



# Application of the Protection Motivation Theory in predicting cigarette smoking among adolescents in China



Yaqiong Yan<sup>a,b</sup>, Angela J. Jacques-Tiura<sup>b,\*</sup>, Xinguang Chen<sup>a,b</sup>, Nianhua Xie<sup>a</sup>, Jing Chen<sup>a</sup>, Niannian Yang<sup>a</sup>, Jie Gong<sup>a</sup>, Karen Kolmodin MacDonell<sup>b</sup>

<sup>a</sup> Chronic Disease Department, Wuhan Centers for Disease Prevention and Control, Wuhan 430022, China

<sup>b</sup> Pediatric Prevention Research Center, Wayne State University School of Medicine, 4707 St. Antoine, Suite W534, Detroit, MI 48201, USA

## HIGHLIGHTS

- Little theory-guided research was previously conducted on Chinese youth smoking.
- Components of PMT were associated with smoking intention and behavior.
- Perceived rewards increased smoking intention and behavior.
- Recent smokers indicated lower self-efficacy to avoid smoking.

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## ABSTRACT

Reducing tobacco use among adolescents in China represents a significant challenge for global tobacco control. Existing behavioral theories developed in the West – such as the Protection Motivation Theory (PMT) – may be useful tools to help tackle this challenge. We examined the relationships between PMT factors and self-reported cigarette smoking behavior and intention among a random sample of vocational high school students ( $N = 553$ ) in Wuhan, China. Tobacco-related perceptions were assessed using the PMT Scale for Adolescent Smoking. Among the total sample, 45% had initiated cigarette smoking, and 25% smoked in the past month. Among those who never smoked, 15% indicated being likely or very likely to smoke in a year. Multiple regression modeling analysis indicated the *significance* of the seven PMT constructs, the four PMT perceptions and the two PMT pathways in predicting intention to smoke and actual smoking behavior. Overall, perceived rewards of smoking, especially intrinsic rewards, were consistently positively related to smoking intentions and behavior, and self-efficacy to avoid smoking was negatively related to smoking. The current study suggests the utility of PMT for further research examining adolescent smoking. PMT-based smoking prevention and clinical smoking cessation intervention programs should focus more on adolescents' perceived rewards from smoking and perceived efficacy of not smoking to reduce their intention to and actual use of tobacco.

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## 1. Introduction

Tobacco control in developing countries presents a pressing global public health challenge (Giovino et al., 2012; World Health Organization [WHO], 2011). More than 80% of smokers are in developing countries. Smokers in China alone account for a third of the world total (Giovino et al., 2012). Despite the high rates of smoking in China and other developing countries, few evidence-based tobacco prevention and intervention

studies have been conducted (Shek & Yu, 2011). Moreover, most studies that have been conducted are not guided by an established behavioral theory (see Guo et al., 2007 for a notable exception). Most behavioral theories are developed in the West. Promoting the application of Western-developed behavioral theories in China and other developing countries may advance the understanding of tobacco use for more effective tobacco control across the globe.

### 1.1. Theory-based behavioral research

Contemporary medical and health behavior research has become increasingly grounded in and guided by theory (Glanz, Rimer, & Viswanath, 2008; National Research Council, 2001; Otten, Bricker, Liu, Comstock, & Peterson, 2011). A large number of theories and models have been developed and used to guide behavioral research including

\* Corresponding author at: Pediatric Prevention Research Center, Wayne State University School of Medicine, 4707 St. Antoine, Suite SG14, Detroit, MI 48201, USA. Tel.: +1 313 577 6584.

E-mail addresses: samwhcdc@hotmail.com (Y. Yan), atiura@med.wayne.edu (A.J. Jacques-Tiura), jimchen@med.wayne.edu (X. Chen), xienh@163.com (N. Xie), cj540@163.com (J. Chen), niannianyang@163.com (N. Yang), jiecong322@hotmail.com (J. Gong), kkolmodin@med.wayne.edu (K.K. MacDonell).

the Information–Motivation–Behavioral Theory (Fisher & Fisher, 1992; Fisher, Fisher, Misovich, Kimble, & Malloy, 1996), the Theory of Reasoned Action and Planned Behavior (Ajzen, 1985; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), the Transtheoretical Model of Change (Prochaska & Velicer, 1997), Social Cognitive (Learning) Theory (Bandura, 1989), and Protection Motivation Theory (Boer & Seydel, 1996; Rogers, 1975). With the guidance of a theory or a conceptual framework, a researcher can better investigate and understand smoking behaviors, supporting more effective tobacco use prevention and smoking cessation. In addition, data derived from a theory-guided study will help theorists to refine the proposed theory. To date, little research on smoking in China has been conducted and only a small subset is theory-based.

### 1.1.1. Protection Motivation Theory and health behavior

Among the various theories that are frequently used to guide behavior research, the Protection Motivation Theory (PMT) may be particularly well-suited for understanding and addressing smoking behavior (Floyd, Prentice-Dunn, & Rogers, 2000; Milne, Sheeran, & Orbell, 2000). First elucidated by Rogers (1975), PMT in its current format posits two closely related pathways, Threat Appraisal and Coping Appraisal, which link environmental influences to a behavior through a series of cognitive processes (Fig. 1).

The balance between the two appraisal pathways determines the likelihood for a risk behavior, such as smoking, to occur (Boer & Seydel, 1996; Rogers, 1975). The threat appraisal pathway involves comparing perceived rewards (intrinsic and extrinsic) of a maladaptive health-related behavior (e.g., smoking) with perceived threats (severity and vulnerability) that the behavior poses. For example, adolescents might weigh feelings of relaxation and better concentration (potential perceived intrinsic rewards of smoking) and beliefs that happier and more popular smoke (potential perceived extrinsic rewards of smoking), against their knowledge that smoking causes cancer and other diseases (potential severity of smoking-related risk) and concerns that smoking may lead to an earlier death (potential vulnerability to smoking-related risk). The coping appraisal pathway involves comparing coping efficacy (self-efficacy and response efficacy) of an adaptive variant of the health-related behavior (e.g., avoiding smoking) with perceived response costs of such adaptive behavior. For example, adolescents might consider the health benefits that nonsmokers may enjoy (perceived response efficacy of not smoking) and how well they think they could decline a cigarette offered by a friend (self-efficacy for not smoking), as compared with their concerns about social isolation if they do not smoke (perceived cost of not smoking).

Application of PMT to research has advanced our understanding of a number of health behaviors, including alcohol consumption (Gibbons, Houlihan, & Gerrard, 2010), substance use and abuse (Feigelman, Li, & Stanton, 1995; Stanton & Galbraith, 1994), and sexual risk behavior for HIV infection (Chen et al., 2009; Chen et al., 2010; Gong et al., 2009). As described in the next section, PMT has been used as a framework for tobacco research in the United States. We propose to extend

the application of PMT to smoking behavior in China. The approach commonly seen in the reported studies to examine the utility of a PMT model is either to treat it as a whole or to focus on certain significant constructs (e.g., self-efficacy, response cost) (Chen et al., 2009). In this study, we will investigate PMT constructs hierarchically. Our intention is to provide data on the role of individual PMT constructs, perceptions, and appraisal pathways as an integrative system in predicting smoking behavior.

### 1.1.2. PMT and adolescent tobacco use research

As an integrative conceptual framework, PMT has also been used in tobacco research among adolescents in the United States and other developed countries (Costa, Jessor, & Turbin, 2007; Greening, 1997; Ho, 1998). For example, guided by PMT, one early epidemiological study demonstrated the significance of cognition and appraisal in predicting adolescents' smoking behavior (Greening, 1997). In this sample of 690 American high school students, a logistic regression controlling for age and gender revealed that smokers were more likely to acknowledge the vulnerability to smoking-related diseases, perceived less severity of smoking risks, viewed male smokers as popular (an indicator of extrinsic rewards of smoking, an effect stronger for boys than for girls), and perceived lower response efficacy for not smoking than did nonsmokers.

Anti-tobacco intervention programs based on PMT have also shown significant effects in discouraging tobacco use among adolescents in developed countries (Pechmann, Zhao, Goldberg, & Reibling, 2003; Smith & Stutts, 2003). For example, perceived social disapproval increased adolescents' intentions to abstain from smoking (Pechmann et al., 2003). The successful application of PMT in tobacco research in developed countries suggests the potential utility of the theory to guide tobacco research in developing countries such as China. However, few such studies can be found in the published literature in China.

### 1.2. Need for theory-based tobacco research in China

As part of the global tobacco control effort, reducing tobacco use in China represents a critical challenge. China is the world's largest tobacco producer and consumer, and is home to approximately one-third of the world's smokers (Han, Chen, & Stanton, under review; WHO, 2011). Despite much progress in tobacco control in China, data from diverse sources indicate little decline in the prevalence of tobacco use, particularly tobacco use among adolescents (Chen, Stanton, et al., 2006; Cheng, 2008; Han et al., under review; Zhang, Ou, & Bai, 2011). Every day, approximately 80,000–90,000 Chinese adolescents 12–17 years of age become new smokers and 11–12 million adolescents smoked in the past month (Grenard et al., 2006; Han et al., under review; Weiss, Palmer, Chou, Mouttapa, & Johnson, 2008). Thus, it is a significant and timely challenge for tobacco researchers in China and across the globe to curb the high rates of tobacco use among young Chinese.

There have been notable tobacco control efforts in China, but very few studies or intervention programs have been grounded in specific theory. This lack of theory-based research could be one potential explanation for the persistently high levels of tobacco use among young Chinese after several decades of tobacco control efforts. A search of the published literature in Chinese and English revealed that few studies on tobacco use in Chinese adolescents were theory-guided, and all were conducted by the same research team (e.g., Guo, Unger, Azen, MacKinnon, & Johnson, 2012; Guo, Unger, Palmer, Chou, & Johnson, 2013; Guo et al., 2007). In addition, theories were mentioned in only three reported smoking prevention intervention trials conducted in China (Chen, Fang, Li, Stanton, & Lin, 2006; Chou et al., 2006; Wen et al., 2010). Furthermore, even in these intervention trials, no detailed information was provided about integrating the theories into the intervention programs, and no evaluation data (e.g., mediation effect analysis) were reported to support the role that the theory played in supporting the observed intervention effect.

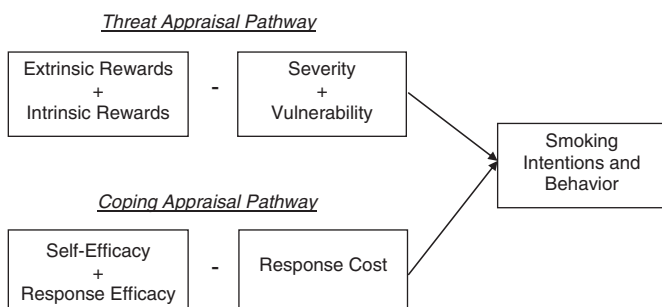


Fig. 1. Schematic representation of the Protection Motivation Theory (PMT) components.

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