WEB APPENDIX 1: MODEL ESTIMATION

This appendix outlines the estimation of our proposed model. To facilitate readability, we first review the description of the model as also outlined in the paper, before discussing how this model is estimated.

We start with the assumption that for each respondent *n* in choice set *t* the utility of each alternative can be written as:

(A1.1) $$U_{int}^{C} = X_{int}\gamma_n' + \varepsilon_{int}',$$

with $\varepsilon_{int}' \sim N(0, I_J)$ and I_J being the (*J*x*J*)–identity matrix.

Similarly, we can rewrite this equation and acknowledge that this utility is affected by a set of latent variables, M_{int}^{*} which represent the perceived benefits of the alternative, as well as the direct effects X_{int} of the attributes *i* of the alternative:

(A1.2) $$U_{int}^{C} = X_{int}\gamma_n + M_{int}^{*}\beta_n + \varepsilon_{int}^{C},$$

where γ_n and β_n are parameters to be estimated and ε_{int}^{C} is a normal distributed error term with correlation structure defined below. We allow for multiple mediating terms (*m*=1,…, $\mathcal{M}$) and consistent with a random utility approach we define:

(A1.3) $$M_{int}^{*m} = X_{int}\alpha_n^m + \varepsilon_{int}^m = V_{int}^m + \varepsilon_{int}^m,$$

with α_n^m a *K*x1 vector of unknown parameters capturing the impact that changes in the product attribute levels have on each latent perception. ε_{int}^m is assumed to be normal distributed with correlation structure further specified below. The overall choice utility U_{int}^{C} of the alternative is then:

(A1.4) $$U_{int}^{C} = X_{int}\gamma_n + \sum_{m=1}^{\mathcal{M}}\beta_n^m M_{int}^{*m} + \varepsilon_{int}^{C} = V_{int}^{C} + \sum_{m=1}^{\mathcal{M}}\beta_n^m V_{int}^m + \sum_{m=1}^{\mathcal{M}}\beta_n^m \varepsilon_{int}^m + \varepsilon_{int}^{C},$$

with γ_n a *K*x1 vector of unknown parameters, and β_n^m unknown scalars that capture the impact of latent dimension *m* on overall choice. We note at this stage that in order for the equation $\gamma_n' = \gamma_n + \sum_{m=1}^{\mathcal{M}}\beta_n^m\alpha_n^m$ to hold, we need to restrict the covariance of $\sum_{m=1}^{\mathcal{M}}\beta_n^m\varepsilon_{int}^m + \varepsilon_{int}^{C}$ to be

equal the covariance of ε'_{int}, i.e. to be equal to the (JxJ)–identity matrix I_J.

Let $\varepsilon_{nt} = \{\varepsilon^1_{1nt},...,\varepsilon^1_{Jnt}, \varepsilon^2_{1nt},...,\varepsilon^2_{Jnt},...,\varepsilon^{\mathcal{M}}_{1nt},...,\varepsilon^{\mathcal{M}}_{Jnt}, \varepsilon^C_{1nt},...,\varepsilon^C_{Jnt}\}^T$, then we assume that ε_{nt} follows a normal distribution with mean 0 and covariance Ω, where:

(A1.5)
$$\Omega = \begin{pmatrix} I_J & \rho^{12} I_J & \cdots & \rho^{1\mathcal{M}} I_J & O_J \\ \rho^{12} I_J & I_J & \cdots & \rho^{2\mathcal{M}} I_J & O_J \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ \rho^{1\mathcal{M}} I_J & \rho^{2\mathcal{M}} I_J & \cdots & I_J & O_J \\ O_J & O_J & \cdots & O_J & \rho I_J \end{pmatrix},$$

with I_J being the (JxJ)–identity matrix, O_J a (JxJ)–zero matrix, ρ^{ml} reflecting the correlation between the latent mediator m and latent mediator l, and ρ the variance of the ε^C_{int} to be defined further down. Thus, we assume that the error terms are uncorrelated over time, alternatives and individuals, but correlated across mediators[1]. We stack all latent outcomes of interest and thus obtain:

(A1.6)
$$U_{nt} = \begin{pmatrix} M^{*1}_{1nt} \\ \vdots \\ M^{*1}_{Jnt} \\ \vdots \\ M^{*\mathcal{M}}_{1nt} \\ \vdots \\ M^{*\mathcal{M}}_{Jnt} \\ U^C_{1nt} \\ \vdots \\ U^C_{Jnt} \end{pmatrix} = \begin{pmatrix} V^1_{1nt} \\ \vdots \\ V^1_{Jnt} \\ \vdots \\ V^{\mathcal{M}}_{1nt} \\ \vdots \\ V^{\mathcal{M}}_{Jnt} \\ V^C_{1nt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n V^m_{1nt} \\ \vdots \\ V^C_{Jnt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n V^m_{Jnt} \end{pmatrix} + \begin{pmatrix} \varepsilon^1_{1nt} \\ \vdots \\ \varepsilon^1_{Jnt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{1nt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{Jnt} \\ \varepsilon^C_{1nt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n \varepsilon^m_{1nt} \\ \vdots \\ \varepsilon^C_{Jnt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n \varepsilon^m_{Jnt} \end{pmatrix} = V_{nt} + \tilde{\varepsilon}_{nt},$$

where:

[1] Note that it is not possible to allow for both a link between the mediating utility and the choice utility and a correlation in the error term between these two utilities as the model would not be identified. See also Chapter 5.2 in Train (2009), with in our case, identification is verified by considering the covariance matrix of the differences $\tilde{\tilde{\Omega}}$.

$$(7)\quad \tilde{\varepsilon}_{nt} = \begin{pmatrix} \tilde{\varepsilon}^1_{1nt} \\ \vdots \\ \tilde{\varepsilon}^1_{Jnt} \\ \vdots \\ \tilde{\varepsilon}^{\mathcal{M}}_{Jnt} \\ \vdots \\ \tilde{\varepsilon}^{\mathcal{M}}_{Jnt} \\ \tilde{\varepsilon}^C_{1nt} \\ \vdots \\ \tilde{\varepsilon}^C_{Jnt} \end{pmatrix} = \begin{pmatrix} 1 & \cdots & 0 & \cdots & 0 & \cdots & 0 & 0 & \cdots & 0 \\ \vdots & \ddots & & & & & & & & \\ 0 & & 1 & & & & & & & \\ \vdots & & & 1 & & & & & & \\ 0 & & & & 1 & & & & & \\ \vdots & & & & & 1 & & & & \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ \beta^1_n & 0 & 0 & \cdots & \beta^{\mathcal{M}}_n & 0 & 0 & 1 & 0 & 0 \\ 0 & \beta^1_n & 0 & \cdots & 0 & \beta^{\mathcal{M}}_n & 0 & 0 & 1 & 0 \\ 0 & 0 & \beta^1_n & \cdots & 0 & 0 & \beta^{\mathcal{M}}_n & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \varepsilon^1_{1nt} \\ \vdots \\ \varepsilon^1_{Jnt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{Jnt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{Jnt} \\ \varepsilon^C_{1nt} \\ \vdots \\ \varepsilon^C_{Jnt} \end{pmatrix} = R_n \begin{pmatrix} \varepsilon^1_{1nt} \\ \vdots \\ \varepsilon^1_{Jnt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{Jnt} \\ \vdots \\ \varepsilon^{\mathcal{M}}_{Jnt} \\ \varepsilon^C_{1nt} \\ \vdots \\ \varepsilon^C_{Jnt} \end{pmatrix},$$

and $\tilde{\varepsilon}_{nt} \sim N(0, \tilde{\Omega}_n)$ with $\tilde{\Omega}_n = R_n \Omega R_n^T$. Defining $\rho^{mm} = 1$ for all m, it can then be shown that the covariance of $\tilde{\varepsilon}^C_{int} = \sum_{m=1}^{\mathcal{M}} \beta^m_n \varepsilon^m_{int} + \varepsilon^C_{int}$ is equal to $\left(\rho + \sum_{m=1}^{\mathcal{M}} \sum_{m'=1}^{\mathcal{M}} \beta^m \beta^{m'} \rho^{mm'}\right) I_J$. Thus, in order for this covariance to be equal to the (JxJ)–identity matrix I_J, we need to set $\rho = 1 - \sum_{m=1}^{\mathcal{M}} \sum_{m'=1}^{\mathcal{M}} \beta^m \beta^{m'} \rho^{mm'}$.We note that the probability of the observed set of choices is then:

$$\text{(A1.8)}\qquad \Pr\left(y^1_{i^1nt} = 1, \ldots, y^{\mathcal{M}}_{i^{\mathcal{M}}nt} = 1, y^C_{i^Cnt} = 1\right) = \int_{\tilde{\varepsilon}_{nt} \in B_{\{i^1, \ldots, i^{\mathcal{M}}, i^C\}nt}} \phi(\tilde{\varepsilon}_{nt})\, d\tilde{\varepsilon}_{nt}\,.$$

where ϕ refers to the pdf of the normal distribution with mean 0 and covariance $\tilde{\Omega}_n$ and

$$\tilde{B}_{\{i^1, \ldots, i^{\mathcal{M}}, i^C\}nt} = \{\tilde{\varepsilon}_{nt} \text{ s.t. } (V^1_{i^1nt} + \tilde{\varepsilon}^1_{i^1nt} > V^1_{j^1nt} + \tilde{\varepsilon}^1_{j^1nt}, \forall j^1 \neq i^1) \wedge \ldots$$

$$\text{(A1.9)}\qquad (V^{\mathcal{M}}_{i^{\mathcal{M}}nt} + \tilde{\varepsilon}^{\mathcal{M}}_{i^{\mathcal{M}}nt} > V^{\mathcal{M}}_{j^{\mathcal{M}}nt} + \tilde{\varepsilon}^{\mathcal{M}}_{j^{\mathcal{M}}nt}, \forall j^{\mathcal{M}} \neq i^{\mathcal{M}}) \wedge \ldots$$

$$(V^C_{i^Cnt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n V^m_{i^Cnt} + \tilde{\varepsilon}^C_{i^Cnt} > V^C_{j^Cnt} + \sum_{m=1}^{\mathcal{M}} \beta^m_n V^m_{j^Cnt} + \tilde{\varepsilon}^C_{j^Cnt}, \forall j^C \neq i^C)\}.$$

In order to estimate the model, we express it in differences. To do so, we define $\tilde{\tilde{\varepsilon}}^m_{mnt} = \tilde{\varepsilon}^m_{jnt} - \tilde{\varepsilon}^m_{i^mnt}$ and $\tilde{\tilde{\varepsilon}}^C_{jnt} = \tilde{\varepsilon}^C_{jnt} - \tilde{\varepsilon}^C_{i^Cnt}$ as the differences between the errors of the non-chosen alternatives and the chosen alternatives for each mediator and for the overall choice respectively. We also define the ((J-1)*($\mathcal{M}$ + 1))x1 vector $\tilde{\tilde{\varepsilon}}_{nt} = \left\{\tilde{\tilde{\varepsilon}}^1_{1nt}, \ldots, \tilde{\tilde{\varepsilon}}^1_{Jnt}, \tilde{\tilde{\varepsilon}}^2_{1nt}, \ldots, \tilde{\tilde{\varepsilon}}^2_{Jnt}, \ldots, \tilde{\tilde{\varepsilon}}^{\mathcal{M}}_{1nt}, \ldots, \tilde{\tilde{\varepsilon}}^{\mathcal{M}}_{Jnt}, \tilde{\tilde{\varepsilon}}^C_{1nt}, \ldots, \tilde{\tilde{\varepsilon}}^C_{Jnt}\right\}^T$, where the "…" is over all alternatives except $i^1, i^2, \ldots, i^{\mathcal{M}}, i^C$.

Define $D_{\{i^1,\ldots,i^{\mathcal{M}},i^C\}}$ with:

(A1.10)
$$D_{\{i^1,\ldots,i^{\mathcal{M}},i^C\}} = \begin{pmatrix} D^1_{i^1} & 0_{(J-1),J} & \cdots & 0_{(J-1),J} & 0_{(J-1),J} \\ 0_{(J-1),J} & D^2_{i^2} & \cdots & 0_{(J-1),J} & 0_{(J-1),J} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0_{(J-1),J} & 0_{(J-1),J} & \cdots & D^{\mathcal{M}}_{i^{\mathcal{M}}} & 0_{(J-1),J} \\ 0_{(J-1),J} & 0_{(J-1),J} & \cdots & 0_{(J-1),J} & D^C_{i^C} \end{pmatrix},$$

where $0_{(J-1),J}$ is a (J-1)xJ matrix of zeros. $D^m_{i^m}$ (m=1,…, $\mathcal{M}$), and $D^C_{i^C}$ are hereby the (J-1) identity matrix with an extra column of -1's added at the i^m's, and i^C's column, respectively.

It is straightforward to see that $\tilde{\tilde{\varepsilon}}_{nt}$ is then also normal distributed with mean 0 and covariance $\tilde{\tilde{\Omega}}_{\{i^1,\ldots,i^{\mathcal{M}},i^C\}} = D_{\{i^1,\ldots,i^{\mathcal{M}},i^C\}}\tilde{\Omega}\left(D_{\{i^1,\ldots,i^{\mathcal{M}},i^C\}}\right)^T$.

The above definition of $\tilde{\tilde{\Omega}}$ allows us to write:

(A1.11)
$$\Pr\left(y^1_{i^1nt}=1,\ldots,y^{\mathcal{M}}_{i^{\mathcal{M}}nt}=1, y^C_{i^Cnt}=1\right) = \int_{\tilde{\varepsilon}_{nt}\in\tilde{B}_{int}} \phi(\tilde{\varepsilon}_{nt})\, d\tilde{\varepsilon}_{nt} = \int_{\tilde{\tilde{\varepsilon}}_{nt}\in\tilde{\tilde{B}}_{int}} \phi(\tilde{\tilde{\varepsilon}}_{nt})\, d\tilde{\tilde{\varepsilon}}_{nt}$$

The latter being a (J-1)*($\mathcal{M}$ +1) integral over

(A1.12)
$$\tilde{\tilde{B}}_{int} = \{\tilde{\tilde{\varepsilon}}_{nt} \text{ s.t. } (\tilde{\tilde{\varepsilon}}^1_{j^1nt} < (V^1_{i^1nt} - V^1_{j^1nt}), \forall j^1 \neq i^1) \wedge \ldots$$
$$(\tilde{\tilde{\varepsilon}}^{\mathcal{M}}_{j^{\mathcal{M}}nt} < (V^{\mathcal{M}}_{i^{\mathcal{M}}nt} - V^{\mathcal{M}}_{j^{\mathcal{M}}nt}), \forall j^{\mathcal{M}} \neq i^{\mathcal{M}}) \wedge \ldots$$
$$\left(\tilde{\tilde{\varepsilon}}_{j^Cnt} < (V^C_{i^Cnt} - V^C_{j^Cnt}\right) + \textstyle\sum_{m=1}^{\mathcal{M}} \beta^m_n (V^m_{i^Cnt} - V^m_{j^Cnt}), \forall j^C \neq i^C)\}.$$

We simulated these probabilities using the GHK simulator (see e.g., Geweke, Keane and Runkle 1994; Chapter 5.6.3 in Train 2009) with 500 Halton draws, and used the simulated probabilities to calculate the likelihood function which we maximized using the BFGS algorithm within the library *Optimum* in *Gauss 17* (Aptech Systems, 2016; Dai, 2002).

Unobserved heterogeneity in γ_n, β_n, or α_n^m can be accounted for in several ways. In our application we investigated whether there are different segments in the market and thus used finite mixture modeling. We estimated the model using the Expectation Maximization algorithm where we defined convergence as a sufficiently small (<0.0001) change in the parameters (Levine and Casella 2001; Train 2008).

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WEB APPENDIX 2: SIMULATIONS

This appendix outlines several simulations that focus on the ability of our proposed model to recover the true parameters under a number of scenarios. Specifically, we do so:

1) for any possible combination of significant and non-significant indirect and direct effects;
2) for competing mediating effects;
3) in the context of high collinearity between attributes and mediator;
4) when only one observation per respondent is available; and,
5) where we illustrate the bias that arises if researchers do not account for direct effects in a mediating choice model such as ours.

In the simulations below we assume there are four binary attributes (K=4) and two benefits (M=2). Hence, we require 15 estimates to recover. Unless otherwise stated, we simulated choice of 250 respondents in 20 choice sets each, with each choice set consisting of three choice alternatives, based on our equations (2) and (3) from the paper. We assume a correlation of ρ=0.4 between the two benefits and unless otherwise stated, set the parameters of significant relationships to 1 and the others to 0.

Simulation 1

In Simulation 1, we show that our model can capture various combinations of attributes that impact no benefits, one benefit or both benefits. Our simulation also includes the case by which one benefit impacts choice and another does not. Using a main effects design, these effects are summarised in Table A2.1.

Table A2.1: Design of Simulation 1

	X_k → Benefit 1	X_k → Benefit 2	X_k → Direct	Design
Attribute 1	Significant impact	No impact	Significant impact	101
Attribute 2	Significant impact	Significant impact	No impact	110
Attribute 3	No impact	Significant impact	Significant impact	011
Attribute 4	No impact	No impact	No impact	000

This corresponds to the set of estimates portrayed in Figure A2.1, with the significant effects bolded.

Figure A2.1: Design of Simulation 1

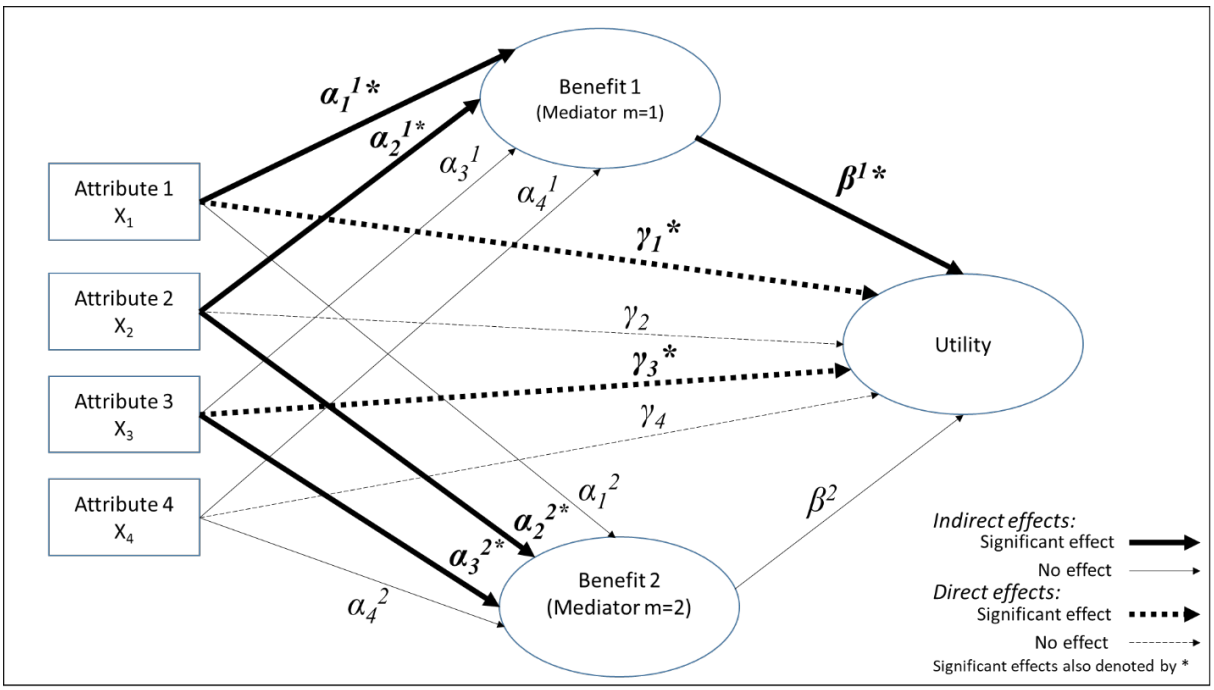

Table A2.2 shows that our estimation can recover the parameters, as the true parameters all lie within the 95% confidence intervals of the estimates.

Table A2.2: Simulation 1 Results

Effect	Parameter	True	Estimate	Standard Error of Estimate	95% Conf. Interval	
X_1→Benefit 1	α_1^1	1	**0.98**	0.03	0.93	1.04
X_2→Benefit 1	α_2^1	1	**1.00**	0.02	0.95	1.05
X_3→Benefit 1	α_3^1	0	**-0.01**	0.02	-0.06	0.03
X_4→Benefit 1	α_4^1	0	**0.01**	0.02	-0.04	0.06
X_1→Benefit 2	α_1^2	0	**-0.01**	0.02	-0.05	0.03
X_2→Benefit 2	α_2^2	1	**0.99**	0.03	0.94	1.04
X_3→Benefit 2	α_3^2	1	**0.98**	0.01	0.95	1.01
X_4→Benefit 2	α_4^2	0	**0.00**	0.02	-0.04	0.05
Direct effect X_1	γ_1	1	**1.05**	0.04	0.96	1.14
Direct effect X_2	γ_2	0	**0.00**	0.04	-0.09	0.08
Direct effect X_3	γ_3	1	**1.07**	0.05	0.97	1.17
Direct effect X_4	γ_4	0	**0.00**	0.03	-0.05	0.05
Benefit 1 →Choice	β^1	1	**1.01**	0.03	0.95	1.08
Benefit 2 →Choice	β^2	0	**0.04**	0.03	-0.01	0.10
Correlation benefits	ρ	0.4	**0.40**	0.02	0.37	0.43

Numbers in boldface indicate that the 95% confidence interval contains the true value.

Simulation 2

In Simulation 2 we demonstrate our model's ability to detect competing mediating effects. To do so we assume that both benefits impact overall utility with $\beta^1 = \beta^2 = 1$, whereas the competing mediating effects were introduced as per Table A2.3.

Table A2.3: Design of Simulation with Competing Effects

True Estimates	Indirect $X_k \rightarrow$ Benefit 1	Indirect $X_k \rightarrow$ Benefit 2	Direct	Total effects
Attributes	α_k^1	α_k^2	γ_k	$\gamma_k' = \gamma_k + \alpha_k^1 * \beta^1 + \alpha_k^2 * \beta^2$
X_1	+1	+1	0	2 (via full mediation)
X_2	-1	+1	0	0 (via competing mediation)
X_3	+1	0	+1	2 (via partial mediation)
X_4	-1	0	+1	0 (via partial mediation)

The results as presented in Table A2.4 show our model's ability to detect all forms of mediation including competing mediation.

Table A2.4: Simulation with competing mediation effects using our model

Effect	Parameter	True	Estimate	Standard Error of Estimate	95% Conf. Interval	
$X_1 \rightarrow$ Benefit 1	α_1^1	1	**0.98**	0.02	0.94	1.03
$X_2 \rightarrow$ Benefit 1	α_2^1	-1	**-0.97**	0.03	-1.02	-0.92
$X_3 \rightarrow$ Benefit 1	α_3^1	1	**0.96**	0.02	0.91	1.01
$X_4 \rightarrow$ Benefit 1	α_4^1	-1	**-0.95**	0.02	-1	-0.9
$X_1 \rightarrow$ Benefit 2	α_1^2	1	**1.02**	0.02	0.97	1.07
$X_2 \rightarrow$ Benefit 2	α_2^2	1	**0.99**	0.03	0.94	1.04
$X_3 \rightarrow$ Benefit 2	α_3^2	0	**0.00**	0.02	-0.04	0.04
$X_4 \rightarrow$ Benefit 2	α_4^2	0	**0.00**	0.02	-0.05	0.05
Direct effect X_1	γ_1	0	**-0.02**	0.06	-0.13	0.09
Direct effect X_2	γ_2	0	**0.04**	0.07	-0.09	0.17
Direct effect X_3	γ_3	1	**1.02**	0.06	0.91	1.13
Direct effect X_4	γ_4	1	**1.01**	0.06	0.88	1.13
Benefit 1 $\rightarrow$ Choice	β^1	1	**0.99**	0.05	0.9	1.08
Benefit 2 $\rightarrow$ Choice	β^2	1	**1.00**	0.04	0.92	1.09
Correlation benefits	ρ	0.4	**0.37**	0.02	0.33	0.41

Numbers in boldface indicate that the 95% confidence interval contains the true value.

Simulation 3

Since both the attributes X and the latent benefits M^{*m} impact the utility of choosing an alternative, one might question whether high collinearity between attributes and latent benefits could lead to biased results. High collinearity between the attributes X and the latent benefits

M^{*m} can however only arise if one attribute exclusively loads on M^{*m}. We note that even in this case the associated parameters β and γ are still identified via the structure of the covariance matrix of the error terms whereas α is identified via the choices associated with the benefit.

To demonstrate this identification, Simulation 3 is adjusted such that Attribute 1 is the only attribute in X that affects Benefit 1, thereby maximising the multi-collinearity between X and $M^{*m=1}$ (i.e., in this simulation the impact of Attribute 2 on Benefit 1 is set to 0). This design is summarized in Table A2.5.

Table A2.5: Design of Simulation 3 to obtain correlated X and X*

	X_k → Benefit 1	X_k → Benefit 2	X_k → direct	Design
Attribute 1	Significant impact	No impact	Significant impact	101
Attribute 2	No impact	Significant impact	No impact	010
Attribute 3	No impact	Significant impact	Significant impact	011
Attribute 4	No impact	No impact	No impact	000

The estimates pertaining to Simulation 3 are presented in Table A2.6.

Table A2.6: Simulation 3 (correlated X and M^{*m} design) Results

Effect	Parameter	True	Estimate	Standard Error of Estimate	95% Conf. Interval	
X_1→Benefit 1	α_1^1	1	**1.01**	0.03	0.96	1.06
X_2→Benefit 1	α_2^1	0	**0.00**	0.02	-0.03	0.03
X_3→Benefit 1	α_3^1	0	**-0.01**	0.02	-0.04	0.02
X_4→Benefit 1	α_4^1	0	**0.00**	0.02	-0.05	0.04
X_1→Benefit 2	α_1^2	0	**-0.01**	0.02	-0.05	0.03
X_2→Benefit 2	α_2^2	1	**0.99**	0.02	0.95	1.03
X_3→Benefit 2	α_3^2	1	**0.98**	0.02	0.94	1.03
X_4→Benefit 2	α_4^2	0	**0.01**	0.02	-0.04	0.05
Direct effect X_1	γ_1	1	**0.98**	0.04	0.90	1.06
Direct effect X_2	γ_2	0	**0.00**	0.04	-0.07	0.07
Direct effect X_3	γ_3	1	**1.03**	0.05	0.94	1.11
Direct effect X_4	γ_4	0	**0.05**	0.04	-0.03	0.12
Benefit 1 →Choice	β^1	1	**1.00**	0.03	0.94	1.05
Benefit 2 →Choice	β^2	0	**0.02**	0.03	-0.04	0.07
Correlation benefits	ρ	0.4	**0.41**	0.02	0.37	0.44

Numbers in boldface indicate that the 95% confidence interval contains the true value.

Table A2.6 shows that the true parameters all lie within the 95% confidence intervals of the estimates, but that these confidence intervals are slightly wider than in Simulation 1. Thus, even when X and M^{*m} are highly correlated, one can assess the independent effect of each on choice.

Simulation 4

In this simulation we focus on the identification of our model in the context of a limited number of observations per individual. We note that as with any choice model, our model needs variation in X to identify parameters. If the researcher is not interested in determining preference heterogeneity, then this variation in X can be purely between subjects. If the detection of preference heterogeneity is desirable, then more choice sets at the individual level are needed.

To demonstrate that recovery of any combination of α, β, and γ is possible without relying on within respondent variation, we employ a simulation where we vary the number of profiles per respondent and show the degree to which the mediation effect is identified by within versus across subject variation in choices and mediators.

In our example in Table A2.7, we use the same simulation set up as in Simulation 1 above, but instead only use one choice set (instead of 20) per respondent. Thus, there is no within respondent variation and no possibility to estimate respondent heterogeneity. The results show that the model is able to correctly identify the true parameters, although with a wider confidence interval due to the lower number of observations.

Table A2.7: Simulation with one choice set per respondent

Effect	Parameter	True	Estimate	Standard Error of Estimate	95% Confidence Interval	
$X_1 \rightarrow$ Benefit 1	α_1^1	1	**0.94**	0.09	0.76	1.11
$X_2 \rightarrow$ Benefit 1	α_2^1	1	**1.12**	0.11	0.89	1.34
$X_3 \rightarrow$ Benefit 1	α_3^1	0	**-0.07**	0.09	-0.23	0.10
$X_4 \rightarrow$ Benefit 1	α_4^1	0	**-0.06**	0.12	-0.29	0.16
$X_1 \rightarrow$ Benefit 2	α_1^2	0	**0.00**	0.08	-0.16	0.17
$X_2 \rightarrow$ Benefit 2	α_2^2	1	**0.96**	0.09	0.78	1.15
$X_3 \rightarrow$ Benefit 2	α_3^2	1	**1.07**	0.11	0.86	1.28
$X_4 \rightarrow$ Benefit 2	α_4^2	0	**0.11**	0.08	-0.04	0.27
Direct effect X_1	γ_1	1	**0.81**	0.16	0.49	1.13
Direct effect X_2	γ_2	0	**-0.20**	0.19	-0.58	0.18
Direct effect X_3	γ_3	1	**1.04**	0.24	0.56	1.51
Direct effect X_4	γ_4	0	**-0.03**	0.12	-0.26	0.21
Benefit 1 $\rightarrow$ Choice	β^1	1	**0.87**	0.15	0.57	1.16
Benefit 2 $\rightarrow$ Choice	β^2	0	**-0.08**	0.13	-0.34	0.18
Correlation benefits	ρ	0.4	**0.33**	0.08	0.17	0.50

Numbers in boldface indicate that the 95% confidence interval contains the true value.

Simulation 5

Table 1 in our paper reveals that the majority of previous research did not include both direct and indirect effects of an attribute on utility simultaneously. In this simulation we focus on the severity of not including direct effects in the estimation using the data generated in Simulation 1. To illustrate, we estimate Hauser and Simmie's (1981) model using their two-stage estimation. That is, we first estimate the α's using two separate probit models, then predict the mediator utilities, and finally include these mediator utilities but no additional direct effects in the probit model that explains choice. The results are given in Table A2.8.

Table A2.8: Two-Stage Estimation of Simulation 1 using Hauser & Simmie (1981)

Effect	Parameter	True	Estimate	Std. Error Estimate	95% Conf. Interval	
X_1→Benefit 1	α_1^1	1	**0.99**	0.03	0.93	1.04
X_2→Benefit 1	α_2^1	1	**1.00**	0.03	0.95	1.05
X_3→Benefit 1	α_3^1	0	**-0.01**	0.03	-0.06	0.04
X_4→Benefit 1	α_4^1	0	**0.01**	0.02	-0.02	0.05
X_1→Benefit 2	α_1^2	0	**-0.01**	0.03	-0.06	0.04
X_2→Benefit 2	α_2^2	1	**1.00**	0.03	0.94	1.06
X_3→Benefit 2	α_3^2	1	**0.99**	0.03	0.93	1.05
X_4→Benefit 2	α_4^2	0	**0.00**	0.02	-0.03	0.03
Direct effect X_1	γ_1	1	0	-	-	-
Direct effect X_2	γ_2	0	0	-	-	-
Direct effect X_3	γ_3	1	0	-	-	-
Direct effect X_4	γ_4	0	0	-	-	-
Benefit 1 →Choice	β^1	1	**0.88**	0.03	0.83	0.93
Benefit 2 →Choice	β^2	0	0.25	0.02	0.20	0.30
Correlation benefits	ρ	0.4	0	-	-	-

Numbers in boldface indicate that the 95% confidence interval contains the true value.

The results lead to the incorrect conclusion that the impact of Benefit 2 on choice is significant when in fact it is not. Thus, while only Benefit 1 should have a significant impact on choice, ignoring direct effects in the estimation leads to bias of the estimation results and more importantly to different conclusions. The direction of the bias is not surprising as it stems from the estimate for β^2 picking up the direct effect of attribute 3 on choice. We note that in order to rule out the possibility that the correlation ρ leads to the bias in β^2, we also simulated data with ρ=0 – the conclusions remain the same. Thus, Hauser and Simmie's (1981) method as well as similar methods ignoring direct effects will provide biased estimates of the benefits on choice if they do not account for all possible benefits associated with a product category.

WEB APPENDIX 3: FULL SETS OF RESULTS FOR AGGREGATE MODEL AND MODEL WITH TWO LATENT SEGMENTS

AGGREGATE RESULTS: TOTAL EFFECTS AND ESTIMATES RELATING TO MEDIATING PATHS

	Total Effects				Perceived Health-Benefits				Perceived Value-Benefits			
Attribute:	γ'	**SE**	**p-value**	**sig**	α^{Health}	**SE**	**p-value**	**sig**	α^{Value}	**SE**	**p-value**	**sig**
Abbott's	0.0859	0.0271	0.0016	***	0.2280	0.0219	0.0000	***	-0.0814	0.0222	0.0003	***
Helga's	0.3838	0.0292	0.0000	***	0.5143	0.0242	0.0000	***	0.0903	0.0248	0.0003	***
Tip-Top	-0.1425	0.0222	0.0000	***	-0.1978	0.0189	0.0000	***	-0.1260	0.0203	0.0000	***
MightySoft	-0.2149	0.0323	0.0000	***	-0.1987	0.0184	0.0000	***	-0.2670	0.0189	0.0000	***
Supermarket brand	-0.1123	0.0247	0.0000	***	-0.3458	0.0260	0.0000	***	0.3841	0.0246	0.0000	***
Wheat (white)	0.0363	0.0317	0.2514		-0.2916	0.0211	0.0000	***	0.1165	0.0265	0.0000	***
Wholemeal wheat	0.4076	0.0305	0.0000	***	0.3574	0.0183	0.0000	***	0.3933	0.0203	0.0000	***
Unbleached white	0.0465	0.0199	0.0195	**	-0.1617	0.0181	0.0000	***	0.1165	0.0204	0.0000	***
Unbleached w/meal	0.2767	0.0359	0.0000	***	0.3646	0.0215	0.0000	***	0.3727	0.0243	0.0000	***
Gluten free	-0.7672	0.0404	0.0000	***	-0.2687	0.0265	0.0000	***	-0.9990	0.0409	0.0000	***
Trad. stone-milled	0.0548	0.0244	0.0252	**	0.1058	0.0173	0.0000	***	-0.0187	0.0183	0.3071	
Low GI	0.0580	0.0229	0.0113	**	0.1272	0.0161	0.0000	***	0.0012	0.0166	0.9424	
High fiber	0.0639	0.0231	0.0058	***	0.1407	0.0161	0.0000	***	0.0089	0.0174	0.6091	
No add sugar	0.0050	0.0249	0.8400		0.1084	0.0175	0.0000	***	0.0415	0.0185	0.0251	**
Low salt	-0.0002	0.0212	0.9926		0.0997	0.0159	0.0000	***	-0.0391	0.0168	0.0201	**
98% fat free	-0.0085	0.0249	0.7317		0.0850	0.0169	0.0000	***	-0.0093	0.0180	0.6055	
Enriched omega 3	0.0402	0.0237	0.0894	*	0.0946	0.0177	0.0000	***	0.0448	0.0196	0.0225	**
No flavors etc.	0.0384	0.0232	0.0981	*	0.1937	0.0159	0.0000	***	0.0426	0.0168	0.0114	**
Low carb	0.0232	0.0219	0.2893		0.0792	0.0152	0.0000	***	-0.0035	0.0169	0.8360	
No seeds	0.0347	0.0234	0.1387		-0.1307	0.0171	0.0000	***	-0.0509	0.0159	0.0014	***
with Linseed	0.0517	0.0226	0.0224	**	0.0794	0.0161	0.0000	***	0.0136	0.0149	0.3616	
with Pumpkin	-0.0520	0.0261	0.0465	**	0.0729	0.0149	0.0000	***	-0.0408	0.0159	0.0104	**
with Poppy	-0.0344	0.0217	0.1122		-0.0216	0.0202	0.2852		0.0781	0.0168	0.0000	***
No grains	-0.0299	0.0232	0.1986		-0.1529	0.0160	0.0000	***	-0.0390	0.0153	0.0107	**
Mixed grains	-0.0106	0.0232	0.6488		0.0324	0.0164	0.0485	**	0.0285	0.0147	0.0528	*
Mixed wholegrain	0.0405	0.0232	0.0817	*	0.1205	0.0156	0.0000	***	0.0105	0.0158	0.5065	
Niacin, vit. E & B6	-0.0273	0.0184	0.1378		0.1037	0.0143	0.0000	***	0.0046	0.0144	0.7495	
Zinc & iron	0.0247	0.0140	0.0784	*	0.1064	0.0137	0.0000	***	0.0177	0.0139	0.2032	
Expires in 1 day	-0.2234	0.0237	0.0000	***	-0.0763	0.0186	0.0000	***	-0.0966	0.0180	0.0000	***
Expires in 3 days	0.0266	0.0243	0.2752		0.0243	0.0187	0.1941		-0.0087	0.0180	0.6290	
Expires in 5 days	0.1969	0.0230	0.0000	***	0.0520	0.0184	0.0048	***	0.1053	0.0180	0.0000	***
Size (per 100g)	0.1243	0.0281	0.0000	***	0.0544	0.0274	0.0473	**	0.2805	0.0280	0.0000	***
Price ($)	-0.3383	0.0831	0.0001	***	0.0141	0.0885	0.8734		-0.9106	0.0899	0.0000	***
					Est.	**SE**	**p-value**	**sig.**	**Est.**	**SE**	**p-value**	**sig.**
Mediator Impact (β^m)					0.3176	0.0289	0.0000	***	0.3257	0.0284	0.0000	***
Correlation (ρ^{HV})									0.5899	0.0226	0.0000	***

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.

AGGREGATE RESULTS: INDIRECT EFFECTS AND DIRECT EFFECTS

	Total indirect (Health Benefits				Total indirect (Value Benefits)				Direct Effect			
Attribute:	$(\alpha\beta)^{Health}$	**SE**	**p-value**	**sig**	$(\alpha\beta)^{Value}$	**SE**	**p-value**	**sig**	γ	**SE**	**p-value**	**sig**
Abbott's	0.0719	0.0109	0.0000	***	-0.0268	0.0095	0.0050	***	0.0403	0.0271	0.1366	
Helga's	0.1630	0.0154	0.0000	***	0.0294	0.0087	0.0007	***	0.1898	0.0318	0.0000	***
Tip-Top	-0.0624	0.0079	0.0000	***	-0.0408	0.0079	0.0000	***	-0.0392	0.0190	0.0394	**
MightySoft	-0.0633	0.0086	0.0000	***	-0.0873	0.0092	0.0000	***	-0.0638	0.0272	0.0192	**
Supermarket brand	-0.1092	0.0117	0.0000	***	0.1255	0.0123	0.0000	***	-0.1271	0.0302	0.0000	***
Wheat (white)	-0.0923	0.0111	0.0000	***	0.0386	0.0156	0.0138	**	0.0902	0.0306	0.0033	***
Wholemeal wheat	0.1132	0.0115	0.0000	***	0.1282	0.0131	0.0000	***	0.1667	0.0284	0.0000	***
Unbleached white	-0.0510	0.0074	0.0000	***	0.0377	0.0074	0.0000	***	0.0587	0.0191	0.0022	***
Unbleached w/meal	0.1157	0.0132	0.0000	***	0.1219	0.0124	0.0000	***	0.0395	0.0309	0.2014	
Gluten free	-0.0855	0.0125	0.0000	***	-0.3264	0.0297	0.0000	***	-0.3551	0.0441	0.0000	***
Trad. stone-milled	0.0335	0.0069	0.0000	***	-0.0062	0.0058	0.2865		0.0286	0.0227	0.2080	
Low GI	0.0404	0.0065	0.0000	***	0.0002	0.0055	0.9741		0.0179	0.0218	0.4118	
High fiber	0.0448	0.0067	0.0000	***	0.0027	0.0056	0.6369		0.0172	0.0216	0.4260	
No add sugar	0.0345	0.0068	0.0000	***	0.0135	0.0062	0.0302	**	-0.0423	0.0235	0.0722	*
Low salt	0.0316	0.0060	0.0000	***	-0.0126	0.0056	0.0252	**	-0.0187	0.0208	0.3688	
98% fat free	0.0273	0.0063	0.0000	***	-0.0033	0.0060	0.5792		-0.0333	0.0239	0.1638	
Enriched omega 3	0.0302	0.0066	0.0000	***	0.0144	0.0066	0.0287	**	-0.0042	0.0228	0.8539	
No flavors etc.	0.0616	0.0079	0.0000	***	0.0140	0.0056	0.0134	**	-0.0366	0.0218	0.0935	*
Low carb	0.0254	0.0055	0.0000	***	-0.0015	0.0054	0.7797		-0.0004	0.0205	0.9844	
No seeds	-0.0413	0.0057	0.0000	***	-0.0166	0.0054	0.0022	***	0.0931	0.0214	0.0000	***
with Linseed	0.0252	0.0056	0.0000	***	0.0043	0.0049	0.3777		0.0208	0.0213	0.3290	
with Pumpkin	0.0230	0.0051	0.0000	***	-0.0134	0.0053	0.0123	**	-0.0611	0.0233	0.0089	***
with Poppy	-0.0070	0.0064	0.2723		0.0257	0.0060	0.0000	***	-0.0528	0.0196	0.0072	***
No grains	-0.0484	0.0056	0.0000	***	-0.0128	0.0049	0.0088	***	0.0319	0.0207	0.1236	
Mixed grains	0.0105	0.0053	0.0471	**	0.0095	0.0048	0.0493	**	-0.0303	0.0207	0.1436	
Mixed wholegrain	0.0379	0.0059	0.0000	***	0.0034	0.0050	0.4968		-0.0016	0.0207	0.9384	
Niacin, vit. E & B6	0.0327	0.0054	0.0000	***	0.0015	0.0048	0.7474		-0.0617	0.0161	0.0001	***
Zinc & iron	0.0336	0.0053	0.0000	***	0.0060	0.0047	0.2034		-0.0149	0.0136	0.2735	
Expires in 1 day	-0.0240	0.0059	0.0001	***	-0.0317	0.0062	0.0000	***	-0.1677	0.0209	0.0000	***
Expires in 3 days	0.0074	0.0058	0.2018		-0.0029	0.0058	0.6234		0.0228	0.0210	0.2779	
Expires in 5 days	0.0166	0.0060	0.0058	***	0.0346	0.0066	0.0000	***	0.1449	0.0208	0.0000	***
Size (per 100g)	0.0173	0.0093	0.0626	*	0.0913	0.0118	0.0000	***	0.0157	0.0275	0.5669	
Price ($)	0.0036	0.0280	0.8974		-0.2976	0.0389	0.0000	***	-0.0500	0.0889	0.5739	

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.

SEGMENT 1 RESULTS: TOTAL EFFECTS AND ESTIMATES RELATING TO MEDIATING PATHS

	Total Effects				Health Perceptions				Value Perceptions			
Attribute:	γ'	**SE**	**p-value**	**sig**	α^{Health}	**SE**	**p-value**	**sig**	α^{Value}	**SE**	**p-value**	**sig**
Abbott's	0.0517	-0.0795	0.8708		0.3178	0.0263	0.0000	***	-0.2805	0.0316	0.0000	***
Helga's	0.1426	0.0251	0.0000	***	0.3999	0.0324	0.0000	***	-0.3527	0.0301	0.0000	***
Tip-Top	-0.1519	0.0232	0.0000	***	-0.2896	0.0219	0.0000	***	-0.3611	0.0265	0.0000	***
MightySoft	-0.0837	0.0272	0.0022	***	-0.1494	0.0190	0.0000	***	-0.3264	0.0205	0.0000	***
Supermarket brand	0.0413	0.0325	0.2038		-0.2787	0.0318	0.0000	***	1.3207	0.0491	0.0000	***
Wheat (white)	0.2087	0.0710	0.4624		-0.2839	0.0250	0.0000	***	0.5215	0.0548	0.0000	***
Wholemeal wheat	0.3949	0.0260	0.0000	***	0.3067	0.0212	0.0000	***	0.5305	0.0385	0.0000	***
Unbleached white	0.1498	0.0301	0.0000	***	-0.1586	0.0291	0.0000	***	0.4700	0.0489	0.0000	***
Unbleached w/meal	0.3711	0.0251	0.0000	***	0.3849	0.0265	0.0000	***	0.6551	0.0366	0.0000	***
Gluten free	-1.1246	0.0437	0.0000	***	-0.2491	0.0230	0.0000	***	-2.1771	0.0950	0.0000	***
Trad. stone-milled	0.0465	0.0233	0.0459	**	0.1106	0.0220	0.0000	***	-0.0413	0.0232	0.0754	*
Low GI	0.0686	0.0243	0.0048	***	0.1381	0.0236	0.0000	***	-0.0745	0.0215	0.0006	***
High fiber	0.0683	0.0260	0.0087	***	0.1365	0.0239	0.0000	***	-0.0597	0.0233	0.0107	**
No add sugar	0.0437	0.0263	0.0967	*	0.1352	0.0220	0.0000	***	0.0166	0.0196	0.3995	
Low salt	0.0529	0.0232	0.0227	**	0.1205	0.0222	0.0000	***	-0.0875	0.0216	0.0001	***
98% fat free	-0.0005	0.0232	0.9838		0.0590	0.0231	0.0107	**	-0.1069	0.0229	0.0000	***
Enriched omega 3	0.0335	0.0234	0.1517		0.1389	0.0225	0.0000	***	0.0674	0.0259	0.0093	***
No flavors etc.	0.0506	0.0239	0.0341	**	0.2191	0.0230	0.0000	***	-0.0421	0.0231	0.0694	*
Low carb	0.0366	0.0225	0.1045		0.0841	0.0216	0.0001	***	0.0021	0.0232	0.9274	
No seeds	0.0495	0.0593	0.7811		-0.1779	0.0207	0.0000	***	-0.0768	0.0199	0.0001	***
with Linseed	0.0725	0.0208	0.0005	***	0.0799	0.0224	0.0004	***	0.0167	0.0201	0.4054	
with Pumpkin	-0.0156	0.0238	0.5140		0.1114	0.0206	0.0000	***	-0.0307	0.0194	0.1138	
with Poppy	-0.1064	0.0217	0.0000	***	-0.0134	0.0190	0.4787		0.0908	0.0202	0.0000	***
No grains	-0.0736	0.1207	0.7603		-0.2413	0.0189	0.0000	***	-0.0567	0.0195	0.0036	***
Mixed grains	-0.0216	0.0208	0.2999		0.0571	0.0189	0.0026	***	0.0569	0.0196	0.0038	***
Mixed wholegrain	0.0952	0.0210	0.0000	***	0.1842	0.0188	0.0000	***	-0.0002	0.0193	0.9904	
Niacin, vit. E & B6	-0.0158	0.0204	0.4369		0.1408	0.0193	0.0000	***	0.0114	0.0189	0.5462	
Zinc & iron	0.0155	0.0222	0.4853		0.1516	0.0183	0.0000	***	0.0475	0.0205	0.0208	**
Expires in 1 day	-0.2993	0.0301	0.0000	***	-0.0602	0.0201	0.0028	***	-0.1884	0.0214	0.0000	***
Expires in 3 days	0.0908	0.0206	0.0000	***	0.0123	0.0199	0.5371		0.0499	0.0212	0.0186	**
Expires in 5 days	0.2086	0.0212	0.0000	***	0.0479	0.0203	0.0186	**	0.1385	0.0215	0.0000	***
Size (per 100g)	0.1723	0.0215	0.0000	***	0.0543	0.0298	0.0687	*	0.6100	0.0256	0.0000	***
Price ($)	-0.5388	0.0568	0.0000	***	-0.0199	0.0479	0.6779		-2.1515	0.1347	0.0000	***
					Est.	**SE**	**p-value**	**sig.**	**Est.**	**SE**	**p-value**	**sig.**
Mediator Impact (β^m)					0.2874	0.0221	0.0000	***	0.2953	0.0180	0.0000	***
Correlation (ρ^{HV})									0.2693	0.0326	0.0000	***

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.

SEGMENT 1 RESULTS: INDIRECT EFFECTS AND TOTAL EFFECTS

	Total indirect (Health Benefits)				Total indirect (Value Benefits)				Direct Effect			
Attribute:	$(\alpha\beta)^{Health}$	**SE**	**p-value**	**sig**	$(\alpha\beta)^{Value}$	**SE**	**p-value**	**sig**	γ	**SE**	**p-value**	**sig**
Abbott's	0.0915	0.0098	0.0000	***	-0.0827	0.0148	0.0000	***	0.0430	0.0272	0.1136	
Helga's	0.1153	0.0128	0.0000	***	-0.1042	0.0112	0.0000	***	0.1303	0.0292	0.0000	***
Tip-Top	-0.0834	0.0082	0.0000	***	-0.1065	0.0108	0.0000	***	0.0376	0.0213	0.0773	*
MightySoft	-0.0433	0.0065	0.0000	***	-0.0961	0.0084	0.0000	***	0.0554	0.0243	0.0228	**
Supermarket brand	-0.0801	0.0116	0.0000	***	0.3894	0.0287	0.0000	***	-0.2663	0.0338	0.0000	***
Wheat (white)	-0.0820	0.0101	0.0000	***	0.1537	0.0232	0.0000	***	0.1366	0.0311	0.0000	***
Wholemeal wheat	0.0884	0.0093	0.0000	***	0.1564	0.0145	0.0000	***	0.1505	0.0246	0.0000	***
Unbleached white	-0.0457	0.0095	0.0000	***	0.1386	0.0165	0.0000	***	0.0563	0.0356	0.1145	
Unbleached w/meal	0.1111	0.0125	0.0000	***	0.1930	0.0154	0.0000	***	0.0675	0.0256	0.0085	***
Gluten free	-0.0719	0.0091	0.0000	***	-0.6417	0.0465	0.0000	***	-0.4109	0.0387	0.0000	***
Trad. stone-milled	0.0317	0.0069	0.0000	***	-0.0119	0.0066	0.0742	*	0.0268	0.0219	0.2207	
Low GI	0.0398	0.0070	0.0000	***	-0.0223	0.0064	0.0005	***	0.0503	0.0235	0.0327	**
High fiber	0.0394	0.0068	0.0000	***	-0.0178	0.0067	0.0080	***	0.0466	0.0235	0.0478	**
No add sugar	0.0388	0.0068	0.0000	***	0.0051	0.0059	0.3890		-0.0017	0.0228	0.9405	
Low salt	0.0347	0.0065	0.0000	***	-0.0260	0.0066	0.0001	***	0.0435	0.0230	0.0592	*
98% fat free	0.0171	0.0069	0.0132	**	-0.0317	0.0070	0.0000	***	0.0136	0.0224	0.5420	
Enriched omega 3	0.0399	0.0069	0.0000	***	0.0196	0.0078	0.0120	**	-0.0277	0.0228	0.2235	
No flavors etc.	0.0631	0.0082	0.0000	***	-0.0123	0.0071	0.0837	*	-0.0009	0.0243	0.9714	
Low carb	0.0245	0.0064	0.0002	***	0.0005	0.0068	0.9424		0.0102	0.0218	0.6411	
No seeds	-0.0511	0.0063	0.0000	***	-0.0224	0.0061	0.0002	***	0.1225	0.0202	0.0000	***
with Linseed	0.0230	0.0069	0.0010	***	0.0047	0.0058	0.4178		0.0450	0.0193	0.0202	**
with Pumpkin	0.0321	0.0066	0.0000	***	-0.0091	0.0058	0.1174		-0.0382	0.0212	0.0712	*
with Poppy	-0.0039	0.0055	0.4743		0.0268	0.0065	0.0000	***	-0.1293	0.0202	0.0000	***
No grains	-0.0695	0.0062	0.0000	***	-0.0166	0.0058	0.0047	***	0.0123	0.0197	0.5315	
Mixed grains	0.0167	0.0055	0.0026	***	0.0169	0.0059	0.0041	***	-0.0544	0.0197	0.0058	***
Mixed wholegrain	0.0529	0.0069	0.0000	***	-0.0003	0.0058	0.9554		0.0421	0.0196	0.0317	**
Niacin, vit. E & B6	0.0407	0.0064	0.0000	***	0.0035	0.0055	0.5209		-0.0604	0.0183	0.0010	***
Zinc & iron	0.0435	0.0062	0.0000	***	0.0138	0.0062	0.0253	**	-0.0416	0.0214	0.0520	*
Expires in 1 day	-0.0174	0.0059	0.0032	***	-0.0556	0.0066	0.0000	***	-0.2266	0.0199	0.0000	***
Expires in 3 days	0.0036	0.0058	0.5371		0.0146	0.0062	0.0187	**	0.0726	0.0196	0.0002	***
Expires in 5 days	0.0138	0.0060	0.0213	**	0.0409	0.0070	0.0000	***	0.1540	0.0202	0.0000	***
Size (per 100g)	0.0160	0.0091	0.0775	*	0.1799	0.0122	0.0000	***	-0.0237	0.0041	0.0000	***
Price ($)	-0.0055	0.0134	0.6822		-0.6338	0.0559	0.0000	***	0.1023	0.0791	0.1961	

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.

SEGMENT 2 RESULTS: TOTAL EFFECTS AND ESTIMATES RELATING TO MEDIATING PATHS

	Total Effects				Health Perceptions				Value Perceptions			
Attribute:	γ'	**SE**	**p-value**	**sig**	α^{Health}	**SE**	**p-value**	**sig**	α^{Value}	**SE**	**p-value**	**sig**
Abbott's	0.1368	-0.0249	0.1704		0.0997	0.0299	0.0009	***	0.0676	0.0295	0.0223	**
Helga's	0.7214	0.0374	0.0000	***	0.7036	0.0409	0.0000	***	0.4902	0.0398	0.0000	***
Tip-Top	-0.1352	0.0295	0.0000	***	-0.0787	0.0276	0.0045	***	0.0525	0.0272	0.0535	*
MightySoft	-0.3885	0.0274	0.0000	***	-0.2472	0.0248	0.0000	***	-0.2204	0.0241	0.0000	***
Supermarket brand	-0.3345	0.0360	0.0000	***	-0.4774	0.0262	0.0000	***	-0.3899	0.0270	0.0000	***
Wheat (white)	-0.1626	0.0723	0.5739		-0.2890	0.0250	0.0000	***	-0.0951	0.0265	0.0003	***
Wholemeal wheat	0.5037	0.0371	0.0000	***	0.4259	0.0273	0.0000	***	0.4786	0.0289	0.0000	***
Unbleached white	-0.0896	0.0475	0.0597	*	-0.1922	0.0270	0.0000	***	-0.1691	0.0304	0.0000	***
Unbleached w/meal	0.1506	0.0311	0.0000	***	0.3497	0.0223	0.0000	***	0.2443	0.0234	0.0000	***
Gluten free	-0.4021	0.0306	0.0000	***	-0.2944	0.0232	0.0000	***	-0.4587	0.0231	0.0000	***
Trad. stone-milled	0.0771	0.0307	0.0123	**	0.1044	0.0273	0.0001	***	0.0465	0.0245	0.0584	*
Low GI	0.0355	0.0299	0.2356		0.1171	0.0251	0.0000	***	0.0455	0.0248	0.0673	*
High fiber	0.0664	0.0288	0.0215	**	0.1498	0.0278	0.0000	***	0.0797	0.0271	0.0034	***
No add sugar	-0.0381	0.0293	0.1943		0.0795	0.0257	0.0021	***	0.0788	0.0257	0.0023	***
Low salt	-0.0654	0.0290	0.0244	**	0.0768	0.0266	0.0040	***	0.0326	0.0247	0.1869	
98% fat free	-0.0218	0.0327	0.5043		0.1433	0.0291	0.0000	***	0.0787	0.0273	0.0041	***
Enriched omega 3	0.0494	0.0293	0.0917	*	0.0432	0.0267	0.1065		0.0506	0.0258	0.0499	**
No flavors etc.	-0.0008	0.0306	0.9779		0.1608	0.0256	0.0000	***	0.0941	0.0242	0.0001	***
Low carb	0.0082	0.0334	0.8050		0.0991	0.0270	0.0003	***	0.0316	0.0272	0.2459	
No seeds	0.0201	0.0240	0.7805		-0.0721	0.0235	0.0022	***	-0.0429	0.0236	0.0698	*
with Linseed	0.0234	0.0291	0.4213		0.0651	0.0236	0.0058	***	-0.0138	0.0243	0.5702	
with Pumpkin	-0.0808	0.0278	0.0038	***	0.0362	0.0225	0.1075		0.0161	0.0225	0.4760	
with Poppy	0.0373	0.0285	0.1914		-0.0292	0.0244	0.2317		0.0406	0.0241	0.0925	*
No grains	0.0259	0.0272	0.6336		-0.0544	0.0223	0.0147	**	-0.0244	0.0227	0.2816	
Mixed grains	-0.0070	0.0283	0.8041		0.0045	0.0223	0.8392		0.0256	0.0226	0.2585	
Mixed wholegrain	-0.0189	0.0277	0.4939		0.0499	0.0222	0.0247	**	-0.0012	0.0227	0.9589	
Niacin, vit. E & B6	-0.0360	0.0273	0.1885		0.0520	0.0218	0.0172	**	0.0000	0.0218	1.0000	
Zinc & iron	0.0332	0.0251	0.1872		0.0391	0.0233	0.0940	*	0.0004	0.0227	0.9846	
Expires in 1 day	-0.1393	0.0432	0.1073		-0.0864	0.0225	0.0001	***	-0.0814	0.0233	0.0005	***
Expires in 3 days	-0.0506	0.0284	0.0748	*	0.0264	0.0226	0.2435		-0.0439	0.0231	0.0572	*
Expires in 5 days	0.1899	0.0267	0.0000	***	0.0600	0.0223	0.0074	***	0.1253	0.0234	0.0000	***
Size (per 100g)	0.0664	0.0116	0.0000	***	0.0538	0.0220	0.0146	**	0.0771	0.0151	0.0000	***
Price ($)	-0.1882	0.0914	0.0398	**	0.0490	0.0406	0.2272		-0.0913	0.0399	0.0223	**
					Est.	**SE**	**p-value**	**sig.**	**Est.**	**SE**	**p-value**	**sig.**
Mediator Impact (β^m)					0.6784	0.0335	0.0000	***	0.0042	0.0343	0.9031	
Correlation (ρ^{HV})									0.8653	0.0172	0.0000	***

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.

SEGMENT 2 RESULTS: INDIRECT EFFECTS AND DIRECT EFFECTS

	Total indirect (Health Benefits)				Total indirect (Value Benefits)				Direct Effect			
Attribute:	$(\alpha\beta)^{Health}$	**SE**	**p-value**	**sig**	$(\alpha\beta)^{Value}$	**SE**	**p-value**	**sig**	γ	**SE**	**p-value**	**sig**
Abbott's	0.0672	0.0243	0.0057	***	0.0005	0.0101	0.9640		0.0689	0.0264	0.0093	***
Helga's	0.4771	0.0358	0.0000	***	0.0031	0.0170	0.8550		0.2401	0.0271	0.0000	***
Tip-Top	-0.0529	0.0191	0.0058	***	0.0003	0.0020	0.8681		-0.0822	0.0251	0.0011	***
MightySoft	-0.1675	0.0184	0.0000	***	-0.0014	0.0077	0.8521		-0.2196	0.0244	0.0000	***
Supermarket brand	-0.3238	0.0238	0.0000	***	-0.0025	0.0135	0.8549		-0.0072	0.0291	0.8050	
Wheat (white)	-0.1942	0.0204	0.0000	***	-0.0006	0.0117	0.9566		0.0308	0.0316	0.3303	
Wholemeal wheat	0.2888	0.0234	0.0000	***	0.0030	0.0165	0.8570		0.2123	0.0333	0.0000	***
Unbleached white	-0.1307	0.0203	0.0000	***	-0.0010	0.0059	0.8694		0.0410	0.0451	0.3637	
Unbleached w/meal	0.2366	0.0192	0.0000	***	0.0015	0.0085	0.8574		-0.0864	0.0250	0.0006	***
Gluten free	-0.2004	0.0186	0.0000	***	-0.0029	0.0160	0.8566		-0.1977	0.0231	0.0000	***
Trad. stone-milled	0.0710	0.0189	0.0002	***	0.0002	0.0018	0.8981		0.0059	0.0267	0.8250	
Low GI	0.0794	0.0181	0.0000	***	0.0002	0.0018	0.8966		-0.0448	0.0257	0.0814	*
High fiber	0.1026	0.0200	0.0000	***	0.0004	0.0029	0.8834		-0.0372	0.0252	0.1412	
No add sugar	0.0539	0.0184	0.0034	***	0.0005	0.0029	0.8728		-0.0925	0.0241	0.0001	***
Low salt	0.0518	0.0178	0.0036	***	0.0002	0.0014	0.9042		-0.1174	0.0254	0.0000	***
98% fat free	0.0975	0.0212	0.0000	***	0.0004	0.0029	0.8818		-0.1204	0.0308	0.0001	***
Enriched omega 3	0.0296	0.0182	0.1051		0.0002	0.0019	0.8950		0.0202	0.0244	0.4076	
No flavors etc.	0.1095	0.0184	0.0000	***	0.0006	0.0034	0.8666		-0.1112	0.0260	0.0000	***
Low carb	0.0681	0.0192	0.0004	***	0.0002	0.0014	0.9113		-0.0598	0.0283	0.0349	**
No seeds	-0.0482	0.0160	0.0026	***	-0.0002	0.0012	0.8642		0.0683	0.0231	0.0031	***
with Linseed	0.0438	0.0160	0.0064	***	-0.0001	0.0010	0.9087		-0.0214	0.0231	0.3552	
with Pumpkin	0.0243	0.0152	0.1105		0.0001	0.0010	0.9253		-0.1043	0.0225	0.0000	***
with Poppy	-0.0199	0.0167	0.2340		0.0002	0.0016	0.8860		0.0574	0.0236	0.0153	**
No grains	-0.0375	0.0156	0.0164	**	-0.0002	0.0010	0.8431		0.0639	0.0236	0.0069	***
Mixed grains	0.0037	0.0159	0.8144		0.0002	0.0012	0.8511		-0.0111	0.0235	0.6357	
Mixed wholegrain	0.0338	0.0153	0.0277	**	0.0000	0.0008	0.9723		-0.0528	0.0237	0.0259	**
Niacin, vit. E & B6	0.0344	0.0153	0.0247	**	0.0000	0.0008	0.9908		-0.0701	0.0222	0.0016	***
Zinc & iron	0.0271	0.0155	0.0810	*	0.0000	0.0008	0.9771		0.0071	0.0225	0.7509	
Expires in 1 day	-0.0579	0.0153	0.0002	***	-0.0005	0.0031	0.8714		-0.0806	0.0236	0.0007	***
Expires in 3 days	0.0176	0.0152	0.2477		-0.0003	0.0017	0.8596		-0.0676	0.0237	0.0044	***
Expires in 5 days	0.0403	0.0154	0.0089	***	0.0008	0.0045	0.8568		0.1482	0.0235	0.0000	***
Size (per 100g)	0.0365	0.0168	0.0306	**	0.0009	0.0028	0.7510		0.0289	0.0063	0.0000	***
Price ($)	0.0331	0.0285	0.2459		-0.0007	0.0035	0.8298		-0.2206	0.0982	0.0249	**

Significant terms indicted by */**/*** for effects are .10/.05/.01 levels.