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Curiosity predicts smoking experimentation independent of susceptibility in a US national sample ☆

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HIGHLIGHTS

- Identifying who is at risk to smoke is critical to programs to prevent smoking.
- Current susceptibility index identifies 30% of future experimenters.
- Adding curiosity improves the sensitivity of the susceptibility index to over 50%.
- Preventing pre-teens from becoming curious about smoking is an important goal.

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ABSTRACT

Purpose: To improve smoking prevention efforts, better methods for identifying at-risk youth are needed. The widely used measure of susceptibility to smoking identifies at-risk adolescents; however, it correctly identifies only about one third of future smokers. Adding curiosity about smoking to this susceptibility index may allow us to identify a greater proportion of future smokers while they are still pre-teens.
Methods: We use longitudinal data from a recent national study on parenting to prevent problem behaviors. Only oldest children between 10 and 13 years of age were eligible. Participants were identified by RDD survey and followed for 6 years. All baseline never smokers with at least one follow-up assessment were included ($n = 878$). The association of curiosity about smoking with future smoking behavior was assessed. Then, curiosity was added to form an enhanced susceptibility index and sensitivity, specificity and positive predictive value were calculated.
Results: Among committed never smokers at baseline, those who were 'definitely not curious' were less likely to progress toward smoking than both those who were 'probably not curious' ($OR_{adj} = 1.89$; 95% CI = 1.03–3.47) or 'probably/definitely curious' ($OR_{adj} = 2.88$; 95% CI = 1.11–7.45). Incorporating curiosity into the susceptibility index increased the proportion identified as at-risk to smoke from 25.1% to 46.9%. The sensitivity (true positives) for this enhanced susceptibility index for both experimentation and established smoking increased from 37–40% to over 50%, although the positive predictive value did not improve.
Conclusion: The addition of curiosity significantly improves the identification and classification of which adolescents will experiment with smoking or become established smokers.

1. Introduction

Despite considerable public health action to prevent smoking initiation over the past 50 years (U.S. Department of Health and Human Services, 2012), in 2013, 38% of high school seniors had previously smoked and 16.3% were current smokers (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2014). A recent Surgeon General's report (U.S. Department of Health and Human Services, 2012) called for a renewed focus on increasing efforts to prevent smoking initiation. The

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success of this approach will depend on both improved identification of at risk adolescents before they have experimented and developing effective prevention interventions (Biglan, Brennan, Foster, & Holder, 2004).

The susceptibility to smoking index (Pierce, Choi, Gilpin, Farkas, & Merritt, 1996) is a widely used measure of risk among never smokers that assesses both intention to smoke and self-efficacy about refusing a cigarette. While this index consistently identifies teens with double the risk of starting to smoke (U.S. Department of Health and Human Services, 2012), the proportion of true positives (sensitivity) over the subsequent four years is a low one third of future smokers (Choi, Gilpin, Farkas, & Pierce, 2001; Gritz et al., 2003). This at-risk measure index would be more useful for the development of effective population interventions if it identified more than half of future smokers.

Tobacco marketing is widely recognized as an influence on future initiation (National Cancer Institute, 2008; U.S. Department of Health and Human Services, 2012) and a number of marketing theories specify curiosity as a critical mediating variable through which marketing can affect consumer behavior (Ray, 1982; Smith & Swinyard, 1988; Wells, Burnett, & Moriarty, 2000). Curiosity would appear to be a good candidate variable to improve the susceptibility to smoking index.

Previously, in a three year follow-back to a sample of 12–15 year old teens in California (Pierce, Distefan, Kaplan, & Gilpin, 2005), we demonstrated that curiosity has independently predicted initiation among baseline never smokers with the additive effect coming mainly from predicting which committed never smokers would experiment in the time period. In both this original study and a more recent international study (Guo, Unger, Palmer, Chou, & Johnson, 2013), curiosity about smoking was associated with receptivity to tobacco industry marketing messages, suggesting that it could be a mediator variable through which marketing influences initiation.

Categorizing smoking risk in the pre-teen years before many major influences on smoking will have occurred will necessarily result in a lower rate of true positives. For example, adolescents are more likely to become smokers if they have friends who smoke (U.S. Department of Health and Human Services, 2012); this is especially true with increasing age (Gilpin, Choi, Berry, & Pierce, 1999). Academic achievement is also negatively associated with smoking initiation throughout adolescence (U.S. Department of Health and Human Services, 2012), and this effect is enhanced by friend smoking. Part of this increased risk may come from more free time to socialize with friends who smoke, especially when a single parent has limited time to implement recommended parenting practices (Hoeve et al., 2009). These and other influences on smoking result in higher rates among those with lower socio-economic status and among non-Hispanic whites compared to other race–ethnic groups (U.S. Department of Health and Human Services, 2012).

In this study we examine whether curiosity can increase the predictive validity of the susceptibility to smoking index. We use data from a US national randomized study of parenting to prevent problem behaviors where participants entered their teen years well after the restrictions on tobacco marketing that followed the Master Settlement Agreement (Pierce & Gilpin, 2004). We hypothesize that the addition of curiosity will differentially increase the proportion of the identified teen population who will initiate smoking.

2. Material and methods

2.1. Study participants and survey methods

In 2003, a random digit dialed (RDD) telephone methodology was used to identify US families with an oldest child between 10 and 13 years old. Parents were invited by mail and telephone interview to join a study on parenting to prevent problem behaviors through adolescence, the protocol for which has been published (Pierce et al., 2008). Both adolescents and parents were enrolled and interviewed by phone (n = 1036 pairs). Our analysis used the six adolescent interviews that occurred at approximately 8–12 month intervals after completion of the study baseline assessment. We used only adolescents who reported that they had never tried cigarettes – even a puff – and had at least one follow-up assessment (n = 878).

2.2. Survey measures

2.2.1. Sociodemographics

At baseline, adolescents self-reported their age, gender, race/ethnicity, and whether or not they lived in a single parent household. The initial telephone number was used to categorize participants by region of the country (Northeast, Midwest, South, and West).

2.2.2. Tobacco use

To determine if the adolescent had initiated tobacco use they were asked, “Have you ever smoked a cigarette?” and, if not, “Have you ever tried or experimented with cigarette smoking, even a few puffs?” A ‘no’ response to both questions classified the adolescent as a never smoker. Established smokers were those who responded positively to the question “Have you smoked at least 100 cigarettes in your life?”

2.2.3. Social smoking environment

At baseline, adolescents were asked: “Have any people that you live with now smoked cigarettes in the last year?” with a ‘yes’ or ‘no’ response; and “How many of your best friends smoke?” with responses ‘none’, ‘some’, ‘most’ or ‘all’ and re-coded dichotomously as either ‘none’ or ‘some/most/all’.

2.2.4. Perceived school performance

At baseline, adolescents ranked their performance in school as ‘much better than average,’ ‘better than average,’ ‘average,’ or ‘below average’. As the lowest category had few responses, we combined it with the ‘average’ response category.

2.2.5. Receptivity to tobacco advertising

At baseline, receptivity to tobacco advertising was measured with two sets of questions: “Think back to the cigarette advertisements you have recently seen. What is the name of the cigarette brand of your favorite cigarette advertisement?” Respondents who did not name a brand were also asked, “Of all the cigarette advertisements you have seen, which do you think attracts your attention the most?” and “If you were given a tee-shirt or a bag that had a tobacco industry cigarette brand image on it, would you use it?”; Those who responded ‘Probably Yes’ or ‘Definitely Yes’ that they would use an item with a tobacco logo were classified as ‘Highly Receptive’. Those who named a favorite cigarette brand only were classified as ‘Moderately Receptive’. Everyone else was classified as ‘Low Receptivity.’

2.2.6. Susceptibility to smoking

At baseline, susceptibility to smoking was assessed with three items: “Do you think that in the future you might experiment with cigarettes?”; “At any time during the next year do you think you will smoke a cigarette?” and “If one of your best friends were to offer you a cigarette, would you smoke it?” Response options included ‘Definitely Not’, ‘Probably Not’, ‘Probably Yes’, and ‘Definitely Yes’. Adolescents reporting ‘Definitely Not’ to all three questions were classified as ‘committed never smokers.’ Adolescents who responded ‘Probably Not’ to all three questions were classified as having level 1 susceptibility. Those reporting ‘Probably Yes’ or ‘Definitely Yes’ to any question were classified with Level 2 susceptibility.

2.2.7. Curiosity

As in previous studies, curiosity about smoking was assessed using the single item: “Have you ever been curious about smoking