Changes in Dependence Over One Year among Adult Smokers who Switched Completely or Partially to use of the JUUL System

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Introduction

• Nicotine is the primary constituent in cigarettes that sustains smoking and leads to dependence on cigarettes.
• Electronic cigarettes (e-cigarettes) or “Electronic Nicotine Delivery Systems” (ENDS) deliver nicotine without many of the toxic chemicals in cigarette smoke, which are largely products of combustion. 2,4
• ENDS are intended to reduce harm by helping smokers who would not otherwise quit in the near term switch away from smoking.
• Researchers and regulators agree that some degree of dependence is necessary if ENDS are to facilitate smokers switching away from cigarettes.3,7
• Previous papers comparing dependence on ENDS to dependence on cigarettes are limited by the psychometric validity of measures used to assess dependence and by cross-sectional designs.8-9
• The current study used a measure of dependence psychometrically validated for quantitative comparison of dependence on cigarettes and ENDS.
• This is a secondary analysis of the longitudinal Adult JUULSwitching and Smoking Trajectories (ADJUST) study10 to address two questions:
  1. How does smokers’ dependence change as they transition from baseline cigarette smoking to subsequent use of JUUL?
  2. How does the level of dependence change over 12 months of use?

Methods

Participants
• US adult (age ≥21 years) established smokers who purchased a JUUL Starter Kit (JSK) in a retail store or online via JUUL’s website in June to October, 2018 who accepted an invitation to participate in the study.
• Established smokers: at baseline, smoked ≥100 cigarettes lifetime, smoked in the past 30 days, and smoked some days or every day.
• 17,619 adult established smokers provided baseline and at least some follow-up data.

Assessment of Dependence
• After baseline assessment, participants were invited by email to complete follow-up assessments 1, 2, 3, 6, 9 and 12-month later.
• Dependence was assessed with the Tobacco Dependence Index (TDI), a validated measure from the PATH study (Range: 1-5; higher scores indicate greater dependence).11-14 Validated for assessing and comparing cigarette and ENDS dependence (i.e., specifically developed to be invariant over product).
• Cigarette dependence was assessed at baseline only
• JUUL dependence was assessed at each follow-up among JUUL users
• Participants were classified as having switched if they had not smoked at all (even a puff) in the past 30 days.

Statistical Analysis
• Transitions from smoking: Paired t-tests assessed changes in dependence (from smoking baseline) to JUUL dependence 1 and 12 months later (separately for switchers and dual users).
• Change over time: Multilevel linear models (MLM) tested the linear association of JUUL dependence with time and months since baseline
• Subsample analyses were run among participants who used JUUL at all six follow-ups, out to month 12, separately for smokers consistently switched and those consistently dual using at all 6 follow-ups.
• The minimally important difference (MID) in TDI dependence scores was estimated by comparing the Month 1 scores of participants who did and did not switch at Month 2.

Results

Changes in Dependence Over Baseline Cigarette Dependence to JUUL Dependence at Each Follow-Up

Figure 1: Changes in Dependence Over One Year among Adult Smokers who Switched Completely or Partially to use of the JUUL System

Figure 2: Changes in Dependence Over Baseline Cigarette Dependence to JUUL Dependence at Each Follow-Up by Switching Status

Figure 3: Change from Baseline to Month 12

Figure 4: Figure 5

Limitations

• The sample consisted of smokers who purchased a JSK and volunteered for a study
• Cigarette dependence was assessed only at baseline, so the data do not capture the trajectory of cigarette dependence in dual users
• Data were not available on use of or dependence on other tobacco products
• Some follow-ups were missed, which could have introduced bias. However, analyses7 showed that participants who missed follow-ups were not materially different from those who did not

Strengths

• Use of the TDI, which is validated for assessing and comparing dependence on both cigarettes and ENDS
• A large sample of adult smokers, followed over six time-points for as long as 12 months
• JUUL purchasers likely represent more engaged JUUL users who might be deemed at greatest risk for JUUL dependence
• Analyses examined increases in dependence among participants who reported using JUUL for all follow-ups, which might be deemed at greatest risk for JUUL dependence
• Analyses helped establish the MID for the TDI scale by reference to prospective prediction of a behaviorally meaningful endpoint – switching completely away from cigarettes

Conclusions

• Average dependence declined significantly and meaningfully as smokers transitioned from cigarette smoking to use of JUUL; the decline was evident even after JUUL use for 12 months.
• Even among participants who reported consistently using JUUL at all follow-ups over 12 months, the average increase in JUUL dependence was small (0.01 points per month) and did not exceed the minimally important difference for the TDI scale.
• These findings are consistent with multiple studies reporting that dependence on ENDS is lower than dependence on cigarettes.6,8
• These new data add a within-person longitudinal perspective demonstrating:
  1. mean decline in dependence as shift from smoking to JUUL
  2. little increase in dependence over 12 months of use

References