

# **The Relationship between E-cigarette Use and Tobacco Status among Youth in Public Health Tobacco Cessation Programs**

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## **Abstract**

*E-cigarette use is an emerging and fast-growing trend particularly among youth and young adults that has not been thoroughly researched in terms of quit rates and abstinence rates. The objective of this research was to determine whether there is an association between e-cigarette use and cessation rates of youth in tobacco cessation programs. This research, compiled in Fiscal Year 2015, analyzes quantitative evaluation data gathered from statewide public health tobacco cessation programs in Idaho in order to explore the relationship between e-cigarette use and quit rates. This research evaluates data from participants of tobacco cessation programs (N=2127) and the association between youth e-cigarette use and tobacco status at the end of the program. The research was conducted using SPSS to analyze tobacco cessation outcomes by age group and e-cigarette use. Chi square analysis was conducted between e-cigarette use and the tobacco status of youth and adults. Results showed significant associations between tobacco status by age group as well as by youth e-cigarette use. The data shows that e-cigarettes show promising potential for use as a cessation tool among participants attempting to quit tobacco use. Understanding behaviors in electronic cigarette use is important to implementing changes in clean indoor air policies, understanding the best practices for effective tobacco cessation in order to improve quit and abstinence rates, and advancing accurate perceptions on the safety of e-cigarette use for all users.*

## **Background**

The popularity of electronic cigarettes (e-cigs) is increasing rapidly, particularly among youth and young adults. Increases in use are due, in part, to heavy advertising and marketing directed toward this population (Kalkhoran, Grana, Torsten, & Ling, 2015; Cooper, Case, & Loukas, 2015). Studies show that not only are e-cigs more likely to be used by younger individuals, but young adults are primarily attracted to them because of their potential for both reduced tobacco use and safer smoking experiences (Cooper et al., 2015). People in general perceive e-cigarettes as a safer and more effective way to aid their attempts to quit smoking despite a lack of research (Baeza-Loya et al., 2014). In order to best address the needs of individuals who wish to quit the use of tobacco and understand the implications of e-cigarettes on youth and young adults (who are the primary users of e-cigarettes), it is imperative to further explore the relationship between tobacco cessation and e-cigarette use in youth.

To date, there have been only two randomized controlled trials on the relationship between e-cigarettes and tobacco quit rates (Caponnetto et al., 2013; Bullen et al., 2013). These experiments showed e-cigarettes have the potential to be a successful tool in helping smokers increase their quit rates and reduce tobacco consumption when compared to control groups. A study carried out in Hawaii by Pokhrel, Fagan, Little, Kawamoto, and Herzog (2013) found that e-cigarettes may potentially be better suited to assist cessation attempts as opposed to alternative cessation methods because, although they deliver nicotine in the same way that a nicotine patch or prescription cessation medication would, they closely resemble the experience of smoking a traditional cigarette. In contrast, a study carried out by Christensen, Welsh, and Faseru (2014) concluded that although the quit attempts were more common among e-cigarette users, e-cigarette use is negatively associated with long-term abstinence rates. These studies produce a similar conclusion that although the effect of e-cigarettes on long-term tobacco abstinence is not promising, it is evident that e-cigarettes do have the potential to aid quit rates and reduction rates in the short term.

Due to issues relating to privacy, IRB requirements, and availability for follow-up, there are currently no experiments or studies addressing the relationship between youth tobacco cessation and e-cigarette use (Curry et al., 2007). In the United States, almost 90% of smokers had begun smoking in their youth (CDC, 2013). A 2012 National Youth Tobacco Survey uncovered that nearly 7% of middle school children and over 23% of high school students were currently using tobacco products (CDC, 2013). Although the youth tobacco use rate is declining, the

prevalence of alternative cigarette products by youth is increasing (Tworek et al., 2014). Effective evidence-based programs for youth that take into account the effect of e-cigarettes are desperately needed (Tworek et al., 2014).

## Methods

### Data Collection

The Millennium Tobacco Cessation Program is a counseling program that has been offered in Idaho for the past 15 years. In 2015, 2,127 individuals participated in one of these tobacco cessation programs across the 44 counties in Idaho. The program is mandated to meet best practices of tobacco cessation as is evident from published literature. The program components consist of addiction counseling, consequences of addiction and tobacco use, and quit techniques. Upon entering the program, participants completed a survey of demographic information and their tobacco use, e-cigarette use, and quit attempt history. At the end of each program, the tobacco status of each participant was recorded by the instructor.

### Participants

Of these participants, 960 (45%) were youth under age 18; 838 (40%) were adults age 18 and older; and 333 (16%) were pregnant women. Among the total 2,127 participants, 1,077 were female and 1,050 were male.

### Definitions

Completion of the tobacco cessation program was defined as having completed four sessions. Quit attempt was defined as having abstained from tobacco for at least 48 consecutive hours. Cessation was self-reported by the participant and confirmed by the program instructor.

Tobacco status reduction was defined as using less tobacco than at the start of the program, but still currently using tobacco.

### Analysis

Statistical analysis was performed using IBM SPSS Statistics 21. Analysis was performed on youth participant's tobacco use, e-cigarette use, and tobacco status at the end of the program. Crosstabs were compared for youth and e-cigarette use, youth and tobacco status, as well as e-cigarette use and tobacco status. Crosstab statistics were chi-square and uncertainty coefficient. Graphs were constructed using ChartBuilder for youth participants who did not use e-cigarettes as well as for youth who did use e-cigarettes, and data was clustered by participant tobacco status to compare the outcomes of the two groups.

### Results

*E-cigarette users.* Out of the 2,127 total participants, 1,363 reported current or past use of e-cigarettes. A total of 743 (54.5%) of e-cigarette users were youth under age 18 at the beginning of their tobacco cessation program. An additional 299 (21.9%) e-cigarette users were in the 18-24 age group at the start of the program. Only 316 (23.2%) of the e-cigarette users were older than 24 years of age at the start of the cessation program.

*Youth and smoking status.* Smoking status was analyzed in comparison to youth participants. There were a total of 998 youth with a reported smoking status at the end of the tobacco cessation program. In total, 414 (41.5%) of those youth quit tobacco use. Additionally, 287 (28.8%) youth reduced their tobacco use, and 142 (14.2%) youth made no change in their tobacco status. Two-sided chi-square analysis was performed showing a significant association for these variables with  $P = .00$ , Chi-Square = 102.69.

Table 1: Participant Tobacco Status by Age Group\*\*

	Tobacco Status at End of Program				Total
	Quit	Reduced	No Change	No Answer	
Youth	414 (41.5%)	287 (28.8%)	142 (14.3%)	155 (15.5%)	998
Adult	245 (21.7%)	376 (33.3%)	249 (22.1%)	258 (22.8%)	1128
					2126

\*\* $P = .00$ , Chi-Square = 102.69, two-tailed chi-square test.

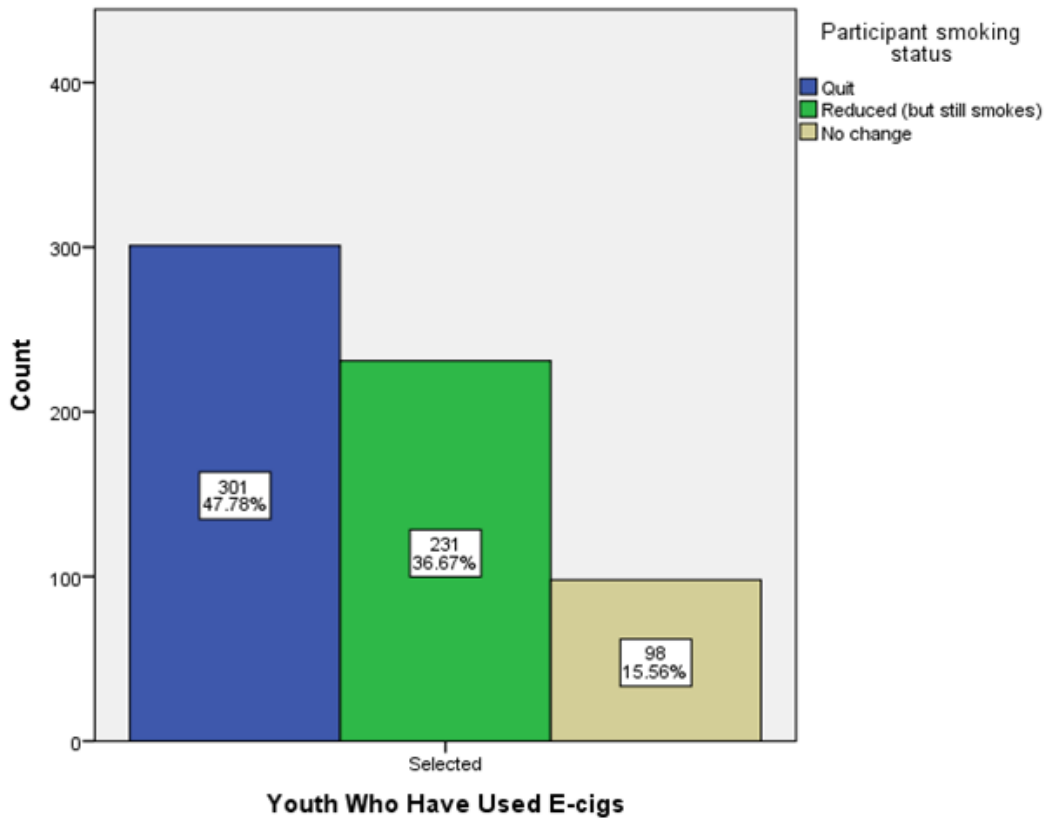


Figure 1: Youth e-cigarette and tobacco use. A sum of 630 youth participants reported past or current e-cigarette use and also reported their smoking/tobacco status. Youth e-cigarette users were found to have a 47.78% quit rate at the end of the tobacco cessation program with 301 participants quitting tobacco use. This participant group also had a 36.67% reduction rate with 231 reducing tobacco use. A total of 98 (15.56%) experienced no change in tobacco use by the end of the program.

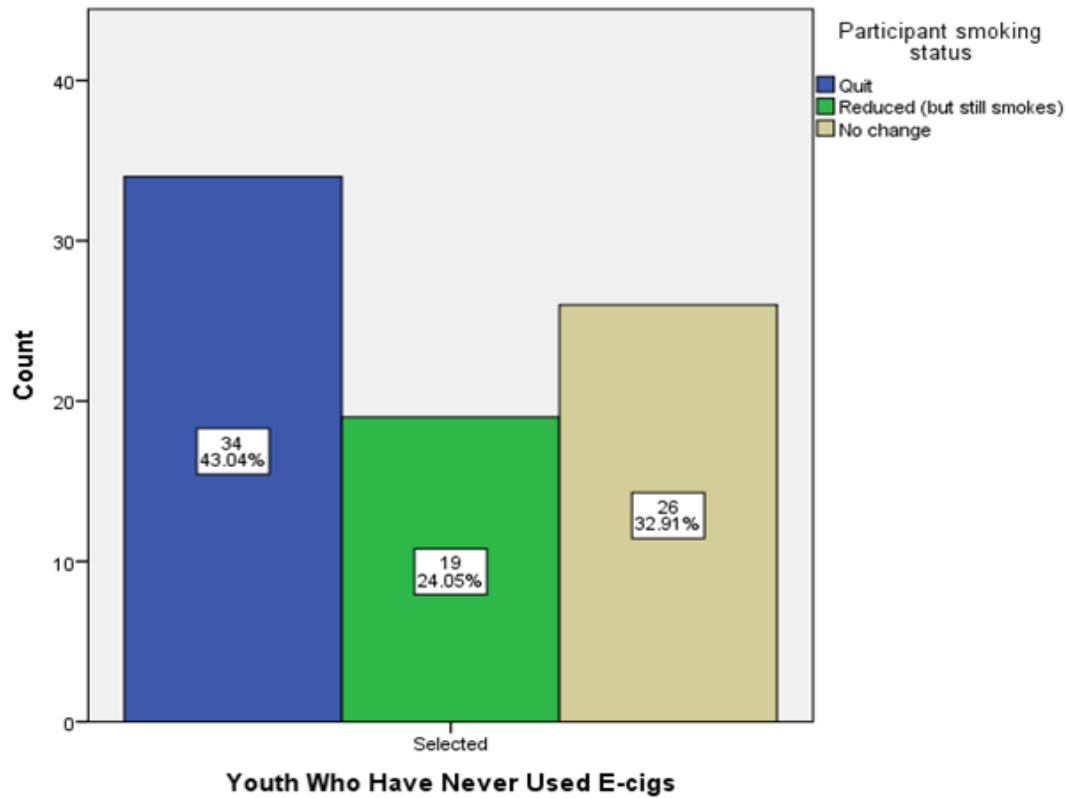


Figure 2: Youth and tobacco use without e-cigarettes. A sum of 79 youth participants reported never having used e-cigarettes and reported their smoking/tobacco status. Youth e-cigarette users with no past or current e-cigarette use were found to have a 43.04% quit rate at the end of the tobacco cessation program with 34 participants quitting tobacco use. This participant group also had a 24.05% reduction rate with 19 reducing tobacco use. A total of 26 (32.91%) experienced no change in tobacco use by the end of the program.

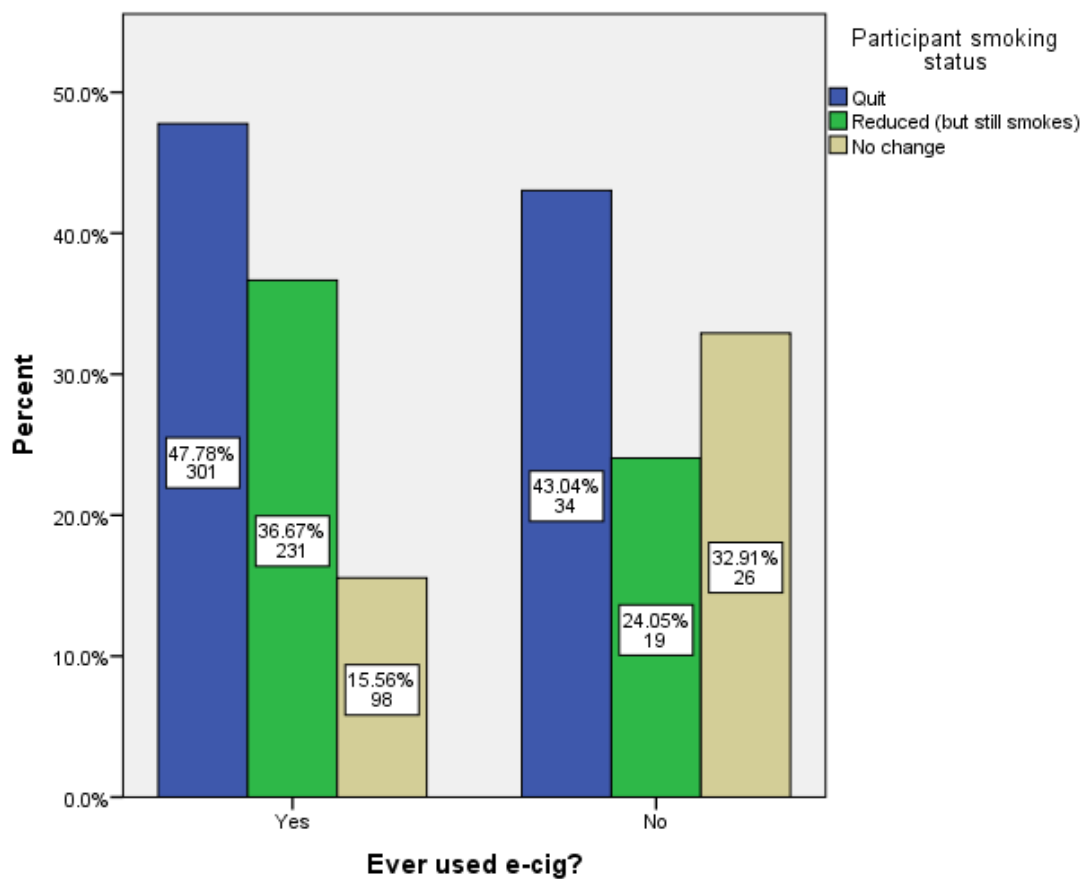


Figure 3: Youth tobacco status by e-cigarette use. Among the 998 youth participants, 116 did not report whether they had used any e-cigarettes. Out of the remaining 842 youth, 752 reported e-cigarette use. There were 301 (47.8%) of these youth who quit tobacco use at the end of the program. Another 231 (36.7%) reduced their amount of tobacco consumed, and 98 (15.6%) did not experience any changes. Out of the 90 youth participants who had never used e-cigs, 34 (43%) quit tobacco use, 19 (24%) reduced their consumption of tobacco, and 26 (32.9%) did not change their tobacco status. Youth smoking status and e-cigarette use was found to have a significant relationship with  $P = .001$ , Chi-Square = 23.85.

Table 2: Youth Tobacco Status by E-cigarette Use\*\*

E-cigarette Use?	Tobacco Status at End of Program				Total
	Quit	Reduced	No Change	No Answer	
Yes	301 (40%)	231 (30.7%)	98 (13%)	122 (16.2%)	752
No	34 (37.8%)	19 (21.1%)	26 (28.9%)	11 (12.2%)	90
					842
** $P = .001$ , Chi-Square = 23.85, two-tailed chi-square test.					

## Conclusions

This research proved consistent with the literature in the area of youth electronic cigarette use. Youth and young adults accounted for 76.4% of e-cigarette users, and the majority of youth (74.5%) reported use of e-cigarettes. Overall, youth had higher quit rates than adults across all categories. Youth who used e-cigarettes had higher quit rates (47.8% compared to 43.04%) and reduction rates (36.7% compared to 24.05%). In contrast, youth who did not use e-cigarettes had higher rates of no change in their tobacco status (32.9% compared to 15.6%). These results show youth who use e-cigarettes have a higher likelihood of quitting tobacco use than youth who do not use e-cigarettes. Also, these results show that youth who had never used e-cigarettes were more likely to experience no change or reduction in their tobacco use by the end of the tobacco cessation program when compared with youth who had a history of e-cigarette use.

Although these results show a relationship between e-cigarette use and higher quit and reduction rates, the long-term follow-up status of participants was not analyzed in this study. In addition, the ambiguity of the health impact on individuals suggests e-cigarette use as a cessation aid should be closely supervised. E-cigarettes should not be recommended for recreational use until their long-term effects are more wholly understood. However, their use as a cessation aid for tobacco users who are attempting to quit shows promising results.

This brief analysis includes limitations relating to the surveys and participant response. E-cigarette use is broadly defined as ever having used e-cigarettes and does not differentiate between past or current usage, minimal to frequent use, or use as a cessation aid versus recreationally. In addition, e-cigarette use and amount of tobacco consumed is self-reported by the participant. This leaves room for possible response bias in survey data.

These findings are important to inferring the impact that e-cigarettes have on tobacco cessation participants and continued studies will be needed in this area. Understanding behaviors in e-cigarette use is important to implementing changes in clean indoor air policies, understanding the best practices for effective tobacco cessation in order to improve quit and abstinence rates, and advancing accurate perceptions on the safety of e-cigarette use for all users.

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