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Forbidden Fruit and the Prediction of Cigarette Smoking

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Abstract

The concept of “forbidden fruit” has been popularly associated with adolescent cigarette smoking in the US. However, only a few empirical studies have been conducted to investigate how this construct operates among adolescents. We examined the concurrent and prospective relationships between two related concepts of forbidden fruit and adolescent cigarette smoking behavior and intention. We found some support for forbidden fruit attitudes as concurrent and longitudinal predictors of smoking and intention to smoke. Implications of these findings are discussed.

Keywords

forbidden fruit; teens; cigarette smoking

Introduction

The concept of “forbidden fruit” (FF) provides one reason that youth may begin to use tobacco. While used popularly among anti-tobacco activists and some researchers, it is not clear how many empirically-based studies using this concept have been completed. This brief report describes ways in which the term has been used and provides a cross-sectional and prospective empirical test of the relations of this concept with tobacco use and intention among teens.

Searches of Google Scholar, Ovid MEDLINE® (1950-September 7, 2008), and PubMed PMC, on August 5, 2008, revealed 174, one, and five web pages, respectively, when the terms “forbidden fruit” and “tobacco use” were crossed. These articles were addressed in the contexts of tobacco industry advertisements for youth (e.g., DeJong, 1996; Gale et al., 2006), supply reduction strategies for youth (e.g., Willemsen and De Zwart, 1999), or the contents of youth prevention programming (e.g., Sussman, 2002). We inferred from these searches, three related definitions of “forbidden fruit” as applied to youth smoking. One definition pertains to an emotional reaction. Because of a tabooed status, thoughts of smoking or smoking in the future evoke positive arousal-excitement and pleasure, and may lead to later normalization of smoking as a practice. This initial reaction is referred to as an FF reaction (Pechmann, 2001; Pechmann and Shih, 1999).

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Declaration of Interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of this paper.

A second cognitive/attitudinal definition focuses on reactance effects among youth when adults tell them not to smoke (Bushman and Stack, 1996). The tobacco industry's use of the FF concept has been stated as consisting of admonitions by adults that youth should not smoke, even stated by adult smokers. Youth, then, may ignore these directives from authority to show that they are making their own choice (DeJong, 1996; Sussman, 2002). The tobacco industry also admonishes parents to keep cigarettes away from their children's reach (Landman, Ling et al., 2002). According to this perspective, the tobacco industry may dangle tobacco use as a forbidden fruit for youth, which, then, may become interpreted as a sign of independence (Koh, 1999). Interestingly, according to Willemsen and De Zwart (1999), sales restrictions and age limits on purchasing tobacco products may produce this FF effect and is not recommended as a means of prevention (Willemsen and De Zwart, 1999).

A third definition is an extension of the second definition. Not only do adults tell youth not to smoke, but they (and the tobacco industry) indicate that tobacco use is a "responsible" choice among adults; in other words, they indicate that tobacco use is not okay among youth but might be okay among adults, or when becoming an adult (Sussman, 2002; Sweda and Daynard, 1996; Wakefield, McLeod et al., 2006; Willemsen and De Zwart, 1999). Youth, then, may believe it is okay for them to smoke even though others in society view it as only all right for adults to smoke.

Thus, teens may be tempted to try tobacco as a forbidden fruit, as a means to show independence or rebellion. Sensation-seeking youth may be particularly prone to demonstrate attitudes consistent with a forbidden-fruit-type of attitude (Bushman and Stack, 1996; DeJong, 1996; Gale et al., 2006; Zuckerman, 1979). To assess whether or not an FF attitude is redundant with sensation-seeking, the latter variable should be added as a predictor in a study that examines this arena.

The Present Study

We attempted to examine the FF concept through use of a self-report measure. This measure examines youths' perceptions of society and their own attitude toward acceptability of adult versus youth smoking. First, we examine the cross-sectional relation of forbidden fruit with tobacco use. Next, we examine the possible prospective reciprocal relations of current tobacco use, tobacco use intention, and forbidden fruit, measured at baseline and one-year follow-up.

Method

School Selection and Experimental Design

A total of twelve alternative/continuation high schools from three counties in southern California (Los Angeles, Ventura, and Orange) were recruited as a convenience sample for participation in this study. In California, schools in the alternative high school system are known as "continuation" high schools (CHS). These schools serve youth who are unable to remain in the traditional public high school system due to functional problems, such as difficulties in attendance, achieving academic credits, or substance use. Youth are mandated in the State of California to receive at least part-time education until they are 18 years of age. This led to the creation of the CHS system. The schools were assessed at baseline and one year later as part of a teen tobacco use cessation study (Project EX-4).

Subjects

School enrollment and consent information were collected simultaneously. For the 12 CHSs in the study, a total of 2,020 students were enrolled in the classrooms selected for participation in the study. This was 64.5% of the total enrollment ($n = 3139$) for all 12

schools combined. An average of eight classes were selected per school, with a range of five (smallest schools) to 13 classes (largest schools). Of the 2,020 students enrolled in the classes selected, 1,367 were consented for participation in the study (67.7% of the total enrolled). Of the 1,367 consented students, 1,097 took the pretest survey (86.2%). Among the 1,097 subjects that participated in the pretest survey, 710 students completed questionnaires one year later (64.7% retention rate).

Baseline subjects varied from 13 to 19 years of age (mean age = 16.5 years, SD = 1.0 years) at pretest. The sample was 62.7% male; 16.4% white, 70.9% Hispanic, 3.5% Asian, 5.1% African American, and 4.1% other ethnicity. Further, 51.7% of the students lived with both parents; approximately 47% of youths' fathers and 49% of youths' mothers completed high school. Modal occupations among fathers were skilled laborers (39.5%) and minor professionals or small business owners (26.9%). Modal occupations among mothers were minor professionals, semiskilled workers, or semiskilled laborers (39.9%), while 29.4% were housewives or homemakers. Approximately 42% of the subjects had smoked a cigarette in the last month and 52% reported that they may smoke in the next 12 months.

Data Collection and Measures

Pretest measures were collected from students using a self-report, closed-ended response questionnaire. Questionnaires were administered over one class period. Demographic items included age (in years), gender, ethnicity (dummy-coded as non-Hispanic white, Hispanic, black, Asian, and other), mixed ethnicity (yes/no), current living situation (dummy-coded, with parents, alone, other), and parents' education (mean response across father's [or stepfather's] and mother's [or stepmother's] educational levels based on categories derived from Hollingshead and Redlich (1958).

Smoking behavioral items included past 30-day use of cigarettes, which was assessed with the item asking "How many cigarettes have you smoked in the last 30 days?" Responses were asked on a 12-point scale that was represented by numeric intervals from "0 cigarettes" to "100+ cigarettes" (i.e., 0, 1–10, 11–20, ..., 90–100, 100+). A dichotomous 30-day smoking indicator was employed to divide subjects into current + smokers and noncurrent smokers. Smoking intention was assessed in the survey with the question "How likely is it that you will smoke cigarettes in the next 12 months? Would you say..." with response categories of "1 = definitely not," "2 = probably not," "3 = a little likely," "4 = somewhat likely," and "5 = very likely". The dichotomous smoking intention status was coded as "yes" if subjects answered anything other than "definitely not" for smoking in the next 12 months. These smoking-related measures have been used often in our own and others' research (Sussman et al., 1995).

"Forbidden fruit" attitude was defined in two ways with three rating scale items. These items were "Do others in society think it is okay for adults to smoke?," "Do others in society think it is okay for people your age to smoke?," and "Do you think it is okay for people your age to smoke?" Each of these three items consisted of four forced-choice responses. These responses were then binary coded. The response choices "very much so," "somewhat," and "a little bit" were coded as "yes," and "not at all" was coded as "no". The two measures of FF attitude were defined dichotomously in two slightly different ways for the analysis. The first two items were used to compose the first FF attitude measure (FF1). FF1 attitude was valued as "yes" if a subject self-reported that others in society think it is (a) okay for adults to smoke but (b) not at all okay for people his/her age to smoke. Otherwise, FF1 was valued as "no."

In addition to FF1, when a subject also reported that he/she thinks it is okay for people his/her age to smoke, the second FF indicator (FF2) was then valued as "yes". Otherwise, FF2

was valued as “no”. That is, the third item was added to the other two items (FF1) to compose the second measure of FF. This second measure (FF2) indicates a personal reaction aspect of the FF concept (society thinks it is okay for adults but not peers to smoke, but they think it is okay for peers to smoke). The prevalence for these two definitions of FF was 45% and 14%, separately. The correlation (phi coefficient) between these two definitions of FF was 0.46.

Sensation-seeking was measured with six items from the impulsivity subscale of the Zuckerman–Kuhlman questionnaire, each binary coded as “true” or “false” responses (e.g., “I like to have new and exciting experiences and sensations even if they are a little frightening,” “I like doing things just for the thrill of it”); Cronbach’s alpha = 0.79; Simon et al., 1994). At baseline, sensation-seeking was not correlated with FF1, but was positively correlated with FF2 (point biserial correlation = 0.10, $p = 0.001$).

Data Analysis

Both cross-sectional and potential reciprocal longitudinal relationships between FF and smoking were analyzed with data assessed at pretest and one-year follow-up. To account for the potential within-school clustering of students on the outcomes, the data analysis was conducted with a generalized mixed-linear model (Murray and Hannan, 1990) using the SAS statistical package version 9.1 (SAS Institute, 2001). The variables evaluated in this analysis include the dichotomous indicators for monthly smoking, smoking intention, and FF (0 = no and 1 = yes). The variables adjusted for in the analyses included age, gender, ethnicity, parents’ education level, whether the student lives with both parents, self-reported academic performance, and the school-level smoking reduction intervention condition. Due to its potential confounding effects, the analysis was done in two models: one that adjusted for sensation-seeking and one that did not.

Results

Assessment of Attrition Bias at One-year Follow-up

While the cross-sectional analysis was conducted among all subjects who participated in the pretest survey, the longitudinal analysis was limited to those retained at the one-year follow-up. To assess the potential sampling bias due to attrition at the 1-year follow-up, a comparison was made on eight key baseline measures of the sample that was lost at one year ($n = 387$) to the one-year analysis sample of 710 subjects. Measures included: age, gender, ethnicity, living with both parents (or not), parents’ educational level, past 30-day cigarette use, weekly cigarette use, and daily cigarette use. The comparisons utilized chi square or *t*-test models to indicate statistically significant differences (two-tailed p value at the 0.05 level).

Ethnicity showed a statistically significant difference between the “lost” and the “retained” samples at the one-year follow-up survey ($\chi^2 = 22.0$, $df = 5$; $p = 0.0005$). Compared with the “lost” sample, the “retained” sample contained more Hispanic (76% versus 62%, $p < 0.0001$) and fewer white (13% versus 22%, $p = 0.005$) subjects at the one-year follow-up. The retained subjects at one-year follow-up also differed from the lost-to-follow-up samples on living situation (“lost” sample was relatively more likely to live with one parent), parents’ level of education (“lost” sample was relatively low on parents’ education), and cigarette smoking status (“lost” sample was relatively more likely to be smokers). To statistically adjust for possible bias induced by nonrandom attrition at one-year follow-up, a “propensity to attrition” score was calculated for each subject retained at the one-year follow-up, and included as an adjustment variable in the analyses. This score is calculated among the entire baseline sample by associating the difference in selected baseline measures

to the actual attrition status in a multiple regression analysis and assuming the association is also maintained among the subjects retained at one-year follow-up survey (Rosenbaum and Rubin, 1983).

Cross-sectional Relationships of Forbidden Fruit and Smoking-Related Items

As shown in Table 1, cross-sectional analysis showed that FF1 was not significantly related to past 30-day smoking or 12-month smoking intention. However, FF2 was significantly related to cigarette smoking behavior and intention. At baseline, compared with the subjects who did not endorse a personal reaction-based FF attitude, those subjects who reported having a personal reaction-based FF attitude were more likely to be 30-day smokers and had greater intention to smoke during the next 12 months, whether or not sensation-seeking was statistically controlled.”

Longitudinal Relationships of Forbidden Fruit and Smoking-Related Items

In the longitudinal analysis, subjects who endorsed FF1 or FF2 at baseline were more likely to intend to smoke over the next 12 months, assessed one year after pretest, when sensation-seeking was controlled (only FF1 was a significant predictor without controlling for sensation-seeking). Both baseline smoking status and intention, on the other hand, failed to be statistically significantly predictive of the FF measures assessed at follow-up.

Discussion

The present study is one of only three studies to our knowledge that have directly empirically examined the relationships between tobacco as a forbidden fruit and adolescent cigarette use or intention to use cigarettes in the future; the other two being Pechmann and Shih (1999) and Pechmann (2001). In the cross-sectional analysis (controlling for covariates and sensation-seeking), we found that the adolescents who believed that society views smoking as an adult appropriate behavior that is not youth appropriate, but who personally approved of youth smoking (i.e., the second measure of FF in the present study), were two and a half times more likely to smoke cigarettes. Additionally, adolescents with such beliefs were found to be four times as likely to express intention to smoke in the next year. It is not surprising that adolescents whose attitudes about a deviant behavior is positive and contrary to what they think the others in society believe would be more likely to commit that behavior. The fact that the FF attitude held whether or not sensation-seeking was entered in the model suggests that this particular tendency to rebel against adults and assert one’s independence might be perceived as a unique manifestation of the adolescent developmental stage which centers on the pursuit of self-identity (Erickson, 1968).

When conceptualized as adolescents’ perceptions of society’s beliefs without consideration of personal beliefs (i.e., the first measure of FF in the present study), FF was not found to be concurrently associated with either past 30-day cigarette use or intention to smoke. However, in the longitudinal analysis, the first definition of forbidden was found to significantly predict smoking intentions one year later, even after controlling for potential confounders. This suggests that adolescents who perceive cigarette smoking to be socially approved adult behavior (a “responsible” choice) may over time develop intention to smoke cigarettes, as they grow older, and question whether or not the concept of FF should apply to them.

Study Limitations

There are at least two general limitations of the present study. First, this study cannot resolve for sure whether or not the relations of the FF concept and intention to smoke are due to a personal reaction-based interpretation of the concept (FF2) or in agreement with the social

perception-based interpretation of the concept (FF1). The cross-sectional results could suggest a personal reaction-based interpretation of the FF concept, whereas the longitudinal results might lead one to speculate that most youth may not rebel against the FF concept, but rather may obey an adult responsible choice interpretation and obtain an interest in smoking as they grow older and perceive of themselves as more responsible. Alternatively, both measures of FF may operate in the longitudinal models, at least after controlling for the effects of sensation-seeking. Future studies are needed to more closely examine these two types of FF perspectives and their relations with sensation-seeking and intention to smoke.

Second, the results may have somewhat limited generalizability. Our subjects were predominantly urban and Hispanic, and attended the CHS system in California, and generalizability of the findings is limited to a population with pretest measurement access restrictions like those experienced in this study (i.e., absentee and refusal mechanisms). In addition, the generalizability of the present findings is likely to be limited to States like California, which has been a pioneer in the tobacco control movement. In California the social normative beliefs regarding cigarette smoking are likely to be much less prosmoking than they are in a State with average to high smoking prevalence. Youth in States with relatively less progressive tobacco control programs and more pro-smoking social norms might actually be more inclined to view smoking as a forbidden fruit because of the increased prevalence of role-modeling of smoking behaviors by adults. Consistent with this hypothesis, the pro-smoking social norms would serve to amplify the message implicit in tobacco industry advertising that smoking is an adult behavior and therefore a marker of adulthood and maturity, and would be facilitative of adolescents interpreting tobacco use as a forbidden fruit.

Future studies should measure this FF construct and integrate it into social development and social learning models of substance use etiology. In application, there is a need for assessments regarding the negative effects that age-limit-related legal sanctions might have on social norms concerning tobacco use among adolescents (Willemssen and De Zwart, 1999). Based on the findings of this study and studies by Pechman et al., interventions that focus on youth experimenting with tobacco or expressing the intention to smoke or prosmoking beliefs should incorporate strategies/messages counteracting the FF perspectives as one means of reducing youth smoking or hindering the progression to regular smoking. Clearly, tobacco use is not a responsible choice for adults or youth, and this message is of paramount importance to communicate to youth and adults.

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Cross-sectional and reciprocal longitudinal relationships among forbidden fruit (FF) attitude, 30-day cigarette smoking, and 12-month intention to smoke

Table 1

Model type	Predictors	Dependent variables ^{a,b}		Dependent variables ^{a,c}	
		30-day smoking	Smoking intention	30-day smoking	Smoking intention
Cross-sectional	FF1 ^d	0.86 (0.67–1.11)	1.07 (.84–1.38)	0.89 (0.70–1.14)	1.03 (.80–1.31)
	FF2 ^d	2.53 (1.77–3.61)	3.97 (2.46–6.41)	2.51 (1.74–3.62)	3.97 (2.42–6.52)
Longitudinal ^{e,f}	Predictor set #1	30-day smoking	Smoking intention	30-day smoking	Smoking intention
	FF1 ^d	0.85 (0.16–4.40)	1.91 (1.16–3.14)	0.74 (0.14–3.85)	1.89 (1.14–3.13)
	FF2 ^d	1.53 (0.87–2.72)	1.58 (0.94–2.65)	1.53 (0.85–2.73)	1.73 (1.02–2.92)
	Predictor set #2	FF1	FF2	FF1	FF2
	30-day smoking	0.33 (.06–1.74)	0.95 (0.28–3.28)	0.31 (.58–1.66)	0.81 (0.23–2.83)
	Smoking intention	1.12 (0.74–1.70)	1.85 (0.80–4.26)	1.12 (0.73–1.71)	1.73 (0.73–1.13)

^a Shown are odds ratios and 95% confidence intervals estimated from regressions; significant results are set in bold.

^b Adjusted for age, gender, ethnicity, whether live with both parents, parents' education level, and intervention condition.

^c Adjusted for all covariates in (b) and sensation-seeking.

^d FF1 was valued as "true" if a subject self reported that "*the others in society* think it is 'okay' for adults to smoke, but it is not at all 'okay' for people his/her age to smoke". FF2 was "true" when an FF1 "true" subject also reported that "*he/she* thinks it is 'okay' for people his/her age to smoke".

^e For longitudinal models, a propensity score was added as a covariate to adjust for the potential bias induced by nonrandom attrition at follow-up.

^f There were two longitudinal bidirectional prediction model sets; Set #1 predicted 30-day smoking and smoking intention from FF1 and FF2 either controlling or not controlling for sensation-seeking, and Set #2 predicted FF1 and FF2 from 30-day smoking and smoking intention either controlling or not controlling for sensation-seeking.