Evaluating the Predictive Value of Measures of Susceptibility to Tobacco and Alternative Tobacco Products

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Abstract

Background—The "cigarette susceptibility index" has been adapted for other products, yet, the validity of these adapted measures–particularly among youth who have used other tobacco products–has not been evaluated.

Methods—We used prospective data from the Southern California Children's Health Study to evaluate the association of questionnaire measures assessing susceptibility to e-cigarette, cigarette, hookah and cigar/cigarillo/little cigar use at wave 1 (W1; 11th/12th grade) with subsequent initiation between W1 and W2 (16 months later; N=1453). We additionally examined whether each effect estimate differed by use of other tobacco products at W1.

Results—Odds ratios, attributable risk%, and risk differences for product initiation among susceptible vs. non-susceptible youth were consistently higher among never users of any tobacco product than among youth with any tobacco use history. For example, susceptible (vs. non-susceptible) youth with no prior tobacco use had 3.64 times the odds of subsequent initiation of e-cigarettes (95%CI:2.61,5.09), while among users of another product, susceptible (vs. non-susceptible) youth had 1.95 times the odds of e-cigarette initiation (95%CI:0.98,3.89; p-interaction=0.016). 60.4% of ecigarette initiation among never users of any product could be attributed to susceptibility, compared to 19.8% among users of another product. The e-cigarette absolute risk difference between susceptible and non-susceptible youth was 21.9%(15.2,28.6) for never users, vs. 15.4%(0.2,30.7) for users of another product.

Conclusion—Tobacco product-specific susceptibility associations with initiation of use at W2 were markedly attenuated among prior users of other products, demonstrating reduced utility for these measures among subjects using other products.

Keywords

susceptibility; tobacco; adolescents; methodology

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1. INTRODUCTION

The "susceptibility to smoking index" (Choi et al., 2001; Jackson, 1998; Nodora et al., 2014; Pierce et al., 1996; Pierce et al., 2005; Strong et al., 2014; Unger et al., 1997) has been widely accepted as a measure used to estimate elevated risk of future initiation of combustible cigarettes, and has historically been used in numerous cross-sectional studies to provide timely results on risk factors for cigarette initiation, when prospective data are not available (SERVICES, 2014; Services., 2016). Given high rates of e-cigarette use among youth (Cullen et al., 2018; Miech et al., 2017) – which have raised concerns in the public health community over the behavioral consequences that may result from the rise in popularity of emerging tobacco products – similar measures that can be used to estimate risk factors for e-cigarette initiation could prove useful to the public health community in the absence of longitudinal data. For example, susceptibility to emerging product use among non-users in large panel studies such as the National Youth Tobacco Survey (NYTS) (Cullen et al., 2018), Monitoring the Future Study (MTF) (Miech et al., 2017), or Youth Risk Behavior Surveillance Study (YRBSS) (Demissie et al., 2017) could be used to predict patterns of initiation and to identify risk factors for initiation, based on associations with susceptibility, that would be useful to develop timely intervention and regulation. Many studies have begun to include susceptibility indices adapted for other tobacco products as surrogates for future use on study questionnaires, including the NYTS (Cullen et al., 2018). Such data could be informative to estimating future trends in the use of new products, provided that susceptibility indices can predict product onset with reasonable accuracy. Given the widespread adoption of adapted indices, evaluation of how well these measures predict future use is needed.

We recently reported that while the susceptibility to smoking index performs moderately well as a surrogate for future cigarette initiation among youth who have not used any other tobacco products, including e-cigarettes or hookah, virtually no association was observed between susceptibility and future cigarette use among those who had ever used e-cigarettes or hookah (Barrington-Trimis et al., 2017). Thus, use of the susceptibility to smoking index as a proxy for future cigarette use among those who have previously used other tobacco products may be inappropriate. Similar assessment of adapted susceptibility indices for initiation of other products has been limited. Two recent studies examined predictive validity of susceptibility indices adapted to alternative tobacco products (Bold et al., 2016; Cole et al., 2017), but they did not examine how the indices performed in users of other products. One study evaluated the relationship of susceptibility to e-cigarette use to future e-cigarette initiation in a sample of adolescents who had never used either e-cigarettes or cigarettes at baseline (Bold et al., 2016; Cole et al., 2017); the other study evaluated the predictive validity of adapted measures of susceptibility for cigarettes, e-cigarettes, cigarillos/little cigars, cigars, hookah, and smokeless tobacco in a sample restricted to those who (a) had never used cigarettes and (b) had not used other tobacco products or e-cigarettes in the past 30 days at baseline ((Bold et al., 2016; Cole et al., 2017).

Based on prospectively collected data from the Southern California Children's Health Study (CHS), where susceptibility was assessed at W1 among non-users and tobacco product use assessed at W2, we conducted analyses to determine the performance of product-specific

susceptibility measures. We report the association between susceptibility to a product and subsequent initiation of that product among youth who had vs. had not used other tobacco products. We also report the sensitivity, specificity, negative predictive value, and positive predictive value of measures of susceptibility to e-cigarette use, cigarette use, hookah use, and cigar/cigarillo/little cigar use for subsequent initiation of use of each of these products.

2. METHODS

2.1 Study Sample

An initial wave 1 (W1) questionnaire was completed in 11th or 12th grade (mean age = 17.3 years) between January 2014 and June 2014 at participating schools in the Southern California Children's Health Study. Information was collected on use of tobacco products (including e-cigarettes, cigarettes, hookah, and cigar/cigarillo/little cigar use) and susceptibility to future use of each product, using adapted susceptibility indices (described below). The study has been described previously (Barrington-Trimis et al., 2015; McConnell et al., 2006). Participants were contacted to complete an online follow-up questionnaire between February 2015 and July 2016 (N=1553; 74.1% retention), approximately 16 months later, after participants reached the age of 18 (W2). Demographic characteristics of participants are reported in Table 1. A total of 1453 participants contributed to at least one analysis.

2.2 Ethics Statement

The study was approved by the University of Southern California Institutional Review Board. Participants age 18 or older provided written informed consent. Written parental informed consent and student assent were obtained for all CHS participants prior to data collection in 2014.

2.3 Measures

2.3.1 Susceptibility to tobacco product use—Susceptibility to cigarette use has been defined as the absence of a firm commitment not to smoke (Nodora et al., 2014; Pierce et al., 1996; Strong et al., 2014). In the current study, we evaluated susceptibility to e-cigarette use, cigarette use, hookah use, and cigar/cigarillo/little cigar use. Participants were asked the following questions for each product, with four response options (definitely not, probably not, probably yes, definitely yes): a) At any time in the next year do you think you will use this product?; b) If one of your best friends were to offer you this product would you use it?; c) Have you ever been curious about using this product? A composite three-measure index for each product was created, according to previously used methods: participants were classified as having no susceptibility in the composite index if they responded "definitely not" to all three questions about a given product (Nodora et al., 2014). Participants answering probably not, probably yes, or definitely yes to any question were classified as "susceptible" to that product. Participants who did not respond "definitely no" to all three questions or who did not respond "probably not" "probably yes" or "probably no" to at least one question were considered to have missing data and were excluded from analyses (e-cigarettes – N=11; cigarettes – N=9; hookah – N=10; cigar/cigarillo/little cigar – N=10).

2.3.2   Tobacco and Alternative Tobacco Product Use—At each survey, participants were asked the age at which they had first used each of four products: e-cigarettes, cigarettes, hookah, or cigar/cigarillo/little cigars (Barrington-Trimis et al., 2015). Participants who had "never tried" a product (not "even one or two puffs") were classified as "never users". Those reporting an age at first use of each tobacco product were classified as ever users of that product.

2.3.3   Sociodemographic characteristics—Parent-completed questionnaires were used to assess gender, race/ethnicity (Hispanic, Non-Hispanic White, Other), and parental education (highest level of education of either parent; <12th grade, high school diploma or GED, some college, college degree, some graduate school or higher). Community of residence at W1 was a study design variable (McConnell et al., 2006).

2.4   Statistical Analysis

Based on prospectively collected data, where susceptibility was assessed at W1 and tobacco product use assessed at W2, we conducted analyses to evaluate the association between susceptibility to a product and subsequent use of that product, and we evaluate the performance of each product-specific susceptibility index. All statistical analyses were based on two-sided hypotheses tested at a 0.05 level of significance. Analyses were performed using SAS 9.4.

2.4.1   Association Between Susceptibility and Subsequent Use—Unconditional logistic regression models were used to evaluate the association between susceptibility to each product at W1 and subsequent use of that product at W2, with adjustment for gender, race/ethnicity, parental education, and community as fixed effects. Effect estimates are reported as odds ratios (ORs) with 95% confidence intervals (CI). Formal tests of interaction were used to evaluate whether odds ratios for the association between susceptibility and subsequent use differed for those who had used any other type of tobacco product at W1, compared to those who had never used any tobacco products, by including a product interaction term for susceptibility*use of any other tobacco product in each model.

2.4.2   Attributable Risk Percent (AR%)—AR% was used to estimate the proportion of product initiation (by product) that could be attributed to the susceptibility measure among never users of any other tobacco product and among users of at least one other product at W1.

2.4.3   Absolute risk difference (RD)—RD was used to estimate the relative difference in initiation rates between those who were vs. were not susceptible to a given product among those who had never used any other product and those who had used at least one other product at W1, with adjustment for gender and parental education.

2.4.4   Predictive Value—Negative predictive value (NPV) is the probability that youth who were not susceptible to a product did not initiate use of that product, calculated as the number of non-susceptible youth for a product who did not initiate use of that product divided by the total number of youth among those who were not susceptible to use of that

product. Positive predictive value (PPV) is the probability that youth who were susceptible to use of a product initiated use of that product between W1 and W2, calculated as the number of susceptible youth who did initiate use of a product divided by the total number of susceptible youth for that product. Of note, NPV and PPV are dependent, in part, on the prevalence of initiation of a given tobacco product (Altman and Bland, 1994). 95% CIs were calculated using Exact (Clopper Pearson) Confidence Limits for binomial proportions. Differences in predictive value between non-users of all tobacco products and users of any other product were calculated using chi-squared statistics.

2.4.5 Sensitivity/Specificity—Sensitivity is the probability that youth who initiated use of a tobacco or alternative tobacco product had reported susceptibility to use of that product at W1, calculated as the number of youth initiators who were susceptible to tobacco use divided by the total number of youth who initiated use of that product. Specificity is the probability that youth who did not initiate use of a tobacco product were not susceptible at W1, calculated as the number of youth who were not susceptible divided by the total number of youth who did not initiate use of a product. 95% CIs were calculated using Exact (Clopper Pearson) Confidence Limits for binomial proportions. Differences in sensitivity and specificity between non-users of all tobacco products and users of any other product were calculated using chi-squared statistics.

3. RESULTS

3.1 Prevalence of susceptibility and tobacco product initiation between W1 and W2

Susceptibility to any of the four tobacco products was generally higher among adolescents who had previously used another tobacco product than among youth who had never used any tobacco products (Table 2). For example, 39.1% of youth who had used a product other than e-cigarettes were susceptible to e-cigarette use, compared to 26.3% of youth who had never used any other tobacco product. Between W1 (11th or 12th grade) and W2, among never users of any tobacco product, 21.9% of youth initiated e-cigarette use, 10.4% of youth initiated cigarette smoking, 15.7% of youth initiated hookah use, and 9.8% of youth initiated cigar/cigarillo/little cigar use. Initiation rates for each product among W1 users of any other tobacco product were substantially higher: 59.1% initiated e-cigarette use, 36.8% initiated cigarette use, 33.3% initiated hookah use, and 31.2% initiated cigar/cigarillo/little cigar use.

3.2 Association between product-specific susceptibility and initiation of each product

3.2.1 Initiation rates—Overall, the rates of initiation for each product among youth with no W1 history of any tobacco use were lower than for youth who had ever used any tobacco product among both susceptible and non-susceptible participants (Figure 1). For example, e-cigarette initiation rates were lower among those who had never used any other tobacco product than among those who had used another product at W1. Among never tobacco product users, 15.4% of youth not susceptible to e-cigarette use, and 39.8% of youth who were susceptible to e-cigarette use subsequently initiated e-cigarette use between W1 and W2. Among youth with a history of any tobacco use (other than e-cigarettes) at W1, a larger proportion of youth initiated e-cigarette use between W1 and W2, including 55.1% of non-susceptible youth and 67.1% of susceptible youth.

3.2.2.   Odds Ratios for the association between susceptibility and future use
—While large, statistically significant associations were observed between each susceptibility index and subsequent initiation among never users of any tobacco product, much smaller associations were observed among those with any history of tobacco use (p-interactions: 0.005–0.076; Table 3). For example, after adjustment for covariates, susceptible youth had 3.64 times the odds of initiating e-cigarette use (95%CI: 2.61, 5.09). Among users of any other product, the association between susceptibility to e-cigarettes and subsequent initiation of e-cigarettes was substantially smaller than that observed for non-users (adjusted OR=1.95; 95%CI: 0.98, 3.89; p-interaction = 0.016). Similar patterns of weaker associations between susceptibility and initiation among W1 users of other products were observed for other tobacco products.

3.2.3   Attributable Risk Percent
—Overall, a higher proportion of tobacco product initiation can be attributed to susceptibility among never users of any tobacco product compared to users of any other product (Table 3). For example, among never users of any product, 60.4% of e-cigarette initiation can be attributed to susceptibility to e-cigarette use; among users of any other product, 19.8% of e-cigarette initiation can be attributed to susceptibility to e-cigarette use.

3.2.4   Absolute risk difference
—For cigarettes and cigar/cigarillo/little cigars, the absolute risk difference for susceptible vs. non-susceptible adolescents was similar between never users of any product, and among users of any other product (Table 3). For e-cigarettes and hookah, the RD was larger for never users of any product compared to users of any other product. For example, among never users of any other tobacco product, the adjusted difference in initiation rates was 21.9% (RD: 21.9; 95%CI: 15.2, 28.6); among users of any other product, the adjusted difference in initiation rates was 15.4% (RD: 15.4; 95%CI: 0.2, 30.7).

3.3   Performance of each product-specific susceptibility index

3.3.1.   Differences in performance between never users and users of any other product
—NPV was significantly higher among never users of any tobacco product than among users of any other product for each of the four susceptibility measures, while PPV was significantly lower (with the exception of hookah, for which no statistical difference was observed between users and non-users) (Supplemental Table 1). No differences in sensitivity were observed between never users and users of another product. Specificity was statistically significantly higher among never users (vs. ever users of another product) for all four tobacco products.

3.3.2.   Differences in performance by product type
—Among never users of any tobacco product, NPV was higher, and PPV was lower, for cigarettes and cigar/cigarillo/little cigars relative to e-cigarettes and hookah; sensitivity and specificity were fairly similar across all four products (Supplemental Table 1). Among users of any tobacco product, NPV was substantially lower and PPV was substantially higher for e-cigarettes, relative to corresponding values for cigarettes, hookah, and cigar/cigarillo/little cigars. Sensitivity was highest for hookah, followed by cigar/cigarillo/little cigars, with e-cigarettes and cigarettes

having the lowest values. Specificity was highest for cigarettes, followed by e-cigarettes, cigar/cigarillo/little cigars, and hookah, with an approximate 5–10% decrease in the absolute value of specificity between each product, respectively.

4. DISCUSSION

Between W1 in 11th/12th grade and W2 approximately 16 months later, a substantial number of youth initiated tobacco or alternative tobacco product use (e.g., cigarettes, e-cigarettes, hookah or cigar/cigarillo/little cigars) for the first time. Among youth who had never used any tobacco product, strong associations were observed between each susceptibility measure and future initiation of that product, suggesting that adapted susceptibility measures may be useful in predicting initiation of all tobacco products in this group. However, among users of any other tobacco product, markedly attenuated and non-statistically significant associations between susceptibility and future use were observed, suggesting reduced utility in the capacity to predict new onset among this subpopulation.

Recent cross-sectional studies have used adapted tobacco product-specific susceptibility measures as a proxy for future initiation to identify risk factors (SERVICES, 2014; Services., 2016). This is appropriate when there is a strong association between the susceptibility measure and subsequent initiation, and PPV is high. If susceptibility is strongly associated with future initiation of a product, then observed risk factors for susceptibility are likely also to be associated with initiation.

Although we found relatively low PPV among non-users of any tobacco products, the strong association between susceptibility and future use of a product in this group suggests that these measures may nevertheless be a useful adaptation of the cigarette susceptibility measures in studying risk factors for initiation of other tobacco and alternative tobacco products in cross sectional studies. Furthermore, attributable risk % estimates were high for each product among the group of never users, suggesting that a substantial proportion of initiation (>60% across all products) can be attributed to susceptibility to use of that product.

Among youth with any history of tobacco use at W1, PPVs were higher (relative to never tobacco product users) – particularly for e-cigarettes, where nearly 70% of susceptible youth initiated use of e-cigarettes – but associations between each product-specific susceptibility measure and subsequent initiation of that product were weak and were not statistically significant for any product except cigarettes. These findings suggest that susceptibility is not an appropriate surrogate for future initiation of alternative tobacco products among youth who had used any other tobacco product at W1. Risk factors for susceptibility to a tobacco product are unlikely to be good predictors of initiation of that products among users of other products. Additionally, a low proportion of initiation of each product can be attributed to susceptibility to that product among youth who have used other tobacco products.

As an example of how well a risk factor for initiation might be identified based on the cross-sectional association with susceptibility, we examined how use of each tobacco product in the home was associated with susceptibility and with subsequent initiation. We observed a strong association between home use of each product and susceptibility to use of that

product among study participants who had not used any other product at W1, but not for those who had used another product at W1 (Supplemental Table 2); similar findings were observed for the association of home use of each product with subsequent onset of that product – significant increased odds of use among never users of any product, but not among those who had used another product. To date, this has not had a substantial impact on evaluation of risk factors because the population of never users has been far larger than the population of tobacco users, thereby weighting estimates of a combined sample closer to that of the population of never users (in which use of the susceptibility measure to estimate onset is valid).

Odds ratios, which evaluate the relative odds of initiation for one group vs. another, provide no information on the underlying absolute risks associated with susceptibility. Because the odds ratio for initiation of a product depends on the baseline prevalence of use, which is lower for non-users of other products, we speculated that the absolute risk difference in the rates of initiation of a product by susceptibility to that product might be similar among users and non-users of other products, even if the odds ratios were much higher among non-users (Noordzij et al., 2017). For cigarettes, for example, the absolute risk differences associated with baseline susceptibility among non-users and users of another product were 14.5% and 14.7% (from Table 3). However, this explanation for the difference in odds ratios was not consistent across products, as the susceptibility absolute risk differences for e-cigarettes and hookah, as well as the odds ratios, were much larger among never baseline users of other products. Additional research is needed to understand the reason for these different patterns of association.

The absolute risk difference is also useful because it can be directly applied to the population to estimate the number of new tobacco initiators that are attributed to a given exposure. In a population of approximately 1.5 million youth aged 15–17 in California (https://datacenter.kidscount.org/), for example, the risk difference for initiation of 21.9% between susceptible and non-susceptible persons among never users of e-cigarettes corresponds to approximately 328,500 new e-cigarette users that can be identified from the susceptibility measure among (the majority of) youth who had never used any other product.

This is the first study to report on the differential performance by tobacco use history of newly adapted measures of susceptibility to alternative tobacco products. Results indicate that analysis should generally be restricted to never tobacco product users if seeking to utilize susceptibility measures as a proxy for future use in the absence of prospective data. The study extends our understanding of the predictive value of the susceptibility to cigarette measures among never tobacco users compared to users of e-cigarettes or hookah (Barrington-Trimis et al, 2017). Estimates of the proportion of youth susceptible to each tobacco product were consistent with recent studies ((Bold et al., 2016; Cole et al., 2017). Patterns of predictive value of susceptibility to each product were also generally similar to those previously reported (Cole et al. 2017), although the positive predictive value tended to be higher in the current study for all products, and the prior work did not include a comparison of predictive value by baseline use and non-use of other products. Results were also consistent with another recent study investigating the association of the susceptibility to

e-cigarette use adapted measure with subsequent e-cigarette initiation in a sample restricted to never cigarette and never e-cigarette users at baseline (Bold et al. 2016).

The study is subject to some limitations. Because of the relatively low rates of cigarette smoking and use of combustible tobacco products in California relative to other geographic regions, the extent to which results are generalizable to youth in other areas is unclear. Further, we examined the validity of susceptibility measures among youth in grades 11/12 at W1, with follow up approximately 16 months later; results may not be generalizable to younger adolescents or to older young adults, or to studies assessing onset of tobacco use over shorter or longer periods of time. There are several variations in previous studies of the questions assessing susceptibility – particularly for combustible cigarette use – thus, the susceptibility questions we used may not produce identical prevalence and predictive value as other susceptibility measures. However, given the relatively consistent predictive value of variant measures of susceptibility to cigarettes in the historical literature, any differences due to variations in wording of alternative tobacco product susceptibility are not likely to markedly affect the pattern of results reported in the current study.

5. CONCLUSION

The associations between susceptibility measures and subsequent use for each tobacco product were large and statistically significant among adolescents who reported no prior history of tobacco use. However, among prior users of any other tobacco product, markedly attenuated, statistically non-significant associations with susceptibility were observed, demonstrating reduced utility for these measures in this population to estimate future initiation of a given product.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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HIGHLIGHTS

- Performance of the susceptibility index differed by use of other tobacco products

- Associations of susceptibility with initiation were stronger for never-tobacco-users

- Susceptibility measures may be inappropriate among users of other tobacco products
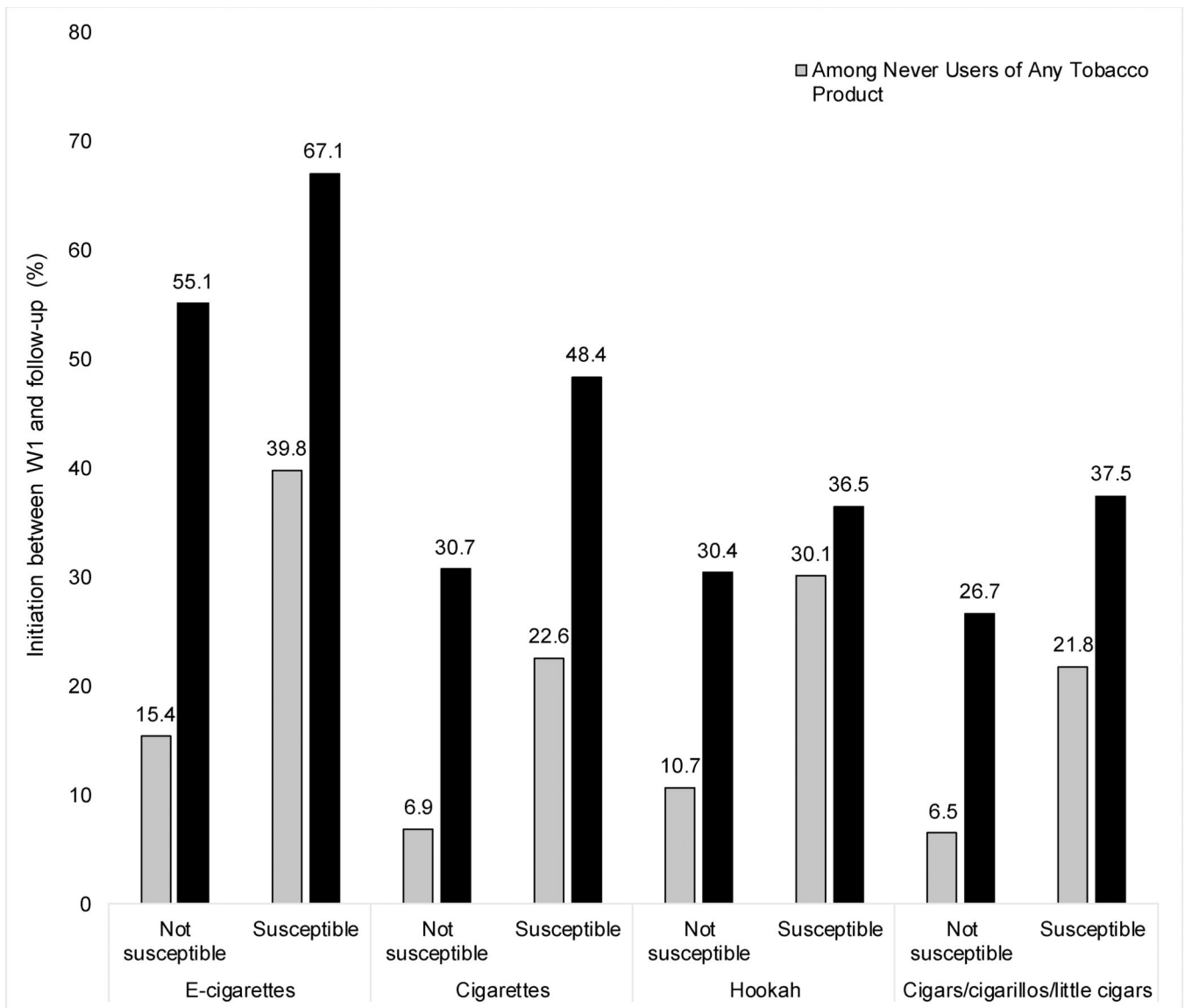
Figure 1.
Prevalence of initiation of e-cigarettes, cigarettes, hookah, and cigar/cigarillo/little cigars, stratified by susceptibility at W1, and by prior use of any product other than the initiation product at W1.

Table 1.

Demographic characteristics of participants

		N (%)
Gender		
	Female	801 (51.6)
	Male	752 (48.4)
	Hispanic White	758 (48.8)
	Non-Hispanic White	592 (38.1)
	Other	203 (13.1)
Parental Education		
	High school diploma/GED or lower	462 (29.7)
	Some college	548 (35.3)
	College degree or higher	446 (28.7)
	Missing	97 (6.2)
W1 Grade		
	10/11	887 (57.2)
	12	665 (42.8)

Table 2.

Analytic sample for each product, and prevalence of initiation (new onset) between W1 and W2 overall, among those who had never used any other product, and among those who had used another product

	Total N	Susceptibility at W1 N(%)	Initiation between W1 and W2 N(%)
E-CIGARETTES	1197	337 (28.4)	327 (28.1)
Used other products	199	77 (39.1)	114 (59.1)
Never used any other product	998	260 (26.3)	213 (21.9)
CIGARETTES	1293	320 (24.9)	208 (16.4)
Used other products	295	96 (32.7)	106 (36.8)
Never used any other product	998	224 (22.6)	102 (10.4)
HOOKAH	1145	326 (28.7)	201 (17.9)
Used other products	147	75 (51.4)	48 (33.3)
Never used any other product	998	251 (25.4)	153 (15.7)
CIGAR/CIGARILLO/LITTLE CIGARS	1365	354 (26.1)	207 (15.5)
Used other products	367	153 (41.8)	112 (31.2)
Never used any other product	998	201 (20.3)	95 (9.8)

Table 3.

Association of susceptibility indices for each product with future use of that product, stratified by W1 use of any tobacco product

	Odds Ratio (95% CI)[a]	Attributable Risk %[b]	Absolute risk difference (95%CI)[a]
E-cigarettes			
Among Never Users of Any Tobacco Product	3.64 (2.61, 5.09)	60.4%	21.9% (15.2, 28.6)
Among Users of At least 1 Tobacco Product	1.95 (0.98, 3.89)	19.8%	15.4% (0.2, 30.7)
Pvalue for test of difference[c]	0.016		
Cigarettes			
Among Never Users of Any Tobacco Product	3.72 (2.40, 5.77)	68.9%	14.5% (7.9, 21.2)
Among Users of At least 1 Tobacco Product	1.92 (1.12, 3.30)	34.4%	14.7% (2.2, 27.2)
Pvalue for test of difference[c]	0.076		
Hookah			
Among Never Users of Any Tobacco Product	3.68 (2.54, 5.33)	64.6%	18.3% (11.8, 24.8)
Among Users of At least 1 Tobacco Product	1.50 (0.64, 3.53)	12.4%	8.4% (−9.2, 26.0)
Pvalue for test of difference[c]	0.025		
Cigar/cigarillo/little cigars			
Among Never Users of Any Tobacco Product	3.90 (2.46, 6.19)	68.0%	8.5% (3.1, 14.0)
Among Users of At least 1 Tobacco Product	1.50 (0.92, 2.45)	24.4%	8.3% (−1.7, 18.3)
Pvalue for test of difference[c]	0.005		

[a] Adjusted for gender, race/ethnicity, parental education, and community

[b] Adjusted for gender and race/ethnicity

[c] P-value for interaction to assess difference in OR estimates among never users of any tobacco product and among users of at least one other product