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## Smoking Cessation in People with Mental Health Conditions: Exploring the Role of Family and Peers

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**SMOKING CESSATION IN PEOPLE WITH MENTAL HEALTH CONDITIONS:  
EXPLORING THE ROLE OF FAMILY AND PEERS**

A Dissertation Presented

By

CATHERINE S. NAGAWA

Submitted to the Faculty of the  
University of Massachusetts Graduate School of Biomedical Sciences, Worcester  
in partial fulfillment of the requirements for the degree of

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March 28<sup>th</sup>, 2022

CLINICAL AND POPULATION HEALTH RESEARCH

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This work was undertaken in the Graduate School of Biomedical Science

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## ABSTRACT

**Introduction:** Despite advances in evidence-based smoking cessation approaches, quit rates in people with mental health conditions who smoke have not increased over the past decade. This research explored the role of family or peers in promoting smoking cessation in this population, using three specific aims; 1) examine the association between family or peer views on tobacco use and smoking cessation, 2) identify pathways through which family or peer factors influence smoking cessation, and 3) identify social barriers and facilitators to seeking cessation support when quitting.

**Methods:** We used data from the Population Assessment of Tobacco and Health Study and collected qualitative data from people with mental health conditions who currently smoke or quit within the last five years. Data were analyzed using logistic regression modeling, structural equation modeling, and rapid qualitative analysis.

**Results:** Having family or peers with positive or neutral views on tobacco use significantly reduced the odds of quitting smoking. Higher intentions to quit and positive changes in smoking behavior mediated the relationship between supportive family or peer behaviors and quitting smoking. Quitting together and encouragement from family or peers were perceived as supportive, while nagging the individual undermined quitting success. Except for individuals who regarded autonomy highly or were not ready to stop smoking, stronger social relationships and tailored support increased willingness to involve family members in cessation interventions.

**Conclusions:** Supportive family or peer attitudes and behaviors can positively influence smoking cessation in people with mental health conditions who smoke. Ways to identify ideal family or peer support partners to involve in cessation interventions are proposed.

## **DEDICATION**

I am dedicating this dissertation work to my grandparents, Geraldine Nansubuga Mirundi and John Zirimenya Mirundi, who meant and continue to mean so much to me. Although they are no longer of this world, their memories continue to regulate my life.

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**LIST OF ABBREVIATIONS****ACRONYM    MEANING**

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<b>SEM</b>	Structural Equation Models
<b>GAIN-SS</b>	Global Appraisal of Individual Needs - Short Screener
<b>PATH</b>	Population Assessment of Tobacco and Health
<b>US</b>	United States
<b>95%CI</b>	95% Confidence Intervals
<b>OR</b>	Odds Ratios
<b>SAMHSA</b>	Substance Abuse and Mental Health Services Administration

## PREFACE

The work presented in this dissertation has been previously presented or published or is currently under review in a peer-review journal

**Chapter II:** Association between family or peer views on tobacco use and past 30-day smoking cessation among adults with mental health conditions

- Nagawa CS, Pbert L, Wang B, Cutrona S, Davis M, Lemon S, Sadasivam R. (2020)  
Association between family or peer influences on smoking cessation among adults with mental health conditions. 5<sup>th</sup> annual cancer disparities symposium (virtual)-  
Poster presentation
- Nagawa CS, Pbert L, Wang B, Cutrona S, Davis M, Lemon S, Sadasivam R. (2021)  
Association between family or peer views on tobacco use and past 30-day smoking cessation among adults with mental health problems. Under review

**Chapter III:** Examining pathways between family or peer factors and smoking cessation in a nationally representative sample of adults with mental health conditions: a structural equation analysis

- Nagawa CS, Wang B, Davis M, Pbert L, Cutrona S, Lemon S, Sadasivam R. (2022)  
Family and peer influences on smoking cessation among smokers living with mental health conditions: A structural equation modeling analysis. 43rd Annual Meeting & Scientific Sessions of the Society of Behavioral Medicine - Poster presentation
- Manuscript in preparation for submission.

**Chapter IV:** Experiences using family or peer support for smoking cessation and considerations for support interventions: a qualitative study in adults with mental health conditions

- Manuscript in preparation for submission

## **CHAPTER I**

### **INTRODUCTION**

#### **Mental health conditions in the United States**

Mental health conditions are diagnosable mental disorders that involve significant changes in thinking, emotion, or behavior.<sup>1</sup> Diagnosable mental health disorders include major depressive disorders, anxiety disorders, and schizophrenia. Approximately 20% of US adults experience a mental illness in a given year.<sup>2</sup>

#### **High prevalence of smoking in persons with mental health conditions**

Recent data show that cigarette smoking among US adults is now at an all-time low of 14%.<sup>3</sup> However, 34 million US adults continue to smoke cigarettes, with marked disparities in this population.<sup>3, 4</sup> Currently, one in three US adults with mental health conditions smoke cigarettes, compared to about one in five adults without mental health conditions.<sup>5</sup> People with mental health conditions who smoke are now estimated to comprise up to 40% of the U.S. cigarette market.<sup>6</sup>

#### **Negative impact of smoking in people with mental health conditions**

Life expectancy in persons with mental health conditions is 25 to 30 years lower than the general population.<sup>7, 8</sup> Smoking independently explains almost ten years of potential life lost in people with mental health conditions.<sup>7, 8</sup> The excess mortality is due to health conditions for which smoking is a known risk factor (cardiovascular disease, respiratory disease, and cancers).<sup>8</sup> A population-based study conducted in California showed that tobacco-related diseases accounted for about 50% of deaths in persons with

depression, 53% of deaths in those with schizophrenia, and 48% of deaths in persons with bipolar disorder.<sup>9</sup>

Cigarette smoking reduces the quality of life of people with mental health conditions.<sup>10</sup> Tobacco use, including smoking, complicates mental health treatment.<sup>11</sup> Studies have shown that components in tobacco smoke accelerate the metabolism of some antidepressant and antipsychotic medications, resulting in lowered blood levels and possibly reduced therapeutic benefits.<sup>12</sup> Smoking is also associated with worse symptoms and outcomes among people with mental health conditions, including more severe depressive symptoms, a greater likelihood of psychiatric hospitalization, and increased suicidal behavior.<sup>13, 14</sup>

### **Low quit rates in people with mental health conditions who smoke**

Many individuals with mental health conditions who smoke want to and are able to quit smoking.<sup>5</sup> Data shows that among people with mental health conditions who smoke, 43% are in the pre-contemplation stage of change, 38% in contemplation, and 19% in the preparation stage.<sup>15</sup> The distribution of readiness to quit observed in people with mental health conditions is similar to that observed in the general population.<sup>15</sup> People with mental health conditions who smoke also report intentions to stop smoking as often as people in the general population.<sup>16</sup> However, the quit rate in people with mental health conditions who smoke is much lower (24%) than in the general population (52%), and it has not increased over the past decade.<sup>17</sup>

### **Challenges of quitting faced by people with mental health conditions who smoke**

High nicotine dependence levels and infrequent use of smoking cessation treatments make it challenging to quit for people with mental health conditions who smoke.<sup>18</sup> Quitting is even more challenging with poor self-perceived mental well-being.<sup>19</sup> People with mental health conditions report using cigarettes to alleviate emotional problems such as depression and anxiety, stabilize their mood, and relieve stress.<sup>20-22</sup> This creates a misconception that quitting smoking may worsen mental health symptoms.<sup>23-24</sup> This misconception is prevalent in the social networks of people with mental health conditions, including family members and close friends.<sup>25-28</sup> These pro-smoking social norms are likely to deter quitting in people with mental health conditions who smoke.

Available pharmacotherapies and evidence-based behavioral cessation strategies are effective for quitting in people with mental conditions who smoke; however, they have had a limited impact on quit rates in this population.<sup>29</sup> Public health efforts made to increase quit rates in the general population have not effectively addressed the challenges faced by people with mental health conditions who smoke. Leading researchers have called for innovative approaches to address smoking disparities in this sub population.<sup>30, 31</sup> Research focused on addressing quitting challenges faced by people with mental health conditions who smoke continues to be of public health significance.

### **Overview of the role of family or peer-based support in improving the well-being of people with mental health conditions**

Three of the ten guiding principles of the mental health recovery model<sup>32, 33</sup> specify that recovery is supported through social networks and peer support. The Substance Abuse

and Mental Health Services Administration (SAMHSA) defines recovery as *“the process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential.”*<sup>34</sup> SAMHSA states that the *“presence and involvement of people who believe in the person’s ability to recover; who offer hope, support, and encouragement; and who also suggest strategies and resources for change”* is an important factor in the recovery process.<sup>34</sup>

In practice, research shows that family members or peers of people with mental health conditions are often involved in several aspects of their health care, including seeking and accessing health services and continually monitoring the health status of loved ones.<sup>35, 36</sup> Meaningful and relevant support provided to people with mental health conditions includes person-centered support (communication that relays acceptance and valuing of the individual, their symptoms and their mental illness), instrumental support (assistance in locating and accessing resources), and informational support (providing helpful information that can facilitate solving or eliminating problems causing stress).<sup>37, 38</sup>

Given that people with mental health conditions are more likely to experience social isolation than those without mental health conditions,<sup>39, 40</sup> there is ongoing research on ways to alleviate social isolation among people with mental health problems, and ways to leverage close relationships to support their well-being such as maintaining a healthy weight.<sup>41</sup>

### **Family or peer-based support in promoting smoking cessation in people with mental health conditions who smoke**

The use of family or peer support to promote smoking cessation in people with mental health conditions fits within the widely accepted guiding principles of the mental health recovery model. Since smoking is a significant health risk in people with mental health conditions, there is considerable interest in establishing whether family or peer support could be harnessed in cessation interventions to improve quit rates in people with mental health conditions who smoke.<sup>10-12</sup> Findings from exploratory studies conducted in former smokers with mental health conditions show that support from family or peers is a significant contributor to successful quitting,<sup>42</sup> and suggest that smoking cessation role models and receipt of practical or emotional support for quitting were beneficial during quit attempts.<sup>26</sup> These findings suggest that family or peer support has the potential to supplement existing efforts to reduce smoking in people with mental health conditions who smoke.

### **Research gaps focusing on family or peer-based support and smoking cessation in people with mental health conditions who smoke**

Despite the potential of using family or peer support to reduce smoking in people with mental health conditions who smoke, a few knowledge gaps remain. Previous studies that have examined the association between family or peer influences on smoking cessation in people with mental health conditions were conducted in small samples,<sup>42, 26</sup> or in the general population of people who smoke.<sup>43, 44</sup> This association has not been explored in large representative samples of people with mental health conditions. Also, there is a

limited understanding of the pathways through which family or peer attitudes and behaviors impact smoking cessation. Identifying mediating factors may help clarify how family or peers influence quitting positively.

Establishing whether family or peer support can be harnessed in cessation interventions tailored to people with mental health conditions who smoke is important. Family or peer support interventions conducted in the general population of smokers that have aimed to enhance or re-direct the influence of family or peers in a positive way have underperformed. Evidence suggests that interventions failed to increase family or peer support for smoking cessation.<sup>43, 44</sup> Therefore, identifying ways to increase family and peers support is needed to develop suitable support interventions.

## **DISSERTATION AIMS AND HYPOTHESES**

This dissertation research was designed to explore the role of family or peers in promoting smoking cessation to inform the development of suitable family or peer-based interventions in persons with mental health conditions who smoke. The specific aims were as follows:

**Specific Aim 1:** To examine the association between family or peer views on tobacco use and smoking cessation using a nationally representative sample of people with mental health conditions who smoke.

**Hypothesis 1:** Survey respondents who have family or peers with positive or neutral views on tobacco use will be less likely to report smoking cessation than those with family or peers with negative views on tobacco use.

**Specific Aim 2:** To identify pathways through which family or peers' attitudes and behaviors influence smoking cessation in people with mental health conditions who smoke, using structural equation models.

*Hypothesis 2:* Family or peer attitudes and behaviors on smoking cessation will be mediated through the individuals' smoking behaviors and moderated through the participants' mental health well-being.

**Specific Aim 3:** To identify social barriers and facilitators to seeking cessation support and assess participants' willingness to involve family or peers in cessation interventions.

## CHAPTER II

# ASSOCIATION BETWEEN FAMILY OR PEER VIEWS ON TOBACCO USE AND PAST 30-DAY SMOKING CESSATION AMONG ADULTS WITH MENTAL HEALTH CONDITIONS

## ABSTRACT

### Background

The misconception that quitting smoking could worsen mental health symptoms is common in the social networks of people with mental health conditions. Such misconceptions likely deter quitting in people with mental health conditions who smoke. We examined the effects of family or peer views on tobacco use on past 30-day cessation among adults with mental health conditions who smoke.

### Methods

We used nationally representative data from the Population Assessment of Tobacco and Health Study. Participants in the current study were followed for one calendar year. We included adults who currently smoked and reported mental health symptoms over the past year (unweighted  $n=4,201$ ). Mental health was assessed using the Global Appraisal of Individual Needs Short Screener questionnaire. We used logistic regression models to estimate odds ratios (OR) and 95% confidence intervals (95%CI) of past 30-day smoking cessation.

## **Results**

Overall, close to one-half of the study participants were male (48%) and one in four (25%) were between 25 and 35 years of age. Most (71%) of the participants identified as Non-Hispanic. Compared with participants reporting negative family or peer views on tobacco use, those reporting neutral or positive family or peer views were 32% less likely (adjusted OR: 0.68, 95%CI: 0.51 – 0.93) to report past 30-day smoking cessation. The association between family or peer views on tobacco use and smoking cessation was significant in individuals reporting internalizing and externalizing mental health symptoms (adjusted OR: 0.62, 95%CI: 0.42 – 0.92), but not for those reporting symptoms on a single subscale.

## **Conclusion**

Our findings suggest that neutral or positive family or peer views on tobacco use may deter cessation efforts of smokers with mental health conditions. Efforts to modify these views are needed to improve quit rates among smokers with mental health conditions.

## INTRODUCTION

In the United States, adults with mental health conditions have a markedly higher prevalence of cigarette smoking (31%) than the general adult population (17%).<sup>4</sup> Smoking-related diseases account for nearly half of all deaths in individuals diagnosed with depression, schizophrenia, and bipolar disorder.<sup>9</sup> Although smokers with mental health conditions are interested in quitting cigarette smoking,<sup>5</sup> their quit rate is much lower (24%) than that of the general population (52%).<sup>17</sup> Furthermore, quit rates in smokers with mental health conditions have not increased over the past decade,<sup>17</sup> despite advances in evidence-based smoking cessation approaches.

Perceived social support from family members or peers can positively impact successful smoking cessation.<sup>45-47</sup> Family members and peers provide support to people with mental health conditions who smoke through the provision of tangible resources (e.g., medication reminders), informational support (e.g., how to cope with nicotine withdrawal symptoms), or emotional support (e.g., encouragement to stay smoke-free) during quitting attempts.<sup>48</sup> Findings from exploratory qualitative studies that have enrolled former smokers with mental health conditions show that positive influences from family or friends (such as smoking cessation role models tangible and emotional support) are key facilitators of quit attempts and successful quitting.<sup>26, 49, 50</sup>

However, it is commonly misperceived that smoking cigarettes helps with mental health symptom management and that engaging in smoking cessation practices may worsen the individual's mental health symptoms.<sup>25 51</sup> Many incorrectly believe that quitting smoking interferes with recovery from mental illness, assuming that eliminating the coping

strategy leads to a decline in mental health functioning.<sup>52</sup> Such misconceptions about smoking and mental illness likely create social spaces where smoking is acceptable or encouraged, likely deterring cessation. Past studies that have assessed the effect of supportive versus non-supportive family or peer views on tobacco use on smoking cessation have been primarily done in the general population of adult smokers.<sup>53-58</sup> Understanding the social environments where cessation experiences occur can inform future cessation interventions for people with mental health conditions who smoke.

This study used a longitudinal survey dataset to examine the association between family or peer views on tobacco use and smoking cessation using a nationally representative sample of people with mental health conditions who smoke. We hypothesized that survey respondents who have family or peers with positive or neutral on tobacco use will be less likely to report smoking cessation than those with family or peers with negative views on tobacco use.

## **METHODS**

### **Study design**

Using the Population Assessment of Tobacco and Health (PATH) dataset<sup>59</sup>, we prospectively examined associations between family or peer views on tobacco use and smoking cessation in people with mental health conditions who smoke.

### **Data source**

The PATH Study is a nationally representative, ongoing longitudinal study of 32,320 adults aged 18 years or older, and 13,651 youths aged 12–17 years in the U.S.<sup>59</sup> PATH collects information on tobacco-use patterns, social influences, risk perceptions,

and attitudes towards current and newly emerging tobacco products, tobacco initiation, and cessation. Data collection began in September 2013.

The study used a four-stage stratified area probability sample design to enroll study participants.<sup>59</sup> First, geographical primary sampling units were selected. Second, smaller geographical segments were sampled within each primary sampling unit. Third, households within the smaller geographical segments were selected, using residential addresses in the U.S Postal Service Computerized Delivery Sequence Files, with coverage enhancement procedures to include addresses not listed in those files.<sup>60</sup> Fourth, individuals were sampled from selected households. A roster of all members in the sampled household was constructed by interviewing one adult household member. Information contained in this roster was used to oversample sub-groups of interest.

Study respondents completed the survey via computer-assisted personal interviewing and audio computer-assisted self-interviewing. In the current study, we used data collected in the third and fourth year: between October 2015 and October 2016 (baseline in the present study) and December 2016 and January 2018 (follow-up). Thus, participants in the current study were followed for one calendar year. We selected these time points for use in the current study because detailed information on family and peer influences on smoking was not captured at earlier time points.

### **Study sample**

We included individuals in the current study if they: 1) were adults ( $\geq 18$  years), 2) were smoking at baseline of the current study (2015), and 3) had experienced two or more mental health symptoms over the past year. Smoking at baseline was defined as having

smoked at least 100 cigarettes in their lifetime *and* having smoked cigarettes in the past 30 days.

#### Assessing mental health symptoms (or status)

Mental health symptoms were captured using the Global Appraisal of Individual Needs Short Screener (GAIN-SS) modified for the PATH Study.<sup>61</sup> The items on the GAIN-SS questionnaire are derived from the full GAIN instrument, a validated and standardized biopsychosocial assessment for individuals entering treatment for mental health and substance abuse disorders.<sup>62</sup> We used the internalizing and externalizing disorder subscales on the GAIN-SS to capture mental health conditions.<sup>63</sup> An example of a question on the internalizing sub-scale is, “When was the last time you had a significant problem with feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future?” and on the externalizing subscale; “When was the last time you had a hard time paying attention at school, work or home?”

At baseline (2015), participants were asked how frequently they experienced mental health symptoms in the past year. Each symptom is assigned a score of one. Scores range from 0–4 on the internalizing disorder sub-scale and 0–7 on the externalizing disorder sub-scale. Participants can report up to 11 mental health symptoms on the two subscales. High scores on the internalizing sub-scale are most closely associated with disorders such as depression, anxiety, trauma, and (at extremely high levels) schizophrenia and bipolar disorder, while high scores on the externalizing sub-scale are most closely associated with diagnoses of attention deficit disorders and impulsivity.<sup>64</sup> Participants were included in the current study if they reported at least two mental health symptoms

across the two subscales, which is consistent with validated and clinically relevant cut points<sup>61</sup> used in prior studies.<sup>65 66</sup>

Among the 32,320 adults enrolled, 28,146 had complete baseline data. We excluded participants who were not currently smoking at baseline or had never smoked (n=18,749), those who did not fit the criteria used to assess mental health status (n=4,342), and those who had missing data on primary exposures and outcomes (n=610). This resulted in a final analytical sample size of 4,201 individuals aged 18 years or older. (**Figure 1**)

### **Study measures**

Exposure variable: family or peer views on tobacco use. Participants reported family or peer views on tobacco use at baseline using the question: “Thinking about the people who are important to you, how would you describe their views on using tobacco in general?” (Response options included: very positive (n=160, 4%), positive (n=209, 5%), neutral (n=1,346, 32%), negative (n=1,419, 34%), very negative (n=1067, 25%)). Given the uneven distribution of this variable, participants were further classified into two study groups based on their responses: those reporting negative family or peer views and those reporting neutral or positive family or peer views.

Outcome: smoking cessation. The primary outcome of interest was past 30-day smoking cessation measured at follow-up, captured using the question, “In the past 30 days, have you smoked a cigarette, even one or two puffs?”<sup>67</sup> (Response: yes, no).

Covariates: sociodemographic and smoking characteristics. Data collected included age, sex, marital status, education level, whether a participant had received assistance or income from the state or federal government, their overall mental health status (response

options were: excellent, very good, good, fair, poor), and whether a participant currently lived alone. Smoking characteristics included the number of cigarettes smoked per day, age when individuals first smoked cigarettes regularly, use of electronic cigarettes (e-cigarettes), and level of nicotine dependence (measured using the Fagerstrom scale<sup>68</sup>). The PATH study also collected data on family or peer smoking status was captured using the question, “Thinking about the people who are important to you, do any of them use cigarettes?” (Response options: yes, no).

### **Statistical Analysis**

We calculated frequency distributions, means, and standard deviations (SD) for sociodemographic, mental health symptoms, and smoking characteristics further stratified according to family or peer views on tobacco use. Differences in the distribution of participant characteristics by family or peer views were examined using chi-square for categorical variables and t-tests for continuous variables. We also present data on the past 30-day smoking cessation rates by family or peer views.

We used logistic regression models to estimate crude and multivariable adjusted odds ratios (ORs) and accompanying 95% confidence intervals (CI). We used family or peer views on tobacco use as the independent variable and past 30-day smoking cessation as the dependent variable. The change-in-estimate procedure was used to assess potential confounding.<sup>69</sup> Following the forward selection procedure, all covariates were individually added to the crude model. Variables that caused a 10% change in the crude estimate were retained as confounders in the final regression model.<sup>70, 71</sup> Age, gender, race or ethnicity, and smoking status of family and peers were retained in the final model (irrespective of

whether they met the above criteria) given their relevance in the association under study. We used the Hosmer-Lemeshow goodness of fit to test for logistic regression model fit.<sup>72</sup> A p-value greater than 0.05 indicated a good model fit. Data analysis was conducted in STATA v15. All analyses were conducted using replicate weights to account for the PATH Study's complex survey design.

### **Stratified Analysis**

The terms “internalizing” and “externalizing” are widely used and distinguish between groups of individuals based on their behavioral, emotional, and social problems.<sup>73</sup> <sup>74</sup> Internalizing symptoms include those related to anxiety and depression and focus on the internal expression of distress, while the externalizing symptoms are directed outwardly and include those related to conduct, aggression, and delinquency.<sup>75 76</sup>

Since differences in mental health symptom manifestation may impact how family or peers influence smoking cessation in people with mental health conditions who smoke, we examined this association in three mental health symptom mutually exclusive groups. We created three analysis groups based on the mental health symptoms participants reported. The first group included participants who had reported symptoms on the internalizing disorder sub-scale only, the second group included those who had reported symptoms on the externalizing disorder sub-scale only, and the third group included participants who had reported symptoms on both sub-scales.

## RESULTS

### **Demographic, smoking, and mental health characteristics**

Overall, close to one-half of the study participants were male (48%) and one in four (25%) were between 25 and 35 years of age. Most (71%) of the participants identified as Non-Hispanic Whites. About half (51%) of participants had an educational attainment level of high school or less. More than half (57%) of the participants smoked cigarettes regularly before they turned 18 years of age. The average number of cigarettes smoked per day was 14 (median: 14; inter-quartile range: 11). At follow-up, 10% (unweighted n=384) of study participants reported past 30-day cessation (95% CI: 9% to 11%) (**Table 1**).

More than one-half (58%) of participants reported mental health symptoms on both the internalizing and externalizing sub-scale; the remainder reported symptoms on a single sub-scale (28% reported symptoms on the internalizing sub-scale only, and 14% reported symptoms on the externalizing subscale only). The mean number of mental health symptoms reported was five (mean: 5.4; SD 3.1). Participants who reported mental health symptoms on both the internalizing and externalizing sub-scales had an average of seven mental health symptoms (SD: 2.3). Participants who reported symptoms on the externalizing sub-scale only and those who reported on the internalizing scale only, each had an average of three mental health symptoms (SD: 1.0 for internalizing sub-scale and SD: 1.1 for externalizing sub-scale).

## **Characteristics of study participants according to family or peer views on tobacco use**

Participants who had family or peers with positive or neutral views were less likely to report past 30-day smoking cessation (7%) at one year follow-up compared to those with family or peers with negative views on tobacco use (12%) (p-value < 0.01) (**Figure 2**). The mean number of baseline cigarettes smoked per day for participants who had family or peers with positive or neutral views (mean 16; SD: 54.5) was higher than that of participants who had family or peers with negative views (mean 12, S.D:19) (p-value <0.01). Participants who had family or peers with positive or neutral views on tobacco use also included a higher proportion of individuals who were non-Hispanic Black individuals, had less than high a school education, and received assistance or income from the federal or state government in comparison with those who had family or peers with negative views (p-values <0.01) (**Table 1**).

## **Association between family/peer views on tobacco use and past 30-day smoking cessation**

In the unadjusted analysis, we found that participants who had family or peers with positive or neutral views on tobacco use were 45% less likely to report past 30-day cessation than those who reported family or peer negative views (OR: 0.55, 95% CI: 0.42 – 0.73). In the multivariable adjusted analysis, in which we controlled for age, gender, race or ethnicity, smoking status of family and peers, and number of cigarettes smoked at baseline, we found that participants who had family or peers with positive or neutral views

on tobacco use were 32% less likely to report past 30-day cessation than who had family or peers with negative views (OR: 0.68, 95% CI: 0.51 – 0.93) (**Table 2**).

### **Association between family/peer views on tobacco use and past 30-day smoking cessation stratified by mental health symptoms**

Participants were stratified into three groups: those who reported mental health symptoms on the internalizing disorder sub-scale only, those who reported symptoms on the externalizing disorder sub-scale only, and those who reported symptoms on both sub-scales. Among participants who reported mental health symptoms on the internalizing disorder subscale, the odds of past 30-day cessation were 17% lower (OR: 0.83; 95% CI: 0.43 – 1.62) for those who had family or peers with positive or neutral views on tobacco use than those who had family or peers with negative views. Among participants with mental health symptoms on the externalizing disorder subscale, the odds of past 30-day cessation were 26% lower (OR: 0.74; 95% CI: 0.38 – 1.46,) for those who had family or peers views with positive or neutral views on tobacco use compared to those who had family or peers with negative views on tobacco use. Among participants with mental health symptoms on both the internalizing and externalizing disorder subscale, the odds of past 30-day cessation were 38% lower (OR: 0.62 95% CI: 0.42 – 0.92) for those who had family or peers with positive or neutral views compared to participants who had family or peers with negative views on tobacco use (**Figure 3**).

## DISCUSSION

In a nationally representative sample of people with mental health symptoms who smoke, approximately 1 in 10 individuals reported past 30-day cessation. Individuals with family or peers with positive or neutral views on tobacco use were less likely to report past 30-day cessation than those with family or peers with negative views. In the stratified analysis, the association between family or peer views on tobacco use and smoking cessation was significant in individuals who reported mental health symptoms on both sub-scales (internalizing and externalizing mental health sub-scales), but not for those with single scale symptoms.

### **Family or peer views on tobacco use and smoking cessation**

The proportion of smokers who abstained from cigarettes in the past month in this study is comparable to proportions reported in the general population.<sup>77</sup> This findings is in line with past studies that indicate that the proportion of individuals with mental health conditions who smoke who want to and are able to quit smoking is comparable to that of the general population.<sup>5</sup>

We found that people with mental health conditions who had family or peers with positive or neutral views on tobacco use were significantly less likely to stop smoking. Past qualitative findings have found that family members or peers of people with mental health conditions believe that smoking helps with mental health symptoms management, and that engaging in smoking cessation practices may worsen the smoker's mental health symptoms.<sup>25</sup> Also, family members who take on a caregiving role are involved in purchasing cigarettes to 'maintain routines' for people with a mental health condition who

smoke.<sup>51</sup> Our findings show that positive views on smoking significantly reduce the chances of quitting smoking. Educating family members or close friends about the benefits of quitting in people with mental health conditions could contribute to successful quitting. People who smoke are more likely to quit when family members and close friends whose opinion is valued think they should quit and believe that smoking is unacceptable behavior in social situations.<sup>78</sup>

### **Family or peer views on tobacco use and smoking cessation by mental health symptoms**

We found that the negative effect of having family or peers with positive or neutral views on tobacco use on smoking cessation was more apparent in people who reported mental health symptoms on both the internalizing and externalizing sub-scales, and not in those with single sub-scale symptoms. Reporting symptoms on both sub-scales was linked to a higher mean of mental health symptoms which could perhaps indicate greater severity of the mental health condition.<sup>64</sup> Therefore, one possible explanation for this finding is that adults with greater severity of mental health conditions may rely more on family or close social contacts to access mental health services. Therefore, family or peer views on tobacco use are likely to have a greater impact on their health behavior including smoking cigarettes. Furthermore, the severity of the mental health condition could also be associated with the misconceptions of smoking and mental health management. For example, this may lead to a family member or close friends having an even stronger favorable opinion on tobacco use to manage symptoms, serving as a barrier to quitting. Further exploration

needed to clarify whether family or peers influences on smoking cessation differ by level of mental health severity.

### **Study strengths and limitations**

The current study used a nationally representative sample, and as such, findings from this study are likely to be generalizable to US adults with mental health conditions who smoke.

The study also had several limitations that must be kept in mind in interpreting the study results. First, the GAIN-SS measures severity of mental health symptomatology, not the diagnosis. However, the high sensitivity and specificity between GAIN-SS items and clinical diagnosis tools<sup>79</sup> support the use of symptoms as good indicators of clinically significant mental health conditions. The GAIN-SS tool has been recommended for use in epidemiological studies.<sup>65</sup> Second, the survey question used to establish family or peer views on tobacco use did not capture family or peer views specific to smoking and having a mental health condition. It is possible that the measure used in the current study led to an underestimation of the proportion of family members or peers who normalize smoking based on the incorrect belief that quitting smoking interferes with recovery from mental illness. This, in turn, likely resulted in an underestimation of our point estimates. Third, because of small numbers we grouped individuals who had family or peers with positive views together with those who had family or peers with neutral views. The degree to which family or peer views impact smoking cessation might differ depending on whether the views held are positive or neutral. This needs to be further explored. However, it is unlikely that the impact of family or peers with neutral views on tobacco use would be a protective

one given that smokers are more likely to quit smoking when family members and close friends whose opinion is valued think they should quit, or believe that smoking is unacceptable behavior in social situations.<sup>78</sup>

## **Conclusions**

Quitting smoking improves one's mental health status. Understanding why people with mental health conditions continue to smoke at higher rates than the general population could inform the development of more nuanced and effective cessation interventions. Our findings suggest that having family or peers with neutral or positive views on tobacco use deters cessation efforts of people with mental health conditions who smoke. Efforts to modify these views are needed to improve quit rates among smokers with mental health conditions.

## TABLES AND FIGURES

**Table 1:** Distribution of participant characteristics according to family or peer views on tobacco use among people with mental health conditions who smoke, using data from the Population Assessment of Tobacco and Health (PATH) study 2015 - 2016

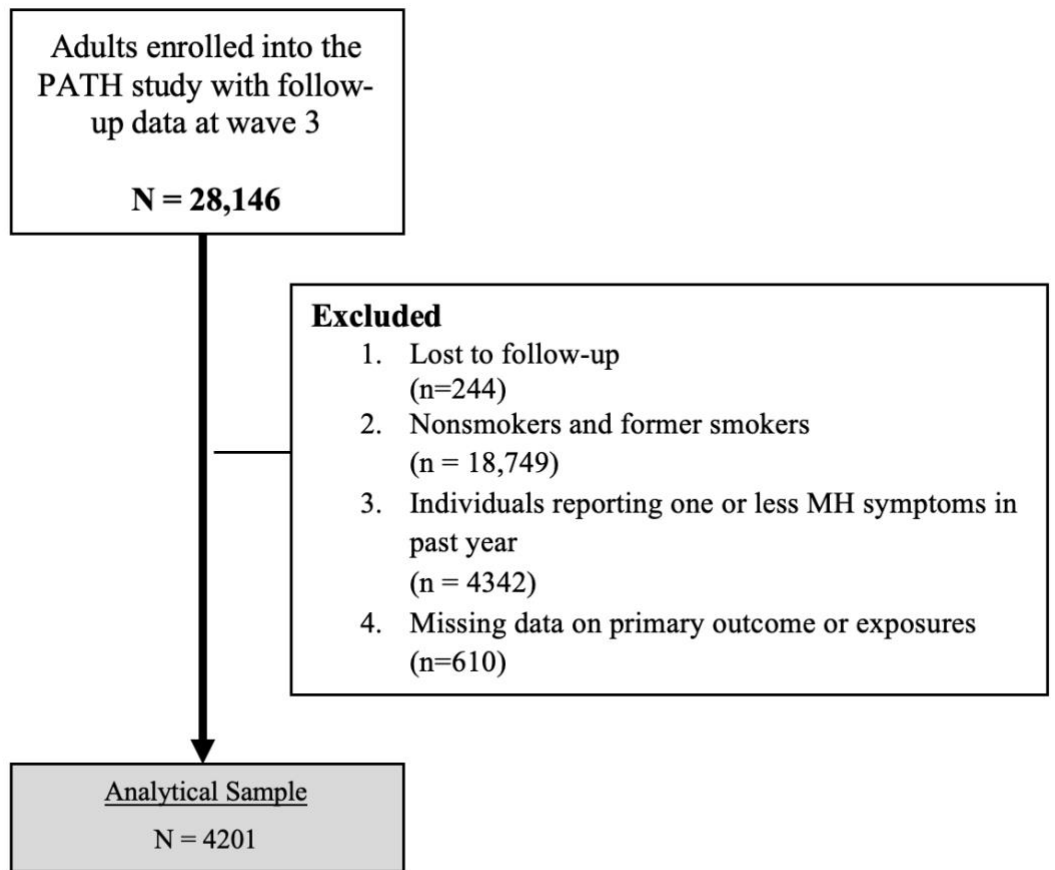
Participant Characteristics	Total (%)	Family/Peer views on tobacco use <sup>1</sup>		p-value
		Negative views (%)	Neutral or Positive views (%)	
<b>N</b>	4201	2486 (61.8%)	1715 (38.2%)	
<b>Age<sup>1</sup></b>				
18 to 24	17.3	15.9	19.5	<0.01
25 to 34	25.4	25.0	25.9	
35 to 44	20.0	21.3	17.7	
45 to 54	19.5	18.6	20.9	
55 and older	17.9	19.2	15.9	
<b>Men</b>	47.9	47.6	48.5	0.63
<b>Race/ethnicity<sup>1</sup></b>				
NH Whites	70.9	72.8	67.9	<0.01
NH Blacks	11.3	9.2	14.8	
Hispanics	9.8	9.8	9.7	
Other	7.9	8.2	7.8	
<b>Education attainment<sup>1</sup></b>				
High school or less than high school	51.3	45.2	61.4	<0.01
<b>Marital Status<sup>1</sup></b>				
Married	31.9	33.3	29.8	0.14
Widowed/Separated/Divorced	30.8	30.2	31.8	
Never married	37.2	36.5	38.4	
<b>Mental Health Symptoms</b>				
Reporting symptoms on internalizing sub-scale only	28.8	27.1	31.4	0.02
Reporting symptoms on internalizing sub-scale only	15.1	16.1	13.5	
Reporting symptoms on both sub-scales	56.1	56.7	55.1	
<b>Received assistance/income from state<sup>1</sup></b>	35.0	31.2	41.2	<0.01
<b>Cigarettes smoked per day at baseline, median (IQR) <sup>1</sup></b>	14 (11)	12.1 ± 19.0	15.8 ± 54.5	<0.01
<b>Family or peers smoke cigarettes</b>	69.7	61.7	82.1	<0.01

<sup>1</sup>Missing values: family/peer views (n=85), age (n=105), race/ethnicity (n=76), education (n=116), marital status (n=74), received assistance/income from state (n=25), cigarettes smoked per day (n=43), age first smoked regularly (n=695); IQR: Inter-quartile range

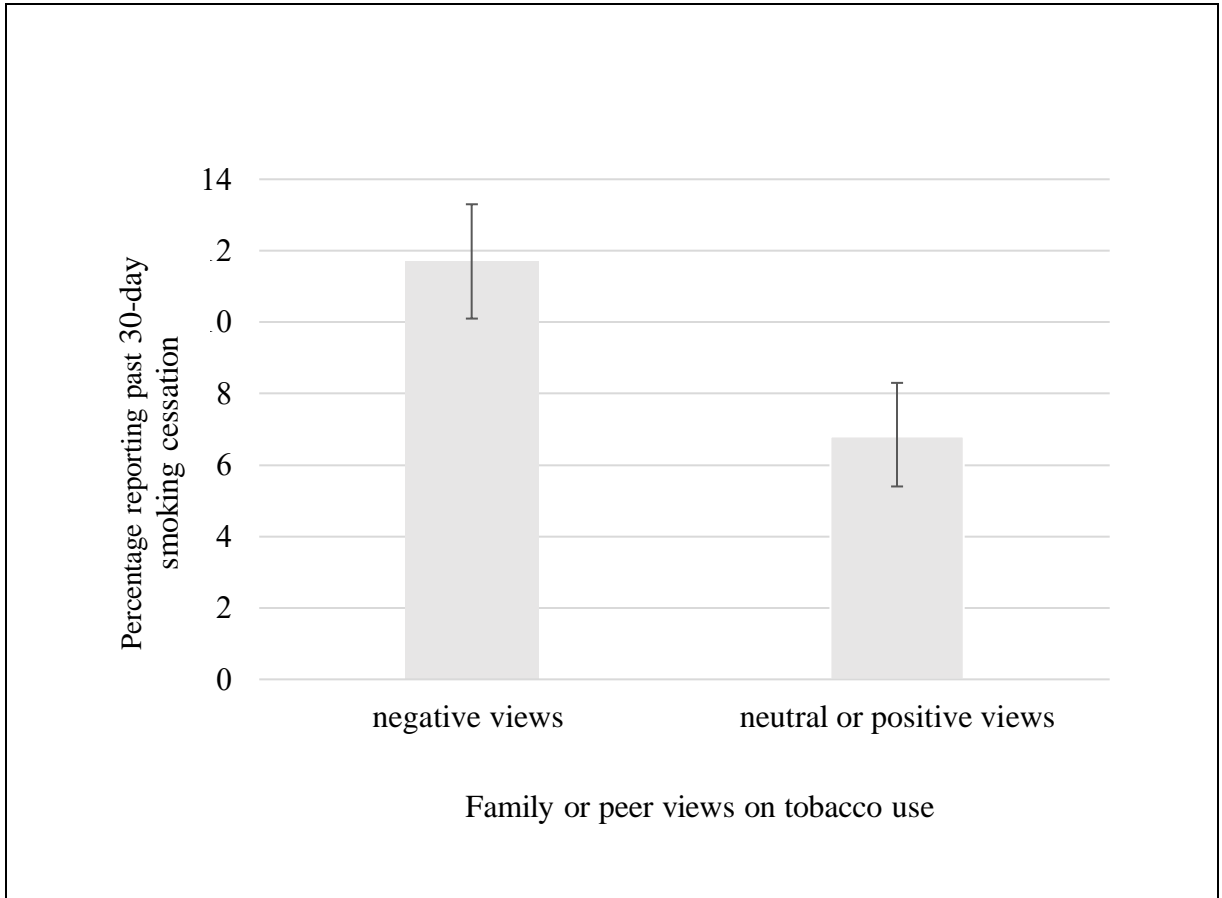
**Table 2:** The odds ratios estimated from logistic regression analysis examining the effect of positive or neutral family or peer views on tobacco use views on past 30-day smoking cessation, using data from the Population Assessment of Tobacco and Health study 2015 – 2016

Characteristics	Adjusted for demographic variables		Adjusted for demographic variables and cigarettes/day		Adjusted for demographic variables and cigarettes/day and family/peer smoking status	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Family/peer views on tobacco use</b>						
Negative views	1.00	reference	1.00	reference	1.00	reference
Neutral/positive	0.55	0.42 – 0.72	0.66	0.49 – 0.89	<b>0.68</b>	<b>0.51 – 0.93</b>
Crude model: OR:0.55; 95% CI: 0.42 – 0.73; P-value: <0.01						

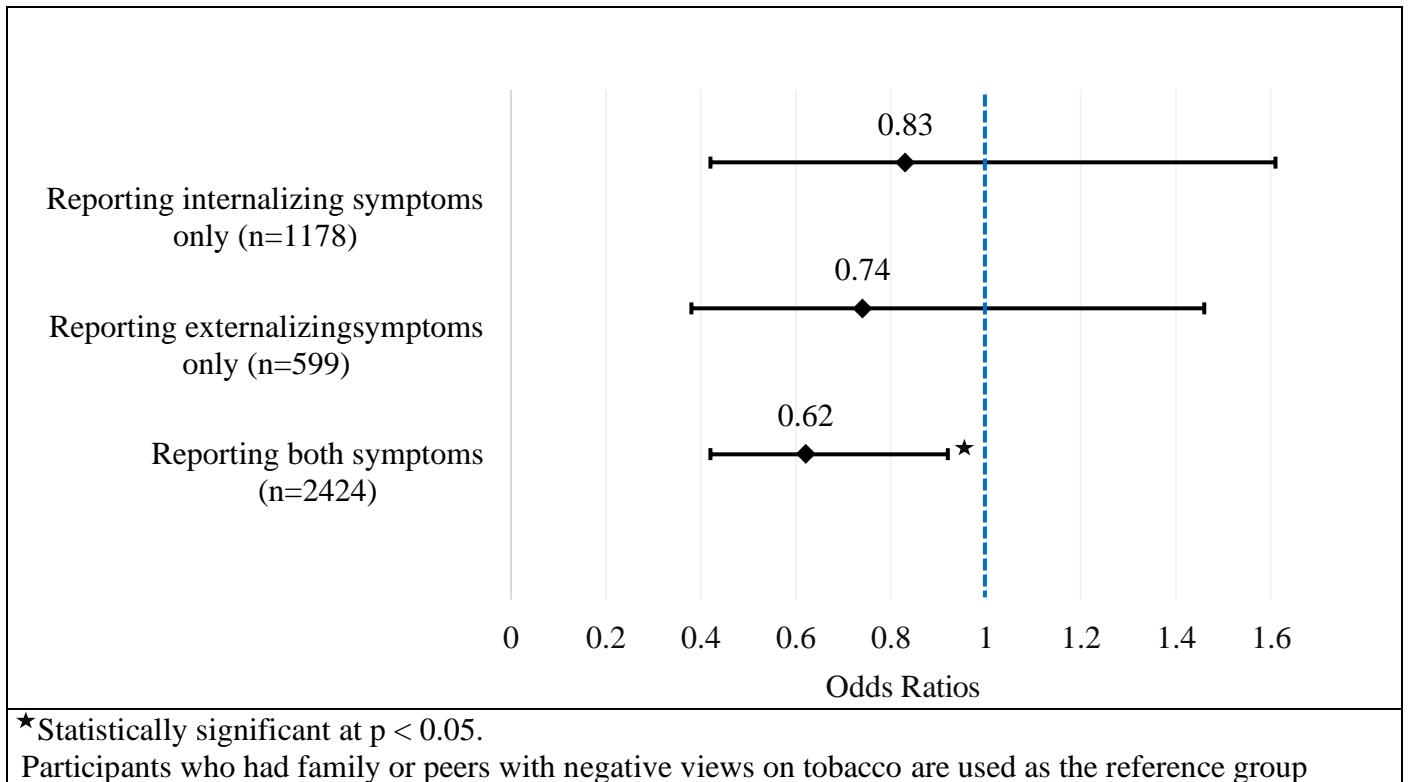
**Figure 1:** Exclusion criteria of the study population of people with mental health conditions who smoke, Population Assessment of Tobacco and Health (PATH) Study



**Figure 2:** The proportion of participants who reported smoking cessation at follow-up by family or peer views on tobacco use among people with mental health conditions who smoke, using data from the Population Assessment of Tobacco and Health Study, 2016



**Figure 3:** Forest plot showing adjusted odds ratios and 95% confidence intervals for past 30-day smoking cessation by mental health symptoms groups using data from the Population Assessment of Tobacco and Health study (2015 – 2016)



**CHAPTER III**

**EXAMINING PATHWAYS BETWEEN FAMILY OR PEER FACTORS AND  
SMOKING CESSATION IN A NATIONALLY REPRESENTATIVE SAMPLE OF  
ADULTS WITH MENTAL HEALTH CONDITIONS: A STRUCTURAL  
EQUATION ANALYSIS**

**ABSTRACT**

**Background**

Supportive family or peer attitudes and behaviors positively impact quitting. However, the limited understanding of the pathways through which family or peer attitudes and behaviors impact smoking cessation limits the development of suitable cessation interventions in people with mental health conditions who smoke. This study examined pathways through which family and peer factors influenced smoking cessation in adults with mental health conditions who smoke.

**Methods**

We used data from the Population Assessment of Tobacco and Health (PATH) Study, a national longitudinal survey. Baseline data were collected in 2015 and follow-up data in 2016. We included adults who currently smoke and had experienced two or more mental health symptoms in the past year (unweighted n=4,201). Mental health symptoms were measured by the Global Appraisal of Individual Needs Short Screener. We explored how family or peer views on tobacco use, family or peer smoking status, and rules against

smoking in the home influenced quitting. Structural equation modeling (SEM) was used to test the hypothesized relationships between family and peer factors, mediating factors, and smoking cessation over a one year period.

## **Results**

We identified two pathways through which family and peers influenced smoking cessation. Having family or peers with negative views on tobacco use indirectly affected smoking cessation, mediated through the individual's intention to quit (regression coefficient: 0.19) and use of evidence-based approaches during their past year quit attempt (regression coefficient: 0.32). Having rules against smoking in the home (regression coefficient: 0.33) and having non-smoking family members or peers (regression coefficient: 0.11) had a positive indirect effect on smoking cessation, mediated through changes in smoking behaviors (regression coefficient: 0.32). All paths shown in the final model were statistically significant ( $p < 0.01$ ). The model explained 28% of the variability in smoking cessation.

## **Conclusion**

When examined simultaneously, family and peer factors indirectly affected smoking cessation by increasing the intention to quit and facilitating positive changes in the smoking behavior. Family or peer-based cessation interventions that systematically increase intentions to quit and monitor changes in smoking behavior may be able to assess the efficacy of family and peer support on quitting in people with mental health conditions who smoke.

## INTRODUCTION

Smoking remains the leading preventable cause of death globally, disproportionately affecting people with mental health conditions.<sup>80</sup> Approximately one in four US adults experience some form of mental health condition<sup>81</sup>, and consume almost 40% of all cigarettes smoked by adults.<sup>82</sup> Between 2008 and 2016, quit rates among people with mental health conditions who smoke were consistently lower than quit rates in the general population each year, including most recently in 2016 (24% vs. 52%).<sup>17</sup> Findings from exploratory qualitative studies that have examined resources used to quit smoking among people with mental health conditions who recently quit indicate that positive influences from family or peers facilitate successful quitting.<sup>26, 49, 50</sup> Family or peer-based interventions have the potential to be an innovative and practical approach to improving quit rates in people with mental health conditions who smoke.<sup>83-85</sup>

To date, no family or peer-based interventions have been developed for people with mental health conditions who smoke. Much of the work has been conducted in the general population of smokers.<sup>53-58</sup> Persons who received partner support during the cessation intervention were no more likely to abstain from cigarettes at follow-up than smokers who did not receive partner support.<sup>43</sup> A significant limitation of the studies was the lack of evidence that interventions were able to increase the amount of support provided to study participants.<sup>43 44</sup> A fine-grained understanding of how existing family or peer attitudes or behaviors influence smoking behaviors could inform approaches to enhance family and peer support to improve quit rates.

In the general population of smokers, successful quitters tend to have non-smoking families or peers<sup>86</sup> and rules against smoking in the home.<sup>87</sup> Studies have also found that having the perception that immediate family or peers disapprove of one's smoking is associated with making a quit attempt.<sup>78,88</sup> Supportive social environments provide a strong incentive to quit<sup>78</sup>, which increases intentions to quit, enabling smoking cessation. However, there is limited research exploring how family and peer smoking status, rules on smoking in the home, and family or peer attitudes impact smoking cessation in people with mental health conditions. Social influences and social norms constructs<sup>89</sup> embedded in behavior change theories indicate that individual-level factors are significantly affected by the behaviors and opinions of significant others. Understanding the specific nature of these relationships can inform the development of support interventions that effectively address the cessation needs of smokers with mental health conditions.

We examined the relationship between family and peer factors on smoking cessation, and assessed the mediating role of individual-level factors, using a nationally representative sample of people with mental health conditions who smoke.

## **METHODS**

### **Study setting and data source**

We used data from the Population Assessment Tobacco Health (PATH) study, a nationally representative, ongoing longitudinal study. PATH collects information on tobacco-use patterns, social influences, attitudes toward tobacco products, tobacco initiation, and cessation. Baseline data used in the current study were collected in 2015 and

follow-up data in 2016 (one-year follow-up). Data were collected via computer-assisted personal interviewing (CAPI) and audio computer-assisted self-interviewing (ACASI).

### **Study sample**

We included adults ( $\geq 18$  years) who were currently smoking (had smoked at least 100 cigarettes in their lifetime and had smoked cigarettes in the past 30 days) at baseline, and reported two or more mental health symptoms over the past year.

### **Mental health Symptoms**

Mental health symptoms were measured using the Global Appraisal of Individual Needs Short Screener (GAIN-SS).<sup>61</sup> The items for the GAIN-SS are derived from the full GAIN instrument, a validated and standardized biopsychosocial assessment for individuals entering treatment for behavioral health disorders.<sup>62, 90</sup> GAIN-SS is recommended for use in epidemiological samples,<sup>65</sup> prior studies conducted among people living with mental health conditions have used the GAIN-SS.<sup>66, 91, 92</sup>

On the GAIN-SS scale, a score of one was assigned to each mental health symptom experienced over the past year. Scores range from zero to four on the internalizing disorder sub-scale and zero to seven on the externalizing disorder sub-scale. Participants can report up to eleven mental health symptoms on both subscales. Using clinically relevant cut points and as informed by past studies<sup>66, 91, 92</sup>, we included participants who had experienced at least two mental health symptoms over the past year, regardless of the subscale. Validation studies indicate that those who report two or more symptoms are likely to have a mental health diagnosis.<sup>79, 61</sup>

Among the 32,320 adults enrolled at baseline, 28,146 had complete data. We excluded 18,749 adults who were either nonsmokers or former smokers at baseline. We further excluded adult smokers who had not reported any symptom or reported only one mental health symptom in the past year (n=4,342). Individuals who had missing data on primary exposures and outcomes (n=610) were excluded. Our analytical sample consisted of 4,201 smokers who had experienced two or more mental health symptoms over the past year (**Figure 1**).

## **Measures**

We collected data on sociodemographic factors (age, sex, race and ethnicity, marital status, whether participant lived alone, and education level), family and peer related factors, intentions to quit smoking, the individual's smoking behavior, self-perceived mental well-being, use of evidence-based cessation approaches, and smoking cessation. Data on demographic factors and exposure variables were collected at baseline (2015), and data on outcome variables were collected after a one-year follow-up (2016).

### Exposure variables of interest

1. *Family or peer views on tobacco use:* Participants were asked to report whether their family members and close friends had views that favor or oppose tobacco use. This was assessed using the question, "Thinking about the people who are important to you, how would you describe their views on using tobacco in general?" Response options were very positive, positive, neutral, negative, very negative.

2. *Family or peer smoking status.* Participants were asked to report the smoking status of those who were important to them using the question, "Thinking about the people who are important to you, do any of them use cigarettes?" (Responses were yes, no).
3. *Rules on smoking in the home:* This was captured using a single measure; "For tobacco products that are burned, such as cigarettes, cigars, pipes or hookah, which statement best describes the rules about smoking a tobacco product inside your home?" Participants responded by indicating whether: 1) smoking was not allowed anywhere or anytime, 2) smoking is allowed in some places or sometimes, or 3) Smoking is allowed anywhere, at any time.

#### Individual-level factors

4. *Intentions to quit smoking:* Intentions to quit were assessed using three measures in which participants reported on their levels of interest in quitting, the time frame within which they planned to quit smoking, and how frequently they thought about the harms associated with using tobacco. All three measures have been shown to be strongly associated with the smokers' intentions to quit<sup>93</sup> and have practical applications when distinguishing between individuals with low and those with high intentions to quit smoking in the stages of change behavioral model.<sup>94 93</sup> Level of interest in quitting was measured on a scale of 1 = not at all interested to 10 = extremely interested, using the statement "Overall, on a scale from 1 to 10 where one is not at all interested and ten is extremely interested, how interested are you in quitting smoking cigarettes? Please choose a number from 1 to 10" In the second measure of intentions to quit, participants were asked to indicate, on a scale of 1 to 5, the time frame within which they planned

to quit smoking (1 = In the next 7 days, 2 = In the next 30 days, 3 = In the next 6 months, 4 = In the next year, 5 = More than one year from now). The third measure captured how frequently smokers thought about the harm associated with using tobacco, using the question, "In the past 30 days, how often did you think about the harm your tobacco use might be doing to you?" Participants responded on a scale of 1 to 5 (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very often). Cronbach's alpha for the intentions to quit smoking scale was 0.65 (**Figure 5**).

5. *Smoking behaviors*: We described the smoking behavior of study participants using three variables: number of cigarettes smoked per day, time to the first cigarette after waking, and craving, which are all behavioral markers for tobacco dependence<sup>95-98</sup>. Number of cigarettes was assessed as packs smoked per day. Time to the first cigarette after waking was assessed using the question, "How soon after you wake up do you smoke your first cigarette? 1 = Within 5 minutes, 2 = 6 to 30 minutes, 3 = 31 to 60 minutes, 4 = After 60 minutes. Higher values indicated a lowered dependence on cigarette smoking. Participants also rated their level of agreement to the following statement to capture the frequency of cigarette cravings, "I find myself reaching for tobacco products without thinking about it" on the scale of 1 = not true of me at all to 5 = extremely true of me. This question was reverse coded such that higher values indicated experiencing cravings less frequently. Cronbach's alpha for the smoking behavior scale was 0.71 (**Figure 5**).
6. *Self-perceived mental well-being*: Participants' self-perception of their mental health was assessed using the question. "In general, how would you rate your mental health,

which includes stress, depression, and problems with emotions?" Responses included 1= Excellent, 2 = Very good, 3 = Good, 4 = Fair, 5 = Poor. Self-perceived mental health was reverse coded in the analysis such that higher values corresponded to better self-perceived mental well-being.

7. *Use of evidence-based cessation approaches during past year quit attempt(s)*: This variable was assessed using a two-stage process. First, participants were asked, "In the past 12 months have you tried to quit smoking/using tobacco product(s)?" Participants responded with either a yes or no. Those who had made a past-year quit attempt were then asked if they had used evidence-based cessation approaches during the quit attempt. Use of evidence-based cessation strategies during past-year quit attempts was assessed using four questions: 1) "In past 12 months, have you used counseling, telephone helpline, books, pamphlets, videos, quit tobacco clinic, class, support group, or web-based program to help when you last tried to quit smoking?", 2) "In the past 12 months, have you used a nicotine patch, gum, inhaler, nasal spray, lozenge, or pill when you last tried to quit smoking?", 3) "Thinking back to the time you tried to quit in the past 12 months, did you use Chantix, varenicline, Wellbutrin, Zyban, or bupropion?", and 4) "Thinking back to the time you tried to quit in the past 12 months, did you rely on the support of friends and family to help you?" Participants responded with either yes or no on each of the three questions. We then classified them into three groups; 1= those who had made a past-year quit attempt(s) using any of the evidence-based cessation approaches, 2 = those who had made a past-year quit attempt(s) but had not

used any of evidence-based cessation approaches, and 3= those who had not made a past-year quit attempt.

#### Outcome variable of interest

8. *Smoking Cessation.* We assessed current smoking status at the one-year follow-up, using the question, "Do you currently smoke cigarettes (1=every day, 2=somedays, and 3=not at all)?)

### **Formulation of the hypothesized model**

We hypothesized that having family or peers with negative views on tobacco use had a direct relationship with smoking cessation, and an indirect relationship mediated through an individuals behaviors (intentions to quit and smoking behaviors). In the literature, intentions reflect the extent to which individuals are motivated to perform a behavior and are conceptualized as the most proximal antecedent of behavior.<sup>99 99</sup> Thus, having higher intentions to quit was hypothesized to be associated with the use of evidence-based cessation approaches during quit attempt (s), which in turn was hypothesized to be associated with smoking cessation. Based on the existing literature<sup>86, 87, 100</sup>, we further hypothesized that having rules against smoking in the home and non-smoking family members or peers would directly or indirectly affect smoking cessation in adult smokers with mental health conditions. The individual-level behaviors were assessed as mediators in this relationship. We also assessed self-perceived mental well-being as a covariate in the relationship between family and peer factors (views, rules, and smoking status of family or peers) and smoking cessation (**Figure 4**)

## **Statistical analysis**

Spearman correlation analysis was conducted to examine the strength of correlations between variables. To account for the complex sampling procedures of the PATH study, we obtained weighted correlations using the ‘corr\_svy’ command in STATA that displays correlation coefficients that account for the probability sampling weights.

We used structural equation models to examine the relationships between family and peer factors and smoking cessation. Structural equation models allow simultaneous estimation of relationships between observed (manifest) and unobserved (latent) variables. Rectangles represent manifest variables and ovals represent latent variables. An assumed causal path between two variables is represented by a one-way arrow. Numerical values on the arrows are standardized partial regression coefficients, which indicate the effect of one variable on the other, controlling for all other variables in the model. Regression coefficients without a sign indicate a positive association, while those with a minus sign indicate a negative association. The initial model included two latent variables (smoking behaviors and level of intention to quit) and six manifest variables (family and peer negative views on tobacco use, rules against smoking in the home, family or peer smoking status, self-perceived mental well-being, use of evidence-based cessation approaches during quit attempt(s), and smoking cessation).

The analysis was a two-step process. First, we used confirmatory factor analysis to form latent variables from indicator variables. Descriptive analysis, confirmatory factor analysis, and correlation analysis were performed in STATA (V.15). We then constructed

a structural model to test the hypothesized relationships between latent constructs and manifest variables. We used Wald tests criteria to remove non-significant paths that did not increase the model chi-square. The model was evaluated using the goodness-of-fit index (GFI), chi-square to degrees-of-freedom (df) ratio, root mean square error of approximation (RMSEA), and Tucker-Lewis index (TLI). Good model fit is determined by an RMSEA less than 0.08, chi-square to degrees-of-freedom (df) ratio less than 5, and values of GFI and TLI greater than 0.90. Structural model procedures were conducted using the Mplus statistical software package (V 7.0)

## **RESULTS**

### **Participant Characteristics**

Overall, forty-eight percent of respondents were male (48%), one in four (25%) were aged between 25 and 35 years. A majority (71%) self-identified as non-Hispanic Whites, and 11% as non-Hispanic Blacks. About half (51%) had a high school education level or less. The average number of cigarettes smoked per day was 13.4 (SD: 28.8). The mean number of mental health symptoms was five (mean: 5.4; SD 3.1) (**Table 1**).

### **Correlation between family or peer views on tobacco use, rules against smoking in the home, family or peer smoking status, and smoking cessation in adults with mental health conditions who smoke.**

All three family and peer factors were positively correlated with each other. Having family and peers with negative views on tobacco use positively correlated with having rules against smoking in the home (correlation coefficient: 0.17, p-value < 0.01) and having non-smoking family members or peers (correlation coefficient: 0.23, p-value < 0.01). Having

rules against smoking positively correlated with having non-smoking family or peers (correlation coefficient: 0.14, p-value < 0.01) (**Table 3**)

Having family or peers with negative views about tobacco use positively correlated with higher intentions to quit (correlation coefficient: 0.19, p-values < 0.01). Higher intentions to quit positively correlated with the use of evidence-based cessation approaches during the past year quit attempt (s) (correlation coefficient: 0.33, p-value < 0.01). Using evidence-based cessation approaches during past year quit attempts was positively correlated with no current use of cigarettes (correlation coefficient: 0.41, p-value < 0.01).

Rules against smoking in the home positively correlated with positive changes in smoking behaviors (correlation coefficient 0.33; p-value < 0.01) and no current use of cigarettes (correlation coefficient: 0.16; p-value). Having a non-smoking family or peers also positively correlated with positive changes in smoking behaviors (correlation coefficient: 0.12; p-value < 0.01). Positive changes in smoking behaviors correlated with no current use of cigarettes (correlation coefficient: 0.36, p-value < 0.01) (**Table 3**).

### **Model fit**

The overall fit of the final model was good. The RMSEA was 0.03, the chi-square degrees-of-freedom (df) ratio was 5, the TLI was 0.96, and the CFI was 0.98. All paths shown in the final model were statistically significant (standardized coefficients are shown in **Figure 6**). The overall model explained 28% of the variability in smoking cessation outcomes.

## **Associations between family or peer factors, self-perceived mental well-being, smoking behaviors, and smoking cessation**

Family and peer negative views on tobacco use had an indirect effect on smoking cessation, mediated through the smoker's intention to quit (regression coefficient: 0.19), which was associated with using evidence-based smoking cessation approaches during a past year quit attempt (regression coefficient: 0.32). The use of evidence-based approaches during a past year attempt was strongly associated with past 30-day smoking cessation (regression coefficient: 0.38). Having rules against smoking in the home (regression coefficient: 0.33) and having non-smoking family members or peers (regression coefficient: 0.11) had positive indirect effects on smoking cessation, mediated through positive changes in the individual's smoking behavior (regression coefficient: 0.32) **(Figure 6)**

## **DISCUSSION**

We examined relationships between family and peer factors and smoking cessation using a nationally representative US sample of adults with mental health conditions who smoke. We identified two pathways through which family and peers influenced smoking cessation. Family or peers' negative views on tobacco use had an indirect relationship with smoking cessation, mediated through intentions to quit and use of evidence-based approaches during past year quit attempts. Having rules against smoking in the home and non-smoking family or peers had an indirect relationship with smoking cessation, mediated through the individual's smoking behavior.

**Intentions to quit, family or peers views on tobacco use, and smoking cessation**

We found that having family or peers with negative views on tobacco use positively influenced smoking cessation by increasing one's intentions to quit. Smokers with high intentions were more likely to use evidence-based cessation approaches during their quit attempts. This finding is consistent with past findings illustrating the positive benefits of a supportive social environment for motivating smokers to quit.<sup>101-103</sup> The benefits of having family and peers with negative views on tobacco use on intentions to quit may suggest the capacity of family or peers to help smokers recognize the negative aspects of tobacco use and the importance of quitting.<sup>104</sup>

Misconceptions about smoking and mental health symptom management exist,<sup>25 51</sup> and undermine the quitting success. A proposed strategy from the present findings is to use educational programs to change family and peer views on tobacco. These findings further suggest that cessation interventions that partner with family could also regularly monitor for changes in intentions to quit and use of evidence-based approaches in study participants as indications of cessation progress. This could provide the evidence needed to assess the efficacy of family and peer influences on quitting in people with mental health conditions who smoke.

### **Changes in smoking behavior, home smoking rules, and family or peers smoking status**

Having rules against smoking in the home and non-smoking family members or peers were both associated with positive changes on smoking behavior which positively impacted smoking status one year later. Past studies indicate that the level of exposure to smoking visual cues increases cravings.<sup>104</sup> Smoking-addiction-related craving is often

produced by pairing an external stimulus, such as holding a cigarette, with access to nicotine.<sup>105</sup> Active smoking is more likely to occur after exposure to visual smoking cues such as seeing others handling a cigarette. Thus, lower levels of exposure to smoking cues may it relatively easier for people to stop quitting. These supportive behaviors reduce the frequency of exposure to smoking visual cues from family members or close friends, making it relatively easier for smokers to stop smoking. Thus, our findings could suggest that family or peers who do not smoke or have rules against smoking in the home positively impact quitting by reducing the number of smoking cues in the smokers' physical environment.

We also found that a majority (82%) of participants in our study lived with someone. Therefore, smokers may be more likely to follow the smoking rules in a home if there is someone to be accountable to and that individual does not smoke. Implementing smoke-free rules and encouraging quitting in important others who smoke could improve quit rates in this population. Furthermore, regular monitoring of changes in smoking behavior (such as reduction in the number of cigarettes smoked or experience of cravings) could provide evidence of family and peer support on quitting success in people with mental health conditions who smoke.

### **Different family and peers factors are correlate with each other**

All three family or peer behaviors and attitudes investigated in this study were associated with each other but worked through distinct behavioral routes to influence smoking status. That is, having rules against smoking in the home and non-smoking family and peers improved smoking behaviors and having negative views on tobacco use worked

to boost the smoker's motivation to quit. This finding is consistent with research on social norms<sup>106</sup> which indicates that descriptive social norms (what other people actually do) and injunctive norms (what other people think you should do) can have independent influences on behavior<sup>107, 108</sup> Cessation interventions that aim to alter multiple family or peer factors could significantly improve quit rates in this population.

### **Study strengths and limitations**

This was the first population-based study to examine the process(es) through which family or peer attitudes and behaviors influence smoking cessation in people with mental health conditions who smoke. Identifying behavioral mechanisms through which family or peer norms impact quitting is informative to designing suitable interventions that effectively address the cessation needs of smokers with mental health conditions.

The present study had several limitations that need to be kept in mind in interpreting the present results. The GAIN-SS measures the severity of mental health symptomatology and does not provide a diagnosis. However, the high sensitivity and specificity between GAIN-SS items and clinical diagnosis tools<sup>79</sup> support the use of symptoms as good indicators of clinically significant mental health conditions.<sup>65</sup> Second, the model focused on the effects of family and peer factors on smoking cessation. We did not account for other factors that may impact cessation outcomes in this population. such as access to mental health services or the use of available health services.<sup>109</sup> Third, our study is limited by its lack of information from family or peers. Dyadic views from family or peers and smokers are equally informative when developing support interventions.

### **Conclusion**

When examined simultaneously, family and peer factors had indirect effects on smoking cessation in a nationally representative sample of smokers with mental health conditions. Changing existing family or peer norms on tobacco use is necessary to facilitate successful quitting. Our study indicates that different aspects of family and peer support are correlated with each other and may work through different pathways to influence smoking behaviors. Family or peer-based cessation interventions that systematically improve mediators identified in this study may be better able to assess the efficacy of family and peer support on quitting in people with mental health conditions who smoke.

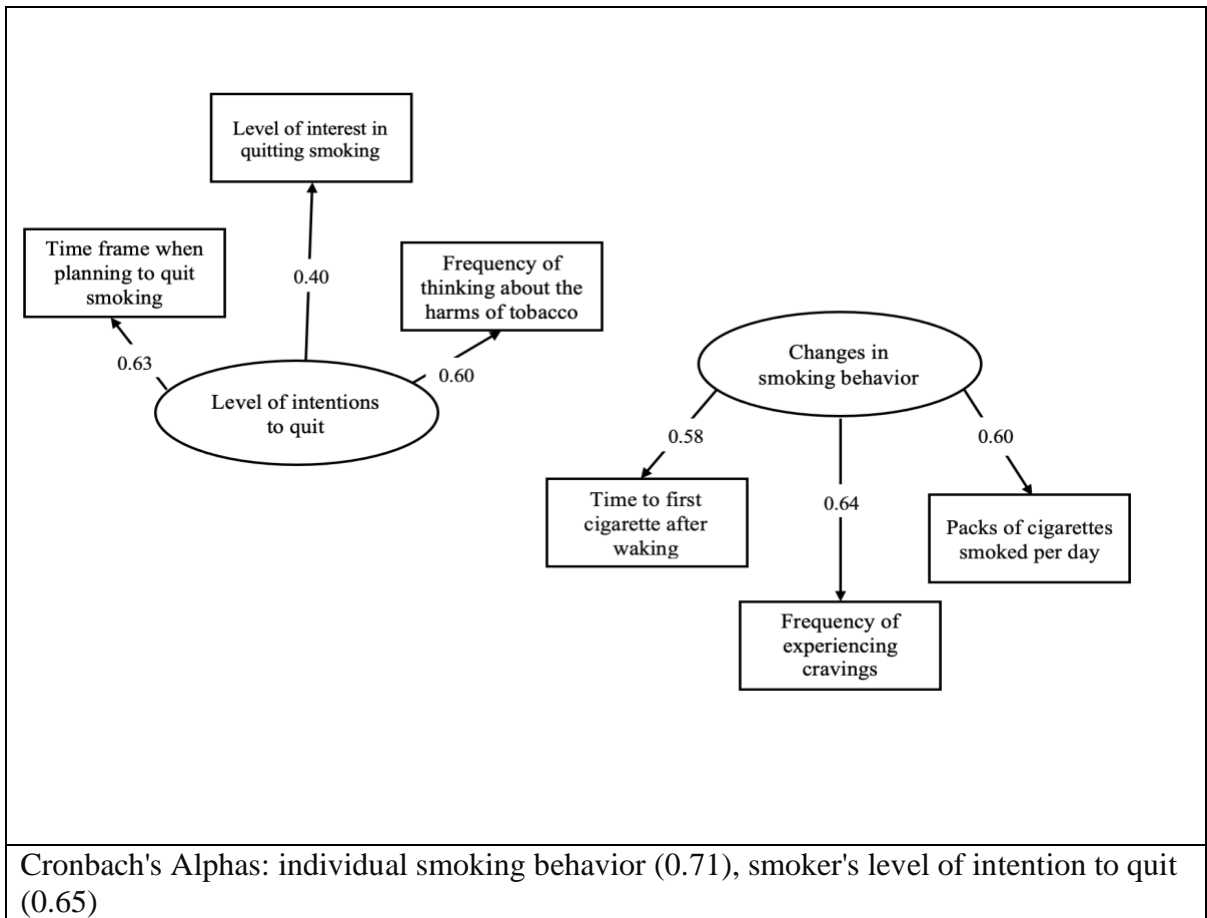
## TABLES AND FIGURES

**Table 3:** Correlations between family or peer factors, self-perceived mental well-being, smoking behavior, and smoking cessation in smokers with mental health conditions using data from the Population Assessment of Tobacco Health Study (2015 – 2016)

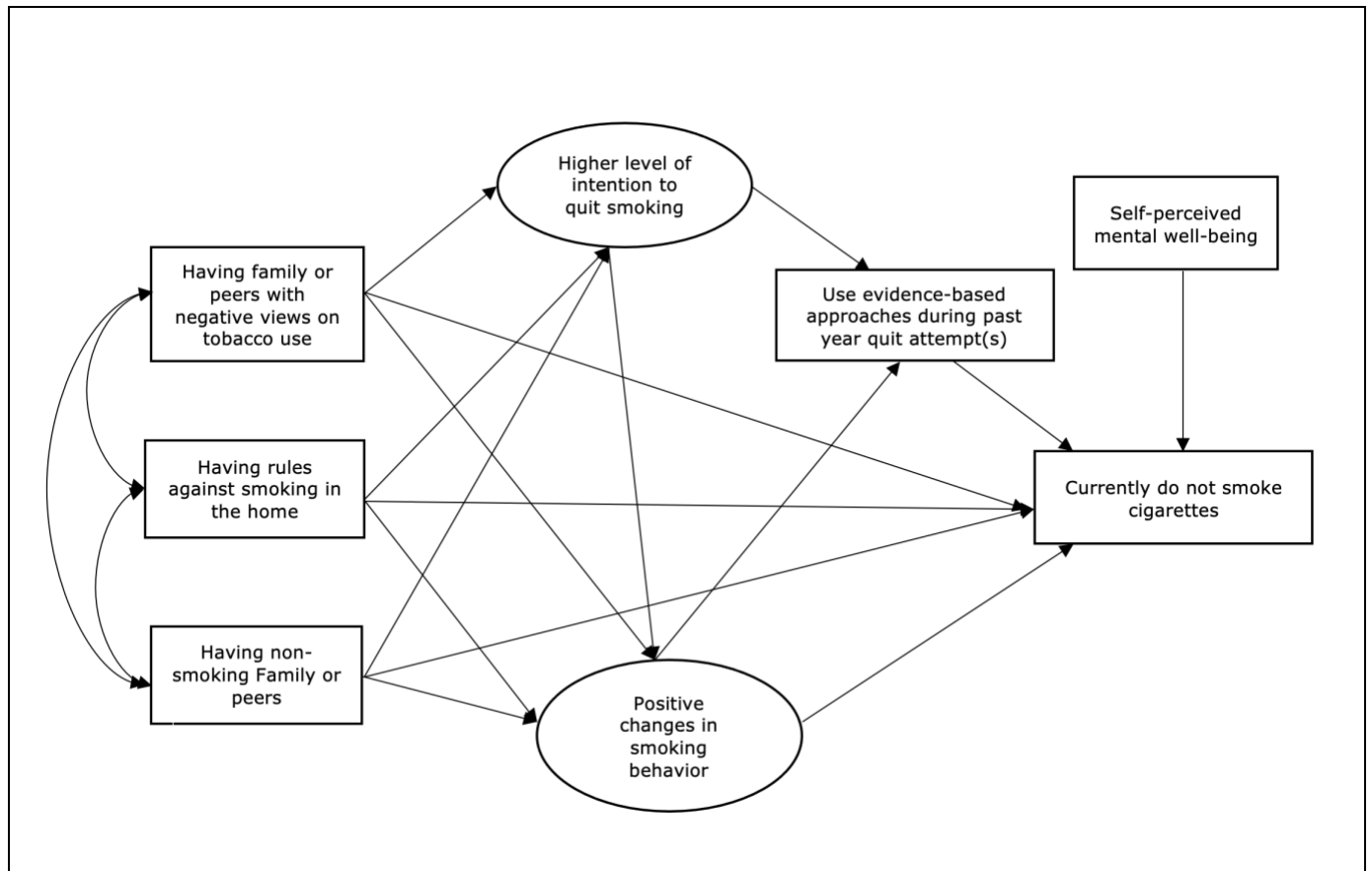
<b>Latent and Manifest Variables</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
1. no current use of cigarettes	1.00							
2. use of evidence-based cessation approaches	0.41*	1.00						
3. high level of intention to quit	0.07*	0.32*	1.00					
4. changes in smoking behavior	0.36*	0.08*	0.03	1.00				
5. having family or peer negative views on tobacco use	0.04	0.04	0.19*	0.07*	1.00			
6. rules against smoking in the home	0.16*	0.05*	0.10*	0.33*	0.17*	1.00		
7. self-perceived mental well-being	-0.01	0.04	0.05*	-0.07*	-0.04	0.01	1.00	
8. non-smoking family or peers	0.07*	0.01	0.06*	0.12*	0.23*	0.14*	-0.05*	1.00

\*p value < 0.01

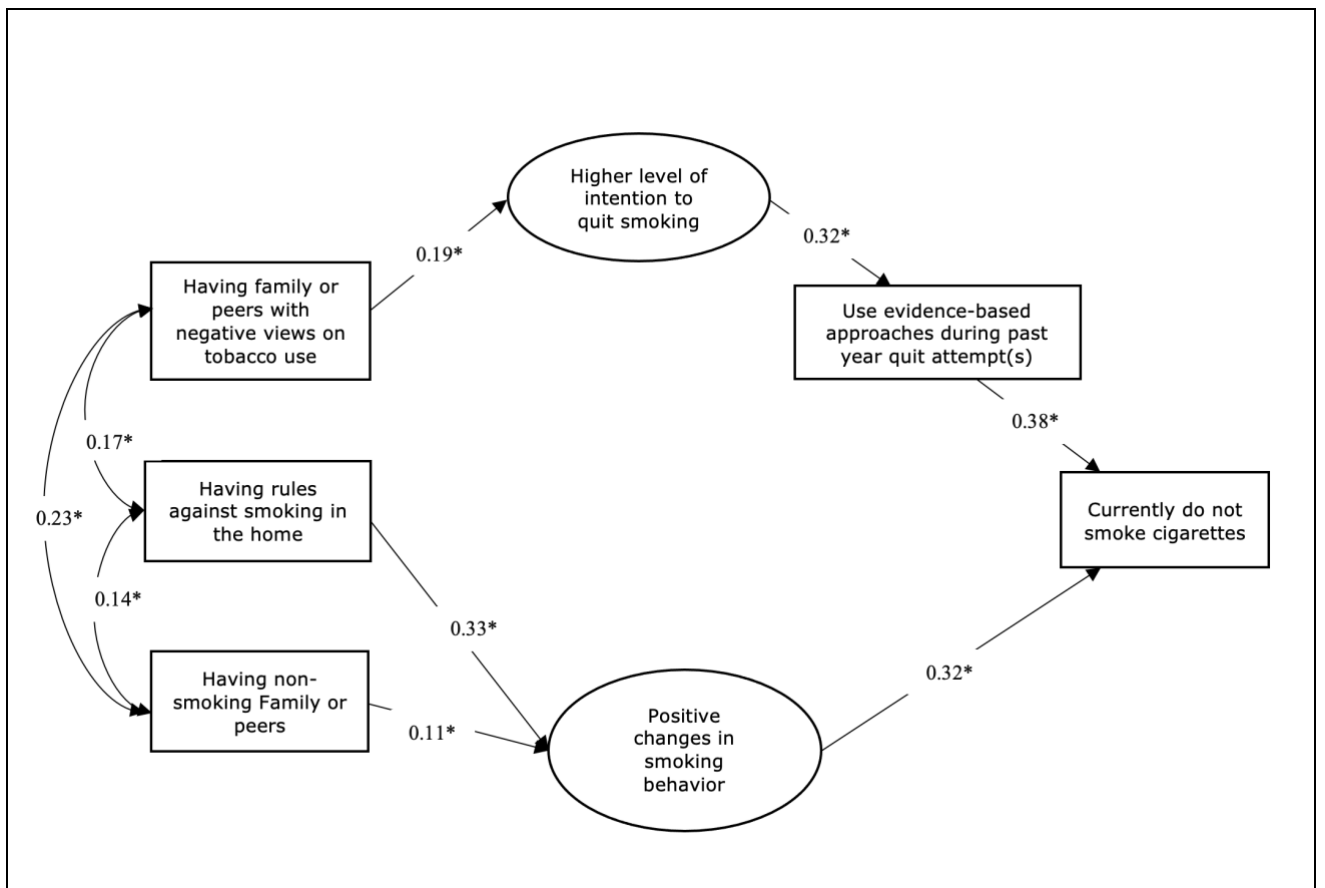
**Figure 4:** Confirmatory factor analysis of the smoker's level of intention to quit and the individual's smoking behavior of the study participants



**Figure 5:** Hypothesized relationships between family or peer factors and smoking cessation in smokers with mental health conditions



**Figure 6:** Final model depicting relationships between family or peer factors and smoking cessation in smokers with mental health conditions using data from the Population Assessment of Tobacco and Health (PATH) Study (2015 – 2016)



## **CHAPTER IV**

### **EXPERIENCES USING FAMILY OR PEER SUPPORT FOR SMOKING CESSATION AND CONSIDERATIONS FOR SUPPORT INTERVENTIONS: A QUALITATIVE STUDY IN ADULTS WITH MENTAL HEALTH CONDITIONS**

#### **ABSTRACT**

##### **Background**

Effective support interventions for people with mental health conditions who smoke are needed to reduce their risk for developing smoking-related diseases. This qualitative study assessed how people with mental health conditions who smoke engaged with their family members or peers when quitting smoking, and assessed their interest in involving family or peers in cessation interventions.

##### **Methods**

We recruited 24 adults with mental health conditions who currently smoke or had quit within the past five years. Participants were recruited nationally from publicly funded mental health programs. Qualitative interviews were conducted virtually between November 2020 and August 2021. Data were analyzed using a rapid thematic qualitative analytic approach. The interview questions broadly focused on participants: 1) perceptions of their family and peer attitudes towards their smoking behavior, 2) experience with engaging their family members or peers for support during smoking cessation efforts, and 3) willingness to involve family or peers in smoking cessation behavioral interventions.

## **Results**

Majority of the participants were aged between 36 to 54 years (11/24, 46%), 62% were men, and 71% (17/24) were current cigarette smokers. Four themes emerged from the data: 1) quitting together with family or peers who smoke presents opportunities for communal quitting, but having family or peers who are current smokers and are not actively quitting makes quitting challenging, 2) the tone in which family or peers express support influences the response to the support, 3) better quality and strength of the relationship and providing tailored support increases willingness to involve family or peers in cessation interventions, and 4) family or peer support is less likely to be impactful among individuals who regard autonomy highly or are not ready to quit.

## **Conclusion**

Training family members and peers to identify and engage in supportive behaviors may promote smoking cessation in people with mental health conditions who smoke. Cessation interventions that partner with family members or peers may benefit from recruiting support partners who share a strong relationship with the individual and can recognize and respond to the individual's specific cessation needs.

## INTRODUCTION

People with mental health conditions, such as bipolar disorders, depression, and schizophrenia, have a significantly higher smoking prevalence than the general population.<sup>4</sup> Smoking independently explains almost ten years of potential life lost in people with mental health conditions.<sup>5</sup> The excess mortality is due to health conditions for which smoking is a known risk factor.<sup>8</sup> Evidence-based smoking cessation intervention programs and strategies targeting the general population have not worked as effectively for people with mental health conditions who smoke.<sup>6</sup> Interventions tailored to promote cessation in people with mental health conditions who smoke are needed. Smoking cessation interventions that integrate family or peer-based support may be an innovative approach to helping people with mental health conditions who smoke quit.

Many adults with mental health conditions have regular contact with family members and friends.<sup>110-113</sup> Studies have found that the majority of adults with mental health conditions have regular social contact with either family members or friends.<sup>110, 111</sup> Family members and close friends are often a principal resource for adults with mental health conditions, and are often involved in several aspects of their health care including seeking and accessing health services and continually monitoring the health status of loved ones.<sup>35, 36</sup> Family members and close friends involved in the care of people with chronic health conditions, including those with mental health conditions, report positive caregiving experiences which are associated with strengthened relationships and improved family quality of life.<sup>114, 115</sup>

Smoking cessation studies conducted in people with mental health conditions who previously smoked suggest that social support from family members or friends is a key component for improving long-term success in quitting.<sup>7-9</sup> There is considerable interest in establishing whether social support can be harnessed in an intervention to improve quit rates in people with mental health conditions who smoke.<sup>10-12</sup>

The current study aimed to understand how people with mental health conditions who currently smoke or recently quit engaged family members or peers when quitting smoking. We asked participants to reflect and report on their experiences using family or peers as sources of support during cessation. We also asked about their interest and willingness to involve family members or peers in cessation interventions to help them quit smoking.

## **METHODS**

### **Study design and study setting**

We conducted qualitative interviews to capture the views and experiences of using family or peers support for smoking cessation among adults with mental health conditions who currently smoke or quit within the past 5 yrs. We recruited both current smokers and those who had quit within the past five years to get a comprehensive view on both supportive and unsupportive family or peer behaviors that hinder or promote cessation. This research was a part of a pilot study that aimed to adapt a technology cessation intervention for people with mental health conditions who smoke that had been previously shown to be effective in the general population.<sup>116</sup> Participants were recruited nationally from three publicly funded mental health agencies: Clubhouses accredited by the

International Center for Clubhouse Development<sup>117</sup>, Thresholds Agency, and Massachusetts Department of Mental Health agencies such as Open Sky. These mental health programs provide services to individuals with various mental health conditions. Services include the opportunity for friendship, employment, housing, education, and access to medical and psychiatric services. Clubhouses are accessed by about 100,000 people with mental health conditions.<sup>118</sup> Thresholds is a large community mental health center in Chicago that serves 12,500 adults and youth each year. The Massachusetts Department of Mental Health programs provide various clinical and non-clinical services to adults with serious mental illnesses.

### **Study sample and recruitment activities**

We recruited twenty-four adults with mental health conditions who currently smoke or quit within the past five years. In the current study, participants were recruited through virtual information sessions administered by a research coordinator at several mental health agencies in the US. Potential participants provided contact information to the research coordinator, who set up one-on-one virtual meetings to provide more information about the study. Participants provided written informed consent before enrollment into the study. This project was approved by the institutional review boards at the Department of Mental Health in Massachusetts and the University of Massachusetts Chan Medical School.

### **Interview guide development and data collection**

We requested feedback on the qualitative interview questions from a stakeholder advisory panel to assess the appropriateness of the study questions. The stakeholder advisory panel (n = 9) were adults with mental health conditions who currently smoke or

recently quit (within the past five years). The stakeholder advisory panel was recruited from the same mental health programs from which the study participants were recruited to ensure the representativeness of the study population.

Two trained researchers (CN and IL) conducted the qualitative interviews using a semi-structured interview guide via zoom video conference software.<sup>20</sup> Interviews were conducted between November 2020 and August 2021. The interview questions broadly focused on participants: 1) perceptions of their family and peer attitudes towards their smoking behavior, 2) experience with engaging their family members or peers for support during smoking cessation efforts, and 3) willingness to involve family or peers in smoking cessation behavioral interventions. In addition to the interview, participants completed a baseline questionnaire that captured demographic information (age, sex race/ethnicity, educational level) and smoking behavior or history (for people who recently quit). All interviews were audio-recorded and transcribed professionally.

### **Data analysis**

The rapid thematic qualitative analytic approach was used to analyze the interview data. This rapid approach is a team-based qualitative inquiry that uses triangulation and iterative data analysis to quickly develop a preliminary understanding of a situation from the insider's perspective.<sup>22, 23, 24</sup> The approach involves summarizing transcript data, guided by pre-specified domains that align with key interview questions and the overall study objectives. Summaries of the transcript data are then consolidated to allow the analysts to develop themes and sub-themes from the data.<sup>23</sup>

Details on the analysis steps followed are provided below:

1. *Created domain names that mapped to key interview questions:* In the first step, we pre-specified "domains" based on key questions in the interview guides. Based on the interview questions and discussions with the research team, we developed three domains: 1) perceptions of their family and peer attitudes towards their smoking behavior, 2) experience with engaging their family members or peers for support during smoking cessation efforts, and 3) willingness to involve family or peers in their smoking cessation attempts and smoking cessation behavioral interventions.
2. *Created a summary template (by domains) and performed a 'test drive' to assess usability, relevance, and consistency.* In this step, we developed a transcript summary template in word. The summary template is structured so that each section corresponds to a pre-specified domain and interview guide question. The summary template guided the analyst team in mapping the participant's responses to the corresponding domain. Two coders (CN, IL) used the template to summarize the same transcript to evaluate whether the specified domains were identifiable in the data and check for consistency across coders in capturing the domains. The template was modified based on feedback from the research team (R.S., MD). Testing was repeated with a second transcript after incorporating modifications. Once the consistency of summary content was established, transcripts were equally divided across the coders and summarized using the modified template.
3. *Transferred transcript summaries into a matrix.* We placed information from the twenty-four transcript summaries into an M.S. Excel matrix. The columns represented

the pre-specified domains, and the rows represented a summarized response from each study participant. The transcript summaries were placed into a matrix to analyze the depth and breadth of information for each domain.<sup>25</sup>

4. *Identified study themes and sub-themes from the matrix.* Themes were identified within each domain. The analytic team collaboratively and iteratively reviewed, discussed, and sorted the data to refine the initial themes and sub-themes and highlight the most salient quotes. Final themes highlight the views and experiences with using family or peer support for smoking cessation and considerations for support cessation interventions. A brief descriptor (sub-theme) of what participants reported is provided within each theme.

## RESULTS

### Participant Characteristics

Almost all study participants took medication for their mental health condition (96%). Majority of the participants were aged between 36 to 54 years (11/24, 46%). More than half of the study participants were male (62%), half of them self-identified as non-Hispanic White (50%), and had a high school education (54%). Seventy-one percent of participants smoked (n=17), and most of those who smoked were actively trying to quit smoking (10/17, 59%). Most of the study participants did not have rules against smoking in their homes, and less than one-third lived with another person. (**Table 4**).

With the exception of three participants, those who completed the qualitative interviews indicated that at least one family member or peer had suggested that they quit smoking. More than half of the study participants identified immediate family members,

including parents and siblings (17/24), as key social contacts. Half of the participants identified peers, close friends, or housemates (12/24) as close social contacts. Other key social contacts included extended family members (7/24) and spouses or life partners (5/24). Participants' key social contacts are collectively referred to as family or peers in the results below.

### **Experiences with using family or peer support for smoking cessation and considerations for improving support cessation interventions**

Four themes emerged from the data: 1) quitting together with family or peers who smoke presents opportunities for communal quitting, but having family or peers who are current smokers and are not actively quitting makes quitting challenging, 2) the tone in which family or peers express support influences the response to the support, 3) better quality and strength of the relationship and providing tailored support increases willingness to involve family or peers in cessation interventions, and 4) family or peer support is less likely to be impactful among individuals who regard autonomy highly or are not ready to quit.

#### ***Quitting together with family or peers who smoke presents opportunities for communal quitting, but having family or peers who are current smokers and are not actively quitting makes quitting challenging***

Participants indicated that quitting with family or peers who smoke offered opportunities to share information on cessation strategies and provided an opportunity for communal quitting.

*" I have two very, very close friends that I've known for, gosh, it's been like 15 years now. One of them does not smoke and is like a sister to me. The other used to smoke and went through, whenever I quit with Allen Carr's book in 2014, she went through that with me, was not successful, but then became successful this year at quitting smoking. So, we've always battled quitting smoking together. So that friend is kind of like my battling smoking friend. We're always trying to battle quitting."*  
(Recently quit)

*"One thing I didn't like about the gum, and my uncle said the same thing. Because he was trying to quit smoking, it was like it's that constant moving of the jaw and gnawing that like hurts your jaw. He didn't like that. And he told me about the lozenges. So, that's why I switched to lozenges. It was more of like of someone going through the same quitting process too. Like, so it was nice, like go through the same steps."* (Recently quit)

In contrast, participants noted that having family members or peers who were current smokers but were not interested in quitting made it challenging for them to stop smoking.

*"I smoke when I'm with him (boyfriend), but I don't carry that home. You know, it's like I'm gonna go see him on Wednesday, and I'll probably smoke and keep up with him, and then I'll come home and I won't have any cigarettes"* (Currently smokes)  
*"But then I know that my best friend, who's supplying me with the cigarettes, he smokes. And he isn't going to quit. I know that. And I'm afraid of how I'm going to deal with that. Not wanting to have a cigarette smell in your room, so which means*

*I would have to, you know, jeopardize this friendship, you know. So that holds me from doing it." (Currently smokes)*

***The tone in which family or peers express support influences the response to the support.***

Most of the participants had at least one family member or peer who wanted them to quit smoking. However, how support was communicated to the participant either encouraged or discouraged smoking. Communication that facilitated quitting tended to be more encouraging and seemed less direct about the smoker needing to quit. Participants who found this helpful said:

*"I actually lived in her house. So, it was one of those things where she didn't forbid it, but she just made it very known that it was something that's really bad for you, and it'd just be really great to stop. It was just more of a supportive, like you should really think about this more, type of thing." (Recently quit)*

*"Well, yeah, I mean my mother has always been very supportive of me quitting smoking, but never been like, you need to quit. She's always been like, oh, I'm so proud type thing. I have two friends that have always been people I can call and talk to about smoking and quitting, and they're very supportive. And I mean my partner is supportive as well. Those four people I tend to lean on for support."*

*(Recently quit)*

However, nagging or criticizing the smoker undermined quitting success. Often, this manifested as inappropriate or misguided advice from family members or peers.

*"He doesn't understand that criticizing me makes me want to smoke more. He thinks he's doing a good thing by telling me this, this, and this... And he doesn't understand like it gets me upset. And then I want to smoke more." (Currently smokes)*

*"Lecturing, oh, God, yeah. You don't lecture anybody on an addiction because you won't get anywhere with it" (Recently quit)*

***Better quality and strength of the relationship and providing tailored support increases willingness to involve family or peers in cessation interventions***

Participants recognized that support from family and friends was beneficial to quitting. However, they were willing to involve family members in cessation interventions as support partners only if they had a close relationship and expected the support partner to respond to their cessation needs. Under this theme, we observed that participants' responses focused more on their relationships with family members than with peers, and the strength of the relationship depended on the frequency of contact with family members.

*"I mean I definitely think it depends on the relationship and how strong the relationship is. ..if it was a family member that I was really close to. And they, you know, mentioned that it was probably best for you to stop smoking, it's not good for you. I think that could be very well received. And again, it's one of those things where that person may not stop right away. But it could definitely influence them stopping eventually" (Recently quit)*

*"Because I'm not around them enough to make it even really matter. It would be better maybe if they were closer or like around more often" (Currently smokes)*

Cessation support needs varied among study participants. These included dealing with withdrawal symptoms during cessation, managing mental health symptoms when quitting and financial needs to purchase cessation aids. Participants were willing to involve family members if the support was tailored to their distinct needs.

*"And so yeah, so it would help just because like the support I got in my experience was like they paid. My parents paid for those aids in order for me to quit smoking. So it was nice for them to fund me in that way to pay for me to stop." (Recently quit)*

*"I feel much better with people that recognize that I obviously want to quit smoking. This is not something I love. And support me in that way to actually quit smoking. And support me through the anxious times and the depressed times. Because even though all these people want me to quit smoking, nobody knew I was depressed. Nobody knew I was anxious. Nobody asked." (Recently quit)*

***Family or peer support is less likely to be impactful among individuals who regard autonomy highly or are not ready to quit.***

Individuals who regard autonomy highly often view quitting as a self-directed activity. In some cases, unwanted support from family or peers triggered more smoking resulting in a situation similar to that observed among participants who were criticized or nagged about smoking.

*"I feel like it should be kind of like a solo project. I mean just the fact that I don't like others telling me how to live my life. So, a lot of my friends would probably pull the 'we can help you' card. Do this. Do that. And that would probably just*

*irritate me a lot and make me want to smoke more. Just to spite them." (Currently smokes)*

*"No, well the reason that I don't is because, like you're dealing with adults, and I mean and my family would be there with whatever, but the bottom line is this is my problem." (Currently smokes)*

Participants indicated that their desire to quit could not be induced by support from family or peers. Thus, support from family and friends was not perceived as helpful if the individual was not ready to quit smoking.

*"That's how it was with me, I wanted to smoke. I didn't really care. Because how I was looking at it, everybody talks about it, oh, you're going to die. You're going to die. And this and the other. But when I look at it, I mean everybody's going to die whether it's early or it's not. You know. I'm going to enjoy my life how I want to enjoy it, whether it's smoking or not." (Currently smokes)*

*"Like it can be very helpful if people are, you know, very supportive and whatnot. But it has to come from yourself, the desire to quit." (Currently smokes)*

## DISCUSSION

The current study aimed to understand how people with mental health conditions who smoked or recently quit engaged with family members or peers and assessed their interest in involving them in cessation interventions. We found that a shared interest in quitting with family members or peers who were current smokers presented opportunities for communal quitting. Encouragement to stop smoking from family or peers was perceived as supportive while nagging the smoker undermined quitting success. In general, participants were willing to involve family or peers in cessation interventions if the strength of the relationship between the smoker and the support person was strong and support was tailored to their cessation needs. However, family or peer support was likely to be less impactful in those who regarded autonomy highly or were not ready to stop smoking.

### **Shared interest in quitting with family or peers presented opportunities for communal quitting**

Having a shared interest in quitting with other family members or peers who are current smokers offered opportunities for smokers to share information on cessation resources, which promoted cessation practices. However, quitting was challenging when family members or peers who smoked were not actively quitting. Past studies show that the smoking status of significant others is a key determinant of whether the smoker quits.<sup>26-</sup>  
<sup>28</sup> For instance, among people who smoke, cessation is less likely if more social network members smoke.<sup>86</sup> Our findings add to existing literature to show that having significant others who smoke makes cessation more challenging if they are not actively quitting. This

suggests that support from family or friends can be expanded by promoting cessation in family or peers who are current smokers.

**Encouragement to stop smoking from family or peers was perceived as supportive while nagging the smoker undermined quitting success.**

Communication that facilitated quitting tended to be more encouraging and seemed less direct about the individual needing to quit. This is consistent with past research suggesting that emotional support, including encouragement from family or peers, is beneficial to people with mental health conditions who smoke.<sup>49</sup> Smokers who feel supported by others are more likely to make positive lifestyle changes, including quitting smoking.<sup>30, 31</sup> We found that harmful behaviors such as nagging or criticizing were counterproductive to quitting success. The habit of nagging or criticizing the individual may arise from a lack of personal experience with or knowledge about quitting smoking and related challenges or may come from a desire for the individual to quit as quickly as possible to improve their health. Training significant others on how to provide cessation support is feasible.<sup>119</sup> When trained, support persons show improvement in supportive behavior scores, which increases the number of quit attempts and improvement in the stages of change in the individual who smokes.<sup>120</sup>

**Willingness to involve family or peers in cessation interventions depended on strength of the relationship and receiving tailored support.**

We found that the participants' willingness to involve family or peers in cessation interventions was contingent on the strength of the relationship they had with the potential support person and the ability of the support person to respond to the smoker's needs. This

is consistent with research that suggests that types of relationships in a network (e.g., primary or strong vs. secondary or weak ties) influence the receipt of various kinds of social support.<sup>121</sup> Family members with strong relationships with the individual may be better able to understand the cessation needs of the individual than others. There is some indication that benefits of support from family or peers may hinge on the capacity of support persons to understand the needs of their friend/loved one and to provide what is needed.<sup>32, 33</sup> Support interventions conducted in the general population have been unsuccessful at increasing support from family or peers.<sup>13, 14</sup> Our findings suggest that increasing family and peer support may require developing family or peer support cessation programs that are sensitive and responsive to the specific cessation needs of the individual. This could be achieved by involving family members or peers with strong relationships with the individual.

**Family or peer support likely to be less impactful in those not ready to quit or those who value autonomy**

In many of the participants, we found strategies that could be used to engage family and peers in cessation efforts in positive and more supportive ways. However, this was not the case for everyone. Some participants felt that quitting should be a self-directed activity free from family or peer involvement. Others were not ready to quit smoking which lowered their interest in involving family or peers in interventions.

Participants' reluctance to involve family or peers could be due to several factors. First, participants may not be motivated to quit smoking and therefore not at a stage to consider engaging family or peers in supporting a quit attempt. It is possible that they

would be willing to seek support from family and peers at a later time. In this case, focusing on helping the individual increase their perceived importance and confidence in quitting could help move them along the stages of behavioral change. Second, it could be that they do not expect they would receive constructive support based on certain characteristics of the family. For instance, families characterized by conflict, anger, aggression, or relationships lacking warmth reduce the chances that any helpful support will be available to the individual.<sup>122</sup> It, therefore, may be misguided to assume that all smokers will accept or benefit from cessation support provided by family or peers.

### **Study strengths and limitations**

This study is the first to suggest that the quality and strength of family and peer relationships are important to consider when identifying support partners in smoking cessation interventions. These findings have implications for designing tailored support interventions to promote cessation in this study population.

We did not collect data on family or peer characteristics that could affect the participant's efforts to quit smoking, including histories of family separation, attachment levels, and geographic distance. Asking questions about these characteristics from study participants could be useful in estimating quitting success rates in participants who receive family or peer support in cessation interventions. We observed that participants' responses to questions about willingness to involve family and peers in interventions relied heavily on their experiences with family rather than peers. Further research is needed to examine if family support is preferable to peer support in smokers with mental health conditions. We did not collect data on specific mental health diagnoses or severity. Family or peers

cessation support may be offered differently depending on the specific mental health diagnosis of the individual or severity of symptoms.

## **Conclusions**

Encouragement from family and peers or having a family member or peer who smokes but is actively quitting is beneficial to quitting. Therefore, training family members and peers of smokers with mental health conditions to identify and engage in supportive behaviors may promote smoking cessation in people with mental health conditions who smoke. In terms of designing cessation support interventions, the emerging picture is that the features of the social relationship, such as the perceived strength of relationships and whether available support is tailored to the needs of the individual, are important factors to consider. Cessation interventions that partner with family members or peers may benefit from recruiting support partners with strong relationships with the participant who can recognize and respond to the specific cessation needs of the individual.

## TABLES

**Table 4:** Sociodemographic characteristics of people with mental health conditions who smoke or recently quit recruited from publicly funded mental health programs (n = 24).

Participant Characteristics	N (%)
<b>Age</b>	
18-34	9 (38%)
36-54	11 (46%)
55-65	4 (17%)
<b>Gender</b>	
Male	15 (62%)
Female	8 (33%)
Non-Binary	1 (4%)
<b>Race and ethnicity</b>	
Non-Hispanic White	13 (50%)
Non-Hispanic Black	6 (23%)
Other	7 (27%)
<b>Education level</b>	
Some high school/high school graduate	13 (54%)
<b>How hard is it for you (and your family) to pay for medical care?</b>	
Very hard	3 (12%)
Somewhat hard	4 (17%)
Not very hard	16 (67%)
Don't know	1 (4%)
<b>Do you take medication for your mental health?</b>	
Yes	23 (96%)
<b>Do you currently smoke?</b>	
Yes	17 (71%)
Past 12 quit attempts among those who currently smoke	10/17 (59%)
<b>Past 30-day electronic cigarette use</b>	
Every day or some days	6 (25%)
Not at all	18 (75%)
<b>Is smoking allowed where you live?</b>	
Yes	20 (83%)
<b>Besides yourself, does anyone who lives with you smoke cigarettes now?</b>	
No	16 (70%)
<b>At least a family member or peer wants the smoker to quit</b>	21 (88%)

## CHAPTER V

### DISCUSSION

#### SUMMARY OF STUDY FINDINGS

This dissertation research explored the role of family or peers in promoting smoking cessation to inform the development of effective family or peer-based interventions in adults with mental health conditions who smoke. The specific aims were to: 1) examine associations between family or peer views on tobacco use and smoking cessation, 2) identify pathways through which family or peers' attitudes and behaviors influence smoking cessation, and 3) identify social barriers and facilitators to providing cessation support effectively, and to assess willingness to involve family or peers in cessation interventions in this population. In aims 1 and 2, we used data from the Population Assessment of Tobacco and Health (PATH) study, a nationally representative longitudinal survey of U.S non-institutionalized individuals with annual participant interviews.<sup>59</sup> In aim 3, a semi-structured interview guide was used to collect data and the quotes presented.

**In the first aim,** the main finding was that participants who had family or peers with positive or neutral views on tobacco use were 32% less likely (adjusted OR: 0.68, 95%CI: 0.51 – 0.93) to report past 30-day smoking cessation than those who had family or peers with negative views on tobacco use. Misconceptions that smoking cigarettes helps with mental health symptom management and that engaging in smoking cessation practices may worsen the smoker's mental health symptoms are prevalent in the social networks of people with mental health conditions who smoke.<sup>25 51</sup> Therefore, efforts to modify these

views are needed. People who smoke are more likely to quit when family members and close friends whose opinion is valued think they should quit and believe that smoking is unacceptable in social situations.<sup>78</sup>

**In the second aim,** we identified two factors that mediated the relationship between family or peers' attitudes and behaviors, and smoking cessation in people with mental health conditions who smoke. One factor was high intentions to quit which mediated the relationship between family or peer negative views and smoking cessation. The other was positive changes in smoking behaviors, which mediated the relationship between rules against smoking in the home, having non-smoking family members or peers, and smoking cessation. Past research shows that supportive social environments are beneficial for quitting smoking,<sup>101-103</sup> and this is consistent with our findings. All three family or peer behaviors and attitudes investigated in this study correlated with each other but worked through distinct behavioral routes to influence smoking status. This findings is supported by social norms research<sup>106</sup>, which specifies that descriptive social norms (what other people actually do) and injunctive norm (what other people think you should do) can have independent influences on behavior<sup>107, 108</sup> Family or peer-based cessation interventions that systematically improve mediators identified in this study will likely improve quit rates in this population.

**In the third aim,** we found that quitting together with family members or peers who currently smoked presented opportunities for communal quitting. Encouragement from family or peers was perceived as supportive, but nagging the smoker undermined quitting success. Smokers who feel supported by others are more likely to make positive

lifestyle changes, including quitting smoking<sup>30, 31</sup> Training family members and peers of people with mental health conditions who smoke to identify and engage in supportive behaviors may promote smoking cessation in this population. Training family members or peers to provide cessation support is feasible,<sup>119</sup> and is shown to increase the number of quit attempts and facilitate improvement in the stages of change in the individual who smokes.<sup>120</sup> We also found that participants were willing to involve family or peers in cessation interventions if the strength of the relationship between the smoker and the support person was strong and support would be tailored to their cessation needs. Cessation interventions that partner with family members or peers may benefit from involving support partners who have strong relationships with the participant. Nonetheless, individuals who regarded autonomy highly or were not yet ready to stop smoking were less willing to seek family or peer support. It may be therefore be misguided to assume that all smokers will accept or benefit from cessation support provided by family or peers.

### **DISSERTATION STRENGTHS AND LIMITATIONS**

This is the first population-based study to highlight when and how family or peer support offers the expected added value to quitting in people with mental health conditions who smoke. Using a nationally representative sample to examine associations between family or peer factors and smoking cessation makes the study findings generalizable to adults with mental health conditions who smoke in the US. The use of SEMs to evaluate pathways through which family or peer factors influenced smoking cessation offered benefits that would not have been possible with traditional statistical approaches. For instance, SEMs account for measurement errors; thus, our analysis modeled and explicitly

estimated measurement error in the indicators of latent variables (smoking behaviors and intentions to quit). SEMs also provide more straightforward tests for mediation and allow for more precision in the specification of study hypotheses which opens up avenues for novel research questions.

The study also had limitations. First, the GAIN-SS measures severity of mental health symptomology, not the diagnosis. However, the high sensitivity and specificity between GAIN-SS items and clinical diagnosis tools<sup>79</sup> support the use of symptoms as good indicators of clinically significant mental health conditions. The GAIN-SS tool has been recommended for use in epidemiological studies.<sup>65</sup> Nonetheless, the lack of information on the specific mental health diagnoses limited assessment of how diagnosis impacts interactions between family or peers and cessation support. Second, given our focus on family and peer factors, we did not account for other factors that may impact cessation outcomes in this population. For instance, we did not consider access to mental health services or the use of available health services, which plays a role in cessation. Third, we did not collect data on other family or peer characteristics that could influence the participant's efforts to quit smoking, including histories of family separation, attachment levels, and geographic distance. About 15% of the study participants had missing data on primary study exposures and outcomes. Characteristics that differed between those with and with no missing data on primary variables on two variables: sex and whether participants received income assistance from the state. (**Table 5**)

## **STUDY IMPLICATIONS: THE ROLE OF FAMILY AND PEERS**

Aim 1 and 2 findings indicate that family or peer-based interventions can be an effective smoking cessation approach. In Aim 2, we identified specific pathways through which family or peers influence cessation. Aim 3 findings suggest that identifying the appropriate family member to provide support, the tone with which support is provided, and the extent to which support is tailored to meet the needs of the individual is important.

Taken together, our results show that family members and peers can positively impact quit rates in people with mental health conditions who smoke by creating environments that increase the chances of quitting success and by providing appropriate support. When changing positive family and peer views on tobacco use to negative, is done in combination with implementing rules against smoking in the home and quitting smoking (for family or peers who currently smoke), we should expect to see higher intentions to quit and positive changes in the smoking behavior in people with mental health conditions. Over time, people who smoke may be more likely to stop smoking. Based on our findings, support is perceived as helpful if: 1) the family member or peer who takes on the supporting role shares a strong relationship with the person trying to quit, 2) the support offered is encouraging, and 3) tailored to fit the needs of the individual.

## **FUTURE DIRECTIONS**

We need health education programs that facilitate changes in family or peer attitudes and provide information on evidence-based strategies that families and peers can implement to help individuals quit. Mental health programs often provide training to families on evidence-based mental health practices, thus health education on smoking can

be intergrated into existing programs.<sup>123</sup> It is important to note that we did not consider all the factors that may be important in assessing the relationship between family or peer factors and achieving quitting success in this population. One factor that might have a major impact on social interactions between the participant and the family member or peer is the mental health diagnosis or the severity of the mental health symptoms. There is a need to assess whether our findings would differ by diagnosis or severity of symptoms. We also lacked data on family characteristics such as histories of family separation, attachment levels, and geographic distance, which could impact the quality of the family relationships and hence support expected. Asking questions about these characteristics from study participants could be useful in estimating quitting success rates in participants who receive family or peer support in cessation interventions.

Implementing suitable support interventions will require researchers to account for multiple factors. It will be necessary to obtain information on the strength and quality of the relationship between the support person. Obtaining this information provides the researcher with ways to identify 1) ideal support partners within a cessation support intervention, and 2) potential barriers and challenges that may arise from existing family or peer behaviors. There are two ways in which such an assessment could be done in behavioral interventions without increasing participant burden. Asking participants to reflect on past quitting experiences can help them identify potential support partners and become aware of family members or peers who may be problematic or detrimental to quitting. Another way to identify potential support persons is to use established tools that can depict family dynamics including the experience of supportive and nonsupport

interactions. For instance, genogram and ecomaps can portray family structures (genogram) and social relationships (ecomap)<sup>124</sup> Although their original and predominant application is in family therapy, these tools provide a “visual means of facilitating discussions around the structure and strengths of social networks”<sup>125</sup> The data collected often provides rich contextual information on social support networks and can uncover new information such as the presence of shadow networks within the participant’s network of friends and professionals.<sup>126</sup> Also, social network approaches can be used to measure strength of social ties.<sup>127</sup>

Our findings also open up avenues for research examining how to offer support to individuals who are not interested in involving family or peers in cessation interventions. We assumed that individuals who were reluctant about involving family or peers were not yet motivated to quit. Perhaps moving them along the stages of change will eventually lead to support seeking as they navigate the quitting process. This hypothesis needs to be evaluated further using quantitative approaches that can accurately measure stages of behavioral change and examine associations between stages of change and support seeking. The other assumption was that reluctance to involve family members may reflect an unsupportive family environment potentially characterized by difficult or weak relationships with family members. There is a need to identify ways to support individuals who might have weak relationships with family members. Supportive behaviors such as quitting together or being encouraging that we observed in our study might not be as helpful for individuals who regard autonomy highly or have weak or difficult relationships with family members. What could be helpful is offering support in less direct or less emotional

ways to contribute to the successful quitting of a loved one. This could include functional support approaches such as paying for their cessation medications or other cessation support.

## **CONCLUSIONS**

Existing family and peer attitudes and behaviors can positively influence smoking cessation by improving smoking behaviors and increasing intentions to quit. Quitting together and encouragement from significant others is perceived as supportive, while nagging and criticizing people who smoke is counterproductive to quitting success. Family members or peers who have strong social relationships with the individual and can provide tailored support are ideal sources of support in behavioral cessation interventions. Ways to identify ideal support partners are proposed. Support seeking may be negatively impacted by individuals not motivated to quit or by families characterized by conflict. More research is needed to clarify these findings.

## SUPPLEMENTAL MATERIALS

**Table 5:** Comparison of participants with, versus those without, missing data on primary study outcomes among smokers with mental health conditions, using data from the Population Assessment of Tobacco and Health (PATH) study 2015– 2016

Participant Characteristics	No missing data n = 4201	Missing data N = 610	p-value
<b>Age</b>			
18 to 24	983 (23.9%)	168 (28.0%)	0.08
25 to 34	963 (23.5%)	146 (24.3%)	
35 to 44	765 (18.6%)	106 (17.6%)	
45 to 54	762 (18.6%)	88 (14.6%)	
55 and older	632 (15.4%)	93 (15.5%)	
<b>Men</b>	1803 (42.9%)	325 (53.4%)	0.01
<b>Race/ethnicity</b>			
NH Whites	2761 (66.7%)	408 (68.6%)	0.12
NH Blacks	519 (12.5%)	56 (9.4%)	
Hispanics	459 (11.1%)	64 (10.8%)	
Other	401 (9.7%)	67 (11.3%)	
<b>Education attainment<sup>1</sup></b>			
High school or less than high school	2081 (50.8%)	301 (50.4%)	0.87
College/Advanced degree	2017 (49.2%)	296 (49.6%)	
<b>Marital status</b>			
Married	1230 (29.7%)	171 (28.5%)	0.71
Widowed/Separated/Divorced	1200 (29.0%)	172 (28.6%)	
Never married	1706 (41.2%)	258 (42.9%)	
<b>Received assistance/income from state<sup>1</sup></b>	1578 (37.7%)	180 (29.8%)	0.01
<b>Mental Health Symptoms</b>			
Reporting symptoms on internalizing sub-scale	1178 (28.0%)	167 (27.4%)	0.84
Reporting symptoms on externalizing sub-scale	599 (14.3%)	92 (15.1%)	
Reporting symptoms on both sub-scales	2424 (57.7%)	351 (57.5%)	
<b>Used e-cigarettes in the past year</b>	1562 (37.2%)	216 (35.4%)	0.40
<b>How soon after waking do you use cigarettes</b>			
Within 5 minutes	1095 (26.1%)	161 (26.4%)	0.16
5-30 minutes	1452 (34.6%)	192 (31.5%)	
31-60 minutes	618 (14.7%)	83 (13.6%)	
After 60 minutes	1036 (24.7%)	174 (28.5%)	
<b>Cigarettes smoked per day at baseline</b>	16.1 (27.6)	18.2 (30.0)	0.15

**Table 6:** Qualitative interview guide used to collect data from people with mental health conditions who smoke or quit within the last 5 years recruited from publicly funded mental health programs in the United States

1. Who would you consider or identify as your family/peers/close friends?

PROBES

- Children, brothers & sisters, spouse, boyfriend/girlfriend, parents, grandchildren
- Friends at work, at home, at the clubhouse

*For the next set of questions, we'll refer to those individuals as "your family or close friends."*

2. How does your family or close friends/peers feel about your smoking?

PROBES

Do they smoke? (If multiple individuals are identified, we can ask about closest family members first).

- Disapprove of smoking? Describe how this disapproval is expressed?
- Do you discuss ways to stop smoking with them
- Do they stay away from you because you smoke?
- Explore as related to smoking and non-smoking friends/family

3. Think about the last time you tried to quit (or reduced smoking) or thought about quitting.

Could you describe some of the ways you tried to engage or involve your family (e.g., shared your quitting goals) or friends/peers during this period?

PROBES

- If family members were not engaged, why did you decide not to talk to family about quitting?
- If not thinking about quitting/never tried quitting. Describe some of the ways you think your family or friends could be helpful when you start to think about quitting or reducing the number of cigarettes you smoke.

4. Are family members or close friends important to you as you think about quitting?

PROBES

- Would you use their support to quit smoking? Why or why not?
- What are some things they might say or do that will be/ will not be helpful to you?
- Positive: Family stopped smoking, displayed disapproval for my smoking habit, offered to provide support during quitting, offered to purchase cessation aid for me
- Negative: Complained all the time about my smoking etc.

5. How would you feel about a smoking intervention that involves a family member to encourage/help you quit smoking?

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