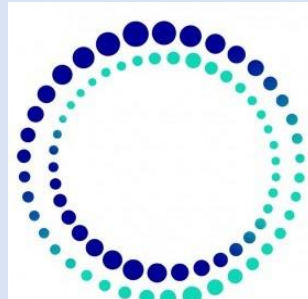# Exploratory Analysis of Baseline Predictors of Engagement with Theory-based Modules of an ACT Smoking Cessation App for People with SMI

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Background

(1) People with mental health symptoms tend not to engage with smoking cessation apps, or have serious challenges operating them. (2) We developed **Learn to Quit**, an ACT smoking cessation app designed to address key psychological barriers to engagement and cessation in this population (i.e., mental health symptoms, cognitive functioning, low perspective taking, and experiential avoidance). (3) Understanding whether these factors influenced objectively measured engagement with ACT's theory-based components is a critical step in the study of this new digital ACT intervention.

Methods

Design: Secondary analysis of a pilot RCT (NCT #03069482). Associations between theory-based baseline characteristics and levels of engagement with the Learn to Quit app 30 days post-randomization

Procedures: Patients from the North Carolina Triangle Area, recruited from Duke Health and community clinics

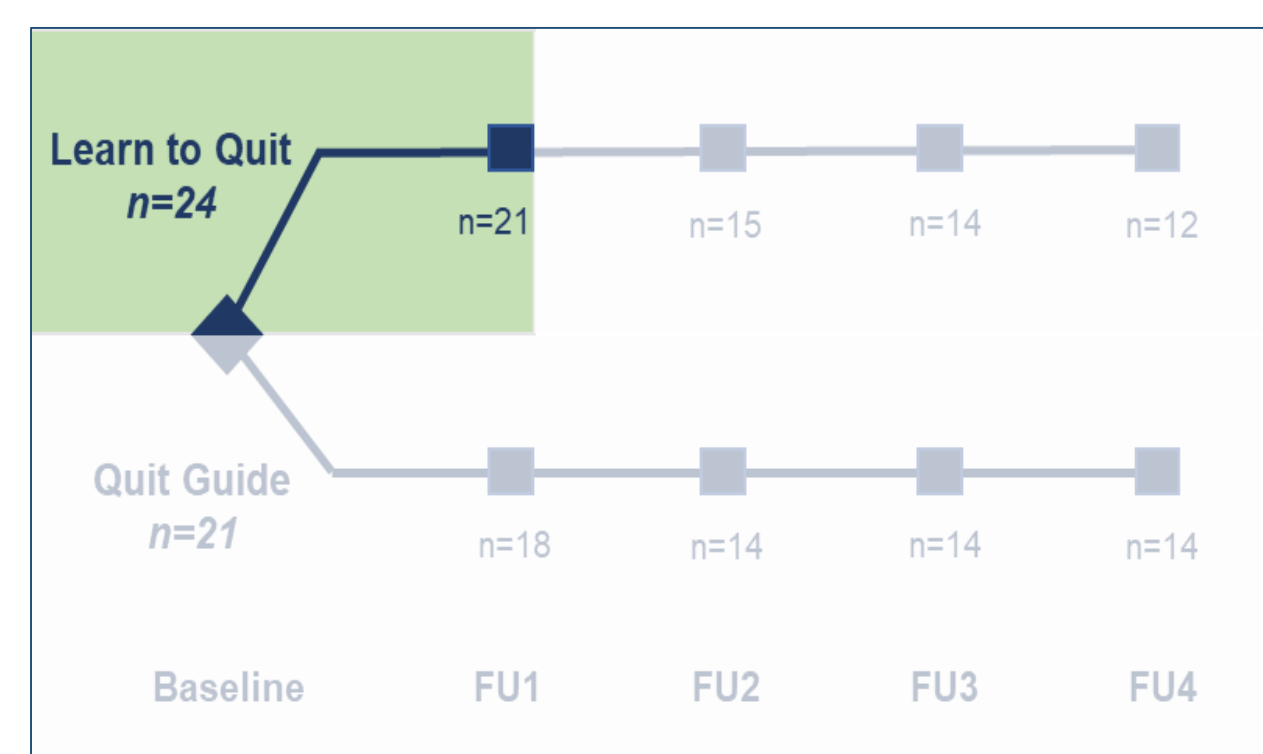Figure 1. Sample wire-frames of Learn to Quit Modules

App Engagement: Duration of use of Learn to Quit modules, measured with Google Analytics

Baseline Measures:
- Brief Symptom Inventory (BSI)
- Brief Assessment Cognition (BAC)
- Avoidance and Inflexibility Scale (AIS)
- Theory of Mind, False-Belief (ToM)

Table 1. Sample Demographics (n = 21)

Age, mean	47.6
Female	52.4%
Race/Ethnicity	
White	52.4%
Black/African-American	42.9%
Other	4.7%
Household Income	
< $35,000	66.7%
> $35,000	33.3%
Education	
High school or less	33.3%
Some college	23.8%
College degree or more	42.9%

Analysis: Our exploratory analysis (Tukey, 1977) used visual inspection and simple descriptive statistics to examine patterns of association between baseline measures and app engagement 30 days post-randomization. We used R and the *ggplot2* and *corrgram* packages to generate our graphics.

Figure 2. Segment of Data Analyzed from Larger Pilot Trial

Results

Characteristics of Our Sample
Participants were 21 individuals with a diagnosis of serious mental illness. The demographics of these individuals were diverse and characteristic of this population (see Table 1). They had a wide range of psychiatric diagnoses, from bipolar (n=10), to schizophrenia (n=3), schizoaffective (n=4), and recurrent major depression (n=4)

Overview of Results
- 43% percent of the sample experienced psychotic symptoms
- The sample had high levels of experiential avoidance ($M_{AIS} = 51$), and low levels of cognition ($M_{BAC} \geq 1$ SD below mean)
- Participants opened the app 56% of all possible days
- 47 modules completed on average (out of 28 possible lessons). This metric indicates repeated practice of ACT modules

Figure 3. Duration of Practice by Levels of Cognitive and Psychiatric Functioning

Panel A: Psychiatric Symptoms

Panel B: Cognitive Performance

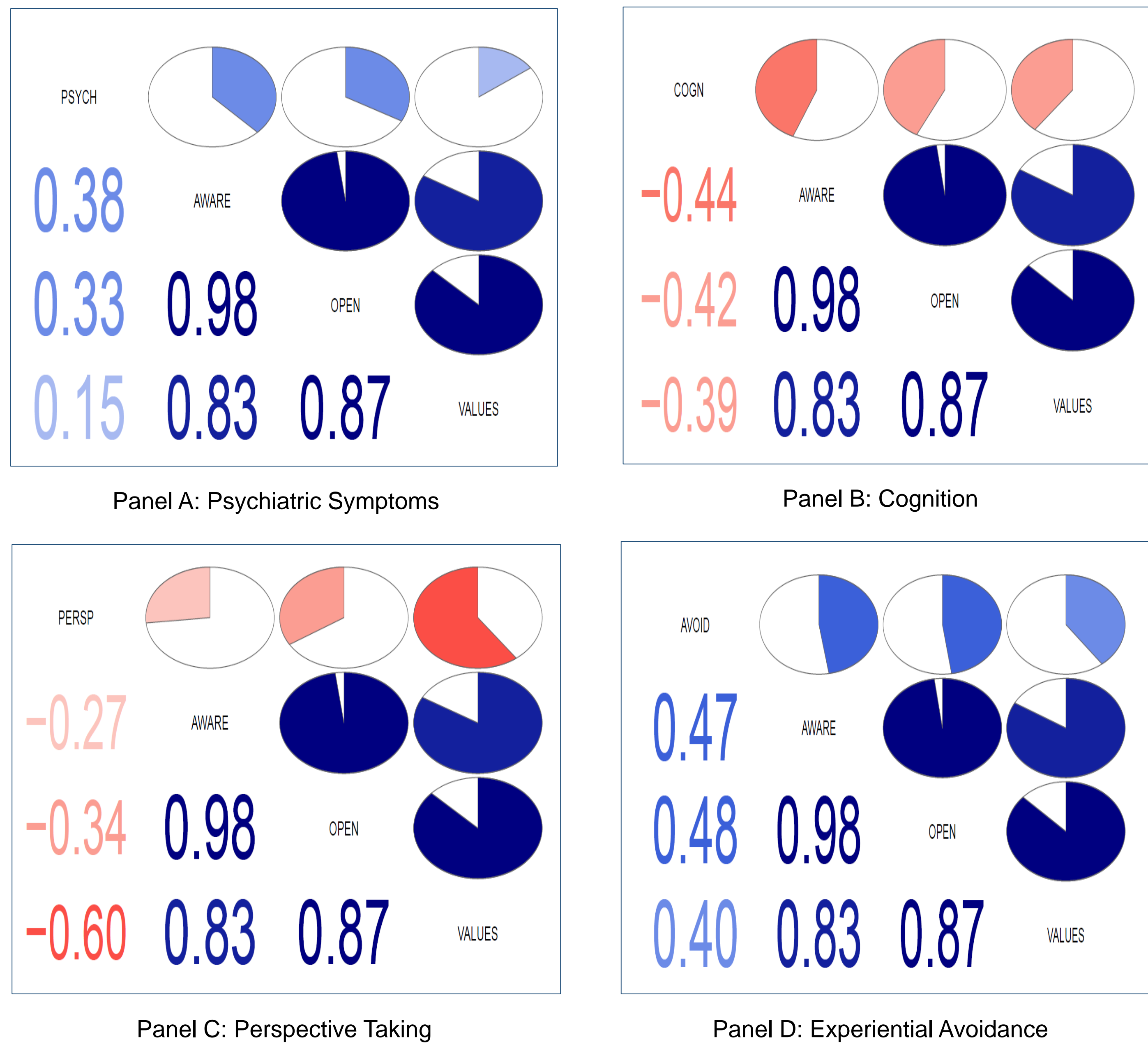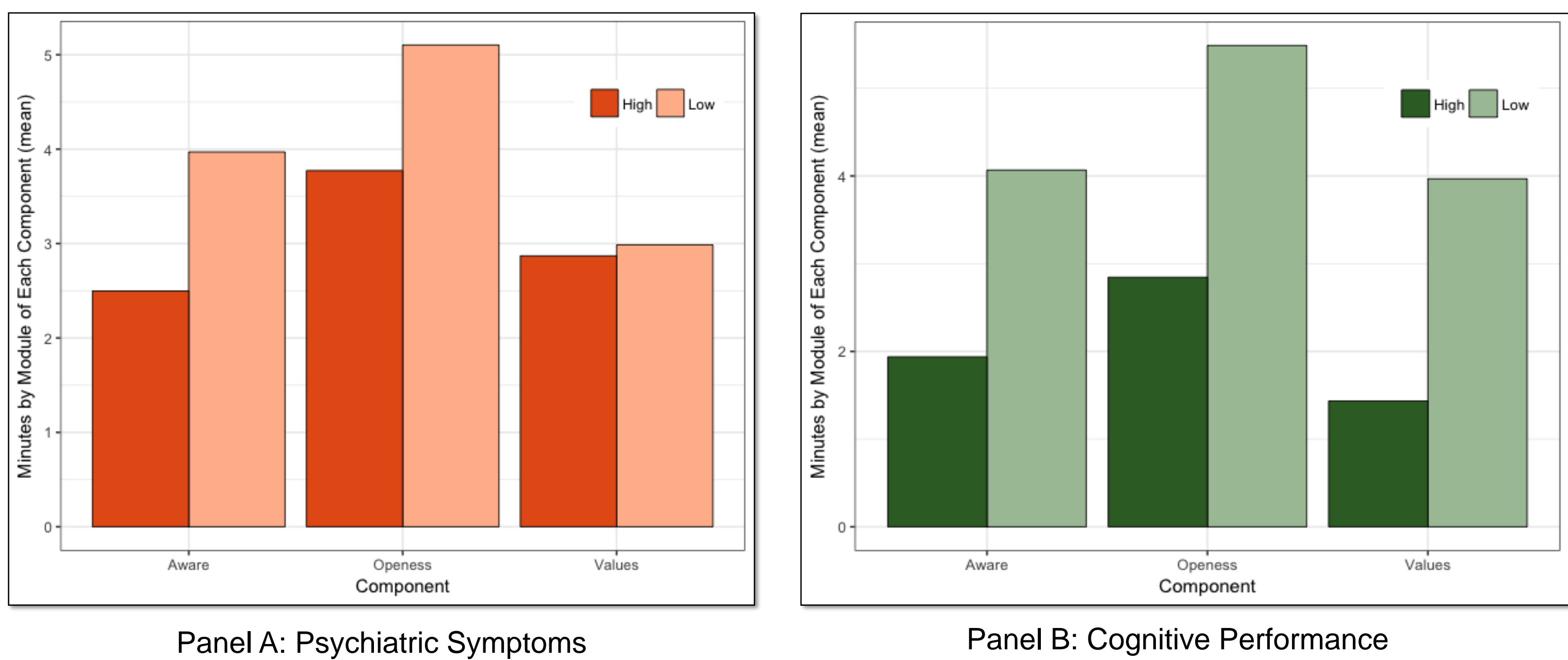Figure 4. Correlation Matrices between Key Theory-Based Characteristics and Duration of Practice of ACT Modules

Panel A: Psychiatric Symptoms

Panel B: Cognition

Panel C: Perspective Taking

Panel D: Experiential Avoidance

Figure 5. Duration of Practice by Levels of Perspective Taking and Exp. Avoidance

Panel A: Perspective Taking

Panel B: Smoking-Related Experiential Avoidance
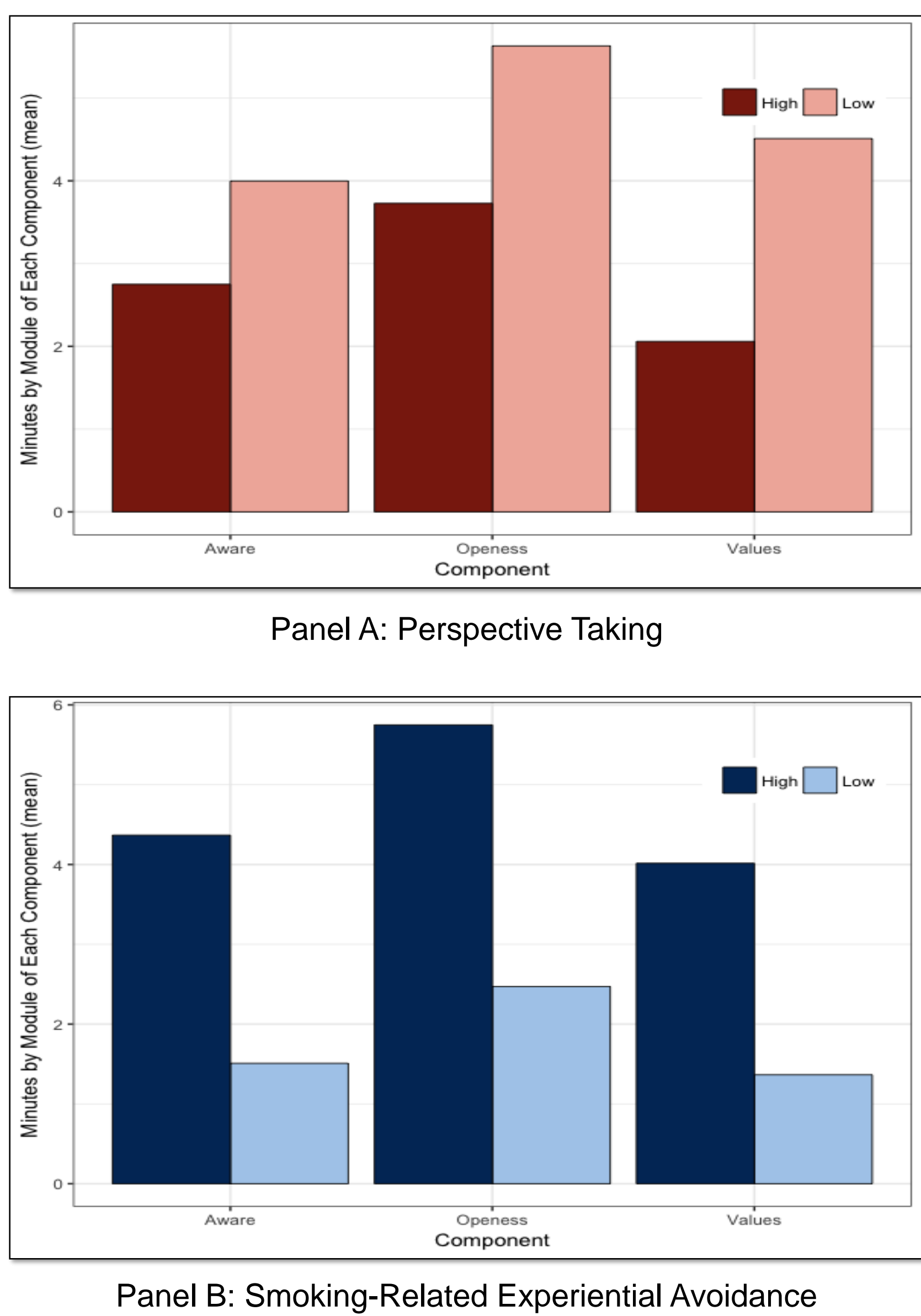
Conclusion

Learn to Quit modules appear to effectively engage individuals with the baseline characteristics that most define our target population, that is, frequent psychiatric symptoms, lower cognitive functioning, low perspective taking and high levels of smoking-related experiential avoidance.

In conclusion, **Learn to Quit effectively engages patients with the personal characteristics that are in most need of ACT's active psychological ingredients.**