SUPPLEMENTARY MATERIALs

Consumer Attitudes and Willingness to Pay for Novel Bio-Based Products Using Hypothetical Bottle Choice

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These Supplementary Materials include additional information that was referred to in the main manuscript, as well as additional pre-registered hypotheses, analyses, and their results. All measures, data, and analysis code are available at the Open Science Framework https://osf.io/62xvj/.

Pilot Study

Demographics

Fifty-two Dutch participants took part in the pilot study, 28 males and 24 females, mean age 28.62 (*SD* = 10.80). Participants came from varied educational backgrounds with one person (1.9%) each completing primary and education trade/technical/ vocational training, 15 (28.8%) secondary education, 27 (51.9%) having completed undergraduate education, and 8 (15.4%) postgraduate education.

Coding

The coding was done by the first author and there was no pre-determined coding scheme, as the aim of the pilot was to reduce researcher bias when it came to selecting the social groups. The only pre-determined factor was, that the group 'family' would be excluded in the main study because people's relationships with their families vary greatly and that might influence the effectiveness of our manipulation.

First, the responses from twenty randomly selected participants were coded by colour-coding similar responses. This established the main categories of social groups then also applied to the remaining participants. We distilled 18 main social groups. These broad categories were later expanded to encompass 28 social groups, which enabled the inclusion of several higher-level groups that several participants mentioned being part of but rarely made it into the first five groups they mentioned (e.g., people from your country, fellow house owners). These were included as social groups that participants belong to, but that is of little importance to them (later 'least valued' condition). Expanding the number of groups also allows participants to make more specific group choices, enhancing the strength of the manipulation of group importance in the main study.

Main Study

Hypotheses

Pre-registered Hypotheses that are not (explicitly) part of the main manuscript. Many of the correlations results can be found in Table 8.

H7: Bottle choice will positively correlate with willingness to pay. Bottle choice will positively correlate with the willingness to pay for that bottle type.

H8: Bottle choice will positively correlate with the time-investment task. (Paper) PEF bottle choice will positively correlate with the number of rounds completed in the WEPT.

H9: Willingness to pay will positively correlate with the time-investment task.

H10: Identification as an environmentalist will correlate with political orientation. Liberal and more progressive participants will identify more as an environmentalist than those on the conservative end of the spectrum.

H11: We expect a negative correlation between right-wing/conservatism and pro-environmental behaviour:

a) willing to pay for bio-based bottles.

b) number of completed time-investment tasks.

c) likelihood of choosing a bio-based bottle (irrespective of condition).

H12: Explore how of intrinsic and extrinsic motivation relate to the other measures (i.e., WTP, time-investment, identification with being an environmentalist, political orientation etc).

H13: Explore the effects of attitude on willingness to pay.

More negative attitudes towards a type of plastic leads to a lower WTP for that type of plastic. More negative attitude towards PET could also lead to a higher WTP for the more sustainable plastics.

H14: Because socials norms appear to be uniquely powerful predictor of pro-environmental behaviour (Berger, 2019), we also assessed the perceived environmental norms of the group. Perceived environmental values of the group will correlate with bottle choice.

In the ‘most important’ condition, the bottle choice will align most with the perceived environmental values of the group.

Measures

More information about the measures mentioned in the main manuscript but that were not related to the main hypotheses.

Motivation

We assessed participants’ intrinsic and extrinsic motivation for pro-environmental behaviour. Participants indicated on a 7-point Likert scale how much they agree to five statements assessing their explicit motivation (e.g., “I attempt to appear pro-environmental in order to avoid disapproval from others”) and five items assessing their implicit motivation (e.g., “I attempt to behave pro-environmentally because it is personally important to me”). This measure was taken form Brick and Lai (2018), and both subscales showed good reliability with Cronbach’s alphas of $\alpha = .79, .87$ for the extrinsic and intrinsic subscales respectively.

Perceived Environmental Norms of the Group

Participants in the most valued and least valued condition were asked how important the environment was to their mentioned social group. This was done to gauge whether their choice of bottle might have been due to the perceived environmental values of the group .To this end we adapted the pro-environmental descriptive norm measure used by Bissing-Olson et al. (2016). Participants responded to the following three items (*1 = disagree strongly* to *7 = agree strongly)*: “Most members of this group act in environmentally friendly ways”, “Most members of this group try to conserve resources”, and “Most members of this group engage in environmentally-friendly behaviours”. For both conditions, this scale showed an extremely high reliability of $\alpha = .96$.

Results

There were no significant group differences between the conditions in demographics, prior knowledge, environmentalist identity, or political orientation. Table S1 shows the results of the one-way ANOVA comparing age, gender, education, prior knowledge, environmentalist identity, and political orientation between the three conditions.

Table S1

One-way ANOVA Assessing Potential Differences Between Conditions.

Variable		df	*F*	*p*-value
Age	Between Groups	2	.053	.948
	Within Groups	526		
	Total	528		
Gender	Between Groups	2	.319	.727
	Within Groups	526		
	Total	528		
education	Between Groups	2	.094	.910
	Within Groups	526		
	Total	528		
Prior knowledge	Between Groups	2	.103	.902
	Within Groups	526		
	Total	528		
Environmentalist identity	Between Groups	2	.039	.962
	Within Groups	526		
	Total	528		
Political orientation	Between Groups	2	.240	.786
	Within Groups	526		
	Total	528		

Table S2

Logistic Regression of Attitudes on Bottle Choice.

Bottle choice		Wald	*p*	Odds ratio
PEF plastic	Intercept	.064	.800	
	positive PET	**9.64**	**.002**	**.552**
	negative PET	1.74	.188	1.22
	positive PEF	**4.80**	**.029**	**1.73**
	negative PEF	2.02	.155	.683

	positive paper	1.97	.160	1.36
	negative paper	2.23	.136	1.36
Paper PEF	Intercept	.851	.356	
	positive PET	**16.6**	**.000**	**.460**
	negative PET	1.08	.300	1.17
	positive PEF	.785	.376	1.25
	negative PEF	.556	.456	.821
	positive paper	**22.9**	**.000**	**3.06**
	negative paper	.271	.603	1.11

Note. The reference category is PET plastic. Significant predictors are shown in bold.

Pre-registered Exploratory Analyses

Relationship Between Bottle Choice and WTP

We predicted that bottle choice would positively correlate with the willingness to pay (WTP) for that bottle type. The pre-registered correlational analysis revealed that both willingness to pay for PET plastic and for the paper PEF bottle correlate to bottle choice in general: $r(527) = -.10$, $p = .017$ and $r(527) = .21$, $p < .001$ respectively. WTP for PEF plastic did not relate to overall bottle choice, $r(527) = -.05$, $p = .279$. We also conducted a multinomial logistic regression, in which we regressed the WTP for the different types of bottles onto the different bottle choices. Those who chose the PEF plastic compared to PET bottle were willing to pay more for the PEF plastic bottle, $b = 4.57$, Wald $\chi^2 = 6.96$, $p = .008$. They were also willing to pay less for the PET plastic bottle (see Table S3). Participants who chose the paper PEF bottle indicated more willingness to pay for the paper PEF bottle, than those who chose the PET plastic bottle, $b = 3.35$, Wald $\chi^2 = 8.81$, $p = .003$. They were also willing to pay less for the PET plastic bottle. When setting Paper PEF as the reference category, those participants who chose the PET plastic bottle were willing to pay more for the PET plastic bottle, $b = 4.07$, Wald $\chi^2 = 10.96$, $p < .001$, and significantly less for the paper PEF bottle, $b = -3.35$, Wald $\chi^2 = 8.81$, $p = .003$.

Table S3.

Multinomial Logistic Regression of WTP on Bottle Choice.

Bottle choice		Wald	Sig.	Odds ratio
PEF plastic	Intercept	5.07	.024	
	PET_WTP	9.49	.002	.022
	PEF_WTP	6.96	.008	96.86
	Paper_WTP	.66	.418	.41
Paper PEF	Intercept	10.28	.001	
	PET_WTP	10.96	<.001	.017
	PEF_WTP	.134	.714	1.89
	Paper_WTP	8.81	.003	128.49

Note. The reference category is PET plastic.

Bottle Choice and the WEPT

A bootstrapped (5000) Spearman correlation suggested that bottle choice was positively correlated with WEPT trials completed, $r(527) = .17$, $p <$ .001, BCa 95% CI [.08, .25]. WEPT trials were also positively related to the choice of the bio-based bottles, $r(527) = .11$, $p = .012$, BCa 95% CI [.21, .20].

The Relationship Between WTP and the WEPT

We conducted bootstrapped (5000) Spearman correlational analyses to determine whether participants' willingness to pay for the different bottle types relates to their efforts in the WEPT. We found that effort in the WEPT was not correlated with willingness to pay for any of the bottles (see Table S3). Our hypothesis was therefore not supported.

Relationship Between Environmentalist Identity and Political Orientation

There was a moderate correlation between identification as an environmentalist and political orientation, $r(527) = -.345$, $p < .001$, suggesting that the more left-wing and progressive participants were, the more they identified as an environmentalists.

Political Orientation and Pro-environmental Behaviour

A correlation analysis (Table S4) revealed that the more right-wing/conservative participants were, the fewer WEPT trials they completed.

We ran a multinomial logistic regression (instead of the pre-registered regression) to determine whether likelihood of choosing a bio-based bottle related to political orientation. Results suggest that neither those who chose the PEF plastic bottle (b = -.063, Wald χ^2 = .26, p = .613), nor those who chose the paper PEF bottle (b = -.15, Wald χ^2 = 1.63, p = .202) were of different political orientations from those participants who chose the PET bottle (reference category).

Motivation

We ran a bootstrapped (5000) correlation matrix (Table S4) to determine whether and how extrinsic and intrinsic motivation related to the other variables measured: Willingness to pay for the different material types, bottle choice (a bio-based versus PET bottle), political orientation, environmentalist identity, number of WEPT trials completed, and attitudes towards the different materials.

Participants with higher extrinsic motivation tended to have lower intrinsic motivation, identified less with being an environmentalist, and had less positive attitudes towards paper PEF. They were however willing to pay more for the PET plastic bottle. None of the other correlations were significant

Participants high in intrinsic motivation were willing to pay less for PET plastic, had more negative attitudes towards PET, and tended to be more left-wing. They were also willingness to pay more for the paper PEF bottle, made a more sustainable bottle choice, completed more WEPT trials, and held positive attitudes towards paper PEF. This suggests that it is mainly internal motivation that is related to pro-environmental attitudes and behaviour.

Perceived Environmental Values and Bottle Choice

A Spearman correlation showed that perceived environmental group norms did not relate to bottle choice overall, $r = .05$, $p = .34$. Neither did they relate to bottle choice in the most valued condition, $r = .07$, $p = .33$, nor in the least valued condition, $r = .05$, $p = .51$. This suggests that bottle choice is not influence by the perceived environmental values of the social group present.

Table S4

Correlation Table Including Motivation

	1	2	3	4*	5	6*	7	8	9	10	11
1. PET WTP											
2. PEF plastic WTP	.76 [z]										
3. paper PEF WTP	.54 [z]	.76 [z]									
4. Bottle choice*	-.10 [x]	.03	.06								
5. Political Orientation	-.03	-.15 [z]	-.20 [z]	-.05							
6. WEPT trials*	-.05	.02	.04	.11 [x]	-.16 [z]						
7. Environmentalist ID	-.06	.09 [x]	.23 [z]	.11 [x]	-.35 [z]	.18 [z]					
8. PET overall attitude	.04	-.02	-.11 [x]	-.19 [z]	.12 [y]	-.04	-.11 [x]				
9. PEF plastic overall attitude	.05	.13 [y]	.01	-.09	-.08	.09	.06	-.03			
10. Paper PEF overall attitude	-.13 [y]	-.03	.09 [x]	.14 [y]	-.11 [y]	.14 [y]	.15 [z]	-.36 [z]	.29 [z]		
11. Extrinsic motivation	.09 [x]	-.002	-.30	-.01	.07	-.04	-.14 [y]	.06	-.07	-.13 [y]	
12. Intrinsic motivation	-.11 [x]	.07	.20 [z]	.13 [y]	-.40 [z]	.21 [z]	.70 [z]	-.21 [z]	.07	.24 [z]	-.15 [z]

[x] $p < .05$; [y] $p < .01$; [z] $p < .001$

* Spearman correlation instead of Pearson correlation.

Note. Bio-based bottle choice combines the choices of the PEF plastic and the paper PEF bottle.

References

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