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Sponsorship Disclosures and Perceptions of E-cigarette Instagram Posts

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Objectives: Instagram influencers have many followers and are often paid to promote products, including e-cigarettes. This experimental study assessed effects of sponsorship disclosures on perceptions of e-cigarette Instagram influencer posts. **Methods:** Young adult e-cigarette users (age 18-29; N = 917) were randomly assigned to 3 experimental conditions varying the clarity of sponsorship disclosure on simulated Instagram influencer posts: clear (eg, “#sponsored”), ambiguous (eg, “#sp”), or no disclosure (ie, vaping-related hashtags only). After viewing each of 4 Instagram posts featuring a fictitious e-cigarette brand, participants reported hashtag recognition, ad recognition, ad trust, influencer credibility, and post engagement intentions. After viewing all posts, participants reported brand attitudes, brand use intentions, and vaping intentions. **Results:** With greater recognition of clear (but not ambiguous) disclosure hashtags, ad recognition increased ($p = .001$), perceptions of influencer credibility decreased ($p = .022$), and intentions to engage with posts decreased ($p = .008$). Ad trust was lower with greater hashtag recognition regardless of disclosures ($p < .001$). Sponsorship disclosures did not significantly affect brand attitudes, brand use intentions, or vaping intentions. **Conclusions:** Recognizing clear sponsorship disclosures may influence young adults’ perceptions of and engagement with e-cigarette Instagram posts but may not affect perceptions or use of products.

Key words: e-cigarette; ENDS; Instagram; influencer; advertising; social media
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E-cigarette use, or “vaping,” is popular among young adults, including those who have never used tobacco products,¹ thereby increasing their risk for nicotine dependence and exposure to toxicants.² Increasing vaping prevalence³ coincides with the rising popularity of Instagram, which has an estimated advertising audience of nearly 600 million young adults worldwide.⁴ E-cigarette content has been prevalent on social media, including Instagram, since the early 2010s.⁵⁻⁷ In a 2017 study of youth from Canada, England, and the United States (US), the majority of youth reported recent exposure to vaping ads and identified social media as one of their primary sources of vaping ad exposure.⁸ A 2018 petition sent to the US Federal Trade

Commission (FTC) by 9 leading public health and medical groups documented extensive sponsorship of social media posts by tobacco giants (eg, British American Tobacco, Phillip Morris International).⁹ A 2-year investigation released in 2018 found that sponsored vaping posts were viewed over 25 billion times worldwide, reaching over 40 countries.¹⁰

Although social media platforms (eg, Instagram, Twitter) now generally restrict paid advertisements for tobacco products (eg, e-cigarettes, little cigars, cigarillos),¹¹ data from 2017-2019 show that these products continue to be marketed on Instagram by affiliate marketers and sponsored influencers.¹² Influencers are individuals with large followings on social media whose posts are thought to influ-

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ence trends.¹³ Influencers are often paid to promote products,¹⁴ including e-cigarettes,¹² on Instagram. Influencer word-of-mouth advertising has greater credibility and authenticity than traditional advertising, as it is often integrated seamlessly with daily narratives influencers post on Instagram.¹⁵ E-cigarette influencer posts on Instagram attract underage users and drew increasing user engagement through the late 2010s.¹² Due to its highly visual nature, Instagram is particularly well-suited for glamorizing e-cigarette use. In 2019, vaping-related Instagram influencer posts containing sexualized imagery attracted more engagement from Instagram users compared to posts without sexualized imagery.¹² Exposure to e-cigarette social media content is associated with greater likelihood of vaping among young adults.^{15,16} Moreover, 2 recent experimental studies found that briefly viewing e-cigarette Instagram posts increased youth's positive attitudes toward e-cigarettes and intentions to vape,^{17,18} with one study identifying stronger effects when an e-cigarette was purportedly endorsed by a celebrity than a non-celebrity.¹⁸ A longitudinal study of adolescents found that exposure to e-cigarette advertising on Facebook was associated with greater risk of subsequent vaping, though Instagram use was not measured.¹⁹ A focus group of young adults, only half of whom had previously used e-cigarettes, had positive perceptions of Instagram e-cigarette posts.¹² In sum, influencers continue to promote e-cigarettes on Instagram despite restrictions, and their posts may have deleterious effects on young Instagram users.

The FTC has sought to mitigate the effects of influencer marketing by requiring influencers to disclose that they are being paid to promote the featured product (ie, sponsorship disclosures).²⁰ Sponsorship disclosures may help consumers make more informed decisions. According to the Persuasion Knowledge Model, recognition of advertising results in critical message processing and resistance to persuasion.²¹ Research on non-tobacco products shows that including disclosures on sponsored online content increases recognition of the content as an advertisement, compared with no disclosure^{22,23} or ambiguous disclosure.¹⁴ Disclosure can influence brand attitudes^{22,23} by decreasing trust in the brand and the influencer. Two studies did not find statistically significant direct effects of disclosure condition on purchase intentions,^{14,23} although one

study²³ found that disclosure was related to perceptions of the influencer and advertisement. The extent to which sponsorship disclosures on Instagram influencer posts affect e-cigarette use is unknown. Because many young adult e-cigarette users have never smoked cigarettes,²⁴ and young e-cigarette users are at risk for smoking,²⁵⁻²⁷ clear sponsorship disclosures could benefit public health if they reduce young adults' likelihood of vaping.

In this study, we sought to determine the effects that clear and ambiguous sponsorship disclosures on e-cigarette influencer posts have on young adult e-cigarette users' perceptions and intentions regarding vaping. Due to young adults' frequent Instagram use⁴ and Instagram's algorithms that tailor content to individual behaviors and interests, young adults who vape are highly likely to see e-cigarette influencers' posts on Instagram. In an experimental study, participants viewed simulated Instagram posts that used hashtags to vary the clarity of sponsorship disclosures (ie, clear disclosures, ambiguous disclosures, or no disclosures). Then, participants reported perceptions of the post, influencer, and brand, plus intentions to interact with the post, try the brand's products, and vape. Based on prior research, we hypothesized that compared with no disclosures, disclosures would result in: (1) greater recognition of the post as an advertisement, (2) lower ad trust, (3) lower perceptions of influencer credibility, (4) lower intentions to interact with posts, (5) more negative attitudes toward the brand, (6) less interest in trying the brand, and (7) lower intentions to vape. We hypothesized that clear disclosures would be more influential than ambiguous disclosures.

METHODS

Participants, Procedure, and Design

Eligibility and recruitment. Eligible participants were 18-to-29-year-olds in the US who had used an e-cigarette at least once and used Instagram at least weekly. These criteria represent the subset of young adults who are most likely to see e-cigarette influencer posts on Instagram, as the platform tailors its suggested content to users' interests and behavior. Participants were recruited online using Qualtrics survey panels with quotas to ensure diversity in race/ethnicity, education, and sex approximately equivalent to the US census distribu-

tion. Qualtrics panelists receive rewards points as compensation.

Procedure. Qualtrics panelists completed an online screener, and those eligible consented and completed the study online. All participants first answered questions about their Instagram and tobacco product use (ie, descriptive measures). Next, participants viewed 4 Instagram posts purportedly created by influencers. Posts differed by experimental condition as described below. Participants were instructed to imagine that they were scrolling through their Instagram feeds and came across the posts made by influencers they follow. They were asked to look at each post carefully, including its hashtags, before answering subsequent questions. After viewing each post, participants answered a series of questions about that post (ie, post-level outcomes) before viewing the next post. After viewing all 4 posts, participants completed measures assessing attitudes and intentions toward the brand in the posts (ie, brand-level outcomes) and additional demographic questions (ie, descriptive measures). Lastly, participants were debriefed.

Experimental design and Instagram posts. Participants were randomly assigned to one of 3 conditions, which determined the sponsorship disclosures they viewed. In the clear disclosure condition, the first hashtag in each post was a clear disclosure (“#sponsored” or “#paidad”)¹⁴ and the second was a popular hashtag related to vaping and congruent with the photo (eg, #girlshovape, #guyswhovape, #vapefam, #vapelyfe). Popular vaping-related hashtags were identified by browsing Instagram just prior to the data collection period and were varied across posts. In the ambiguous disclosure condition, the first hashtag was an ambiguous disclosure (“#partner” or “#sp”)²⁸ and the second hashtag was vaping-related. In the no disclosure condition, both hashtags were vaping-related.

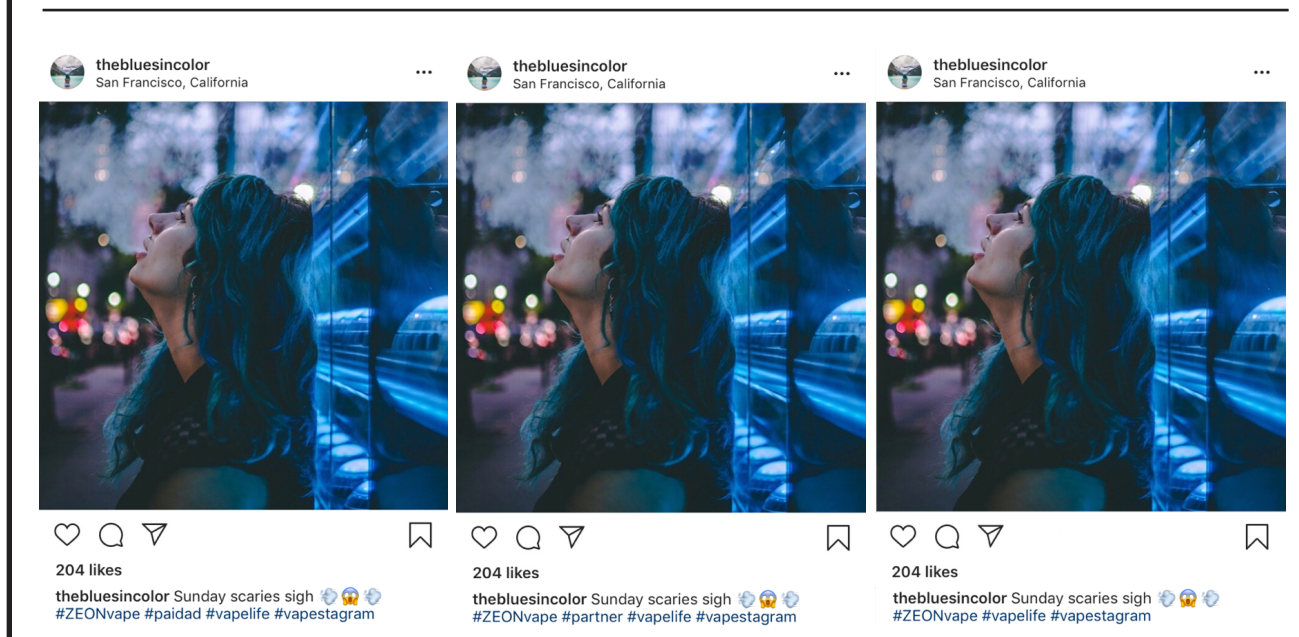
The research team created 11 sets of posts, with each set depicting a different hypothetical influencer, including diversity in sex, race/ethnicity, and location. Drawing sets of stimuli from a larger pool of posts follows recommendations for message evaluation,²⁹ and reduces the likelihood that results are due to idiosyncratic differences among stimuli rather than manipulated constructs.³⁰ Each set contained 3 posts (one for each disclosure condition), resulting in 33 total posts. Once randomly

assigned to a condition, participants were randomized to view 4 of 11 posts in their condition, in random order.^{29,30} Each post contained a photo of a young adult vaping and a caption written by the research team, modeled on existing influencer Instagram posts. Photos were publicly available or were purchased from photograph sites. All photos were carefully chosen to resemble the style of real Instagram influencer posts. Each post had between 128 and 214 “likes,” based on published engagement rates for Instagram influencers with relatively small followings.³¹ In each post set, the image and caption were identical across conditions except for hashtags (Figure 1). Consistent with prior research,³² a fictitious e-cigarette brand name in hashtag form (#ZEONvape) was included on all posts along with the 2 other hashtags that varied by condition (described above).

Measure

Post-level outcomes. After each post, participants completed measures of ad recognition, ad trust, influencer credibility, and post engagement intentions. The *ad recognition* measure read, “Indicate the extent to which you thought the Instagram post was advertising” (1 = strongly disagree, 7 = strongly agree).^{14,33} *Ad trust* consisted of 4 statements (eg, “I think the Instagram post tells the truth”) rated on the 7-point Likert scale.^{22,34} The *influencer credibility* measure asked participants to evaluate the influencer on 6 traits using 5-point semantic differential scales (dishonest/honest, untrustworthy/trustworthy, uninformed/informed, stupid/smart, attractive/unattractive, popular/unpopular; adapted from prior research).³⁵ The 3-item *post engagement intentions* measure adapted from prior research³⁶ asked how likely participants would be to: (1) “like,” (2) comment on, and (3) share the post on a 5-point Likert scale. Participants also completed *hashtag recognition* measures after each post. They were given a list of 5 hashtags, plus a “none of these” option and asked to indicate which hashtags they saw in the post they viewed. Two correct answers were provided for each post: the brand name (#ZEONvape), and the disclosure hashtag (clear and ambiguous disclosure conditions) or one of the vaping-related hashtags (no disclosure condition). The remaining 3 options and “none of these” were incorrect.

Figure 1
Sample Instagram Posts from a Single Post Set, Showing Each Experimental Condition. From Left to Right: Clear Disclosure, Ambiguous Disclosure, No Disclosure



Average scores on each post-level outcome for each of the 11 influencers, combining across the 3 conditions for each influencer, are reported in Supplemental Table 1. All outcomes (ad recognition, ad trust, post engagement intentions, influencer credibility, and hashtag recognition) were similar across influencers, suggesting that observed differences in outcomes were not due to individual influencer characteristics.

Brand-level outcomes. After viewing all 4 posts, participants completed measures of their attitudes toward the fictitious ZEON Vape brand (*brand attitudes*), hypothetical intentions to use the brand if it were real (*brand intentions*), and intentions to vape (*vaping intentions*). The *brand attitudes* measure asked participants to rate the brand on 6 traits using 5-point semantic differential scales (unappealing/appealing, bad/good, unpleasant/pleasant, unfavorable/favorable, unlikeable/likeable, untrustworthy/trustworthy).^{22,37} To measure *brand intentions*, participants rated agreement with the statements: “I would like to try this brand” and “I would buy other vaping products of this brand” on a 5-point Likert scale.^{14,38} To measure *vaping intentions*, participants answered: “Do you think you

will use an e-cigarette soon?” and “If one of your best friends were to offer you an e-cigarette, would you use it?” (1 = definitely yes, 4 = definitely no; reverse-scored for analyses).³⁹ These 2 items specifically reflect intentions to use, rather than curiosity about e-cigarettes, and were derived from a validated and widely used measure of susceptibility to use.³⁹

Descriptive measures. Participants reported *Instagram use intensity* with 6 items (eg, “Instagram is part of my everyday activity”), measured on 1-5 Likert-type scales (adapted from the Facebook Intensity Scale).⁴⁰ Participants also reported *past-month use (0-30 days) of each of the following*: cigarettes, cig-a-likes (eg, Blu, NJOY), cartridge-style or pod vapes (eg, JUUL, Suorin), vape pens (eg, eGO-C), and large tank devices (eg, eGO-V, KangerTech). Definitions, examples, and pictures of each product category were provided. To describe tobacco product use in this sample, responses were coded into “cigarettes only” (1+ days of cigarette use, 0 days of any e-cigarette product), “e-cigarettes only” (0 days of cigarette use, 1+ days of e-cigarette product[s]), “dual use” (1+ days of cigarette use and 1+ days of e-cigarette product[s]), and “no use” (0 days of use-

Table 1
Participant Characteristics by Sponsorship Disclosure Condition in Analytic Sample (N = 917)

| | Clear (N = 299) | Ambiguous (N = 299) | No Disclosure (N = 319) | Overall (N = 917) |
|--|--------------------|------------------------|----------------------------|----------------------|
| Sex assigned at birth (% female) | 173 (57.9%) | 160 (53.5%) | 173 (54.2%) | 506 (55.2%) |
| Gender identity | | | | |
| Female | 156 (52.5%) | 160 (53.9%) | 163 (52.1%) | 479 (52.8%) |
| Male | 127 (42.8%) | 126 (42.4%) | 138 (44.1%) | 391 (43.1%) |
| Gender minority | 14 (4.7%) | 11 (3.7%) | 12 (3.8%) | 37 (4.1%) |
| Sexual identity | | | | |
| Straight/heterosexual | 239 (80.2%) | 229 (77.6%) | 243 (76.4%) | 711 (78.0%) |
| Gay or lesbian | 12 (4.0%) | 22 (7.5%) | 20 (6.3%) | 54 (5.9%) |
| Bisexual | 44 (14.8%) | 42 (14.2%) | 51 (16.0%) | 137 (15.0%) |
| Other | 3 (1.0%) | 2 (0.7%) | 4 (1.3%) | 9 (1.0%) |
| Age (M/SD) | 23.9 (3.4) | 23.8 (3.2) | 23.9 (3.5) | 23.9 (3.4) |
| Race/ethnicity | | | | |
| Non-Hispanic White | 184 (62.6%) | 148 (50.0%) | 161 (51.8%) | 493 (54.7%) |
| Non-Hispanic Black | 26 (8.8%) | 36 (12.2%) | 42 (13.5%) | 104 (11.5%) |
| Hispanic | 60 (20.4%) | 86 (29.1%) | 66 (21.2%) | 212 (23.5%) |
| Other or multiple race(s) | 24 (8.2%) | 26 (8.8%) | 42 (13.5%) | 92 (10.2%) |
| Education | | | | |
| Less than college degree | 180 (60.2%) | 183 (61.2%) | 190 (60.3%) | 553 (60.6%) |
| College degree | 119 (39.8%) | 116 (38.8%) | 125 (39.7%) | 360 (39.4%) |
| Current student status | | | | |
| Not currently attending school | 81 (27.5%) | 84 (28.6%) | 89 (28.4%) | 254 (28.2%) |
| High school or GED classes | 55 (18.6%) | 59 (20.1%) | 55 (17.6%) | 169 (18.7%) |
| Community college | 53 (18.0%) | 42 (14.3%) | 49 (15.7%) | 144 (16.0%) |
| 4-year college or university | 98 (33.2%) | 105 (35.7%) | 116 (37.1%) | 319 (35.4%) |
| Instagram intensity (M/SD) | 3.8 (.81) | 3.7 (.81) | 3.7 (.83) | 3.8 (.82) |
| Past-month tobacco product use | | | | |
| No use | 6 (2.0%) | 11 (3.7%) | 14 (4.4%) | 31 (3.4%) |
| Cigarettes only | 6 (2.0%) | 1 (0.3%) | 7 (2.2%) | 14 (1.5%) |
| E-cigarettes only | 113 (37.8%) | 104 (34.8%) | 125 (39.2%) | 342 (37.3%) |
| Dual use | 173 (58.2%) | 183 (61.2%) | 173 (54.2%) | 530 (57.8%) |
| Time to first e-cigarette | | | | |
| Within 30 minutes of waking | 152 (51.2%) | 134 (44.8%) | 137 (43.8%) | 423 (46.5%) |
| After 30 minutes | 145 (48.8%) | 165 (55.2%) | 176 (56.2%) | 486 (53.5%) |
| Self-perceived e-cigarette addiction from 0-100% (M/SD) | 55.6% (31.4%) | 48.4% (32.1%) | 51.1% (31.7%) | 51.7% (31.8%) |

Note.

Percentages are of complete cases.

Table 2
Mean Post-level and Brand-level Outcomes by Condition

| | Clear (N = 299) | Ambiguous (N = 299) | No Disclosure (N = 319) | Overall (N = 917) |
|-----------------------------|--------------------|------------------------|----------------------------|----------------------|
| Post-level variables | | | | |
| Ad recognition | 3.91 (.80) | 3.58 (.88) | 3.57 (.90) | 3.68 (.88) |
| Ad trust | 2.81 (.92) | 2.92 (.87) | 2.84 (.88) | 2.86 (.89) |
| Influencer credibility | 3.32 (.86) | 3.32 (.86) | 3.38 (.82) | 3.34 (.85) |
| Post engagement intentions | 2.53 (1.07) | 2.50 (1.08) | 2.50 (1.05) | 2.51 (1.07) |
| Brand variables | | | | |
| Brand attitudes | 3.46 (1.02) | 3.47 (1.04) | 3.50 (1.00) | 3.48 (1.02) |
| Brand intentions | 4.27 (1.33) | 4.12 (1.46) | 4.21 (1.46) | 4.20 (1.42) |
| Vape intentions | 3.32 (.69) | 3.27 (.77) | 3.19 (.78) | 3.26 (.75) |

ing any product). To measure nicotine dependence, participants reported *time before using e-cigarettes* after waking on a typical day (within 30 minutes/after 30 minutes)⁴¹ and *self-perceived addiction to e-cigarettes* on a 0-100% scale (not at all addicted to extremely addicted).⁴² *Demographics* included sex assigned at birth (male/female), gender identity (female, male, trans female/trans woman, trans male/trans man, genderqueer/gender non-conforming, or other), age (in years), race/ethnicity (recoded into non-Hispanic White, non-Hispanic Black, Hispanic, and other/multiple races), education (recoded into college degree vs less than a college degree), sexual identity (straight/heterosexual, gay/lesbian, bisexual, other, unreported), and current student status (not enrolled, high school or GED classes, community college, 4-year college or university, unreported). Participants also reported whether they would commit to providing honest answers. Only participants who responded that they would provide their best answers were included in analyses.

Data Analysis

Data aggregation. Reliability was calculated and exploratory factor analyses with maximum likelihood extraction and promax rotation were conducted for each measure with 3 or more items. Because each participant viewed 4 posts and completed post-level measures 4 times, reliability and factor structure for post-level measures were examined within each post. For 3 of the 33 posts, a small second factor was extracted from the influencer credibility measure; otherwise, all scales were uni-

dimensional across all influencers. Therefore, post engagement intentions ($\alpha = .74-.86$), influencer credibility ($\alpha = .84-.91$), brand attitudes ($\alpha = .93$), and Instagram intensity (alpha = .84) scores were computed using the mean of all items in each measure. Ad trust had poor reliability ($\alpha = .49-.76$), which improved when the reverse-scored item (“I don’t believe what the influencer wrote in the Instagram post”) was dropped ($\alpha = .68-.86$). Negatively worded items paired with mostly positively-worded items can be cognitively confusing, and thus, challenging for participants to answer accurately, and dropping reverse-scored items often improves a measure’s reliability and validity.⁴³⁻⁴⁵ Brand and vape intentions scores were calculated using the mean of the 2 items in each measure. Correlations between 2-item measures (brand intentions, vape intentions) were examined. The 2 brand intentions ($r = .76, p < .001$) and 2 vape intentions variables ($r = .60, p < .001$) were strongly correlated.

Hashtag recognition. Participants’ recognition of disclosure (clear and ambiguous disclosure conditions) or vaping hashtags (no disclosure condition) was scored. For each of the 4 posts, selecting the correct hashtag was coded as “1;” not selecting the correct hashtag was coded as “0.” Points were summed; therefore, hashtag recognition scores could range from 0 to 4.

Effects of disclosure condition on post- and brand-level outcomes. Seven linear regression analyses were conducted, with condition and disclosure hashtag recognition as independent variables and post- and brand-level outcomes as the dependent

Table 3
Post-level and Brand-level Outcomes by Disclosure Condition and Recognition of Disclosure Hashtags

| | Ad recognition | | | Ad trust | | | Influencer credibility | | | Post engagement intent | | |
|--|----------------------|---------|-----------------|----------------------|---------|-----------------|------------------------|---------|-------------|------------------------|---------|-----------------|
| | Model R ² | Model F | Model p | Model R ² | Model F | Model p | Model R ² | Model F | Model p | Model R ² | Model F | Model p |
| | β | t | p | β | t | p | β | t | p | β | t | p |
| Ambiguous condition^a | .04 | 8.22 | <.001 | .08 | 14.77 | <.001 | .02 | 3.96 | .001 | .05 | 9.11 | <.001 |
| Clear condition^b | .17 | 4.31 | <.001 | -.08 | -1.96 | .051 | -.06 | -1.39 | .166 | -.03 | -.63 | .532 |
| Hashtag recognition^c | -.11 | -1.89 | .060 | -.23 | -3.83 | <.001 | -.06 | -1.06 | .292 | -.15 | -2.40 | .017 |
| Ambiguous X recognition^d | .07 | 1.50 | .134 | .04 | .90 | .371 | .01 | .26 | .796 | .01 | .18 | .857 |
| Clear X recognition^e | .15 | 3.36 | .001 | -.11 | -2.46 | .014 | -.11 | -2.29 | .022 | -.12 | -2.64 | .008 |
| | Brand attitudes | | | Brand intentions | | | Vape intentions | | | | | |
| | Model R ² | Model F | Model p | Model R ² | Model F | Model p | Model R ² | Model F | Model p | | | |
| | β | t | p | β | t | p | β | t | p | | | |
| Ambiguous condition^a | .01 | 1.19 | .310 | .01 | 1.98 | .080 | .01 | 1.36 | .237 | | | |
| Clear condition^b | -.03 | -.83 | .409 | .004 | .11 | .910 | .09 | 2.37 | .018 | | | |
| Hashtag recognition^c | -.04 | -.67 | .505 | -.04 | -.70 | .486 | .07 | 1.14 | .256 | | | |
| Ambiguous X recognition^d | .03 | .65 | .518 | .02 | .31 | .755 | -.02 | -.30 | .761 | | | |
| Clear X recognition^e | -.06 | -1.19 | .235 | -.07 | -1.50 | .134 | -.02 | -.33 | .745 | | | |

Note.

^aTests main effects of ambiguous disclosures compared to no disclosure

^bTests main effects of clear disclosures compared to no disclosure

^cTests main effect of correctly recognized disclosure/vaping hashtags

^dTests interaction between exposure to ambiguous disclosure (vs no disclosure) and correctly recognized disclosure hashtags

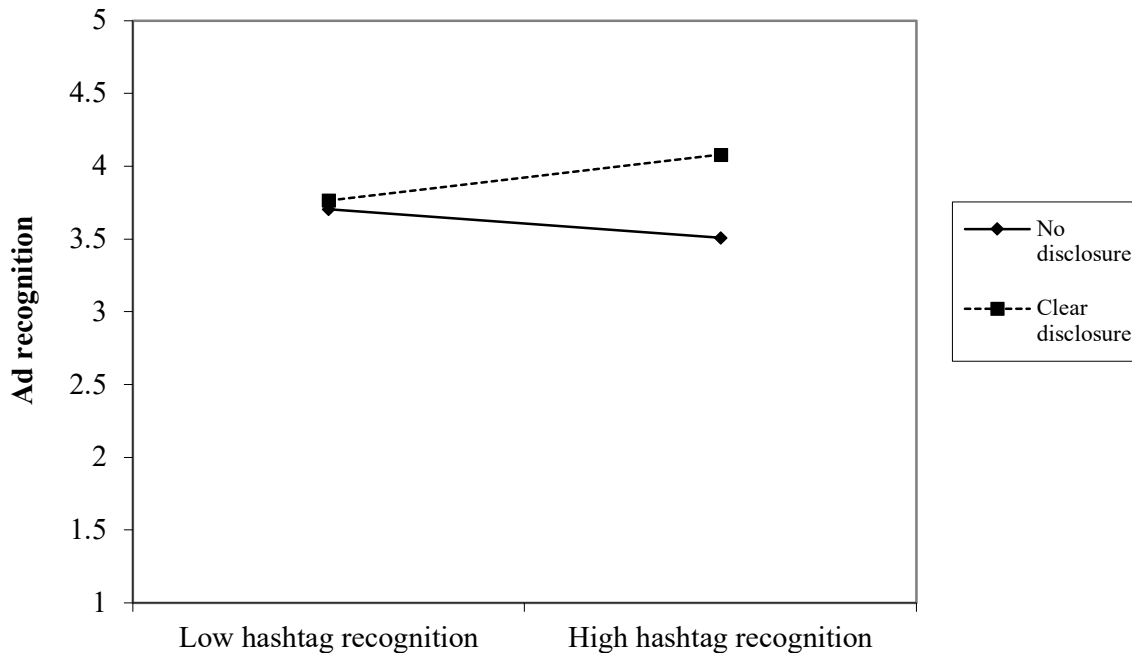
^eTests interaction between exposure to clear disclosure (vs no disclosure) and correctly recognized disclosure hashtags

Bolded p-values are statistically significant after correcting for multiple comparisons using the Benjamini-Hochberg procedure.

variables. Condition was dummy-coded, with “no disclosure” as the reference group. Similar to previous research on sponsorship disclosures,¹⁴ we examined hashtag recognition (ie, correctly identifying the hashtags viewed) as a potential moderator of the effects of viewing sponsorship disclosures.

Participants who do not remember seeing the disclosure hashtags may have been less influenced by them. The Benjamini-Hochberg procedure⁴⁶ was applied to the 7 models to control the false-discovery rate across all outcomes. All p-values < .009 were considered statistically significant.

Figure 2
Effect of Clear Sponsorship Disclosure (vs No Disclosure) on Advertising Recognition as a Function of Hashtag Recognition. Greater Recognition of Clear Disclosure Hashtags Resulted in Higher Advertising Recognition



RESULTS

Participant Characteristics

Table 1 displays participant characteristics. A slight majority (55%) of the sample was female. The sample was 55% non-Hispanic White, 24% Hispanic, 12% non-Hispanic Black, and 10% multiracial or other. The most common pattern of tobacco use was past-month use of both e-cigarettes and cigarettes (58%), followed by e-cigarettes only (37%), cigarettes only (2%) and no past-month use (3%).

Effects of Disclosure Condition

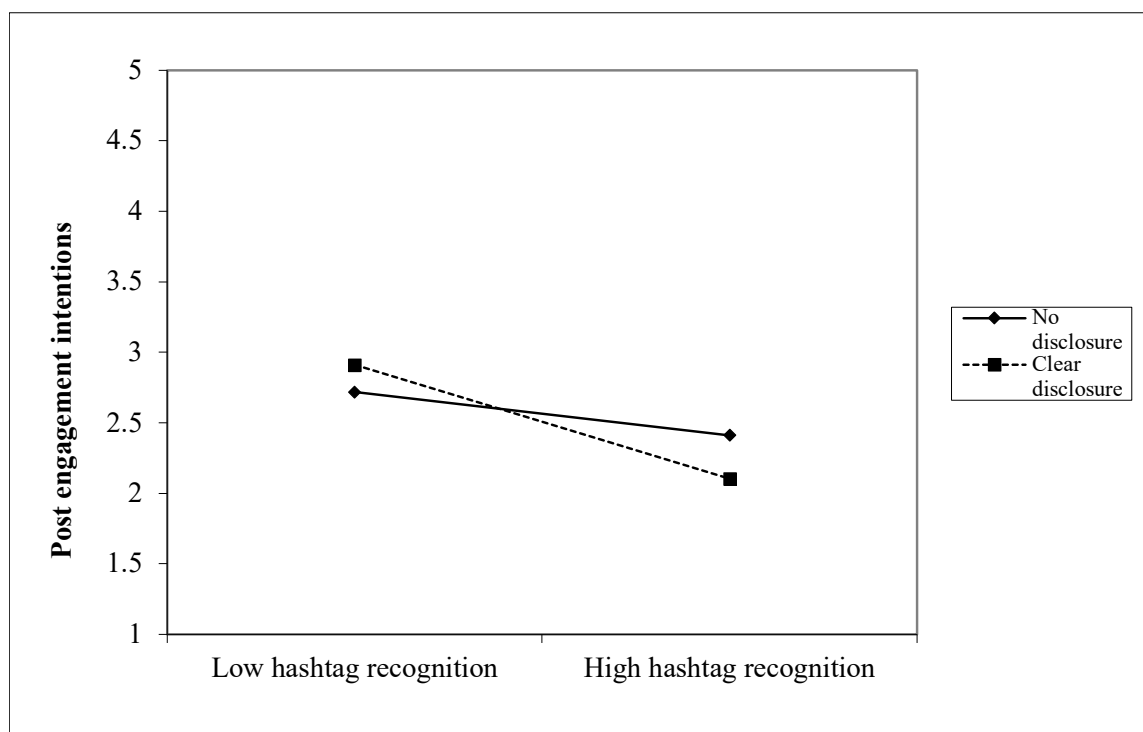
Average scores for each outcome by condition are in Table 2. Results of regression models are in Table 3.

Post-level outcomes. Exposure to and recognition of sponsorship disclosures significantly impacted ad recognition (model $R^2 = .04$, $F = 8.22$, $p < .001$), ad trust (model $R^2 = .08$, $F = 14.77$,

$p < .001$), influencer credibility (model $R^2 = .02$, $F = 3.96$, $p = .001$), and post engagement intent (model $R^2 = .05$, $F = 9.11$, $p < .001$). First, participants who saw clear disclosures were more likely to perceive the Instagram post as an advertisement ($M = 3.91$, $SD = .80$) compared with those who did not see a disclosure ($M = 3.57$, $SD = .90$; $p < .001$). Ambiguous disclosures ($M = 3.58$, $SD = .88$) did not elicit increased advertising recognition, relative to no disclosure ($p = .747$). This finding suggests that clear disclosures were indeed clearer indications of sponsorship than ambiguous disclosures. This main effect was qualified by an interaction, such that advertising recognition increased with greater recognition of clear disclosure hashtags ($p = .001$), as Figure 2 illustrates.

Second, ad trust was lower with greater hashtag recognition, regardless of the hashtag’s content ($p < .001$). Ad trust decreased with greater recognition of clear disclosure hashtags, though this interaction was not statistically significant after correcting

Figure 3
Effect of Clear Sponsorship Disclosure (vs No Disclosure) on Post Engagement Intentions as a Function of Hashtag Recognition. Greater Recognition of Clear Disclosure Hashtags Resulted in Lower Intentions to Engage with the Influencers' Posts



for multiple comparisons ($p = .014$). Third, when hashtag recognition was greater, clear disclosures resulted in less positive perceptions of the influencer, though not significantly after correcting for multiple comparisons ($p = .022$). Fourth, when hashtag recognition was greater, clear disclosures resulted in lower intentions to engage with the post ($p = .008$), as Figure 3 illustrates.

Brand-level outcomes. Sponsorship disclosures did not significantly affect brand attitudes (model $R^2 = .01$, $F = 1.19$, $p = .310$), brand intentions (model $R^2 = .01$, $F = 1.98$, $p = .080$), or vape intentions (model $R^2 = .01$, $F = 1.36$, $p = .237$).

DISCUSSION

This is the first study to examine the impact of disclosures on young adult e-cigarette users' perceptions of e-cigarettes and influencers on Instagram. Viewing and recognizing sponsorship disclosures on Instagram influencer posts affected young

adults' recognition of the influencer posts as advertising, trust in the advertisements, perceptions of the influencers' credibility, and intentions to engage with (ie, "like" or comment on) the influencers' posts. Most notably, participants who viewed clear sponsorship disclosures had significantly greater recognition of the posts as advertisements and lower intentions to interact with the posts. Participants who saw clear disclosures also had lower trust in the ads and viewed the influencers as less credible, although these interactions were not statistically significant after correcting for multiple comparisons. Participants who correctly recognized more hashtags had lower ad trust, regardless of the hashtags' content. Importantly, viewing disclosures did not affect participants' attitudes toward the brand, intentions to use the brand's products, or intentions to vape.

The finding that clear disclosures promoted recognition of posts as advertisements is consistent

with the purpose of disclosures and with research in other domains.^{14,22,23,47} Disclosures are intended to inform consumers that an Instagram post is a paid endorsement of a product. Simply viewing clear disclosures increased ad recognition, whereas viewing ambiguous disclosures did not, suggesting that the clear disclosure hashtags used in this experiment were indeed clearer indications of sponsorship than the ambiguous disclosure hashtags. Importantly, the relationship between viewing clear disclosures and recognizing an influencer post as an advertisement was especially strong among young adult e-cigarette users with better recognition of the clear disclosure hashtags, who may have paid more attention to the hashtags.

Clear disclosures did not affect trust in the advertisement to the same extent as advertising recognition. Participants who correctly recognized more hashtags had less trust in the ads, regardless of whether the hashtags contained clear disclosures, ambiguous disclosures, or no disclosures. Recognizing more hashtags may reflect greater attention paid to the advertisement and its claims. When more attentional resources are devoted to processing a message, stronger arguments are needed to persuade a consumer.⁴⁸ E-cigarette influencer posts mostly rely on peripheral cues, such as attractive models, rather than deeper persuasive arguments.¹² Viewers who process a message more deeply may not be persuaded by such peripheral cues. Instagram allows individuals to scroll easily through many posts, rather than lingering on a single post and processing a message deeply. Therefore, many Instagram users' ad trust may not be affected by sponsorship disclosures.

Viewing and recognizing clear sponsorship disclosures was modestly associated with lower ad trust, but this difference did not reach statistical significance after correcting for multiple comparisons. Similarly, viewing and recognizing clear disclosures was only modestly associated with perceiving the influencer as less credible. Influencer posts are designed to appear to be personal posts, not traditional advertisements, and may be viewed as reflections of the influencer themselves. Some Instagram users' positive perceptions of influencers may be separate from their perceptions of the brand. Indeed, other research has found that disclosures were not detrimental to Instagram users'

perceived closeness with influencers.⁴⁹

Viewing and recognizing clear disclosures resulted in significantly lower intentions to engage with the Instagram post. This finding is consistent with an analysis of alcohol promotions from Instagram influencers followed by young adults. Alcohol posts with a sponsorship disclosure had significantly fewer likes and comments than alcohol posts from influencers without a sponsorship disclosure.⁵⁰ Results may reflect a trend toward overall skepticism of e-cigarette influencer posts that are perceived as advertisements. Social media is conducive for developing parasocial interaction (ie, the perception of having a personal relationship with a media figure),⁵¹ including the sense of connection with an influencer.⁴⁹ Importantly, participants in this study viewed only one post from each influencer. Following an influencer may build trust over time and produce different results, including greater post engagement.

Disclosures did not affect brand attitudes, perhaps because participants may not have attributed sponsorship to the brand. According to the Persuasion Knowledge Model, when consumers are unsure which aspects of an advertisement are driven by a sponsor versus by an individual (ie, an influencer), they may evaluate the influencer more than the sponsor.²¹ This may explain why participants who recognized the clear disclosure had somewhat more negative perceptions of influencers, but brand attitudes were unaffected. Importantly, disclosures did not affect interest in trying the brand's products or their intentions to vape, even among those who recognized the disclosures. Although clear disclosures on e-cigarette posts may accomplish the goal of alerting consumers to a sponsored post, results suggest that clear disclosures did not discourage vaping among young adults with previous vaping experience.

Warning labels have been required on e-cigarette social media advertisements, including influencer posts, since August 2018.⁵² Text warnings on images posted on Twitter from a fictitious e-cigarette brand negatively influenced health perceptions (compared with no warning).³² One study found that most sponsored e-cigarette Instagram posts sampled from June 2019 did not include FDA-mandated warning labels. Only 3%-11% of posts in each category (eg, e-juice, mod devices) included

the required labels.¹² Although not synonymous with sponsorship disclosures, continued proliferation of e-cigarette posts that omit FDA-mandated warning labels suggests that enforcement is an ongoing challenge. Instagram banned e-cigarette companies from using its “branded content” advertising feature in December 2019;⁵³ however, influencer posts that do not use the “branded content” feature will likely remain on Instagram.

Limitations and Future Directions

Although our study’s experimental design is a strength, participants had limited exposure to sponsored e-cigarette content (ie, viewing 4 posts on a single occasion). The limited exposure may have diminished our ability to detect distal effects, such as interest in the product. Disclosures affected participants’ recognition of the posts as advertisements, suggesting that the experimental manipulation was successful. Repeated exposure to content may produce stronger results. Participants varied in how frequently they used e-cigarettes. Craving, which was not measured before exposure to the Instagram posts, may have influenced intentions to vape. Although we would not expect craving to interact with exposure to sponsorship disclosures to influence outcomes, adjusting for pre-exposure craving could have strengthened results. Furthermore, we used a fictitious brand and influencers to eliminate pre-existing attitudes toward a brand and maximize variation in influencers. This approach increases internal validity.³² Images and captions in the posts were designed carefully to resemble Instagram posts made by real influencers, and participants were instructed to imagine that they followed the fictitious influencers on Instagram. Nonetheless, participants may have responded differently to influencers they personally follow. Additional research to extend ecological validity would complement the contributions of this experimental study. Lastly, our study focused specifically on young adults who have used e-cigarettes at least once and recruited a convenience Internet panel sample. Although the sample is not representative of all young adult e-cigarette users, prior research concluded that a convenience Internet panel sample yielded findings comparable to those of a representative sample in experimental studies of tobacco-related behavior.⁵⁴ We also used quotas in our sampling to

ensure diversity in participant characteristics. Due to the algorithms Instagram uses to curate content, experienced e-cigarette users are most likely to be exposed to vaping-related content. The effects of disclosures on social media users who have not used e-cigarettes is also worthy of study. Non-users of e-cigarettes may have greater variability in their intentions to use e-cigarettes in the future.

Conclusions

Viewing and recognizing clear disclosures of sponsorship on e-cigarette Instagram posts increased young adult e-cigarette users’ perceptions of the posts as advertisements and decreased intentions to engage with the posts. Disclosures did not affect perceptions of the brand, intent to use the brand’s products, or intent to vape. When noticed by viewers, clear disclosures may lead to greater awareness of influencer posts as sponsored advertisements. Future research should explore effects of additional safeguards, such as warning labels on Instagram images, to communicate risks of vaping to young social media users.

IMPLICATIONS FOR TOBACCO REGULATION

Social media tobacco advertising, including influencer posts on Instagram, elicits billions of impressions worldwide.¹⁰ Although disclosure of sponsorship on tobacco-related Instagram influencer posts is inconsistent and is an important first step toward brand transparency,⁹ additional regulatory action may be needed to protect young adults’ health. Internationally, the World Health Organization Framework Convention on Tobacco Control recognizes the importance of restricting tobacco advertising in digital media and requiring disclosures of sponsorship.⁵⁵ In the US, the Food and Drug Administration (FDA) requires that print and other ads that include visual components (eg, ads on signs, shelf-talkers, Internet Web pages, and emails) carry a warning label about the addictiveness of nicotine.⁵⁶

Our results suggest that clear sponsorship disclosures are necessary, but not sufficient, to protect young adult e-cigarette users from negative effects of influencer content on Instagram. Because Instagram is highly visual, placing text warnings on images (rather than in the caption) may be an im-

portant adjunct to clear sponsorship disclosure. Policies on disclosure and warnings also need enforcement measures to be effective. Social media content can be disseminated rapidly worldwide, creating challenges for any individual government seeking to regulate content. Social media platforms need to establish and enforce their own regulations in addition to government action. Restrictions should apply to all tobacco products, including emerging products (eg, heated tobacco products), regardless of the country in which posts originate.

Human Subjects Approval Statement

All research activities were approved by the University of California, San Francisco Institutional Review Board.

Conflict of Interest Disclosure Statement

The authors have no financial relationships relevant to this article or potential conflicts of interest to disclose.

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**Supplemental Table 1
 Post Outcomes by Influencer**

| | Brand hashtag recognition (N/% correct) | Second hashtag recognition (N/% correct) | Post engagement intentions (M/SD) | Influencer credibility (M/SD) | Ad recognition (M/SD) | Ad trust (M/SD) |
|---------------|--|---|--|--------------------------------------|------------------------------|------------------------|
| Aris | 324 (80.4%) | 239 (59.3%) | 2.51 (1.15) | 3.34 (.95) | 3.67 (1.18) | 2.82 (.97) |
| Aimee | 264 (80.7%) | 184 (56.3%) | 2.64 (1.15) | 3.41 (.93) | 3.76 (1.11) | 2.94 (1.01) |
| Azure | 295 (89.9%) | 123 (54.2%) | 2.61 (1.17) | 3.42 (.92) | 3.75 (1.11) | 2.82 (1.04) |
| Blues | 259 (80.4%) | 184 (57.1%) | 2.47 (1.15) | 3.30 (.94) | 3.63 (1.23) | 2.82 (.98) |
| Leo | 261 (82.1%) | 188 (59.1%) | 2.60 (1.18) | 3.42 (.93) | 3.48 (1.23) | 2.86 (1.00) |
| Luca | 243 (77.4%) | 180 (57.3%) | 2.40 (1.12) | 3.24 (.94) | 3.53 (1.21) | 2.85 (.94) |
| Mayne | 275 (82.6%) | 195 (58.6%) | 2.52 (1.17) | 3.30 (.96) | 3.95 (1.05) | 2.86 (.99) |
| Samira | 273 (81.5%) | 177 (52.8%) | 2.53 (1.17) | 3.42 (.93) | 3.86 (1.11) | 2.97 (.96) |
| Sarah | 272 (84.5%) | 203 (63.0%) | 2.66 (1.15) | 3.44 (.90) | 3.58 (1.24) | 2.85 (1.01) |
| Seeing | 270 (84.6%) | 171 (53.6%) | 2.53 (1.20) | 3.33 (.95) | 3.76 (1.15) | 2.89 (.99) |
| Sergio | 274 (84.0%) | 176 (54.0%) | 2.49 (1.16) | 3.25 (.96) | 3.53 (1.18) | 2.78 (.97) |

Note:

Due to a programming error, the correct disclosure hashtag was not provided as a response option for participants who saw the Azure ambiguous disclosure post. N/% correct is reported only for the Azure clear disclosure no disclosure posts.