

Investigating the Substitutability of Alternative Nicotine and Tobacco Products for Conventional Cigarettes in an Experimental Tobacco Marketplace among Vulnerable Populations

ABSTRACT

Background: Rural areas have the highest smoking rates in the United States, which suggests the need to develop more effective regulatory policies to address smoking in these areas. One way to model the effects of potential policy changes on the use of various concurrently available products in the tobacco landscape is with the experimental tobacco marketplace (ETM). The ETM is an online marketplace wherein, through increasing the price of conventional cigarettes, one can investigate the substitutability of other fixed-price tobacco products (e.g., e-cigarettes) for cigarettes. To date the ETM has not been used to investigate cigarette demand and product substitutability among populations especially vulnerable to tobacco addiction.

Methods: Participants were 19 daily smokers from three vulnerable populations. In each session, prices per conventional cigarette were increased (\$0.12, \$0.25, \$0.50, \$1.00, \$2.00) while the prices for other commodities (e.g., JUUL, filtered cigars, snus, etc.) remained fixed. Across three ETM sessions, either all products, all products except cigars, or all products except JUUL were available. Linear regression was performed on group mean data as a function of log-transformed cigarette price to determine substitution.

Results: Cigarette demand decreased as a function of increasing cigarette price. JUUL substituted for cigarettes when all products were available, with slope of price vs demand significantly greater than zero [$F(1,4)=12.56, p<0.05, R^2=.81$]. In the session where cigars were unavailable, the JUUL slope was positive, albeit not significantly different than zero [$F(1,4)=6.59, p=.08, R^2=.69$]. When JUUL was unavailable, cigar purchasing increased with price, but the slope was not significantly different than zero [$F(1,4)=7.46, p=.07, R^2=.71$].

Conclusion: JUUL demonstrated the greatest substitutability when constraints on cigarettes increased in the current study, suggesting that it could serve as an alternative to cigarettes among rural and vulnerable populations should regulatory restrictions increase.

INTRODUCTION

- Although smoking rates among the general population have declined, smoking prevalence remains high among vulnerable populations such as individuals with substance use disorders, mental illness or socioeconomic disadvantage¹⁻⁵
- Given smoking rates are disproportionately higher among vulnerable populations and individuals living in rural areas, it is important to understand how tobacco regulatory policies impact smoking among these populations
- One such way to model potential tobacco policy changes is with the experimental tobacco marketplace (ETM)
- The ETM allows for researcher to examine how participants purchase tobacco products in a virtual store in which a variety of nicotine and tobacco products are concurrently available^{6,7}
 - This allows for researchers to investigate cigarette demand and product substitutability in more naturalistic settings
- The purpose of the current study was to experimentally model the effects of increased cigarette price on the purchasing of alternative combustible (e.g., cigarillos) and non-combustible (e.g., e-cigarettes) sources of nicotine among individuals with substance use disorders, socioeconomic disadvantage or mental illness residing in a rural state

METHOD

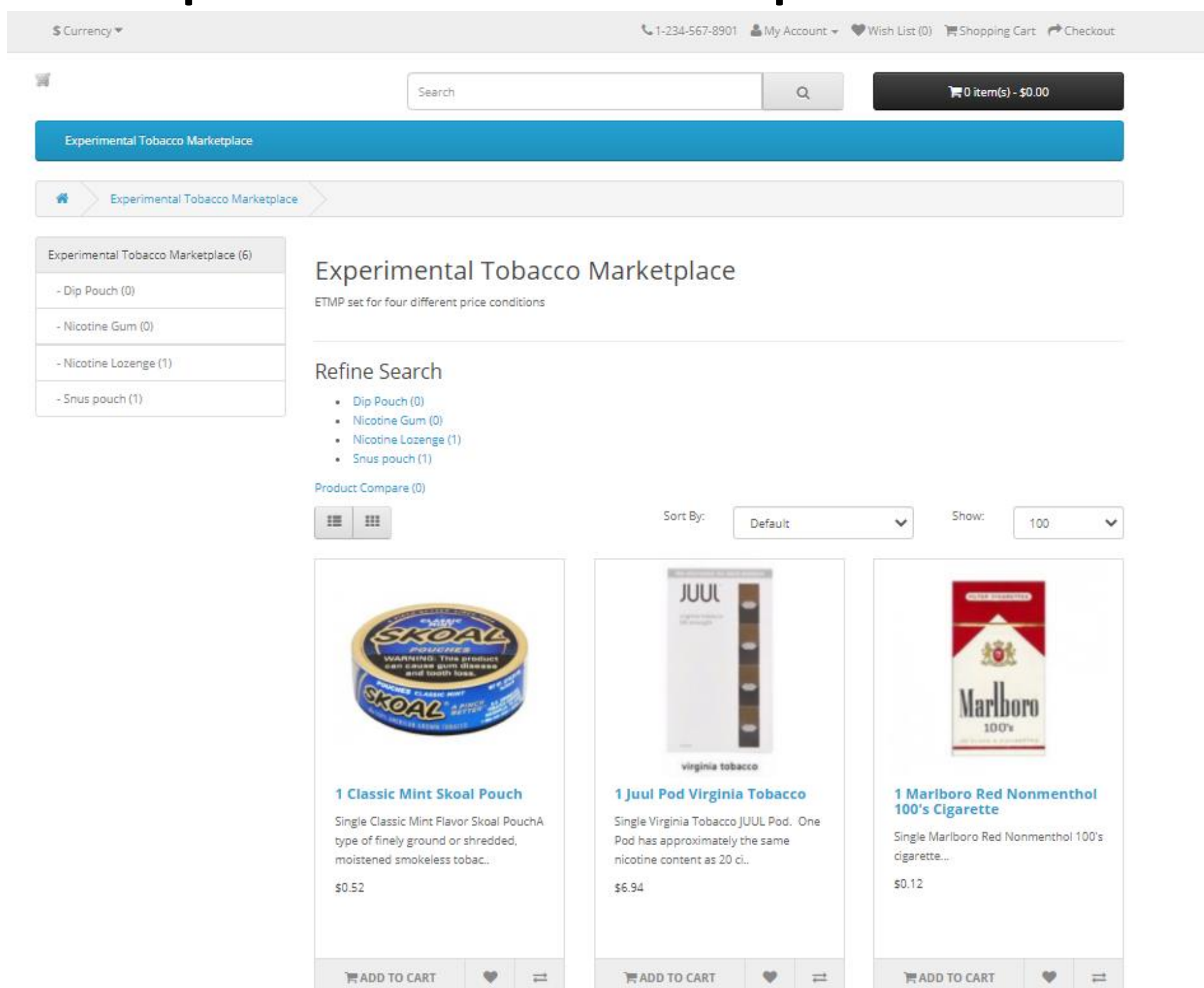
Procedure

- 19 daily smokers from three vulnerable populations
 - 5 Women of Socioeconomic Disadvantage of Reproductive Age
 - 9 Individuals Diagnosed with Opioid Use Disorder
 - 5 Individuals Diagnosed with Affective Disorders
- Participants received in-session spending money based on their weekly cigarette consumption
- In each ETM session, cigarettes were available at five different prices (\$0.12, \$0.25, \$0.50, \$1.00, \$2.00)
 - The price of all other products remained fixed
- ETM sessions differed by the products available
 - All products available (i.e., Skoal, Nicorette gum, JUUL pods, usual brand cigarettes, Nicorette lozenges, snus, and cigarillos)
 - All products except JUUL
 - All products except cigars
- One cigarette price condition was actualized each session

Data Analysis

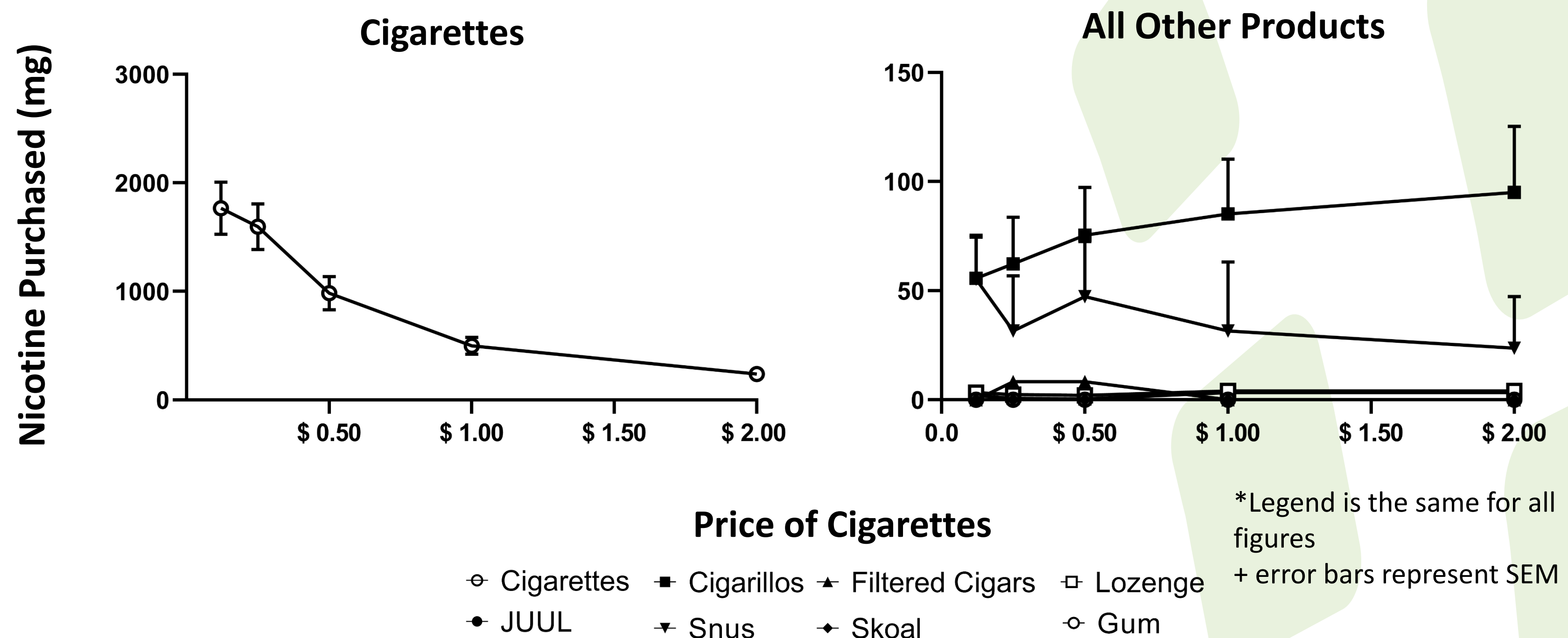
- Line regression was performed on group mean data as a function of log-transformed cigarette price

Experiment Tobacco Marketplace Interface



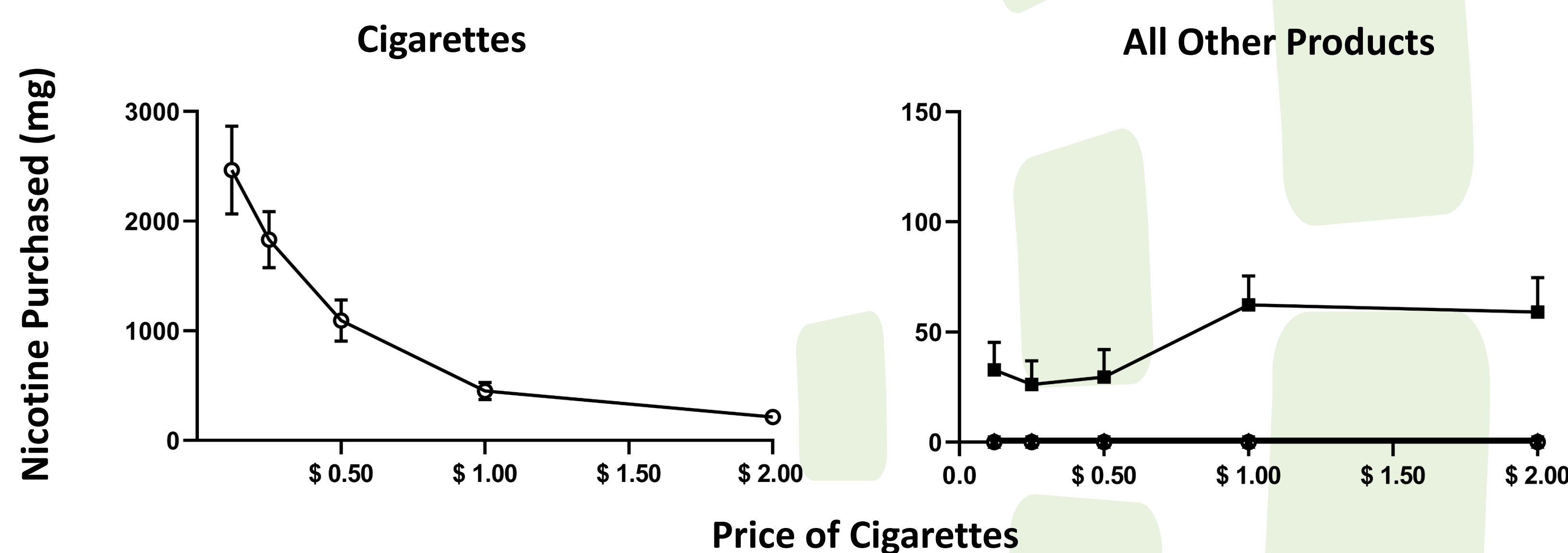
RESULTS

All Products Available



- JUUL substituted for cigarettes
 - The slope of price vs demand was significantly greater than zero $F(1,4)=12.56, p<0.05, R^2=.81$

No Cigars Available



- JUUL did not substitute for cigarettes, however, JUUL purchases increased as a function of increased cigarette prices
 - The slope of price vs demand was not significantly greater than zero $F(1,4)=6.59, p=0.08, R^2=.69$

No JUUL Available



- Cigars did not substitute for cigarettes, however, cigar purchases increased as a function of increased cigarette prices
 - The slope of price vs demand was not significantly greater than zero $F(1,4)=7.46, p=0.07, R^2=.71$

DISCUSSION

- The current study replicates and extends previous work with the ETM by examining the substitutability of alternative products among populations especially vulnerable to nicotine addiction
- Across all sessions, cigarette purchases decreased as a function of increased price
- Fewer cigarettes were purchased when more alternative products were available
- JUUL demonstrated the greatest substitutability when constraints on cigarettes increased in the current study
- Participants rarely purchased other available products (e.g., lozenges, Skoal, or gum)
- The concurrent availability of JUUL (and, potentially, other e-cigarettes) may provide an alternative to cigarettes among rural and vulnerable populations should regulatory restrictions on cigarettes increase.

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