

Differences in Perceived Health Risk of Cigarettes and IQOS® by Current Product Use Categories and Intention to Quit: A Cross-Sectional Study in Japan

E. Spies¹, M. Dobrynina¹, G. Kallischnigg², M.-S. Zwiesel², C. Chrea¹, L. Prieto¹, P. Langer¹, R. Weitkunat¹

¹ PMI R&D, Philip Morris Products S.A., Quai Jeanrenaud 5, CH-2000 Neuchâtel, Switzerland ² ARGUS Statistik GmbH, Berlin, Germany

Introduction and Objectives

Smoking cigarettes remains a leading cause of preventable deaths. Quitting smoking is the best way of reducing tobacco-related health risks. These facts have been well understood. For adult smokers who would otherwise continue to smoke, potentially less harmful alternatives should be developed. Understanding the risk perceptions associated with these alternatives may help create appropriate communications to facilitate harm reduction.

Past research suggests that individuals' smoking behavior influences the risks associated with that behavior.

- Risk perceptions vary by smoking behavior (smoker versus non-smoker, Morrell et al., 2010; current versus former smoker, Boney-McCoy et al., 1992).

This study examined risk perceptions of THS 2.2, (a candidate Modified Risk Tobacco Products commercialized in many markets under the *IQOS brand name*), cigarettes (CC) by tobacco use and behavioral intentions.

Research Question: What is the relationship between demographic variables (gender, age group, and education), geographic region of residence, tobacco use, and intention to quit all tobacco and risk perception of CC, IQOS, and the difference in risk between CC and IQOS?

Methods

The current study pooled data from three waves of an online, cross-sectional survey conducted among a convenience sample of IQOS users (N=1,500) registered in the product's database in Japan.

Questionnaires administered in the survey including a comprehensive assessment of current and past tobacco use behavior. The perceived health risk associated with smoking CC and using IQOS was assessed with the ABOUT™-Perceived Risk Instrument (Cano et al., 2018). ABOUT-Perceived Risk consists of two scales: an 18-item Health Risk scale, and a 7-item Addiction Risk scale. Both scales provide a calibrated score of absolute perceived risk ranging from 0 (no risk) to 100 (very high risk). In this study, only the Perceived Health Risk scale was used.

The dependent and independent variables used for the analysis are listed in Table 1. Grouping for intention to quit CC and intention to stop IQOS was performed. The variables tobacco use, intention to quit all tobacco, and the indirect relative health risk between CC and IQOS were newly created.

Table 1: Overview of the Data Analysis Strategy and Included Variables/Subjects for the Multiple Linear Regression Models.

| Dependent Variables | Independent Variables | Included Subjects |
|---|---|--|
| Absolute Health Risk score for CC | Sex (male/female) | Full sample |
| Absolute Health Risk score for IQOS | Age group (20-29, 30-39, 40-49, 50+) | IQOS users sample Wave 2 to 4 |
| Indirect relative Health Risk score between CC and IQOS (Difference in absolute scores between CC and IQOS) | Education (college/university, high school, junior high school, don't know/not applicable) | For comparability reasons include only subjects in regression where all dependent and independent variables are available (non-missing). |
| | Geographic region | |
| | Time since start smoking | |
| | Tobacco use (single product - IQOS, dual product - IQOS + CC, poly product (IQOS + CC + at least one other, IQOS + another product, not CC) | |
| | Intention to quit IQOS (no/yes) | |
| | Intention to quit CC (no/yes) | |
| | Intention to quit CC and IQOS (no/yes) | |

Due to the definition and consideration of the dependent and independent variables, n=362 subjects were excluded in these analyses because of missing values.

Descriptive analysis of dependent and independent variables, including visualization of the distribution was conducted. Additional bi-variate analyses to explore dependencies between model covariates were performed including the visualization of chi-square tests by mosaic plots.

The following regression analyses were performed:

- Multiple regression using all listed independent variables
- Multiple regression using all listed independent variables without *Regions*
- Multiple Regression using stepwise backward-selection procedure ($p < 0.1$ per variable).

Results

Table 2 describes the frequencies of the independent variables, and Table 3 describes the distribution of the Perceived Health Risk scores.

Table 2: Description of the Independent Variables.

| Variable | Value | N=1138 Frequency | Percent |
|---|---------------------------|---------------------|---------|
| Sex | Male | 936 | 82.25 |
| | Female | 202 | 17.75 |
| Age group | 20 - 29 | 239 | 21.00 |
| | 30 - 39 | 411 | 36.12 |
| | 40 - 49 | 339 | 29.79 |
| | 50+ | 149 | 13.09 |
| Education | College/University | 667 | 58.61 |
| | High School | 408 | 35.85 |
| | Junior High School | 58 | 5.10 |
| | Don't know/Not applicable | 5 | 0.44 |
| Geographic region | Kanto_Chubu | 673 | 59.14 |
| | Other_regions | 465 | 40.86 |
| Tobacco use | Single | 722 | 63.44 |
| | Dual | 233 | 20.47 |
| | Poly | 88 | 7.73 |
| | Other | 95 | 8.35 |
| Intention to quit CC (grouped) | Question not asked | 817 | 71.79 |
| | No | 72 | 6.33 |
| Intention to stop IQOS (grouped) | Yes | 249 | 21.88 |
| | No | 731 | 64.24 |
| Intention to quit all tobacco | Yes | 407 | 35.76 |
| | No | 737 | 64.76 |
| | Yes | 401 | 35.24 |
| | No | 737 | 64.76 |

Table 3: Description of the Dependent Variables.

| Variable | n | Mean | Std Dev |
|--|------|-------|---------|
| Perceived Health Risk CC | 1138 | 63.78 | 16.21 |
| Perceived Health Risk IQOS | 1138 | 44.04 | 16.66 |
| Difference in Perceived Health Risk CC - IQOS | 1138 | 19.74 | 17.49 |

Figures 1–3 summarize the final step of the models that were run to predict the three dependent variables. The regression coefficients are expressed in Perceived Health Risk score units. All models rejected the null hypotheses that all coefficients equal zero. Models explained between 3–4% of the variance of the dependent variable.

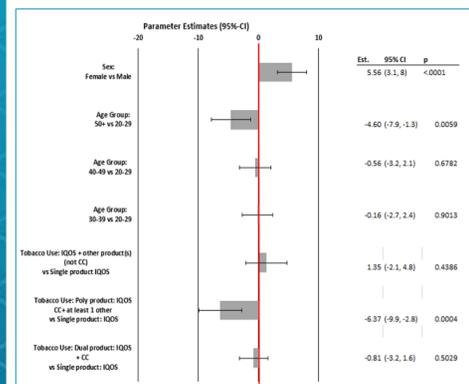


Figure 1: Parameter Estimates with 95% Confidence Limits: Perceived Health Risk CC.

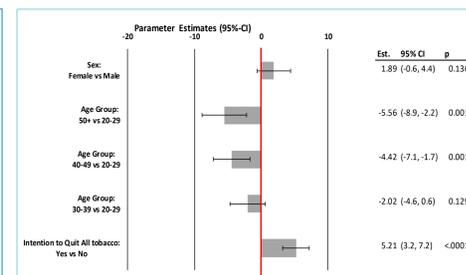


Figure 2: Parameter Estimates with 95% Confidence Limits: Perceived Health Risk IQOS.

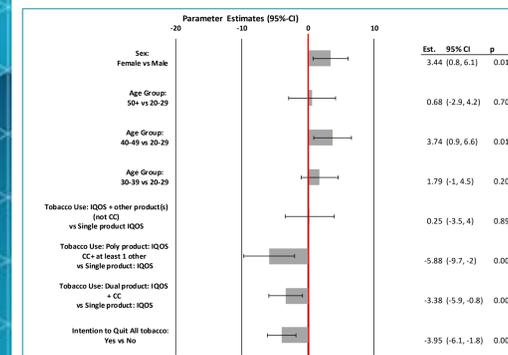


Figure 3: Parameter Estimates with 95% Confidence Limits: Difference Perceived Health Risk CC and IQOS.

For both the CC and IQOS regression models, females perceived a higher health risk compared to males, by 5.6 and 1.9 units of Health Risk score, respectively.

Compared to the youngest age group (ages 20–29), those 50 and older perceived a lower health risk for both CC and IQOS, by 4.6 and 5.6 units of Health Risk score, respectively.

Participants who reported they intended to quit all tobacco perceived IQOS at higher health risk by 5.2 units compared to those who did not.

Summary & Discussion

Communication of risk remains a challenging. Understanding the risks associated with IQOS may help create messages that help current smokers switch to a better alternative instead of continuing to smoke. This risk must be put in the context of current behavior and behavioral intentions. Additionally, formation of risk perceptions are the result of personal experiences, availability of examples, and affective factors (Ferrer & Klein, 2015) and are influenced by personal experience with smoking (Morrell et al., 2010).

Findings have implications for medical and public health messaging and audience segmentation for risk reduction behaviors. Certain characteristics, such as age, gender, and poly-use, discriminate distinct patterns of risk perception. This may have implications on tailoring reduced risk messaging.

Finally, it is important to consider that the independent variables could explain only about 3–4% of the variance of the observed risk perception scores. This can partially be explained by the inclusion of categorical independent variables, but it also implies that the main factors that may determine risk perception have not been addressed in the present study. It is likely that the unexplained variance could be explored by adding a broad battery of measures to future studies, including instruments on cognitive styles and personality.

References

Boney-McCoy, S., Gibbons, F.X., Reis, T.J. et al. (1992). Perceptions of smoking risk as a function of smoking status. *Journal of Behavioral Medicine*, 15(5) 469-488. <https://doi.org/10.1007/BF00844942>

Ferrer, R. A., & Klein, W. M. P. (2015). Risk perceptions and health behavior. *Current Opinion in Psychology*, 5, 85-89. <https://doi.org/10.1016/j.copsyc.2015.03.012>

Cano, S., Chrea, C., Salzberger, T., et al. (2018). Development and validation of a new instrument to measure perceived risks associated with the use of tobacco and nicotine-containing products. *Health and Quality of Life Outcomes*, 16(1), p 192 <https://doi.org/10.1186/s12955-018-0997-5>

Morrell, H. E. R., Song, A. V., & Halpern-Felsher, B. L. (2010). Predicting adolescent perceptions of the risk and benefits of cigarette smoking: A longitudinal investigation. *Health Psychology*, 29 (6), 610-617. <http://psycnet.apa.org/doiLanding?doi=10.1037%2Fa0021237>

Footnote: Reduced-risk Products ("RRPs") is the term PMI uses to refer to products that present, are likely to present, or have the potential to present less risk of harm to smokers who switch to these products versus continued smoking. PMI has a range of RRP's in various stages of development, scientific assessment, and commercialization. Because our RRP's do not burn tobacco, they produce an aerosol that contains far lower quantities of harmful and potentially harmful constituents than found in cigarette smoke.