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Tobacco smoking and antisocial deviance among Vietnamese, Vietnamese-American, and European-American adolescents

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Abstract

Tobacco smoking is one of the most significant modifiable behavioral health risk factors worldwide. Although smoking rates in some high-income countries (HIC) have declined, rates in many low-and-middle-income countries (LMIC) remain high. Adolescence is a key developmental risk period for smoking initiation. Research indicates that a major adolescent risk factor for tobacco smoking is antisocial deviance, which includes such behaviors as aggression, risk-taking, and rule-breaking. The linkages between antisocial deviance and smoking suggest that these behaviors and their underlying attitudes can be important targets for smoking prevention programs, but for public health efficiency it is important to target the components of antisocial deviance most closely linked smoking. However, although 80% of smokers live in LMIC, most relevant research has been conducted in HIC and its applicability to LMIC is unclear, given cultural differences between many HIC and LMIC. The purpose of the present study was to assess cross-cultural variations in relations among components of antisocial deviance and self-reported tobacco smoking among 2,724 10th and 11th grade Vietnamese, Vietnamese-American, and European-American students. Within the combined sample the relation between self-reported smoking and overall antisocial deviance was $\beta=.33$. However, the component of antisocial deviance most strongly related to smoking varied across groups, with Risk-taking most strongly

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related to smoking for Vietnamese-American ($\beta=.37$) and Vietnamese ($\beta=.36$) adolescents, and Rule-breaking Behavior most strongly related to smoking for European-American ($\beta=.51$) adolescents. These and other findings suggest the possible importance of culturally-tailored foci for smoking prevention programs emphasizing different aspects of antisocial deviance.

Keywords

Smoking; tobacco; LMIC; antisocial deviance; Vietnam

Worldwide over 1 billion people smoke tobacco, annually consuming almost 6 trillion cigarettes, with approximately 75% of adult smokers addicted to nicotine (Tobacco Atlas 2017; World Health Organization 2016). The health consequences of this tobacco use would be difficult to overstate, with tobacco use one of the most significant known modifiable health risk factors in the world, resulting in approximately 6 million deaths worldwide each year (World Health Organization 2016). Smoking rates in a number of high income countries (HIC) have decreased over the past several decades; in the U.S., for instance, the most recent estimate is that approximately 17% of adults currently smoke, approximately equal across males and females (Tobacco Atlas 2017). However, in a number of low and middle income countries (LMIC) rates remain high, at least among males. For instance, in China, most recent estimates are that 48% of adult males and 2% of adult females smoke (Tobacco Atlas 2015). Overall tobacco use remains a major contributor to the global burden of disease, annually accounting for 8.8% of mortality and 4.1% of disability-adjusted life years lost worldwide (World Health Organization 2016).

To develop evidence-based prevention and intervention programs for smoking and nicotine addiction, understanding of risk factors for tobacco use is critical. Research in HIC has identified a number of factors associated with increased risk for smoking, including experiencing highly stressful life events, having family members who smoke or parents who are not college educated, and being male (U.S. Department of Health and Human Services 2017). Adolescence is a key period of increased risk for initiating smoking. In the United Kingdom, for instance, approximately 40% of regular adult smokers began smoking under age 16 (Cancer Research UK 2017). Research indicates that adolescence also is a key risk period for initiating smoking in LMIC, with for instance an assessment in seven African countries finding that over 15% of school children had begun smoking before age 14 (Peltzer 2011).

Research in HIC over the past several decades indicates that a major risk factor for adolescent tobacco smoking is antisocial deviance (Wellman et al. 2016). Adolescent antisocial deviance has been variously defined as behavior and attitudes that have the function and the effect of violating generally accepted social norms, often directly violating the rights of others (e.g., violence; theft) but not always (e.g., substance abuse; driving a motor vehicle very fast) (Dishion & Patterson 2006). Antisocial deviance is comprised of several components, in particular aggressive behavior, risk-taking, and rule-breaking behavior. Various goals underlie why individuals engage in such behaviors. Within this context, aggressive behavior is seen as having the functions of obtaining material gain,

increasing one's social status by dominating or threatening others, responding to perceived threats, and compensating for feelings of powerlessness (Bushman 2017). Risk-taking behavior has been seen as serving the goal of sensation seeking by increasing novelty and stimulation, and impressing one's peers to gain increased social status due to one's fearlessness (Cestac et al. 2011; Sales & Irwin 2009). Rule-breaking behavior has been closely linked to rebelliousness, with rule-breaking seen as a behavior often used for the purpose of expressing an attitude of rebelliousness towards society (e.g., Burt 2014). In their systematic review of risk factors for smoking initiation, Wellman et al. (2016) found that antisocial deviant behaviors such as these were the most consistent personality predictors of smoking initiation among youth. This relation between adolescent smoking and antisocial deviance has been conceptualized for several decades as representing psychological reactance (i.e., an aversive affective reaction to perceptions of external attempts to control one's autonomy) to perceived threats to one's freedom by authority figures such as parents or teachers, with smoking representing an overt expression of this antisocial rejection of authority and rules (Brehm & Brehm 1981). The linkages between the various components of antisocial deviance and smoking suggest that these behaviors and attitudes can be important targets for smoking prevention programs.

However, although approximately 80% of smokers live in LMIC, most research on antisocial deviance and smoking has been conducted in HIC. In their systematic review of predictors of smoking initiation among Asian youth, Talip et al. (2016) identified a single study investigating antisocial deviance as a risk factor for smoking initiation in Asia. This lack of research is potentially problematic as the generalizability of research results from HIC to LMIC such as those in Asia is not clear. In general, HIC such as the United States and most European countries tend to be individualistic whereas LMIC including those in Asia tend to be collectivistic (Peng & Paletz 2011). Within individualistic cultures, people tend to define themselves based on their personal abilities, traits, etc. There are relatively loosely-knit interpersonal networks in which individuals' responsibilities are closely linked only to themselves and their immediate families. Within collectivistic cultures, people are inclined to define themselves through their group memberships and relationships. There are more extended tightly-knit interpersonal associations in which individuals expect members of their in-groups, including but not limited to their relatives, to support members and the group in exchange for their own loyalty to the group (Shavitt et al. 2011).

Effects and correlates of antisocial deviance could vary across individualistic versus collectivistic cultures, making cross-cultural generalizability unclear. For instance, behaviors associated with antisocial deviance including smoking may be more closely linked together within collectivistic cultures because of the stronger, more broad reaction to deviance within collectivistic cultures (Caldwell-Harris & Aycicegi 2006). One therefore might find even closer links between antisocial deviance and smoking in more collectivistic countries, emphasizing the importance of considering antisocial deviance in anti-smoking programs (e.g., Doran et al. 2011). On the other hand, as noted above, rates of smoking (at least for males) are high in many Asian countries, and smoking consequently may be seen as more normative and less representing deviance. This could make antisocial deviance less of a risk factor for smoking among Asian countries, since smoking is less deviant for males, suggesting that anti-smoking campaigns in these regions of the world should emphasize

other factors (e.g., increased awareness of relevant negative consequences and costs of smoking).

Thus, the overall purpose of the present study was to better understand how relations between tobacco smoking and antisocial deviance vary across the United States and the Southeast Asian LMIC of Vietnam, among European-American, Vietnamese-American, and Vietnamese adolescents. These two countries provide a strong socio-cultural contrast, with the United States a high income, culturally individualistic nation, and Vietnam a lower-middle income, culturally collectivistic nation (Hofstede 2017). Vietnam has a 2015 per capita GNI of approximately \$1,980 (World Bank 2017), and is the 13th largest country in terms of population (Central Intelligence Agency 2017). It has adult smoking rates of 47% for males and 1% for females, and it is one of the top ten cigarette consuming nations in the world (Tobacco Atlas 2015). Adolescent mental health problems in Vietnam are relatively high, suggesting the potential for antisocial deviant behavior to have a significant impact on smoking. For instance, a recent nationally representative epidemiological study in Vietnam (Weiss et al. 2014) found that the overall rate of significant mental health problems was approximately 13%, with almost 10% of the adolescent sample above the caseness cutoff for conduct problems such as rule-breaking behavior and aggression.

The European-American adolescents represent a canonically individualistic cultural group, residing in the U.S. HIC national context. Vietnamese-American youth in some ways are in-between two cultures, through their parents sharing their collectivistic cultural and linguistic heritage with Vietnamese youth, often retaining values of family obligation and interdependent social orientation. At the same time the Vietnamese-American adolescents reside within the broader, highly individualistic, HIC U.S. context (Nguyen 2011). Thus, these three groups provide interesting cultural contrasts.

The first specific aim of the study was to assess the extent to which relations between smoking and antisocial deviance varied across these three groups. We first assessed relations between smoking and overall antisocial deviance (i.e., ignoring the subcomponents of antisocial deviance), then assessed the extent to which relations between the subcomponents of antisocial deviance (aggression, risk-taking, and rule-breaking behavior) and smoking differed across the three ethnic groups. In addition, as noted above, in many HIC such as the U.S. and the U.K. the male / female smoking ratio approaches 1/1 whereas in many Asian countries it is much higher; e.g., in Vietnam it is approximately 36/1. These differences suggest that gender may have a significant impact on smoking in countries like Vietnam vs. Western HIC. Thus, the second specific aim of the project was to assess the influence of gender on relations between antisocial deviance and smoking. Because of the complexity of these relations (e.g., Vietnam being a collectivistic society, smoking might be even more closely linked to other antisocial behaviors, whereas on the other hand given the high rates of male smoking in Vietnam, smoking might be seen as less deviant and rebellious and less closely linked to antisocial deviance), specific hypotheses were not made.

Method

Participants

Participants for the present study were 2,724 10th and 11th grade students recruited from 10 U.S. and 12 Vietnamese public high schools selected to provide an approximately parallel range of socio-cultural and socio-economic diversity. The U.S. sample included public high schools in the greater Los Angeles and San Jose, California areas. Vietnamese high-schools were selected from urban and near urban areas in the Ho Chi Minh City and Danang city areas. Like Los Angeles, Ho Chi Minh City is a geographically-extended major industrial area, and a cultural center of the country. Like San Jose, Danang is a progressive, major secondary city located near the coast. Similar recruitment procedures were used in both countries. Brief classroom presentations were used to describe the study to 10th and 11th grade students in participating schools. Consent packets were then distributed to interested students who were asked to return with a signed parental consent form in order to participate. Within the U.S. schools, the goal was to have approximately equal numbers of European-American and Vietnamese-American participants, balanced for gender. However, because the schools overall had more Vietnamese-American students, and because more female students volunteered, among the U.S. students a stratified random sample was used to maximize the gender and ethnicity balance (i.e., all males and all European-Americans were selected, whereas randomly selected Vietnamese-American females were selected to participate in the study). The total sample contained 486 European-American, 853 Vietnamese-American, and 1,385 Vietnamese students. Table 1 reports the ethnicity, gender, and age of the sample across the three groups.

Measures

Because the language of instruction in the U.S. schools is English, the European American and the Vietnamese American students completed the measures in English. Vietnamese students completed the measures in Vietnamese. A number of the measures had pre-existing Vietnamese versions (e.g., the Youth Self-Report form; Achenbach & Rescorla 2012). Measures for which there were not Vietnamese versions were translated, culturally adapted, and back translated by a bilingual team of psychiatrists and psychologists in Vietnam and the U.S. using standard procedures to maintain the semantic, technical, and conceptual content of the measure (e.g., Byrne 2016; Hambleton 2005). The research team is highly experienced in measure adaptation and translation, being the official translator and distributor for a number of well-respected assessment instruments (e.g., the WISC-IV; Dang et al. 2012; the Child Behavior Checklist; Dang et al. 2017) in Vietnam.

Demographics—The demographic questionnaire assessed basic background information regarding the adolescent, the sex and age of the participant, and parents' education and employment status. For participants in the U.S., it also assessed the adolescent's and the parents' generational status in the U.S.

Smoking—Two items assessing smoking from the U.S. Centers for Disease Control *National Youth Tobacco Survey* (US CDC 2015) were included in the survey. The first item assesses lifetime smoking ("Have you ever smoked cigarettes?") on a 1 (Never) to 5

(Regularly now) Likert scale. The second item assesses how much the individual has smoked in the last three months (“How much have you smoked cigarettes during the past 3 months?”) on a 1 (Not at all) to 7 (Two packs or more per day) scale; the two items were correlated .66 ($p < .0001$) in the current sample. For our descriptive analyses, we also assessed “quitting”, defined as having smoked lifetime but currently not smoking. Although having “quit” at age 16 or 17 does not necessarily mean that one has permanently stopped smoking, it is desirable relative to having not “quit” at these ages.

Antisocial deviance—Three components of antisocial deviance were assessed for the present study: (a) aggressive behavior; (b) risk-taking, and (c) rule-breaking behavior. The Youth Self Report (YSR; Achenbach & Rescorla 2001; 2012) *Aggressive Behavior* scale was used to assess aggressive behavior, and the YSR *Rule-breaking Behavior* scale was used to assess rule-breaking behavior. The English language version of the YRS (Achenbach & Rescorla 2001) was used for the U.S. samples, and the Vietnamese language version (Achenbach & Rescorla 2012) was used for the Vietnamese sample. The YSR contains 112 items covering a range of emotional and behavioral problems as well as several positive distractor items. Items are rated on a 0 (“not true of me”) to 2 (“very true or often true of me”) Likert scale. The YSR has shown good reliability and convergent and discriminative validity, across a wide range of cultural groups. For instance, in a review of the YSR and CBCL psychopathology measures in 25 different societies, Rescorla et al. (2013) found that the mean cross-measure correlation across the 25 societies was .41, supporting the convergent validity of the YSR. The YSR *Aggressive Behavior* scale includes items involving physical and verbal aggression, and threatening behavior towards other (e.g., “I get in many fights”; “I tease others a lot”). In the current sample, the alpha internal consistency was .81 for this scale. The YSR *Rule-breaking Behavior* scale includes items assessing rebellious disregard for social expectations and rules (e.g., “I break rules at home, school, or elsewhere” “I cut classes or skip school”). The scale includes a smoking item; in order that the correlation between tobacco use and this YSR scale not be due in part to overlapping items, the tobacco use item was subtracted from the scale score. In the present sample the internal consistency alpha was .76.

The *Risk-taking* scale used in the present study was based on items drawn from (a) the *Risk Preference* subscale of the Benthin Risk Perception Measure (Benthin et al. 1993), and (b) the *Impulsive Sensation-Seeking* subscale of the Zuckerman-Kuhlman Personality Questionnaire (Zuckerman et al. 1993). The scale used in the present study includes 7 items (e.g., “drive a motor vehicle very fast, more than 10 miles an hour over the speed limit”) rated on a 1 (0 times over the past three months) to 4 (more than 10 times over the past three months) Likert scale. The alpha internal consistency for this scale in the current sample was .87 and supporting its convergent validity, its correlations with the YSR *Aggressive Behavior* and YSR *Rule-breaking Behavior* scales were .38 and .49, respectively, with both $p < .0001$.

Procedures

Project data were collected at the participating schools either during free periods or after school. U.S. participants were paid \$20 for their participation, Vietnamese participants were

paid the equivalent of about \$7 for their participation. The study was approved by IRB at Vanderbilt University, the University of California – Los Angeles, and the U.S. FWA IRB at the Danang Psychiatric Hospital.

Statistical Analyses

In the descriptive analyses for the sample, to increase interpretability the continuous smoking scales were dichotomized (e.g., a prevalence of current smoking of, say, .09 is more easily interpretable than a mean level of current smoking of 2.13); rates of smoking thus are presented in Table 2. For inferential analyses, to avoid loss of statistical power (irrelevant for descriptive analyses) associated with dichotomization (Fedorov et al. 2009), variables were not dichotomized. A general linear models approach was used for the inferential analyses, with an R^2 effect size provided for interpreting the magnitude of effects. To reduce sampling effects, variables upon which the three ethnic group samples differed but that likely did not represent fundamental differences at the population level were included as covariates in the models. Covariates included Age and Sex, upon which the three ethnic groups differed (see below) but with these differences likely not representing fundamental population-level differences. The purpose of inclusion of the covariates was to ensure that Group effects were not influenced by sampling-related differences across the groups. On the other hand, we did not assess parental education (or employment) differences for inclusion as covariates because Group differences on these variables likely would reflect actual educational (and employment) differences at the population-level between the U.S. and Vietnam (e.g., Pollack, Weiss, & Trung 2016).

The focus of the first set of inferential analyses was on comparing relations between antisocial deviance and smoking across the three ethnic groups. To provide a baseline comparison for understanding higher order effects, we first assessed the relation between Current Smoking and antisocial deviance, **(a)** in regards to antisocial deviance overall (i.e., collapsed across its three components) as a main effect and then as an interaction with Ethnic Group, **(b)** then in regards to the extent to which the relation between smoking and antisocial deviance varied across the three components of antisocial deviance (aggressive behavior; risk-taking; rule-breaking behavior). In this and the subsequent analyses (below), the three antisocial deviance components were standardized and evaluated as a repeated measure *Domain* (of antisocial deviance) within the general linear models framework, using the Huynh-Feldt-Lecoutre epsilon correction to assess the extent to which relations involving antisocial deviance varied across the different components of antisocial deviance. These first two analyses served as a baseline comparison for the effects of Ethnic Group in the next set of analyses. Then **(c)** the Ethnic Group X Domain (of antisocial deviance) interaction was assessed, to determine the extent to which the relation between smoking and the three antisocial deviance domains varied across the three ethnic groups. Finally, **(d)** Sex was added to the model as a fully crossed factor, to assess the extent to which these various effects differed as a function of participants' sex. It is well established that rates of smoking for Vietnamese males are much higher than for females (e.g., Tobacco Atlas 2015), but whether there are significant female vs. males differences in regards to *relations* between smoking and the various antisocial deviance components is unclear. Therefore, the moderating effects of Sex were evaluated in this last set of analyses. Of the 2,724

participants, 2,667 (98%) had complete data at the scale level across all measures, and across the various measures and participants, .002 of data points were missing. Missing data were imputed using the SAS *Proc MI* procedure, with maximum likelihood estimation.

Results

Sample characteristics

Sample demographic characteristics are reported in Table 1, levels and rates of antisocial deviance and smoking in Table 2, and correlations among the main variables in Table 3. In order to determine whether Age and Sex should be included as covariates in the inferential analyses below, differences on these two variables across the three ethnic groups were assessed. An ANOVA indicated the three groups differed significantly on age, $F(2,2721) = 43.51$, $p < .0001$, with the Vietnamese students older by approximately 3 months than the other two groups, who did not differ significantly. The three ethnic groups also differed significantly on sex, $\chi^2(2) = 39.52$, $p < .0001$, with the European-American and Vietnamese-American having a significantly higher percentage of females than the Vietnamese, and the former two groups not differing. Consequently, to ensure that results were not influenced by sampling-related differences across the groups in these basic demographics, Age and Sex were included as covariates in following analyses.

Relations among smoking and antisocial deviance

For our primary inferential analyses, we first tested the extent to which Current Smoking was part of a broader pattern of antisocial deviance within the overall sample, to provide a baseline comparison for higher order effects. With Age and Sex as covariates in the general linear model, the predictor variable was Current Smoking, and the outcome variable was antisocial deviance, the mean of the three standardized components of antisocial deviant behavior (Aggressive Behavior; Risk-taking; Rule-breaking Behavior) collapsed across ethnic group. The relation between Current Smoking and antisocial deviance was significant, $F(1,2720) = 339.62$, $p < .0001$, $\beta = .33$, $R^2 = .11$. We also tested as a baseline the extent to which this relation between Current Smoking and antisocial deviance varied across the three components of antisocial deviance, using a general linear model with the three standardized antisocial deviance components as a repeated measure, *Domain*. Using the Huynh-Feldt-Lecoutre epsilon correction, the antisocial deviance Domain X Current Smoking interaction was significant, $F(2,5440) = 42.32$, $p < .0001$, $R^2 = .02$, indicating that the relation to current smoking was significantly different across the three components of antisocial deviance. Simple effects for *Domain* were $\beta(\text{Aggressive Behavior}) = .18$ ($R^2 = .03$), $\beta(\text{Risk-taking}) = .36$ ($R^2 = .13$), and $\beta(\text{Rule-breaking Behavior}) = .28$ ($R^2 = .08$), with all three beta (for the relation between current smoking and the antisocial deviance component) significantly different from 0 and significantly different from each other.

In the next analysis, we tested whether the effect of antisocial deviance Domain on the relation between Current Smoking and antisocial deviance varied as a function of Ethnic Group, by including Ethnic Group in the previous model. The Ethnic Group X AD Domain X Current Smoking interaction was significant, $F(4,5432) = 14.21$, $p < .0001$, $R^2 = .01$, indicating that the degree to which the relation between current smoking and antisocial

deviance varied across the three components of antisocial deviance itself varied as a function of Ethnic Group. Table 4 describes this interaction. In sum, for the Vietnamese-American and Vietnamese adolescents, the component of antisocial deviance most strongly related to current smoking was Risk-taking, whereas for the European-American adolescents the component of antisocial deviance most strongly related to current smoking was Rule-breaking Behavior.

In the final analysis, to determine the extent to which this effect varied across males and females, we assessed the Sex X Ethnic Group X AD Domain X Current Smoking interaction, which was significant $F(4,5422) = 7.99, p < .0001, R^2 = .01$. Breaking down this interaction, we found that the three-way Sex X AD Domain X Current Smoking interaction was significant for the Vietnamese-American adolescents with $F(2,1696) = 14.25, p < .0001$ but not the other two groups. Table 5 provides the breakdown of the Sex X AD Domain X Current Smoking interaction for the Vietnamese-American adolescents. However, to better understand this complex four-way interaction, we also broke down the Sex X Current Smoking X AD Domain interaction for the two other ethnic groups, which is also reported in Table 5. As Figure 1 illustrates, (a) for the Vietnamese-American adolescents but not the other two groups, males and females differed significantly in the magnitude of the relation between Current Smoking and Risk-taking (males: $\beta = .51$; females: $\beta = .18$), but (b) the relation between the other two antisocial deviance domains (Aggressive Behavior; Rule-breaking Behavior) and current smoking did not differ significantly across males and females for any of the three ethnic groups. That is, the primary reason for the significant 4-way Sex X Ethnic Group X AD Domain X Current Smoking interaction was that the only significant difference between males and females in regards to the relation between antisocial deviance and current smoking was for Risk-taking among the Vietnamese-American adolescents.

Discussion

The focus of this study was on the assessment of relations between current smoking and antisocial deviance, in particular in regards to the three components of antisocial deviance. We found that the relation between current smoking and overall antisocial deviance was $\beta = .33$. However, this relation between current smoking and antisocial deviance varied significantly as a function of antisocial deviance domain, with $\beta(\text{Aggressive Behavior}) = .18$, $\beta(\text{Risk-taking}) = .36$, and $\beta(\text{Rule-breaking Behavior}) = .28$. Most centrally, this finding highlights the importance of considering the components of antisocial deviance when investigating its relations to smoking, given this variability across domains. We also found that the Current Smoking X Domain X Ethnic Group interaction was significant. Underlying this interaction was the fact rule-breaking behavior was more strongly related to current smoking for the European-American adolescents than it was for the other two groups, whereas the relation between current smoking, and aggressive behavior and risk-taking did not differ across the three groups.

One possible explanation for the finding that rule-breaking behavior was less closely associated with current smoking among Vietnamese and Vietnamese-American than among European-American adolescents is that for the former two groups, there might be fewer

family or social rules against adolescent smoking. If this were the case then, adolescents expressing a rebellious attitude through rule-breaking behavior might be less likely to smoke specifically for that purpose, since smoking was less a part of social rules upon which the adolescent was focused breaking. However, in Vietnam as in the U.S., smoking is not permitted at school (World Health Organization 2017), representing a major social rule against adolescent smoking. In regards to the Vietnamese-American adolescents, at the time of data collection in California where the sample was collected, it was illegal for adolescents under the age of 18 to smoke or purchase tobacco products with the minimum age since raised to 21 (California State Board of Equalization 2017), making smoking a potential law-breaking / rule breaking behavior to express a rebellious attitude.

This suggests that reason for the differences in the relation between rule-breaking and current smoking for the Vietnamese and European-American groups is not simply that there are relatively few rules against smoking for the two Vietnamese groups. Rather, it may be that for the two Vietnamese groups smoking-related rules are seen as at least somewhat different or more distinct from other rules, in comparison for the European-American adolescents. That is, for the Vietnamese groups there may be more distinct categories of adolescent rule-breaking (e.g., smoking, vs. swearing, lying, etc.) than for the European-American adolescents. Vietnamese adolescents' motivations for breaking these different groups of rules (e.g., smoking, vs. swearing or lying, etc.) may differ, and smoking more connected to other antisocial deviance goals (e.g., demonstrating one's boldness; expressing male gender identity).

Breaking down this interaction from the other direction, we found that for the Vietnamese and Vietnamese-American adolescents the antisocial deviance domain most strongly related to current smoking was risk-taking, whereas for the European-American adolescents it was rule-breaking behavior. One possible explanation for this is that within the collectivistic-oriented Vietnamese culture, risk-taking antisocial deviance (e.g., smoking, driving a motor vehicle in a dangerous manner) may have an advantage that one can engage in antisocial deviance but with it being it is less apparent to parents than breaking rules at school and home would. In contrast, rule-breaking or aggressive behavior would likely be more probable to come to parents' attention. Among the European-American adolescents in their more individualistic culture, there may be less concern and even an intention to directly express antisocial deviance towards parents as well as other authority figures in their social lives.

It is interesting to note that in general, aggressive behavior showed lower relations to current smoking than the other antisocial deviance domains, and was the most closely linked antisocial deviance domain for none of the three groups. This suggests that at least in this sample, smoking's function may not be so closely linked to aggressive behavior's goals of dominating, threatening, or harming others (Bodine & Bucher 2013); e.g., for these adolescents a primary function smoking may not have been, for instance, to intimidate a peer.

The final set of analyses assessed effects of Sex on these relations. The Sex X Ethnic Group X AD Domain X Current Smoking interaction was significant. We found that for the

Vietnamese-American adolescents, but not the other two ethnic groups, the females and males differed significantly in the extent to which Current Smoking was related to the antisocial deviance component of Risk-taking, with males showing a significantly larger relation than females ($\beta = .51$ vs. $\beta = .15$, respectively). None of the other female versus male differences within ethnic group and antisocial deviance domain were significant.

Recent research has suggested that due to pervasive cultural stereotypes in part defining “masculinity” as having a muscular physical build, Asian males sometimes may be seen as less “masculine” than other ethnicities (Wilkins et al. 2011). Given that adolescence is a critical time-period when one is developing one's sense of identity, including one's social gender roles, this may place special stress on the Vietnamese-American male adolescents within their schools, particularly given the close presence in society of non-Asian males. In contrast, in Vietnam, virtually all public high-school students are Asian. Thus, some Vietnamese-American males feeling social pressure or stress in regards to their social gender identity may compensate for this with the tendency to demonstrate their “masculinity” through risk-taking behavior to impress their peers, including smoking, linking the two domains more closely than for the other sex and ethnicity groups.

There are several methodological issues or interpretations that should be considered. First, the fact that the Vietnamese-American and Vietnamese adolescents were similar to each other (i.e., they both had risk-taking as the antisocial deviance domain mostly strongly related to smoking) suggests that it is not simply a problem of the validity of the English vs. Vietnamese versions of the questionnaires underlying the group differences. One possible methodological explanation for the fact that risk-taking was more strongly related to smoking for the Vietnamese-American males than for the Vietnamese-American females is that the low levels of current smoking among the Vietnamese-American females attenuated their correlation between current smoking and risk-taking. That is, it is possible that the smaller relation between risk-taking and current smoking among the Vietnamese-American females versus the Vietnamese-American males ($\beta = .18$ vs. $\beta = .51$, respectively) was due at least in part to the fact that the rate of smoking in these females was 2% whereas for the males it was 4%. However, if this were the case, one likely would expect to see a similar pattern for aggressive behavior and rule-breaking behavior, with these constructs showing significantly smaller relations to current smoking among the Vietnamese-American females as opposed to the males. However, the magnitude of the relations between current smoking and these two antisocial deviance domains were quite similar for the Vietnamese-American females and males ($\beta = .18$ vs. $\beta = .19$; $\beta = .32$ vs. $\beta = .29$, respectively). This suggests if the low levels of current smoking did play a role in the Vietnamese-American females having a smaller relation between current smoking and risk-taking than the males, the effect was not substantial.

Clinical implications

Our results may have preliminary implications for smoking prevention and intervention programs. First, in high-income countries some prevention and intervention programs have focused on the link between smoking, and rebelliousness and rule-breaking. Certain programs, for instance, discuss how smoking represents manipulation by tobacco companies

into buying their product to increase company sales and profits, implicitly indicating that smoking thus is actually the exact opposite of being independent and rebellious. In the U.S., this approach has had some success. For instance, in Florida a “truth” campaign based on this strategy led to an 8% decline in smoking among high-schoolers and almost a 20% percent decline among middle-schoolers (Florida Tobacco Control Clearinghouse 2001; U.S. CDC 2003). Our results suggest, however, that with Vietnamese and Vietnamese-American groups, such a focus may be less productive because smoking appears to be less a part of rebelliousness in comparison to European-American adolescents. Rather, our result that the antisocial deviance domain most closely linked to smoking for the Vietnamese-American and Vietnamese is risk-taking behavior suggests that a somewhat different emphasis may be optimal for these groups. For example, it has been found that risk-taking, high sensation seeking youth are more likely to attend to and be convinced by anti-smoking messages that involve intense, emotionally-laden pictures and wording than messages lower in intensity (e.g., Farrelly 2003). Based on our results, such an approach might be particularly useful for Vietnamese and Vietnamese-American groups. In addition, in regards to the Vietnamese-American males and the possibility that their relatively strong link between current smoking and risk-taking ($\beta = .51$) is related to gender-identity issues, it has been suggested that one approach to dealing with smoking as risk-taking to impress one's peers with one's fearlessness or “masculinity” is by providing comprehensive life-style formation training (e.g., Franzkowiak 1987). For adolescents smoking to present a strong male image, broader life-skills training to develop a stronger sense of self may be more effective than direct anti-smoking interventions (Franzkowiak 1987). These suggestions should be considered preliminary, of course, given the importance of replicating our relatively complex results, but the results do suggest areas where future research may be useful. It also may be useful for future research to assess the extent to which a similar pattern of findings is found in neighboring countries, whereas with Vietnam rates of tobacco use are high among males (e.g., in Cambodia, approximately 42% of adult males smoke; Tobacco Atlas 2015).

Limitations

The present study has several limitations. First, all data were self-report. Although surveys were collected anonymously online, it is possible that results could have been influenced by social desirability factors, etc. Future research using multi-informant methods, including biological assay of tobacco use, will be useful. A second limitation is that the present study was cross-sectional. Thus, direction of causality and causal relations cannot be evaluated. Third, the interaction effect sizes were generally relatively small. However, even relatively small effects can be important when they are linked to important outcomes (Prentice & Miller 2003), which in our case is tobacco smoking with its major impact on health. Finally, our interpretations of the 3-way and 4-way interactions are by necessity somewhat speculative given the scarcity of prior research. Thus these findings warrant replication before directly pursuing some of the clinical implications discussed above, although the clinical implications may be useful to guide such future research.

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Figure 1. Relations between Current Smoking and YSR psychopathology, by Ethnic Group, Sex, and Domain of Psychopathology

Agg = Aggressive Behavior. RB = Rule-breaking Behavior. RT = Risk-taking. For Figure 1, data were standardized, but in order to increase the clarity of the figure by separating the three antisocial deviance domains within the figure, the intercept for aggressive behavior was set to +1, for rule-breaking behavior to 0, and for risk-taking to -1. Within the interaction represented by the figure, the only significant male vs. female difference in regards to the relation between current smoking and antisocial deviance was for risk-taking behavior among the Vietnamese-American adolescents.

Table 1
Sample Demographic Characteristics

Characteristic	EA (US) (N=486)	VA (US) (N=853)	VN (VN) (N=1385)
Sex (% female)	62%	64%	51%
Age (Mean years, SD)	15.60 (.65)	15.55 (.61)	15.80 (.71)
Participant born in U.S. (%)	98%	80%	~
Both of participant parents born in U.S. (%)	87%	1%	~
Father education (% high school graduate)	96%	87%	50%
Mother education (% high school graduate)	97%	81%	53%
Father employment (% unemployed) ^I	8%	14%	6%
Mother employment (% unemployed) ^I	19%	25%	6%

Notes. EA = European-American. VA = Vietnamese-American. VN = Vietnamese.

^I = “unemployed” refers to individuals who desire to have a job but do not have one.

Table 2

Antisocial deviance and smoking

Characteristic	EA (US)		VA (US)		VN (VN)	
	Female	Male	Female	Male	Female	Male
<i>Aggressive Behavior</i> (Mean, SD)	6.73 (4.90)	6.28 (4.17)	8.33 (4.54)	7.48 (4.67)	8.27 (5.16)	7.95 (5.89)
<i>Risk-Taking Behavior</i> (Mean, SD)	8.46 (1.69)	8.45 (1.83)	8.31 (1.78)	8.37 (2.13)	9.30 (2.80)	10.05 (3.43)
<i>Rule-Breaking Behavior</i> (Mean, SD)	4.34 (3.81)	4.55 (3.40)	3.86 (3.18)	4.36 (3.16)	4.26 (3.85)	5.69 (4.79)
Lifetime Smoking (%)	17%	15%	12%	12%	11%	26%
Current Smoking (%)	9%	7%	2%	4%	5%	13%
“Quit” ^{<i>I</i>}	45%	52%	80%	65%	52%	49%

Notes. EA = European-American. VA = Vietnamese-American. VN = Vietnamese.

^{*I*} = Has smoked lifetime, but not currently smoking.

Table 3

Zero-Order Correlations Among Primary Variables

	Age	Sex	CS	AD	Agg	RTB	RBB
Age	1.00	0.06	.09	.09	.03	.10	.10
Sex		1.00	.09	.08	-.04	.10	.13
CS			1.00	.34	.18	.37	.30
AD				1.00	.83	.76	.88
Agg					1.00	.38	.67
RBB						1.00	.49
RTB							1.00

Notes. For Sex, Female=1, Male=2. CS=Current Smoking, AD=overall Antisocial Deviance, Agg=Aggressive Behavior, RTB=Risk-Taking Behavior, RBB=Rule-Breaking Behavior. Correlations are zero-order, without covariates.

* =p<.05,
** =p<.01,
*** =p<.001,
**** =p<.0001.

Table 4
Breakdown of Current Smoking x Antisocial Deviance Domain x Ethnic Group interaction

Ethnic Group	Effect	β (Agg)	β (RTB)	β (RBB)
European-American	CS x AD-Domain: $F(2,964) = 21.15^{****}$	.22 ^a	.25 ^a	.51 ^b
Vietnamese-American	CS x AD-Domain: $F(2,1698) = 14.80^{****}$	.17 ^a	.37 ^b	.27 ^c
Vietnamese	CS x AD-Domain: $F(2,2762) = 24.95^{****}$	.19 ^a	.36 ^b	.24 ^c
AD Domain	Effect	β (EA)	β (VA)	β (VN)
<i>Aggressive Behavior</i>	CS x EG: $F(2,2716) = 0.37$	.22	.17	.19
<i>Risk-Taking Behavior</i>	CS x EG: $F(2,2716) = 2.95$	.25	.37	.36
<i>Rule-Breaking</i>	CS x EG: $F(2,2716) = 14.61^{****}$	.51 ^a	.27 ^b	.24 ^b

Notes. β = standardized relation between current smoking and antisocial deviance. Agg = *Aggressive Behavior*, RTB = *Risk-Taking Behavior*, RBB = *Rule-Breaking Behavior*. CS = Current Smoking. AD Domain = antisocial deviance Domain. EG= Ethnic Group. EA = European-American. VA = Vietnamese-American. VN = Vietnamese. Cells within the same row with the same superscript do not differ significantly. Only antisocial deviance Domains with significant effects have pairwise comparisons.

= $p < .0001$.

Table 5
Breakdown of Current Smoking x Antisocial Deviance Domain x Ethnic Group x Sex interaction

Vietnamese-American adolescents. Sex X AD-Domain x CS: $F(2,1696) = 14.25$

AD Domain	Effect	β (Female)	β (Male)
<i>Aggressive Behavior</i>	CS x Sex: $F(1,848) = 0.01$	.18	.19
<i>Risk-Taking Behavior</i>	CS x Sex: $F(1,848) = 23.72^{***}$	.18 ^a	.51 ^b
<i>Rule-Breaking Behavior</i>	CS x Sex: $F(1,848) = 0.21$	.32	.29

European-American adolescents. Sex X AD-Domain x CS: $F(2,962) = 0.63$

AD Domain	Effect	β (Female)	β (Male)
<i>Aggressive Behavior</i>	CS x Sex: $F(1,481) = 1.53$	.26	.14
<i>Risk-Taking Behavior</i>	CS x Sex: $F(1,481) = 0.45$	.27	.22
<i>Rule-Breaking Behavior</i>	CS x Sex: $F(1,481) = 0.00$	.51	.50

Vietnamese adolescents. Sex X AD-Domain x CS: $F(1,2760) = 1.40$

AD Domain	Effect	β (Female)	β (Male)
<i>Aggressive Behavior</i>	CS x Sex: $F(1,1380) = 1.08$	.16	.21
<i>Risk-Taking Behavior</i>	CS x Sex: $F(1,1380) = 0.22$	.37	.36
<i>Rule-Breaking Behavior</i>	CS x Sex: $F(1,1380) = 0.58$	.22	.26

Notes. AD Domain = antisocial deviance Domain. β = standardized relation between current smoking and antisocial deviance. CS = Current Smoking. Cells within the same row with the same superscript do not differ significantly. Only antisocial deviance Domains with significant effects have pairwise comparisons.

 = $p < .0001$.