Impact of The Real Cost Vaping Prevention Advertisements on Adolescents

Hypotheses and Analytic Plan

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Hypotheses

The goal of this study is to determine whether exposure to vaping prevention advertisements reduce susceptibility to vaping. The **primary hypothesis** is that participants who view *The Real Cost* vaping prevention advertisements will have lower susceptibility to vaping compared to those who view neutral vaping control ads at 3 week follow-up.

The investigators also aim to examine the impact of *The Real Cost* vaping prevention ads on a series of other vaping-related outcomes. A**dditional hypotheses** are that, compared to exposure to neutral vaping ads, participants exposed to *The Real Cost* vaping prevention ads will report the following at 3-week follow-up:
- Lower susceptibility to vaping
- Higher health harm risk beliefs about vaping
- Higher addiction risk beliefs about vaping
- More negative attitudes toward vaping
- Less vaping
- Higher attention (assessed only at 2-week follow-up)
- Higher negative affect (assessed only at 2-week follow-up)
- Higher cognitive elaboration
- More social interactions

The investigators will also explore the effects of *The Real Cost* vaping prevention ads on cigarette smoking-related outcomes, compared to exposure to neutral vaping ads. There are **not have directional hypotheses** for the following outcomes:
- Susceptibility to smoking cigarettes
- Health harm risk beliefs about smoking cigarettes
- Addiction risk beliefs about smoking cigarettes
- Attitudes towards smoking cigarettes
- Cigarette smoking behavior

Finally, the investigators will explore whether health harms vaping prevention ads out-perform addiction *The Real Cost* ads. We have labeled this an exploratory activity because the study is powered to compare these ads to control ads but not to one another.

Primary analyses

The investigators will use a critical alpha of 0.05 in all statistical tests. Analyses of the primary and secondary outcomes will include all randomized participants according to the trial arm they were randomized to receive (i.e., intent-to-treat). The investigators will use multiple imputation to handle any missing data on predictors and full information maximum likelihood to handle any missing data on outcomes.

The investigators will report univariate and bivariate descriptive statistics for the primary and secondary outcomes.

For significance testing of the primary hypotheses, the investigators will compare those in *The Real Cost* trial arms (combined) to the control arm. The investigators will use latent curve models so that the investigators can model change in repeated measures over time. After establishing a linear growth trajectory for each latent construct with the intercept coded to be at the last time point, the investigators will regress the latent intercept and slope factors for each outcome on an indicator of random assignment to *The Real Cost* trial arms or to the control arm.

A significant effect on the intercept will indicate a main effect of treatment assignment on the mean level of each outcome at the last time point. A significant effect on the slope, if positive, will indicate that repeated viewing of the ads led to an increase in the difference across trial arms. If negative, it will indicate that the treatment effect diminished over time. As a secondary analysis, the investigators will examine whether there were significant differences in growth factor means as a function of assignment to the *The Real Cost* ad trial arms.

The investigators will also conduct the above analyses comparing those in the *The Real Cost* health harms trial arm to those in the *The Real Cost* addiction trial arm to explore whether there are differences across those trial arms.

The investigators will use a separate model for each of the study outcomes. To account for multiple comparisons, the investigators will use a Benjamini-Hochberg correction to maintain a 5% false detection rate.

Finally, the investigators will conduct exploratory moderation analyses on the primary outcome to examine whether the following variables moderate the impact of *The Real Cost* trial arms (compared to the control arm) on susceptibility to vaping: gender, age, race, Hispanic ethnicity, sexual orientation, parent's education, current vaper (vs. non-current vaper), and tobacco user in the household.

Sample size and power

The investigators plan to enroll 500 individuals per trial arm with the expectation that as many as 33% of participants will drop out of the study before week 3 follow-up. The investigators will use a FIML estimator so the investigators can retain all available data, including observed repeated measures from participants who go on to drop out of the study. With an estimated ICC=.7 (and thus a design effect of 2.4), the investigators have statistical power to detect an effect as small as Cohen's $d = .25$. This effect size is around the same magnitude as the effects observed with pilot data. The investigators expect that the effects will be larger than what is observed in pilot data because the latent variable approach will result in higher reliability measures.

Interim analysis

No interim analyses are planned.