Nicotine, Tobacco, & Cannabis Use in the Digital Age: Psychosocial Influences on Multiple Health Risk Behaviors Among Young People

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I do not have any significant financial interest or other relationship with the manufacturers of any commercial products and/or providers of commercial services discussed in these presentations.
Research Goal

To better understand teens’ vaping behavior patterns and psychosocial influences on their e-cigarette use
Lawsuit: Juul violating federal law by marketing to teens
Juuling: The Addictive New Vaping Trend Teens Are Hiding

‘I Can’t Stop’: Schools Struggle With Vaping Explosion

Study Shows Big Rise in Teen Vaping This Year

More teens are vaping, and many think it's nicotine-free
Research Questions

How do teens’ vaping habits change over time?

Study 1: Examined patterns of use over 12 months in a sample of teens who vape
Study 1: Overview

- Adolescents recruited from the Bay Area for a longitudinal study on teen vaping using online ads and fliers
- Eligibility criteria (screening conducted via phone)
  - Age 13-18
  - Used an e-cigarette at least once in the past 30 days
  - At least 10 lifetime uses of an e-cigarette
- Eligible participants scheduled for a baseline session
- Self-report measures, saliva samples, and urine samples completed at baseline, 6mo, 12mo
Study 1: Descriptive Measures

- Demographics
- E-cigarette use history characteristics
- Current e-cigarette use characteristics
Study 1: Measures

- E-cigarette use frequency (days/month)
- E-cigarette dependence (ECDI scores)
- Past-month cigarette use (yes/no)
- Salivary cotinine (in ng/ml)
- Preferred device (Juul, mod, vape pen, other)

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1: Participant Characteristics

- Recruited 173 adolescent e-cigarette users

- 75% male
  - M age = 16.6
- 55% Non-Hispanic White
- 27% smoked in past month

Frequency:
- M days of use per month = 15.4 (SD=9.8)

Dependence
- M ECDI score = 3.5 (SD = 4.1)
Study 1: Participant Characteristics

**Current Nicotine Use**
- Unknown: 12%
- None contain nicotine: 7%
- Some contain nicotine: 39%
- All e-cigarettes contain nicotine: 42%

**Type of E-Cigarette Used**
- Customizable: 32%
- Other or unknown: 12%
- Vape pen: 34%
- Juul: 22%

**Current Flavor**

<table>
<thead>
<tr>
<th>Flavor</th>
<th>% Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>0</td>
</tr>
<tr>
<td>Fruit</td>
<td>60</td>
</tr>
<tr>
<td>Candy</td>
<td>0</td>
</tr>
<tr>
<td>Methol</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>
Study 1: Participant Characteristics

Nicotine Content of First E-Cigarette

- Unknown: 12%
- Did not contain nicotine: 40%
- Contained nicotine: 48%

First Flavor

- Fruit: 49%
- Tobacco: 6%
- Menthol: 9%
- Other: 9%
- Unknown: 12%

68% received first e-cigarette from a friend
79% first heard about e-cigarettes from a friend
Study 1 Results: Change over Time

E-Cigarette Use Frequency

Baseline 6 Months 12 Months*

- Baseline: 15.4
- 6 Months: 15
- 12 Months*: 19.6

*Significantly higher than baseline (p < .05)

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1 Results: Change over Time

E-Cigarette Dependence

<table>
<thead>
<tr>
<th>Time</th>
<th>ECDI Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>3.4</td>
</tr>
<tr>
<td>6 Months</td>
<td>4.5</td>
</tr>
<tr>
<td>12 Months*</td>
<td>5.1</td>
</tr>
</tbody>
</table>

*Significantly higher than baseline (p < .05)

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1 Results: Change over Time

Nicotine Exposure

COTININE IN NG/ML (MEDIAN)

Baseline 6 Months* 12 Months*

*Significantly higher than baseline (p < .05)

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1: Results

### Preferred Devices

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>6 Months</th>
<th>12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vape pen</td>
<td>34.1%</td>
<td>25%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Mod</td>
<td>32.4%</td>
<td>37.5%</td>
<td>31.5%</td>
</tr>
<tr>
<td>Juul</td>
<td>22%</td>
<td>30%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>11.6%</td>
<td>7.5%</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1: Results

E-Cigarettes Only
N = 127

Dual use N = 16
E-cig only N = 65
Cigs only N = 1
No Use N = 7
Lost to follow-up N = 38

Dual use N = 4
E-cig only N = 2
Cigs only N = 1
No Use N = 4
Lost N = 5

Dual use N = 8
E-cig only N = 44
Cigs only N = 1
No Use N = 7
Lost N = 6

E-cig only N = 2
Cigs only N = 1
No Use N = 3
Lost N = 1

Dual use N = 2
E-cig only N = 8
Cigs only N = 2
No Use N = 3
Lost N = 23

Vogel, Prochaska, Ramo, Andres, & Rubinstein, in press
Study 1: Results

Dual Use
N = 46

- Dual use
  N = 24
- E-cig only
  N = 7
- Lost to follow-up
  N = 15

  - Dual use
    N = 14
    E-cig only
    N = 5
    Cigs only
    N = 2
    Lost
    N = 3

  - Dual use
    N = 3
    E-cig only
    N = 3
    Cigs only
    N = 1

  - Lost
    N = 8

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E-cigarette use frequency, dependence, and cotinine increased over time

- Increases in nicotine exposure could be both a cause and a consequence of increased dependence
- Devices that yield higher nicotine (i.e., Juul, mods) became more popular

Transitions from single to dual and dual to single product use were observed in approximately 1 in 3 users

- 80.3% of the sample continued to use e-cigarettes at 12 months
- None of the baseline dual users abstained from both products at either follow-up
- Dual users may be a particularly high-risk group

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Study 1: Key Points

• Many adolescents who use e-cigarettes are not simply experimenting

• Use can escalate over time, with increased nicotine exposure
Research Questions

How do teens’ vaping habits change over time?

How does social media influence teen vaping?

Study 1: Examined patterns of use over 12 months in a sample of teens who vape

Study 2: Experimentally tested the effects of social media content on adolescents’ thoughts about vaping
TFIF!!! This week has had me like 😷😷😷 I hope everyone has an awesome weekend, good vibes only!!! 📩 ◯ ◯ 💌 vape #vapeporn #vapelife #vapecommunity #vapemaf #vapestagram #vapeon #vaping #instavape #alternative #photooftheday #vapedaily #juice #vapenation #cloudchaser #eliquid #photography #tattooedgirls #altgirl #ecg #vapepics #clouds #vapelove #netblowingsmoke #hdr #cloudchasing #girlswhovape #makeup #vapefriends #tattoo

Dope!

Another good shot you always on top fan have a good night 😘

Babe 😘

Gorgeous shot as always, hope you have a great weekend 😊❤️
Study Purpose
To investigate the impact of social media content on adolescents’ thoughts about e-cigarettes

Specific Aims
1. Examine the association between social media use intensity and e-cigarette thoughts and intentions
2. Experimentally test the effects of social media content on e-cigarette thoughts and intentions
Adolescents recruited online

Random assignment to condition (2 X 2 design)

View 6 Instagram posts

Complete measures

Post Source: Peer or ad
E-cig content exposure: Heavy or light
Participant Recruitment

- Recruited adolescents age 13-18, residing in California

- Study conducted online through Ipsos KnowledgePanel
  - Largest probability-based online panel in the US
  - Teens recruited through parents who were invited to be part of KnowledgePanel
  - Parents provided informed consent; teens provided assent
Hypotheses

**AIM 1**: Examine the association between social media use intensity and e-cigarette thoughts and intentions

- **H1**: Intense social media use will be associated with greater willingness to use.

**AIM 2**: Experimentally test the effects of social media content on e-cigarette thoughts and intentions

- **H2**: Heavy exposure to e-cigarette content will result in greater willingness to use.
- **H3**: Willingness to use will be highest among participants with heavy exposure to *peer-generated* e-cigarette content.
Measures

• Primary outcome
  • Willingness to use e-cigarettes

• Secondary outcomes
  • Intentions to use e-cigarettes
  • Attitudes
  • Norm perceptions
  • Risk perceptions

• Social media use intensity in daily life
Results: Participant Characteristics

- $N=135$
- Age: $M = 15.3$, $SD = 1.7$
- Gender: 52.6% female
- 91% never-smokers (8% lifetime, 1% past-month)
- Analyses weighted to population benchmarks

E-Cigarette Use

- 90% Never
- 8% Past
- 2% Past-month
Results: Aim 1

Aim 1: To examine the association between social media use intensity and e-cigarette thoughts and intentions

- **Greater willingness** to vape (p<.001)
- **Higher intentions** to vape (p<.001)
- **More positive attitudes** toward vaping (p<.001)
- Higher perceptions of vaping as **normative** (p=.001)
- **Lower perceptions of the danger** of vaping (p=.004)
Aim 2 Results: Primary Outcome

Willingness to Use E-Cigarettes

Peer Ad*

Willingness (low to high):

1 2 3 4 5 6 7

Heavy Exposure
Light Exposure
Aim 2 Results: Secondary Outcomes

Intentions to Use E-Cigarettes

- **Peer Ad**: Intentions (low to high)
  - Heavy Exposure: 1.42
  - Light Exposure: 1.3

- **Ad**: Intentions (low to high)
  - Heavy Exposure: 1.78
  - Light Exposure: 1.41

Legend:
- **Heavy Exposure**: *
- **Light Exposure**: 

*Values indicate strength of intentions.
Aim 2 Results: Secondary Outcomes

Attitudes Toward E-Cigarettes

- **Peer**
  - Heavy Exposure: 1.53
  - Light Exposure: 1.25

- **Ad**
  - Heavy Exposure: 1.93
  - Light Exposure: 1.47
Aim 2 Results: Secondary Outcomes

Perceived E-Cigarette Norms

- Peer: Heavy Exposure (1.43), Light Exposure (1.62)
- Ad*: Heavy Exposure (1.66), Light Exposure (1.78)
Conclusions

- Provides preliminary evidence that social media content affects teens’ susceptibility to e-cigarette use.
- High-intensity social media users may be a high-risk group.
- Future directions
  - Identify mechanisms for the relationship between high-intensity social media use and greater willingness to vape.
Research Goal

To understand the relationships between smoking, cannabis use, and young adults’ other health risk behaviors
Research Questions

Is quitting smoking associated with higher or lower metabolic risk behaviors?

Study 1: Tested relationships between smoking cessation, risk behaviors, and stress over nine months
Parent Study

2014-15 Getting Ready to Quit

Secret Group

Discussion Members Events Photos Files

Write Post Add Photo / Video Create Poll Add File

MEMBERS 15 Members

Add People to Group

Tsp Study

November 26, 2014

What would be the best-case scenario if you quit smoking? #motivation

What is the best case scenario if you quit smoking?
Measures

- Smoking (cigarettes in past week)
- Diet
- Physical activity
- Fruit and vegetable consumption
- Sleep hygiene
- Stress management
- Cannabis use
- Heavy alcohol use
- Other drug use
Health Risk Behavior Profiles

- **Metabolic risk**
  - High-fat, high-calorie diet
  - Low physical activity
  - Low FVC
  - Poor sleep
  - Poor stress management

- **Substance use risk**
  - Cannabis use
  - Heavy alcohol use
  - Other drug use

- **Low risk**
Study 1: Hypothesis

[Diagram showing a shopping basket filled with fruits and vegetables, an icon of a cigarette with a no-smoking symbol, and blocks with the word 'RISK' on them. Arrows indicate positive and negative relationships.]
Study 1: Hypothesis
Study 1: Results

- \(0.60^*\)
- \(-1.53^*\)
- \(-0.34^{**}\)
Study 1: Results

-0.59*

-1.94

1.99

-0.16

-0.68**

4.44***
Study 1: Conclusions

• Young adults who quit smoking were more ready to increase FVC 3 months later, and had lower metabolic risk behaviors 3 months after that.
  • *Only among those with high stress!*

• Increasing FVC may be a manageable first step toward a healthier diet.

• Young adults aiming to quit smoking should be supported in increasing FVC as well—even during times of high stress.
Research Questions

How does cannabis use relate to smoking cessation?

Study 2: Tested differences in smoking cessation outcomes between cannabis users and non-users
Study 2: Cannabis & Tobacco
Study 2: Results

Compared to non-users, young adult smokers who used cannabis were:

- Equally ready to quit tobacco ($p = .750$)
- Equally likely to attempt to quit tobacco ($p = .087$)
- Less likely to quit tobacco ($p = .017$)
- Less likely to reduce tobacco ($p = .036$)
Study 2: Conclusions

- Cannabis use may be a barrier to quitting tobacco.
- Smoking cannabis may trigger tobacco cravings, or prevent development of healthier coping.
- Young adult tobacco smokers should be asked about their cannabis use and supported in quitting or reducing cannabis.
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- Sabrina Darrow, PhD (UCSF)
- Caitlin Costello, MD (UCSF)