Curiosity and susceptibility to cigarette smoking among cigarette-naïve, waterpipe smoking US youth: National Youth Tobacco Survey, 2014

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ABSTRACT

INTRODUCTION Waterpipe smoking is harmful and addictive and can be a gateway to cigarette smoking. This study examined the association between curiosity and susceptibility to cigarette smoking among cigarette-naïve US youth who smoke waterpipe using cross-sectional data from the National Youth Tobacco Survey, 2014.

METHODS Susceptibility to cigarettes was assessed using a composite index of three questions: ‘Do you think you will smoke a cigarette in the next year?’, ‘Do you think that you will try a cigarette soon?’, and ‘If one of your best friends were to offer you a cigarette, would you smoke it?’. Curiosity was assessed by one question: ‘Have you ever been curious about smoking a cigarette?’. RESULTS Among current waterpipe smokers, 48.5% (95% CI: 43.1-53.9) were susceptible to cigarettes and 42.6% (95% CI: 36.5-48.9) were curious about cigarettes. Overall, 45.1% (95% CI: 38.9-51.4) and 46.5% (95% CI: 40.2-52.8) of those living with a waterpipe smoker were susceptible and curious about cigarettes, respectively. Current waterpipe smokers had significantly higher odds of susceptibility to cigarettes (aOR=1.5, 95% CI: 1.1-2.3, p<0.04), but not for curiosity about cigarettes (aOR=1.2, 95% CI: 0.83-1.70, p=0.3).

CONCLUSIONS Initiation of cigarettes among adolescents who smoke waterpipe can be due to increasing susceptibility to cigarette smoking rather than increasing curiosity about cigarettes.
pro-tobacco ads and curiosity and susceptibility to cigarettes. However, the availability of non-cigarette tobacco products might increase youth curiosity and/or susceptibility to experiment with cigarettes, beyond the exposure to tobacco ads.

Using a representative sample of US youth, from the 2014 National Youth Tobacco Survey (NYTS), this study examined the association between current waterpipe use, and curiosity and susceptibility to cigarette smoking among US middle and high school adolescents who never smoked cigarettes. Examining the association between waterpipe use and curiosity and susceptibility to cigarettes, separately, is important for understanding which mechanism (curiosity vs susceptibility) underlies the proposed gateway hypothesis for cigarette smoking among cigarette-naive waterpipe smokers.

METHODS
Dataset and study population
Data come from the 2014 NYTS; a school-based, self-administered survey among a large, nationally representative sample of middle (6-8 grades) and high (9-12 grades) school US adolescents from public and private schools. In 2014, the NYTS inquired about ever and current (past 30 days) use of nine tobacco products (cigarettes; cigars, cigarillo, or little cigars; chew tobacco, snuff, or dip; electronic cigarettes; waterpipe; pipe; bidis; snus; and dissolvable tobacco). Information about student socio-demographics, smoking behaviors, attitudes, and exposure to tobacco ads were collected. A stratified, three-stage cluster sampling design was used by the NYTS to obtain a representative sample of US middle and high school adolescents. The sampling design includes primary sampling units (PSUs) within each stratum, schools within each selected PSU, and in the final stage, classes within each selected school. More details about NYTS are available elsewhere.

The sample for this study included adolescents who never smoked cigarettes, not even a puff or two. This was assessed by the survey question: ‘Have you ever tried cigarette smoking, even one or two puffs?’. Adolescents who answered ‘No’ to this question were considered never smoked cigarettes and were included in the analysis (N= 16,709; weighted % = 76.39). Since the data are publicly available, this study deemed exempt from IRB approval.

Outcome variables
Two outcomes, curiosity about cigarettes and susceptibility to cigarette smoking, were studied. Each of these outcomes independently predicts experimentation with cigarettes. Susceptibility to cigarette smoking was assessed by a composite index using three survey questions: ‘Do you think you will smoke a cigarette in the next year?’, ‘Do you think that you will try a cigarette soon?’, and ‘If one of your best friends were to offer you a cigarette, would you smoke it?’. Each question has four response options: ‘Definitely yes’, ‘Probably yes’, ‘Probably not’, and ‘Definitely not’. Students who answered ‘Definitely not’ to all three questions were considered not susceptible to cigarette smoking and those who gave a response other than ‘Definitely not’ to any of the three questions were considered susceptible to cigarette smoking. Curiosity was assessed by the survey question: ‘Have you ever been curious about smoking a cigarette?’, with four response options: ‘Definitely yes’, ‘Probably yes’, ‘Probably not’, and ‘Definitely not’. Students who answered ‘Definitely not’ were considered not curious, and curious if answered otherwise.

Explanatory variable
The primary independent variable is current waterpipe smoking, defined as smoking waterpipe at least once in the past 30 days. Eight hundred (3.33%) participants have missing data on current waterpipe smoking and were excluded from the analysis. Thus, the final sample included 1,349 (6.17%) current waterpipe smokers.

Covariates
Selection of covariates was guided by the socio-environmental framework of smoking initiation among adolescents, and by reviewing the literature for factors related to curiosity and susceptibility to cigarette smoking or smoking initiation among youth. Covariates included were socio-demographics, current use of other tobacco/nicotine products (electronic cigarettes, cigar/cigarillo/little cigar, smokeless tobacco), exposure to secondhand smoke/vape, exposure to pro-tobacco ads, receptivity to tobacco marketing, and beliefs about smoking-related harm.

Current use of tobacco/nicotine was defined as the use of a tobacco/nicotine product on at least one day during the past 30 days. Smokeless tobacco was defined as the use of chewing tobacco, snuff, dip, snus, or dissolvable tobacco. To assess exposure to secondhand smoke (from a waterpipe) or vape (from electronic cigarettes), students were asked if anyone who lives with them now uses either of these products.

Exposure to pro-tobacco ads in convenient stores was assessed by the question: ‘When you go to a convenience store, supermarket, or gas station, how often do you see ads or promotions for cigarettes or other tobacco products?’. On the internet by the question: ‘When you are using the internet, how often do you see ads or promotions for cigarettes or other tobacco products?’. In magazines/newspapers by the question: ‘When you read newspapers or magazines, how often do you..."
see ads or promotions for cigarettes or other tobacco products?; and in movies by the question ‘When you watch TV or go to the movies, how often do you see actors and actresses using cigarettes or other tobacco products?’ For all these variables, the exposure was classified into never, rarely/sometimes, and most of the time/always. Receptivity to tobacco marketing was assessed by the question: ‘How likely is it that you would ever use or wear something – such as a T-shirt, hat or sunglasses – with a tobacco brand name, logo, or picture on it?’. Students who answered ‘Very likely’ or ‘Somewhat likely’ were classified as having high receptivity and those who answered ‘Somewhat unlikely’ or ‘Very unlikely’ were classified as having low receptivity.

Two questions were used to assess students’ beliefs about smoking-related harm: ‘How much do you think people harm themselves when they smoke cigarettes some days but not every day?’, and ‘How strongly do you agree with the statement “All tobacco products are dangerous”?’. Responses to the first question were classified into no harm, little/some harm, and a lot of harm. The second question has four responses: strongly agree, agree, disagree, and strongly disagree. Agree and strongly agree were grouped under the category ‘agree’, while disagree and strongly disagree were grouped under the category ‘disagree’.

Statistical analysis

Descriptive statistics for the sample’s characteristics were calculated and presented by curiosity and susceptibility status using percentages and 95% confidence intervals (CIs). All percentages were weighted using sampling weights to account for the complex survey design and non-response. In the bivariate analysis, percentages were considered statistically different when their corresponding CIs were not overlapping. Participants with missing values in the outcome variables were excluded: 64 (0.33%) were missing curiosity status, while 54 (0.25%) were missing susceptibility status. Missing values in the covariates were excluded as they were overall low and ranged from 0.61% in age groups, to 3.33% in current use of smokeless tobacco products. Consequently, the percentages throughout this paper are for those with complete data. Separate multivariable logistic regression models were used to examine the factors associated with each outcome (curiosity, susceptibility) and all factors were entered simultaneously into these models. Hosmer-Lemeshow test was used to evaluate the model’s goodness-of-fit, and a p-value >0.05 indicates a good model fit. Adjusted odds ratios (aOR) with 95% CIs were reported and standard errors were estimated using Taylor linearization method. All analyses were performed using svy command in Stata 13 (StataCorp, College Station, Texas) and the level of significance was set at p<0.05.

RESULTS

Sample characteristics

The sample for this study consists of 16,709 US youths who never smoked a cigarette, not even a puff or two. Among them 27.61% (95% CI: 26.47-28.78) were susceptible to cigarettes and 30.05% (95% CI: 28.91-31.21) were curious about cigarette smoking. Table 1 presents the sample characteristics. There were no significant differences in the percentage of boys and girls who were curious or susceptible to cigarette smoking. Youth age groups, those aged 17 years or more were less susceptible to cigarettes (24.16%, 95% CI: 21.51-27.03). Hispanic youth were more susceptible to cigarette smoking than all other races/ethnicities (Table 1).

Relationship between curiosity and susceptibility to cigarettes

Among the whole sample, 1736 youths (9.95%, 95% CI: 9.32-10.58) were not curious but susceptible to cigarettes, compared with 3060 youths (17.84%, 95% CI: 16.85-18.82) who were both curious and susceptible to cigarettes.

Bivariate analysis

Susceptibility to cigarette smoking was higher among current waterpipe smokers and among individuals who were living with a waterpipe smoker than those who were not waterpipe smokers or living with someone who smokes waterpipe. Similar findings were found for electronic cigarettes, cigar/cigarillo/little cigar, or smokeless tobacco. Students exposed to pro-tobacco ads at convenient stores, internet, newspapers/magazines, or movies, and those highly receptive to tobacco marketing were more susceptible to cigarette smoking. Students who agree that all tobacco products are dangerous or believe people harm themselves a lot when they smoke somedays were less susceptible to cigarette smoking.

A higher percentage of current users of waterpipe or electronic cigarettes, but not cigar/cigarillo/little cigar or smokeless tobacco, were curious about cigarettes than non-users. Students living with someone who uses waterpipe, cigarettes, or electronic cigarettes were more curious about cigarettes than those who did not. Compared to those never exposed to pro-tobacco ads and those with low receptivity to tobacco marketing, students exposed to any kind of pro-tobacco ads assessed in this study (convenient store, internet, newspaper/magazines, movies) and those with high receptivity to tobacco marketing were more curious about cigarettes. Finally, students who agree that all tobacco products are dangerous or believe people harm themselves when they smoke somedays were less curious about cigarette smoking (Table 1).
Table 1. Descriptive statistics for a sample of youth who never tried cigarettes, National Youth Tobacco Survey, 2014

| Characteristic                          | N* | Susceptible to cigarettes (% (95% CI)) | N* | Curious about cigarettes (% (95% CI)) |
|-----------------------------------------|----|---------------------------------------|----|--------------------------------------|
| **Sociodemographic**                    |    |                                       |    |                                      |
| Sex                                     |    |                                       |    |                                      |
| Girls                                   | 8,310 | 26.83 (25.38-28.33) | 8,308 | 30.73 (29.21-32.30) |
| Boys                                    | 8,243 | 28.38 (26.99-29.81) | 8,236 | 29.26 (27.67-30.89) |
| **Age in years**                        |    |                                       |    |                                      |
| ≤13                                     | 7,132 | 26.75 (25.05-28.51) | 7,127 | 28.13 (26.85-29.45) |
| 14                                      | 2,590 | 30.57 (27.10-34.27) | 2,583 | 34.40 (31.30-37.65) |
| 15                                      | 2,122 | 30.77 (28.20-33.46) | 2,127 | 33.32 (31.08-35.64) |
| 16                                      | 1,940 | 27.75 (25.43-30.20) | 1,941 | 29.13 (26.64-31.75) |
| ≥17                                     | 2,807 | 24.16 (21.51-27.03) | 2,804 | 28.26 (25.71-30.95) |
| **Race/ethnicity**                      |    |                                       |    |                                      |
| White                                   | 6,813 | 25.93 (24.58-27.34) | 6,814 | 29.22 (27.94-30.54) |
| Black                                   | 2,453 | 26.40 (24.17-28.76) | 2,458 | 26.77 (24.41-29.27) |
| Hispanic                                | 4,530 | 34.19 (32.47-35.96) | 4,524 | 34.28 (32.39-36.23) |
| Other/multiple race                     | 2,054 | 26.40 (23.30-29.75) | 2,048 | 33.15 (30.38-36.05) |
| **Grade**                               |    |                                       |    |                                      |
| Middle school                           | 8,991 | 27.48 (25.69-29.34) | 8,979 | 29.10 (27.87-30.35) |
| High school                             | 7,589 | 27.73 (26.13-29.38) | 7,591 | 30.91 (29.14-32.74) |
| **Current use of tobacco/nicotine products** |    |                                       |    |                                      |
| Current waterpipe smoking               |    |                                       |    |                                      |
| No                                      | 15,839 | 26.99 (25.87-28.13) | 16,255 | 29.79 (28.68-30.93) |
| Yes                                     | 367   | 48.46 (43.08-53.88) | 390   | 42.64 (36.56-48.96) |
| Current electronic cigarettes use       |    |                                       |    |                                      |
| No                                      | 15,952 | 26.50 (25.38-27.66) | 15,947 | 29.37 (28.24-30.52) |
| Yes                                     | 517   | 60.50 (55.21-65.56) | 516   | 50.74 (44.59-56.86) |
| Current cigar/cigarillo/little cigar use |    |                                       |    |                                      |
| No                                      | 16,151 | 27.33 (26.17-28.52) | 16,144 | 30.03 (28.88-31.20) |
| Yes                                     | 232   | 42.72 (35.44-50.32) | 230   | 32.66 (25.08-41.26) |
| Current smokeless tobacco use           |    |                                       |    |                                      |
| No                                      | 15,982 | 27.31 (26.17-28.47) | 15,979 | 30.14 (29.01-31.29) |
| Yes                                     | 162   | 40.10 (32.18-48.58) | 162   | 28.30 (21.53-36.22) |
| **Exposure to secondhand smoke/vape**   |    |                                       |    |                                      |
| Live now with waterpipe smoker          |    |                                       |    |                                      |
| No                                      | 16,264 | 27.22 (26.04-28.43) | 16,255 | 29.69 (28.52-30.88) |
| Yes                                     | 391   | 45.08 (38.89-51.43) | 390   | 46.47 (40.25-52.80) |
| Live now with cigarette smoker          |    |                                       |    |                                      |
| No                                      | 12,575 | 25.78 (24.55-27.04) | 12,570 | 28.60 (27.20-30.04) |
| Yes                                     | 4,080 | 33.41 (31.47-35.41) | 4,075 | 34.66 (32.63-36.75) |
| Live now with electronic cigarettes user |    |                                       |    |                                      |
| No                                      | 15,518 | 26.75 (25.53-28.00) | 15,514 | 29.47 (28.29-30.67) |
| Yes                                     | 1,137 | 39.50 (36.11-42.99) | 1,131 | 38.09 (34.29-42.04) |
| **Exposure to pro–tobacco ads and receptivity to tobacco marketing** |    |                                       |    |                                      |
| See cigarette ads at gas station or convenient store |    |                                       |    |                                      |
| Never                                   | 966   | 19.74 (16.65-23.24) | 967   | 20.67 (17.58-24.14) |
| Rarely/sometimes                        | 5,507 | 26.29 (24.60-28.05) | 5,502 | 28.55 (26.89-30.27) |
| Most of the time/always                 | 9,202 | 28.91 (27.63-30.22) | 9,198 | 32.20 (30.93-33.49) |
| See actors using cigarettes in movies   |    |                                       |    |                                      |
| Never                                   | 1,318 | 23.53 (20.60-26.73) | 1,319 | 22.47 (19.62-25.60) |
| Rarely/sometimes                        | 10,153 | 27.28 (26.03-28.57) | 10,143 | 30.19 (28.92-31.49) |
| Most of the time/always                 | 4,369 | 29.92 (27.85-32.08) | 4,368 | 32.64 (30.28-35.08) |
| See cigarette ads in newspapers/magazines |    |                                       |    |                                      |
| Never                                   | 1,864 | 22.41 (19.85-25.21) | 1,859 | 24.54 (21.95-27.34) |
| Rarely/sometimes                        | 7,984 | 29.27 (27.82-30.67) | 7,977 | 31.95 (30.53-33.40) |
| Most of the time/always                 | 1,563 | 26.88 (23.37-30.70) | 1,561 | 31.87 (29.66-34.17) |
| See cigarette ads when using the internet |    |                                       |    |                                      |
| Never                                   | 2,543 | 19.65 (17.64-21.82) | 2,544 | 22.21 (20.03-24.56) |
| Rarely/sometimes                        | 11,097 | 29.15 (27.93-30.41) | 11,098 | 32.09 (30.90-33.30) |
| Most of the time/always                 | 2,117 | 28.23 (25.55-31.06) | 2,109 | 29.44 (26.96-32.06) |
## Receptivity to tobacco marketing

| Low       | 14,639 | 25.63 (24.40–26.89) | 14,641 | 28.58 (27.44–29.75) |
| High      | 1,394  | 52.22 (49.31–55.12)  | 1,388  | 49.52 (46.35–52.69)  |

## Beliefs about harm due to smoking

### Agree that ‘All tobacco products are dangerous’

| Disagree | 1,265 | 40.66 (37.83-43.55) | 1,269 | 37.23 (34.05-40.52) |
| Agree    | 14,641| 26.63 (25.50-27.78)  | 14,632| 29.41 (28.24-30.62) |

### Believe how much people harm themselves when smoke somedays, but not everyday

| No harm   | 404    | 43.74 (37.74-49.93) | 402   | 33.29 (27.74-39.34) |
| Little/some harm | 6,715  | 36.68 (35.03-38.36) | 6,710 | 39.27 (37.50-41.06) |
| A lot of harm | 9,147  | 20.33 (19.21-21.50) | 9,146 | 23.28 (22.17-24.44) |

* Unweighted frequency of all youth who never smoked cigarettes, not even a puff or two. The number of missing values is unequal in each of the two studied outcomes. § Weighted row percent of susceptible youth. ¶ Weighted row percent of curious youth.

### Table 2. Multivariable logistic regression for factors associated with susceptibility and curiosity about cigarettes among youth who never tried cigarettes, National Youth Tobacco Survey, 2014

| Characteristic                                      | Susceptibility to cigarettes | Curiosity about cigarettes |
|-----------------------------------------------------|------------------------------|----------------------------|
|                                                     | aOR 95% CI p value           | aOR 95% CI p value         |
| **Sociodemographic**                                |                              |                            |
| **Sex**                                             |                              |                            |
| Girls                                               | Ref                          | Ref                        |
| Boys                                                | 0.98 (0.86-1.11) 0.78        | 0.86 (0.74-0.99) 0.04       |
| **Race/ethnicity**                                  |                              |                            |
| White                                               | Ref                          | Ref                        |
| Black                                               | 0.99 (0.82-1.20) 0.95        | 0.96 (0.81-1.14) 0.71       |
| Hispanic                                            | 1.59 (1.40-1.80) <0.0001     | 1.33 (1.19-1.48) <0.0001    |
| Other/multiple race                                 | 1.15 (0.92-1.44) 0.19        | 1.30 (1.10-1.54) 0.002      |
| **Current use of tobacco/nicotine products**        |                              |                            |
| Current waterpipe smoking                           |                              |                            |
| No                                                  | Ref                          | Ref                        |
| Yes                                                 | 1.52 (1.01-2.26) 0.04        | 1.19 (0.83-1.70) 0.33       |
| Current electronic cigarettes use                   |                              |                            |
| No                                                  | Ref                          | Ref                        |
| Yes                                                 | 3.67 (2.76-4.86) <0.0001     | 2.18 (1.58-2.99) <0.0001    |
| Current smokeless tobacco use                       |                              |                            |
| No                                                  | Ref                          | Ref                        |
| Yes                                                 | 0.94 (0.48-1.82) 0.86        | 0.44 (0.24-0.78) 0.006      |
| Exposure to second hand smoke/vape                  |                              |                            |
| Live now with waterpipe smoker                      |                              |                            |
| No                                                  | Ref                          | Ref                        |
| Yes                                                 | 1.51 (1.06-2.14) 0.02        | 1.37 (0.97-1.93) 0.06       |
| Live now with cigarette smoker                      |                              |                            |
| No                                                  | Ref                          | Ref                        |
| Yes                                                 | 1.24 (1.08-1.42) <0.002      | 1.15 (0.98-1.34) 0.07       |
| Exposure to pro-tobacco ads and receptivity to tobacco marketing |                          |                            |
| See pro-tobacco ads in newspapers/magazines         |                              |                            |
| Never                                               | Ref                          | Ref                        |
| Rarely/sometimes                                    | 1.31 (1.08-1.57) 0.005       | 1.23 (1.03-1.46) 0.02       |
| Most of the time/always                             | 1.16 (0.89-1.51) 0.25        | 1.30 (1.03-1.65) 0.03       |
| See pro-tobacco ads in the internet                 |                              |                            |
| Never                                               | Ref                          | Ref                        |
| Rarely/sometimes                                    | 1.24 (1.01-1.54) 0.04        | 1.28 (1.05-1.55) 0.01       |
| Most of the time/always                             | 1.15 (0.89-1.47) 0.26        | 1.11 (0.86-1.41) 0.39       |
| Receptivity to tobacco marketing                    |                              |                            |
| Low                                                 | Ref                          | Ref                        |
| High                                                | 2.81 (2.40-3.30) < 0.0001    | 2.18 (1.83-2.60) <0.0001    |
Multivariable analysis
Table 2 presents results from multivariable logistic regression models assessing the association between current waterpipe smoking, and curiosity and susceptibility to cigarette smoking.

1) Current waterpipe use and susceptibility to cigarette smoking
Among students who reported never smoked cigarettes, current waterpipe smokers were 1.5 times more susceptible to cigarette smoking than non-current waterpipe smokers; controlling for socio-demographics, use of other combustible and non-combustible tobacco products, receptivity to tobacco marketing, beliefs and attitudes towards tobacco use, and exposure to pro-tobacco ads (aOR=1.52, 95% CI: 1.01-2.26, p=0.04). Students living with someone who smokes waterpipe (aOR=1.51, 95% CI: 1.06-2.14, p=0.02), or cigarettes (aOR=1.24, 95% CI: 1.08-1.42, p<0.002) were more likely to be susceptible to cigarette smoking.

2) Use of other tobacco products, exposure to tobacco ads and susceptibility to cigarette smoking
Electronic cigarette users were 3.6 times more likely than non-users to be susceptible to cigarette smoking (aOR=3.6, 95% CI: 2.76-4.86, p<0.0001). Those reported exposure to pro-tobacco ads rarely/sometimes in newspapers/magazines (aOR=1.31, 95% CI: 1.08-1.57, p=0.005), or the internet (aOR=1.24, 95% CI: 1.01-1.54, p=0.04), and those with high receptivity to tobacco marketing (aOR=2.81, 95% CI: 2.40-3.30, p<0.0001) were more likely to be susceptible to cigarette smoking. Finally, the belief that people harm themselves a lot when they smoke somedays (aOR=0.29, 95% CI: 0.16-0.54, p<0.0001) was protective against susceptibility to cigarettes (aOR=0.74, 95% CI: 0.40-1.36, p=0.33) or cigarettes (aOR=1.24, 95% CI: 1.08-1.42, p<0.002) were more likely to be susceptible to cigarette smoking.

3) Current waterpipe use and curiosity about cigarette smoking
Current waterpipe smoking was not associated with curiosity about cigarettes (aOR=1.19, 95% CI: 0.83-1.70, p=0.33). A borderline association was observed between curiosity about cigarettes and living with someone who smokes waterpipe (aOR=1.37, 95% CI: 0.97-1.93, p=0.06) or cigarettes (aOR=1.15, 95% CI: 0.98-1.34, p=0.07).

4) Use of other tobacco products, exposure to tobacco ads and curiosity about cigarette smoking
Electronic cigarette users were more curious about cigarettes (aOR=2.18, 95% CI: 1.58-2.99, p<0.0001) than non-users, while smokeless tobacco users were less curious about cigarettes (aOR=0.44, 95% CI: 0.24-0.78, p=0.006). Higher odds of curiosity about cigarettes were associated with exposure to pro-tobacco ads in newspaper/magazines rarely/sometimes (aOR=1.23, 95% CI: 1.03-1.46, p=0.02), or most of the times/always (aOR=1.30, 95% CI: 1.03-1.65, p=0.03), exposure to pro-tobacco ads rarely/sometimes on the internet (aOR=1.28, 95% CI: 1.05-1.55, p=0.01), and high receptivity to tobacco marketing (aOR=2.18, 95% CI: 1.83-2.60, p<0.0001). The belief that all tobacco products are dangerous (aOR=0.80, 95% CI: 0.65-0.98, p=0.03), and that people harm themselves a lot when they smoke somedays (aOR=0.63, 95% CI: 0.42-0.942, p=0.02) were protective against curiosity about cigarettes. (Table 2).

DISCUSSION
Using a representative sample of cigarette-naïve US youth, it was found that 48.5% of current waterpipe smokers and 45.1% of those living with a waterpipe smoker were susceptible to cigarette smoking, compared with 27% among non-current waterpipe smokers and 27.2% among those not living with a waterpipe smoker. Current waterpipe smokers and those living with a waterpipe smoker were 1.5 times more susceptible to cigarettes than those not smoking waterpipe or living with a waterpipe smoker. Although a higher proportion of current waterpipe smokers and those living with a waterpipe smoker were curious about cigarettes, these associations did not reach statistical significance. These findings suggest that cigarette-naïve youth who use waterpipe are highly susceptible to cigarettes, but not more curious about cigarettes, which may support the underlying assumption of the gateway hypothesis that increasing demand to nicotine may lead to cigarette smoking among cigarette-naïve adolescents who smoke waterpipe.[10]

The finding that waterpipe smoking was associated with susceptibility but not curiosity deserves further discussion. This is probably due to the differences in defining each concept. Curiosity is measured directly by asking participants if they were ever curious about cigarettes, while susceptibility is measured indirectly using a composite index of 3 items:
how likely is it that participants will smoke a cigarette in the next year; will try a cigarette soon; and the self-efficacy to refuse a cigarette offered by a close friend. Another plausible explanation is that youths who smoke waterpipe might initiate cigarettes as a result of increased susceptibility to cigarettes, perhaps due to increased demand for nicotine, rather than an increasing curiosity about cigarettes. This needs to be tested in a longitudinal study.

Previous studies have shown that waterpipe use among youth who never smoked can lead to initiation of cigarette smoking. To the best of the author’s knowledge, this study is the first to show that waterpipe use is associated with increased susceptibility to cigarette smoking using a large, representative sample of cigarette-naïve US youth. A possible explanation for this observation is that youth who smoke waterpipe may be more susceptible to initiating cigarette smoking to satisfy a craving for nicotine by using the easily accessible cigarette, compared to a less mobile, less accessible waterpipe. Another finding of this study is that living with a waterpipe smoker is associated with a higher susceptibility to cigarette smoking. It is well established that exposure to secondhand smoke is associated with higher susceptibility and subsequent initiation of cigarette smoking among cigarette-naïve youth. Youth living with a smoker possibly perceive smoking as a socially acceptable practice that can encourage initiation of smoking. Although the US has adopted indoor air policies against smoking, paradoxically, waterpipe is exempt from such policies. Extending indoor air polices to include waterpipe and addressing exposure to waterpipe tobacco smoking at home can be effective in preventing susceptibility and initiation of cigarettes among cigarette-naïve US youth.

Although marketing restrictions on tobacco ads and promotions have been in place since 1998, many never-smoking US youth are still exposed to pro-tobacco ads and at risk of smoking initiation. This study shows that exposure to pro-tobacco ads mainly on the internet and in newspapers/magazines was associated with curiosity and susceptibility to cigarette smoking among youth who never smoked. In fact, US middle and high school students are increasingly exposed to pro-tobacco ads on the internet. This finding is of great concern given that waterpipe ads on the internet are less likely, compared with cigarette ads, to depict smoking in a negative way, mention the harmful effects of smoking, show antismoking messages, or provide advice on quitting. In addition, less than 1% of the waterpipe marketplace on the internet shows any warning against tobacco on the first web page, and many use deceptive descriptions of waterpipe appealing to youth. More importantly, unregulated pro-tobacco ads expose cigarette-naïve youth to smoking images that can normalize smoking.

This study highlights important demographic disparities in the susceptibility and curiosity about cigarettes that have important policy implications. First, Hispanic youth were more susceptible and curious about cigarettes than non-Hispanic white youth. This is likely because Hispanic youth have lower perceived harm of tobacco use and at higher risk of initiating smoking. Second, boys were less curious about cigarettes than girls in this study. While concerns about weight control may explain why young girls were more curious about cigarettes than boys, other factors such as boys’ higher curiosity about alternative tobacco products, cigars and smokeless tobacco as examples, may explain this observation.

This study has limitations. Tobacco use was self-reported and subject to recall errors. However, estimates were based on current tobacco use, which provides more valid estimates of tobacco use among youth. Given the cross-sectional nature of NYTS, a causal inference between waterpipe use and susceptibility to cigarettes cannot be established. Strengths include the large sample size, a good overall response rate of 73.3% achieved in NYTS 2014, and the generalizability of these findings to middle and high school students in the US.

CONCLUSIONS

In summary, this study presents data on the association between current waterpipe use, and susceptibility and curiosity about cigarettes among a nationally representative sample of US youth. Current waterpipe use or living with a waterpipe user was independently associated with susceptibility, but not curiosity, to cigarette smoking. These findings suggest that experimentation with cigarettes among cigarette-naïve adolescent waterpipe smokers can be due to increasing susceptibility, where the more addicted youths may need to use cigarettes to satisfy nicotine craving rather than having higher curiosity to use cigarettes. This needs to be examined in a longitudinal study.

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CONFLICT OF INTERESTS

The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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