The impact of demographics, dependence, and biomarkers on transitions in tobacco product use in a cohort of smokers and dual users

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Methods

Multistate Markov Transition Model Framework

Markov transition models are continuous time stochastic processes models. We consider these transitions in our model.

State Transitions

Tobacco use states

Data: we observe state of the state people are in at specific times.

Reality: people transition between states at any time.

Transition Probabilities

Plot A gives the observed transition probabilities, which the model matches well in Plot B.

Plot C predicts transition probabilities after 1 year.

Key Findings

- E-cigarette use was relatively transient (consistent with contemporary analysis of the PATH study).
- Cigarette dependence and spousal smoking were barriers to cigarette cessation from dual use.
- E-cigarette dependence measures were generally associated with reduced e-cigarette cessation rather than enhanced cigarette cessation.
- Using e-cigarettes first in the morning, motivation to quit smoking, and sensory/social/emotional enjoyment of e-cigarettes (secondary dependence motives) were facilitators of transition from dual to sole e-cigarette use.

The Multistate Markov Transition Model Framework is a powerful tool for analyzing transitions in tobacco product use. It allows for the investigation of the dynamics of tobacco use over time, taking into account the complex relationships between different states and transitions. The model provides insights into the factors that influence transitions from one tobacco use state to another, which can inform public health interventions aimed at reducing tobacco use and improving health outcomes.

Introduction

- Electronic nicotine delivery systems (ENDS) have the potential to help people who smoke cigarettes transition to a less harmful product.
- It is uncertain whether and to what extent ENDS facilitate cigarette cessation in real-world settings.
- A better understanding of what personal and product characteristics are associated with ENDS-facilitated cigarette cessation could improve tobacco control interventions.

Data

- 422 adult daily cigarette users and dual cigarette and ENDS users.
- Followed up every 2 months for 2 years.
- Tobacco product use states determined every two months by self-report and abstinent resubmission over the past 30 days.

Variable Definitions

- Biomarkers: NNAI, Cotinine, 3HC.
- Demographics: Gender, age, race/ethnicity, education (defined in ages 25+), psychiatric history, partner smoking.
- Cigarette dependence: Daily, occasional, non-smoker.
- ENDS dependence: Frequency (everyday, somewhat), FTND (low 1–4, high 5+), motivation to quit (low 1–4, high 5+), smoking within 30 minutes of getting up.
- WISDM primary dependence motives (PDM), secondary dependence motives (SDM) (low to high, moderate 3–4, high 5+).

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