



# Are smokers too optimistic about their health status: *Ex ante* perception versus *ex post* observation



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## ABSTRACT

As the world has moved toward the era of non-communicable diseases, whether the individuals are in a capable position to accurately evaluate their own health status has an important implication on disease prevention in particularly and population health outcome in general. In this paper, we address four important questions surrounding the accuracy of health perception: (1) to what extent that individuals can make an accurate evaluation on their own health status; (2) what are the major factors influencing health misperception if any; (3) what are the causal directions between health behavior and health perception; and (4) whether individuals can learn and update their self-evaluation on health status over time and whether such learning is productive in that it mitigates the health misperception. Specifically, we use a longitudinal data set obtained from Taiwan that covers six waves of survey over about twenty-year period to compare the *ex ante* subjective perception on health and the *ex post* mortality hazards. Our results suggest that over one third of the survey respondents are not performing well in the evaluation of their own health status. We also find that smokers are more likely to have an optimistic bias on their own health assessment as compared to nonsmokers. After controlling for the simultaneous causality problem, we find a causal effect of individuals' misperceptions on continuing smoking, but not vice versa. In addition, our results show that individuals update their subjective perception on health over time through the learning from personal health shocks and the provision of public information on smoking hazards. Although the learning process tends to be overshooting among smokers, it is beneficial to mitigate the optimistic bias. We also find the evidence that personal health shock has a stronger impact on updating behavior than public information, indicating that personal experience is a more effective channel through which to correct the bias in health perception, compared to the provision of public information, such as anti-smoking campaign.

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## 1. Introduction

Life is a journey surrounding by the uncertainty in that people do not have full information to know whether certain event will occur in advance. One of the uncertain events in daily life is the incidence of illness which has been characterized as one of most important features of health care market (Arrow, 1963). Under the uncertain environment, individuals often make a decision

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according to the subjective evaluation on their health status which is based on the prior belief and may be updated over time as new information emerges. As the world has moved forward toward the era of non-communicable diseases (NCDs), a growing body of research has shown that the incidence of NCDs is strongly associated with individual health behavior on what they do or not to do in the daily life, which in turn is influenced by their subjective health evaluation. As a result, whether the individual's *ex ante* evaluation about their health status is accurate or not has important implication for disease prevention and population health outcome (Global Burden of Disease Study, 2015).

This paper aims to address four important questions surrounding the accuracy of health perception. First, we investigate the questions on to what extent that individuals can make an accurate evaluation about their health status. Second, we examine the determinants of the misperception of individuals' health status if any, with the special focus on the smoking status. Third, we explore the causal directions between health behavior and health perception. Fourth, we investigate how individuals can use new information to update their subject evaluation on health status over time and whether the learning is productive in that it mitigates the bias in the subjective perception on their health status.

Specifically, we measure the *ex ante* perception on the health status by self-rated general health (SRH). We then compare the SRH with the *ex post* observation measured by the mortality hazards estimated from a longitudinal data set obtained from Taiwan that covers six-wave surveys over near 20-year period. Based on the comparison between *ex ante* subjective perception and the *ex post* objective observation, we are able to assess the extent of individuals' optimistic/pessimistic bias on their self-rated health status. In addition, given the advantage of the panel structure of our data set, we are able to examine how the individuals' optimistic/pessimistic bias, if any exists, responds to the health shocks over a nearly 20-year period (1989–2007). Furthermore, the time span of our data covers the major period of widespread anti-smoking campaigns in Taiwan, which allows us to investigate the role of public information in the adjustment of individuals' health perceptions.

The remainder of this paper is organized as follows. Section 2 provides a brief review on the previous research with the focus on whether individuals are able to make an adequate assessment on smoking risk. Section 3 outlines our empirical strategies, and Section 4 provides a detailed description of the data and relevant variables. Our empirical findings are presented and discussed in Section 5, while the final section concludes and highlights the policy implications.

## 2. Previous research

Smoking has been widely recognized as the major risk factor of many non-communicable diseases, such as lung cancer, chronic bronchitis and emphysema, and ischemic heart disease. Therefore, understanding whether smokers are systematically more likely to have a misperception on their health status than their counterpart has important implication on tobacco control policy in particular and disease prevention in general. Earlier studies examined the accuracy of smoker's knowledge of smoking risks by comparing individuals' subjective assessments of a typical smoker's longevity expectation or probability of developing smoking-related illnesses (so-called "third-person questions") with the life table data (Antoñanzas et al., 2000; Kristiansen, Harding, & Eiser, 1983; Liu & Hsieh, 1995; Viscusi, 1990, 1992). Their results revealed that smokers substantially overestimated smoking's health risks, which challenges the argument that people smoke because they don't know the health risk of smoking.

Another branch of literature on smoker's behavior emphasized the question on how to measure smokers' risk perceptions. Hanson and Logue (1998) argued that any "third-person question" suffers from a potential bias in that respondents may fail to apply risk perceptions in general to themselves. Weinstein (1989) also suggested that people have a tendency to believe the risks of various behaviors are lower for themselves than they are for other people who engage in similar behaviors, especially if these behaviors are controllable by themselves, for example, smoking. Based on the concept of the so-called "optimistic bias", several studies followed the framework of Hamermesh (1985) to utilize the respondents' expectations of their own probabilities of longevity in terms of reaching a specific age or the onset of specific diseases to measure their risk perception of smoking. Arnett (2000) found that even though the majority of smokers agree, in general, that smoking causes death eventually, they are less likely than nonsmokers to apply the health risks of smoking to themselves. Khwaja, Sloan, and Chung (2007) compared subjective longevity expectations to estimated probabilities of mortality and came to a similar conclusion as Arnett (2000). However, Smith, Taylor, Sloan, Johnson, and Desvousges (2001) found smokers are more pessimistic than nonsmokers regarding their likelihood of living to age 75 or older. Khwaja, Sloan, and Wang (2009) alternatively found that both smokers and nonsmokers tend to overestimate the risks of strokes, lung disease, and heart disease.

The inconsistency of conclusions from previous empirical evidence regarding smoker's risk perceptions may reflect that the measurement of risk perception using the probability-based longevity/diseases expectation is sensitive to the comparison across individuals, samples, or time periods. In fact, there have been academic discussions on the problems of utilizing the probability-based expectations. In the context of an imperfect rational model, it is argued that people have difficulty to cognitively form probabilities (Sloan & Hsieh, 2012). Weinstein (1998) surveyed a wide range of literature to conclude that people have substantial difficulty using the probabilities and percentages that form their risk perceptions. In addition, Sandman, Weinstein, and Miller (1994) further showed that individuals usually alter their risk perceptions if the range of the "risk ladder" is modified. Since numerical risk estimates may not be cognitively reliable, Windschitl and Wells (1996) suggested that people's assessment of likelihood based on a scale of verbal categories is a better predictor than the numerical probability would be. Finally, it is worth noting that questions pertaining to longevity expectations or the risks of getting specific illnesses are usually only covered in a small number of surveys, especially those surveys designed purposely for smoking-related research (for example, the Health and Retirement Study, the Survey on Smoking, and the National Longitudinal Survey of Youth).

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