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UNIVERSITY OF CALIFORNIA, SAN DIEGO

SAN DIEGO STATE UNIVERSITY

Essays on the Marketing and Packaging of Cigarettes

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in

Public Health (Global Health)

by

Eric Craig Leas

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2017

The Dissertation of Eric Craig Leas is approved, and it is acceptable

in quality and form for publication on microfilm and electronically:

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Chair

University of California, San Diego

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2017

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Acknowledgements

Thanks, Kenzie, for your commitment to my success and our marriage during this season of my training. David, thank you for your support, patience and kindness and for teaching me the values of community and collaboration. Thank you, John Ayers, for your friendship and teaching me many great research skills. Thanks to the members of the Human Nature Group who created a supportive environment for taking risks and exploring new ideas. Thank you to Wael Al-Delaimy, Nancy Binkin, Tom Novotny and John Pierce for investing considerably in my professional development. Thank you to Tom and Nancy for introducing me to your friends. Thanks to my entire dissertation committee who has been a great source of expertise.

Chapter 2, in full, is currently being prepared for submission for publication of the material. Eric Leas was the primary investigator and author of this material.

Chapter 3, in full, has been submitted for publication of the material and has been presented at the 38th annual meeting and scientific sessions of the Society of Behavioral Medicine. Eric Leas was the primary investigator and author of this material and presented the research at the Society of Behavioral Medicine.

Chapter 4, in full, is currently being prepared for submission for publication of the material. Eric Leas was the primary investigator and author of this material.

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(Listed Alphabetically; Selected from >1000 reports; Parentheses indicate number of appearances, if more than 1)

@CharlieSheen	Newsweek
@DrOz	Newsy
ABC News (2)	Oregon Live
AOL News	Pacific Standard
AP News	Patch
BBC News	Perez Hilton
Bloomberg BNC	Pink News
CBS News (2)	Politico
CNN	Reuters (2)
Daily Mail	The San Diego Union Tribune (3)
Discovery News	Science Daily
The Doctor Oz Show (2)	The Seattle Times
FiveThirtyEight	Slate
Forbes (2)	Tech at Bloomberg (2)

Fortune   Time Magazine
Fox News   The Times of Dallas
The Guardian   The Times of San Diego
Hollywood Reporter   The Today Show
How Stuff Works   The UCSD Guardian Magazine
Huffington Post (4)   The UCLA Alumni Magazine
KPBS   US News and World Report (3)
The Los Angeles Times (2)   Us Weekly
Mashable   VOX
Mic   Vice
Mirror   Washington Post (2)
MSN   WebMD
National Affairs   WGN Broadcasting
NBC News (2)   World News Tonight
NY Mag: Science of Us (4)   Yahoo! News
            The New York Times

Abstract of Dissertation

Essays on the Marketing and Packaging of Cigarettes

by

Eric Craig Leas

Doctor of Philosophy in Public Health (Global Health)

University of California, San Diego, 2017

San Diego State University, 2017

Professor David Strong, Chair

Background: To curb smoking rates, the World Health Organizations'
Framework Convention on Tobacco Control recommends that countries ban all forms
of tobacco advertising and restrict the use of certain terminology on packaging and
branding. However, in many countries, including the United States, tobacco remains
one of the most heavily marketed consumer goods. Through a series of studies, I
explore several issues pertaining to the marketing of tobacco products including:
whether some brands act as "starter-brands" for young adults (Chapter 2), whether
certain marketing practices make cigarettes seem "safer" (Chapter 3) or more

appealing (Chapter 4) than other brands, and how removing branding from packaging impacts these perceptions (Chapters 3 and 4).

Methods: This document is composed of three independent studies. The data for Chapter 2 are derived from a national survey of U.S. adults known as the Population Assessment of Tobacco Use and Health ("the PATH study"), while the data for Chapters 2 & 3 were gathered using a web-based marketing experiment.

Results: In Chapter 2 we identified 13 sub-brands on the U.S. market that were used more frequently by young adults than among the rest of adult smokers. Nine of these 13 sub-brands were menthol-flavored, three contained menthol "crush" capsules and two were from a new lower-cost Marlboro line called "Marlboro Black." The second study suggested that packaging of a brand of cigarettes called Natural American Spirit conveys the brand is safer and that removing tobacco branding alters this perception. The final study suggests that the packaging of U.S. cigarette brands differentiate in terms the perceived attractiveness of the pack, the perceived taste and harshness, and the social image they convey about their consumers and that standardized packaging both reduces these perceptions and forces brands to appear more similar in terms of these perceptions.

Conclusion: These data suggest that many U.S. cigarette brands contain marketing features that are appealing to health-concerned smokers and young adults. The data also suggest that standardized packaging would constrain the ability of manufacturers to market to these consumer groups through their packaging.

Chapter 1: Introduction

Smoking remains the leading cause of preventable death both globally and in
the United States, killing 6 million adults each year.[1,2] In addition to its death toll,
smoking also has considerable economic burden, with roughly $300 billion spent
annually on smoking-related health care in the United States alone.[3] Nonetheless,
globally 1 in 5 adults are smokers (22%).[4]

To curb smoking rates, the World Health Organizations' Framework
Convention on Tobacco Control recommends that countries ban all forms of tobacco
advertising and restrict the use of terminology on packaging and branding.[5,6]
Receptivity to tobacco advertising has been shown to predict which adolescents will
become susceptible to smoking and begin using cigarettes.[7-9] Moreover, certain
cigarette-marketing strategies that promote cigarettes as "safer" can lead health-
concerned smokers to delay or abandon quitting smoking.[10] Restricting advertising
completely or in part is expected to reduce consumers' draw to smoking by limiting
their exposure to messages that entice initiation or delay quitting. However, in most
countries, including the United States, tobacco remains one of the most heavily
marketed consumer goods, with $8.49 billion spent on cigarette advertising and
promotion in 2014 in the United States alone.[11]

In this dissertation, through a series of studies I explore several issues
pertaining to the marketing of tobacco products. The dissertation includes three
independent chapters that have been submitted, or are being prepared for,
publication. Chapter 2 uses data from a large nationally representative sample of U.S.
smokers to identify brands that are disproportionately used by young adults and why
smokers say they use these brands. Chapter 3 assesses the perceptions of safety

conveyed through the packaging of a brand of cigarettes called Natural American

Spirit and how standardized packaging affects these perceptions. Chapter 4 explores

appeal-related characteristics conveyed through packaging including taste and

consumer identities and how standardized packaging affects these perceptions.

Together, this collection of manuscripts provides data that are both actionable for

policy-makers and useful for guiding future research.

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Chapter 2: Young Adult Cigarette Brand Preference, Reasons For Use And Perceptions Of Harm, United States, 2013-2014

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Background. Studying cigarette brand preference can provide insights into the influence that marketing practices and design have on consumer behavior.

Method. Using the Population Assessment of Tobacco Use and Health we report on cigarette "sub-brand" (brand and variant) popularity for the leading 36 cigarette sub-brands and each sub-brand's relative popularity among young adults compared with the rest of the adult smokers (18-24 years old vs. ≥25 years old). We also describe the reasons adults gave for their brand preferences across sub-brands and age groups.

Results. Adults in the PATH study used a total of 223 cigarette sub-brands. Marlboro Red, Newport Menthol and Marlboro Gold were the most frequently used cigarette sub-brands for all adults. Thirteen of the top 36 sub-brands were used more frequently by young adults than the rest of adult smokers ($p < 0.05$). Nine of these 13 sub-brands were menthol-flavored, three contained menthol "crush" capsules and two were from a new lower-cost Marlboro line called "Marlboro Black." Taste was the most frequently reported reason young adults gave for choosing their cigarette brand (88%); however, some young adults also reported cost (30%) and reduced-harmfulness relative to other brands (11%) as reasons for their brand preference.

Conclusion. There are well over 200 cigarette sub-brands on the U.S. market, and there are clear distinctions in brand preference observed by age group. Highlighting attributes that make brands appealing to young people can lead to appropriate regulation, particularly for the 13 sub-brands that we identified as being significantly more popular among young adults.

Introduction

The process of becoming an adult smoker typically starts during adolescence, with 99% of initiation occurring by the age of 26.[1,2] Receptivity to tobacco marketing has been shown to predict which adolescents will become susceptible to smoking and begin using cigarettes.[3-5] Therefore, limiting marketing and design features that primarily attract young people to tobacco use could prevent smoking initiation.

The tobacco industry also acknowledges the importance of young adulthood as a period for attracting new smokers. As strategic reports attest: "young adult smokers have been the critical factor in the growth and decline of every major brand and company over the last 50 years. If younger adults turn away from smoking, the industry will decline, just as a population which does not give birth will eventually decline."[6] The tobacco industry has been effective at marketing brands to young adults' occupations, values and lifestyles and have often used decentralized marketing to target young adults, for instance through bars or nightclub events or direct consumer marketing.[7-11] Moreover, as the youngest legal targets of advertising, young adults also provide indirect access to youth who are often reached and impacted by marketing and branding aimed at young adults.[12-15]

The factors that influence young adults' brand preferences have long been studied. These studies typically find that young adults and youth more frequently use tobacco brands that are flavored to be sweet,[16] menthol-flavored[17-21] contain menthol capsules,[22,23] are marketed with terms such as "light/mild"[24] and "additive-free/natural" [25-28] or that use iconic characters such as Joe Camel.[29] Qualitative research also suggests that many young adults rely on cigarette packaging and brand-related imagery to inform their preferences and construct their social identity.[30-32]

While current research is critical in developing an understanding of cigarette brand preferences, there remain important open questions pertaining to how branding and marketing might impact consumer behavior. One important question is whether some brands act as "starter-brands" that attract adolescents and young adults to smoking. The Population Assessment of Tobacco Use and Health (the "PATH Study") offers the first opportunity to investigate the characteristics of smokers who use the more than 200 brands of cigarettes that are on the U.S. market. We report on cigarette sub-brand usage for the first time (Aim 1). We also explore the question of starter-brands by describing cigarette sub-brands that are use more frequently by young adults (Aim 2), any common features of these cigarette brands (Aim 3) and report the reasons that smokers describe for using these brands (Aim 4). Lastly, we explore how reasons for brand preference differ between young adults and the rest of the adult smoking population (Aim 5).

Methods

Data Source

Our analyses were conducted using the 2013-2014 wave (Wave 1) of the PATH Study. The PATH Study is a nationally representative, longitudinal cohort study that used Audio-Computer Assisted Self-Interviews available in English and Spanish to collect information on tobacco-use patterns and associated health behaviors. Recruitment employed address-based, area-probability sampling, using an in-person household screener to select youth and adults. Adult tobacco users, young adults ages 18 to 24, and African Americans were oversampled relative to population proportions. The PATH study weighting procedures adjusted for oversampling and nonresponse; combined with the use of a probability sample, the weighted data allow

the estimates produced by the PATH Study to be representative of the non-institutionalized, civilian U.S. population. Further details regarding the PATH Study design and methods are published.[33] All analyses were performed using the "Public Use File" (goo.gl/s0qUTR). Westat's Institutional Review Board approved the PATH study design and protocol, the Office of Management and Budget approved the data collection and the University of California: San Diego's Institutional Review Board approved these analyses.

Analytical Sample

Our analytical sample consisted of adults who were at least 18 years of age and were 'current established smokers,' which was defined as having smoked at least 100 cigarettes in their lifetime and currently smoking at least 'some days' (n=11,402). We used the full sample of current established smokers to calculate each cigarette sub-brand usage rates (defined in statistical overview) and reported reason for brand preference among smokers who reported a sub-brand that they 'regularly use.' For reliable estimation, the users of a list of 36 sub-brands that had at least n=50 regular users were retained for the final study sample (n=8,007).

Measures

Sub-Brand Preference

Respondents selected their regular or last-smoked cigarette sub-brand from a series of point-and-click drop-down menus, allowing them to identify the exact product that they smoke. For a large number of sub-brands, the displayed list included a thumbnail image of each brand logo or package and a text-label under the image, for the rest only a text-label was displayed. If the respondent did not find their particular brand or product on the list, they could add the brand or product as an

'other-specify' text response. Our categorization of sub-brands included all product sizes (e.g., 100s, kings, etc.) that had at least n=50 respondents who 'regularly used' the brand, which resulted in 36 sub-brands ("top 36 sub-brands"). To aid qualitative interpretation, we further coded the top 36 sub-brands to indicate their typology ("menthol," "menthol 'crush' capsule," "additive-free," "natural," "former light or mild") and parent company (Altria, Reynolds American, ITG Brands).

Reasons for Sub-Brand Choice

The PATH study asked respondents who reported having a 'regular brand' of cigarettes about motivations for choosing their brand. These questions all stemmed from a single prompt: 'In choosing your regular brand of cigarettes was part of your decision based on the following:" "it might not be as bad for your health" (Harm Reduction), "the tar and nicotine levels" (Tar and Nicotine), "as a way to help you quit smoking" (Quitting), "the taste" (Taste), "the amount of satisfaction it gives you" (Satisfaction), "it is less expensive" (Price), "the design of the pack" (Pack Design), "people important to you use this brand" (Friends). The question ordering was randomly assigned and all variables had the same response options ('1=Yes,' '2=No').

Respondents Age

Respondents were asked to record their age ("Can you tell me how old you are?"). Age in years was divided into two categories: "young adults" (18-24 years old), and "the rest of adult smokers" (25+ years old).

Missing Data

The survey administrators logically assigned five missing values for the age variable from a household screener, as described in the PATH study User Guide (goo.gl/s0qUTR). For the reasons for brand preference variables, the responses

"don't know" and "refused" were omitted from analyses (≤0.9%). Respondents who reported their "brand" but did not indicate the sub-brand (1.5%) or used a product that was not coded by the survey administrators (1.3%) were included in the "other" category in the calculation of relative market share and omitted from all other analyses.

Statistical Analysis

We had five primary analytical aims. First, we ranked each cigarette sub-brand according to how frequently they were used by American smokers. To assess frequency of use, we defined the "sub-brand usage" rate (SBU rate) as the percent of all manufactured cigarette users in a defined population who reported using a particular sub-brand of cigarettes [$SBU\ rate = \frac{Number\ of\ users\ of\ a\ sub-brand\ of\ cigarettes}{Total\ number\ of\ cigarette\ users} \cdot 100$]. SBU rates were calculated for the top 36 sub-brands and for the indicator variable representing all other brands that did not meet our criteria. We further described the 36 sub-brands qualitatively according to their parent company and typology. Second, we compare SBU rates for each of the top 36 sub-brands between young adults and the rest of adult smokers, by calculating the ratio of SBU rates (RSBU) between young adults and the rest of adult smokers [$RSBU = \frac{SBU\ rate\ among\ young\ adults\ smokers}{SBU\ rate\ among\ the\ rest\ of\ adult\ smokers}$] for each sub-brand. Rao-Scott adjusted χ^2 statistics were used to test the statistical significance of the RSBU rates for each sub-brand. Third, we describe common attributes of the brands that had a statistically significantly higher SBU rates among young adult smokers according to their typology. Our fourth aim was to describe the sub-brands according to the reasons that smokers gave for using their brand. We report the proportion of respondent indicating each reason for choosing their sub-brand across all 36 of the sub-brands in the supplementary appendix (Supplementary

Figure 2.1) and focus on a subset of 13 sub-brands that had significantly higher SBU

rates among young adults in the text. Finally, we assessed differences in reasons for

brand preference between young adults and the rest of the adult smoking population

using percentages and Rao-Scott adjusted χ^2 statistics.

All analyses were weighted using the adult sample weights provided in the

PATH survey and by using the Balanced Repeated Replication ("BRR") method with

Fay's adjustment (ρ = 0.3). All analyses were performed using R version 3.2.2, all

tests were two-tailed and significance was assessed at α = 0.05.

Results

Adult smokers in the PATH study used a total of 223 cigarette sub-brands. Of

these, 36 sub-brands met our inclusion criteria, accounting for 73.1% of all sub-

brands used by American adults. All of the top 36 sub-brands were owned by the

three largest cigarette manufacturers: Altria (n=15; 43%), Reynolds American (n=15;

43%) and ITG Brands (n=5; 14%). Fifteen (43%) of these sub-brands were menthol-

flavored, 13 (37%) had formerly been marketed as "light," "mild" or "low-tar" and four

(11%) have received warnings from the United States Food and Drug Administration

(FDA) about the use the terms "additive-free" (American Spirit Full-bodied and Mellow

and Winston Gold and Red) and "natural" (American Spirit Full-bodied and Mellow) in

their marketing and labeling materials. The three cigarette sub-brands that were used

most frequently by American smokers were: 1. Marlboro Red (13.1%), 2. Newport

Full-Flavor Menthol (12.8%) and 3. Marlboro Gold (10.9%).

A Rao-Scott adjusted χ^2 statistic calculated on the overall distribution of the 36

sub-brands and the category for all other brands indicated a significant difference in

the frequency at which of sub-brands were used by young adults and the rest of adult

smokers (χ^2 (df = 36) = 933.4; p<0.001). The three cigarette sub-brands that were used most frequently used by young adults again were: 1. Marlboro Red (18.6%), 2. Newport Full-Flavor Menthol (17.7%) and 3. Marlboro Gold (7.4%), which comprised 43.7% of the sub-brands used by young adults (Table 2.1 column 2).

Thirteen of the top 36 sub-brands were used more frequently by young adults than the rest of adult smokers (Figure 2.1). For instance, young the SBU rate for Camel Turkish Royal was 11.2 times (p<0.001) higher among young adults than among the rest of the adult smokers and the SBU rate for Camel Crush Bold was 7.2 times (p<0.001) higher among young adults than the rest of adult smokers. Nine out of 13 sub-brands with higher SBU rates among young adults were menthol-flavored (denoted in Figure 2.1 with an "(M)"). All of the "crush" capsule cigarettes in the top 36 brands had higher SBU rates among young adults, including Camel Crush Bold (RSBU = 7.2; p<0.001), Camel Crush (RSBU = 2.8; p<0.001) and Camel Silver Menthol (RSBU = 2.7; p<0.001). Only one cigarette sub-brand that had been marketed as "light" or "mild" had a higher SBU rate among young adults, but this brand also contained menthol and menthol "crush" capsules (Camel Silver (M)). Two sub-brands of Natural American Spirit, which have been marketed with terms such "natural," "additive-free" or "organic," were comparable SBU rates among young adults and the rest of adult smokers (RSBU (range): 1.2-1.4; p>0.05), as did three other brands of menthol-flavored cigarettes that had been marketed as a "light" cigarettes (RSBU (range): 0.48-1.25; p's ≥0.10) and Camel Blue, which has also been marketed as a "light" cigarette (RSBP = 0.91; p = 0.66). The remaining cigarette sub-brands that had been marketed as "light" (Marlboro Silver, Pall Mall Blue Pall Mall Orange and Winston Gold) or "additive-free" (Winston Gold and Red) among the top

36 sub-brands had low SBU rates among young adults than the rest of adult smokers (RSBU (range); 0.0-0.7; p <0.01).

The most frequently reported reasons for brand preference among users of the 13 sub-brands with SBU rates that were higher among young adults were, "the taste" and for "the amount of satisfaction it gives you," reported by 88% (range: 79%-98%) and 79% (range: 62%-83%) of smokers who used these brands, respectively (Figure 2.2). The next closest reason for brand preference was because "people important to you use this brand" (27%; range: 12-38%), followed by "the tar and nicotine levels" (23%; range: 2-28%) and "it is less expensive" (22%; range: 10-93%). Twelve percent (range: 0-17%) of respondents who used brands that were more popular among young adults reported choosing their brand because "it might not be as bad for your health," 11% (range: 1-21%) reported choosing their brand for "the design of the package" and 8% (range: 0-9%) reported choosing their brand "as a way to help me quit."

Finally, we further assessed the relationship between age and reasons for brand preference among the population of smokers who had a regular brand of cigarettes (Table 2.2). The greatest difference in reasons for brand preference between young adults and the rest of adult smokers was on the measure for "people important to you use this brand" (30% vs. 20%; χ^2 = 65.50; p<0.001) and the smallest difference was on the measure for "the amount of satisfaction it gives you" (76% vs. 73%; χ^2 = 6.12; p = 0.007). Additionally, a smaller proportion of young adults reported choosing brands because "it is less expensive" (30% vs. 40%; χ^2 = 48.54; p <0.001), because "it might not be as bad for your health" (11% vs. 18%; χ^2 = 40.40; p <0.001), "as a way to help me quit" (7% vs. 11%; χ^2 = 28.93; p <0.001) and for "the tar and

nicotine levels" (21% vs. 27%; χ^2 = 19.18; p < 0.001) and a larger proportion of young

adults reported choosing brands for "the taste" (88% vs. 83%; χ^2 = 28.91; p <0.001)

and "the design of the pack" (12% vs. 9%; χ^2 = 20.63; p <0.001).

Discussion

We found that young adults used several cigarette sub-brands more

frequently than the rest of adult smokers. Reasons for preferences of these brands

were primarily "taste" and "satisfaction," and the majority of these brands were

menthol-flavored. While choice for sub-brands perceived to be harm reducing was

less common among young adults, 11% of young adult smokers who had regular

brands of cigarettes reported choosing their brands under the presumption that it

"might not be as bad for your health."

The attributes that make brands appealing to young people need to be

understood, particularly among the 13 sub-brands that we identified as being used

more frequently by young adults. Our findings are consistent with findings published

elsewhere that suggest that menthol brands are increasing in popularity among youth

and young adults.[17-23] A major contribution of this work is to identify which menthol

brands, specifically, were used more frequently by young people. For instance, we

found that three relatively new menthol sub-brands that use "crush" capsules were

used almost entirely by young adults, while some menthol-flavored cigarettes that

have been on the market for many years were not (e.g., Kool Full-Flavor Menthol).

Young adults also used Camel Turkish Royal, Marlboro Black, Marlboro Blend

No. 27 and Marlboro Red more often even though these brands are not menthol-

flavored. Young adults have long been a major focus of marketing for Altria's flagship

brand, Marlboro Red;[7] however, some lay reports suggest that Altria is beginning to

diversify the Marlboro brand to appeal to a broader range of young adults values and lifestyles by introducing the line "Marlboro Black."[34] In recent marketing, this brand has been described as "a 'bold and modern' take on Marlboro (Red) -- think tattoos, black jeans and motorcycles instead of Stetsons, blue jeans and horses;" it is also available at a lower price point then Marlboro Red.[34] Consistent with product description, we found that more than half of those who smoked Marlboro Black reported using the brand for its lower price. Although there are no reports on brand preference for Marlboro Blend No. 27 or Camel Turkish Royal, our analysis suggests cost was infrequently reported as a reason for using these sub-brands, but "taste" and "satisfaction" levels were frequently reported. Lay reports suggest that the Camel "Turkish" line was introduced after the Master Settlement Agreement disallowed the use of cartoons in cigarette advertising; this forced RJ Reynolds to develop new marketing tactics beyond their popular "Joe Camel" cartoon, with industry interviews suggesting that the brand was designed to reinforce a "slightly exotic, fun image" of camel cigarettes.[35] The attributes that make these brands appealing to young adults are important questions and require further investigation.

Although "taste" and "satisfaction" were by far the most frequently reported reasons for use, our results also suggest that harm reduction remains a common motivation for cigarette brand preference, despite FDA regulations restricting any marketing practices that convey that any tobacco product is safer than another.[36] As outlined in the Family Smoking Prevention and Tobacco Control Act, any U.S. cigarette manufacturer that seeks to assert its' brands "safety" must submit scientific data that demonstrates that their brand is indeed safer. If successful, the product could be marketed as a "Modified Risk Tobacco Product." Currently, no brand has

completed this permitting process. While preference for sub-brands that are perceived to be less harmful was less of a motivation for brand preference among young adults than among the rest of adult smokers, 11% reported choosing their brand for this reason. This is of public health concern as many young adults who might not otherwise smoke may be maintaining or initiating cigarette smoking by choosing brands that they perceive to be "safe" or "safer," as appears to be the case with other products that are thought of as less harmful such as e-cigarettes.[37] Our analysis found that the brand Natural American Spirit is the most frequently perceived to be harm-reducing, however many brands that have formerly been marketed as "light," "mild" or "ultra-light" are also still commonly perceived to be harm reducing (see Supplementary Figure 2.1).[28]

We also found that lower-cost versions of many flagship brands are more frequently used by U.S. smokers. For instance, in addition to the lower-cost "Marlboro Black" line, Altria recently introduced the lower-priced "special blend" versions of their popular Marlboro Gold and Red products in 2010, which ranked 17th and 19th in our analysis in terms of total market share. Trends in market share also suggest that such "premium discount" blends are becoming increasingly popular. In our analysis, we ranked two Pall Mall varieties among the top 10 most popular U.S. sub-brands and other assessments have shown that Pall Mall's market share has grown substantially over the last decade.[38]

A few limitations to our analysis should also be noted. First, the PATH study enquired about only eight reasons for brand preference. Whether this survey instrument captured all or even the most prominent reasons for use is unknown. The nuance behind a respondent's "reasoning" was not captured (e.g., what about "the

taste" did respondents like?). Such qualitative information is needed to develop a better context for understanding brand preference especially among the brands that are more popular among young adults. Also, enquiring about reasons for use in this setting may pressure respondents to make post-hoc attribution for their brand preference. Nonetheless, a major strength of this study was the large and nationally representative sample and a survey instrument that allowed for respondents to point-and-click through cigarette brands and sub-brands to identify the exact brand that they used.

While taking into account these important limitations, we found that there are well over 200 cigarette sub-brands on the U.S. market that are regularly smoked by U.S. adults. The PATH study offers the first opportunity to investigate the characteristics of smokers who used these sub-brands. The results herein are useful for identifying sub-brands that are disproportionately attracting young consumers and for identifying brands perceived to be "safer" and, as such, serve as a baseline for studies of cigarette branding and marketing. Future research is needed to explore the marketing and branding of cigarettes that are disproportionately used by young people, the stability of brand preference over time and to assess possible interventions that would address the attraction of young people to certain cigarette brands. Regulatory efforts that remove branding attributes suggesting that cigarettes are less harmful may be needed, and better informing consumers that there is no "safe" or "safer" cigarette may be a potential target of health education.

Acknowledgements

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Table 2.1 Top 36 cigarette sub-brands used by American adults, United States, 2013-14

Sub-Brand	Total	Young Adults (18-24y)	All Other Adults (25y+)
	SBU rate, %	SBU rate, %	SBU rate, %
Marlboro Red	13.1%	18.6%	12.2%
Newport Full Flavor (M)	12.8%	17.7%	12.0%
Marlboro Gold	10.9%	7.4%	11.4%
Marlboro Full Flavor (M)	2.8%	6.5%	2.1%
Camel Blue	2.4%	2.3%	2.5%
Pall Mall Red	2.2%	0.7%	2.5%
Marlboro Silver	2.2%	0.7%	2.5%
Kool Full Flavor (M)	2.0%	1.1%	2.1%
Camel Filters	1.9%	2.3%	1.8%
Pall Mall Blue	1.9%	0.1%	2.2%
Camel Crush	1.8%	4.2%	1.5%
Maverick Full Flavor (M)	1.4%	0.9%	1.4%
Pall Mall Full Flavor (M)	1.3%	0.7%	1.3%
Marlboro Gold (M)	1.1%	1.1%	1.1%
Camel Filters (M)	1.1%	3.2%	0.8%
Marlboro Black	1.1%	2.0%	0.9%
Marlboro Special Blend Gold	1.1%	0.3%	1.2%
Camel Silver (M)	1.0%	2.1%	0.8%
Marlboro Special Blend Red	1.0%	0.3%	1.1%
L & M Filter	0.9%	1.0%	0.9%
Newport Full Flavor	0.8%	0.9%	0.8%
Marlboro Silver (M)	0.8%	1.0%	0.8%
American Spirit Mellow	0.8%	1.0%	0.8%
Marlboro Blend No. 27	0.8%	2.7%	0.5%
American Spirit Full-bodied	0.8%	1.0%	0.7%
Parliament White	0.7%	0.5%	0.8%
Winston Red	0.7%	0.1%	0.8%
Winston Gold	0.6%	0.0%	0.7%
Maverick Full Flavor	0.6%	0.3%	0.6%
Marlboro Black (M)	0.5%	1.3%	0.4%
Kool Blue (M)	0.5%	0.3%	0.6%
Pall Mall Orange	0.5%	0.1%	0.6%
Camel Crush Bold	0.5%	1.7%	0.2%
Marlboro Smooth (M)	0.4%	0.7%	0.4%
L & M Filter (M)	0.4%	1.0%	0.3%
Camel Turkish Royal	0.4%	1.8%	0.2%
All Other Brands	26.3%	12.3%	28.6%

Note 1: Sample size is n = 11,402 and all estimates are weighted to the population
Note 2: "(M)" = menthol-flavored; "SBU rate" = sub-brand usage rate
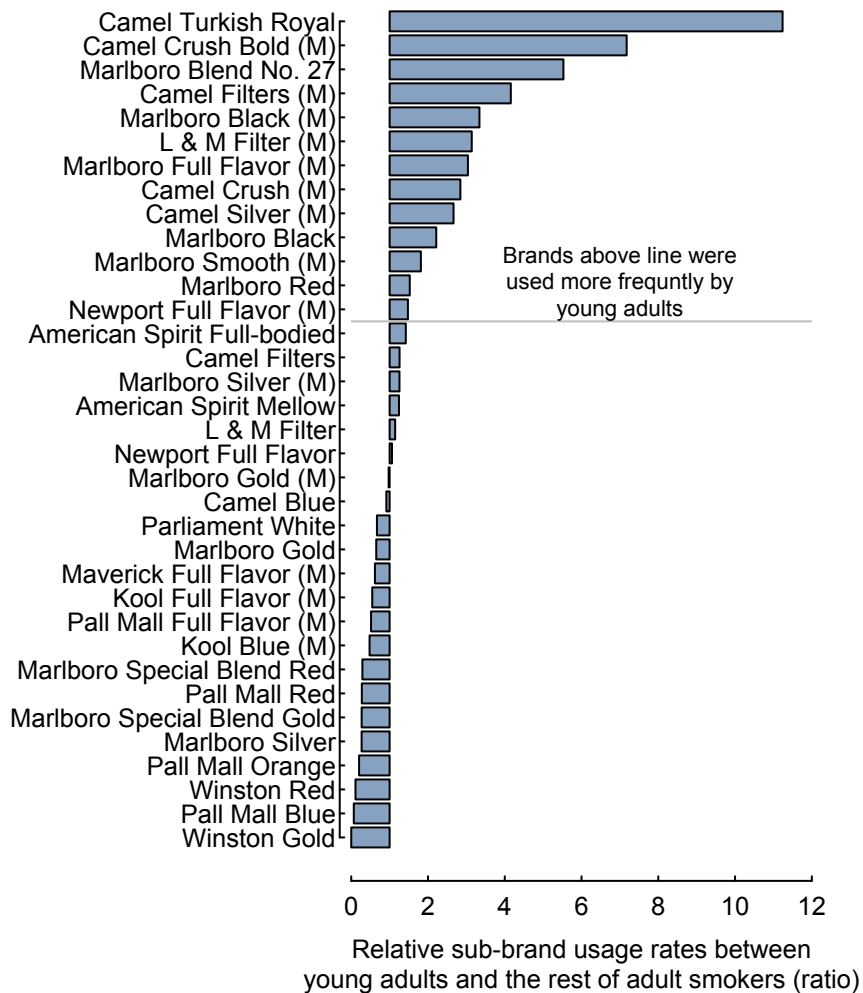
Figure 2.1 Comparison of sub-brand usage rates between young adults and the rest of the adult smoking population, United States, 2013-14

Note: Sample size is n = 11,We and all estimates are weighted to the population

	Taste	Satisfaction	Friends Use	Tar and nicotine	Price	Harm Reduction	Pack Design	Quitting
All 13 Sub-brands	88%	79%	27%	23%	22%	12%	11%	8%
Camel Crush (M)	87%	74%	20%	14%	39%	9%	13%	7%
Camel Crush Bold (M)	92%	62%	30%	10%	40%	5%	21%	3%
Camel Filters (M)	95%	73%	17%	9%	34%	5%	7%	1%
Camel Silver (M)	98%	77%	19%	10%	41%	6%	9%	6%
Camel Turkish Royal	96%	76%	19%	2%	17%	0%	20%	0%
L & M Filter (M)	85%	71%	12%	28%	93%	8%	1%	5%
Marlboro Black	79%	79%	16%	25%	62%	5%	13%	4%
Marlboro Black (M)	97%	79%	15%	11%	75%	5%	11%	9%
Marlboro Blend No. 27	92%	64%	24%	7%	16%	5%	9%	0%
Marlboro Full Flavor (M)	93%	74%	19%	18%	30%	6%	6%	6%
Marlboro Red	85%	79%	23%	27%	20%	13%	12%	10%
Marlboro Smooth (M)	98%	77%	12%	13%	23%	6%	4%	7%
Newport Full Flavor (M)	88%	83%	38%	26%	10%	17%	11%	10%

Figure 2.2 American smokers reported reasons for using the 13 cigarette sub-brands that were significantly more popular among young adults, United States, 2013-14

Note 1: Sample size is n = 4313 and all estimates are weighted to the population.
Note 2: Sample includes only respondents who reported a "regular brand"
Note 3: Each cell is the proportion of smokers who regularly used each sub-brand that indicated each reason for their brand preference. The x-axis is sorted on the category average.
Note 4: A complete summary of reasons for brand preference across all 36 sub-brands assessed is available in the supplementary appendix.

Table 2.2 Reasons for brand preference among American smokers by age group, United States, 2013-14

Reason for Use	18-24 years old	25+ years old			
	%	%	Diff, %	χ^2	p
People important to you use this brand	30%	20%	50%	65.50	0.000
It is less expensive	30%	40%	-25%	48.54	0.000
It might not be as bad for your health	11%	18%	-39%	40.40	0.000
As a way to help me quit	7%	11%	-36%	28.93	0.000
The taste	88%	83%	6%	28.91	0.000
The design of the pack	12%	9%	33%	20.63	0.000
The tar and nicotine levels	21%	27%	-22%	19.18	0.000
The amount of satisfaction it gives you	76%	73%	4%	6.13	0.007

Note 1: Sample size is n = 10,149 and all estimates are weighted to the population
Note 2: Sample includes only respondents who reported a "regular brand"

	Taste	Satisfaction	Price	Tar and nicotine	Friends	Harm Reduction	Quitting	Pack Design
All 35 Sub-brands	85	75	31	25	23	15	9	9
American Spirit Full-bodied	89	74	11	38	25	64	8	18
American Spirit Mellow	85	75	13	52	24	67	25	18
Camel Blue	86	66	20	17	22	8	7	8
Camel Crush (M)	87	74	39	14	20	9	7	13
Camel Crush Bold (M)	92	62	40	10	30	5	3	21
Camel Filters	89	75	25	17	13	7	2	9
Camel Filters (M)	95	73	34	9	17	5	1	7
Camel Silver (M)	98	77	41	10	19	6	6	9
Camel Turkish Royal	96	76	17	2	19	0	0	20
Kool Blue (M)	75	62	27	39	21	26	30	12
Kool Full Flavor (M)	90	80	31	30	33	20	16	14
L & M Filter	71	59	94	18	7	9	8	4
L & M Filter (M)	85	71	93	28	12	8	5	1
Marlboro Black	79	79	62	25	16	5	4	13
Marlboro Black (M)	97	79	75	11	15	5	9	11
Marlboro Blend No. 27	92	64	16	7	24	5	0	9
Marlboro Full Flavor (M)	93	74	30	18	19	6	6	6
Marlboro Gold	82	72	20	30	25	21	12	8
Marlboro Gold (M)	95	71	17	18	14	13	8	8
Marlboro Red	85	79	20	27	23	13	10	12
Marlboro Silver	82	69	16	56	15	29	23	8
Marlboro Silver (M)	93	75	16	27	19	12	10	6
Marlboro Smooth (M)	98	77	23	13	12	6	7	4
Marlboro Special Blend Gold	81	69	78	20	21	10	6	2
Marlboro Special Blend Red	81	67	62	12	20	9	6	3
Maverick Full Flavor (M)	82	77	92	28	21	24	16	10
Newport Full Flavor	84	68	74	17	8	5	9	6
Newport Full Flavor (M)	88	83	10	26	38	17	10	11
Pall Mall Blue	66	59	94	25	8	16	10	3
Pall Mall Full Flavor (M)	78	68	87	19	12	11	7	1
Pall Mall Orange	66	57	93	36	10	23	15	8
Pall Mall Red	75	64	85	14	14	8	5	8
Parliament White	93	79	3	25	32	24	11	13
Winston Gold	89	86	25	44	12	37	11	3
Winston Red	83	84	20	29	11	28	12	3

Supplementary Figure 2.1 American smokers reported reasons for choosing the top 36 sub-brands, United States, 2013-14

Note 1: Sample size is n = 8007 and all estimates are weighted to the population.
Note 2: Sample includes only respondents who reported a "regular brand"
Note 3: each cell is the proportion of smokers who regularly used each sub-brand that indicated each reason for choosing their brand; the x-axis is sorted on the category average.

Chapter 3: Standardized cigarette packaging (with or without warning images) may decrease the perception that Natural American Spirit cigarettes are "safer"

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Background: Over two-thirds of Natural American Spirit (NAS) smokers believe their cigarettes might be "less harmful," but toxicological evidence does not support this belief. We assessed whether standardized packaging could reduce the possibility of that consumers draw erroneous inferences of "safety" from NAS cigarette packaging.

Methods: Smokers (N=909) were recruited to a between-subjects survey experiment (three-brand x three-packaging/labeling styles) through Amazon Mechanical Turk and rated their perception of whether a randomly assigned cigarette package conveyed that the brand was "safer" on a three-item scale (Cronbach's α = 0.92). We assessed whether NAS packs were rated higher on the "safer cigarette" scale than two other brands and estimated the effect that plain packaging (all branding replaced with a drab dark brown color) and Australian-like packaging (all branding replaced with a drab dark brown color and a graphic image and text on 75% of the pack surface) had on perceptions of the NAS cigarette package.

Results: Smokers' ratings of the standard NAS pack on the safer cigarette scale (mean=4.6; SD=2.9) were 1.9 times (P<0.001) higher than smokers' ratings of a Marlboro Red pack (mean=2.4; SD=2.3) and 1.7 times (P<0.001) higher than smokers' ratings of a Newport Menthol pack (mean=2.7; SD=2.4). These perceptions of safety were lower when plain packaging was used (Cohen's d=0.66; p<0.001) and much lower when Australian-like packaging was used (Cohen's d=1.56; p<0.001).

Conclusion: The results suggest that NAS cigarette packaging conveys that its cigarettes are "safer" and that such perceptions are lower with standardized packaging, both with and without warning images.

Introduction

      Although the Family Smoking Prevention and Tobacco Control Act of 2009 ("the Act") essentially banned the marketing of cigarettes as "safe" or "safer" in the United States,[1] more than 2.5 million U.S. consumers believe they are smoking a brand of cigarettes that might be "less harmful".[2] This misconception of reduced harm is problematic from a public health perspective, because health-concerned smokers often switch to cigarettes they believe to be safer and delay or abandon quitting.[3] Moreover, there is no scientific evidence to support the belief that any one brand or sub-brand cigarette is safer.[4] To prevent the marketing of cigarettes as less harmful, the Act instituted a permitting process requiring that brands provide evidence to the United States Food and Drug Administration (FDA) that they in fact reduce the health risks of smoking in order to be marketed as a "Modified Risk Tobacco Product." To date, no cigarette brand has provided such documentation.[1]

      In the United States, the brand "Natural American Spirit" (NAS) is the most commonly perceived as harm-reducing, with as many as 67% of its current consumers reporting that the brand might be "less harmful".[2] Several studies have discussed how attributes included in NAS packaging and advertising may be partially responsible for perceptions that these cigarettes are less harmful. For instance, a recent study by Pearson et al. identified that claims such as "100% Additive-Free" and "Made with Organic Tobacco" can lead some consumers to erroneously infer that the manufacturer has taken efforts to assure that the product is safer.[5] In addition to text, Moran et al.'s study of NAS advertising imagery suggests that consumers might associate some features with reduced harmfulness, including the use of pastel "earth" colors, leaves, farmers and Native Americans characters.[6] Similar claims were made

in Epperson et al.'s study of the social responsibility frames, such as "100% zero-waste-to-landfill" and "Respect the Earth," which appear on the flip-side of NAS cigarette packages.[7] Although NAS is associated with these positive connotations, toxicological reports suggest that NAS cigarettes are in fact not less harmful, resulting in higher machine-yields of known human carcinogens and nicotine than many other leading brands.[8-10]

Some efforts to correct perceptions associated with "additive-free" and "organic" tobacco products have been taken throughout the world. In the United States, a Federal Trade Commission lawsuit in 2000 required that NAS packaging and advertising display the disclaimer "No additives in our tobacco does NOT mean a safer cigarette".[11] An additional settlement agreement with States' Attorney General in 2010 required NAS advertising to also display the message "Organic does NOT mean a safer cigarette".[12] Nonetheless, focus groups conducted by Byron et al. found that many smokers do not notice these warnings and do not find them effective.[13] In support of these findings, a national survey, fielded during a time when these disclaimers were on packaging and advertising, reported that more than two-thirds of NAS smokers believed their cigarettes were less harmful.[2]

Standardized packaging, a policy measure now used in Australia, Canada and several European countries, but not the United States,[14] might aid in preventing erroneous inferences about the safety of cigarettes drawn from their packaging.[15-19] Countries that have adopted standardized packaging have removed all tobacco branding and replaced this packaging with a standard color and applied a photograph and warning of the harms of smoking to the packaging surface. These alterations are

thought to remove cues prompting consumers to contemplate brand-related ideas and instead display a universal representation of the harms of smoking.

As a component of our ongoing trial assessing the impact of Australia's model of cigarette packaging on American smokers' perceptions of tobacco and use behaviors, we sought to assess how standardized packaging might affect perceptions of harm conveyed through NAS cigarette packaging.[20] For our trial, we obtained license from the Commonwealth of Australia to use features of their cigarette packaging design in a series of studies culminating in a randomized field trial of American smokers.[29] We developed two packaging styles for the purposes of this field trial and related pre-market studies. The first packaging style was a mock-up of what "plain" cigarette packaging might look like if it were implemented in the United States (Figure 3.1). This packaging style combined elements of the current U.S. packaging (a U.S. cigarette brand name and the Surgeon General's Warnings) and Australian packaging (a single color called "Pantone 448C," which was selected for packaging in Australia after a series of pre-marketing studies).[21] This pack removed all branding images, standardized fonts and colors and applied no additional enhancement to health warnings beyond the Surgeon General's Warning, which is displayed on the side of the box. The second "Australian-like" condition, however, further enhanced the plain packaging by applying a large and graphic warning image and label to 75% of the pack surface. The packaging was designed to simulate what packaging might look like if the United States adopted Australia's model of cigarette packaging.[22] The image we included on the Australian-like packaging was selected from 8 that we received a license to use from the Australia government. We selected

the image that smokers rated as the most effective at communicating the health risks of smoking.[23]

We hypothesized that smokers would perceive that the NAS packaging conveyed that its cigarettes were "safer" compared to Marlboro Red and Newport Menthol—the two most popular cigarette brands of cigarettes in the United States (Hypothesis 1).[24] We also hypothesized that both the plain and Australian-like packaging would reduce the perception that NAS cigarettes' packaging conveys its cigarettes are "safer" (Hypothesis 2). Finally, because standardization inherently increases the similarity in design features on cigarette packaging, we hypothesized that brands packaged in the plain and Australian-like packaging would be perceived more similarly than the same brands packaged with current U.S. packaging (Hypothesis 3).

Methods

Design

We used a three (brand type) x three (package style) between-subjects experiment to have adult smokers rate a randomly assigned cigarette pack on a survey (N=909).

Sample Recruitment

Participants were invited via Amazon Mechanical Turk, "MTurk," (www.mturk.com) to participate in a brief survey implemented on the Qualtrics platform (www.qualtrics.com) and were compensated $0.40 if they successfully completed the survey. Links to the survey were posted on MTurk between March 3rd and September 6th, 2016. All respondents were screened to determine their eligibility. Respondents in our study were required to be 21 and 50 years old, to have smoked

in the last week (1-7 days vs. 0 days), to smoke a brand of cigarettes being studied (NAS, Marlboro or Newport), and to pass an attention check. To check attention, respondents were asked to evaluate - on a five-point scale anchored at "not at all the case" and "definitely the case" - the reasons behind their initial decision to start smoking. In this series of questions, one of the five questions was: "To check your attention, select 'not at all the case' here," to which we required that all respondents select 'not at all the case' to be eligible for the study.

Ethical approval

The University of California: San Diego's Institutional Review Board approved of the study design and analysis.

Procedure

After determining eligibility, respondents were randomly assigned to view and rate images of one of nine cigarette packages (Figure 3.1). The NAS brand was used as the study group. We used the two most popular cigarette brands of cigarettes in the United States[24], Marlboro Red and Newport Menthol as controls. The three design conditions were:

Current U.S. pack: a pack that could be purchased in the United States today, with the Surgeon General's Warning displayed on the side of the box.

Plain pack: a plain a drab dark brown pack with all brand images removed, the brand name in a standard Arial font and the Surgeon General's Warning displayed on the side of the box.

Australian-like pack: a plain a drab dark brown pack with the brand name in a standard Arial font and a health warning and a large photographic

image displayed prominently on 75% of the pack surface. The Surgeon

General's Warning was displayed on the side of the box.

Measures

After viewing one of the nine images, respondents were asked to rate their

perception of the design of the package. We focus on three items that asked

respondents about the perception of whether the cigarette packaging they viewed

was designed to convey that the cigarettes were harm reducing. "To what extent do

you agree that this pack makes the cigarettes seem…": "...healthier than other

cigarettes;" "...lower in nicotine or tar than other cigarettes;" "...safer to smoke than

other cigarettes?" Responses to all items were provided on a digital-analog scale that

range from "1 = Completely Disagree" to "6 = Completely Agree." These three items

formed what we refer to as the "Safer Cigarette" scale, achieved high psychometric

reliability (Cronbach's α = 0.92) and were summed and rescaled to range from 0 to 10

for ease of interpretation.

Demographics and Smoking History

Respondents recorded their race ("White," "Black," "Other"), age (Years),

education level ("< High School," "Some College," "College Grad"), sex ("Male,"

"Female"), the number of days they smoked in the week before taking the survey (1-7

days) and the brand of cigarettes they smoked. We constructed a dummy variable

that indicated whether respondents evaluated their own brand or another brand

(viewed own brand vs. another brand).

Statistical Analysis

Analysis of variance and χ^2 tests were used to check that random assignment

yielded equivalent groups with respect to smoking history and demographic

characteristics. Analysis of variance was also used to test whether there were differences in respondents' perceptions of the standard U.S. packages across brands and whether the effects of plain packaging and Australian-like packaging varied significantly by brand. Means, standard deviations (SDs) and Holm-adjusted pairwise t-tests were used to describe the pairwise differences between brands on the measures that were significant in analysis of variance. Cohen's *d*'s and Student's *t*-tests were computed to describe the magnitude and significance of the effect of plain packaging and Australian-like warnings relative to the current package for each brand of cigarettes. We used Intraclass Correlation Coefficients (ICCs) to compare the proportion of the total variation in ratings on the safer cigarettes scale that occurred between brands across each of the pack conditions. We calculated 95% confidence intervals for ICCs via bootstrap; by fixing the brand and pack style that each respondent was assigned to and by drawing 1000 times from the distribution of responses rating each brand and style on the safer cigarette scale. All analyses were performed using R version 3.2.2, all tests were two-tailed and significance was assessed at α = 0.05.

Results

In table 3.1 we display results suggesting that randomized respondents across packaging groups were balanced with respect to race (P=0.96), age (P=0.84), education level (P=0.72), sex (P=0.58), the number of days they smoke per week (P=0.30), and whether they rated their own brand vs. another brand (P=0.91). The randomization of respondents across brands was also balanced with respect to race (P=0.39), age (P=0.90), education level (P=0.72), sex (P=0.097), the number of days they smoke per week (P=0.30), and whether they rated their own brand vs. another

brand (P=0.20). A total of N=296 respondents were randomized to rate a pack of cigarettes that could be purchased in the United States today, N=305 were randomized to rate a plain pack and N=308 were randomized to rate an Australian-like pack. Across these groups, a total of N=280 respondents rated NAS packaging, N=352 rated Marlboro Red, and N=277 rated Newport Menthol.

Figure 3.2 shows that the ratings of the packages of the three brands differed significantly on the safer cigarette scale in the current U.S. packaging condition ($F_{(2,293)}$ = 22.51; P<0.001). Pairwise comparisons suggested that smokers' ratings of the standard NAS pack (mean=4.6; SD=2.9) were 1.9 times (4.6/2.4; P<0.001) higher than smokers' ratings of a Marlboro Red pack (mean=2.4; SD=2.3) and 1.7 times (4.6/2.7; P<0.001) higher than smokers' ratings of a Newport Menthol pack (mean=2.7; SD=2.4) on the safer cigarette scale. Smokers' ratings of the Marlboro Red pack did not statistically differ from smokers' ratings of the Newport Menthol pack (P=0.44) on the safer cigarette scale.

Figure 3.3 shows that the effect of plain packaging on cigarette safety ratings differed by brand ($F_{(2,596)}$ = 7.4; P<0.001). In pairwise comparisons across brands, plain NAS cigarette packs were rated lower than the U.S. NAS cigarette packs on the safer cigarettes scale (Cohen's d=0.66; P<0.001). However, there was a negligible difference between plain and U.S. packs for Marlboro Red (Cohen's d=0.02; P=0.87) and Newport Menthol (Cohen's d=0.15; P=0.29) on the safer cigarette scale.

Figure 3.3 also shows that the Australian-like packaging was associated with lower ratings on the safer cigarette scale compared to standard U.S. packaging, but the magnitude of the difference varied significantly between brands ($F_{(2,598)}$=13.5; P<0.001). In pairwise comparison across brands, the ordering in terms of the

magnitude of the difference between Australian-like and U.S. packaging on the safer

cigarette scale was a follows, NAS (Cohen's d=1.56; p<0.001), Marlboro Red

(Cohen's d=0.88; p<0.001) and Newport Menthol (Cohen's d=0.84; p<0.001).

Finally, in Figure 3.4 we show that variance between cigarette brands on the

safer cigarette scale was lower for plain and Australian-like packs than current U.S.

packs. Specifically, in the standard U.S. pack condition, 13% (95% CI: 7-22) of the

total variation in ratings on the safer cigarette scale occurred between brands.

However, in the plain packaging condition, only 1% (95% CI: 0-5) of the total variation

in cigarette safety ratings occurred between brands. Moreover, the Australian-like

packaging essentially eliminated between-brand variance on the safer cigarette scale,

with 0% (95% CI: 0-3) of the total variation in ratings on the safer cigarette scale

occurring between brands.

Discussion

Using a large web-based experiment, we demonstrated that both the plain and

Australian-like cigarette packaging could reduce the perception that NAS cigarettes

are safer. Either packaging style also appeared to force brands to be more similar

with regard to their perceived safety, however the Australian-like packaging had a

much larger effect on ratings on the perceived safety scale for all brands. As such,

these findings suggest that the forms of packaging assessed herein may aid in

promoting adherence to the Acts' requirement that no tobacco manufacturer uses

marketing attributes that either implicitly or explicitly convey that their brand is less

harmful, unless they have provided evidence for this claim.

As hypothesized, we found that smokers believe NAS packaged cigarettes are

safer than other brands on the market. This finding further reinforces the FDA's letters

sent to the makers of NAS warning them that consumers interpret marketing features on their products as conveying that the brand is a "Modified Risk Tobacco Product," rendering their product adulterated under the terms of the Act.[25] While we did not assess which design features specifically are conveying these perceptions in our experiment, Pearson's et al.'s study found that terms such as "Natural" and "100% Additive-free," as well other design features on NAS packaging, can convey these perceptions of reduced harm.[5]

These findings also support the hypothesis that both plain and Australian-like packaging could reduce the perceptions that NAS cigarettes packaging conveys their cigarettes are "safer." These results advance the findings of Pearson's et al.'s study, which showed that removing the term "additive-free" did not substantially change the perceived harm of NAS, by documenting two efficacious regulatory solutions that would substantially alter these perceptions. The effectiveness of the plain and especially the Australian-like packaging is consistent with previous studies that have also shown that standardizing cigarette packaging can affect harm perceptions conveyed about brands.[18,19,26-29] We should also note that only the Australian-like warning was associated with lower ratings of the perceived safety of Marlboro Red and Newport Menthol cigarettes, which is in line with other studies that have also found that incorporating pictures on packaging increases the attention to, and the salience of warning, messages.[30]

The plain and Australian-like packaging styles also increased the similarity in harm perceptions among brands. This constraint on brands is a compelling facet of these packaging styles given that the Act requires that no one brand be thought of as less harmful without first completing a permitting process. As numerous brands are

still thought of as less harmful,[2] these or similar packaging styles may represent an option for addressing the issue. Future studies could address whether plain, Australian-like or comparable packaging strategies also increase the similarity of perceptions among other brands that are thought of as less harmful (e.g., former light cigarette brands).

A few limitations of our study should be noted. First, the study was based on a convenience sample and therefore is limited in its ability to generalize to the U.S. population of smokers. However, the primary purpose of the study was to make comparisons across experimental conditions. Insofar as randomization controlled both measured and unmeasured confounding, our study will be unbiased in accomplishing this aim. Moreover, the consistency of our results with previous studies—both on the effects of packaging and the ratings of NAS relative to the packaging of other U.S. cigarette brands—increases our confidence in the generalizability of these results. Second, we did not address the specific attributes that are conveying that NAS is less harmful. As we discussed in the introduction, previous studies have suggested that there could be multiple attributes that are conveying the brand is less harmful.

While taking into account these important limitations, our results clearly suggest that standardized packaging (either with or without warning images) could reduce the possibility that consumers draw erroneous inference about the relative safety of NAS cigarettes and could reduce the heterogeneity in this perception among U.S. brands. Future studies should address whether these effects extend to other brands that are thoughts of as less harmful such as former light and mild cigarettes.

Acknowledgements

This chapter is currently being prepared for submission for publication of the

material. Eric Leas was the primary investigator and author of this material.

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Figure 3.1 Illustration of the nine experimental conditions to which survey could have been assigned
Note: Permissions to print packaging in Australian likeness are provided under license from the Commonwealth of Australia ©.

Table 3.1 Demographic characteristics of survey respondents by packaging condition and by brand, United States, 2016

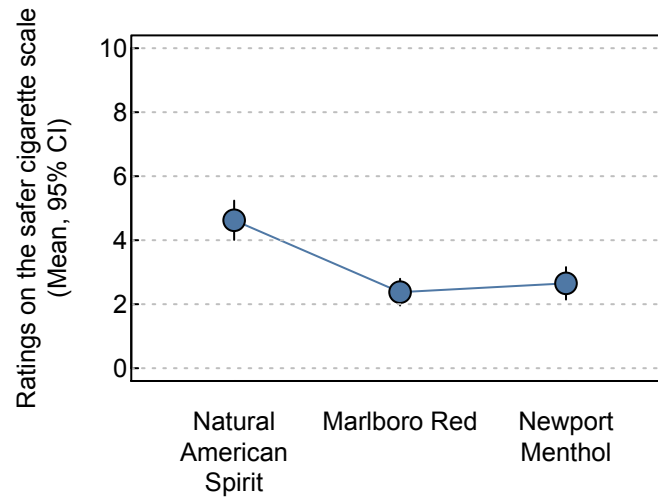| Variable	Level	Total	Stimulus Pack				Stimulus Brand			
		Current (N = 909)	Current (N = 296)	Standardized (N = 305)	Australian-like (N = 308)		Natural American Spirit (N =280)	Marlboro Red (N = 352)	Newport Menthol (N = 277)	
		%	%	%	%	Pr(F) or Pr(χ^2)	%	%	%	Pr(F) or Pr(χ^2)
Race	White	71	71	72	70	0.946	75	68	71	0.385
	Black	11	10	11	12		10	11	12	
	Other	18	19	17	18		15	21	17	
Age in Years	Mean (SD)	100	31.8 (7.1)	31.7 (6.9)	31.5 (7.1)	0.840	31.6 (7.0)	31.8 (7.0)	31.6 (7.1)	0.899
Education level	< High school	12	12	12	12	0.723	12	13	11	0.724
	Some College	50	51	47	52		49	51	49	
	College Grad	38	36	41	37		39	36	40	
Sex	Male	62	65	60	63	0.579	63	59	67	0.097
	Female	37	35	40	37		37	41	33	
Days Smoked each week	Mean (SD)	100	5.8 (1.9)	6.0 (1.7)	5.9 (1.8)	0.303	6.0 (1.7)	5.8 (1.9)	6.0 (1.8)	0.301
Brand Viewed is Brand Smoked	Yes	61	60	61	61	0.905	62	57	64	0.199
	No	39	40	39	39		38	43	36	

Figure 3.2 Ratings of the Natural American Spirit, Marlboro Red and Newport menthol cigarette packaging on the safer cigarette scale among respondents who rated the current U.S. packaging, United States, 2016
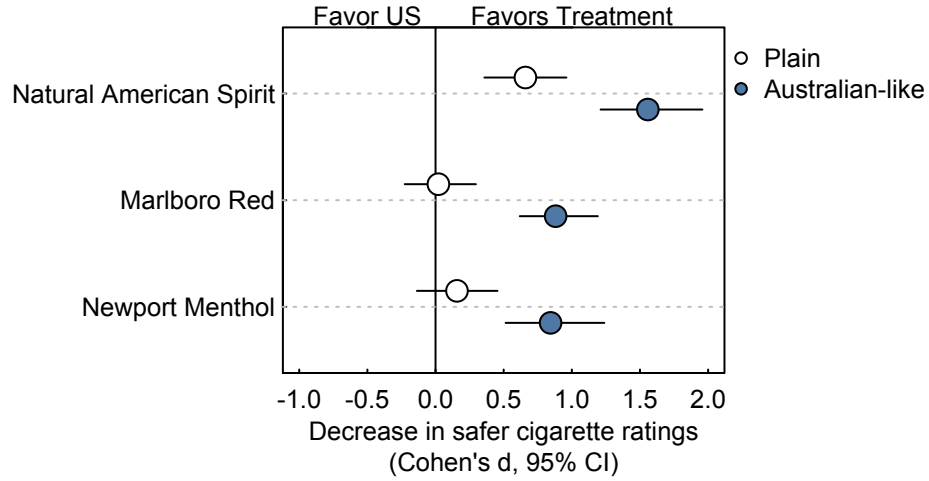
Figure 3.3 Difference in survey respondents' ratings on the safer cigarette scale across experimental conditions by brand of cigarettes, United States, 2016
Note: In our experiment the plain and Australian-like packs were associated with lower ratings than U.S. packs on the safer cigarette scale for NAS, while only the Australian-like packs were associated with lower ratings on the safer cigarette scale for Marlboro Red and Newport Menthol
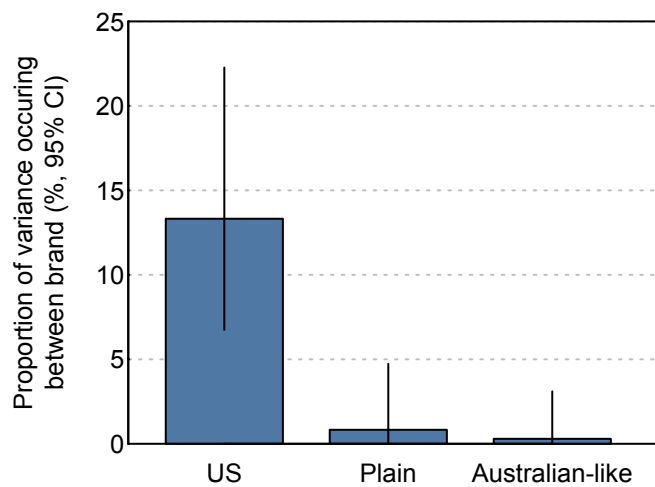
Figure 3.4 The proportion of variance in survey respondents ratings on the safer cigarette that is occurring between brands, stratified by packaging condition, United States, 2016
Note: Brands were rated more similarly on the safer cigarette scale in the plain and Australian-like pack condition than the U.S. pack condition

Chapter 4: Standardized cigarette packaging may decrease the appeal of U.S.

cigarette brands and increase smokers' intentions to quit

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Objective. In the presence of marketing restrictions, cigarette packaging has become the primary vehicle that cigarette makers use to convey perceptions about their brand. We assessed how removing branding from cigarette packaging affects perceptions conveyed about U.S. cigarette brands and smokers' intentions to quit smoking.

Methods. Smokers (N=909) were recruited to a between-subjects survey experiment (three-brands x three-packaging/labeling styles) through Amazon Mechanical Turk. We assessed the effect that that plain packaging (all branding replaced with a drab dark brown color) and Australian-like packaging (all branding replaced with a drab dark brown color and a graphic image and text on 75% of the pack surface) had on the appeal of the packaging of three brands of cigarettes (Natural American Spirit (NAS), Marlboro Red and Newport Menthol), as well as increasing smokers' intentions to quit. Smokers rated the appeal of the stimulus they were shown on six scales and their intentions to quit smoking before and after viewing the cigarette pack.

Results. Among the three current U.S. packs, Marlboro Red was rated higher on the "masculinity" scale, NAS was rated higher on the "sophisticated" and "friendly" scale and Newport Menthol was rated on the lower pack attractiveness and "sophisticated" scale. Plain packaging was associated with lower pack ratings for most measures and did not increase intentions to quit; however, Australian-like packaging was associated with substantially lower pack-ratings on every scale and increased intentions to quit. Both the Plain and Australian-like styles increased the similarity in perceptions conveyed about the three brands of cigarettes.

Conclusion. Removing tobacco branding could alter perceptions of U.S. cigarette brands and increase the similarity in these perceptions about cigarette brands. Picture warnings may be needed to increase intentions to quit smoking.

Introduction

In the presence of marketing restrictions on mediums such as television and radio, cigarette packaging and the storefront have become the proverbial "last frontier" available to tobacco companies to develop marketing strategies to attract consumers.[1-6] In terms of mere exposure, cigarette packaging is perhaps the most effective cigarette-marketing medium, as a pack-a-day smoker could potentially view their cigarette pack 7300 times a year (20 cigarettes in a pack x 365 days in a year). Moreover, unlike with most consumer products whose packing is discarded, smokers carry around their packs like a "badge" that makes a statement about themselves and exposes other consumers to the product via social contact.[6] Acknowledging the importance of this medium, tobacco companies have invested heavily in packaging, utilizing design features that communicate information about their cigarettes including taste, cigarette strength and tobacco quality and to communicate their brand's "personality".[2,4,6,7]

Many governments throughout the world also acknowledge the importance of packaging as a tool for communicating health information to consumers and limiting their exposure to brand-related appeals. The United States became the first country to require that cigarette packs display health disclaimers, when it applied the Surgeon General's Warning in 1965.[8] Although this warning has received some text editing over the years, the design has remained largely unchanged. During this time, more than 100 countries have enhanced the warning labels on cigarette packaging by applying large text or pictures that warn of the health consequences of smoking.[9] These warnings are thought to cue smokers to think about the health consequences of smoking each time they reach for their cigarettes.[10-18] In addition to enhanced

health warnings, some countries have also standardized cigarette packaging by removing tobacco manufacturers' visual cues that prompt consumers to contemplate brand-related ideas and instead display a single color and a standard text that indicates the brand.[12,13,19-25]

Although the United States has not standardized cigarette packs sold in the , in 2009, the Family Smoking Prevention and Tobacco Control Act ("the Act") included a element that required that new warning labels be placed on U.S. cigarette packs.[26] A separate element also required that these warnings be accompanied by photographs developed by the United States Food and Drug Administration (FDA).[27] However, a lawsuit brought by Reynolds American in 2012 struck down this motion, with the judge citing that proposed graphic warnings were unconstitutional because they went beyond the display of factual information.[28]

In this manuscript, we assessed how cigarette packaging design features used in Australia might affect perceptions conveyed about U.S. brands of cigarettes. We obtained a license from the Commonwealth of Australia to use elements of their packaging design in a series of studies culminating in a randomized field trial of U.S. smokers.[29] We developed two packaging styles for the purposes of this field trial and related pre-market studies. The first was a mock-up of what "Plain" cigarette packaging might look like if it were implemented in the United States (Figure 4.1). This pack combined elements of both current U.S. packaging (a U.S. cigarette brand name and the Surgeon General's Warnings) and Australian packaging (a single dark drab-brown color called "Pantone 448C," which was selected for packaging in Australia after a series of pre-marketing studies).[7] This pack applied no additional enhancement to health warnings beyond the Surgeon General's Warning, which is

displayed on the side of the box. The second "Australian-like" condition further

enhanced the plain packaging by applying a large and graphic warning image and

label to 75% of the packing surface. The packaging was designed to simulate what

packaging might look like if the United States were to adopt Australia's model of

cigarette packaging. The image we included on the Australian-packaging was

selected from eight currently in use in Australian and was selected by U.S. smokers

as the most effective at communicating the health risks of smoking in a recent

survey.[29]

Using these two packaging designs and three current U.S. brands, we

examine the effect that plain and Australian-like packaging might have on altering the

appeal of U.S. cigarette brands. Following previous pre-marketing research in

Australia, we expected that both plain and Australian-like warnings would reduce the

perceived attractiveness of the packaging (Hypothesis 1), create less desirable

expectations of taste (Hypothesis 2) and strength (Hypothesis 3) and alter brand

personality (Hypothesis 4). Also, because both plain and Australian-like packaging

inherently increased the similarity of the design facets on cigarette packaging, we

also hypothesized that these packaging conditions would increase the similarity in

perceptions conveyed about the brands (Hypothesis 5). Finally, because we used an

image that was designed to cue cognitions on the health consequence of smoking in

the Australian-like condition, we hypothesized that this condition would motivate

smokers to consider quitting while the other two conditions would not (Hypothesis 6).

Methods

Design

We used a three (brand-type) by three (pack-style) between-subjects experiment to have adult smokers rate a randomly assigned cigarette pack on a survey. The target sample size for each of the nine conditions was N ~ 100 and the final sample size for the experiment was N = 909.

Sample Recruitment

Participants were invited via Amazon Mechanical Turk, "MTurk," (www.mturk.com) to participate in the brief survey that was implemented on Qualtrics (www.Qualtrics.com) and were compensated $0.40 USD if they successfully completed the survey. Links to the survey were posted on MTurk between March 3rd and September 6th, 2016. All respondents were screened to determine their eligibility including age (between 21 and 50), whether they had smoked in the last week (determined via self-report), the brand of cigarettes they smoked, and whether they were paying attention to the questionnaire. To check attention, respondents were asked to evaluate - on a five-point scale anchored at "not at all the case" and "definitely the case" - the reasons behind their initial decision to start smoking. In this series of questions, one of the five options was: "To check your attention, select 'not at all the case' here," to which we required that all respondents select 'not at all the case' to be eligible for the study.

Ethical approval

The University of California: San Diego's Institutional Review Board approved of the study design and analysis.

Procedure

After determining eligibility, respondents were randomly assigned to view and rate images of a cigarette pack (Figure 4.1). The packs presented were of three major

U.S. brands of cigarettes: Natural American Spirit (NAS), Marlboro Red or Newport Menthol and the three packaging styles included:

Current U.S. pack: a pack that could purchase in the United States today.

Plain pack: a plain pack with the brand name in a standard Arial font and the Surgeon General's Warning displayed on the side of the box.

Australian-like pack: a plain pack with the brand name in a standard Arial font and a health warning and a large photographic image displayed prominently on the box.

Measures

Pack Ratings

Ratings of cigarette packaging were obtained through a questionnaire that was completed in three parts, all with digital-analog scales that ranged from "1 = Completely Disagree" to "6 = Completely Agree." First, respondents rated perceptions they had about the characteristics of the pack on four items. These items stemmed from a single heading: "to what extent do you agree that this pack of cigarettes is made…" and included: "...to look stylish," "...to look fashionable," "...to have an appealing design" and "…to be attractive to look at." After completing this section respondents rated their sensory expectations of the cigarettes conveyed through the packaging. These expectations were recorded on six items that stemmed from a single heading: "To what extent do you agree that this pack makes the cigarettes seem…" and included "...higher quality than other cigarettes," "...more flavorful than other cigarettes," "...more satisfying than other cigarettes," "...milder or smoother than other cigarettes," "...less harsh than other cigarettes" and "...more soothing or relaxing

than other cigarettes." Finally, respondents rated their perceptions of the brand personality of the pack using a series of seven survey items. These items stemmed from a single heading "To what extent do you agree that this pack makes the person smoking the cigarettes look..." and included "...masculine," "...rugged," "...sociable or outgoing," "...young," "...friendly," "sophisticated," "classy."

Intention to quit

Change in intention to quit was measured using a change score. Before and after viewing the pack, respondents rated their intention to quit on a single item: "Are you considering quitting smoking in the next three months?" Response were recorded on a digital analog scale ranging from "1=Definitely Not" to "7=Definitely Yes." A single change score representing change in intention to quit was calculated by taking the difference in respondent's responses on this item after vs. before viewing the pack.

Demographics and Smoking History

Respondents recorded their race ("White," "Black," "Other"), Age (Years), Education level ("< High School," "Some College," "College Grad"), sex ("Male," "Female"), the number of days they smoked in the week before their survey (1-7 days) and the brand of cigarettes they smoked (viewed own brand vs. another brand).

Statistical Analysis

Exploratory factor analysis was used to examine whether the pack rating items measured the same latent constructs (Table 4.1). A parallel test suggested that six factors best represented the 17 pack ratings items (Supplementary Figure 4.1).[30] An exploratory factor model specifying with a six-factor solution was fit to the data and factor loadings were inspected to interpret the resulting factors. As we expected

the factors to be at least partially correlated, we specified an oblique factor rotation ("promax") when interpreting the factor model. The Tucker Lewis Index of 0.97 produced by the model was above the conventional threshold of 0.95, suggesting evidence of a reliable factor specification.[31] Items that loaded ≥0.40 on a distinct factor were averaged to create sub-scales and rescaled to range between 0 and 10. The six scales consisted of four items assessing "attractiveness": "...to look stylish," "...to look fashionable," "...to have an appealing design" and "to be attractive to look at" (Cronbach's α = 0.94); three items assessing expectations of "taste": "...higher quality than other cigarettes," "...more flavorful than other cigarettes" and "...more satisfying than other cigarettes" (Cronbach's α = 0.92); three items assessing expectations of "strength": "...milder or smoother than other cigarettes," "...less harsh than other cigarettes" and "...more soothing or relaxing than other cigarettes" (Cronbach's α = 0.89); two items assessing "masculine" brand personality: "...masculine" and "...rugged" (Cronbach's α = 0.81); three items assessing "friendly" brand personality: "...sociable or outgoing," "...young" and "...friendly" (Cronbach's α = 0.86); and two items assessing "sophisticated" brand personality: "sophisticated" and "classy" (Cronbach's α = 0.84).

Analysis of variance and χ^2 tests were used to check that random assignment yielded equivalent groups with respect to smoking history and demographic characteristics. Analysis of variance was also used to assess whether there were differences in respondent's ratings of the three U.S. cigarette brands and to test whether the ratings of U.S. cigarette brands differed between the current U.S. packaging, plain packaging and Australian-like packaging. Means, Standard Deviations (SDs), Cohen's d and Student's t tests were used to evaluate pairwise

differences, while adjusting the statistical significance of each comparison using the Holm's method.[32] Intraclass Correlation Coefficients (ICCs) were computed to describe the variance in ratings between brands across study conditions. We calculated 95% CIs for Cohen's ds and ICCs via non-parametric bootstrap, by fixing the brand and pack style that each respondent was assigned to and by drawing 1000 times from the distribution of ratings in each condition. All analyses were performed using R version 3.3.1, all tests were two-tailed and significance was assessed at the α = 0.05 level.

Results

Sample characteristics and group assignment

The respondents in each experimental condition were statistically comparable with respect to the assessed demographic and smoking characteristics (Table 4.1). A total of N=296 respondents were randomized to view a pack of cigarettes that could be purchased in the United States today, an additional N=305 were randomized to view the plain pack and N=308 were randomized to view the Australian-like pack. A total of N=280 respondents rated NAS packs, N=352 rated Marlboro Red packs, and N=277 rated Newport Menthol packs.

Effect of tobacco branding

Ratings of the packs of current U.S. cigarette brands were significantly different on four of the six scales (Figure 4.2). Marlboro Red (mean: 6.5; SD: 2.6) packaging was perceived as more "masculine" than NAS (mean: 5.2; SD: 2.8) and Newport Menthol (mean: 4.4; SD: 2.7), NAS (mean: 5.2; SD: 2.8) packaging was perceived as more "sophisticated" than Marlboro Red (mean: 4.7; SD: 2.7) and Newport Menthol (mean: 3.8; SD: 2.7) and as more "friendly" (mean: 5.8; SD: 2.6)

than Marlboro Red (mean: 4.4; SD: 2.2) and Newport Menthol (mean: 4.7; SD: 2.7).

Newport Menthol (mean: 5.2; SD: 2.9) packaging was perceived as less attractive

than NAS (mean: 6.9; SD: 2.4) and Marlboro Red (mean: 6.5; SD: 2.5).

Effects of packaging design alterations on branding

The differences between the current U.S., plain and Australian-like packs with

regard to cigarette taste (F = 1.07; P = 0.37) and strength (F = 1.01; P = 0.40)

expectations were comparable in size for every brand (Figure 4.3). When compared

to the U.S. packs, the plain packs were associated with lower expectations of tobacco

quality (Cohen's d (average) = 0.47; P <0.001) and the Australian-like packs were

associated with considerably lower expectations of tobacco quality (Cohen's d

(average) = 2.04; P <0.001). Similarly, across all brands, the plain packs were

associated with a greater expectation that the cigarettes would be "harsh" tasting

(Cohen's d (average) = 0.24; P<0.001) and the Australian-like packs were

associated with much greater expectation that the cigarettes would be "harsh" tasting

(Cohen's d (average) = 1.74; P<0.001).

The differences between the current U.S., plain and Australian-like packs

varied significantly by brand (Figure 4.3) with respect to pack attractiveness (F = 6.24;

P<0.001), and the "friendly" (F = 3.80; P=0.005), "masculine" (F = 6.61; P<0.001),

and "sophisticated" personality ratings (F = 4.40; P=0.002). Compared to the U.S.

packs, the NAS plain packs were associated with lower perceived pack attractiveness

(Cohen's d = 0.61; P<0.001) and "friendly" personality ratings (Cohen's d = 0.54;

P<0.001), but Marlboro Red and Newport Menthol did not differ substantially

(Cohen's d ≤ 0.25). The plain packs were also associated with higher "sophisticated"

personality ratings for Marlboro Red (Cohen's d = 0.46; P<0.001) and Newport

Menthol packs (Cohen's d = 0.49; P=0.001) and lower "masculine" personality ratings

for the Marlboro Red packs (Cohen's d = 0.43; P=0.001).

Compared to the current U.S. packs, the Australian-like packs were

associated with substantially lower pack ratings for all of the measures assessed and

all brands (Cohen's d ≥ 0.98; P's <0.001; Figure 4.3). Pairwise-comparisons

suggested that the magnitude of the difference between the current U.S. and

Australian-like packs was larger for NAS and Marlboro Red than the Newport Menthol

pack with respect to pack attractiveness and sophisticated personality ratings. The

magnitude of the difference between the current U.S. and Australian-like packs was

also larger for Marlboro Red than NAS and Newport Menthol with respect to

masculine personality ratings.

Effect of Packing Alterations on Intention to Quit

In Figure 4.3 we also show that plain packaging (vs. current U.S. packaging)

had a negligible and non-significant effect on changing intentions to quit (Cohen's d

(average) = -0.16; P = 0.09). However, the Australian-like packaging (vs. current U.S.

packaging) had a small and significant effect on increasing intentions to quit (Cohen's

d (average) = 0.46; P < 0.001). These effects did not appear to vary significantly by

brand (F = 0.98; P = 0.42).

Effect on Increasing Similarity of Branding

In addition to having effects on pack ratings, the plain and Australian-like

packaging increased the similarity pack ratings between brands (Figure 4.4). The

greatest reduction in between-brand variance was on the "masculine" personality

scale, with 10% (95% CI: 5-18) of the total variance in pack ratings occurring between

brands in the U.S. condition and 0%(95% CI:0-4) occurring in the plain condition and

0% (95% CI:0-3) occurring in the Australian-like condition. Similar patterns were observed for the pack attractiveness, sophisticated, and friendly personality characteristics, but as discussed above, the taste and strength ratings did not vary considerably between brands in any condition, with <2% of the variance in rating occurring between brands even in the U.S. condition.

Discussion

Using a large web-based experiment, we identified that when U.S. cigarette packs are stripped of tobacco branding smokers find the packs less attractive, the pack's constituents lower in quality and brands become more similar it terms of the identities they convey about their consumers. These effects were apparent even in a plain packaging condition, but noticeably increased when packaging also contained a picture-warning label. While plain packaging altered some perceptions conveyed about cigarette brands, only the Australian-like warnings were associated with increased motivation to consider quitting smoking in the coming months. These results expand the literature on cigarette pack design in several ways and provide the first simulation of how Australia's model of cigarette packaging might affect perceptions of U.S. cigarette brands and smokers intentions to quit.

As expected, there were noticeable differences in the perceived design characteristics of U.S. brands of cigarettes. For instance, Marlboro Red cigarette packaging was thought to convey a "masculine" brand personality while NAS were perceived as more "friendly" and "sophisticated". These findings are consistent with previous studies that have used a range of methodologies, but typically find that cigarette packaging can convey sensory expectations and brand personalities.[2,4,6,7,11-13,25] The finding that brands can convey personalities about their consumers is of

particular concern for youth and young adult smokers who are frequently motivated to use tobacco brands based on the symbolic meaning they convey[21,33,34] and whose brand preferences are more often influenced by packaging design.[35]

These data also suggest that—consistent with our hypotheses—plain packaging and especially Australian-like packaging could lower the perceived attractiveness of cigarette packs, alter expectations of tobacco quality and strength and change the personality characteristics conveyed about consumers. Moreover, the standardization of design may increase the homogeneity in these perceptions between brands. These findings are consistent with previous research suggesting that progressively greater standardization has a greater effect on the appeal of packaging.[10-15,18-20,22,23,25] We add to this literature primarily by making two contributions. First, we show that even plain packaging (i.e., without warning alterations) can effect perceptions of cigarette brands. Second, we show that applying packaging increases the similarity of perceptions about brands, essentially "standardizing" brand-related perceptions.

These data also suggested that only the Australian-like packaging condition increased intentions to quit smoking. This finding adds to a growing literature that reinforces the relative effectiveness of photographic vs. text-based warnings at achieving this aim.[14-18] This literature—largely based on the Extended Parallel Processing Model—discusses the importance of coupling images that provoke negative affect arousal with messages that provide a solution to the negative affect being felt (e.g., quitting smoking reduces the health risks of smoking).[36,37] The Australian-like warning in our study included design features that addressed each of these components. The pack was designed to provoke a strong negative affect

response (the image of a gangrenous foot) and offer a solution to the negative affect—quit smoking (the Surgeon Generals Warning reading: "Quitting smoking now will greatly reduce serious risks to your health").

Some study limitations should be noted. First, this study was based on a convenience sample. Thus, the results may not generalize to the broader population of U.S. smokers or to smokers of sub-brands other than the three included in this study. However, this was an experimental study rather than a population-based survey and the primary motivation for the study was to randomly assign smokers to groups and to compare these groups. In so far as our tests of the equal groups assumptions also reflect randomization of unmeasured confounding, this aim appeared to be met. Second, respondents may have responded to pack ratings based on their experience with advertising for a specific brand, rather than the properties of the package itself. For instance, print ads for each brand are also available in the United States. However, this difference would be more likely to bias comparisons across brands than across packaging styles. Finally, we examined a narrow set of rating domains and thus may not fully capture the domains imbued in the brands we studied or the effect that plain and Australian-like packaging would have these domains.

While taking into account these limitations, our findings clearly suggest that plain and Australian-like packaging would affect the appeal of cigarette packaging and provide a greater control of the design facets that brands use to market their products. The results also indicated that while plain packaging increased the similarity of brands, only the Australian-like condition increased intentions to quit smoking, suggesting that enhancements to warning labels may be needed to advance this aim.

Acknowledgements

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Figure 4.1 Illustration of the nine experimental conditions to which survey could have been assigned
Note: Permissions to print packaging in Australian likeness are provided under license from the Commonwealth of Australia ©.

Table 4.1 Exploratory factor analysis of the pack rating items among survey respondents, United States, 2016

Characteristic	Pack Attractive-ness	Cigarette Strength	Friendly Personality	Cigarette Taste	Masculine Personality	Sophisti-cated Personality
	Loadings	Loadings	Loadings	Loadings	Loadings	Loadings
The pack design is…						
Stylish	0.93					
Fashionable	0.87					
Appealing	0.94					
Attractive	0.93					
Makes the tobacco seem…						
Higher in quality				0.60		
More flavorful				0.86		
More satisfying				0.79		
Milder		0.77				
Less harsh		0.98				
More soothing		0.74				
Makes person smoking the cigarettes look…						
Masculine					0.85	
Rugged					0.86	
Sociable			0.65			
Young			0.80			
Friendly			0.83			
Classy						0.66
Sophisticated						0.81
SS loadings	3.91	2.65	2.38	2.22	1.61	1.59
Proportion Var	0.23	0.16	0.14	0.13	0.09	0.09
Cumulative Var	0.23	0.39	0.53	0.66	0.75	0.85
Proportion Explained	0.27	0.18	0.17	0.15	0.11	0.11
Cumulative Proportion	0.27	0.46	0.62	0.78	0.89	1.00
Cronbach's α	0.97	0.93	0.92	0.95	0.85	0.91

Tucker Lewis Index of factoring reliability = 0.971

Note1: Results are from a principle-axis factor model specifying promax rotation and a six-factor solution

Note2: Factor loadings ≤ |0.40| are suppressed for interpretability

Table 4.2 Demographic characteristics of survey respondents by packaging and brand experimental conditions, United States, 2016

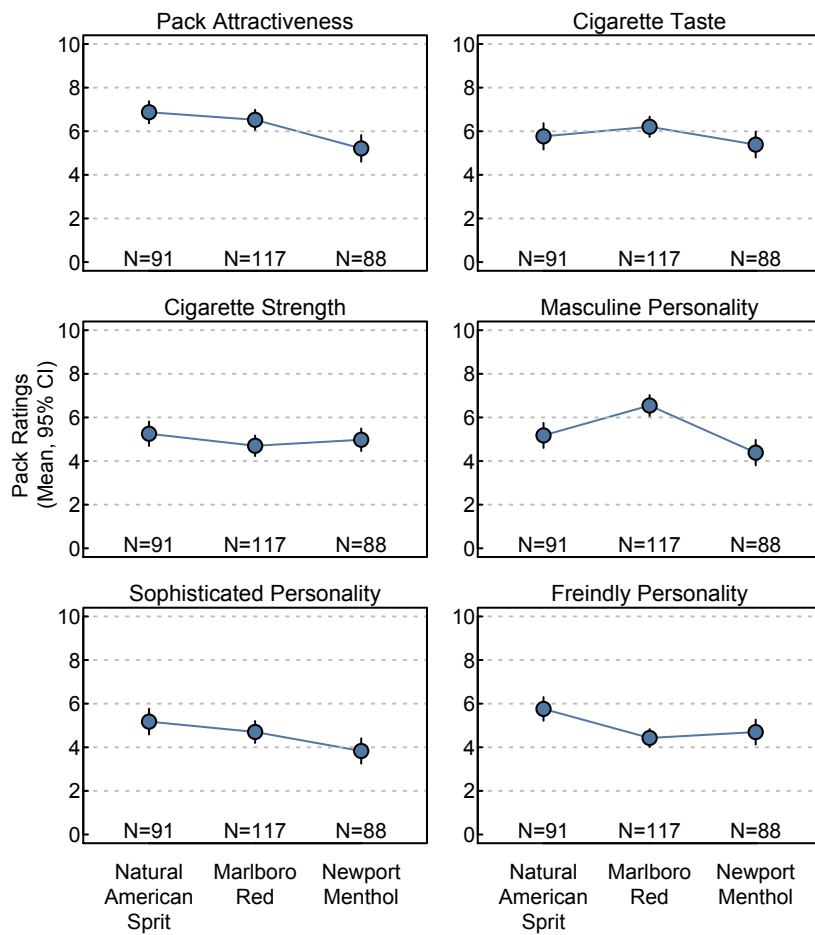| Variable	Level	Total	Stimulus Pack				Stimulus Brand			
			Current	Standardized	Australian-like		Natural American Spirit	Marlboro Red	Newport Menthol	
		(N = 909)	(N = 296)	(N = 305)	(N = 308)		(N =280)	(N = 352)	(N = 277)	
		%	%	%	%	Pr(F) or Pr(χ^2)	%	%	%	Pr(F) or Pr(χ^2)
Race	White	71	71	72	70	0.946	75	68	71	0.385
	Black	11	10	11	12		10	11	12	
	Other	18	19	17	18		15	21	17	
Age in Years	Mean (SD)	100	31.8 (7.1)	31.7 (6.9)	31.5 (7.1)	0.840	31.6 (7.0)	31.8 (7.0)	31.6 (7.1)	0.899
Education level	< High school	12	12	12	12	0.723	12	13	11	0.724
	Some College	50	51	47	52		49	51	49	
	College Grad	38	36	41	37		39	36	40	
Sex	Male	62	65	60	63	0.579	63	59	67	0.097
	Female	37	35	40	37		37	41	33	
Days Smoked each week	Mean (SD)	100	5.8 (1.9)	6.0 (1.7)	5.9 (1.8)	0.303	6.0 (1.7)	5.8 (1.9)	6.0 (1.8)	0.301
Brand Viewed is Brand Smoked	Yes	61	60	61	61	0.905	62	57	64	0.199
	No	39	40	39	39		38	43	36	

Figure 4.2 Ratings of the Natural American Spirit, Marlboro Red and Newport menthol cigarette packaging on the six study scales among respondents who rated the current U.S. packaging, United States, 2016
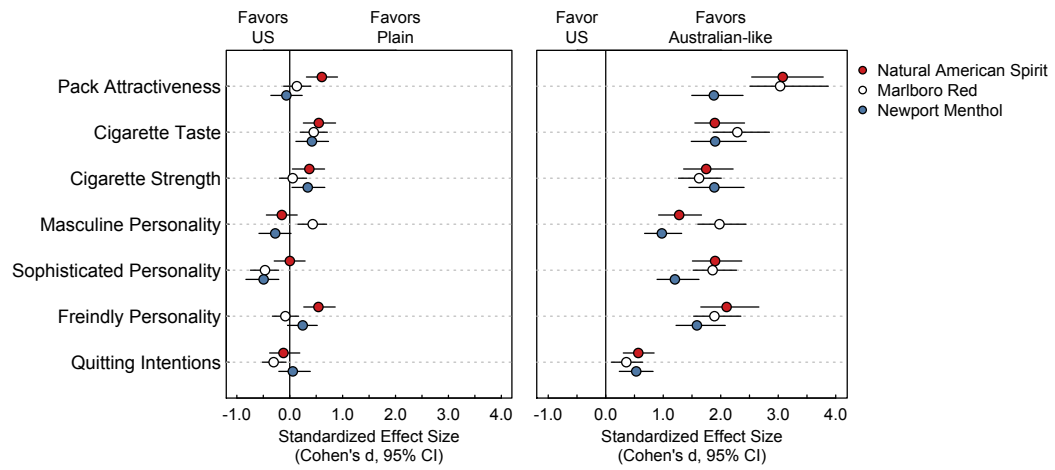
Figure 4.3 Differences in pack ratings and intentions to quit smoking between respondents who rated the plain and U.S. packs (left panel) and between Australian-like and U.S. packs (right panel)
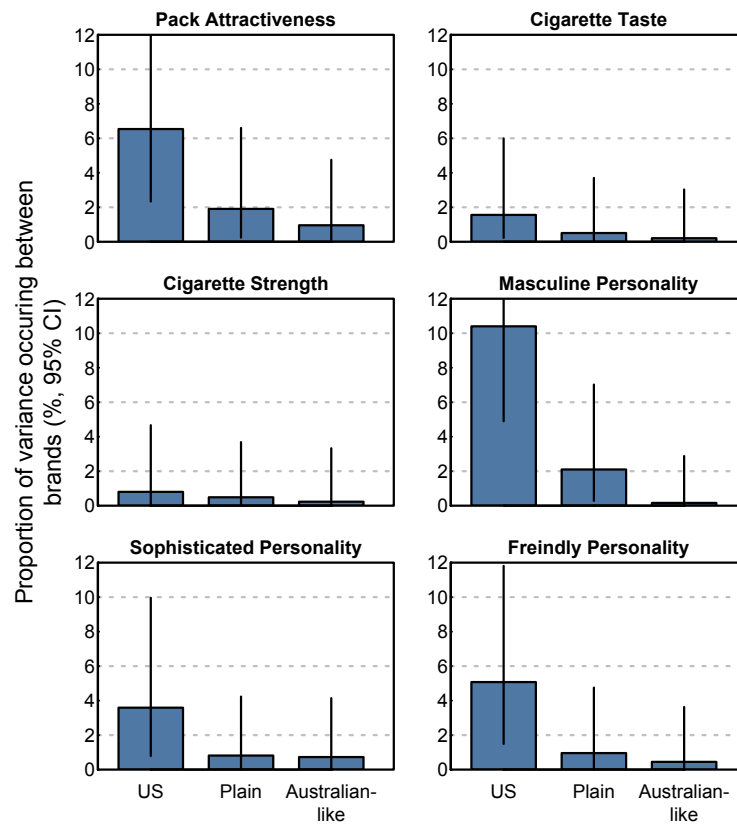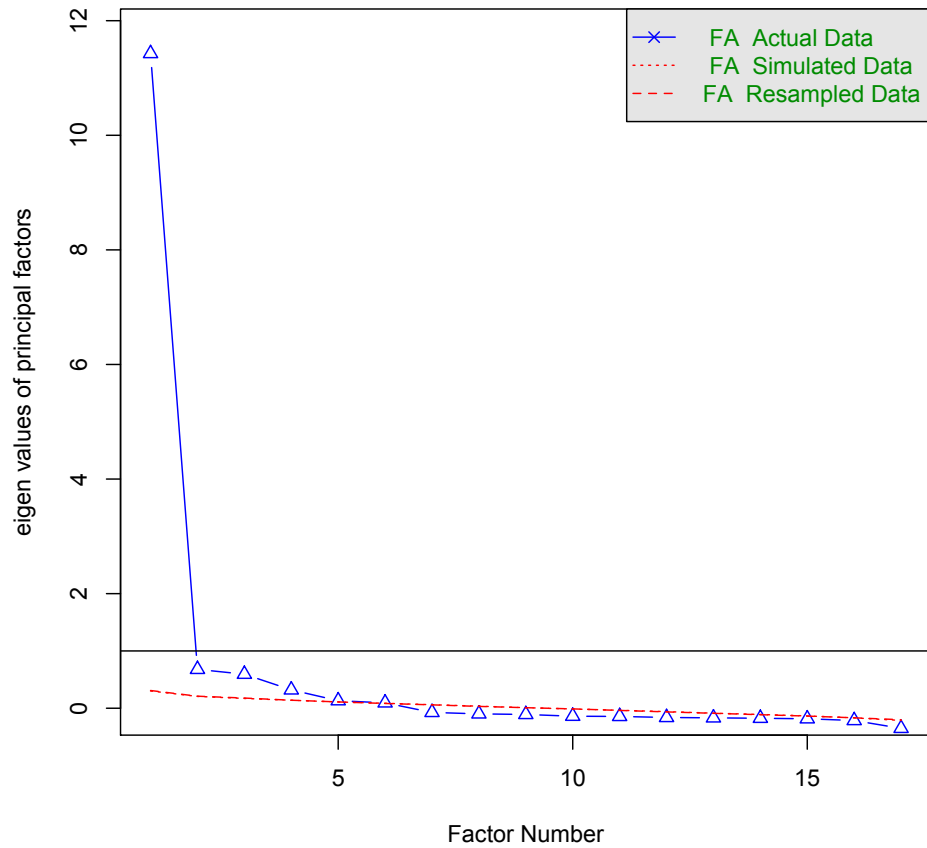
Figure 4.4 The proportion of the variance in survey respondents' ratings that is occurring between brands by packaging condition, United States, 2016
Note: Brands were rated more similarly on each scale in the plain and Australian-like pack condition than the U.S. pack condition

Parallel Analysis Scree Plots

Supplementary Figure 4.1 Results of the parallel test assessing the appropriate number factors among respondents who rated the cigarette packages on the 17 survey items in our experiment, United States, 2016
Note: The comparison of the observed to the simulated data suggested that N=6 was the appropriate factor specification.

Chapter 5: Conclusion

Millions of young adults and health-concerned smokers continue to smoke cigarettes in spite of an essential ban on the marketing of cigarettes to young people and of cigarettes as "safe" or "safer." This body of work identifies specific sub-brands that are disproportionately used by these consumers and highlights one marketing medium—packaging—where intervention could begin to reduce the appeal of smoking.

In Chapter 2, using the point-and-click technology in the PATH study, we documented cigarette brand preference at the sub-brand level for the very first time. The data indicated that there are well over 200 cigarette sub-brands in use in the U.S. marketplace with clear distinctions in brand preference by age and reasons for use. We highlighted 13 sub-brands as being significantly more popular among young adults. The majority of these brands were menthol-flavored and some contained menthol "crush" capsules, suggesting these items may be a point for possible regulation. Future research could explore the appeal of these brands; especially "crush" capsule cigarettes, which we found only one other peer-reviewed publication on.

The results of the survey experiments (Chapters 3 and 4) suggested that certain cigarette brands use their packaging to present themselves as "safer" than others and to make their product appealing to consumers by conveying personality characteristics about their consumers and by conveying expectations of tobacco quality and strength. The studies also identify that removing tobacco branding could alter perceptions of U.S. cigarette brands, increase the similarity in these perceptions about cigarette brands and, if accompanied with enhanced text warnings, increase

smokers' motivation to quit. These packaging styles would place the United States closer to WHO FCTC recommendations and would adhere more closely to U.S. policy under the Family Smoking Prevention and Tobacco Control act which requires that no brand be marketed as safe or safer without first demonstrating that it is in fact safer.