# Evolving IQOS packaging designs change perceptions of product appeal, uniqueness, quality, and safety: A randomized experiment, 2018, USA

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## Abstract

**Background:** Globally, the tobacco industry is promoting heated tobacco products. These products may represent a strategy to promote dual use of tobacco products. One product, IQOS from Philip Morris International, is being proposed in the U.S. for marketing as a less harmful product. The visual design of tobacco products can influence consumers by implying product characteristics. Thus, we sought to test the impact of IQOS packaging designs on cognitive, affective, and behavioral intention responses.

**Methods:** From existing IQOS packages used globally, we developed three IQOS packages that decreasingly linked the product to the Marlboro brand. In September-October 2018, we assigned participants randomly to one package in an online experiment. All participants (n=954) were U.S. adults reporting current smoking and no colorblindness. The experiment used quota sampling to ensure diversity by gender, sexual orientation, race, ethnicity, and education. Measures were informed by the Context of Consumption Framework. To assess differences in ratings, we conducted non-parametric Kruskal-Wallis tests with post-hoc comparisons using Dunn's test.

**Results:** We found significant differences in cognitive indicators including appeal ($H$=6.87, $p$=0.03), uniqueness ($H$=15.68, $p$<0.01), brand equity-quality ($H$=122.35, $p$<0.01), and perceived safety compared to other tobacco products ($H$=14.27, $p$<0.01). Participants rated packages similarly on affective and behavioral intention measures. All were rated low for talking to others about the product and high for interest in trying with a coupon.

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**Conclusion:** Linking or separating IQOS products with a well-established cigarette brand changes how adult smokers respond to the product. Regulators should consider the visual design of packaging.

## Introduction

Internationally, tobacco companies are promoting heated tobacco products as harm-reduction products.[1] These products did not historically (and do not currently[2]) garner high satisfaction from consumers.[3, 4] However, they are important for regulators for three reasons: (1) they represent a potential strategy to promote dual use of products;[1] (2) compared to conventional cigarettes they may have the potential to reduce exposure to toxicants;[5] and, (3) there is interest in trying them among youth.[6] As of January 2018, Philip Morris International's IQOS heated tobacco product is available in 30 countries.[7] In the U.S., the Food & Drug Administration (FDA) approved marketing of IQOS on April 30, 2019.[8]

Like in the U.S., countries around the world are faced with the question of how heated tobacco products should be regulated and marketed.[9] As such, it is important to know how the design of IQOS packaging can convey information to consumers even in the absence of an explicit claim of being a lower risk product. We sought to examine the effect of different versions of IQOS's evolving packaging on cognitive, affective, and behavioral intention responses.

## Methods

### Study Design and Participants

We conducted a randomized experiment using an online survey panel, Qualtrics Panels, with U.S. adults who reported current smoking and not being color blind. Each participant was randomized by Qualtrics to see one of three IQOS packs. Participants were recruited by Qualtrics and received "points" for their participation. To improve data quality, we used attention checks and a minimum time to complete the survey. We fielded the survey from September 14 to October 1, 2018.

We used quota sampling to ensure diversity by race, ethnicity, gender, sexual orientation, and educational attainment. Regarding demographics, the participants (n=954) reported identifying as: male (48.0%), female (48.7%), transgender (1.8%), or another way (1.4%); straight (48.7%), gay or lesbian (23.3%), bisexual (27.8%); Asian (3.5%), American Indian/Alaska Native (4.1%), Black or African American (18.4%), White (71.5%), or as another race (6.5%); and, Hispanic, Latino/a, or Spanish origin (18.4%). Regarding educational attainment, 71.3% reported less than four years of college. Regarding nicotine dependence, 24.1% of participants reported their first cigarette of the day is typically within 5 minutes of waking and 25.6% after 60 minutes of waking.

### Stimuli Development

Using Google Image Search and published literature, we identified IQOS packaging used globally, ranging from Marlboro branded,[10] to HEETS from Marlboro,[11] to HEETS

branded with no mention of Marlboro.[12] We shared this information with a professional graphic designer with training in product packaging design to modify existing IQOS packaging into three images reflecting real-world IQOS packaging (Figure 1). We removed health warnings, product details, and used only English words. The purpose was to create packages paralleling evolving IQOS designs,[11] not to isolate the contribution of any particular design feature. Consumers interpret packaging as a gestalt of all of the design elements.[13]

### Measures

Our measures draw on a theoretical framework developed in the field of product visual design,[13] which we have previously explored qualitatively with adults who report smoking.[14] Briefly, the Context of Consumption Framework suggests that visual changes to product design can have an effect on cognition, affect, and behavior related to the product. Thus, we adapted measures for each of these categories. Cognitive responses included aesthetic responses (e.g., how unique or different the product is from others) and semantic responses (e.g., information conveyed by the design like harmfulness). For cognitive-aesthetic responses, we assessed product appeal (1-item), product noticeability (1-item), and product uniqueness (1-item). For cognitive-semantic responses, we assessed a brand equity perceived quality subscale (4-item scale, alpha=0.90),[15] perceived product safety compared to other tobacco products (4-item scale, alpha=0.92),[16] and product safety compared to cigarettes (1-item).[17] For affective responses, we assessed how the product made the respondent feel using positive (9-items, alpha=0.97) and negative (2-items, alpha=0.79) scales and one item for feeling shocked identified in the marketing literature. [18, 19] For behavioral responses, we used a word-of-mouth scale that assessed the likelihood of recommending the product to others (3-items, alpha=0.93)[20] and coupon influence ("Imagine you had a coupon for a free pack. How likely would you be to try this pack?"). All details are available in our institutional repository (University of North Carolina Dataverse, doi:10.15139/S3/5QZXJY, https://dataverse.unc.edu/dataverse/R03CA212542).

### Analysis

Because of statistically significant non-normality in our dependent variables, we conducted a Kruskal-Wallis test for each measure. Kruskal-Wallis tests are the non-parametric equivalent of an ANOVA. When significant at the conventional $p<0.05$ level, we conducted a post hoc comparison between the study conditions using Dunn's test. We present means and standard deviations. We used SPSS 25 for analysis. We did not adjust our results for multiple comparisons across our dependent variables.[21] In the rare cases with missing data, we used pairwise deletion. The East Carolina University and Medical Center IRB reviewed and approved our study protocol (#16–001200).

## Results

As shown in Table 1, there were significant differences in how participants rated the three packages on two of three cognitive-aesthetic measures. Ratings of packaging appeal differed across the three packages ($H$=6.87, $p$=0.03). Dunn's post-hoc tests indicated significantly less appeal for the HEETs package than for the Marlboro package and no difference between

either of these packages and the HEETS/Marlboro package (Table 1). Ratings of noticeability did not differ by package ($H$=5.80, $p$=0.06). Ratings of uniqueness differed by package with the Marlboro pack being most unique ($H$=15.68, $p$<0.01). There were also significant differences in ratings of two of three cognitive-semantic measures. Ratings of brand equity ($H$=122.35, $p$<0.01) were highest for the Marlboro pack, lower for the HEETS/Marlboro pack, and lowest for the HEETs pack. Perceived safety compared to other tobacco products ($H$=14.27, $p$<0.01) was lower for the Marlboro pack than the other two packs. The measure of comparative safety to cigarettes did not differ ($H$=2.56, $p$=0.28). Regarding affective and behavioral measures, participants rated all of the packs similarly with positive ($H$=0.61, $p$=0.74), negative ($H$=1.93, $p$=0.38), and shocked ($H$=3.19, $p$=0.20) affective ratings, low endorsement of plans to talk about the product ($H$=0.27, $p$=0.87), and high endorsement of willingness to try with a coupon ($H$=1.33, $p$=0.51).

## Discussion

### Principal Findings

We found that different pack designs of IQOS, which were based on real-world IQOS packaging from around the globe, changed perceptions of appeal, uniqueness, quality, and safety. The evolving design of IQOS packaging can imply modified risks to consumers.

### Study Findings in Context

A growing body of scientific literature suggests heated tobacco products may represent a way to create a product for dual use with conventional cigarettes and potentially addict non-smokers.[1, 2, 22] Especially in the absence of plain packaging regulations, the pack is an important marketing tool,[23, 24] and the tobacco industry is keenly aware of the importance of color, overall aesthetics, and the importance of high quality graphic design.[25] Prior research has indicated that the tobacco industry uses color and graphic design of tobacco products to evade limits on marketing products as lower risk.[26–28] The visual design of cigarette packages are considered a part of the product by adults who smoke, who perceive the product within the packaging as an extension of the design.[29] Thus, even in the absence of an explicit claim of a lower-risk product, as shown in our results, IQOS products could be marketed and perceived by consumers to be lower in risk based on packaging. IQOS products are already viewed by consumers in Japan and Switzerland as "pure" and "clean,"[2] which is likely an outcome of both the visual design of the product and marketing efforts. Our results suggest that branding an IQOS product with a recognizable and well-established tobacco brand or the lack thereof can influence consumers' response to the product. Regulators should be aware that IQOS packaging available globally may already be communicating different levels of harmfulness regardless of approval to market a product as lower risk.

### Limitations

Our study was not designed to provide national estimates and may not generalize to smokers who do not participate in online survey panels. Our study included only adults who reported current smoking and does not address the perceptions of youth or non-smokers. While our design has strong internal validity, it does not replicate real-world behaviors. We cannot

isolate the impact of any one design feature as we sought to create three unique designs. Our measures do not allow us to compare risk of perceived harm with specific products on the market. Future work should consider study designs with greater ecological validity to address behavioral responses and identify what measures of perceived product characteristics are most related to real-world behavior. Finally, although ratings of perceived safety compared to other tobacco products differed significantly by package, ratings comparing the package to cigarettes were not significantly different. This may be due to the use of a scale based on ratings of specific factors such as tar instead of a general rating.

## Conclusion

Consumers' perceptions of harm can be influenced by the design of IQOS packaging. The level of differentiation from existing cigarette brands could influence consumer perceptions of product safety. Regulators must consider the role of visual design and packaging of the IQOS and similar heated tobacco products.

## Acknowledgements

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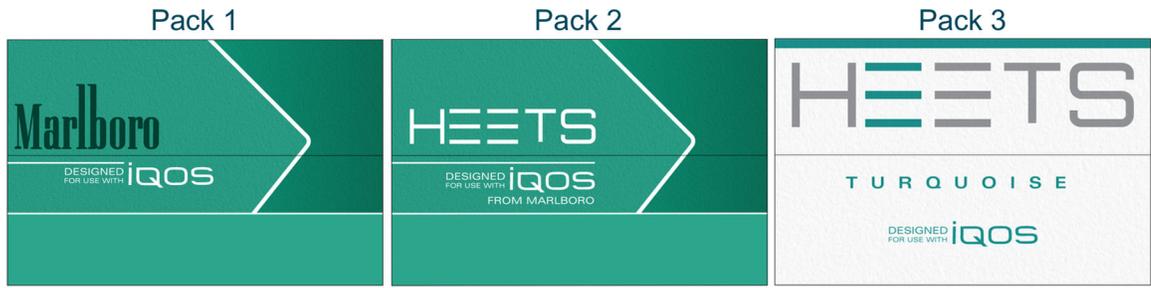
**Figure 1.**
Stimuli used in experiment

**Table 1.**

Mean and standard deviation of dependent variables with significant within-row Kruskal-Wallis tests indicated by presence of superscript letters and significant post-hoc tests indicated by different superscript letters, 2018, n=954, USA

| Indicator | Pack 1 (Marlboro) | Pack 2 (HEETS/Marlboro) | Pack 3 (HEETS) |
|---|---|---|---|
| | n=333 | n=330 | n=291 |
| **COGNITIVE** | | | |
| Aesthetic | | | |
| Appeal | 0.41 (1.06)[a] | 0.29 (1.10)[a,b] | 0.21 (1.02)[b] |
| Noticeability[*] | 1.42 (0.96) | 1.47 (0.95) | 1.29 (0.97) |
| Uniqueness[*] | 0.92 (0.80)[a] | 0.71 (0.79)[b] | 0.73 (0.79)[b] |
| Semantic | | | |
| Brand Equity-Quality | 0.84 (0.92)[a] | 0.57 (0.88)[b] | 0.17 (0.67)[c] |
| Perceived Safety Compared to Other Tobacco Products | −0.25 (1.09)[a] | −0.02 (1.00)[b] | 0.07 (0.98)[b] |
| Comparative Safety-Cigarettes | 0.22 (0.59) | 0.28 (0.68) | 0.24 (0.71) |
| **AFFECTIVE**[†] | | | |
| Positive | 0.95 (1.09) | 0.98 (1.09) | 0.94 (1.11) |
| Negative | 0.39 (0.80) | 0.49 (0.91) | 0.42 (0.79) |
| Shocked | 0.38 (0.97) | 0.45 (0.98) | 0.43 (0.90) |
| **BEHAVIORAL** | | | |
| Word of Mouth | −0.10 (1.12) | −0.16 (1.08) | −0.12 (1.01) |
| Try with Coupon | 1.03 (1.22) | 1.02 (1.21) | 1.01 (1.10) |

Note: Presence of superscripted letters indicates significance of Kruskal-Wallis test between three stimuli for a given indicator; pairwise comparisons are presented within rows for a given indicator and significant differences are indicated by differences in the superscript letter.

[*] indicates an item scored from 0 to 3.

[†] indicates scored from 0 to 4. All others are scored from −2 to 2 with a neutral zero.