

# Social Media and Vaping: The Role of Social Norms and Motives

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Traditional cigarette use has declined drastically in college students (CDC, 2019; Jamal et al., 2015), while vaping has grown rapidly (Johnston et al., 2019). Research indicates social media use and communication of social norms online have been associated with greater substance use (Brunborg et al., 2017; Ohannessian et al., 2017). Additionally, motives for substance use have also been shown to predict distinct patterns of consumption (Cooper et al., 1992). The present study examined how social media use was associated with vaping in college students, and how social norms, perceptions, and motives intervened. A total of 104 undergraduate students participated in a web-based survey ( $M_{age} = 19.74$ ). Results indicated greater social media use, perceiving electronic cigarettes more favorably, and social norms were associated with higher levels of

vaping. Social norms did not mediate the relationship between social media and vaping, but social norms did mediate the relationship between perceptions towards vaping frequency. Social motive moderated the relationship between social media and vaping, while conformity motive did not. The role of social norms was important in partially explaining the relationship between perceptions towards e-cigarettes and vaping. As vape use continues to rise in young adults, the present study helps to expand our knowledge on predictors of use and the role of social norms and motives on health behavior.

*Keywords: social media, vaping, e-cigarettes, social norms, motives, college students*

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The pattern of tobacco use among Americans has shifted in recent years from conventional cigarettes to electronic nicotine delivery systems and requires consideration of new types of harms and long-term implications (Pepper et al., 2019). Perceptions of harms and social norms among college students have prompted the use of conventional tobacco cigarettes, but little research is available concerning the social norms and perceptions towards electronic cigarette use/vaping of nicotine products among college students (Waters et al., 2017). College students are a demographic of interest as most tobacco product use is initiated in young adulthood (Elders et al., 1994).

One avenue for the way social norms present in society is via online communication and social networking. Social media use is ubiquitous among college students and nearly 88% of young adults between the ages of 18-24 report having at least one form of social media (Smith & Anderson, 2018). Social media has an important influence on the social norms and attitudes towards substance use in college students and has been found to be predictive of greater frequency of substance use in previous studies (Ohannessian et al., 2017).

The social norms approach to health behavior is based on the notion that individuals' behaviors are affected by their perceptions of others and whether certain behaviors are likely to be approved or disapproved by others (Choi et al., 2016). Electronic cigarettes have been viewed more favorably than traditional cigarettes in recent studies, with students reporting perceived health benefits in comparison to traditional cigarettes, benefits related to smoking cessation, as well as curiosity over use and taste, perceived social norms, and convenience of use (Pénzes et al., 2016). Little is known about the relationship between social media, social norms, and motives within the context of electronic cigarette/vape use. The present study aimed to examine this relationship in college students, while examining the mediating effect of social norms and the moderating role of motives for vaping within a college student population.

Young individuals who engage in electronic cigarette use are also more likely to engage in smoking tobacco products in the future, raising a concern over the long-term effects of electronic cigarette use initiation (CDC, 2019). While conventional cigarette use is declining in college students, electronic cigarette use continues to steadily increase (Singh et al., 2016). Vaping among college students for nicotine increased from 6% in 2017 to 16% in 2018 and was among the greatest one-year increase for any substance in the Monitoring the Future study since the survey was first administered in 1975 (Schaeffer, 2019). Perceptions of electronic cigarette use among college students have been reported as generally more positive than traditional cigarettes, raising a concern over the awareness of the nicotine in electronic cigarettes and personal vaporizers (Cooper et al., 2017).

While it may take decades before biomedical science fully understands the long-term health risks of electronic cigarettes, the rapid increase in electronic cigarette use

suggests that waiting to gain understanding about the psychological factors that influence electronic cigarette use will further impact and harm public health (Waters et al., 2017). Evaluating how young adults and college students perceive electronic cigarettes and how they are exposed to this information is essential to reducing the use and initiation of electronic cigarettes and vaporizers.

## **LITERATURE REVIEW**

### **Social Media**

In order to prevent electronic cigarette use initiation and potential nicotine addiction in young adults, research is needed to examine predictors of electronic cigarette/vaping usage and frequency. One essential tool for doing so is to examine the social networks that may be encouraging or discouraging norms and perceptions around substance use. While we know peer influence and peer networks have a strong powerful influence on health behaviors such as substance use, less is known about how social media may influence vape use through social norms and motives that are unique to the social network environment.

Along with transitioning and meeting new friends comes the introduction and connection of social networks via mobile phones and social media applications. Popular social networking apps that are accessible through mobile phones include Snapchat, Twitter, Facebook, Instagram, etc. The social media networks of college students specifically are an important risk factor for electronic cigarette use (Sawdey et al., 2017). According to Smith and Anderson (2018), 88% of young adults (18-24) in America indicate that they use at least one form of social media. Nearly half of college students reported that they viewed an advertisement about electronic cigarettes in the last 6 months on at least one social media platform, particularly on the applications Facebook, Twitter, and/or Instagram (Sawdey et al., 2017).

Some studies have shown that the greater the amount of time on social media platforms (e.g. Instagram, Snapchat, Facebook, and Twitter), the greater the association and likelihood of heavy alcohol consumption and problematic alcohol use (Brunborg et al., 2017; Ohannessian et al., 2017). While it has been well established how peers influence

substance use behaviors, less is known within the context of social media and how social media may be encouraging more frequent electronic cigarette use.

### **Social Norms**

The social norms approach to health behavior is based on the notion that individuals' behaviors are affected by their perceptions of others and whether certain behaviors are likely to be approved or disapproved by others (Choi et al., 2016). It has been observed that perceptions of peers can have effects on college students' smoking intention specifically, with the perception that peers approve of smoking behaviors predictive of smoking intention (Paek, 2009). Overall, social norms have been found to be significant predictors of college students' smoking intention (Paek, 2009).

Individuals often look to their peers for guidance and/or confirmation on appropriate behaviors. College students have been found to overestimate other students' drinking behavior (descriptive norms) as well as their attitudes (injunctive norms) towards drinking behavior (Carey et al., 2007). A study on alcohol norms found that a significant portion of students misjudge their peers' alcohol consumption (Brunelle & Hopley, 2016). Results indicated a mediation effect, where participants exposed more often to alcohol on social networking sites were more likely to overestimate quantity and frequency drinking norms which predicted greater alcohol consumption (Brunelle et al., 2016). Research also indicates that college students generally have more favorable attitudes and higher acceptance of electronic nicotine delivery systems compared to traditional cigarette use, highlighting that social norms may be influencing one's perceptions of acceptance and likelihood of use (Noland et al., 2016).

### **Motives**

Motives for substance use, more specifically alcohol consumption, are important because they have been shown to predict distinct patterns of consumption and substance use-related problems (Cooper et al., 1992). While previous research had perceived social drinking to be less harmful, recent studies suggest that social motives (to obtain social rewards) can be related to problematic drinking (Van Damme et al., 2013) as well as alcohol-related problems (Labrie et al., 2007). Conformity motives for drinking refers to drinking alcohol to avoid social rejection (Cooper, 1994). Individuals with high conformity motives are those who drink alcohol to meet the expectations of their group and peer

networks that they value and desire to feel a part of the group or peer network (Choi et al., 2016). It is also likely that motivations to drink change in response to social roles (Patrick et al., 2018). Role changes may represent opportunities for new social relationships and social drinking (e.g. starting college) in such a way that social or conformity motives may increase in response (Patrick et al., 2018). Drinking is particularly common for first year college students because of the time period of making new friends and adjusting to a new social environment (Borsari et al., 2007).

Despite the popularity of electronic cigarettes or electronic nicotine delivery systems, there is surprisingly little research on why people vape (Ayers et al., 2017; Grana et al., 2014). While most of the research related to motivations for substance use behaviors has related to alcohol consumption, there has been little examination of motivations for vape use in college students. One study in Hungary examined intentions and motivations to experiment with electronic cigarettes in undergraduate students (Pénczes et al., 2016). Students reported perceived health benefits in comparison to traditional cigarettes and the benefit of helping smoking cessation, as well as curiosity over use and taste, perceived social norms, and convenience of use (Pénczes et al., 2016). This was the first study to assess motivations for electronic cigarette use among university students. Still, it remains unclear how social networks within the context of social media may influence both motives and perceived social norms in relation to subsequent vape use in college students.

### **Present Study**

The primary purpose of this study was to identify variables that could potentially predict vape use in college students and expand our knowledge of vape and electronic cigarette use. Most of the research done on social media and substance use has been within the context of alcohol and marijuana use (Moreno & Whitehill, 2016). While social media use has been linked to greater alcohol consumption and social norms and motives have played a role in alcohol use, we do not know if these social norms and motives will act as intervening variables between social media use and vaping (Brunborg et al., 2017; Ohannessian et al., 2017). The following four hypotheses were proposed: 1) Perceptions of vape use, such as individuals who report electronic cigarettes more favorably than traditional cigarettes, would positively predict reported vaping; 2) Reported social media use would positively predict reported vape use; 3) Perceived social norms would mediate

the relationship between social media use and vaping frequency, such that social media use would positively predict social norms, which in turn would positively predict vaping frequency; 4) Social motive to vape would moderate the relationship between reported social media use and reported vaping frequency, such that higher levels of social motive would increase the relationship between social media use and vaping frequency and lastly; 5) Conformity motive to vape would moderate the relationship between reported social media use and reported vaping frequency, such that higher levels of conformity motive would increase the relationship between social media use and vaping frequency.

**METHODS**

**Participants**

The sample consisted of 104 undergraduate students from a small public university in the Northeast ( $M_{age} = 19.74$ ,  $SD = 2.35$ , 70% female). The racial/ethnic demographics (see Table 1) included 78% Caucasian, 18% Hispanic, 4% African American, 3% Asian/Pacific Islander, 2% Native American, and 3% Other. Over 90% of the participants were full-time enrollment status and 60% were commuter students who did not reside on campus. For vape use, 39% had never vaped, 16% had tried, but stopped, and 45% of the participants were categorized as vapers, based on their self-report of vaping sometimes, almost every day, or every day.

Table 1. Demographics ( $N = 104$ )

Demographics	<i>M or N (SD or %)</i>
Gender	
Female	73 (70.2)
Male	31 (29.8)
Age	19.74 (2.35)
Race/Ethnicity	
Caucasian	81 (78)
Hispanic	19 (18)
African American	5 (4)
Asian/Pacific Islander	3 (3)
Native American	2 (2)
Other	3 (3)
Enrollment Status	
Full-time	98 (94.2)

Part-time Campus Living Status	6 (5.8)
Commuter Residential	63 (60.7) 41 (39.3)
Vape Use	
Never	40 (38.5)
Have tried	17 (16.3)
User	47 (45.2)

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## Design and Procedure

The present study was implemented through a cross-sectional anonymous web-based survey with recruitment through the Department of Psychological Science research participation system (SONA). We obtained approval from the university's Institutional Review Board for Human Participants before conducting the study to protect students' privacy and confidentiality. Participants were recruited via the SONA online participation pool system posted on the SONA website and participants received 1 course credit as compensation for their time. After reading the informed consent form, participants were asked to consent and could not proceed unless they agreed.

## Measures

***Social Media Use.*** The Technology Use Questionnaire (TUQ; Ohannessian, 2009) assessed how much time individuals engage with social networking sites. Four different social media applications - Facebook, Instagram, Snapchat, and Twitter were assessed as participants reported how often they used these applications on an 8-point Likert-type scale ranging from 0 (never) to 7 (almost constantly). Participants' answers were used (the scores on each social media platform) to form a composite score of overall social media usage of the four applications. An average social media use score was calculated by averaging use across the apps. Higher scores indicate higher social media use.

***Social Norms.*** The Smoking and Social Norms Measure (França et al., 2009) was used to assess social norms towards vaping ( $\alpha = .88$ ). The scale was modified from one focusing on conventional cigarette smoking and included 4 items (e.g. "What would your close friends think if you smoked electronic cigarettes occasionally?"). The responses were coded as 0 = strongly disapprove, 1 = disapprove, and 2 = would not disapprove. A

composite score was calculated by adding the three social norms items together. An average score was then calculated on the three items. Higher scores indicated greater social norms towards vape use.

***Social and Conformity Motive.*** The Modified Drinking Motives Questionnaire (Blackwell & Conrod, 2003) was modified to assess motives within the context of electronic cigarette/vape use. The subscales social and conformity were used to assess participants' motives for vape use. Social motive ( $\alpha = .90$ ) assessed vaping for social reasons/benefits and asked questions such as vaping “because it is what most of my friends do when we get together” and “to be sociable.” Conformity motive ( $\alpha = .91$ ) assessed vaping in order to conform, such as vaping “so that others won’t kid me about not using” and “so I won’t feel left out”. This measure has 10 items (5 for conformity and 5 for social) and uses a 5-point Likert scale ranging from 1 (almost never/never) to 5 (almost always/always). Two composite scores were calculated from the items on both the social and conformity category by adding up the five items. A mean score was calculated for each motive and higher scores indicated higher social and conformity motive to vape. Findings, in general, suggest the DMQ-R is a valid instrument when distributed to college students (MacLean & Lecci, 2000).

***Vaping.*** The Substance Frequency-of-Use Scale (Kimber & Sandell, 2009) was used to measure e-cigarette and nicotine vape use. The measure was modified from asking “do you smoke?” to “do you smoke electronic cigarettes/vape nicotine products?” and participants were asked to answer this question relevant to vape/electronic cigarette use, measured as 0 = no, have never, 1 = have tried but stopped, 2 = yes, but only occasionally, on weekends or at parties, and 3 = yes, every day or almost every day. Participants were informed that vape use was within the context of nicotine products such as *JUUL* and did not include vaping other substances such as marijuana. Participants selected one response that ranged from non-user to moderate/heavy user.

***E-cigarette Perception.*** The Comparing E-Cigarettes and Cigarettes Questionnaire (Hershberger et al., 2017) was used to assess perceptions towards e-cigarettes ( $\alpha = .74$ ). The aim of the scale was to assess if individuals perceived electronic cigarettes as more socially acceptable and less harmful than traditional cigarettes. The scale consisted of 7 items such as “electronic cigarettes can be used to quit or cut down on smoking traditional



cigarettes” and “electronic cigarettes are less harmful to the user’s health than traditional cigarettes”. Responses were rated on 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A composite score was calculated from participant’s responses by adding up all items and calculating a mean score and all items were reversed coded. Higher values indicate more positive beliefs about electronic cigarettes compared to traditional cigarettes.

## RESULTS

Means and correlations for all study variables are presented in Table 2. The first hypothesis was perceptions of vape use, such as individuals who report electronic cigarettes more favorably than traditional cigarettes, would positively predict vaping. This hypothesis was supported, with perceptions towards e-cigarettes and vaping positively predicting vaping. The second hypothesis was that reported social media use would positively predict vape use, which was also supported. In addition, social norms, and social motives positively predicted vaping. Social media positively predicted social motives, while social norms and social motives, positively predicted conformity motives. Social norms and social motives positively predicted perception towards e-cigarettes.

Table 2. Correlations

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1.Social Media Use	-					
2.Social Norms	.05	-				
3.Social Motive	.26**	.37***	-			
4.Conformity Motive	.18	.23*	.54***	-		
5.Vaping	.26**	.49***	.60***	.19*	-	
6.E-Cigarette Perception	-.04	.27*	.30**	.13	.37***	-
<i>Mean</i>	4.17	2.46	1.74	1.19	1.31	3.08
<i>SD</i>	1.57	.67	.95	.50	1.22	.77

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

To test hypothesis 3, a mediation analysis was conducted using SPSS macro, PROCESS model 4, using 5,000 bootstrap samples with bias corrected 95% confidence intervals (Hayes, 2018) to assess if social norms would mediate the relationship between social media and vaping. The predictor, social media, did not significantly predict social norms,  $\beta = .05, p = .624$ , where  $\beta$  denotes standardized coefficients in the regression model. The results of the regression indicate that social media accounted for less than 1% of the variance in social norms,  $F(1, 102) = 0.24, p = .624$ . The mediator, social norms, did significantly predict the outcome, vaping,  $\beta = .47, p < .001$ , controlling for the direct effect of social media. The results of the regression indicate that social norms and social media account for roughly 30% of the variance in vaping,  $F(2, 101) = 20.57, p < .001$ . The indirect effect was  $ab = .02, 95\% CI [-.08, .12]$ . The significance test was based on the confidence interval, and the confidence interval includes a zero, indicating the effect is not significant. Overall, social norms did not mediate the relationship between social media and vaping (see Figure 1). The direct effect ( $c'$  path) on social media and vaping (controlling for the indirect effect) was significant,  $\beta = .23, p = .007, 95\% CI [.05, .31]$ . The total effect ( $c$  path) was also significant,  $\beta = .20, p = .009, 95\% CI [.05, .35]$ .

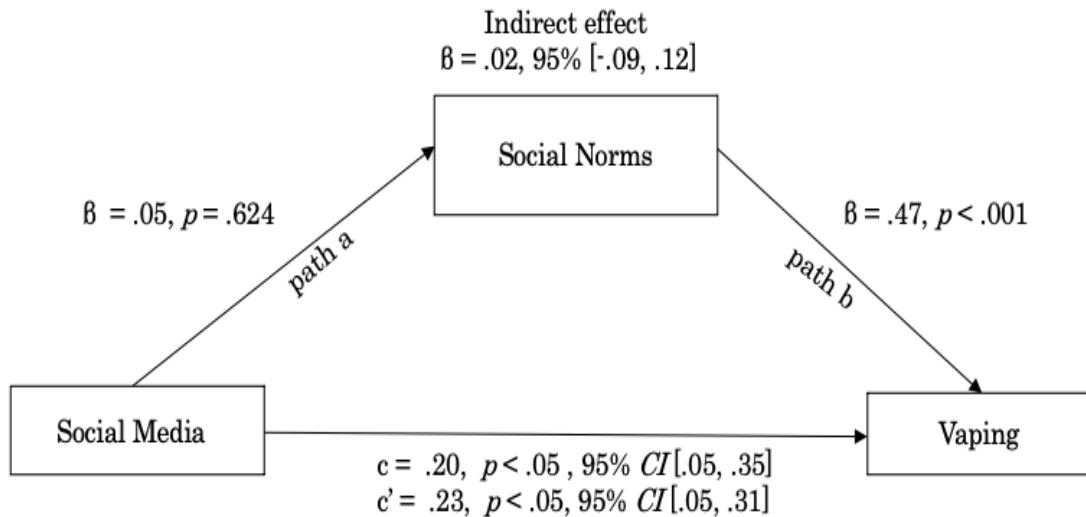


Figure 1: Mediation analysis with predictor social media, mediator social norms, and outcome vaping;  $\beta$  represents standardized coefficients.

To test hypothesis 4 that the social motive would moderate the relationship between social media and vaping, a multiple regression analysis was conducted using the SPSS macro implementing PROCESS model 1 (Hayes, 2018). The overall model was significant,  $R^2 = .42$ ,  $F(3, 100) = 24.07$ ,  $p < .001$ . Social media, the social motive and the interaction term (social media x social motive), were significant predictors of vaping. The model including the interaction between social media and social motive accounted for significantly more variance than a model including just social media and vaping by themselves,  $R^2$  change = .05,  $p = .005$  (See Table 3).

*Table 3: Regression Results for Testing Moderation by Social Motive of the Social Media-Vaping Relationship.*

Variables	$\beta$	<i>se</i>	<i>CI</i>		
			<i>t</i>	LL	UL
<i>Main Effects</i>					
Social Media	.43**	.14	3.18	.16	.71
Social Motive	1.85***	.40	4.66	1.06	2.63
Social Media x Social Motive	-.23*	.08	-2.90	-.39	-.07

*Note.* Moderation analysis for predictor social media, moderator social motive, and outcome vaping. The  $R^2$  value is .42.

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

Given that the interaction effect was significant, a simple slopes analysis was conducted to interpret the effect. Figure 2 shows the graph of simple slopes of social media predicting vaping, separately for the three levels of social motive. The significance tests for the simple slopes indicated that for low social motive, the social media, and vaping simple slope was positive and significant,  $b = .19$ ,  $t = 2.456$ ,  $p = .016$ . For the mean of social motive, the social media and vaping simple slope was not significant,  $b = -.01$ ,  $t = -.115$ ,  $p = .989$ . For high social motive, the social media, and vaping slope was significant,  $b = -.27$ ,  $t = -2.314$ ,  $p = .023$ . The regions of significance included values of social motive below  $-.536$

and above .676. For levels of social motive below -.536, the relationship between social media and vaping is positive. For levels of social motive above .676, the relationship between social media and vaping is negative. The pattern of the simple slopes for levels of high social motive was the opposite of what was hypothesized.

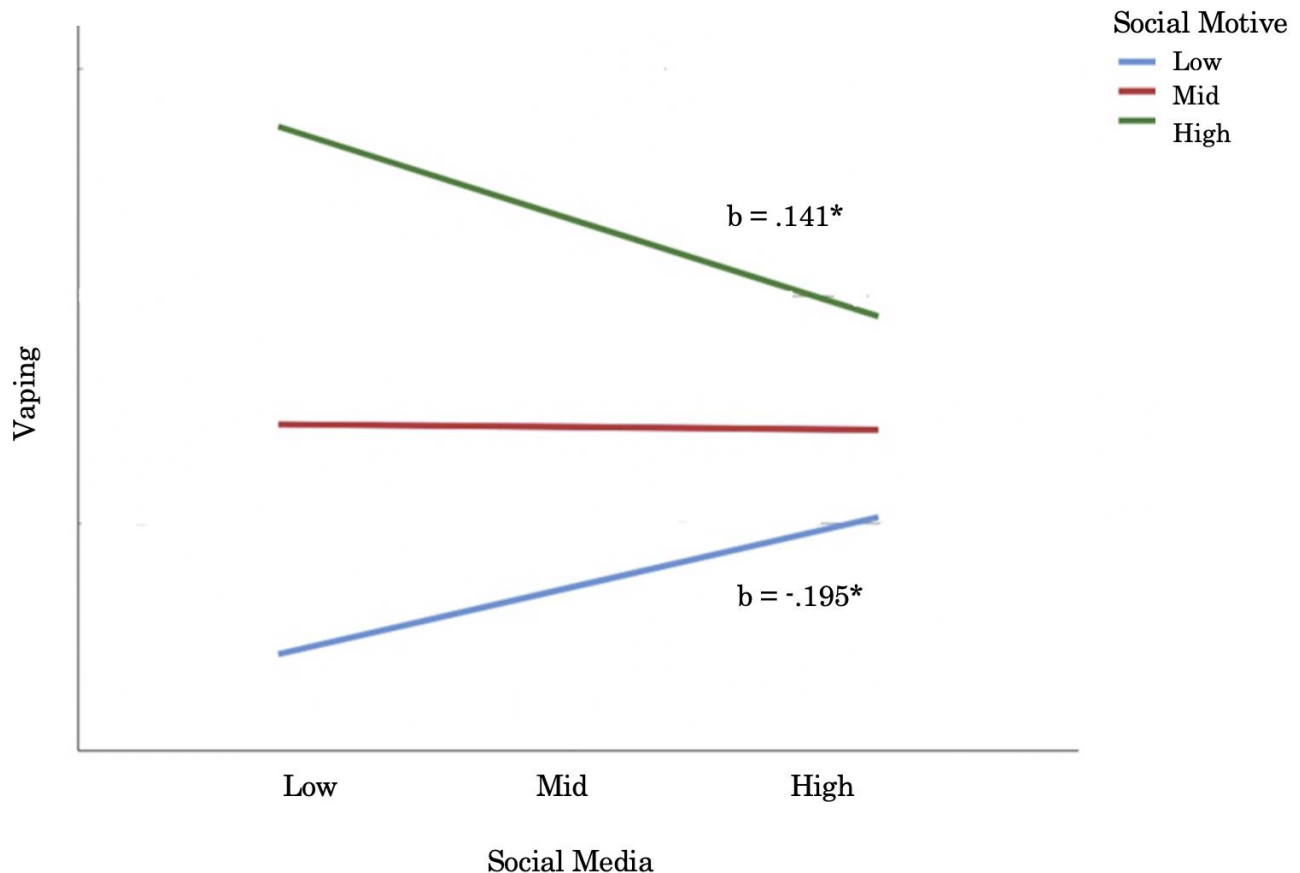


Figure 2: Simple slopes of social media predicting vaping for 1 *SD* below the mean of social motive, the mean of social motive, and 1 *SD* above the mean of social motive; *b* represents unstandardized coefficients.

*Note.*  $*p < .05$

To test the hypothesis 5 that conformity motive would moderate the relationship between social media and vaping, a multiple regression analysis was conducted using PROCESS model 1 (Hayes, 2018). The overall model was significant,  $R^2 = .10$ ,  $F(3, 100) = 3.88$ ,  $p = .011$ . (See Table 4). Social media but not conformity was a significant predictor of

vaping. The interaction term (social media x conformity motive) was not significant,  $R^2$  change = .02,  $p = .171$ , therefore the conformity motive did not moderate the relationship between social media and vaping.

*Table 4. Regression Results for Testing Moderation by Conformity Motive of the Social Media-Vaping Relationship.*

Variables	$\beta$	<i>se</i>	<i>t</i>	<i>CI</i> LL	UL
<i>Main Effects</i>					
Social Media	.48*	.23	2.07	.02	.95
Conformity Motive	1.68	.98	1.72	-.26	3.63
Social Media x Conformity Motive	-.27	.19	-1.38	-.65	.12

*Note.* Moderation analysis for predictor social media, moderator conformity motive, and outcome vaping. The  $R^2$  value is .10.

\* $p < .05$

Given that perceptions towards e-cigarettes was positively associated with vaping, we ran an exploratory analysis to examine if social norms could potentially mediate the relationship. The mediation was run using PROCESS model 4, using 5,000 bootstrap samples for bias corrected 95% confidence intervals (Hayes, 2018). The predictor, perceptions towards e-cigarettes, did significantly predict social norms (the mediator),  $\beta = .27$ ,  $p = .006$ . The results of the regression (see Figure 4) indicate that perceptions towards e-cigarettes accounted for 7% of the variance in social norms,  $F(1, 102) = 7.94$ ,  $p = .006$ . The mediator, social norms, did significantly predict the outcome, vaping,  $\beta = .42$ ,  $p < .001$ , holding perceptions toward e-cigarettes constant. The results of the regression indicate that social norms and perceptions toward e-cigarettes accounts for roughly 30% of the variance in vaping,  $F(2, 101) = 21.51$ ,  $p < .001$ . The indirect effect was  $ab = .11$ , 95%, *CI* [.02, .23]. The confidence interval does not include zero and  $\beta$  was reduced, indicating partial mediation thus supporting the hypothesis that social norms would mediate the relationship between perceptions towards e-cigarettes and vaping (see Figure 3). The

direct effect (*c'* path) on perceptions of e-cigarettes and vaping (controlling for the indirect effect through social norms) was  $\beta = .26, p = .003, 95\% CI [.14, .68]$ . The total effect (*c* path) was  $\beta = .59, p = .000, 95\% CI [.30, .88]$ .

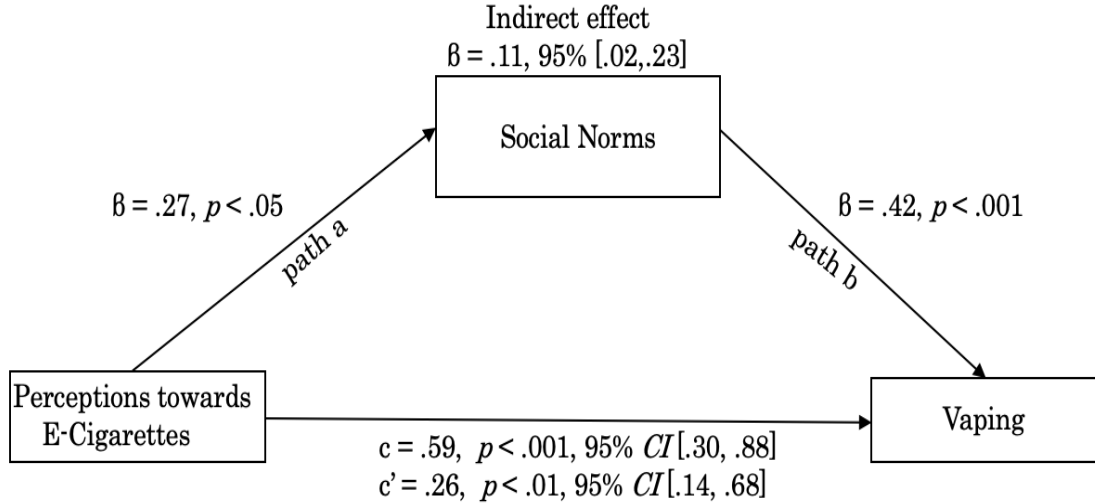


Figure 3: Exploratory mediation analysis between predictor perceptions towards e-cigarettes, mediator social norms, and outcome vaping;  $\beta$  represents standardized coefficients.

## DISCUSSION

The goal of the present study was to examine potential predictors of vaping in college students and examine the role of intervening variables. While long-term implications of vaping are unclear, potential risks come from several areas, such as device specific concerns and safety, the chemical makeup of the liquid products being vaporized, and the potential toxicity and levels of nicotine inhaled in concentrated forms (Laucks & Salzman, 2020). Identifying predictors of usage may help public health efforts to decrease initiation of use.

Our first hypothesis that perceptions of vape use, such as viewing e-cigarettes more favorably than traditional cigarettes, would positively predict vaping was supported. This finding is similar to previous studies (Trumbo & Harper, 2013), where positive orientations and beliefs towards electronic cigarettes were predictive of initiation of use, along with higher social norms towards the use of e-cigarettes. The second hypothesis that

social media would positively predict vaping frequency was supported. This finding is consistent with previous research on undergraduate students within the context of other substances, where more time spent on social media was associated with greater frequency of alcohol use and synthetic cannabinoid use (Guitierrez & Cooper, 2016). Overall, findings in previous literature suggest that time spent on social networking sites is associated with greater substance use in college students, and the present study found similar results within the context of electronic cigarette usage. The present study is one of the first that we know of that examines how social media use is associated with electronic cigarette use, as most previous research has examined social media within the context of alcohol or marijuana use (Guitierrez & Cooper, 2016; Ohannessian et al., 2017).

The third hypothesis that social norms would mediate the relationship between social media and vaping in college students was not supported. The findings indicate that social media did not predict social norms, but social norms did predict vaping. Previous literature indicates that positive messages and portraying the benefits of marijuana use on social media were associated with a greater likelihood of usage in adolescents (Roditis et al., 2016). These findings suggest that it may not be the use of social media in general that is associated with social norms, but rather the specific content that is on social media. The number of positive advertisements or posts that portray electronic cigarettes favorably may be associated with social norms among college students, rather than the mere usage/frequency of social media. While social media frequency by itself may not predict social norms, the endorsements or advertisements of electronic cigarette products, or the types of friendships an individual has on social media may be associated with social norms among college students.

The fourth hypothesis that the social motive would moderate the relationship between social media and vaping was partially supported. The findings indicate moderation did occur, but in the opposite direction that was hypothesized. Findings indicate that the social media-vaping slope was positive for students with low social motives and negative for students with high social motives. The direction of slopes were opposite of what was hypothesized and both social media and social motive positively predicted vaping in the present study. It is important to consider whether an individual's peer group approves or disapproves of vaping, as this may have a strong association with

their social motive to vape. Cheney et al. (2018) found that some college students reported their vaping was viewed negatively by other college students or friends. Students whose friends had negative views reported that they preferred to vape at home alone or with friends or roommates who did approve (Cheney et al., 2018). However, other students reported that their friends either did not care or did not disapprove of their vaping, and some reported that their friends actively supported it (Cheney et al., 2018). Some individuals had met their friends through vaping and/or initiated vape use in the first place because their current friend group vaped (Cheney, 2018). The effect of the social motive may depend heavily on the types of peer relationships and whether an individual's friend group includes those who are also vape users. Overall, the present study is one of the first that we know of to examine social motive in the context of e-cigarette and vape use.

The fifth hypothesis that conformity motive would moderate the relationship between social media and vaping, such that higher levels of conformity motive and higher levels of social media would be associated with higher levels of vaping. Conformity motive was not a significant predictor of vaping, and there was not a significant interaction between social media and conformity motive. Conformity motives were modified from drinking motivation to vaping motivation. Lee et al. (2017) found that conformity motives was not a significant predictor of marijuana use over time. Additionally, while motives did predict increased use within the context of alcohol, substance use also predicts future increased motives, which suggest that the use of substances reinforces one's reasons and motivations for using (Lee et al., 2017). In other words, when individuals engage in more substance use behaviors, their motivations for usage increase, and it becomes difficult to examine over time. Conformity motive may be specific to the type of substance and may be influenced by certain demographics. For example, future research could examine how conformity motive plays a role in a variety of substances, including alcohol, marijuana, and electronic cigarette use. Additionally, certain demographics, such as the age of the college students, year in college, residence status, etc. may be associated with conformity motive for using substances. Researchers have found that there is an association between college environment and drinking frequency, with greater exposure to college environmental factors, the greater the risk of frequent and heavy drinking (Lorant et al.,



2013). Examples of college factors include living on campus in a dormitory with roommates, attending on-campus parties, and pre-partying activities with friends and/or roommates (Lorant et al., 2013). The demographics of the present study include a large portion of students who commute to campus. Future research could examine conformity motive within a college population that consists of predominantly residential, undergraduate college students. Additionally, research has indicated that within the United States, reports of college drinking vary drastically between colleges, indicating that environmental and social influences may have an impact on an individuals' drinking behavior (Tyler et al., 2016). Future research is needed to examine if trends in vape use differ across college campuses and what social and environmental factors are associated with higher conformity motive and vaping.

In the exploratory analysis, results indicated that social norms mediated the relationship between perceptions towards e-cigarettes and vaping. These findings indicate that social norms may help to explain the relationship between perceptions towards e-cigarettes and vaping. Social norms act a partial mediator in the relationship, indicating that social norms accounts for some, but not all, of the relationship between perceptions towards e-cigarettes and vaping frequency. These findings help to expand our knowledge on the relationship between perceptions towards e-cigarettes and vaping In the present study, positive perceptions towards e-cigarettes were associated with higher levels of vaping, and higher levels of social norms were associated with higher levels of vaping. A study on college students recruited from a large southwestern public university found that both users and nonusers had cited social stigma as a perceived disadvantage of e-cigarette use (Case et al., 2015). This suggests that social norms may vary depending on other factors such as location and campus environment. Within the context of traditional cigarettes, the overestimation of the prevalence of peer smoking is associated with smoking initiation (Wang et al., 2011). One potential reason cigarette smoking has declined among young adults may relate to social norms. Despite the opposition and marketing of the tobacco industry over time, public health efforts and advances in our knowledge of the dangers of cigarettes smoking have brought about an extraordinary change in the attitudes towards smoking (Lynch & Bonnie, 1994). The current social norms towards e-cigarettes and vaping raises concern, as encouraging young adults to quit

vaping may be more difficult when it is perceived as socially acceptable. A social environment that is favorable to e-cigarettes/vaping has been associated with a greater likelihood of susceptibility of use (Barrington-Trimis et al., 2016). By targeting the social norms towards electronic cigarettes/vaping, we may be able to discourage usage over time.

### **Limitations**

The generalizability of the study in relation to social media use as a predictor of vaping in college students applies only to the following four platforms: Facebook, Instagram, Twitter, and Snapchat. The participants in the present study were undergraduate college students and a goal of the study was to have the findings be generalizable to undergraduate college students overall. However, the demographics of the sample were a large majority female, commuter status, and Caucasian, making it difficult to generalize the findings to male undergraduate students, minority populations, and students who live on campus. Previous literature indicates there may be gender differences in motives related to substance use, such that male college students tend to exhibit stronger conformity and social motives for drinking than females (Van Damme et al., 2013). Future research could benefit from a more diverse sample size that includes an even proportional of male to female undergraduate students.

Possible limitations include bias of the self-report measures of social media usage, motives, social norms, and vaping frequency. Future research may benefit from recording college students actual screen time, as participants may be unaware of how often they are interacting with social media platforms. Additionally, while the informed consent specifically stated that the participants responses were confidential, the use of electronic cigarettes is illegal under the age of 21 and vaping is prohibited on the campus. Each building on campus has a sign that states smoking/vaping is strictly prohibited. This may have had a potential impact on participants openness to disclose personal substance use information. The present study is correlational in design, and no causal relationships can be determined between variables. Additionally, the study design was not longitudinal, so we cannot determine if these relationships exist over time, or the direction of these relationships.

## **Future directions**

Future research could examine how other types of media use are associated with social norms and vaping in college students. A potential way to strengthen the present study would be to examine the specific content on social media sites, such as advertisements that promote the use of electronic cigarettes. The promotion of electronic cigarette use on social media sites could be associated with social norms in college students and initiation of vape use. Future research could also examine electronic cigarette/vape use in relation to all four motivations (coping, conformity, social, and enhancement) for substance use, as social and conformity motive were assessed in the present study. Additionally, examining social norms and motivations for vaping by gender may be helpful in understanding why college students use electronic cigarettes and vaporizers.

## **Conclusion**

Overall, the findings indicate novel information about the relationship between social media, perceptions towards e-cigarettes, social norms, vaping motives, and vaping frequency among college students. Additionally, the findings related to perceptions towards e-cigarettes in this study versus other studies suggests that some college students perceive e-cigarettes more favorably than traditional cigarettes while others appear to view e-cigarettes more negatively, indicating some discrepancy in how college students perceive e-cigarettes. Social influences and campus environment may have a potential influence on how e-cigarettes and vaping are perceived. Nonetheless, college students may benefit from informative messages detailing the dangers of electronic cigarette/vape use. Health communication programs and campaigns may benefit from addressing the perceived norms surrounding e-cigarettes use among college students (Case et al., 2016). Given that college students have been found to perceive e-cigarettes as less addictive and harmful than traditional cigarettes (Cooper et al., 2017), health campaigns may benefit by explicitly addressing and targeting myths and misinformation.

Vaping continues to be a global public health crisis and undergraduate students are a particular demographic of interest as substance use is often initiated in college (Lipari & Francois, 2013). While all the dangers of e-cigarettes and vaporizers are still

being studied, smoking continues to be the leading cause of preventable death (CDC, 2019). By continuing to examine predictors of vape use and the role of social media, norms, and motives - we may be able to learn more about the ways in which we can prevent the initiation of vape use. While *JUUL* continues to promote itself online through social media (Chu et al., 2018), examining predictors of vape use may help public health professionals and psychologists to develop policies and prevention programs that aim to prevent vaping in young adults.

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