




# Peer Crowd Identification and Adolescent Health Behaviors: Results From a Statewide Representative Study

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## Abstract

**Purpose.** Peer crowds are macro-level subcultures that share similarities across geographic areas. Over the past decade, dozens of studies have explored the association between adolescent peer crowds and risk behaviors, and how they can inform public health efforts. However, despite the interest, researchers have not yet reported on crowd size and risk levels from a representative sample, making it difficult for practitioners to apply peer crowd science to interventions. The current study reports findings from the first statewide representative sample of adolescent peer crowd identification and health behaviors. **Methods.** Weighted data were analyzed from the 2015 Virginia Youth Survey of Health Behaviors ( $n = 4,367$ ). Peer crowds were measured via the I-Base Survey™, a photo-based peer crowd survey instrument. Frequencies and confidence intervals of select behaviors including tobacco use, substance use, nutrition, physical activity, and violence were examined to identify high- and low-risk crowds. Logistic regression was used to calculate adjusted odds ratios for each crowd and behavior. **Results.** Risky behaviors clustered in two peer crowds. Hip Hop crowd identification was associated with substance use, violence, and some depression and suicidal behaviors. Alternative crowd identification was associated with increased risk for some substance use behaviors, depression and suicide, bullying, physical inactivity, and obesity. Mainstream and, to a lesser extent, Popular, identities were associated with decreased risk for most behaviors. **Conclusions.** Findings from the first representative study of peer crowds and adolescent behavior identify two high-risk groups, providing critical insights for practitioners seeking to maximize public health interventions by targeting high-risk crowds.

## Keywords

adolescent health risk behaviors, marijuana prevention, obesity prevention, peer crowds, suicide prevention, tobacco prevention

Adolescence is a transitional period marked by identity exploration and development as youth explore and define themselves (Brechwald & Prinstein, 2011; Erikson, 1994). During this critical time, adolescents establish lifelong health behaviors and are more likely to take risks (Steinberg, 2008), leading public health interventions to frequently target this age range.

Peer crowds have been used to conceptualize identity formation and behavior during adolescence. Described as “macro-level subcultures” with distinct beliefs, values, and norms, peer crowds transcend immediate friends, geography, and race/ethnicity (Moran, Walker, Alexander, Jordan, & Wagner, 2017; Sussman, Pokhrel, Ashmore, & Brown, 2007). This construct draws on social identity theory, which posits that individuals develop identity from their social crowds, to explain how peer crowds affect values, norms, and behaviors (Abrams & Hogg, 2006; Moran et al., 2017;

Sussman et al., 2007; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Rather than interactional peer groups with which an individual directly interfaces, peer crowds are cognitive constructs representing broader identities that provide youth with prototypes of norms as they strive for a stable social identity and a sense of self (Abrams & Hogg, 2006; Moran et al., 2017; Turner et al., 1987). Individuals may identify with multiple crowds; however, the stronger an individual identifies with a particular crowd, the more closely his

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or her beliefs, values, and behaviors will mirror those of the crowd (Abrams & Hogg, 2006; Berkowitz, 2005; Moran et al., 2017; Turner et al., 1987). As such, crowd identity can strongly affect youth's social environments and behaviors, indicating that peer crowds may be useful health intervention targets.

Although varying names are used in the literature, U.S. adolescent crowds generally include Mainstream (Brains, Academics, Normals, Homebody), Popular (Partiers, Preppy, Elites), Hip Hop (Urban, Gangsters), Alternative (Hipsters, Emos, Rockers, Deviants, Skaters), and Country (Moran et al., 2017; Sussman et al., 2007). Across studies, the Mainstream crowd demonstrates lower risk for many behaviors, while Alternative, Hip Hop, and Popular crowds demonstrate increased risk for various behaviors including tobacco and alcohol use, mental health concerns, or unhealthy eating patterns (Doomwaard, Branie, Meeus, & ter Bogt, 2012; Fallin, Neilands, Jordan, Hong, & Ling, 2015; Lee, Jordan, Djakaria, & Ling, 2014; Lisha, Jordan, & Ling, 2016; Moran et al., 2017; Sessa, 2007; Stapleton, Turrisi, & Hillhouse, 2008; Sussman et al., 2007). Though nonrepresentative, such findings indicate that peer crowds, through the beliefs and norms they foster, may have strong, distinct behavioral associations.

Within commercial marketing, audience segmentation, particularly psychographic segmentation, is widely accepted as an effective means of reaching a campaign's target (Tedlow & Jones, 2014). For example, tobacco industry marketing capitalizes on social identities by targeting psychographic groups like the Hip Hop and Hipster crowds, using strategies built on these subcultures' values and norms to influence tobacco uptake (Cruz, Wright, & Crawford, 2010; Hafez & Ling, 2006; Hendlin, Anderson, & Glantz, 2010). Much as commercial marketers use social identities to target campaigns, public health practitioners can use peer crowds to develop targeted interventions addressing the values and norms driving behavior.

Several examples of such application exist. Experiments have demonstrated the positive effects of peer crowd-targeted messaging on those in the targeted crowd, such as increased antismoking attitudes and decreased smoking susceptibility (Moran & Sussman, 2014, 2015). In the field, the "Commune" campaign in California targeted the emerging adult Hipster crowd, successfully decreasing its smoking rates (Ling et al., 2014; Ling & Jordan, 2011), while the "HAVOC" campaign in Oklahoma and New Mexico showed potential to reduce smoking among Partier crowd emerging adults exposed to the campaign (Fallin et al., 2015; Kalkhoran, Lisha, Neilands, Jordan, & Ling, 2016). The "Syke" campaign also demonstrated potential to reduce smoking among Alternative adolescents in Virginia (Jordan, Turner, & Djakaria, 2013), while nationally, the U.S. Food and Drug Administration utilizes peer crowd-targeting in its *Fresh Empire* tobacco education campaign for multicultural Hip Hop adolescents (<http://www.fda.gov/TobaccoProducts/PublicHealthEducation/>

[PublicEducationCampaigns/FreshEmpireCampaign/default.htm](http://www.fda.gov/TobaccoProducts/PublicHealthEducation/Campaigns/FreshEmpireCampaign/default.htm); Moran et al., 2017). These examples demonstrate that peer crowd targeting can improve an intervention's ability to reach its target audience and can increase efficiency by concentrating limited resources on high-risk subpopulations rather than on general audiences (Ling, Holmes, Jordan, Lisha, & Bibbins-Domingo, 2017).

Evidence of the association between crowd identification and health behaviors, and of commercial marketing's success using similar segmentation, supports health educators utilizing peer crowd targeting to segment audiences. However, it is difficult for practitioners to select target audiences and win funding for interventions without reliable measurements of crowd size and behavior. To date, no state or nationally representative studies of adolescent crowd identification and health behaviors have been reported. To this end, this study seeks to expand knowledge of crowd identification and risk by exploring, for the first time, representative data on peer crowds and various behaviors of interest to adolescent health practitioners and researchers, using data collected via the 2015 Virginia Youth Survey. This study also provides insight into select behaviors previously unreported in conjunction with crowd identity, such as suicide, bullying, dating violence, nutrition, and obesity.

## Methods

### *Virginia Youth Survey*

The biennial Youth Risk Behavior Survey (YRBS) is developed and administered nationally by the U.S. Centers for Disease Control and Prevention (CDC) to assess adolescent health behaviors. The YRBS is also administered locally by many U.S. states, providing states with a limited opportunity to supplement the standard questionnaire. In 2015, Virginia's YRBS, the Virginia Youth Survey (VYS), supplemented the standard YRBS questionnaire with a photo-based peer crowd measurement tool, the I-Base Survey™, to collect representative data on health behaviors and crowd identification. VYS administration followed standard YRBS methodology for sampling, school recruitment, and data collection (Brenner et al., 2013). Weighting followed YRBS procedures (Brenner et al., 2013; CDC, 2016) based on sex, race/ethnicity, and grade to adjust for nonresponse, and it was scaled to ensure that weighted estimates were representative of Virginia students in Grades 9 to 12. Data reported here are for high school students only, as the I-Base Survey was administered only to this population.

Eighty-three schools were selected systematically with probability proportional to enrollment in Grades 9 to 12. Following YRBS protocols, public and charter schools were included in the sample frame; private, alternative, vocational, and special education schools were excluded. All sampled schools participated, for a school response rate of 100.0%. Within a school, systematic equal probability sampling was

used to select classes for participation. Of the 6,206 sampled students, 5,195 (83.7%) returned the survey, and 4,367 students submitted questionnaires with usable data after cleaning including complete I-Base Survey data, for a student response rate of 70.4%. The resulting overall response rate for the survey was 70.4%. Within the final sample, question response rates ranged from 63.7% to 99.7%, with the majority above 90.0%.

The VYS study protocol was approved by the Virginia Department of Health institutional review board. Passive parental permission was obtained via a letter provided to parents/guardians prior to survey administration; parents/guardians signed and returned the letter only if they did not want their children to participate. A waiver of informed consent was obtained; however, students were informed that participation was voluntary and they could withdraw at any time.

### *Health Behavior Measurement*

Respondents answered questions regarding personal behaviors related to safety, violence, bullying, depression, suicide, tobacco use, alcohol use, illicit drug use, weight, nutrition, and physical activity. The 2015 VYS high school questionnaire is available at <http://www.vdh.virginia.gov/virginia-youth-survey/questionnaires-and-documentation/>. Select items are reported here to represent a cross-section of pressing adolescent health issues for researchers and practitioners across fields. Most questions required respondents to report whether or the number of times they had engaged in a behavior or experienced an event within a set timeframe (i.e., past 30 days or 12 months). Details of how responses were collapsed for reporting can be found in Tables 2 and 3.

### *Peer Crowd Measurement*

The I-Base Survey, created by Rescue Agency, draws on the Social Type Rating procedure of Brown, Herman, Hamm, and Heck (2008) to allow respondents to use self-identification and visual aids (i.e., photographs) to describe their peer crowds. This method has been used effectively across various locations and populations to identify consistent crowds with unique behaviors (Fallin et al., 2015; Lee et al., 2014; Ling et al., 2014; Rescue Social Change Group, 2008, 2010). Formative studies similar to those described by Lee et al. (2014) and Ling et al. (2014), including qualitative research with Virginia teens (Rescue Social Change Group, 2008, 2010), informed the 2015 VYS I-Base Survey. The VYS I-Base Survey included 80 photographs of anonymous youth representing five crowds. Photographs were evenly split by gender and represented a mix of races/ethnicities, ensuring that each crowd was represented by an equal number of photographs from a variety of races/ethnicities. Participants completed the I-Base Survey after the standard YRBS portion of the VYS. Respondents were asked to review the photographs and select six (three male and three female) who

would most fit in their main group of friends and six who would least fit.

Five peer crowds were measured: Hip Hop, Alternative, Mainstream, Popular, and Country. Figure 1 provides crowd descriptions and example images of adolescents who identify with each. When students selected a photograph as “best fit,” they received one point for the crowd that photograph represented. Similarly, when they selected a photograph as “least fit,” they were subtracted one point for the crowd that photograph represented. Based on this scoring, respondents were assigned a numeric score for each crowd from  $-6$  to  $6$ , with a positive score indicating identification with the crowd and a negative score indicating no identification. A respondent who did not select any photographs representing a particular peer crowd as best or least fit received a score of  $0$  for that crowd. Respondents were neither told what the photographs represented nor apprised of the crowd terminology used here, to avoid influencing selections.

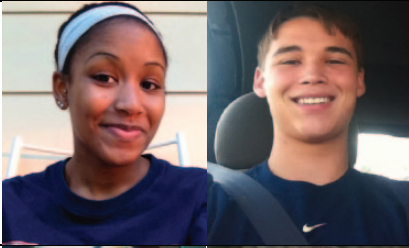



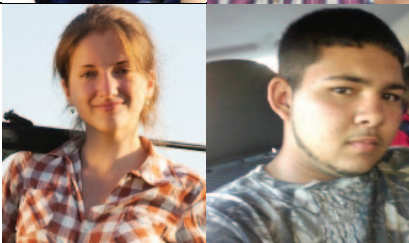
### *Data Analysis*

Table 1 presents weighted demographics for the full sample and for participants categorized by primary peer crowd. Primary peer crowd refers to a participant’s highest scoring crowd. Respondents who did not have a positive, nonzero score for any crowd, or who had a high score tied between crowds, were classified as “Indeterminate”; 16.7% of respondents received this classification. Chi-square tests of independence were conducted to examine if demographic differences across crowds were statistically significant.

Weighted frequencies for the full sample and for each primary peer crowd were examined to identify crowds at risk for each behavior, to identify efficient targets for intervention (Table 2). Statistically significant differences between each crowd and the full sample were calculated at 95.0%, 99.0%, and 99.9% confidence levels by determining standard error and multiplying by the critical value ( $z$ ) associated with the chosen confidence level. Two frequencies were considered significantly different if their confidence intervals (CIs) did not overlap.

Logistic regression was used to examine the association between identification and behavior, controlling for demographics. For regression models, peer crowd score from  $-6$  to  $6$  for all participants was used to quantify the change in risk associated with a 1-point increase in crowd identification. Unique models were created for each crowd and behavior, with crowd score as the independent variable, behavior as the dependent variable, and age, gender, and race/ethnicity as controls. Each regression was conducted on the full sample, allowing for examination of crowd identification as a spectrum rather than as a discrete category. Table 3 reports adjusted odds ratios (AOR) and 95% CI for the change in risk associated with a 1-point increase in crowd score. Regressions used the Complex Samples module of SPSS version 24 with weighted data (IBM Corp., Armonk, NY).



Peer Crowd	Sample Images Representing Crowd	Description
<b>Mainstream</b> Related terms: Brains, Academics, Normals, Homebody		<ul style="list-style-type: none"> <li>• Value family, faith, future goals</li> <li>• Do not seek external validation and place less value on social status</li> <li>• Perceived as friendly, approachable, and goal oriented</li> <li>• Often associated with academic performance</li> </ul>
<b>Popular</b> Related terms: Partiers, Preppy, Elites		<ul style="list-style-type: none"> <li>• Highly value social status and external validation</li> <li>• Possess extended networks of friends and acquaintances</li> <li>• Place high importance on appearance and style</li> <li>• Prefer pop and dance music</li> </ul>
<b>Hip Hop</b> Related terms: Urban, Gangsters		<ul style="list-style-type: none"> <li>• Often feel they have to overcome life struggles to succeed</li> <li>• Value authenticity, confidence, and respect</li> <li>• Distinct clothing and style, used as status symbol</li> <li>• Prefer hip hop and rap music</li> </ul>
<b>Alternative</b> Related terms: Hipsters, Emos, Rockers, Deviants, Skaters		<ul style="list-style-type: none"> <li>• Take pride in being different from most adolescents; use physical appearance to demonstrate uniqueness</li> <li>• Value individuality, creativity, art</li> <li>• Prefer alternative or punk rock music</li> </ul>
<b>Country</b>		<ul style="list-style-type: none"> <li>• Value their communities and families</li> <li>• Believe in tradition, patriotism, hard work</li> <li>• Enjoy outdoor activities including hunting, fishing, “mudding” trucks</li> <li>• Prefer country music</li> </ul>

**Figure 1.** U.S. adolescent peer crowd sample images and characteristics.

## Results

Table 1 presents demographics for the full sample and for each primary peer crowd. The largest crowd was Popular (35.3%), followed by Mainstream (19.8%). All demographic characteristics differed significantly across crowds (all  $p < 0.001$ ).

Table 2 summarizes frequencies overall and by primary peer crowd. Compared with the full sample, primarily Mainstream adolescents reported significantly lower rates of almost all risk behaviors, while primarily Popular adolescents reported lower rates of some behaviors including suicidal intentions and attempts, and physical inactivity. In

contrast, primarily Hip Hop adolescents reported significantly higher rates of most behaviors including substance use, suicidal intentions and attempts, physical violence, and physical inactivity. Similarly, primarily Alternative adolescents reported significantly higher rates of several behaviors including some tobacco and drug use, experiences of bullying, symptoms of depression, suicidal intentions and attempts, feelings of being unsafe at school, and physical inactivity. While generally at lower risk than primarily Hip Hop and primarily Alternative adolescents, primarily Country adolescents did report increased rates of smokeless tobacco use, carrying a weapon, and obesity.

**Table 1.** Weighted Sample Characteristics Overall and by Peer Crowd, 2015 Virginia Youth Survey.

Characteristic	Full sample (N = 330,890), %	Mainstream (N = 65,483), %	Popular (N = 116,909), %	Country (N = 24,552), %	Alternative (N = 19,181), %	Hip Hop (N = 49,660), %	Indeterminate (N = 55,105), %
Total	—	19.8	35.3	7.4	5.8	15.0	16.7
Gender***							
Female	50.8	57.3	45.9	33.2	61.4	57.5	51.5
Age***							
14 years old or younger	20.1	23.0	19.1	25.1	22.9	14.0	20.5
15 years old	27.1	29.8	28.5	21.7	27.5	24.6	25.2
16 years old	23.6	24.7	22.9	25.0	24.3	26.5	20.4
17 years old	23.1	17.9	23.3	25.1	22.4	25.3	26.6
18 years old or older	6.2	4.6	6.3	3.1	2.9	9.6	7.3
Race/ethnicity***							
Hispanic/Latino	11.8	11.4	12.4	5.4	11.7	13.1	12.5
Non-Hispanic African American	21.0	17.8	10.7	6.3	5.9	59.3	24.7
Non-Hispanic White	55.3	54.4	67.5	83.1	70.7	15.0	48.8
Non-Hispanic Asian	4.6	9.9	3.5	1.7	2.2	1.2	6.0
Non-Hispanic Native Hawaiian or Other Pacific Islander	0.4	0.6	0.2	0.4	0.6	0.2	0.4
Non-Hispanic American Indian or Alaska Native	0.5	0.2	0.9	0.0	0.5	0.7	0.4
Non-Hispanic Multiple Races	6.3	5.7	4.8	3.0	8.4	10.7	7.4

Note. Chi-square test of independence conducted for each demographic characteristic.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 3 reports AOR and 95% CI for each crowd and behavior. Results corroborate the frequency analysis, identifying Hip Hop and Alternative crowds as generally associated with increased risk, and Mainstream and Popular crowds with decreased risk. In particular, a 1-point increase in Hip Hop score was associated with a 45% increase in odds of marijuana use (95% CI = 1.35, 1.56); 43% increase in odds of waterpipe use (95% CI = 1.29, 1.59); 39% increase in odds of cigar product use (95% CI = 1.25, 1.53); and 22% increase in odds of cigarette use (95% CI = 1.12, 1.34). For Alternative, the largest AORs were observed for depression and suicidal behaviors, including a 30% increase in odds of attempting suicide in the past year (95% CI = 1.22, 1.39); 30% increase in odds of seriously considering suicide in the past year (95% CI = 1.25, 1.36); and 29% increase in odds of feeling sad or hopeless (95% CI = 1.24, 1.34).

## Discussion

Results demonstrate strong associations between peer crowd identification and risk behaviors among Virginia adolescents. In particular, Alternative identification was associated with depression, suicidal ideation and actions, physical inactivity, bullying, and some substance use. Similarly, Hip Hop

identification was associated with increased risk for almost all substances, in addition to violence and some suicide measures. In contrast, Mainstream and, to a lesser degree, Popular identities were associated with lower risk for most behaviors. These findings, summarized in Table 4, indicate that certain crowds are at higher risk, corroborating and expanding on similar associations previously reported in nonrepresentative studies (Doornwaard et al., 2012; Lisha et al., 2016; Moran et al., 2017; Sussman et al., 2007). This evidence supports the conclusion that peer crowd identities are associated with certain risk behaviors, and they may provide an effective target for interventions.

As reported elsewhere, considerations of crowd values and beliefs provide insight into how crowd identification may shape behavior, leading to concentrations of risk in particular crowds, such as Hip Hop and Alternative reported here (Moran et al., 2017; Sussman et al., 2007). In this way, seemingly disconnected behaviors may become intertwined with one another and the social identity shared by a crowd. The interconnectedness of risk behaviors presents an opportunity to create meaningful change by addressing the underlying values and beliefs fueling the targeted behavior as well as other behaviors associated with each crowd.

**Table 2.** Frequency of Select Self-Reported Health Behaviors, Overall and by Primary Peer Crowd, 2015 Virginia Youth Survey Weighted Sample.

Behavior	Full sample (N = 330,890), %	Mainstream (N = 65,483), %	Popular (N = 116,909), %	Country (N = 24,552), %	Alternative (N = 19,181), %	Hip Hop (N = 49,660), %	Indeterminate (N = 55,105), %
<b>Tobacco<sup>a</sup></b>							
Currently used any tobacco	22.1	<b>7.9***</b>	23.1	28.9	<b>34.1*</b>	<b>36.3***</b>	16.7
Currently smoked cigarettes	7.9	<b>2.8**</b>	8.1	6.6	<b>20.8***</b>	12.5	6.0
Currently used smokeless tobacco	5.0	<b>0.2***</b>	6.5	<b>15.4***</b>	2.0	5.5	3.2
Currently smoked cigars, cigarillos, or little cigars	6.9	<b>2.3*</b>	6.5	6.6	7.0	<b>15.4***</b>	5.6
Currently used electronic vapor products	16.3	<b>5.1***</b>	16.7	20.0	25.4	<b>28.5***</b>	12.8
Currently used waterpipe to smoke tobacco	6.5	<b>0.9***</b>	5.8	4.4	6.0	<b>18.2***</b>	5.3
<b>Alcohol<sup>a</sup></b>							
Currently drank alcohol	24.1	<b>11.7***</b>	28.0	22.4	31.4	<b>34.1**</b>	20.9
Drank five or more drinks of alcohol in a row in the past 30 days	11.2	<b>3.2***</b>	14.0	11.4	13.8	<b>17.2*</b>	9.0
Rode with driver who had been drinking alcohol in the past 30 days	15.2	<b>9.5*</b>	15.4	11.9	17.1	<b>23.1**</b>	15.2
<b>Other drugs<sup>a</sup></b>							
Currently used marijuana	15.8	<b>5.9***</b>	15.3	<b>6.2*</b>	15.0	<b>34.2***</b>	16.9
Currently took prescription drug without doctor's prescription	7.5	<b>1.8***</b>	7.0	7.7	11.2	<b>14.7**</b>	7.1
Currently took OTC drugs to get high	4.2	<b>0.6**</b>	2.8	2.6	<b>11.6**</b>	<b>10.6**</b>	3.9
<b>Bullying<sup>b</sup></b>							
Were bullied on school property in the past year	20.0	19.6	20.0	21.9	<b>38.0***</b>	14.2	18.9
Were bullied electronically in the past year	14.3	11.8	15.6	11.8	<b>28.2***</b>	12.8	12.4
<b>Depression and suicide<sup>b</sup></b>							
Felt sad or hopeless most days for 2 weeks or longer in the past year	27.0	23.6	22.1	25.1	<b>62.5***</b>	33.1	24.7
Seriously considered attempting suicide in the past year	14.2	12.4	<b>9.4**</b>	14.6	<b>39.5***</b>	18.0	14.5
Made a plan about how to attempt suicide in the past year	12.0	9.3	<b>8.1*</b>	12.0	<b>34.5***</b>	<b>17.4*</b>	11.3

(continued)

Table 2. (continued)

Behavior	Full sample (N = 330,890), %	Mainstream (N = 65,483), %	Popular (N = 116,909), %	Country (N = 24,552), %	Alternative (N = 19,181), %	Hip Hop (N = 49,660), %	Indeterminate (N = 55,105), %
Attempted suicide in the past year	6.5	3.9	<b>3.8*</b>	6.1	<b>17.8***</b>	<b>11.2*</b>	7.8
Safety and violence							
Did not go to school due to feeling unsafe at school or on way to or back from school in the past 30 days <sup>a</sup>	5.3	2.4	3.8	2.2	<b>12.3*</b>	9.1	6.9
Were threatened or injured with a weapon on school property in the past year <sup>b</sup>	5.3	2.9	5.1	7.2	<b>13.2**</b>	6.8	3.9
Carried a weapon in the past 30 days <sup>a</sup>	15.3	<b>8.0***</b>	14.1	<b>42.9***</b>	19.7	13.5	14.5
Were in a physical fight in the past year <sup>b</sup>	19.7	<b>8.5***</b>	20.2	22.8	19.5	<b>33.3***</b>	18.2
Experienced physical dating violence in the past year <sup>b</sup>	10.2	7.1	8.4	5.1	15.9	<b>17.0*</b>	8.8
Physical activity and nutrition							
Watched TV for 3 or more hours per day <sup>c</sup>	23.7	17.3	20.6	25.3	26.6	<b>36.1***</b>	24.3
Played video or computer games or used computer for 3 or more hours per day <sup>c</sup>	42.2	46.8	36.3	38.9	<b>63.3***</b>	45.7	40.2
Did not participate in at least 60 minutes of physical activity on at least 1 day in the past 7 days <sup>d</sup>	16.0	16.0	<b>9.7**</b>	16.8	<b>25.3*</b>	<b>23.1*</b>	19.5
Played on at least one sports team in the past year <sup>b</sup>	57.3	<b>48.9*</b>	<b>72.2***</b>	<b>40.4**</b>	<b>30.1***</b>	50.8	58.4
Drank a can, bottle, or glass of sugar-sweetened beverage in the past 7 days <sup>e</sup>	17.8	13.0	19.0	24.5	16.7	21.9	14.2
Did not eat fruit or drink 100% fruit juices in the past 7 days <sup>d</sup>	6.5	6.1	5.1	<b>11.0*</b>	10.4	8.3	4.7
Ate breakfast on all 7 days of the past week <sup>f</sup>	38.2	42.4	43.2	37.0	<b>18.5***</b>	<b>27.4**</b>	38.9
Obesity <sup>g</sup>							
Were obese	12.9	10.4	9.3	<b>28.0***</b>	20.2	14.7	13.4

Note. OTC = over-the-counter; BMI = body mass index; CDC = Centers for Disease Control and Prevention.

<sup>a</sup>Proportion of participants who engaged in the behavior on one or more of the past 30 days. <sup>b</sup>Proportion of participants who engaged in the behavior at least once in the past year. <sup>c</sup>Proportion of participants who engaged in the behavior for 3 or more hours per day. <sup>d</sup>Proportion of participants who did not engage in the behavior at all in the past 7 days. <sup>e</sup>Proportion of participants who engaged in the behavior at least once in the past 7 days. <sup>f</sup>Proportion of participants who engaged in the behavior on all 7 of the past 7 days. <sup>g</sup>Proportion of participants who, based on BMI calculated using standard formula and self-reported height and weight, were at or above 95th percentile for BMI based on age- and sex-specific reference data from 2000 CDC growth charts. P-value was calculated for each primary peer crowd compared with full sample. Values in bold indicate significant difference from full sample.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Table 3.** Adjusted Odds Ratios for Select Self-Reported Health Behaviors by Peer Crowd Score, 2015 Virginia Youth Survey Weighted Sample.

Behavior	Mainstream (N = 267,898), AOR (95% CI)	Popular (N = 308,606), AOR (95% CI)	Country (N = 222,835), AOR (95% CI)	Alternative (N = 318,492), AOR (95% CI)	Hip Hop (N = 268,190), AOR (95% CI)
<b>Tobacco<sup>a</sup></b>					
Currently used any tobacco	<b>0.60 (0.55, 0.65)</b>	0.99 (0.94, 1.04)	0.93 (0.86, 1.00)	1.06 (1.00, 1.11)	<b>1.28 (1.18, 1.39)</b>
Currently smoked cigarettes	<b>0.57 (0.49, 0.66)</b>	0.90 (0.81, 1.00)	<b>0.83 (0.75, 0.92)</b>	<b>1.17 (1.09, 1.26)</b>	<b>1.22 (1.12, 1.34)</b>
Currently used smokeless tobacco	<b>0.53 (0.46, 0.61)</b>	1.04 (0.93, 1.15)	1.11 (0.94, 1.31)	0.99 (0.92, 1.07)	<b>1.22 (1.06, 1.39)</b>
Currently smoked cigars, cigarillos, or little cigars	<b>0.58 (0.50, 0.67)</b>	0.96 (0.86, 1.06)	0.88 (0.76, 1.02)	1.01 (0.95, 1.09)	<b>1.39 (1.25, 1.53)</b>
Currently used electronic vapor products	<b>0.61 (0.55, 0.67)</b>	0.99 (0.93, 1.06)	0.93 (0.85, 1.01)	1.06 (1.00, 1.12)	<b>1.26 (1.15, 1.38)</b>
Currently used waterpipe to smoke tobacco	<b>0.57 (0.48, 0.67)</b>	0.91 (0.83, 1.01)	<b>0.85 (0.77, 0.94)</b>	1.04 (0.97, 1.11)	<b>1.43 (1.29, 1.59)</b>
<b>Alcohol<sup>a</sup></b>					
Currently drank alcohol	<b>0.73 (0.67, 0.79)</b>	1.06 (0.99, 1.13)	<b>0.92 (0.85, 0.99)</b>	1.00 (0.95, 1.05)	<b>1.26 (1.19, 1.35)</b>
Drank five or more drinks of alcohol in a row in the past 30 days	<b>0.67 (0.60, 0.75)</b>	1.05 (0.96, 1.14)	0.90 (0.82, 1.00)	1.01 (0.95, 1.07)	<b>1.27 (1.17, 1.38)</b>
Rode with driver who had been drinking alcohol in the past 30 days	<b>0.75 (0.69, 0.82)</b>	0.99 (0.94, 1.05)	0.93 (0.85, 1.01)	1.03 (0.99, 1.07)	<b>1.18 (1.10, 1.26)</b>
<b>Other drugs<sup>a</sup></b>					
Currently used marijuana	<b>0.63 (0.58, 0.69)</b>	1.01 (0.94, 1.10)	<b>0.75 (0.69, 0.82)</b>	1.02 (0.97, 1.07)	<b>1.45 (1.35, 1.56)</b>
Currently took prescription drug without doctor's prescription	<b>0.53 (0.45, 0.61)</b>	0.93 (0.84, 1.03)	<b>0.83 (0.74, 0.93)</b>	<b>1.11 (1.02, 1.20)</b>	<b>1.34 (1.22, 1.47)</b>
Currently took OTC drugs to get high	<b>0.49 (0.42, 0.58)</b>	<b>0.80 (0.69, 0.92)</b>	<b>0.74 (0.64, 0.85)</b>	<b>1.22 (1.12, 1.34)</b>	<b>1.35 (1.19, 1.52)</b>
<b>Bullying<sup>b</sup></b>					
Were bullied on school property in the past year	0.91 (0.83, 1.00)	<b>0.93 (0.88, 0.98)</b>	0.98 (0.90, 1.06)	<b>1.11 (1.07, 1.15)</b>	0.97 (0.92, 1.02)
Were bullied electronically in the past year	<b>0.83 (0.75, 0.92)</b>	0.95 (0.88, 1.03)	0.91 (0.82, 1.01)	<b>1.10 (1.05, 1.15)</b>	1.07 (0.99, 1.14)
<b>Depression and suicide<sup>b</sup></b>					
Felt sad or hopeless most days for 2 weeks or longer in the past year	<b>0.81 (0.76, 0.87)</b>	<b>0.82 (0.77, 0.87)</b>	<b>0.82 (0.76, 0.89)</b>	<b>1.29 (1.24, 1.34)</b>	1.02 (0.97, 1.07)
Seriously considered attempting suicide in the past year	<b>0.86 (0.79, 0.95)</b>	<b>0.74 (0.69, 0.80)</b>	<b>0.85 (0.79, 0.92)</b>	<b>1.30 (1.25, 1.36)</b>	0.99 (0.92, 1.08)
Made a plan about how to attempt suicide in the past year	<b>0.85 (0.77, 0.94)</b>	<b>0.75 (0.69, 0.82)</b>	<b>0.85 (0.78, 0.92)</b>	<b>1.29 (1.22, 1.36)</b>	1.02 (0.95, 1.09)
Attempted suicide in the past year	<b>0.78 (0.66, 0.92)</b>	<b>0.77 (0.67, 0.88)</b>	<b>0.79 (0.68, 0.92)</b>	<b>1.30 (1.22, 1.39)</b>	1.00 (0.91, 1.11)
<b>Safety and violence</b>					
Did not go to school due to feeling unsafe at school or on way to or back from school in the past 30 days <sup>a</sup>	<b>0.65 (0.56, 0.76)</b>	0.90 (0.78, 1.03)	0.92 (0.79, 1.07)	<b>1.17 (1.09, 1.26)</b>	1.09 (0.98, 1.21)

(continued)



**Table 3. (continued)**

Behavior	Mainstream (N = 267,898), AOR (95% CI)	Popular (N = 308,606), AOR (95% CI)	Country (N = 222,835), AOR (95% CI)	Alternative (N = 318,492), AOR (95% CI)	Hip Hop (N = 268,190), AOR (95% CI)
Were threatened or injured with a weapon on school property in the past year <sup>b</sup>	<b>0.69 (0.57, 0.84)</b>	<b>0.87 (0.77, 0.98)</b>	0.96 (0.83, 1.12)	<b>1.18 (1.10, 1.27)</b>	1.06 (0.97, 1.15)
Carried a weapon in the past 30 days <sup>a</sup>	<b>0.71 (0.65, 0.78)</b>	<b>0.89 (0.84, 0.95)</b>	<b>1.19 (1.09, 1.31)</b>	<b>1.09 (1.03, 1.16)</b>	1.03 (0.96, 1.11)
Were in a physical fight in the past year <sup>b</sup>	<b>0.69 (0.64, 0.74)</b>	0.97 (0.90, 1.04)	0.93 (0.87, 1.00)	1.05 (0.99, 1.11)	<b>1.22 (1.14, 1.31)</b>
Experienced physical dating violence in the past year <sup>b</sup>	<b>0.78 (0.66, 0.92)</b>	<b>0.89 (0.81, 0.98)</b>	<b>0.82 (0.71, 0.96)</b>	<b>1.13 (1.05, 1.21)</b>	<b>1.14 (1.07, 1.21)</b>
Physical activity and nutrition					
Watched TV for 3 or more hours per day <sup>c</sup>	<b>0.84 (0.78, 0.91)</b>	<b>0.94 (0.90, 0.99)</b>	0.98 (0.92, 1.05)	<b>1.06 (1.03, 1.11)</b>	1.06 (1.00, 1.11)
Played video or computer games or used computer for 3 or more hours per day <sup>c</sup>	1.02 (0.95, 1.10)	<b>0.87 (0.82, 0.93)</b>	<b>0.92 (0.85, 0.98)</b>	<b>1.14 (1.10, 1.19)</b>	0.99 (0.94, 1.04)
Did not participate in at least 60 minutes of physical activity on at least 1 day in the past 7 days <sup>d</sup>	0.98 (0.90, 1.08)	<b>0.82 (0.77, 0.88)</b>	0.97 (0.90, 1.05)	<b>1.16 (1.11, 1.21)</b>	0.98 (0.92, 1.04)
Played on at least one sports team in the past year <sup>b</sup>	1.04 (0.98, 1.11)	<b>1.40 (1.32, 1.49)</b>	1.02 (0.95, 1.10)	<b>0.77 (0.73, 0.80)</b>	<b>1.05 (1.01, 1.10)</b>
Drank a can, bottle, or glass of sugar-sweetened beverage in the past 7 days <sup>e</sup>	<b>0.86 (0.79, 0.93)</b>	1.03 (0.96, 1.10)	0.99 (0.93, 1.06)	1.00 (0.96, 1.05)	1.05 (1.00, 1.10)
Did not eat fruit or drink 100% fruit juices in the past 7 days <sup>d</sup>	0.90 (0.79, 1.03)	<b>0.80 (0.72, 0.89)</b>	<b>1.14 (1.02, 1.27)</b>	1.08 (0.99, 1.18)	1.02 (0.92, 1.12)
Ate breakfast on all 7 days of the past week <sup>f</sup>	<b>1.15 (1.08, 1.23)</b>	<b>1.10 (1.04, 1.16)</b>	<b>1.07 (1.02, 1.12)</b>	<b>0.90 (0.87, 0.94)</b>	<b>0.93 (0.88, 0.97)</b>
Obesity <sup>g</sup>					
Were obese	0.89 (0.78, 1.01)	<b>0.85 (0.78, 0.93)</b>	<b>1.17 (1.07, 1.28)</b>	<b>1.09 (1.03, 1.15)</b>	0.96 (0.90, 1.02)

Note. AOR = adjusted odds ratio; CI = confidence interval; OTC = over-the-counter; BMI = body mass index; CDC = Centers for Disease Control and Prevention. Values in bold indicate significant AOR.

<sup>a</sup>Proportion of participants who engaged in the behavior on one or more of the past 30 days. <sup>b</sup>Proportion of participants who engaged in the behavior at least once in the past year. <sup>c</sup>Proportion of participants who engaged in the behavior for 3 or more hours per day. <sup>d</sup>Proportion of participants who did not engage in the behavior at all in the past 7 days. <sup>e</sup>Proportion of participants who engaged in the behavior at least once in the past 7 days. <sup>f</sup>Proportion of participants who engaged in the behavior on all 7 of the past 7 days. <sup>g</sup>Proportion of participants who, based on BMI calculated using standard formula and self-reported height and weight, were at or above 95th percentile for BMI based on age- and sex-specific reference data from 2000 CDC growth charts.

In contrast to commercial marketing that utilizes targeted psychographic audience segmentation (Tedlow & Jones, 2014), public health education often employs general approaches to reach the largest audience possible (Noar, 2006), even if only a small portion of those reached are at risk. Mass media approaches, however, are unlikely to persuade high-risk crowds because they do not use characters or leverage values relatable to at-risk adolescents (Moran et al., 2017). Practitioners can utilize peer crowd segmentation to

address this issue and spend intervention funds efficiently by focusing efforts on at-risk subgroups (Ling et al., 2017). For example, given the higher rate of marijuana use among Hip Hop adolescents (34.2%) compared with the general population (15.8%) reported here, a marijuana prevention campaign could be twice as efficient with its media spending by incorporating Hip Hop values and beliefs to deliver a targeted message. Peer crowd segmentation of health education efforts thus offers an opportunity to increase efficiency by

**Table 4.** Summary of Adolescent Health Risk Behavior Findings by Peer Crowd, 2015 Virginia Youth Survey.

Topic	Mainstream	Popular	Country	Alternative	Hip Hop
Tobacco	Decreased risk of all behaviors	—	Increased risk of smokeless tobacco use; decreased risk of cigarette and waterpipe use	Increased risk of cigarette use	Increased risk of tobacco use, especially cigar product, electronic vapor product, and waterpipe use
Alcohol	Decreased risk of all behaviors	—	Decreased risk of current alcohol consumption	—	Increased risk of all behaviors
Other drugs	Decreased risk of all behaviors	Decreased risk of OTC drug use	Decreased risk of marijuana, prescription drug, and OTC drug use	Increased risk of prescription and OTC drug use	Increased risk of marijuana, prescription drug, and OTC drug use
Bullying	Decreased risk of experiencing bullying	Decreased risk of experiencing bullying	—	Increased risk of experiencing bullying	—
Depression and suicide	Decreased risk of most behaviors	Decreased risk of most behaviors	Decreased risk of most behaviors	Increased risk of all behaviors	Increased risk of making a suicide plan and attempting suicide in the past year
Safety and violence	Decreased risk of all behaviors	Decreased risk of being threatened or injured with a weapon at school, carrying a weapon, and experiencing dating violence	Increased risk of carrying a weapon; decreased risk of experiencing dating violence	Increased risk of skipping school due to feeling unsafe, being threatened or injured with a weapon at school, carrying a weapon, and experiencing dating violence	Increased risk of engaging in physical fights and experiencing dating violence
Physical activity and nutrition	Decreased risk of sedentary behavior and unhealthy eating habits	Decreased risk of sedentary behavior and unhealthy eating habits	Increased risk of not consuming fruit or 100% fruit juice in previous week; more likely to eat breakfast daily	Increased risk of sedentary behavior; less likely to eat breakfast daily	Less likely to eat breakfast daily
Obesity	—	Decreased risk of obesity	Increased risk of obesity	Increased risk of obesity	—

Note. OTC = over-the-counter.

most expediently reaching those at risk (Ling et al., 2017). Evaluated peer crowd-targeted campaigns further demonstrate that a peer crowd approach can affect behavior change efficiently (Fallin et al., 2015; Kalkhoran et al., 2016; Ling et al., 2014; Ling & Jordan, 2011).

### Limitations

While this study provides insightful data, there are several limitations worth noting. First, the 2015 VYS methodology has inherent limitations. The survey relies on self-report, which may lead to under- or overreporting. Data are limited

to Virginia and may not reflect trends in other states, the United States, or other countries; however, results do demonstrate the utility of crowd identification as a tool for researchers and practitioners and can serve as a basis for work in other contexts. Additionally, due to the school sampling process, adolescents who have dropped out of school or attend alternative or private schools are not reflected. Previous research demonstrates that peer networks influence academic engagement (Heaven, Ciarrochi, & Vialle, 2008; Ryan, 2001), which may lead to underrepresentation of high-risk crowds in school-based studies due to school disengagement and dropout. Furthermore, many risk behaviors are more

common among adolescents who have dropped out of school (Lanza & Huang, 2015; Tice, 2013; Townsend, Flisher, & King, 2007); thus, the omission of this population could lead to an underestimation of risk.

Second, there is not currently a validated method for peer crowd measurement (Cross & Fletcher, 2009). However, the I-Base Survey has been utilized in numerous studies with youth and emerging adults (Fallin et al., 2015; Jordan et al., 2013; Kalkhoran et al., 2016; Ling et al., 2014; Ling et al., 2017; Lisha et al., 2016) and has demonstrated effectiveness and consistency in identifying crowds. Future research is needed to validate the I-Base Survey and compare it with other methods of crowd measurement. Additionally, the crowds reported here are broader than those recorded by some methods. Although niche crowds reported in some studies may represent subgroups of broad, generalizable crowds (Moran et al., 2017), research comparing results across different methods is warranted to confirm assumptions and to potentially identify crowds not currently reflected in broader categorizations.

Third, only current behaviors and crowd identity can be assessed due to this study's cross-sectional nature, precluding assessment of causality. The current method also cannot account for changes in an individual's crowd identity over time or the consequent effects on behavior. Similarly, although crowd identity may more accurately be conceptualized as a continuum (Moran et al., 2017), frequencies reported here categorize crowds as mutually exclusive, to guide identification of efficient targets for intervention (Ling et al., 2017). The use of logistic regression in this study begins to address this limitation, as participants were not placed into mutually exclusive crowds for regressions.

Finally, while regression models controlled for demographics, factors not measured in this study such as personality, parental relationships, cultural upbringing, home environment, and socioeconomic status may interact with peer crowd identification to affect behavior. Such factors may even affect the crowds youth seek. For instance, an adolescent who feels misunderstood at home may relate to Alternative adolescents who share similar feelings of being outsiders, making crowd identification an intermediary step between childhood influences and adolescent behavior. Within the limits of this study, it is difficult to state how much of behavior is influenced by crowds compared with other factors. However, it is theorized that peer crowds as social identities transcend many of these factors (Moran et al., 2017), and so they remain an important influence on behavior.

### **Implications**

This study indicates that adolescent peer crowd identities are associated with risky health behaviors, and as such, should be a key measure in future health behavior research. By including a tool such as the I-Base Survey in future studies,

researchers may succeed in identifying not only at-risk subpopulations but also effective avenues of intervention appropriate for at-risk crowds. In addition to research validating a crowd measurement tool, a nationally representative study of adolescent behaviors and crowds is needed to examine national trends and crowd sizes, and could be used to develop national interventions. To ensure that targeted campaigns resonate with intended audiences, research into the values, beliefs, and message reception of high-risk crowds is also necessary. Finally, a longitudinal study of the emergence of an individual's crowd identity, changes over time, and risk behaviors would illuminate how these factors interact throughout adolescence and emerging adulthood. Such research could provide further insight into how crowds influence behaviors and how interventions can effectively leverage a targeted approach.

This study also provides guidance for practitioners seeking to develop targeted interventions for high-risk adolescents. Given the unique values and beliefs of peer crowds, identification of high-risk crowds such as Hip Hop and Alternative allows practitioners to develop interventions that link the crowd's values to behavior change, utilize relatable messengers, and are disseminated in ways most likely to reach the targeted crowd (Moran et al., 2017). Successful approaches used in the "Commune," "Havoc," and "Syke" peer crowd-targeted interventions (Fallin et al., 2015; Jordan et al., 2013; Ling et al., 2014) can be adapted to the values and behaviors of at-risk adolescent crowds, for example, to address substance use among Hip Hop youth or mental health issues among Alternative youth. Combined with research on crowd risks, values, beliefs, and message reception, peer crowd-targeted interventions may provide an efficient means of achieving behavior change with the most at-risk adolescents.

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