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Associations Between E-Cigarette Use Frequency and Mental Health Symptoms on Adolescent Academic Performance

BACKGROUND: While current electronic cigarette (e-cigarette) use has declined in the United States (US), from 7.7% in 2023 to 5.9% in 2024, they remain popular among adolescents. Mental health symptoms such as depression and anxiety are more prevalent among adolescent e-cigarette users than non-users, and both e-cigarette use and poor mental health have been associated with poor academic performance. However, less is known about whether the frequency of e-cigarette use, independently or jointly with mental health symptoms, influences academic performance. This study examined the association between frequency of current e-cigarette use and mental health symptoms independently and jointly on subsequent academic performance among US adolescents.

METHODS: Using a cross-sectional study design, we analyzed data from the 2025 National Youth Tobacco Survey (NYTS). The study included youth who reported e-cigarette use within the past 30 days and had valid information on academic performance and mental health symptoms (N=950). The primary outcome was self-reported academic performance (grades A to F). The predictors of interest were e-cigarette use frequency and mental health symptoms, and covariates included age, sex, race, and grade level. Survey weighted descriptive statistics summarized participant characteristics. Chi-square tests compared participant characteristics by academic performance, while weighted ordinal regressions examined the independent and joint associations of e-cigarette use frequency and mental health symptoms with academic performance, after adjusting for covariates.

RESULTS: Among 950 current e-cigarette users, most reported earning mostly A's (31.4%) or mostly B's (34.1%), while 12.6% reported mostly D/F grades. In bivariate analysis, academic performance did not differ significantly by e-cigarette use frequency ($p = 0.219$) but did not differ significantly with mental health symptoms ($p = 0.151$). After adjusting for age, sex, race, and grade level, mental health symptoms had 45% higher odds of poorer academic performance (AOR = 1.45, 95% CI = 1.07-1.96; $p = 0.018$). Additionally, those who used e-cigarettes on 20-30 days/month had significantly higher odds of poorer academics compared to those smoking 1-5 days (AOR=1.45, 95% CI= 1.06-1.99; $p = 0.023$). No significant interactions were observed between e-cigarette use frequency and any mental health symptom, indicating that the association between mental health and academic performance did not differ by e-cigarette use.

CONCLUSION: Among youth who currently use e-cigarettes, mental health symptoms, and more frequent e-cigarette use was not associated with poorer academic performance in unadjusted analyses, when examined with covariates this relationship is better explained. These findings highlight the importance of addressing mental health alongside tobacco prevention and cessation efforts to support academic success among adolescents.