Advancing the development of a genetically-informed smoking cessation intervention

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Introduction

- Genetic variation in nicotinic receptor subunits explains differences in smoking behaviors and risk of smoking-related diseases.
- Personalized genetic risk tools may personalize treatment or motivate smoking cessation, yet no such behavioral interventions exist.
- We used the NIH Stage Model of Behavioral Intervention Development to iteratively design a genetically-informed smoking intervention (*RiskProfile*).
- We tested the tool's acceptability and potential influence on smoking.

Methods

- Step 1: Iterative Design and Development
  - We developed a risk score algorithm that integrates genetic (*CHRNA5* variants) and phenotypic (cigarettes per day) factors to estimate one's risk of lung cancer and difficulty quitting smoking.
    - In prototype studies, we co-designed *RiskProfile* with current smokers.
- Step 2: Proof-of-Concept Testing
  - Current smokers (n=108) were enrolled in a pre-post study with 3 visits.
  - Visit 1: Baseline assessment and genetic testing via 23andMe.
  - Visit 2: Receipt of personalized *RiskProfile* (~6 weeks later).
  - Visit 3: Follow-up assessment (30 days after receiving *RiskProfile*).

Results

- Step 1: Iterative Design and Development
  - In 111 current smokers, 95% desired smoking-related genetic results.
  - Co-design activities yielded a well-accepted risk communication tool.
- Step 2: Proof-of-Concept Testing
  - Of 108 enrolled smokers, 83% (n=90) were retained across 3 visits.
  - 89% recalled key messages of *RiskProfile* at 30-day follow-up.
  - Using intent-to-treat analyses, 77% reported smoking-related behavior change (quit attempts, fewer cigarettes, used cessation medications).
  - Average cigarettes per day: 12.8 at baseline, 11.3 at intervention, 9.8 at 30-day follow-up ($F(2, 214)=19.995$, $p<0.001$). Cigarettes per day decreased from intervention to 30-day follow-up; $p=.001$).

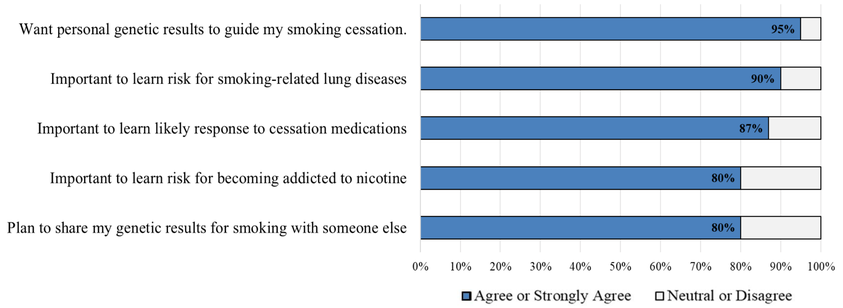
Acknowledgment:
This research was supported by the National Institute on Drug Abuse under Award Number K12DA041449.

Relevant Publications:

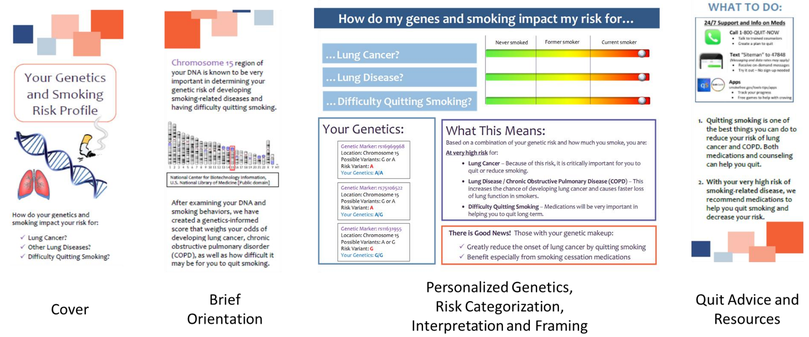
Ramsey AT et al. (2020). doi: 10.1158/1940-6207.CAPR-20-0029; PMID: 32209550
Ramsey AT et al. (2020). doi: 10.1158/1940-6207.CAPR-20-0328; PMID: 32958583

Step 1: Iterative design and development

High demand for smoking-related genetic risk results (n=111)



Sample sections of *RiskProfile*

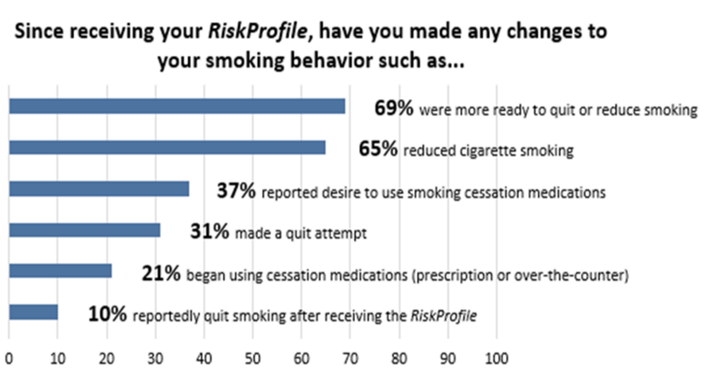


Among current smokers, a personalized genetically-informed intervention (*RiskProfile*) was highly acceptable, well-understood, and associated with reduction in smoking.

This demonstrates proof of concept for an innovative application of genomic data to promote health behaviors and reinforces the value of the NIH Stage Model for behavioral intervention development.

Step 2: Proof-of-concept testing

RiskProfile and smoking-related behavior change (n=108)



Reduced smoking after receiving *RiskProfile* (n=108)