



## Youth peer crowds and risk of cigarette use: The effects of dual peer crowd identification among hip hop youth<sup>☆</sup>

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### ABSTRACT

**Introduction:** Recent research has found that the Hip Hop peer crowd has a strong link to risky health behaviors, including tobacco use. The current study expands on previous research on the Hip Hop peer crowd by investigating the nuances of the effects on cigarette risk that Hip Hop identification has in combination with other peer crowds.

**Methods:** Targeted social media advertisements were used to recruit youth to complete an online survey. Participants ( $n = 4681$ ) self-reported peer crowd identification via the I-Base Survey™, and cigarette smoking status. Smoking status was compared between peer crowd groups consisting of participants who had identification with only one peer crowd, and those who had identification with the Hip Hop peer crowd and one other crowd (i.e., Hip Hop dual peer crowd identification).

**Results:** Significant differences in cigarette status were observed among the dual and single peer crowd groups. Specifically, differences in cigarette Non-susceptible Non-triers and Experimenters demonstrated that youth who identified as Mainstream Only were at lowest risk while youth who identified as Hip Hop/Alternative had the highest rates of cigarette experimentation. There were no differences between peer crowd groups on proportions of Susceptible Non-triers.

**Conclusions:** Examining dual peer crowd identifications provides a nuanced understanding of risk. Dual identification with Hip Hop seems to have differential effects compared to solo identification with other crowds, whereby Hip Hop identification may increase cigarette experimentation when combined with another peer crowd. Findings demonstrate the potential of considering multiple peer crowd identification to inform public education campaign development.

## 1. Introduction

### 1.1. Fresh Empire

To reduce the extensive burden tobacco inflicts on public health in the United States (DHHS, 2014), The Family Smoking Prevention and Tobacco Control Act (TCA) granted the Food and Drug Administration (FDA) the authority to regulate tobacco products and educate the public about the dangers of tobacco use. To accomplish its mission, FDA has employed a comprehensive public education strategy by investing in a series of media campaigns, including campaigns tailored for at-risk populations. These campaigns are designed to message directly to populations most at risk for tobacco use, including historically underserved populations such as African American, Hispanic, Asian/Pacific

Islander, and Multiracial youth (Centers for Disease Control and Prevention, 2013). To address these populations, FDA and its marketing and research contractor, Rescue Agency, developed a peer crowd-targeted campaign, *Fresh Empire*. This campaign is directed at youth ages 12–17 who are cigarette susceptible non-triers and experimenters and identify with the Hip Hop peer crowd. This approach allows FDA to communicate directly and authentically with teens by targeting and tailoring health messages that reflect the reality of Hip Hop teens' lives and values. Launched in 2015, *Fresh Empire* was developed based on insights from extensive qualitative and quantitative formative research with the target audience.

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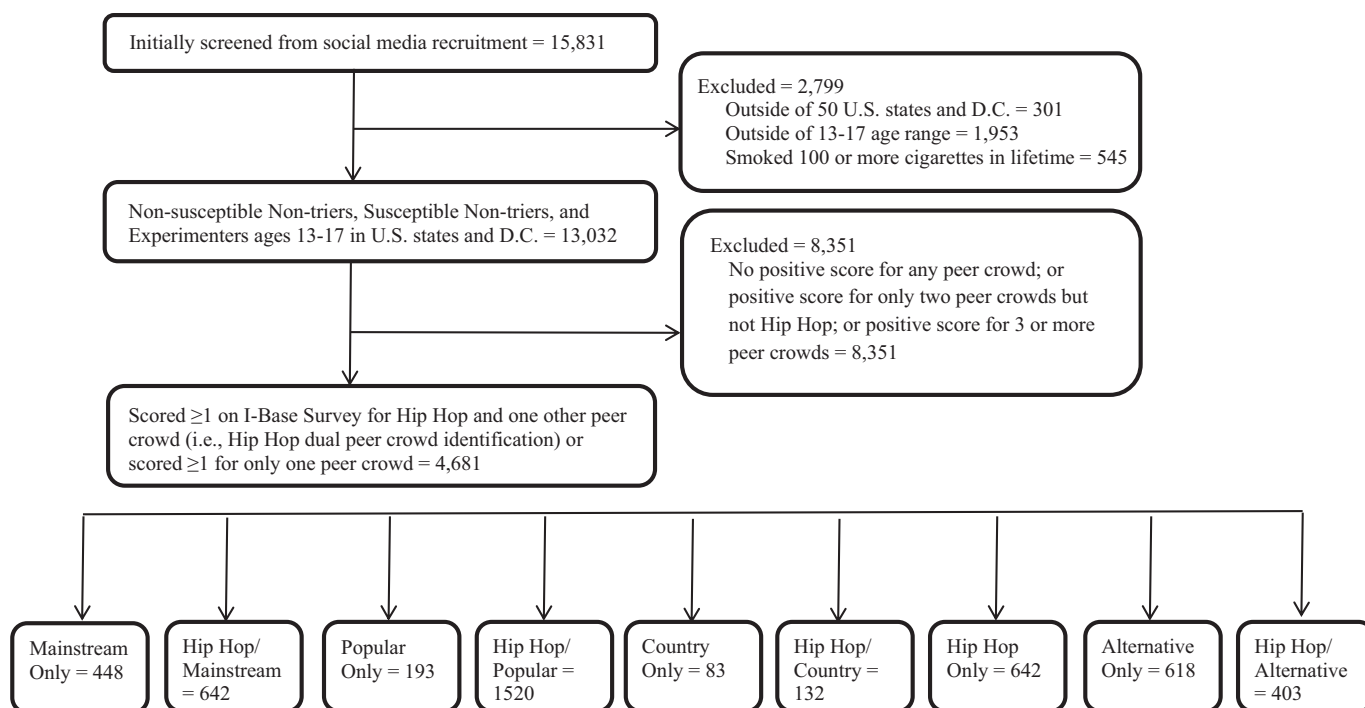


Fig. 1. Participant selection for final analyses.

### 1.2. Peer crowd targeting

Numerous public health efforts have used peer crowd segmentation to identify at-risk subgroups of adolescents and young adults (Jordan et al., 2019; Lee, Jordan, Djakaria, & Ling, 2014; Ling, Holmes, Jordan, Lisha, & Bibbins-Domingo, 2017; Lisha, Jordan, & Ling, 2016; Moran, Walker, Alexander, Jordan, & Wagner, 2017; Stalgaitis, Wagner, Djakaria, & Jordan, 2019; Sussman, Pokhrel, Ashmore, & Brown, 2007; Walker et al., 2018) and develop targeted interventions for them (Fallin, Neilands, Jordan, Hong, & Ling, 2015; Jordan, Turner, & Djakaria, 2013; Kalkhoran, Lisha, Neilands, Jordan, & Ling, 2016; Ling et al., 2014; Wagner, Fernandez, Jordan, & Saggese, 2019). Peer crowds are macro-level subcultures with shared values and norms which transcend race/ethnicity and geography (Moran et al., 2017; Sussman et al., 2007). Peer crowds commonly found among U.S. youth include Popular (value social status, enjoy socializing, care about their appearance), Mainstream (deprioritize social status, are friendly and approachable, often academically successful), Hip Hop (value authenticity and confidence, feel they have to overcome struggles to reach their goals, enjoy rap/hip hop music), Country (value tradition and patriotism, respect hard work, enjoy outdoor activities like hunting/fishing), and Alternative (value individuality and self-expression, differentiate themselves from other teens, enjoy alternative music genres and art) (Jordan et al., 2019; Moran et al., 2017; Stalgaitis et al., 2019; Wagner et al., 2019). Research has linked identification with certain peer crowds to engagement in various risky behaviors including tobacco use (Jordan et al., 2019; Lee et al., 2014; Walker et al., 2018). For example, Walker et al. (2018) found that teens who highly identified with the Hip Hop and Alternative peer crowds were at increased risk for cigarette experimentation relative to others. By leveraging the values and interests of at-risk crowds, peer crowd-targeted interventions can be utilized to address these types of health disparities (Fallin et al., 2015; Kalkhoran et al., 2016; Ling et al., 2014; Ling et al., 2017; Wagner et al., 2019).

### 1.3. The current study

To date, most peer crowd research has assigned participants to a single, mutually exclusive peer crowd or examined each crowd separately (Fuqua et al., 2012; Moran et al., 2017). While this is effective for quickly identifying high-risk crowds for intervention, it does not account for the complexities of adolescent identity (Moran et al., 2017). As youth explore their social environments they may identify with more than one peer crowd, and so it may be more accurate to conceive of peer crowd identification as a spectrum rather than mutually exclusive categories, with an individual potentially drawing identity and behavioral influences from more than one crowd (Erikson, 1994; Moran et al., 2017). As such, assigning an individual to a single crowd reduces the opportunity to develop a nuanced understanding of the association between peer crowd identities and risk behaviors.

To address this gap, the current study investigates the effects on cigarette smoking status that Hip Hop identification has in combination with other peer crowds. The study extends previous research by Walker et al. (2018), using a different method of peer crowd assignment which explores how identification with the Hip Hop peer crowd in conjunction with other crowds (i.e., Hip Hop dual peer crowd identification) affects cigarette status. While many different dual and single peer crowds could be investigated (15 groups), only Hip Hop dual peer crowds and single peer crowds (9 groups), used for comparison, were utilized to directly extend Walker et al. (2018) and provide a basis for future research to investigate other dual peer crowd combinations.

## 2. Methods

### 2.1. Design and procedures

The data utilized in the current analysis are a subset of a sample of 15,831 youth who completed the screener for an online *Fresh Empire* message testing study in April to August 2016 (see Fig. 1). The data in the current analysis are derived from the study described in Walker et al. (2018), using the same peer crowd measurement tool. Although the data are from the same source, peer crowd identification

assignments and related inclusion/exclusion criteria for the analytic sample were derived differently (see Peer Crowd Identification subsection of Measures for more detail). Additional details on the dataset, including study design and recruitment procedures, are described by Walker et al. (2018).

The current analytic sample excluded individuals who were established smokers (had smoked 100 or more cigarettes in their lifetimes), lived outside the United States, or were younger than 13 (to comply with Children's Online Privacy Protection Act regulations regarding online research with minors) or older than 17. Additionally, only youth who identified with a single peer crowd only or identified with the Hip Hop peer crowd and one other crowd, were retained. The final analytic sample included 4681 participants.

## 2.2. Measures

Measures of interest in the current study were self-reported lifetime cigarette smoking behavior, susceptibility to cigarette smoking, peer crowd identification, and demographics, measured to better describe the sample.

### 2.2.1. Cigarette smoking status

Pierce, Farkas, Evans, and Gilpin (1995) utilized a smoking status variable from a combination of self-reported cigarette smoking behavior and susceptibility. This status variable was recreated for the current study's analyses, adding an experimenter category popularized by Mowery, Farrelly, Haviland, Gable, and Wells (2004) and Okoli et al. (2009). In total, three groups of interest were investigated: Non-susceptible Non-triers, Susceptible Non-triers, and Experimenters. Established smokers were excluded as the current study is meant to inform campaign development and established smokers are not in the target audience.

Two items measured cigarette smoking behavior. Youth were first asked "Have you ever tried cigarette smoking, even one or two puffs?" with response options of "Yes" or "No" (Okoli et al., 2009; Pierce et al., 1995; Richardson, Okoli, Ratner, & Johnson, 2010). For those who responded "Yes," a secondary item asked: "About how many cigarettes have you smoked in your entire life?" (Okoli et al., 2009; Pierce et al., 1995). A participant was labeled an Experimenter if they reported "1 or more puffs but never a whole cigarette" to "26 to 99 cigarettes (more than 1 pack, but less than 5 packs)." Those who reported "100 or more cigarettes (5 or more packs)" were categorized as Established Smokers and excluded from analyses.

In line with Pierce et al. (1995), participants were asked, "Do you think you will smoke a cigarette soon?," "Do you think you will smoke a cigarette in the next year?," and "If one of your best friends were to offer you a cigarette, would you smoke it?," with response options on a 4-point Likert scale from "Definitely yes" to "Definitely not." Participants who were not Experimenters or Established Smokers and who selected "Definitely not" on all three susceptibility items were categorized as Non-susceptible Non-triers; the remaining participants were categorized as Susceptible Non-triers.

### 2.2.2. Peer crowd identification

Peer crowd identification was assessed using Rescue Agency's photo-based peer crowd measurement tool, the I-Base Survey™. Research using this tool with youth and young adults has demonstrated consistent, robust findings across analytic methods in regards to peer crowd identification and risks (Fallin et al., 2015; Jordan et al., 2019; Kalkhoran et al., 2016; Lee et al., 2014; Ling et al., 2014; Ling et al., 2017; Lisha et al., 2016; Stalgaitis et al., 2019; Wagner et al., 2019; Walker et al., 2018). First, participants were presented with a grid of 32 photos of unfamiliar female youth representing a mix of races/ethnicities and peer crowds (Hip Hop, Popular, Mainstream, Alternative, Country), and were asked to select, in rank order, the three photos that would best fit with their main group of friends, and the three photos

that would least fit with their main group of friends. Participants then completed the same task for a photo grid of 32 male photos. To reduce potential sources of bias, photo order within each grid was randomized by participant, and peer crowd names were not shared with participants. Photos were selected based on previous mixed-methods research with youth across the U.S. to validate the peer crowd represented by each photo (Wagner et al., 2016).

To score the I-Base Survey and quantify participants' peer crowd identifications, participants were awarded positive points for the peer crowd(s) of the photos they selected as best fit, and negative points for the peer crowd(s) of photos selected as least fit. Participants earned three points for the peer crowd of their top-ranked best fit photos, two points for second-ranked best fit photos, and one point for third-ranked best fit photos, with a similar approach of negative three, two, and one points awarded to least fit photos' peer crowds based on rank. Points for a participant's selections were summed by peer crowd, arriving at a score ranging from negative 12 to positive 12 for each crowd. Examining scores across crowds, participants with a positive I-Base Survey score for only one peer crowd were assigned to that peer crowd for analyses (i.e. single crowd identification). Participants with a positive I-Base Survey score for Hip Hop and one other crowd were assigned to that dual peer crowd group (e.g. Hip Hop/Mainstream) for analyses. Those who scored positively for two peer crowds but not Hip Hop, and those who scored positively for more than two crowds were eliminated as they were not the focus of the paper.

### 2.2.3. Demographic characteristics

Demographic variables collected included sex, age, and self-identified race/ethnicity. For sex, participants reported either "Female" or "Male." Age was reported from "11 years old or younger" through "18 years old or older" with increments of one year in between. Only participants ages 13 to 17 were retained in final analyses. For ethnicity, participants were asked "Are you Hispanic, Latino/a, or Spanish origin?" with response options of "No, not of Hispanic, Latino/a or Spanish origin," "Yes, Mexican, Mexican American, Chicano, or Chicana," "Yes, Puerto Rican," "Yes, Cuban," and "Yes, another Hispanic, Latino/a or Spanish origin." For race, participants were asked "What race or races do you consider yourself to be? (You may select more than one answer)," with response options of "American Indian or Alaska Native," "Asian," "Black or African American," "Native Hawaiian or Other Pacific Islander," "White," and "Other." A mutually-exclusive race/ethnicity variable was created. Any participants who indicated they were of Hispanic, Latino/a, or Spanish origin of any classification were categorized as "Hispanic." Non-Hispanic participants were categorized by the race item. Specifically, those who selected "Black or African American" only were categorized as "Non-Hispanic African American"; those who selected "Asian" and/or "Native Hawaiian or Other Pacific Islander" only were categorized as "Non-Hispanic Asian/Pacific Islander"; those who selected "American Indian or Alaska Native," and/or "Other" were categorized as "Non-Hispanic Other"; and those who selected 2 or more races were categorized as "Non-Hispanic Multiracial."

## 2.3. Data analysis

Table 1 describes the overall sample demographics and Table 2 describes the peer crowd group specific demographics. A Pearson chi-square test was used, assessing significance at the  $p < .05$  level, to investigate the relationship between peer crowd groups and smoking status (Table 3). Follow-up analyses comparing column proportions were conducted using z-tests at the  $p < .05$  level, using the Bonferroni correction to correct for Type I error. These analyses identified differences in proportions among specific peer crowd groups. To accommodate the number of comparisons taking place, in IBM SPSS the Bonferroni correction is completed by multiplying the significance value that would be regularly computed by the number of comparisons

**Table 1**  
Sample descriptive statistics.

Variable	n	%
<b>Sex</b>		
Male	1957	41.81
Female	2724	58.19
<b>Self-identified race/ethnicity</b>		
Hispanic	1034	27.47
NH African American	1286	22.09
NH Asian/Pacific Islander	216	4.61
NH Multiracial <sup>a</sup>	452	9.66
NH White	1293	27.62
NH Other <sup>a</sup>	400	8.55
<b>Smoking status</b>		
Non-susceptible Non-trier	2194	46.87
Susceptible Non-trier	1067	22.79
Experimenter	1420	30.34
<b>Peer crowd</b>		
Mainstream Only (M)	448	9.57
Hip Hop/Mainstream (HH/M)	642	13.72
Popular Only (P)	193	4.12
Hip Hop/Popular (HH/P)	1520	32.47
Country Only (C)	83	1.77
Hip Hop/Country (HH/C)	132	2.82
Hip Hop Only (HH)	642	13.72
Alternative Only (A)	618	13.20
Hip Hop/Alternative (HH/A)	403	8.61
Mean age (SD)	4681	15.19 (1.05)

Non-Hispanic (NH).

<sup>a</sup> Non-Hispanic Multiracial includes those who identified as two or more races.

<sup>b</sup> Non-Hispanic Other includes those who identified as American Indian/Alaskan Native and/or Other.

taking place, in this case 36, rather than the cutoff score being altered through division. The comparison significance value stays  $p = .05$ , and IBM SPSS does not report the exact value but instead simply indicates that  $p < .05$ .

**3. Results**

In the current study, 58% of the sample was female. In addition, 28% of respondents self-reported as Non-Hispanic White, 27% as Hispanic, and 22% as Non-Hispanic African American. Participants

**Table 2**  
Sample descriptive statistics by peer crowd group.

Variable	M		HH/M		P		HH/P		C		HH/C		HH		A		HH/A	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Sex</b>																		
Male	137	30.58	251	39.10	107	55.44	737	48.49	55	66.27	82	62.12	306	47.66	147	23.79	135	33.50
Female	311	69.42	391	60.90	86	44.56	783	51.51	28	33.73	50	37.88	336	52.34	471	76.21	268	66.50
<b>Self-identified race/ethnicity</b>																		
Hispanic	115	25.67	195	30.37	51	26.42	415	27.30	16	19.28	50	37.88	213	33.18	114	18.45	117	29.03
NH African American	96	21.43	198	30.84	36	18.65	450	29.61	2	2.41	11	8.33	177	27.57	40	6.47	24	5.96
NH Asian/Pacific Islander	48	10.71	36	5.61	12	6.22	62	4.08	1	1.20	7	5.30	23	3.58	14	2.27	13	3.23
NH Multiracial <sup>a</sup>	51	11.38	70	10.90	14	7.25	151	9.93	4	4.82	9	6.82	68	10.59	49	7.93	36	8.93
NH White	110	24.55	101	15.73	63	32.64	317	20.86	49	59.04	39	29.55	114	17.76	325	52.59	175	43.42
NH Other <sup>b</sup>	28	6.25	42	6.54	17	8.81	125	8.22	11	13.25	16	12.12	47	7.32	76	12.30	38	9.43
Mean age (SD)	448	15.19 (1.02)	642	15.16 (1.06)	193	15.26 (0.99)	1520	15.18 (1.04)	83	15.25 (1.05)	132	15.02 (0.99)	642	15.26 (1.08)	618	15.23 (1.02)	403	15.14 (1.09)

Mainstream Only (M), Hip Hop/Mainstream (HH/M), Popular Only (P), Hip Hop/Popular (HH/P), Country Only (C), Hip Hop/Country (HH/C), Hip Hop Only (HH), Alternative Only (A), Hip Hop/Alternative (HH/A). Non-Hispanic (NH).

<sup>a</sup> Non-Hispanic Multiracial includes those who identified as two or more races.

<sup>b</sup> Non-Hispanic Other includes those who identified as American Indian/Alaskan Native and/or Other.

were close to evenly split between Non-susceptible Non-triers (47%), Experimenters (30%), and Susceptible Non-triers (23%). The largest proportion of respondents identified with the Hip Hop/Popular dual peer crowd group (32%). Please see Table 1 for descriptive statistics for the full sample.

Table 2 presents demographic characteristics for the peer crowd groups. Peer crowd groups with Mainstream and Alternative identifications tended to have a higher proportion of females, while groups with Country identifications tended to have a higher proportion of males. Groups with Alternative and Country identifications tended to have higher proportions of non-Hispanic White participants, while peer crowd groups with Hip Hop identifications tended to have higher proportions of Hispanic and non-Hispanic African American participants.

The relationship between peer crowd identification and cigarette smoking status (Table 3) was significant  $\chi^2(16, n = 4681) = 206.94, p < .001$ . Follow-up z-tests demonstrated different patterns among the smoking status categories. The Mainstream Only group had a significantly larger proportion of Non-susceptible Non-triers than the Hip Hop/Mainstream, Hip Hop/Popular, Hip Hop Only, Alternative Only, and Hip Hop/Alternative groups. The Hip Hop/Mainstream and Country Only groups had significantly larger proportions of Non-susceptible Non-triers than the Hip Hop Only, Alternative Only, and Hip Hop/Alternative groups. Additionally, the Popular Only, Hip Hop/Popular, Hip Hop/Country, and Hip Hop Only groups had significantly larger proportions of Non-susceptible Non-triers than the Alternative Only and Hip Hop/Alternative groups.

There were no significant differences in proportions of Susceptible Non-triers by peer crowd group. In contrast, the Hip Hop/Alternative group had a significantly higher proportion of Experimenters in comparison to all other groups except Alternative Only. The Alternative Only group had a significantly higher proportion of Experimenters than the Mainstream Only, Hip Hop/Mainstream, Popular Only, Hip Hop/Popular, and Hip Hop/Country groups. The Hip Hop Only group had a higher proportion of Experimenters than the Mainstream Only, Hip Hop/Mainstream, and Popular Only groups. Finally, the Hip Hop/Popular group had a significantly higher proportion of Experimenters than the Mainstream Only group.

**Table 3**  
Distribution of cigarette smoking status by peer crowd.

Smoking Status	M (a)		HH/M (b)		P (c)		HH/P (d)		C (e)		HH/C (f)		HH (g)		A (h)		HH/A (i)			
	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)	n	% (95% CI) (LCL) (UCL)		
Non-susceptible Non-tryers	279	62.28 bdghi (56.59) (67.97)	334	52.02 ghi (46.67) (57.38)	104	53.89 hi (44.31) (63.47)	764	50.26 hi (46.71) (53.81)	51	61.45 ghi (48.09) (74.81)	63	47.73 hi (35.40) (60.06)	275	42.83 hi (36.98) (48.68)	202	32.69  (26.22) (39.16)	122	30.27  (22.12) (38.42)		
Susceptible Non-tryers	90	20.09 (11.81) (28.37)	154	23.99 (17.25) (30.73)	50	25.91 (13.77) (38.05)	322	21.18 (16.71) (25.64)	12	14.46 (-00.05) (34.36)	37	28.03 (13.56) (42.50)	148	23.05 (16.26) (29.84)	163	26.38 (19.61) (33.15)	91	22.58 (13.99) (31.17)		
Experimenters	79	17.63  (09.22) (26.03)	154	23.99 (17.25) (30.73)	39	20.21 (07.61) (32.81)	434	28.56 a (24.31) (32.81)	20	24.10 (05.36) (42.84)	32	24.24 (09.39) (39.09)	219	34.12 abc (27.84) (40.40)	253	40.93 abcdf (34.87) (46.99)	190	47.15 abcdefg (40.05) (54.25)		
Total	448	100.00	642	100.00	193	100.00	1520	100.00	83	100.00	132	100.00	642	100.00	618	100.00	403	100.00		

Mainstream Only (M), Hip Hop/Mainstream (HH/M), Popular Only (P), Hip Hop/Popular (HH/P), Country Only (C), Hip Hop/Country (HH/C), Hip Hop Only (HH), Alternative Only (A), Hip Hop/Alternative (HH/A).

Note. Superscripts indicate significant differences in proportion by peer crowd group using a z-test with the Bonferroni correction. The letter of the superscript signifies that the proportion is statistically greater ( $p < .05$ ) than the proportion for the column labeled with that letter.

#### 4. Discussion

The present study advances peer crowd research by providing evidence for the non-mutually exclusive nature of youth peer crowd identification. This study aligns with previous research demonstrating that the Hip Hop and Alternative crowds are at elevated risk for cigarette use (Jordan et al., 2019; Lee et al., 2014; Walker et al., 2018), and extends previous explorations of multiple peer crowd identification (Fuqua et al., 2012) to explore cigarette status across individuals with single and dual Hip Hop identifications. In this study, the Hip Hop/Alternative, Alternative Only, and Hip Hop Only groups contained the highest proportions of cigarette Experimenters, while Mainstream Only contained the highest proportion of Non-susceptible Non-tryers. Findings demonstrate some youth may identify with, and therefore be influenced by the behavioral norms of, two peer crowds simultaneously, and that these dual identifications may be associated with differential risk for smoking cigarettes.

In the current study, dual identification with Hip Hop and a relatively lower-risk crowd (e.g. Popular or Mainstream) was associated with higher rates of experimentation than singular identification with a lower-risk crowd (e.g. Mainstream alone), indicating Hip Hop identification may have increased risk even among youth with otherwise low-risk identifications. This aligns with previous assertions that mutually-exclusive peer crowd identification approaches may limit understanding of peer crowd risk behaviors (Moran et al., 2017), and indicates that dual identification of particular peer crowds may be associated with higher risk.

Recognizing the non-exclusive nature of peer crowd identification and understanding how identification is associated with risk is useful for the effective development of peer crowd-targeted public education campaigns. Peer crowd-targeted campaigns utilize tailored, values-based messaging delivered via targeted channels to promote positive behavior change and have successfully addressed tobacco use among youth and young adults (Fallin et al., 2015; Jordan et al., 2013; Kalkhoran et al., 2016; Ling et al., 2014; Wagner et al., 2019). The current study is informative for practitioners seeking to develop peer crowd-targeted public education campaigns in two ways.

First, using a broader definition of peer crowd identification could allow practitioners to trace the sources of risk, and pinpoint identifications associated with increased risk to identify populations in need of tailored education efforts. Once high-risk crowds are identified, tailoring through the incorporation of the peer crowd's values and

interests into campaign messaging, and targeting through the delivery of messages via media channels preferred by the crowd, allow practitioners to effectively reach high-risk peer crowds with educational messages (Fallin et al., 2015; Ling et al., 2017; Ling & Jordan, 2011; Wagner et al., 2019).

Second, this approach allows for a more accurate assessment of the size of the at-risk population, as individuals who might be grouped into a low-risk crowd using a mutually-exclusive peer crowd identification approach but who actually have dual identification with a higher-risk crowd can be identified, and correctly considered as part of the audience for a campaign developed for the high-risk crowd. For example, approximately one-third of the current study sample identified as Hip Hop/Popular. Mutually exclusive peer crowd measurement and analysis methods might categorize many of these individuals as Popular Only and therefore outside the influence of Hip Hop peer crowd values and norms. The current study shows that this sizeable group may be at increased risk for cigarette experimentation compared to lower-risk groups such as Mainstream Only, and falls within the audience of a Hip Hop peer crowd-targeted education effort that leverages the norms and values of the Hip Hop peer crowd, such as *Fresh Empire*.

##### 4.1. Strengths & limitations

The primary strength of this study is its diverse, nationally-recruited sample, which is sufficiently large to estimate the prevalence of the conditions of interest with adequate precision. However, recruitment methods were not designed to generate a nationally representative sample, limiting the ability to generalize conclusions to the United States' population. We also could not control for demographic variables in the current analyses, but studies have demonstrated that peer crowd identification consistently predicts risk even while controlling for demographics (e.g. Jordan et al., 2019).

The I-Base Survey used to measure peer crowd identification allowed youth to identify with multiple crowds, and relied on a photo-based self-report mechanism, limiting self-report biases that may occur with other peer crowd measurement methods. However, photo-based tools may be subject to confounding by demographic factors such as race/ethnicity. This method is also limited by researchers' ability to accurately identify and photographically represent peer crowds prior to administering the survey, or post-hoc during data analysis. As such, instruments may fail to present the entire universe of possible peer crowds and may not represent newly emerged peer crowds.

Additionally, though the I-Base Survey provided continuous peer crowd data in alignment with the continuous nature of crowd identification, our analytical methods required mutually-exclusive categories and therefore required we assign group membership, potentially oversimplifying participants' identities. However, the dual identification categories employed here allowed for a nuanced understanding of peer crowd risk that more closely represents the continuous nature of identification and complements previous approaches focusing only on strongly-identified individuals (Lee et al., 2019; Walker et al., 2018).

Finally, the present study is cross-sectional, making it difficult to draw conclusions about causal mechanisms, including direction of causality between peer crowd identification and smoking. Smoking behaviors are the result of many factors, and it is important to identify to what extent peer crowds influence the risk behavior, as well as identify any demographic or other covariates that also impact the behavior.

## 5. Conclusion

The current study demonstrates that approaching peer crowd identification in a non-exclusive manner can provide insight into the association between identification with certain crowds, such as Hip Hop, and cigarette risk. Hip Hop identification alone or in combination with other crowds was associated with cigarette experimentation. This confirms the importance of campaigns such as FDA's *Fresh Empire* tobacco public education campaign to address adolescent cigarette use within the Hip Hop peer crowd. Using measurement tools that allow individuals to identify with multiple crowds, as well as analytical approaches that account for nuanced identifications, can provide a better understanding of peer crowd behavior. This can be used to inform public education efforts that leverage the power of peer crowd values and culture to promote positive behavior change.

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## Declaration of Competing Interest

Mario Navarro and Matthew Walker work for the funder (the U.S. Food and Drug Administration). Carolyn Stalgaitis and Dana Wagner work for the awarded organization (Rescue Agency). There are no other conflicts of interest.

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