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REPLICATION CORNER

The impact of the first light purchase on purchase behavior: a replication across categories and households

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Abstract
In this study, we replicate (Cleeren et al., 2016 *International Journal of Research in Marketing, 33*, 896–906), who examined the short- and long-term effects of a first light purchase on subsequent purchase behavior for a single product category and extend their analysis across 26 product categories while considering potential moderators. We find that Cleeren et al.'s (2016) results replicate only partially. That is, after the first light purchase, households purchase more volume and caloric content in the short run. While we still find that volume increases in the long run, caloric content turns out to decrease in the long run – especially for high-equity brands and among households that intend to eat healthily and purchase more frequently. Discounted products show short-term volume and caloric content increases, but no long-term changes. Similar findings apply to products from healthier categories, although these show a decrease in short-term caloric content. Higher (versus lower) income households do not exhibit short-term behavioral changes but decrease their long-term purchase volume. In contrast, larger (versus smaller) households exhibit decreased short-term volume and calories purchased, but do not change long-term behavior.

Keywords Low-fat · Low-sugar · Light products · Overpurchasing · Household panel data · Long-run impact · Structural break analysis

1 Introduction

Obesity levels have more than tripled since 1975, prompting policy and marketing efforts to reduce calorie intake, such as promoting low-fat or low-sugar alternatives. Experimental studies find that low-fat labels often backfire, increasing consumption due to a *health halo* effect in which the labels increase the healthiness perception of these products (Chandon & Wansink, 2007; Roe et al., 1999). Using real-world purchase data, Cleeren et al. (2016) confirm this effect in the chips category: a first

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low-fat purchase leads to higher subsequent quantity and calorie purchases in the short- and long-run.

This study replicates Cleeren et al. (2016) across multiple categories (including categories with low-sugar products) and extends the prior study by considering the moderating impact of category, household, and product characteristics.

Using scanner data from 1,299 UK households across 26 product categories and a hierarchical structural break model, we find that Cleeren et al.'s (2016) results replicate only partially. That is, after the first light purchase, households purchase more volume and caloric content in the short run. While we still find that volume increases in the long run, caloric content turns out to decrease in the long run – especially for high-equity brands and among households that intend to eat healthily and purchase more frequently. Discounted products show short-term volume and caloric content increases, but no long-term changes. Similar findings apply to products from healthier categories, although these show a decrease in the short-term purchase of caloric content. Regarding household characteristics, higher (versus lower) income households do not exhibit short-term behavioral changes but decrease their long-term purchase volume. In contrast, larger (versus smaller) households exhibit decreased short-term volume and calories but no change in long-term behavior.

2 Potential Moderating Effects

Research suggests that the magnitude of the health halo effect depends on several factors, including claim credibility (Keller et al., 1997), the consumer's underlying motivation (Moorman, 1990) for purchasing the first light product, and the level of nutrition knowledge (Ballco & Gracia, 2022). We use these mechanisms to posit the potential effects of the included moderators.

Claim Credibility. Credible claims increase perceived quality and lower risk, enhancing expected utility and the potential for health halos (Erdem & Swait, 1998; Keller et al., 1997; Roe et al., 1999). This literature suggests claim credibility will be higher for *healthy categories* and *strong brands.* Accordingly, we expect that more credible light claims will trigger a stronger impact of a first light purchase, such that the effect is stronger in healthier categories and for stronger brands.

Intrinsic motivation for first light purchase. The initial motivation to buy a light product can stem from either intrinsic or extrinsic factors. Intrinsic motivation frequently emerges from a desire to improve healthy eating. Consumers motivated by health are more responsive to nutrition information and more likely to form persistent habits (Moorman, 1990; Ryan and Deci, 2017). Hence, we expect intrinsic motives to be more likely to activate halo effects than extrinsic ones. We measure whether the first light purchase was done on a *discount* as a measure of extrinsic motivation. As a result, we expect the impact of the first light purchase to be smaller when the first purchase was done on discount.

Nutrition knowledge. High nutrition knowledge enables consumers to evaluate claims critically, reducing susceptibility to health halos (Ballco & Gracia, 2022). Therefore, we expect weaker effects in more knowledgeable households. Prior

research established that households with healthy eating habits, high incomes, and large sizes possess more nutritional knowledge (e.g., Ballco & Gracia, 2022; Barreiro-Hurlé et al., 2008). In addition, nutrition knowledge can develop through consumer learning across repeated purchases (Grunert et al., 2010). We therefore expect the impact of the first light purchase to be smaller for households with *higher category purchase frequency*, as well as for households with *healthier eating habits*, *higher incomes*, and *larger sizes*.

3 Data

We use household panel data from Kantar UK for our study. The dataset tracks purchase information for 48,561 UK households in 29 food product categories for the years 2009–2012. We focus our analysis on the top 80% best-selling SKUs in each category (in total 2,049 SKUs). We combine SKU-level purchase data with information on SKU's nutrition claims and nutritional content, which were transcribed by an independent consulting firm using scanned pictures of the front side of the packages from 2009. Some packages were unreadable due to low-resolution scans. We obtain a good coverage of 1,519 out of 2,049 SKUs (74%) that account for 81% of the total quantity purchased in the 29 categories. As our data covers all types of nutrition claims, we identify SKUs with a low fat or low sugar claim. The presence of low fat and/or low sugar claims is category dependent. That is, in some categories (e.g., savoury snacks) only low-fat claims occur, in some categories (e.g., soft drinks) only low-sugar claims occur, and in two categories (i.e., crispbreads and chocolate bars) both types of claims occur.[1]

Next, we included households in our per-category sample based on a few selection criteria, following Cleeren et al. (2016). First, the initial purchase of the low-fat or low-sugar product in the category had to occur during the period 2009–2012. Second, we must observe a purchase in the category for these households at least once in the 12 months before and 12 months after the low-fat/low-sugar purchase (i.e., in 2010 or 2011). This left us with 1,299 households covering 26 categories, for 141,024 household-month observations. We observe 1,244 households making a first light purchase in one category, 53 in two categories, and two in three categories. We acknowledge that included households could be different from excluded households for other reasons than making a first light purchase during the sample period. However, on a broad range of variables we find no significant differences between these two groups (Web Appendix A).

[1] We tested whether the effect of a low-fat claim is different from a low-sugar claim by including dummy variables in our main model. These dummy variables were insignificant.

3.1 Main Model Variables

Summary statistics for our sample are provided in Web Appendix B. For each household in each category, we calculate the monthly *purchase volume* (in grams) and *caloric content* purchased for each of the 12 months (1 month = 28 days) before and 12 months after the initial low-fat/low-sugar purchase as our dependent variables.

3.2 Moderating Variables

Category healthiness is measured by using information on each SKU's nutrients (fat, sugar, sodium, and fiber) and caloric content. We use the Nutrient Profiling (NP) model adopted in the United Kingdom, also used in prior marketing studies (e.g., Holtrop et al., 2025). The NP score ranges from −15 (healthiest) to 40 (unhealthiest), which we invert for interpretability. *Brand equity* is measured following Slotegraaf and Pauwels (2008) using the residuals from a regression across all categories with brand revenue premium as the dependent variable, and product line breadth, market share, regular price, discount depth, and category fixed effects as independent variables. *Discount first purchase* takes the value 1 if the first light purchase was purchased with a discount larger than 15% (i.e., 2 regular price standard deviations or more), and 0 otherwise. *Healthy eating intentions* are measured using Kantar data on households' 2009 fruit and vegetable purchases in 108 categories. We compute the total average monthly weight (in kilograms) purchased and divide this by household size. *Purchase frequency* is measured as the average number of monthly purchases at the household level within the category. We include a binary variable for *high-income households*, defined as those households belonging to the two highest (out of six) categories of household income, and we use the number of household members as our measure of *household size*. Web Appendix C provides summary statistics for the moderating variables.

We include multiple control variables: *regular price, regular-discount depth, light price, light-discount depth, advertising spending*, and *percentage of light products available in a category* (see for definition and statistics in Web Appendix C and B, respectively).

4 Econometric Model

We mirror the analysis of Cleeren et al. (2016) by adopting the same structural break model to assess short- and long-term effects. To assess moderating effects, we accommodate the nested structure of our data by embedding the structural break model in a hierarchical linear model framework (e.g., Hanssens et al., 2014). We decompose the variation in the short- and long-term effect of a first purchase into variation due to category-specific and household-category-specific characteristics using random slopes. This hierarchical approach also deals with the feature of our data that the same household is present in multiple categories, so-called cross-effects (Hanssens et al., 2014).

For a specific dependent variable Y (purchase volume or caloric content), our model formulation nests the logarithm of Y[2] in month t (Level 1) in household i (Level 2) and category k (Level 3). Our model can thus be formulated as follows:

Level 1:

$$\begin{aligned} logY_{tik} &= \beta_{0ik} + \beta_1 trend_{tik} + plogY_{t-1,ik} + \beta_2 \Delta logY_{t-2,ik} \\ &+\beta_4 \Delta logY_{t-3,ik} + \sum_{q=2}^{4} \tau_{q-1} Q_{qtik} + \theta_{1ik} DPulse_{tik} + \theta_{2ik} DIntercept_{tik} \\ &+\alpha_1 PriceRegular_{tik} + \alpha_2 DiscountRegular_{tik} + \alpha_3 PriceLight_{tik} \\ &+\alpha_4 DiscountLight_{tik} + \alpha_5 Advertising_{tik} + \alpha_6 PercLightProd_{tk} + \epsilon_{tik} \end{aligned} \tag{1}$$

Level 2:

$$\begin{aligned} \beta_{0ik} &= \gamma_{10k} + \kappa_{11} BrandEquity_{ik} + \kappa_{12} DiscountFirstPurchase_{ik} \\ &+\kappa_{13} HealthIntention_i + \kappa_{14} PurchaseFrequency_{ik} \\ &+\kappa_{15} HighIncomeHH_i + \kappa_{16} HHSize_i + \zeta_{0ik} \\ \theta_{1ik} &= \gamma_{20k} + \kappa_{21} BrandEquity_{ik} + \kappa_{22} DiscountFirstPurchase_{ik} \\ &+\kappa_{23} HealthIntention_i + \kappa_{24} PurchaseFrequency_{ik} \\ &+\kappa_{25} HighIncomeHH_i + \kappa_{26} HHSize_i + \zeta_{1ik} \\ \theta_{2ik} &= \gamma_{30k} + \kappa_{31} BrandEquity_{ik} + \kappa_{32} DiscountFirstPurchase_{ik} \\ &+\kappa_{33} HealthIntention_i + \kappa_{34} PurchaseFrequency_{ik} \\ &+\kappa_{35} HighIncomeHH_i + \kappa_{36} HHSize_i + \zeta_{2ik} \end{aligned} \tag{2}$$

Level 3:

$$\begin{aligned} \gamma_{10k} &= \mu_{10} + \lambda_{11} CategoryHealthiness_k + \xi_{0k} \\ \gamma_{20k} &= \mu_{20} + \lambda_{21} CategoryHealthiness_k + \xi_{1k} \\ \gamma_{30k} &= \mu_{30} + \lambda_{31} CategoryHealthiness_k + \xi_{2k} \end{aligned} \tag{3}$$

where $\varepsilon \sim N(0, \sigma^2)$, $[\zeta_{0ik}, \zeta_{1ik}, \zeta_{1ik}] \sim MVN(0, \Sigma_1)$ and $[\xi_{0k}, \xi_{1k}, \xi_{2k}] \sim MVN(0, \Sigma_2)$, Σ_1, Σ_2 are full covariance matrices, and error terms across levels are independent.

The first level of the model (Eq. 1) explains variation in the dependent variable. Two variables are of focal interest. $DPulse_{tik}$ is a variable that is one in the month of the first light purchase and zero in all other months. Consequently, θ_{1ik} captures the short-term (first month) effect of the first light purchase. Significant and positive (negative) values imply a household bought more (less) volume/calories in the category in the first month following the first light purchase. The variable $DIntercept_{tik}$ is a variable that is one in the month of the first light purchase and all subsequent months. Consequently, θ_{2ik} captures the long-term (intercept shift) effect of the first light purchase. Significant and positive (negative) values imply a household bought more (less) volume/calories after the first light purchase than before.

Our moderators enter the model on level two (Eq. 2) and level three (Eq. 3) to explain variation in three level 1 parameters: The intercept β_{0ik}, the short-term effect parameter θ_{1ik} and the long-term effect parameter θ_{2ik}. β_{0ik} is a household-category

[2] Following common convention, we add 1 to volume or calories to avoid taking the logarithm of 0.

random intercept, capturing variation in baseline purchase volume due to between-household (ζ_{0ik}) and between-category (ξ_{0k}) differences around a grand mean μ_{10m}. We also explain intercept-differences using brand and household (*BrandEquity*, *DiscountFirstPurchase*, *HealthIntention*, *PurchaseFrequency*, *HighIncomeHH, HHSize*, κ_{11-} κ_{16}), and category (*CategoryHealthiness*, $\lambda_{11,}$) characteristics. Next, we explain variation in the short-term effect (θ_{1ik}) by between-household (ζ_{1ik}) and between-category (ξ_{1k}) differences around a grand mean μ_{20}, but also by specific brand and household (κ_{21-} κ_{26}), and category (λ_{21}) characteristics. Similarly, we explain variation in the long-term effect θ_{2ik} (κ_{31-} $\kappa_{36,}$ λ_{31}). We discuss the remaining model specification in Web Appendix D.

To estimate the model using maximum likelihood estimation, we substitute Eqs. 2 and 3 into Eq. 1 to obtain our estimation equation. Before estimation, we assessed the stationarity of our time series using the Levin-Lin-Chu panel root test and found no evidence of unit roots (Web Appendix E). Web Appendix F provides the correlation between variables.

5 Results

5.1 Model free evidence

On the short term (i.e., comparing the month before the first light purchase and the month after), we find strong, significant increases in volume ($M_{before}=297.7$, $M_{after}=1369.9$, $p<.01$) and caloric content ($M_{before}=125.8$, $M_{after}=476.4$, $p<.01$) purchased, indicating that during the month of the first light purchase overall more is purchased (see Fig. 1). On the long term (comparing one year before the first light purchase with one year after), a significant increase is observed for volume ($M_{before}=19814.8$, $M_{after}=21784.5$, $p=.018$), but for caloric content we observe a significant decrease ($M_{before}=8406.1$, $M_{after}=7604.3$, $p=.043$), suggesting that, on average, a long-term volume increase is accompanied by a decrease in caloric content. However, these results do not take into account potential confounding factors such as prices, discounts, and seasonal factors.

5.2 Replication: The Short- and Long-term Effect of the First Low-fat Purchase

Columns 2 and 3 of Table 1 present the results for our models without moderating factors for volume and caloric content purchased (i.e., Eq. 1). For the short-term effect, we find that the first light purchase increases total volume bought ($\mu_{20}=1.476$, $p<0.01$) and caloric content ($\mu_{20}=0.701$, $p<0.01$), in line with the model-free evidence. We find a similar increasing long-term effect for volume bought ($\mu_{30}=.031$, $p<0.01$). However, for caloric content, we find a long-term decrease ($\mu_{30}=-.021$, $p<0.01$). Both findings align with the model-free evidence. These results suggest that the finding of Cleeren et al. (2016) that the first light purchase increases short-term volume and calorie amounts bought replicates across multiple (i.e., 26) categories. While in line with Cleeren et al. (2016) in showing a significant long-term

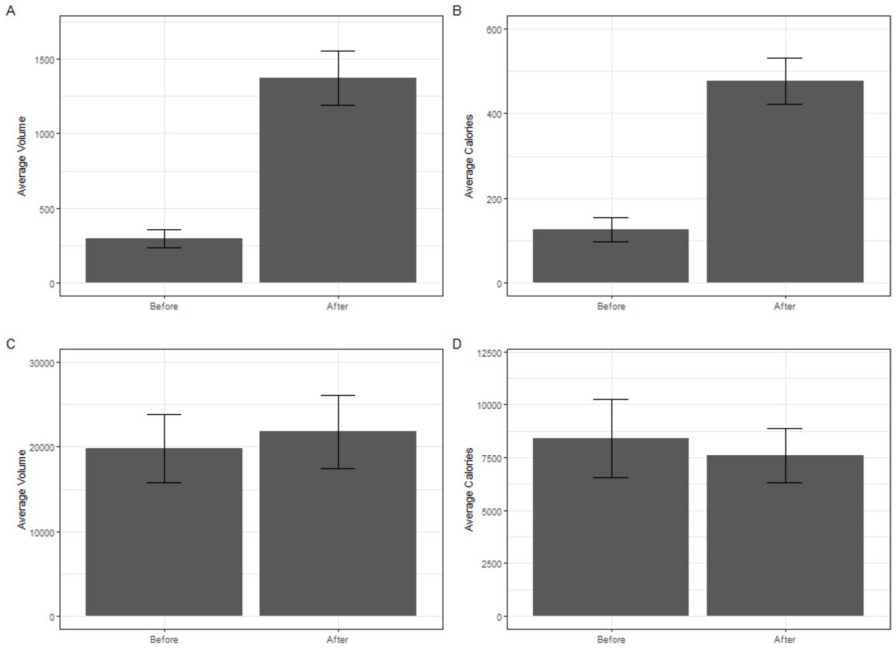


Fig. 1 Average short-term (panel A + B) and long-term (panel C + D) changes in volume and caloric content across categories and households

increase in purchase volume, we find that this is accompanied by a *decrease* in caloric content purchased in the long run, in contrast to their findings. This suggests that, across categories, consumers substitute for lower calorie variants, despite purchasing higher volume. Supporting this substitution effect, re-estimating our model using volume and caloric content of regular products as dependent variables, we find short- and long-term decreases in both variables. We report these results in Web Appendix G.

5.3 Extension: Moderator's Impact on Short- and Long-term Effects

The results for the moderation analysis are presented in columns 4 and 5.

Category healthiness. In categories that are healthier, the short-term effect is stronger for volume bought (λ_{21} = .042, p < .01), but weaker for caloric content (λ_{21} = -.078, p < .01). In the long run, these moderating effects are insignificant (λ_{31} = -.001, n.s. for both volume and calories).

Brand equity. High brand equity products show a smaller increase in volume and caloric content purchases in the short run (κ_{21} = -.060, p < .01; κ_{21} = -.060, p < .01) and long run (κ_{31} = -.011, p < .01; κ_{31} = -.005, p = .013).

Discount first purchase. When the first light product is bought on discount, the short-term effect is significantly lower for volume (κ_{22} = −3.511, p < .01) and caloric

Table 1 Estimation results for the hierarchical linear models without and with moderating variables

	DV: log(Total volume)	DV: log(Total calorie content)	DV: log(Total volume)	DV: log(Total calorie content)
	Coef (sd)	Coef (sd)	Coef (sd)	Coef (sd)
Intercept (μ_{10})	1.408 (.113)***	1.230 (.096)***	1.414 (.114)***	1.204 (.099)***
Trend (β_1)	-.005 (.001)***	-.003 (.001)***	-.005 (.001)***	-.004 (.001)***
Log($Y_{t-1,ik}$) (ρ)	.046 (.002)***	.046 (.002)***	.040 (.002)***	.041 (.002)***
Δ log($Y_{t-1,ik}$) (β_2)	-.019 (.002)***	-.023 (.002)***	-.016 (.002)***	-.019 (.002)***
Δ log($Y_{t-2,ik}$) (β_3)	-.009 (.001)***	-.008 (.001)***	-.008 (.001)***	-.006 (.001)***
Q_{2tik} (τ_1)	-.020 (.009)***	-.003 (.008)	-.019 (.009)***	-.004 (.007)
Q_{3tik}(τ_2)	-.003 (.009)	-.015 (.008)†	-.005 (.009)	-.018 (.008)**
Q_{4tik}(τ_3)	-.011 (.009)	-.006 (.008)	-.012 (.009)	-.010 (.008)
$DPulse_{tik}$ (μ_{20})	1.475 (.022)***	.700 (.019)***	1.290 (.028)***	.783 (.019)***
$Dintercept_{tik}$ (μ_{30})	.031 (.014)***	-.022 (.010) **	.032 (.014)***	-.007 (.012)
$CategoryHealthiness_k$ (λ_{11})	.019 (.013)	-.033 (.023)**	.020 (.013)	-.025 (.011) **
$BrandEquity_{ik}$ (κ_{11})	.056 (.010)***	.046 (.006)***	.048 (.010)***	.043 (.006)***
$DiscountFirstPurchase_{ik}$ (κ_{12})	.387 (.091)***	.258 (.075)***	.490 (.093)***	.394 (.077)***
$HealthIntention_{ik}$ (κ_{13})	.017 (.008)***	.012 (.006)†	.018(.008)***	.017 (.006)***
$PurchaseFrequency_{ik}$ (κ_{14})	.132 (.002)***	.122 (.002)***	.142 (.002)***	.133 (.002)***
$HighIncomeHH_i$ (κ_{15})	.039 (.089)	-.043 (.071)	.070 (.090)	-.052 (.072)
$HHSize_i$ (κ_{16})	.018 (.018)	.013 (.014)	.019 (.018)	.023 (.014)
Category interactions				
$DPulse_{tik}$ x $CategoryHealthiness_k$ (λ_{21})			.042 (.002)***	-.078 (.002)***
$Dintercept_{tik}$ x $CategoryHealthiness_k$ (λ_{31})			-.001 (.001)†	-.001 (.001)
Category -Household interactions				
$DPulse_{tik}$ x $BrandEquity_{ik}$ (κ_{21})			-.060 (.007)***	-.060 (.006)***
$DPulse_{tik}$ x $DiscountFirstPurchase_{ik}$ (κ_{22})			−3.511 (.149)***	−3.468 (.125)***
$DPulse_{tik}$ x $HealthIntention_{ik}$ (κ_{23})			-.020 (.006)***	-.060 (.005)***
$DPulse_{tik}$ x $PurchaseFrequency_{ik}$ (κ_{24})			-.021 (.002)***	-.017 (.002)***
$DPulse_{tik}$ x $HighIncomeHH_i$ (κ_{25})			.097 (.069)	.001 (.058)
$DPulse_{tik}$ x $HHSize_i$ (κ_{26})			-.071 (.013) ***	-.131 (.011)***
$Dintercept_{tik}$ x $BrandEquity_{ik}$ (κ_{31})			-.011 (.003)***	-.005 (.002)**
$Dintercept_{tik}$ x $DiscountFirstPurchase_{ik}$ (κ_{32})			.052 (.044)	.007 (.037)
$Dintercept_{tik}$ x $HealthIntention_{ik}$ (κ_{33})			-.007 (.002)***	-.005 (.002)***

Table 1 (continued)

	DV: log(Total volume)	DV: log(Total calorie content)	DV: log(Total volume)	DV: log(Total calorie content)
$Dintercept_{tik}$ x $PurchaseFrequency_{ik}$ (κ_{34})			-.020 (.001)***	-.020 (.001)***
$Dintercept_{tik}$ x $HighIncomeHH_i$ (κ_{35})			-.071 (.027)***	.020 (.022)
$Dintercept_{tik}$ x $HHSize_i$ (κ_{36})			.004 (.005)	-.011 (.004)
Control variables				
$PriceRegular_{tik}$ (α_1)	-.514 (.007)***	-.510 (.006)***	-.515 (.007)***	-.503 (.006)***
$DiscountRegular_{tik}$ (α_2)	1.394 (.061)***	.590 (.052)***	1.496 (.061)***	.679 (.051)***
$PriceLight_{tik}$ (α_3)	-.546 (.018)***	-.820 (.015)***	-.560 (.018)***	-.749 (.015)***
$DiscountLight_{tik}$ (α_4)	1.570 (.088)***	.981 (.074)***	3.033 (.108)***	2.566 (.091)***
$Advertising_{tik}$ (α_5))	-.090 (.012)***	-.067 (.011)***	-.091 (.012)***	-.063 (.010)***
$PercLightProd_{tik}$ (α_6)	11.685 (.028)***	6.909 (.024)***	11.518 (.028)***	6.959 (.024)***
Copula terms[a]	YES	YES	YES	YES
N	141,024	141,024	141,024	141,024
Number of households	1299	1299	1299	1299
Number of categories	26	26	26	26
Conditional R^2	.829	.837	.832	.842
AIC	455,453.9	408,581.2	454,177.6	405,909.8
BIC	455,759.4	408,886.8	454,601.4	406,343.5

[a]The copula terms that control for potential endogeneity of (light and non-light) price, discount and advertising are significant at the 1% level

***$p<.01$ **$p<.05$ †$p<.10$

content ($\kappa_{22}=-3.468$, $p<.01$). The long-term moderation effect is, however, not significant for volume ($\kappa_{32}=.052$, $p=.237$) and caloric content ($\kappa_{32}=.007$, $p=.850$).

Healthy eating intention. Households that have higher intentions to eat healthy have smaller increases in volume and caloric content purchases on both the short-term ($\kappa_{23}=$-.020, $p<.01$; $\kappa_{23}=$-.060, $p<.01$) as well as the long-term ($\kappa_{33}=$-.007, $p<.01$; $\kappa_{33}=$-.005, $p=.012$).

Purchase frequency. Households with higher purchase frequencies show fewer increases in volume and caloric content purchases in the short ($\kappa_{24}=$-.021, $p<.01$; $\kappa_{24}=$-.017, $p<.01$) and long run ($\kappa_{34}=$-.020, $p<.01$; $\kappa_{34}=$-.020, $p<.01$).

High income households. There is no significant moderation effect of household income in the short run ($\kappa_{25}=.095$, $p=.148$ for volume and $\kappa_{25}=.001$, $p=.987$ for caloric content). For the long-term effects, we find that households with a higher income increase overall purchase volume less ($\kappa_{26}=$-.071, $p=.009$), while the variable does not moderate the effect on caloric content ($\kappa_{26}=.095$, $p=.363$).

Household size. In the short run, larger sized households increase purchase volume and caloric content less ($\kappa_{26}=-.071$, $p<.01$; $\kappa_{26}=-.131$, $p<.01$), but these

effects do not persist in the long run and are insignificant (κ_{36}=.004, p=.424; κ_{36}=–.011, p=.006).

6 General Discussion

Our study replicated Cleeren et al. (2016) from one category (i.e., the chips category) to 26 different categories and extended it by considering moderating effects. We partially confirm their results. We replicate their finding that a first light product purchase increases short-term volume and calorie purchase and show that this health halo effect holds true across multiple product categories and for low-fat and low-sugar claims. We also replicate the findings of Cleeren et al. (2016) that the increase in purchase volume remains in the long run. Yet, in contrast to Cleeren et al. (2016), we find that this is coupled with a decrease in caloric content purchased over time. Empirically, we show a substitution effect in the short and long run, as consumers substitute regular products with lower calorie options despite purchasing larger volumes. This is a novel insight of this replication study.

The moderation analyses further uncovered interesting insights. In contrast to what we expected, we find that more credible claims (as in healthier categories and on strong brands) seem to decrease the health halo effects. Indeed, while households purchase more volume in the short run in healthier categories after the first light purchase, they seem to substitute more for light products as the increase in caloric content is smaller for these categories in the short run. In the long run, these moderating effects disappear. Similarly, we find that the health halo effects are less severe for strong brands in terms of volume and caloric content in the short and long run.

This effect may stem from the widespread belief that healthier products are more expensive – especially high-equity brands – even though this perception does not always align with reality (Haws et al., 2017; Jo & Lusk, 2018).

In line with our expectations, we find that if the motivation is more extrinsic—as when the first light product is purchased on discount—the health halo effect of the first light purchase decreases, with smaller short-term increases in both volume and caloric content. Our results confirm that increased nutrition knowledge, as reflected by healthy eating habits and more frequent purchases in the category, makes consumers less susceptible to health halo effects. For both variables, the health halo effects decrease both in the short and long run. We could not show this effect for household income nor household size, as these variables do not moderate the impact of the first light purchase on the subsequent purchases of volume and caloric content. The only exception is the negative moderating effect of household income on long-term volume, which is again in line with our expectations.

For public policy makers, it is important that our study shows that, across categories, the consequences of overpurchasing light products are not as severe as prior studies have suggested, as the long-term impact on caloric content is negative (Belei et al., 2012; Cleeren et al., 2016; Wansink & Chandon, 2006). At the same time, we do note that our analyses do still indicate overall long-term consumption increases in

response to light-claim purchases, and relatively strong increases for some consumer groups even, like lower-income consumers.

Our findings imply that educating consumers, for example by public health campaigns and educational initiatives, to increase their food and nutrition knowledge is crucial to enable them to make more informed and healthier choices and prevent health halo effects from occurring. Such learning can also occur in the marketplace: when a household buys light products regularly in many categories, there can be learning effects, making them more knowledgeable and helping to mitigate the health halo effect.

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Data availability The authors do not have permission to share data. Data access requests should be channeled through the journal Editor towards AiMark, per AiMarks data transparency policy.

Declarations

Competing interests No competing interests.

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