more participants. The sample size was designed to meet the preferred condition of effect size: 0.15, desired statistical power level: 0.8, and the probability level: 0.05. Based on previous research experiences and the population of China, the

project team had planned to conduct at least 1,500 samples to ensure that the study sample size was great and representative.

The sampling service randomly recruited participants from the eight target areas until a required number of participants had completed the questionnaire. The number of participants of each city was equally drawn from the sampling pool. In particular, each registered respondent on Sojump has been assigned an ID number ranging from 1 to the maximum number of the size, so all the participants should be randomly recruited from the sampling service. Finally, 2,084 questionnaires were collected. After the removal of 515 invalid cases, there were 1,569 final valid questionnaires. The demographic information of the participants is described in Table 1. Among the recruited 1,569 participants, 52.8% were female and 47.2% were male. More than half of the participants held a bachelor's degree or higher (69.5%), and around 23.4% attended some college or held an associate degree, while 7.2% had a high school diploma or less than a high school degree. The average age of the participants was 30. According to Pew Research Center's definition of "generations" (Fry, 2014), 28.9% of the participants were centennials, 58.7% were millennials, followed by 11.3% generation Xers and 1.2% Baby Boomers. At present, they were the main contributors to environmental reduction. Of all participants, about 64.1% reported having monthly household income between ¥5000 ($714) and ¥20,000 ($2857), 23.4% making more than ¥20,000 and 4.1% having less than ¥5000.

Institutional Review Board (IRB)

The project team received permission from the Institutional Review Boards (IRB) to conduct the study and ensured all processes were reasonable and legal. The IRB was instituted to protect the rights of participants (Musoba, Jacob, & Robinson, 2014). The current study was granted to collect and analyze data reported from participants aged 18 and above. Specifically, an

exemption from regulation was received in terms of conducting data internationally while the project team was physically in the U.S. The IRB determined that the research study met its ethical standards.

Questionnaire Design

The questionnaire was designed with a single choice for multiple options methods. Babbie (2013, p.249) indicated that this method could "provide greater uniformity of responses and are more easily processed."

The designing process of the questionnaire was exhaustive and exclusive. The project team adapted the scales from previous research. All the scales were manipulated and revised to serve the purpose of the study, specifically the policies that are regulated in China. The project team revised the questionnaire after discussing with the graduate students about the item choices and appropriations of the language used.

The entire survey took participants about 20 minutes to complete. The survey included 30 variables and contained three parts. The first part asked participants about parts of their demographic information, including living location (single choice from the eight provided locations) and gender. The participants then were asked questions regarding their PM2.5 risk-reduction behavioral intention and other PM2.5 risk-related questions. Finally, the participants answered the rest of the demographic information, including their health condition, household income, marital status and education level. The current study is only interested in nine variables that were measured and the measurement of each variable will be discussed below.

Key Variables

The measurements of the key variables are described below, including the number of items, Likert scale dimensions, the adapted source reference and the Cronbach's alpha (Tavakol &

Dennick, 2011; Sijtsma, 2009) to indicate reliability. Researchers have indicated that "high-quality tests are important to evaluate the reliability of data supplied in an examination or a research study" (Tavakol & Dennick, 2011, p. 54). Alpha value is a commonly employed index of test reliability. The suggested acceptable values of alpha ranging from 0.70 to 0.95 (Bland & Altman, 1997; Nunnally, 1994). Table 2 shows the composite of all key variables as a reference.

Attitude toward PM2.5 Risk-Reduction Behavior (ATT). Measurements were adopted from Ru et al. (2019), Shi et al. (2017a) and Shi et al. (2017b). Participants were asked how they feel about participating in PM2.5 risk-reduction behavior, such as taking public transportation for commuting. Items were assessed on a 7-point Likert scale anchored by "beneficial," "a good idea," "pleasant," "useful." ("1" = strongly disagree, "7" = strongly agree). The measurement indicated that the higher score the participant self-reported, the more positive feeling the person has toward participating in reducing risks caused by PM2.5. The Cronbach's alpha for this 4-item scale was 0.79 (M=5.48, SD=.99).

Perceived behavioral control (PBC). PBC depends mostly on external environment (i.e. availability of facilities) and perceived personal power (i.e. controllability and self-efficacy) to conduct the behavior (Bandura, 2006). Adapted from Shi et al. (2017a), perceived behavioral control was measured using four items on a 7-point Likert scale ("1" = strongly disagree, "7" = strongly agree). Participants were posed statements, such as "I am confident that I could participate in PM2.5 risk-reduction behavior if I wanted to" and "It is easy for me to participate in PM2.5 risk-reduction behavior." The Cronbach's alpha for this 4-item scale was 0.84 (M = 5.33, SD = .93).

Subjective Norm (SN). Guided from Ajzen's (1985; 2006), the theory of planned behavior constructed that a subjective norm is perceived as social pressure to participate in the behavior.

Adapted from previous literature (Shi et al., 2017a; Ru et al., 2019), a 7-point Likert scale from "1=strongly disagree" to "7=strongly agree" to measure subjective norm regarding PM2.5 risk-reduction behaviors. Statements included "Most people important to me would say I should participate in PM2.5 risk-reduction behavior" and "It is expected of me that I participate in PM2.5 risk-reduction behavior." Cronbach's alpha for this 4-item scale was 0.75 (M = 5.07, SD = 1.04).

Moral Norm (MN). Based on Ru et al. (2019)'s paper on young people's behavioral intention towards reducing PM2.5 in China indicated that personal moral norm is also an important factor leading to behavioral intention. I adapted the scale and modified it to the following items. On a 7-point Likert scale from "1 = strongly disagree" to "7 = strongly agree," statements that measured moral norm included, "I would feel guilty if I was not involved in PM2.5 risk-reduction behaviors in daily life" and "I believe that I have a moral obligation to conduct PM2.5 risk-reduction behavior in daily life." Cronbach's alpha for this 3-item scale was 0.83 (M = 5.23, SD = .89).

Institutional Trust. The trust in risk management institutions and/or governments ("institutional trust") is one of the important elements when risks are difficult for the public to control. Guided by Griffin et al. (2008), trust in agencies was composed of four measures. In this study, the operationalization of trust is "the level of confidence an individual has in a specific information source to provide fair and accurate information" (Allen Catellier & Yang, 2012, p. 898). On a 7-point Likert scale from "1 = strongly disagree" to "7 = strongly agree," four items were adapted from the previous research (Poortinga & Pidgeon, 2003). Participants were asked if they agreed or disagreed with the provided statements that describe the governments' ability to deal with the current problem related to PM2.5. Statements included, "The government is doing

a good job with regard to regulate PM2.5 as a pollutant" and "The government is competent enough to deal with pollution caused by PM2.5." Cronbach's alpha for this 4-item scale was 0.82 (*M* = 5.23*, SD* = 1.04).

Exposure to communication channels. Exposure to communication channels often plays different theoretical roles in studies, thus the measurement of exposure to communication channels varied depending on the characteristics of the study. Activities of media audiences are measured in content contexts (i.e. news, advertising, health) and platforms (i.e. newspapers, television, social network sites) (De Vreese & Neijens, 2016; Slater, 2004). According to Niederdeppe (2014), self-report questions about exposure to communication channels are seen to be the most frequently used approach for the measurement of exposure to communication channels. Six items were adapted from Parrott, Silk, Raup Krieger, Harris, & Condit (2004) and manipulated to fulfill the purpose of the current study. On a 7-point scale from "1 = not at all" to "7 = always," participants were asked how often they encountered the information about health risks caused by PM2.5 from each of the provided sources. Sample items included "Interpersonal communication (family, friends, colleagues, etc.)" and "Print media (Newspaper, magazines)." After conducting factor analysis, there are two types of exposure to communication channels categories provided. Cronbach's alpha for exposure to communication channels was 0.62 (*M* = 5.23*, S D*= .95) for news channels and 0.61 (*M* = 4.93*, SD* = 1.06) for socially mediated communication, respectively.

PM2.5 Risk-Reduction Intention. Guided from Ajzen's (1985), intention is sufficient to predict behavior and is measured by the degree of an individual's willingness to engage in a behavior. Items regarding risk reduction behavioral intention were adapted from various sources, including previous literature and the policies reported from Chinese governmental agencies.

Thirteen items were adapted from Delmas & Kohli (2019)'s air pollution health-protective behaviors and Liu, Chiang, Tseng, Ng, Yeh & Fang (2018)'s anti PM2.5 behavioral intention. On a 7-point Likert scale from "1 = very unlikely" to "7 =very likely," participants were asked how likely they were to perform the provided behavior to reduce the potentially harmful health effects from inhaling PM2.5. Statements included "Minimize the times for opening windows" and "Wear face masks." Cronbach's alpha for this 13-item scale was 0.73 (M = 5.55, SD = .63),

Demographic/sociocultural and individual characteristics variables. Demographic variables were used in the original study and mostly as control variables. According to Griffin, Dunwoody, & Neuwirth (1999), items measured demographic and individual characteristics including education, annual household income, age and gender. Consistent with the purpose and topic of the current study, the project team also included a measure of where the participant lives through a single choice method and a self-report of whether he or she had any of the provided health conditions (i.e. heart disease) through a multiple-choice method.

Pilot Test

A pilot was necessary for factoring structure and concurrent validity (Biocca, Harms, & Gregg, 2001), and to attain a stronger understanding of the design of the questions and items. Through the Sojump platform, the project team conducted the pilot test on 150 random participants in the provided eight target areas to check the clarity of the questionnaire items and instructions, specifically to the understanding of the Chinese language used in the questionnaire. The analyses indicated that manipulation of both clarities of the questionnaire items and instructions, and the reliability of each measured item were successful as patterns of statistical significance were in the expected directions. To preserve statistical power, data analyses in the result section are presented for the full sample.

Data Analysis

This study used hierarchical multiple linear regression in SPSS 24.0 to test the hypotheses and research questions. I adopted the principal axis factor analysis (PA) to breakdown the exposure to communication channels scale level in a representative way. With the help of SPSS 24.0, I analyzed the data and generated descriptive statistics and statistical significance for coefficients.

Factor Analysis on Exposure to communication channels. According to Leech, Barrett, & Morgan (2015, p.64), "PA is directed toward enabling one to drive fever variables to provide the same information that one would obtain from the larger set of variables". PA is highly similar mathematically to principal components analysis (PCA). The main difference between PCA and PA is that the former is useful when the project team simply wants to reduce a relatively large number of variables to a smaller number of variables. In contrast, PA factor analysis is used when exploring the covariation among items measured. In this study, I believe that two constructs are underlying the exposure to the communication channels question: news and socially mediated communication. Thus, PA factor analysis was used to determine empirically which item belongs to one of the two constructs. Moreover, conducting PA factor analysis can assist the study to validate the data: if the data fits into the two constructs that I believe exist, then it provides us the support for the construct validity of the exposure to communication channels measured in the entire sample.

Hierarchical Multiple Linear Regression. As a type of multiple regression, hierarchical regression is based on a correlation matrix of all the variables to be considered in the question. The hierarchical regression method was used because the order in which I want to enter

predictors and want to know how prediction by exposure to communication channels and institutional trust improves on the prediction by TPB factors.

Threats to Validity

Considering threats to the validity of the study is important to judge the quality of the study (Feldt & Magazinius, 2010). There are several validity threats to the design of this study. The choice of some questionnaire items is limited to the current knowledge of the project team, the recent reports of PM2.5 risk-related government agencies (i.e. MEP, MOST), and the previous papers. In extending this work the project team should include more items from more sources, such as air pollution health protection behaviors. This would give more data and allow for more statistical analysis. Another threat to the design of questionnaire items is how the approach question response affects the quality of survey data (Fowler, 1992). The current questionnaire items were designed in one direction and this might produce "biased estimates of consistently differed from the true value of what the project teams were trying to measure" (Fowler, 1992, p. 219). The project team should, of course, reverse the direction of some items to strengthen the quality of the study.

The survey was conducted online through Sojump, and the threat to external validity might have occurred when efforts of participation could not be guaranteed. The project team mitigated this threat by rewarding each participant with incentive through Sojump.

Chapter 4: Results

The current chapter reviews the results of the study. First, it will discuss the measurement of model testing to detect the reliability of each variable. Second, it will discuss the descriptive statistic and correlations among key variables based on composite indices. Third, it will discuss the result of principal axis factor analysis to determine which, of a set of exposures to communication channel items, "hang together" as groups and are answered most similarly by the participants. Then, it will restate the hypotheses and research questions and intemperate the results based on the statistical tests. Supportive tables will be present at the end of the paper.

Measurement Model Testing. Before hypothesis testing, I performed a confirmatory factor analysis (CFA) to check the measurement model's reliability and construct validity. The results are presented in Table 2. Regarding an individual's PM2.5 risk-reduction intention, it is figured as a formative construct and conceptualized as the behavioral intention index of the measured 13 items. Though studies have suggested that items may not necessarily covary with each other (Rai & Tang, 2010), the reliability ($\alpha = 73$) and composite reliability (CR = 0.72) show that the constructs' reliability is confirmed. Cronbach's alpha and Composite reliability were used to check the internal consistency of other constructs, which include attitude, PBC, subjective norm, moral norm and institutional trust (Fornell & Larcker, 1981; Ru et al., 2019). Table 2 shows that the minimum value of Cronbach's alpha was 0.73 and CR score was 0.72, both met the preferred value of 0.70 (Raykov, 1997). Thus, the item measurements' reliability was verified. Convergent validity was also tested by the average variance extracted (AVE). In Table 2, the lowest value of AVE was 0.51, which met the recommended benchmark score of 0.50. Overall, the data showed satisfactory reliability and convergent validity. For exposure to communication channels from news, Cronbach's alpha was 0.62 and CR score was 0.60. For

exposure to communication channels from socially mediated communication, Cronbach's alpha was 0.61 and CR score was 0.60. Based on Taber (2018), the values between 0.60 and 0.70 are acceptable in research. The values of AVE of exposure to communication channels were 0.35 and 0.30, which exhibited low internal consistency. According to Hulland (1999), low inter consistency can occur if the underlying construct is multidimensional and this problem could be neglected if the item reliability has met the acceptable value in practice.

Descriptive Statistics. The inter-construct correlations are presented in Table 3. I conducted a collinearity test prior to running the hierarchical multiple regression to determine if the predictors are correlated such that multicollinearity potentially exists. The results showed that all scores were smaller than .50, which indicated that multicollinearity was not likely to be a problem (Leech, Barrett, & Morgan, 2015). Table 3 presents that all the independent variables were positively related to PM2.5 risk-reduction intention with a significant *p-value* at the 0.01 level. Results also show that independent variables are a significantly positive correlation with each other. Specifically, as shown in Table 3, people tend to have a positive attitude towards PM2.5 risk-reduction intention ($r = .29$, $p < 0.01$). Perceived behavioral control and subjective norm also show that the majority of participants agreed to have some confidence on participating in reduction behaviors ($r = .38$, $p < 0.01$) and are influenced by their significant others in some levels ($r = .32$, $p < 0.01$) when deciding on engaging in the behavior. Moreover, the results showed that people read PM2.5 risk-reduction information through both news ($r = .26$, $p < 0.01$) and socially mediated communication ($r = .27$, $p < 0.01$), and the frequency of receiving the message from these platforms will influence their intention to participate in reduction behaviors.

Factor Analysis of Exposure to communication channels. Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the six items of the exposure to communication channels variable questionnaire. The assumption of independent sampling was tested through the Kaiser-Meyer-Olkin (KMO) measure and the Bartlett test. The results showed that the KMO score was .63, which was acceptable and indicated sufficient items for each factor. The Barlett test score was significant ($p < 0.05$), which showed that the items are correlated highly enough to offer a supportive basis for the factor analysis of the exposure to communication channels variable. The assumptions of normality, the variables' being correlated at a moderate level, and linear relationships between pairs of variables were examined and verified. Two factors were divided with the eigenvalues that were greater than 1.0. Based on the design of the questionnaire, the items were designed to index two constructs: news and socially mediated communication. After rotation, the first factor accounted for 33.67% of the variance and the second factor accounted for 20.55% of the variance. Table 4 displays the items, factor loadings for the rotated factors. Results suggest the first factor was shown to index socially mediated communication and all of the three items had positive loadings. The second factor was shown to index news and all of the three items also had positive loadings. "Online news" had a cross-loading of 0.35 (less than .40) from the first factor which was omitted to improve clarity.

Test of hypotheses and research questions. Hierarchical linear regression was adopted to investigate exposure to communication channels, institutional trust, attitude, perceived behavioral control, subjective norm and moral norm after controlling for demographic variables. As one type of multiple regression, it has a few important conditions. First, the dependent variable should be a scale level variable that is normally distributed. In this study, PM2.5 risk

reduction behavioral intention is an interval variable and thus met the condition. Second, the independent variables should be interval or scale level variables, with less dichotomous independent variables. In this study, only gender was a dichotomous variable, which was dummy coded as 1= female and 0 = other (i.e. male). Another condition is the problem of multicollinearity, which was verified in the prior section that was not an issue in this study. Demographic variables were entered on the first step, exposure to communication channels from news and socially mediated communication were entered on the second step, institutional trust was on the third and the components of TPB were entered on the last step. Since the study is only interested in PM2.5 risk-reduction intention as the dependent variable, there was only one model analyzed. The assumptions of normally distributed errors, linearity and uncorrelated errors were tested and met. The results of the hierarchical linear regression analysis are shown in Table 5.

Test of control variables. Gender, age, monthly household income and education level were measured as control variables and entered in the first block of the hierarchical linear regression analysis. To conduct a regression analysis, female was coded as "1" and male was coded as "0." In the first block before other variables were entered, three out of the four significantly predicted PM2.5 risk-reduction intention. Specifically, gender ($\beta = .15$, $p < .001$), monthly household income ($\beta = .12$, $p < .001$), and education level ($\beta = .08$, $p < .001$) were positively associated with the dependent variable. However, as indicated by the adjusted R^2, only 5% of the variance in PM2.5 risk-reduction intention could be predicted from gender, monthly household income and education level combined.

Answer to RQ1. To explore whether exposing information from different media sources influences individuals' PM2.5 risk-reduction intention. Based on the results from M2, which demographic variables were entered in the first block as control variables, and the two exposures

to communication channels dimensions (news and socially mediated communication) were entered in the second. This model was designed to test whether and how exposure to communication channels variables contribute to PM2.5 risk-reduction intention. Results showed that both exposure to communication channels from news ($\beta = .20$, $p < .001$) and socially mediated communication ($\beta = .18$, $p < .001$) had positive impact on PM2.5 risk-reduction intention. To answer RQ1, the beta weights and significance values presented in Table 5 indicated which of the two dimensions contributed most to predicting the dependent variable. Exposure to communication channels from the news has a higher beta (.20) than socially mediated communication (.18). Though differences between the values explained that individuals who have been exposed to PM2.5 risk-related information through news channels are more likely to engage in PM2.5 risk-reduction behavior. Though exposure to communication channels variables significantly predict intention, as indicated by the adjusted R^2, only 15% of the variance in the PM2.5 risk-reduction intention could be predicted by knowing individuals' exposure to communication channels.

Answer to RQ2. Led by research question 2, institutional trust was entered in the third blog, with demographics placed in the first and exposure to communication channels placed in the second. Model 3 intended to see whether institutional trust had a significant contribution to PM2.5 risk-reduction intention. Results showed that institutional trust ($\beta = .23$, $p < .001$) had a positive impact on the intention to reduce the risk caused by PM2.5, controlling for demographic variables and exposure to communication channels. Taken together, the model showed the variables accounted for 19% of the total variance explained. After entering the third variable, exposure to communication channels from news ($\beta = .16$, $p < .001$) and socially mediated communication ($\beta = .15$, $p < .001$) still had positive impact on PM2.5 risk-reduction intention.

However, the beta weights of these two variables decreased. The adjustment is impacted by the magnitude of the effect and the sample size and the value could indicate whether the model is improved after adding more predictors. Through comparing the adjusted R^2 for Model 3 and Model 2, I found that institutional trust significantly improved the prediction. In sum, institutional trust was found positively leading to PM2.5 risk-reduction behavior and therefore research question 2 was answered.

Answer to RQ3. Results of the Pearson correlation (Table 3) indicated that there were significant positive correlations between institutional trust and the components of TPB. Specifically, the correlation between institutional trust and attitude was $r = .30$, $p < .01$, perceived behavioral control was $r = .34$, $p < .01$, subjective norm was $r = .32$, $p < .01$, and moral norm was $r = .30$, $p < .01$. As shown, the correlation coefficients score of each pair of the variables was similar and moderate. These correlations indicated that when the level of institutional trust increases, attitude towards engaging in recommended behaviors, perceived behavioral control, subjective norm and moral norm also tend to increase. Among all these variables, institutional trust and perceived behavioral control have the highest correlation score, as such we could infer that the level of trustworthiness influences individuals' self-efficacy of participating in risk-reduction behaviors.

Results hypothesis 1. After controlling for demographic variables, exposure to communication channels and institutional trust, results showed that attitude towards PM2.5 risk-reduction intentions is positively associated with people's intention of participating in PM2.5 risk-reduction behaviors. Means and standard deviations are presented in Table 2. The final bloc of variables showed that attitudes ($\beta = .07$, $p < .01$) had a positive impact on intention. The result supported H1.

Results hypothesis 2. Through hierarchical linear regression analysis, perceived behavioral control showed a strong positive impact ($\beta = .17$, $p < .001$) on PM2.5 risk-reduction behavior. The result indicated that individuals' confidence levels of participating could predict their intention of participating in risk-reduction behavior.

Results hypothesis 3. The regression Model 4 showed that, after controlling for the demographic variables, exposure to communication channels and institutional trust, subjective norm ($\beta = .06$, $p < .05$) was positively associated with PM2.5 risk-reduction intention. H3 was supported.

Results hypothesis 4. The results showed that moral norm had significant effect ($\beta = .11$, $p < .001$) on PM 2.5 risk-reduction intention. This means that people's intentions of participating in the behavior could be influenced by their moral guidance or standards. Thus, H4 was supported.

PM2.5 risk-reduction intention as the dependent variable (Model 4). Table 5 showed that adding the factors of TPB in the fourth step of the hierarchical regression resulted in a significant improvement in variance explained in the dependent variable, which was able to explain 26% of the total variance of PM2.5 risk-reduction intention (ΔR^2=.26, $p < .001$). The adjusted R^2 also suggests that Model 4 is better than Model 3 given the large increase in the adjusted R^2 value from $\Delta R^2 = .26$to $\Delta R^2 = .19$, reflecting the importance of the combinations of TPB factors. More specifically, among the four TPB factors, perceived behavioral control had the highest beta weight (.17), which indicates the most contribution to predicting intention to engage in PM2.5 risk-reduction behavior. Subjective norm showed the least contribution to the dependent variable with the beta weight (.06), while moral norm had the second-highest beta weight (.11) which strengthens the value of norm in the entire model. Taken together, the four

regression models showed that demographic variables (except for age), exposure to communication channels, institutional trust and each component of TPB were all positively associated with PM2.5 risk-reduction behavioral intention. Among all of these variables, exposure to communications channels from news channels and institutional trust also play significant roles in predicting the dependent variable. Model 4 accounted for about 64% of the total shared variance. The effect size of model 4 is (f = .37), which is considered as large based on Cohen's (1988) definition of multiple regression.

Chapter 5: Discussion

The current chapter discusses the implications and future research directions based on the results presented in chapter 4. It will first discuss the theoretical implications and interpretations of the statistical results, followed by the practical implications and suggestions for future studies. In addition, the current chapter will discuss the conceptual research framework extended from the current study. Moreover, it will discuss in detail the limitations of the current study, which will provide a direction for researchers to conduct related research in the future. Finally, the chapter will outline the importance of the study's results and will draw conclusions and recommendations to help the government and health-related organizations establish regulations to motivate the citizens to adopt recommended risk-reductions measures.

The current study examined the psychological effects of attitude, perceived behavioral control, subjective norm and moral norm on intention to participate in PM2.5 risk-reduction behaviors. A healthy environment is the first condition to ensure that humans and animals can have a safe place to live. Air pollution is considered a long-lasting health issue in China and people who are living in air polluted cities generally neglect the issue as they have been exposed to bad air quality regularly. Studies have reported that air pollution is caused by anthropogenic activities (Ru et al., 2019), such as industrial development and the exhaust of car emissions. Others have indicated that the level of air pollution in China could also be influenced by natural disasters (Zhang & McSaveney, 2018), such as erupting volcanos and wildfires. That said, the major sources of air pollution remained unclear and there are still many unknown factors (Carson & LaRiviere, 2018). However, the health problems caused by PM2.5 have been confirmed and the damages to human bodies are irreversible. Thus, it is necessary to call on citizens' attentions to follow the government' and health organizations' recommended policies. Though previous

work has focused on PM2.5 reduction behaviors through reducing the negative effects of human activities, public acceptance of various announced measures (i.e. market incentive measures, command-and-control measure) still remain low (Fan et al., 2015). The attempts to reduce PM2.5 in China through enhancing PM2.5 reduction intention seemed to be difficult to practice and the results may not be as efficient as predicted. Thus, this study finds that it is more reasonable to enhance citizens' intentions to reduce the risks caused by PM2.5 and facilitate voluntary PM2.5 risk-reduction behaviors in China.

The current research attempts to explore the primary determinants of Chinese people's PM2.5 risk-reduction behavioral intentions based on the TPB model. Three goals of this research include exploring a) the effects of TPB components and moral norm on PM2.5 risk-reduction intention, b) the role of exposure to communication channels from different media sources on individuals' risk-reduction intention, and c) the role of institutional trust on behavioral intention and the correlations between institutional trust and TPB components. Hierarchical regression modeling showed that an individual's intention to participate in risk-reduction behaviors were significantly and positively affected by attitude, perceived behavioral control, subjective norm, ad moral norm. The total model interpreted 64% of the variance. The findings are generally in line with previous studies (Lin, Li, & Bautista, 2017; Chen, 2016). This study verified the predictive validity of adding moral norm to empower the norm values in addition to subjective norm under the context of predicting PM2.5 risk-reduction behavioral intention, which shows the increasing importance of moral norm in the related studies. Based on the results, the current study proposed a conceptual model (Fig.1). In this model, all the hypotheses are summarized in the positive influences that each element is supposed to have in explaining the intention of participating in PM2.5 risk-reduction behaviors. Specifically, the conceptual model proposed

that it is necessary to incorporate moral norm into the TPB model to confirm whether it can better predict intentions when studying health behaviors that contain ethical components. Also, it proposed that institutional trust and exposure to communication channels should be considered in parallel with the TPB determinants when health behavioral intentions and behaviors are influenced by institutional factors. Below each measured variable and its implications will be discussed.

Implications of perceived behavioral control. Previous studies have discussed the importance of the direct effect of PBC on behavioral intention in the theory of planned behavior. The proportions of variance in explaining behavioral intention regarding the determinants of TPB have been debated in various studies (Moták et al., 2017; Abamecha, Godesso, & Girma, 2013). Depending on the topics, contexts and sample size of the study, the effects of each determinant may vary in strength. The current study found that PBC had a high score (M = 5.33) and was the strongest predicting factor ($\beta = .17$, $p < .001$) on the intention to engage in PM2.5 risk-reduction behavior. This finding is consistent with the results of Ru et al.'s (2019) research. PBC has also been highly focused on social cognitive theory. Bandura (1986) suggested that an individual's high self-efficacy will lead to greater willingness in participating in a behavior. This paper found that PBC underlines the importance of enhancing individuals' self-efficacy. On one hand, the government should educate the citizens through different platforms about the efficient results after engaging in the recommended behaviors. For instance, institutions can provide a statistical comparison of the air quality before and after installing air purifiers indoors, as well as provide information regarding the affordable prices of air purifiers. In addition, health-related agencies and risk-regulation institutions such as the Chinese Center for Disease Control and Prevention (China CDC) should make information available regarding PM2.5 risk reduction

behaviors for citizens, and establish more relevant resources, effective solutions, opportunities for citizens to participate in any recommended behavior. Moreover, the central government and medical health centers should emphasize the ease and effectiveness of conducting PM2.5 risk-reduction behaviors in order to build up citizens' confidence.

Implications of attitude. This study confirmed that attitude directly influences Chinese people's PM2.5 risk-reduction intention. However, attitude was not the first major factor in the TPB model which was conflicted with other studies (Shi et al., 2017a; Peters, Gutscher & Scholz, 2011). For instance, De Groot and Steg (2007) found that attitude toward air pollution reduction was the strongest factor among the TPB elements. There are several possible explanations for this. First of all, an individual's attitude towards a behavior could be determined by various factors, including prior knowledge and self-experiences about the risks. That said, every participant's knowledge about the components of PM2.5 and the efficiency of conducting risk-reduction behaviors vary. Secondly, positive attitudes could lead to actual behaviors in many cases, such as smoking cessation, where attitudes about quitting smoking were found to be the most important factor in the intention and actual behavior (Irving, Seidner, Burling, Thomas, & Brenner, 1994). However, unlike smoking cessation, which the pros and cons vary to different people, people generally have positive attitudes toward reducing the health risks caused by PM2.5 as it is common knowledge. Although attitudes toward the behavior are not as important as self-efficacy in predicting the dependent variable, the variable was still found to have a positive effect on the PM2.5 risk-reduction intention. Of course, when facing health risks, more efforts should be made to improve people's attitudes toward healthy behavior. The government and all related institutions should continue to deliver the knowledge of reducing PM2.5 risks and encourage citizens to adopt effective behaviors, such as wearing professional antismog face

masks instead of cotton or gauze masks (Qian et al., 2016). Furthermore, the government should try to build up both a positive attitude and high self-efficacy to reinforce the positive effects of risk-reduction behaviors.

Implications of subjective norm. In this study, the effect of subjective norm on PM2.5 risk-reduction intention was 0.06, which is lower than the effect of PBC and attitude. Consistently with some prior research (Greaves et al., 2013; Ru et al., 2019), the significant direct relationship between subjective norm and the environmental preventive behavioral intention was confirmed but normally to a lesser extent than other psychological factors in the TPB model. Though the beta weight of subjective norm was lower than other variables, it was still significantly positively associated with PM2.5 risk-reduction intention. In the original survey, the measure of subjective norm focused on how individuals would be influenced by their significant ones on the intention to engage in the behavior. The results indicated that the degree of expectations from others would contribute to the behaviors the person makes. The results showed that people agreed they are expected to participate in PM2.5 risk-reduction behaviors (M = 5.07). Compared with Western cultures, Chinese individuals are highly influenced by traditions and more likely to follow significant others' suggestions. The level of impact also varies with different ages. For instance, young people take trusted others as references and their behaviors are highly restricted and influenced by their elder family members. When discussing the reasons why subjective norm is not as significant as other TPB predictors, there are several possible explanations based on the findings from previous studies and the current study. First of all, subjective norm is personally employed and thus the personality of one's and the relationships one has with his or her significant others might also impact their behavioral intention. Second, many Chinese people have not yet realized the importance of individual

PM2.5 risk-reduction behaviors. Some people think the risks of exposure to PM2.5 will not be significant in a short period and it is difficult to adopt and follow the behaviors in a long run. Third, people are not aware which measures work better to achieve PM2.5 risk-reduction. Therefore, in the process of formulating policies, the government and relative institutions should be aware of the role of subjective norm. The social common understanding regarding PM2.5 risks, approaches to reduce the risks and the consequences of not following recommended measures should be considered to create risk-reduction strategies. Moreover, strategies relating to the propaganda of PM2.5 risk-reduction should emphasize both the expectations and the actual behaviors of celebrities.

Implications of moral norm. Moral norm was shown to have the second strongest prediction in the TPB model ($\beta = .11$, $p < .001$), and the coefficients are higher than subjective norm. Moral norm is found to be more stable than other dispositional variables (Klöckner, 2013). A post hoc analysis separating moral norms from the TPB component increased the explained variance by 8% ($p<.001$). The increased proportion of explained variance of intention by moral norms in this study is slightly larger than those reported in other studies. For instance, Rivis & Sheeran (2003) found that adding moral norm increased the explained variance by 5%. Another study considering the effect of moral norm in pro-environmental behavior found that the moral norm raised 1-10% of explained variance in the model (Bamberg, Hunecke, & Blöbaum, 2007). Results from this study indicated that people's PM2.5 risk-reduction intention is influenced by their moral obligations and standards. Numerous studies have studied the effect of moral norm on behavioral intention and behaviors and confirmed the effectiveness. As an additional psychological factor added to the TPB model, moral norm not only improved the explained variance of individuals' PM2.5 risk-reduction intentions but also had an impact on intention with

a strong coefficient. This finding is consistent with some previous studies. Shi et al. (2017a)'s study confirmed the significance of moral norm in predicting household PM2.5 reduction behavior in China. Klöckner's (2013) study found that people's high moral norm guides them to make a positive evaluation of air pollution reduction behaviors and increase their possibilities in participating in the event.

Chinese people have been experiencing the haze and have been educated to the harm of breathing the unqualified air and high moral norm leads them to make a positive evaluation of PM2.5 risk-reduction behaviors and participate in their behaviors. Zimmerman (2007) noted that moral obligations also include individuals' considerations of their responsibilities to others. For instance, as suggested by the CDC, risk-reduction behaviors, such as wearing masks, does not only prevent ones from breathing haze but also helps to avoid transmitting any health risks to others. Thus, people who have high moral norm will consider others' health and more actively participate in these behaviors. As a study has suggested (Shi et al., 2017b), Chinese people tend to have similar moral principles through traditions and education. Young children have been educated to follow the same rules in school and everyone is expected to meet the baseline of a policy requirement so that people's moral guts are highly impacting their behavioral intention. If a person's moral norm is formed, the impact of the norm can last for a long period (Matthies, Klöckner, & Preißner, 2006). Thus, moral norm is an efficient approach to foster people's moral obligations concerning PM2.5 risk-reductions.

Moral norm hasn't been added to the original TPB model and hasn't been adopted to all of the studies. It is necessary to understand that moral norm may contribute more to some health-related issues than other topics (Rivis et al., 2009), which means many people would suffer the risks if one does not take appropriate reduction or preventive health behaviors commended by

health authorities. These health problems include EIDs (Roberto, Mearns, & Silva, 2012), AIDs (Kopelman, 2002), PM2.5-reduction behaviors (De Leeuw et al., 2015), etc. However, moral norm may not be efficient for sun-protective studies, rather other norm values may play significant roles. Mahler (2018) suggested that descriptive norm was the second intervention to motivate people to regularly protect their skin from the sun.

The results of this study suggest that moral norm should be considered in the TPB model when examining PM2.5 risk-reduction intention. Thus, more effort remains for the government and health-related institutions to formulate and promote risk-reduction information on the aspect of moral obligation.

Discussion of exposure to communication channels. The results suggested that exposure to communication channels has an impact on PM2.5 risk-reduction intention and receiving information from different information sources could result in different impacts. News channels were found to be more influential than socially mediated communication, and this is consistent with previous studies that compared the effects of different media dependences in China (Tai & Sun, 2007). In China, a great amount of PM2.5 related information is released by the government-controlled mainstream media, and this type of information is considered as official and supposedly is perceived to be highly reliable. Since Chinese people have lower knowledge about the causing factors of PM2.5 (Shi et al., 2017a), and they are concerned about the risks caused by PM2.5. As a result, citizens tend to trust and follow the recommended behaviors the government suggests. Xiong et al. (2018) found that even though the Chinese people had a good understanding of the risks of PM2.5, they needed more knowledge of the measures to reduce the risks. However, the study also pointed out that information from news media is sometimes not enough for citizens who are living in the air polluted cities and

physically experiencing the situation. It is easier for them to access the real-time report of air quality and effective risk-reduction measures on social media. Thus, they tend to seek help from friends, family, social media blogs and other available websites for available information. As suggested by Hu & Zhang (2014), there are three types of communication channels in general, which include mass media, interpersonal communication, and the Internet. For convenience, the current study combined interpersonal communication and social media into socially mediated communication. Future studies should consider measuring different communication channels separately and compare whether there is any different impact on intentions of interpersonal communication and social media exposure. Through following the news released from the government as the top priority and suggestions from others as the second priority, people are more willing to engage in risk-reduction behaviors.

Further suggested by Galea (2007), increased health information is a potential benefit of health communication campaigns that can help individuals improve their health. As such, people can use different communication channels to gain information relating to PM2.5 risks that can help them adopt proper measures to reduce the risks.

Discussion of institutional trust. As one of the main focuses of this study, institutional trust impacts behavioral intention and also correlates with TPB factors. The concept of institutional trust has had high attention in many health risk studies. The RISP even points out institutional trust can impact effective emotions and lead to information-seeking behaviors (Griffin et al., 1999). Trusting the government or health-related agencies' abilities to control the risks and provide efficient information for citizens to prevent potential risks is important for serious health crises. The current study illustrated that Chinese people generally trust the institutions ($M = 5.23$) in terms of maximumally reducing the risks. Thus, it is important for the

government to continue providing health information to the citizens and effectively controlling the emissions of PM2.5. Furthermore, health institutions should also educate young people about the consequences of not participating in risk-reduction behaviors and the importance of following the messages from health organizations. The positive correlations between institutional trust and other TPB factors also evoke the discussion of whether it could be added as an additional predictor in the model. Allen Catellier & Yang (2012) found that trust is not always positively associated with other psychological predictors in health communication studies. For instance, some people trust that the government can control the risks so they don't have to make sufficient efforts to reduce the risks. In short, the current study indicated that the government should continue improving the overall trustworthiness among citizens and work with the media to deliver effective messages to help citizens reducing the risks caused by PM2.5.

Factor analysis of PM2.5 risk-reduction intention. The original questionnaire has adopted 13 items to measure PM2.5 risk-reduction intention. Although all of the items were framed in a different way, it raised the questions of what items are actually measuring PM2.5 risk-reduction intention and which measure would be the most effective in reducing PM2.5 risks. In doing so, I conducted a principal factor analysis to explore the underlying constructs of PM2.5 risk-reduction intention. After rotation, the first component accounted for 15.25% of the variance, the second component accounted for 14.52% of the variance, the third component accounted for 12.49% of the variance, and the fourth accounted for 10.66% of the variance. Table 6 displays the items, component loadings for the rotated factors. As shown on the table, the four dimensions can be described as follows: 1) personal health promotion, 2) behavioral adjustment to external air (pollution) quality, 3) apply apparatus to obtain better air quality, and 4) window management for air quality control. According to Xiong et al., (2018), Chinese

individuals perceive adjustment of indoor and outdoor activities during hazy days is the most common behavior to reduce PM2.5 exposures. Based on the reliability results from the 13 items, dimension two has the highest reliability score of 0.64 and it includes the most common measures that were suggested in previous studies. Moreover, "wear a breathing mask/medical respirator" was also suggested to be a common measure and it had a cross-loading on component two. Thus, from logical reasoning, I propose that the dimension priorities for effective PM2.5 risk-reduction intention will be behavioral adjustment to external air (pollution) quality and apply apparatus to obtain better air quality. As discussed, Future studies should consider prioritize the four dimensions based on the areas that participants live in, the average income of participants, and the level of the polluted air quality in the area. Researchers should focus on the items that are the most helpful and will make the most differences regarding PM2.5 risk-reduction intention.

Discussion of demographic variables. In line with previous studies, females generally hold more positive attitudes towards adopting healthy behaviors (Ayandele, Popoola, & Obosi, 2020; Jing, Lay, Weis, & Furnham, 2018; Xiong et al., 2018). More than half of the participants were females (52.8%) and the results showed that females were positively associated with intention, which indicated that gender character has impacts on humans' decision-making processes based on personality traits. In terms of monthly household income, 64.1% of the participants earned a monthly income between 5,000 to 20,000 RMB, and 23.4% were making more than 20,000 RMB. The income level of the sampled data represented the average income level of the sampled regions but was slightly higher than the average level of the nation. It could be because the survey was distributed in urban cities. The positive association between income level and intention showed that people who have higher income levels are more likely to engage

in PM2.5 risk-reduction behavior. Moreover, 69.5% of participants held a bachelor's degree or higher and education level was positively associated with intention. To some extent, participants who have a higher education degree tend to be more likely to follow governments' recommended behavior. There are several potential reasons behind the phenomenon of higher household income and education level leading to a greater willingness to participate in PM2.5 risk-reduction behaviors. First, Shi et al. (2017b) pointed out that people who make more financial income generally have higher education due to the economic situation in China. Second, people who make more money are financially supported to follow some of the recommended behaviors, such as installing an air purifier. Surprisingly, age did not show significance in relation to the intention of participating in risk reduction behavior. This conflicted with previous research findings on Chinese young people who are more likely to engage in risk-reduction behavior. Age was found to be an important factor that influences risk perceptions (Huang, Rao, van der Kuijp, Bi, & Liu, 2017). As shown on table 1, the majority of the participants (96%) were under 50 years old and only a small percent (3.4%) were over 50 years old. Comparing to the age distribution in Beijing in 2018, approximately 55% of the population were between 20 and 50 years of age, and approximately 25% were over 50 years old (Textor, 2020). Therefore, the sample in this study was not representative of the population in China. Result showed that age was not statistically significant and this could be attributed to the skewed sample distribution that younger aged participants (between 20 to 50) are a lot more than participants in other age range in this sample. Since the data of the current study is based upon the data collected for the larger study so that the sample was not editable nor manageable by the project team of the current study.

Limitations and Future Research

Although significant findings were obtained, some limitations of this study should be noted. First of all, the use of the secondary analysis method has its limitation. Measures of the items may not capture the exact meaning of points of interest. Future studies should consider analyzing primary data if resources (i.e. finance, time) are supportable. Secondly, the data collected for this study were self-reported questionnaires. Gaes, Kalle, and Tedeschi (1978) suggested the vulnerability of self-report data as self-presentational bias. Although applications of the TPB have generally relied on self-reports, there is a difference between objective and self-reported behavior. Thus, researchers should consider the possibility of "taking accurate and objective multiple measures of behavior" (Conner & Norman, 2005, p. 179). In terms of the questionnaire design method, the study should have randomized the negative items of some variables (i.e. perceived behavioral control) to reduce the possibility of common method bias. Thirdly, all of the variables were asked in the same direction which could impact the results of the study. Although some previous studies suggested that with the number of items being asked, participants became used to the format since the beginning of the questionnaire so that having both directions mixed in the same questionnaire can possibly trick the participants and thus cause low-reliability scores of the scale. Future studies should consider asking the items in two ways based on the construct of the study. Finally, it is important to note that Sojump's sampling pool is gathered by people who have access to the Internet. Similar to other studies that collect data through online platforms, the sample cannot fully reflect the situation beyond the Internet population in China. Considering that the sample size is large and Sojump verified all participants through their email accounts, mobile numbers and online contact information, online surveys are suitable for the current study. However, future studies should select representative

subjects based on the population of the target area. Further, behavioral intentions may not reflect any changes over time. I suggest that future researchers should consider taking multiple measures of behaviors as suggest by Connor & Sparks (2005). In doing so, future research may also want to examine the linkage between behavioral intentions and actual behaviors.

There are several angles that future studies could consider when conducting health risk-related research. Studies should recognize the values of background factors such as socio-demographic variables and affective emotions which may be relevant to health behaviors within the TPB model (Conner & Norman, 2005). Background variables have been tested to influence intention and behavior indirectly through their effects on behavioral, control beliefs or normative (Ajzen & Fishbein, 2005) and emotions have also been used in many risk communication studies and models to mediate the effect of perceived hazard characteristics on behavioral intention. Furthermore, researchers may intergrade the TPB model and other risk-related models for risk communication studies. There are some risk communication concepts, such as risk perceptions that should also be considered depending on the type of health issues. For instance, the RISP (Griffin et al., 1999) has proposed that perceived risks also have an impact on individuals' behavioral intentions and behaviors. In addition, more normative components should also be added to different types of situations. For instance, injunctive and descriptive norms should be adapted to enhance the power of normative measures in predicting smoking. For emerging infection diseases (i.e. COVID-19), people's willingness to wear masks may be increased or decreased based on other people's behaviors and social pressure. This is known as descriptive norms. This study provides a direction for future research to not only look at how exposure to communication channels and institutional trust have an impact on health behavioral intention but also on encouraging how different additional variables may also improve the predicting power in

the TPB model. Finally, the current research did not consider any structural and mediation relationships among the TPB variables, moral norm, exposure to communication channels, and institutional trust. However, I suggest future research to assess a causal model based on existing studies using the TPB model. There are several angles that future research should consider in terms of the causal relationships: 1) trust in institutions and TPB variables (Ozkan & Kanat, 2011), 2) communication channels exposure and TPB variables (Ho, Liao, & Rosenthal, 2015), and 3) moral norms and TPB variables (Shi et al., 2017a).

Conclusion

Through employing the TPB model, the current research explored the primary determinants of Chinese people's PM2.5 risk-reduction behavioral intentions. The current study replicated the original TPB model and added moral norm as a significant additional normative measure to examine the effects of each component on PM2.5 risk-reduction intention. It also looked into the association between exposure to communication channels and behavioral intention to see whether the government can use different media sources as helpers to facilitate behaviors. This paper brings insights to the theoretical and practical implications. First, the study verified that the three predictors of TPB significantly affect behavioral intention. PBC was found to be the strongest predictor of intention, followed by attitude and subjective norm. Thus, it is not necessary to pay equal attention to all predictors in making policies. Policymakers should focus more on how to improve individuals' perceived behavioral control as well as their attitudes toward risk-reduction behaviors. Second, the results supported the role of moral norm in the prediction of people's PM2.5 risk-reduction intentions. I also pointed out that moral norm should be considered based on the topic and background of the study, and it should not be added

to the original TPB but could be an additional psychology construct in determining behavioral intentions and behaviors. Finally, the role of exposure to communication channels and institutional trust have also been emphasized. As contextual factors, the government and health organizations should try to broaden citizens' knowledge about how to effectively reduce the risks and build up their belief about the government's ability to control the risks. The media should play an important role in fostering and motivating PM2.5 risk-reduction behavior. In the future, studies may also want to look at the linkage between behavioral intention and actual behaviors conducted to better promote the policies and help citizens to take those behaviors into practice.

Table 1

Sample Demographics (N=1569)

Demographics	Frequency	Percent (%
Gender		
1. Female	829	52.8
2. Male	740	47.2
Age		
1. 18-24	453	28.9
2. 25-29	375	23.9
3. 30-34	343	21.9
4. 35-39	202	12.9
5. 40-44	96	6.1
6. 45-49	47	3.0
7. 50-54	34	2.2
8. 55-59	12	0.8
9. 60-70	7	0.4
Household Monthly Income (RMB)		
1. Under ¥1000	9	0.6
2. ¥1000 - ¥2999	55	3.5
3. ¥3000 - ¥4999	132	8.4
4. ¥5000 - ¥9999	395	25.2
5. ¥10,000 - ¥19,999	610	38.9
6. ¥20,000 - ¥50,000	336	21.4
7. More than ¥50,000	32	2.0
Education Level		
1. Less than high school	15	1.0
2. High school	97	6.2
3. Some college (without a degree)	281	17.9
4. Associate's Degree	87	5.5
5. Bachelor's Degree	907	57.8
6. Master's Degree	164	10.5
7. Doctorate Degree	12	0.8
8. Professional Degree (JD, MD)	6	0.4
Total	1569	100

Table 2

Mean, Standard Deviation and Reliability of Measures (N=1569)

Variables	**Measures**	***M (SD)***	**Cronbach's alpha**	**CR**	**AVE**
PM2.5 Risk-Reduction Intention (INT): M(SD)= 5.63(1.30)					
INT1	Minimize the times for opening windows on haze days.	4.91 (1.66)	.73	0.72	0.58
INT2	Clean the room with water (i.e. use a damp cloth).	5.48 (1.30)			
INT3	Close windows when the air quality is bad.	6.30 (1.03)			
INT4	Use an air purifier.	5.63 (1.35)			
INT5	Clean or replace the filters installed on the air conditioner more frequently.	5.21 (1.32)			
INT6	Wash hands and face after getting home from outside.	5.89 (1.17)			
INT7	Drink water frequently.	6.00 (1.09)			
INT8	Eat Vegetables and fruits that are rich in Vitamin C.	6.03 (1.08)			
INT9	Adjust outdoor activity plans.	5.19 (1.35)			
INT10	Wear a professional antismog mask (medical, N95/N90, activated carbon, etc.)	5.21 (1.48)			
INT11	Limit going outdoors during work.	5.15 (1.50)			
INT12	Adjust physical exercise time and frequency.	5.14 (1.32)			
INT13	Avoid going to places that are seriously air polluted.	6.01 (1.22)			
Attitude Towards PM2.5 Risk-Reduction Behavior (ATT): M(SD)= 5.48(1.26)					
ATT1	Taking action to reduce risks caused by PM2.5 is beneficial.	5.86 (1.16)	.79	0.75	0.61
ATT2	Taking action to reduce risks caused by PM2.5 is a good idea.	5.62 (1.21)			
ATT3	Taking action to reduce risks caused by PM2.5 is pleasant.	4.98 (1.35)			
ATT4	Taking action to reduce risks caused by PM2.5 is useful.	5.47 (1.32)			
Perceived Behavioral Control (PBC): M(SD)= 5.33(1.35)					

PBC1	I am confident that I could participate in PM2.5 risk-reduction behaviors when it's necessary.	5.86 (1.08)	.84	0.88	0.51
PBC2	It is easy for me to participate in PM2.5 risk-reduction behaviors.	5.04 (1.39)			
PBC3	I have the relevant resources, time and opportunities to participate in PM2.5 risk-reduction behaviors.	5.20 (1.36)			
PBC4	Whether or not to participate in PM2.5 risk-reduction behaviors is entirely up to me.	5.22 (1.55)			
Subjective Norm (SN): M(SD)= 5.07(1.36)					
SN1	People who are important to me (family, colleagues, etc.) would say I should participate in PM2.5 risk-reduction behaviors.	5.52 (1.23)	.75	0.75	0.60
SN2	It is expected of me that I participate in PM2.5 risk-reduction behaviors.	5.18 (1.29)			
SN3	I feel under social pressure to participate in PM2.5 risk-reduction behaviors.	4.41 (1.61)			
SN4	People who are important to me (family, colleagues, etc.) want me to participate in PM2.5 risk-reduction behaviors.	5.17 (1.32)			
Moral Norm (MN): M(SD)= 5.26(1.23)					
MN1	I would feel guilty if I did not participate in PM2.5 risk-reduction behaviors in daily life.	4.10 (1.52)	.83	0.83	0.54
MN2	I believe that I have a moral obligation to conduct PM2.5 risk-reduction behaviors in daily life.	5.58 (1.16)			
MN3	I think that my participation in PM2.5 risk-reduction behaviors goes along with my principle of environmental protection.	6.10 (.998)			
Institutional Trust (IT): M(SD)= 5.28 (1.29)					
IT1	I am confident that government or health organizations can prevent the spread of PM2.5.	5.11 (1.30)	.82	0.86	0.65
IT2	I am confident that the government or health organizations can take effective action to control the risk of PM2.5.	5.38 (1.26)			
IT3	I am confident that the government or health organizations have the risk	5.31 (1.29)			

	management skills to control the risk of PM2.5.				
IT4	I am confident that there are sufficient, properly qualified people in the government or health organizations who have the ability to control the risk of PM2.5.	5.32 (1.31)			
Exposure to communication channels (NEWS): M(SD)= 5.23(.95)					
ECC1	Television news	5.53 (1.23)	.62	0.60	0.35
ECC2	Print media (newspapers, magazines)	4.61 (1.53)			
ECC3	Online news (including portal)	5.56 (1.21)			
Exposure to communication channels (SMC): M(SD)= 5.05(1.33)					
ECC4	Instant messenger apps (WeChat, etc.)	4.82 (1.35)	.61	0.60	0.30
ECC5	Social media and blogs	5.14 (1.45)			
ECC6	Interpersonal communication (family, friends, colleagues, etc.)	4.83 (1.53)			

Note: INT= PM2.5 risk-reduction intention; ATT= attitude towards PM2.5 risk-reduction behaviors; PBC= perceived behavioral control; SN = subjective norm; MN = Moral Norm; IT = institutional trust; ECC(News) = exposure to communication channels-news; ECC(SMC) = exposure to communication channels-socially mediated communication.

Table 3

Descriptive Statistics and Correlations (N=1569)

Construct	ATT	PBC	SN	MN	IT	NEWS	SMC	INT
ATT	1.00							
PBC	.42**	1.00						
SN	.41**	.40**	1.00					
MN	.43**	.45**	.48**	1.00				
IT	.30**	.34**	.32**	.30**	1.00			
NEWS	.17**	.21**	.26**	.23**	.24**	1.00		
SMC	.19**	.21**	.33**	.23**	.19**	.26**	1.00	
INT	.29**	.38**	.32**	.35**	.29**	.26**	.27**	1.00
Means	5.48	5.33	5.07	5.23	5.23	5.23	4.93	5.55
S.D.	.99	.93	1.04	.89	1.04	.95	1.06	.63

Note. ** Correlation is significant at the 0.01 level (2-tailed). ATT=attitudes, PBC=perceived behavioral control, SN=subjective norm, MN=moral norms, IT=institutional trust, ECC(News) = exposure to communication channels-news; ECC(SMC) = exposure to communication channels-socially mediated communication, INT=behavioral intentions

Table 4

Factor Loadings from Principal Axis Factor Analysis with Varimax Rotation for a Two-Factor Solution for Exposure to Communication Channels (N=1569)

Item	Factor Loading		
	1	2	Communality
Interpersonal communication (family, friends, colleagues, etc.)	.75		.14
Social media and blogs	.56		.24
Instant messenger apps (WeChat, etc.)	.41		.24
Television news		.74	.19
Print media (newspapers, magazines)		.43	.12
Online news (including portal)		.40	.21
Eigenvalues	2.02	1.23	
% of variance	33.67	20.55	

Note. "Online news" had a cross-loading of 0.35 (less than .40) from the first factor which was omitted to improve clarity.

Table 5

Results of Hierarchical Regression Analysis Predicting PM2.5 Risk-Reduction Intention (N=1569)

	Model: PM2.5 Risk-Reduction Intention			
	M_1	M_2	M_3	M_4
Step 1: Demographics				
Gender [d]	.15***	.11***	.12***	.09***
Age	.02	.01	.01	-.01
Household Income	.12***	.10***	.09***	.09***
Education	.08**	.07**	.08**	.08**
Step 2: Exposure to communication channels				
News		.20***	.16***	.11***
SMC		.18***	.15***	.10***
Step 3: Institutional Trust				
IT			.23***	.12***
Step 4: Components of TPB				
ATT				.07**
PBC				.17***
SN				.06*
MN				.11***
ΔR^2	.05***	.15***	.19***	.26***
Total R^2 (%)	.64***			
f^2	1.04	.17	.24	.37

Note: Entries are standardized regression coefficients.
*$p < .05$; **$p < .01$; ***$p < .001$
[d] Dummy variable. Gender (male: 0, female: 1).

Table 6

Component Loading for the Rotated Components of PM2.5 Risk-Reduction Intention (N=1569)

Item	Component Loading				
	1	2	3	4	Communality
Drink water frequently.	.78				.63
Eat Vegetables and fruits that are rich in Vitamin C.	.64				.49
Wash hands and face after getting home from outside.	.63				.46
Clean the room with water (i.e. use a damp cloth).	.50				.37
Adjust outdoor activity plans.		.71			.54
Adjust physical exercise time and frequency.		.71			.53
Avoid going to places that are seriously air polluted.	.32	.60			.46
Limit going outdoors during work.		.51		.45	.48
Use an air purifier.			.77		.61
Clean or replace the filters installed on the air conditioner more frequently.			.72		.58
Wear a professional antismog mask (medical, N95/N90, activated carbon, etc.)		.38	.56		.48
Minimize the times for opening windows on haze days.				.84	.73
Close windows when the air quality is bad.	.39			.59	.52
Eigenvalues	3.11	1.56	1.17	1.05	
% of variance	15.25	14.52	12.49	10.66	

Figure

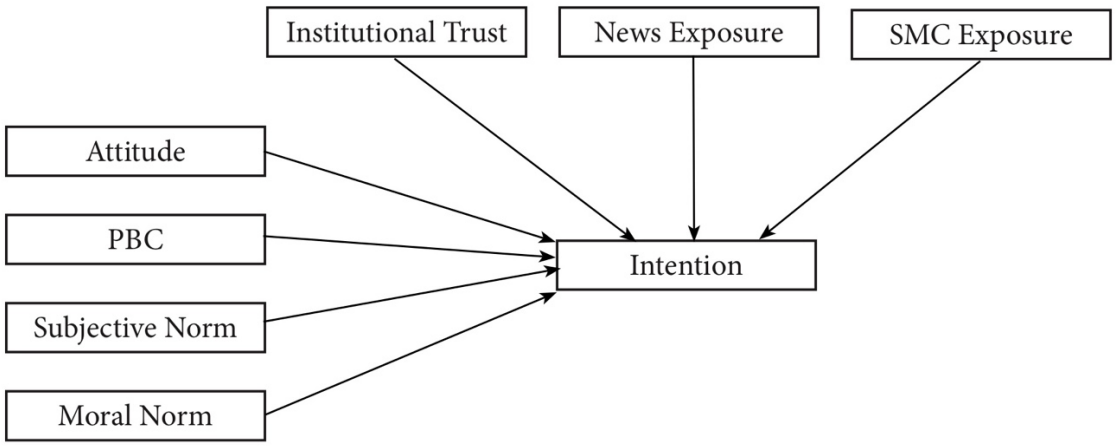

Fig.1. Conceptual Research Framework

Appendix A

Institutional Review Board Memorandum

SYRACUSE UNIVERSITY

INSTITUTIONAL REVIEW BOARD
MEMORANDUM

TO: Joon Soo Lim
DATE: July 31, 2019
SUBJECT: **Determination of Exemption from Regulations**
IRB #: 19-218
TITLE: *Predicting People's Compliance and Preventive Behaviors to Reduce the Health Risk Associated with PM 2.5*

The above referenced application, submitted for consideration as exempt from federal regulations as defined in 45 C.F.R. 46, has been evaluated by the Institutional Review Board (IRB) for the following:

1. determination that it falls within the one or more of the eight exempt categories allowed by the organization;
2. determination that the research meets the organization's ethical standards.

It has been determined by the IRB this protocol qualifies for exemption and has been assigned to category **2**. This authorization will remain active for a period of five years from **July 31, 2019** until **July 30, 2024**.

CHANGES TO PROTOCOL: Proposed changes to this protocol during the period for which IRB authorization has already been given, cannot be initiated without additional IRB review. If there is a change in your research, you should notify the IRB immediately to determine whether your research protocol continues to qualify for exemption or if submission of an expedited or full board IRB protocol is required. Information about the University's human participants protection program can be found at: http://researchintegrity.syr.edu/human-research/ Protocol changes are requested on an amendment application available on the IRB web site; please reference your IRB number and attach any documents that are being amended.

STUDY COMPLETION: Study completion is when all research activities are complete or when a study is closed to enrollment and only data analysis remains on data that have been de-identified. A Study Closure Form should be completed and submitted to the IRB for review (Study Closure Form).

Thank you for your cooperation in our shared efforts to assure that the rights and welfare of people participating in research are protected.

Tracy J. Cromp

Tracy Cromp, M.S.W.
Director

DEPT: Public Communications, Newhouse III – Rm. 452 **STUDENT:** Tong Lin

Appendix B

Informed Consent (English)

SYRACUSE UNIVERSITY
Department of Public Relations

Protocol Title: Predicting people's compliance and preventive behaviors to reduce the health risk associated with PM2.5

Principal Investigator: Dr. Joon Soo Lim, Associate Professor, S.I. Newhouse School of Public Communications, email: jlim01@syr.edu, phone: 315-904-8046

You are invited to take part in a research study conducted by Dr. Joon Soo Lim at S.I. Newhouse School of Public Communications in Syracuse University. The purpose for this research study is to learn about the citizens' perceptions of the risk about the air pollution in China (in Korea for Korean version) and their intentions to take risk-reduction behaviors.

There is only 1 qualification to participate in this study: (1) You must be 18 years of age or older. You will be asked to complete an online questionnaire in a place where you are connected to the internet via any computer, smart phone, or tablet.

The questionnaire includes several questions related to your risk perceptions, attitude toward wearing mask, perceived trust in the city government, risk-reduction behaviors and so on.

There are minimal risks associated with this study. You will, however, have the right to withdraw from the study at any time, as well as the option to not answer questions you may feel uncomfortable about. If you do not want to participate, you have the right to refuse to take part, without penalty. If you decide to take part and later no longer wish to continue, you have the right to withdraw from the study at any time.
Whenever one works with email or the Internet; there is always the risk of compromising privacy, confidentiality and/or anonymity. Your confidentiality will be maintained to the degree permitted by the technology being used. It is important for you to understand that no guarantees can be made regarding the interception of data sent via the internet by third parties.

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about the factors that motivate citizens to take risk-reduction behaviors to reduce personal health risks from air pollution.

You will be given credit from Sujump (Embrain in Korean version) after the completion of this study as a compensation. It will take approximately 20 minutes of your time to complete this survey.

PRIVACY: Your survey answers will be sent to a link at the research firm Sujump (Embrain in Korean version) where data will be stored in a password protected electronic format. SuJump (Embrain in Korean version) does not collect identifying information such as your name, email

address, or IP address. CONFIDENTIALITY: All information will be kept confidential. This means that your name will not appear anywhere and your specific answers will not be linked to your name in any way. No names or identifying information would be included in any publications or presentations based on these data, and your responses to this survey will remain confidential.

As a research participant you have the following rights…
• Your participation is voluntary.
• You may skip and/or refuse to answer any question for any reason.
• You are free to withdraw from this research study at any time without penalty.

If you have any questions, concerns or more information regarding this research, you may contact Dr. Joon Soo Lim, Associate Professor, S.I. Newhouse School of Public Communications, email: jlim01@syr.edu, phone: 315-904-8046.

If you have questions or concerns about your rights as a research participant, you may contact the Syracuse University Institutional Review Board at (315) 443-3013.

I am 18 years of age or older and I understand what my participation in this research involves. I have printed a copy of this form for my personal records.

By continuing I agree to participate in this research study.

(1) Yes

(2) No

Appendix C

Informed Consent (Chinese)

SYRACUSE UNIVERSITY
Department of Public Relations

项目名称：寻求和处理风险信息：中国市民对空气污染问题的看法

主要研究员：Dr.Joon Soo Lim, 副教授，雪城大学纽豪斯新闻传播学院，邮件 jlim01@syr.edu, 电话：315-904-8046

邀请您参加由锡拉丘兹大学 S.I. Newhouse 公共传播学院的 Joon Soo Lim 博士进行的研究。这项研究的目的是了解公民对中国空气污染风险的认识（韩语为韩语），以及他们采取降低风险行为的意图。

参加此研究的资格只有 1 个：（1）您必须年满 18 岁。系统会要求您在通过任何计算机，智能手机或平板电脑连接到互联网的地方填写在线问卷。

问卷包括与您的风险感知，戴口罩的态度，对市政府的感知信任，降低风险行为等有关的几个问题。

与这项研究相关的风险最小。但是，您将有权随时退出研究，并且可以选择不回答您可能不满意的问题。如果您不想参加，您有权拒绝参加，而不会受到处罚。如果您决定参加并且以后不再希望继续，则您有权随时退出研究。

每当有人使用电子邮件或 Internet 时；始终存在损害隐私，机密性和/或匿名性的风险。您的机密性将保持在所使用技术允许的程度。重要的是要您理解，不能保证第三方对通过互联网发送的数据的拦截。

参与这项研究不会给您直接的好处。但是，您的回答可能会帮助我们更多地了解促使公民采取降低风险行为以减少空气污染带来的个人健康风险的因素。

完成这项研究后，您将获得 Sojump（韩语版本）的信用作为补偿。您大约需要 20 分钟的时间才能完成此调查。

隐私：您的调查答案将发送到研究公司 Sojump（韩语的 Embrain）的链接，该链接中的数据将以受密码保护的电子格式存储。 Sojump（韩语版）不会收集您的姓名，电子邮件地址或 IP 地址等识别信息。机密性：所有信息将被保密。这意味着您的名字不会出现在任何地方，您的特定答案也不会以任何方式链接到您的名字。根据这些数据，任何出版物或演讲中都不会包含姓名或识别信息，您对本调查的答复将保持机密。

作为研究参与者，您具有以下权利…
•您的参与是自愿的。
•您可能出于任何原因跳过和/或拒绝回答任何问题。
•您随时可以退出本研究，而不会受到任何处罚。

如果您对此研究有任何疑问，疑虑或需要更多信息，可以联系S.I. Newhouse公共传播学院副教授Joon Soo Lim博士，电子邮件：jlim01@syr.edu，电话：315-904-8046。

如果您对自己作为研究参与者的权利有任何疑问或担忧，可以致电（315）443-3013与锡拉丘兹大学机构审查委员会联系。

我今年18岁以上，并且了解参与这项研究的内容。我已经打印了此表格的副本作为个人记录。

继续，我同意参加这项研究。

（1）是

（2）没有

Appendix D

Major Questionnaire Items (English Version)

PM2.5 Risk-Reduction Intention (INT)

How likely are you to perform the following behaviors to reduce the potential harmful health effect from inhaling PM2.5?

	1 Very unlikely 2-6 7 Very likely
Minimize the times for opening windows on haze days.	
Clean the room with water (i.e. use a damp cloth).	
Close windows when the air quality is bad.	
Use an air purifier.	
Clean or replace the filters installed on the air conditioner more frequently.	
Wash hands and face after getting home from outside.	
Drink water frequently.	
Eat Vegetables and fruits that are rich in Vitamin C.	
Adjust outdoor activity plans.	
Wear a professional antismog mask (medical, N95/N90, activated carbon, etc.)	
Limit going outdoors during work.	
Adjust physical exercise time and frequency.	
Avoid going to places that are seriously air polluted.	

Attitude

How much do you agree/disagree with each of the following statements?

Taking action to reduce the health risks caused by PM2.5 emissions is_____:

	1 Strongly disagree	2-6	7 Strongly agree
Beneficial			
A good idea			
Pleasant			
Useful			

Perceived Behavioral Control

To what extent do you disagree or agree with the following statements?

	1 Strongly disagree	2-6	7 Strongly agree
I am confident that I could participate in PM2.5 risk-reduction behaviors when it's necessary.			
It is easy for me to participate in PM2.5 risk-reduction behaviors.			
I have the relevant resources, time, and opportunities to participate in PM2.5 risk-reduction behaviors.			
Whether or not to participate in PM2.5 risk-reduction behaviors is entirely up to me.			

Moral Norm

To what extent do you disagree or agree with the following statements?

	1 Strongly disagree	2-6	7 Strongly agree
I would feel guilty if I did not participate in PM2.5 risk-reduction behaviors in daily life.			
I believe that I have a moral obligation to conduct PM2.5 risk-reduction behaviors in daily life.			
I think that participate in PM2.5 risk-reduction behaviors goes along with my principle of environmental protection.			

Subjective Norm

To what extent do you disagree or agree with the following statements?

	1 Strongly disagree	2-6	7 Strongly agree
People who are important to me (family, colleagues, etc.) would say I should participate in PM2.5 risk-reduction behaviors.			
It is expected of me that I participate in PM2.5 risk-reduction behaviors.			
I feel under social pressure to participate in PM2.5 risk-reduction behaviors.			
People who are important to me (family, colleagues, etc.) want me to participate in PM2.5 risk-reduction behaviors.			

Institutional Trust

How much do you agree or disagree with the following statements that describe your governments' ability to deal with the current problem related to PM2.5?

	1 Strongly disagree	2-6	7 Strongly agree
I am confident that government or health organizations can prevent the spread of PM2.5.			
I am confident that the government or health organizations can take effective action to control the risk of PM2.5.			
I am confident that the government or health organizations have the risk management skills to control the risk of PM2.5.			
I am confident that there are sufficient, properly qualified people in the government or health organizations who have the ability to control the risk of PM2.5.			

Exposure to Communication Channels

How often do you encounter the information about health risks caused by PM2.5 from each of the following news sources?

	1 Not at all	2~6	7 Always
Interpersonal communication (family, friends, colleagues, etc.)			
Print media (newspapers, magazines)			
Television news			
Online news (including portal)			
Social media and blogs			
Instant messenger apps (WeChat, etc.)			

Appendix E

Major Questionnaire Items (Chinese Version)

减少由 PM2.5 排放引起的健康风险的采取措施意愿

为了减少吸入 PM2.5 可能产生的不良影响，您是否愿意采取下列行动？

1 完全不愿意　　2-6　　7 非常愿意

尽量减少打开窗户的时间。

用水（如使用湿抹布）清扫室内。

室外空气不好的时候关窗。

使用空气净化器。

经常清洗或更换空调上安装的过滤器。

外出回家后洗手和洗脸。

经常喝水。

摄取富含维生素 C 的蔬菜和水果。

调整户外活动计划。

使用雾霾专用口罩（医用，N95/N90, 活性炭
等）。

在工作时（室内中），尽量不到室外去。

调整运动时间和频率。

外出时避开空气污染严重的地方。

态度

您对于参与减少由 PM2.5 排放引起的健康风险的行动所持有的态度是？

采取行动来减少由 PM2.5 排放引起的健康风险是_____:

	1 非常不同意	2-6	7 非常同意
很有益处			
是个好主意			
令人高兴			
很有用			

主观规范

您是否同意下列关于参与减少由 PM2.5 排放引起的健康风险的行动的表述？

	1 非常不同意	2-6	7 非常同意
对我而言重要的人（家人，同事等）认为我应参与减少由 PM2.5 排放引起的健康风险的行动			
对我而言重要的人（家人，同事等）期待我参与减少由 PM2.5 排放引起的健康风险的行动。			
我感受到被要求参与减少由 PM2.5 排放引起的健康风险的行动。			
对我而言重要的人（家人，同事等）希望我参与减少由 PM2.5 排放引起的健康风险的行动。			

道德规范

您是否同意下列关于参与减少由 PM2.5 排放引起的健康风险的行动的表述？

	1 非常不同意	2-6	7 非常同意
在日常生活中，我如果不参与减少由 PM2.5 排放引起的健康风险的行动，就会感到罪恶感。			
我相信，在日常生活中，我们有道德义务执行减少由 PM2.5 排放引起的健康风险的行动。			
我认为采取减少由 PM2.5 排放引起的健康风险的行动是保护环境的行为。			

感知行为控制

您是否同意下列关于参与减少由 PM2.5 排放引起的健康风险的行动的表述？

	1 非常不同意	2-6	7 非常同意
我确信我在必要时可以参与减少由 PM2.5 排放引起的健康风险的行动。			
参与减少由 PM2.5 排放引起的健康风险的行动对我来说是件容易的事情。			
我有足够的能力参与减少由 PM2.5 排放引起的健康风险的行动。			
是否参与减少由 PM2.5 排放引起的健康风险的行动完全取决于我。			

政府机构信任

您是否同意下列关于参与减少由 PM2.5 排放引起的健康风险的行动的表述？

	1 非常不同意	2-6	7 非常同意
我确信政府或相关机构可以阻止 PM2.5 的扩散。			
我确信政府或相关机构可以采取有效措施管控由 PM2.5 引起的健康风险。			
我确信政府或相关机构有管控由 PM2.5 引起的健康风险的技术。			
我确信政府或相关机构内有具备有能力和资格的人去管控由 PM2.5 引起的健康风险。			

媒体曝光

您通过以下渠道获取 PM2.5 健康风险信息的频率如何？

	1 完全不接触	2~6	7 非常频繁地接触
与人交流(家人、朋友、同事等)			
印刷媒体(报纸、杂志)			
电视新闻			
在线新闻(包括门户网站)			
社交媒体/博客			
聊天软件(微信等)			

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Media Studies, June 2020
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RESEARCH INTERESTS

- Health, science, and risk communications
- Effects of persuasive messages on health risk perceptions and behaviors
- The role of media in promoting public health.

EXPERIENCE

S.I. Newhouse School, Syracuse, NY
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- Collect manuscripts for health-related projects
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Graduate Assistant - Executive Education Communications Management
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