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If You Want Help, You'd Better Be Green! Investigating the Effects of Sustainability Perceptions on Customer Co-Creation in New Product Development

Slawka Jordanow 

Saarland University, Saarbrücken, Germany

Correspondence: Slawka Jordanow (slawka.jordanow@uni-saarland.de)**Received:** 27 October 2023 | **Revised:** 5 June 2025 | **Accepted:** 13 September 2025**Associate Editor:** Aron O'Cass**Keywords:** customer co-creation | innovation | new product development | regulatory focus | sustainability

ABSTRACT

Academic Summary: This research examines whether and how a firm's sustainable image increases customer co-creation in new product development (NPD). Across four studies, two scenario-based experiments (Study 1a: $n = 184$; Study 2a: $n = 285$) and two behavior-based idea contests (Study 1b: $n = 197$; Study 2b: $n = 396$), this article evaluates whether a sustainable image and sustainability-focused communications raise co-creation by shaping customers' environmental and health perceptions. Using partial least squares structural equation modeling, Studies 1a–1b show that firms perceived as sustainable elicit higher co-creation intention (Study 1a) and behavior (Study 1b) than firms without a sustainable image. These effects are fully mediated by perceived environmental and health benefits. Studies 2a–2b demonstrate that communications emphasizing environmental or health contributions increase co-creation by raising the corresponding perceived benefits. The effects are contingent on customers' regulatory focus: environmental benefits are more influential for promotion-focused customers, whereas health benefits are more influential for prevention-focused customers. The findings contribute to the understanding of co-creation by identifying sustainability-related benefit perceptions as psychological drivers, detailing communication levers that activate them, and establishing regulatory focus as a boundary condition in sustainability-driven co-creation.

Managerial Summary: To effectively encourage customers to engage in innovation activities, companies should communicate their sustainability efforts in a visible manner. Across four studies, customers were more willing and more likely to take part in idea generation, evaluation, and refinement when they perceived the company as sustainable. This is because people believe their effort will produce products that are better for the environment and for their own health. Companies can unlock this motivation with precise messaging: (1) Environmental messages (e.g., CO₂ reduction, resource savings) raise perceived environmental benefits from co-creating and increase participation. (2) Health messages (e.g., non-harmful materials, wellbeing) raise perceived health benefits and increase participation. Furthermore, companies should match the message to the audience. Customers who seek progress and positive change react especially well to environmental-benefit messaging, while customers who prioritize safety and risk-avoidance react especially well to health-benefit messaging. In conclusion, companies should audit whether customers recognize their sustainable practices, communicate specific environmental or health contributions rather than vague claims, and segment outreach by motivational profile so that the right customers receive the right message at the right time. The result is more and better customer co-creation during NPD, achieved by aligning sustainability signals with what different customers value.

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1 | Introduction

In recent years, the global focus on sustainability has markedly intensified due to heightened awareness of the impacts of climate change and resource depletion. This increased consciousness has led political actors (Halkos and Gkampoura 2021) and economic stakeholders (Kotler 2011) to recognize the critical need for implementing sustainable practices. In the literature, sustainability is typically described using three primary pillars: environmental, economic, and social sustainability (e.g., Goodland 1995; Labuschagne et al. 2005). While all three pillars are necessary for reaching long-term sustainable development (Labuschagne et al. 2005), prior research has especially highlighted environmental sustainability (Bazel-Shoham et al. 2024) as a critical grand challenge (Bazel-Shoham et al. 2024; Bouguerra et al. 2024). Moreover, consumers are increasingly aware of their environmental impact and are demanding more sustainable products and services (Jain et al. 2021; Ketata et al. 2015). Consequently, environmental sustainability has transitioned from the periphery to the business mainstream, prompting companies to intensify the development and production of environmentally sustainable innovations (Paparoidamis et al. 2019; Shu et al. 2016; Dutta et al. 2021). Accordingly, this article focuses on innovation within the context of environmental sustainability and will specifically reference environmental sustainability when discussing sustainability throughout. Sustainable companies are thus understood as organizations that implement activities to reduce pollution and waste, minimize raw material use and energy, particularly in their production activities (Vesal et al. 2021, 2022), aiming for a constant stream of sustainable innovations. These innovations are defined as “a firm’s implementation of a new product, process, or practice, or modification of an existing product, process, or practice that significantly reduces the impact of the firm’s activities on the natural environment” (Varadarajan 2017, 17).

While extensive empirical evidence demonstrates that developing and introducing sustainable innovations can enhance company performance metrics such as profitability, market share, and sales (e.g., Hermundsdottir and Aspelund 2021), challenges persist in achieving their widespread adoption (Paparoidamis et al. 2019; Ozaki 2011; Heidenreich et al. 2017). To accelerate the diffusion of sustainable new products, it is essential to adjust their attributes to increase customer benefits and reduce adoption barriers (Everett M. Rogers 2003). Understanding customers’ preferences and needs is particularly crucial for this purpose (Matzler and Hinterhuber 1998). Prior research demonstrates that customer co-creation effectively identifies and integrates customer needs into new product and service development (Hoyer et al. 2010). Ranjan and Read (2016) define co-creation as customers actively collaborating with firms to create value across NPD or the subsequent consumption. Consistent with literature framing co-creation as a collaborative approach to NPD (e.g., Fuchs and Schreier 2011; Gemser and Perks 2015; Roberts et al. 2022), this article understands co-creation as activities conducted jointly with customers across the NPD process, encompassing tasks such as idea generation and evaluation (Fuchs and Schreier 2011; Chang and Taylor 2016), concept development (Nishikawa et al. 2013), and prototype or product optimization (Chang and Taylor 2016). Today, customer co-creation is often viewed as the “holy grail” for developing or adapting products and services (Handrich et al. 2015). Studies show that it enhances innovation performance (Hsieh and Hsieh 2015),

improves financial results (Zaborek and Mazur 2019), and raises purchase likelihood (Hoffman et al. 2010). Reflecting these benefits, 78% of large companies now embed customer co-creation in their innovation strategy (Wang et al. 2019).

However, to harness this method’s full potential, companies need to understand what drives customers to contribute their resources to co-creation activities in NPD (Hoyer et al. 2010; Vernet and Kidar 2013). Research indicates that engaging customers in co-creation for product or service development remains challenging, as many choose not to participate (Oertzen et al. 2020). For example, a McKinsey & Company study of 300 European firms revealed that while 90% of executives wanted customer involvement in co-creation, only 12% of Internet users already participated (Bughin 2014). Additionally, several studies highlight the importance of identifying drivers for customer contributions to new product development through co-creation (e.g., Oertzen et al. 2020; Hoyer et al. 2010). Therefore, a broad stream of research within the co-creation literature has concentrated on identifying drivers of co-creation behavior. For example, prior research suggests that external incentives, such as financial rewards, can stimulate customers’ motivation to participate in NPD co-creation activities (Hoyer et al. 2010). Moreover, research also indicates that customers’ perceptions of a company or the offers of a company are stimulators for co-creation behavior (e.g., Kim et al. 2019; Clauss et al. 2019). While previous research found a connection between companies’ sustainable image and consumer responses in terms of customer loyalty (Jung et al. 2020) and purchase behavior (Yeonsoo Kim 2017), research on whether customers are more willing to co-create in new product or service development with companies perceived as having a sustainable image is scarce. Only a few studies in the broader context of sustainability indicate that corporate social responsibility (CSR) can have a motivational effect on customers’ co-creation behavior (Iglesias et al. 2020). However, these studies centered their investigations on the social aspects of sustainability, neglecting the environmental aspects of sustainability. Thus, research on whether environmental aspects of a company’s sustainability perceptions drive customer co-creation is lacking at all.

Likewise, empirical research on the psychological mechanisms that drive customers to co-create in NPD with companies perceived as having a sustainable image is lacking. However, since co-creation can significantly improve performance metrics for firms developing sustainable innovations (Zhao et al. 2020; Feng et al. 2021), understanding these psychological mechanisms is essential. Furthermore, previous studies have emphasized the role of communication in facilitating customer co-creation (Haumann et al. 2015; Mahr et al. 2014; Lee and van Dolen 2015), suggesting that effective communication strategies targeting these psychological mechanisms can enhance participation. However, evidence identifying the most effective psychological factors to target in these communication strategies is also lacking.

Additionally, previous research indicates that the effectiveness of sustainability-related communication depends on customers’ regulatory focus (e.g., Bhatnagar and McKay-Nesbitt 2016). Regulatory focus theory identifies two motivational orientations: promotion focus, which seeks growth and positive outcomes, and prevention focus, which aims to avoid negative outcomes and ensure safety (Higgins 1997; Crowe

and Higgins 1997; Motyka et al. 2014). Although regulatory focus has been used to explain communication effectiveness in general (e.g., Zhao and Pechmann 2007), its role as a boundary condition for effective environmental communication in the context of customer co-creation in NPD remains understudied.

This work aims to address these gaps in the literature by conducting four studies. The first two studies ($n_{\text{Study1a}}=184$; $n_{\text{Study1b}}=197$) investigate whether customer co-creation in NPD varies between companies with a sustainable image and those without. In doing so, potential psychological mechanisms explaining this relationship are discovered. Drawing upon the findings of the first two studies, the second set of studies ($n_{\text{Study2a}}=285$; $n_{\text{Study2b}}=435$) investigates tailored communication strategies that target the underlying psychological mechanisms to further enhance customer co-creation in NPD. Additionally, these studies strive to investigate how customers' regulatory focus influences the effectiveness of communication strategies. Theoretically, the findings of the four studies contribute to previous literature on user innovation in two ways: First, prior research has demonstrated that companies' CSR affects customers' probability of engaging in co-creation behavior (Iglesias et al. 2020). This work expands the current knowledge by shifting the lens to environmental aspects of a company's image as a potential driver of customer co-creation behavior in NPD. Moreover, first light is shed on the psychological mechanisms that drive customers' co-creation in NPD with companies characterized by a sustainable image compared to those that are not. Hence, results enrich prior literature on customer-specific drivers for co-creation behavior by uncovering additional drivers and their underlying psychological mechanisms in the context of sustainability. Second, the findings contribute to the literature on communication strategies of sustainable company-related information (e.g., Bashir 2022; Line et al. 2016) by providing first empirical evidence for their effectiveness in driving customer co-creation in NPD. Furthermore, the studies identify individuals' regulatory focus as a crucial boundary condition for effective sustainable communication in co-creation contexts, adding knowledge from a contingency perspective. Practically, since companies often struggle to engage customers to co-create in NPD, these findings offer actionable communication strategies to motivate participation. More detailed, companies should ensure their sustainable practices are recognized by customers and, for those less focused on sustainability, highlight specific sustainable products, processes, or divisions. These insights guide targeted communication strategies, enabling managers to effectively attract customers to co-create in NPD by emphasizing tailored sustainability messages.

2 | Sustainability as Driver of Customer Co-Creation in NPD

2.1 | Conceptual Development

2.1.1 | Sustainability Perceptions and Co-Creation

Following existing research on drivers of customer co-creation, it is evident that customers' perceptions of a company or its offerings significantly influence their co-creation behavior. For

instance, studies have identified factors such as a company's general innovativeness (Kim et al. 2019), business model innovativeness (Clauss et al. 2019), and CSR initiatives (Iglesias et al. 2020) as key motivators for customer engagement. However, empirical studies examining whether customers are more inclined to co-create in NPD with companies perceived as sustainable versus non-sustainable are scarce, despite the growing importance of sustainability practices. This gap is notable, especially since prior research emphasizes the role of valuable tasks in customer co-creation (Haumann et al. 2015). Contributing to sustainable product development may represent just such a valuable task, implying that a company's perceived sustainable image can meaningfully strengthen customers' co-creation intention or behavior.

Although empirical evidence is lacking, the Value-Belief-Norm (VBN) theory (Jansson et al. 2011; Stern et al. 1999) provides a framework to explain why customers might prefer co-creating with sustainable companies. According to VBN theory, customers' values (e.g., altruistic or egoistic) shape their beliefs about the environmental and health impacts of a product or brand, which in turn activate personal norms that guide behavior. A company perceived as contributing to the common good and safeguarding the environment aligns with these norms, making co-creation not just a functional decision but also a morally desirable act. When companies develop and launch sustainable innovations, customers may perceive their engagement as promoting well-being and environmental protection, thereby increasing their motivation to participate in NPD co-creation activities (Hsieh and Chang 2016). Building on this reasoning, existing studies suggested that sustainability can function as a generic motivator for customers' behavior, particularly concerning their general engagement with these companies. For example, Steenis et al. (2023) provided evidence that a product's perceived sustainability influences customers' motivation to continuously engage in respective purchases. Likewise, Chen (2013) proved that a product's sustainable value as perceived by customers affects their motivation to engage in repurchases. Finally, Lin et al. (2017) found that the green perceived value of a brand has a positive impact on customers' motivation to engage in a long-term relationship with the respective company in terms of higher levels of customer loyalty. Conclusively, the customers' perceived sustainability of a product, brand, or company appears to heighten customers' motivation to interact with the respective product, brand, or company. Hence, it can be assumed that customers are more motivated to engage in co-creation during NPD with a company characterized by a sustainable image than with one lacking such an image.

Hypothesis 1. *Customer co-creation in NPD is higher for companies having a sustainable vs. non-sustainable image.*

2.1.2 | The Mediating Role of Environmental Perception and Health Perception

As awareness of the urgent need to act sustainably has increased, customers have become more aware that their behavior and choices impact the environment. Consequently, an increasing number of customers are adjusting their consumption patterns and opting for more sustainable alternatives (Ketata et al. 2015) to reduce environmental harm (Calderon-Monge et al. 2020)

and health-related risks (Birch et al. 2018). Protection motivation theory suggests that when customers perceive environmental and health risks, they are motivated to protect themselves (Ronald W. Rogers 1975). This protective motivation drives them to choose sustainable products as effective coping strategies, reinforcing their shift towards sustainable consumption (Zhao et al. 2016).

To understand and explain the underlying motivations of customers to engage in sustainable behaviors, authors often relied on consumer values (e.g., Schultz and Zelezny 1998; Yadav 2016; Sadiq et al. 2022). This viewpoint is explained by the fact that values are seen as motivators for human actions, as they are mostly associated with specific goals and can explain the underlying motivations for attitudes and behavior (Schwartz 2012). Existing studies in the context of values and sustainable consumer behavior provide evidence that altruism and egoism play a significant role in explaining the underlying reasons for customers' engagement in sustainable actions (Kareklas et al. 2014; Prakash et al. 2019). More specifically, altruism is associated with an enhanced concern for others (Kago and Venkataraman 2023). Within this respect, research suggests a link between altruism and environmental concern in a way that altruism triggers a preference for behaviors that benefit the environment or others over those that primarily benefit themselves (Mansoor and Paul 2022; Yadav 2016), which in turn might explain the preference for sustainable behaviors. In this regard, multiple studies have established the importance of environmental concern in the context of sustainable consumer behavior. Sadiq et al. (2022) found that customers' environmental concerns positively affect their attitude towards sustainable offerings. Furthermore, Panda et al. (2020) proved that long-term interaction with a sustainable brand, that is, brand loyalty, is motivated by customers' environmental concerns. Lastly, Prakash et al. (2019) determined that environmental concern can be considered a driver for higher intentions to purchase sustainable products.

Framed within VBN theory, these findings suggest that environmental perceptions represent a critical belief structure that emerges from altruistic values and, in turn, activates personal norms to engage with the sustainable company. In other words, customers' perception of whether a company's products contribute to the environment and thus address their environmental concerns explains their engagement with the company, that is, loyalty, attitude or purchase intention. Thus, assuming that this effect extends to customer co-creation is reasonable. More precisely, if a company offers sustainable products, customers are likely to perceive these products as environmentally conscious, influencing their engagement in co-creation with the respective company during NPD. By doing so, customers' environmental perceptions not only mirror their altruistic values but also amplify the normative pressure to co-create environmentally friendly new products with companies they perceive as environmentally responsible. Therefore, customers' environmental perception of a company's products may mediate the effect of perceived sustainable image on their co-creation behavior.

Hypothesis 2. *The effect of a sustainable vs. non-sustainable image on customer co-creation in NPD is mediated by customers' environmental perceptions.*

Customers whose behavioral motivation is predominately driven by egoism perform actions motivated by self-interest (Kago and Venkataraman 2023). This applies whether their primary focus is on their self-concern (Schwartz 1977; Yadav 2016) or/and concern for close individuals (Prakash et al. 2019). In this regard, prior research indicated a connection between egoism and health concern, suggesting that egoism triggers an inclination to prioritize behavior that is beneficial to customers' own health (Prakash et al. 2019; Sadiq et al. 2022), which in turn might explain the preference for sustainable offerings. For example, Sadiq et al. (2022) demonstrated that customers' health concern is a driving factor of their attitude towards sustainable products. Furthermore, Birch et al. (2018) revealed that as customers' concern for health increases their propensity to buy sustainable products, that is, local food, also increases. Finally, Yadav (2016) provided evidence that customers' purchase intentions for sustainable products are driven by their health concern.

From a VBN theory perspective, health perceptions align with egoistic values, leading customers to believe that sustainable products safeguard their own well-being. Such beliefs activate personal norms oriented towards self-interest, which ultimately translate into higher co-creation engagement. In other words, when customers perceive products as free from health risks, thereby addressing their health concerns, they are more inclined to engage with the corresponding company. This heightened engagement explains why customers who perceive a company's offerings as health-safe are more likely to co-create during NPD, making their health perception a plausible mediator of the relationship between perceived sustainable image and customer co-creation.

Hypothesis 3. *The effect of a sustainable vs. non-sustainable image on customer co-creation in NPD is mediated by customers' health perceptions.*

The proposed relationships can be found in Figure 1.

2.2 | Study 1a: Scenario-Based Experiment

2.2.1 | Data, Setting and Measures

To empirically test Hypotheses 1–3, a scenario-based experiment with sustainable image as a between-subjects factor was conducted. This method engages participants with hypothetical scenarios, prompting them to imagine themselves in specific roles or contexts, thereby eliciting valuable insights into their potential reactions and decisions (Kwon and Weingart 2004; Wagner et al. 2009). Scenario-based experiments are particularly effective in establishing causality by creating an abstract environment that controls for extraneous variables (Bitner 1990), which could in a real-world setting influence results on actual co-creation behavior, such as company familiarity or previous experiences with the company. Furthermore, the random assignment of participants to different scenarios effectively neutralizes distortion effects of unobserved individual differences, thereby establishing a robust causality between the variables under investigation (Aronson et al. 1990; Colquitt 2008).

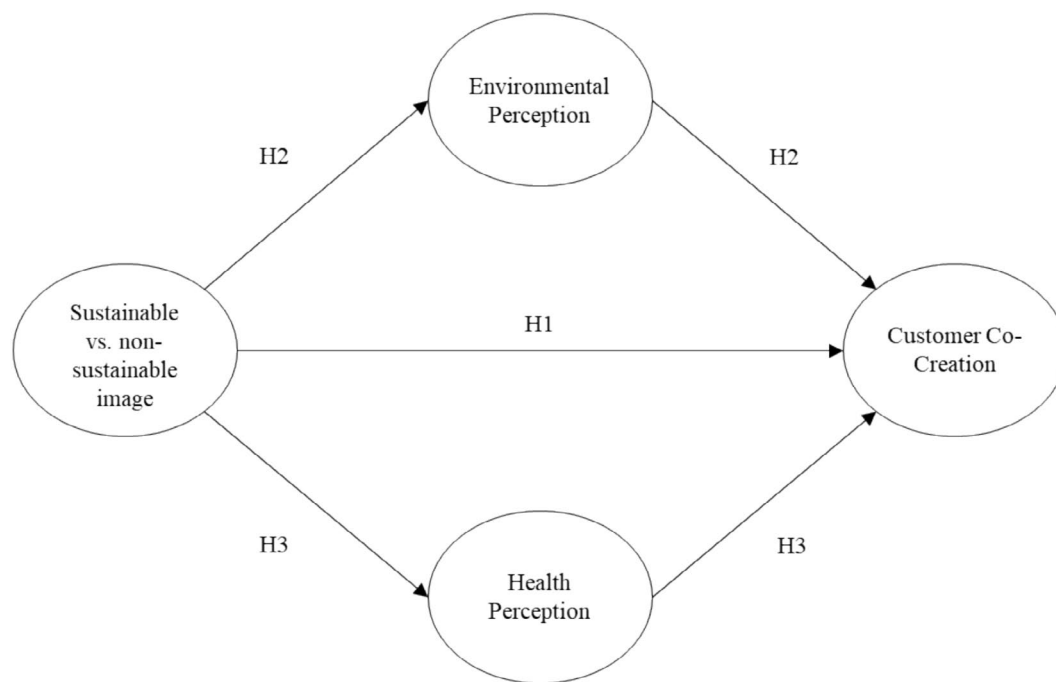


FIGURE 1 | Research model Study 1a and 1b.

A fictitious automotive manufacturer, Jaro Group, was selected as the research context because the automotive industry is commonly used in studies on sustainable consumer behavior (e.g., Jaiswal et al. 2021; Egbue and Long 2012) and has recently undergone significant sustainable transitions (Krätzig et al. 2019). Two scenarios were developed: a sustainable image scenario and a non-sustainable image (control) scenario (see Appendix A.1). In the non-sustainable image (control) scenario, Jaro Group was described as producing cars with high-quality internal combustion engines using traditional procedures and materials. In the sustainable image scenario, it was portrayed as manufacturing cars with high-quality electric motors using sustainable procedures and materials. Following the sustainable image manipulation, participants received an invitation from Jaro Group to join a program that actively involves customers in the company's internal NPD processes. To ensure the scenarios were realistic and the sustainable image manipulation effective, a pretest ($n = 59$) was conducted (Perdue and Summers 1986). Participants rated the scenarios' realism using two questions on a seven-point Likert scale (1 = "completely disagree" to 7 = "completely agree") (Heidenreich et al. 2016; Wagner et al. 2009), achieving a sufficient realism level ($M = 5.322$, $SD = 1.272$). Additionally, three items from Lee's (2020) measurement inventory were adapted to assess the sustainable image manipulation, demonstrating high measurement quality (see Appendix A.2). An ANOVA confirmed the manipulation's effectiveness ($M_{\text{Control}} = 4.474$, $M_{\text{Sustainability}} = 5.848$; $F(1, 58) = 17.002$, $p < 0.01$). To ensure that the scenarios differed only in perceived sustainability and not in perceived innovativeness, a second pretest ($n = 69$) was conducted. Participants rated the companies' innovativeness using an adapted item from Moreau et al. (2001) on a seven-point Likert scale. The ANOVA results showed no significant difference in perceived innovativeness between the non-sustainable image ($M = 3.395$) and the sustainable image

scenarios ($M = 3.774$; $F(1, 68) = 0.782$, n.s.), confirming that perceived sustainability was the sole differentiating factor. Overall, the pretests validated the realism and effectiveness of the scenario manipulations.

Data were collected using a self-administered online questionnaire, with participants recruited by an online crowdsourcing platform (i.e., Clickworker). They were randomly assigned to one of the two pretested scenarios. After reading the scenarios, participants reported their intention to co-create in NPD using an adapted measurement inventory from Kulviwat et al. (2007) (see Appendix A.3). Subsequently, they answered questions on mediators, control variables, and sociodemographic factors. Environmental and health perceptions were measured with three adapted items each from Gershoff and Frels (2015). Green self-identity, as a control variable, was assessed using three items adapted from Hansen et al. (2018). Sociodemographic controls included age (in years), education (six levels), gender (female/male), and annual income (in euros).

Given that the data was gathered based on single informants' responses during an online survey, there may be potential risks of common method bias (Podsakoff et al. 2003). In order to alleviate concerns within this respect, several measures both prior to data collection and through statistical tests during the analysis were implemented. Specifically, participants were assured that there were no right or wrong answers and that their responses would be kept anonymous. Moreover, only established measures were used and the dependent and independent variables in the survey were clearly separated (Podsakoff et al. 2003). In line with previous studies (e.g., Klein et al. 2021), the Harman's single-factor test was performed, finding that no single factor explained more than half of the variance. Accordingly, common method bias did not affect the results.

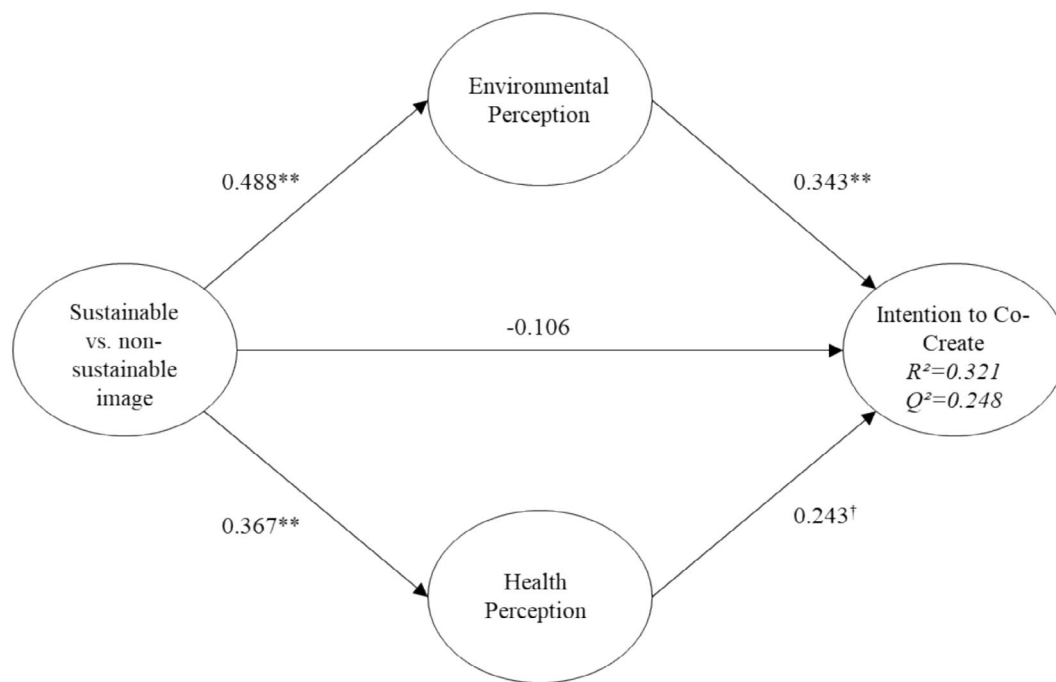


FIGURE 2 | Structural model results of Study 1a.

A total of 200 subjects completed the survey. However, as attention checks were included to detect inattentive participants (Abbey and Meloy 2017), 16 participants were excluded due to incorrectly answering the attention check question. For the remaining 184 participants (M_{age} : 37.271; 38% female), the most frequently mentioned educational category was “university degree or other graduated degree” (51.6%), followed by “high school diploma” (23.9%) and “completed apprenticeship” (13.6%). A total of 39.7% of the participants had an annual income of over 35,000€.

2.2.2 | Analysis and Results

Structural equation modeling (SEM) was used to examine the proposed relationships simultaneously. As no normal distribution was given for the data ($D(184)=0.117$, $p<0.01$), the partial least squares (PLS) method was chosen (Hair et al. 2012), and SmartPLS 3.0 (Hair et al. 2022) was applied for calculation. To test the quality of construct measures, the assessment encompassed the evaluation of indicator and construct reliability, as well as discriminant and convergent validity (Hair et al. 2012; Götz et al. 2009). Results show that all measurements surpassed common threshold values (please see Appendices A.3 and A.4) (Fornell and Larcker 1981). To further validate the discriminant validity beyond the Fornell-Larcker criterion, which was fulfilled (Fornell and Larcker 1981), the correlations' heterotrait-monotrait ratio (HTMT) was assessed (Henseler et al. 2015). All HTMT values of construct pairs were well below the common threshold of 0.900 (Teo et al. 2008; Henseler et al. 2015). Additionally, bias-corrected bootstrap confidence intervals were computed. None of the 95% confidence intervals for any of the construct pairs included 1, confirming the discriminant validity of the constructs (Hair et al. 2017; Klein et al. 2021).

Thereafter, the structural model was assessed (please see Figure 2 and Table 1). Since the studies presented in this manuscript are exploratory in nature, effects reaching a significance threshold of $p<0.10$ are considered significant, consistent with Hair et al. (2017), alongside the conventional thresholds of $p<0.05$ and $p<0.01$. This approach aligns with recent exploratory studies in innovation management (e.g., Gu et al. 2024; Heidenreich et al. 2024; Melnychuk and Schultz 2025) and reflects the exploratory, prediction-oriented characteristics of PLS-SEM, which prioritizes variance explanation and theory building while avoiding the premature exclusion of potentially meaningful relationships. The model showed a satisfactory fit, with an R^2 of 0.321 for customers' co-creation intention and a Q^2 of 0.248, confirming predictive power (Tenenhaus et al. 2005). The highest variance inflation factor (VIF) was 3.291, indicating no multicollinearity issues. Mediation hypotheses were tested following Hayes' (2017) procedure. Initially, without mediators, sustainable image significantly increased co-creation intention ($\beta=0.161$, $p<0.05$), supporting Hypothesis 1.¹ When mediators were included, a sustainable image positively influenced environmental perception ($\beta=0.488$, $p<0.01$), which in turn positively affected co-creation intention ($\beta=0.343$, $p<0.01$), supporting Hypothesis 2. Similarly, sustainable image significantly enhanced health perception ($\beta=0.367$, $p<0.01$), and health perception had a marginally significant positive influence on co-creation intention ($\beta=0.243$, $p<0.10$), thus supporting Hypothesis 3. The direct effect of sustainable image on co-creation intention became non-significant ($\beta=-0.106$, n.s.) when mediators were included, indicating full mediation.

In order to assess the significance of both proposed mediations, the sampling distribution of the indirect effect was bootstrapped (Preacher and Hayes 2008). Both the indirect effect via environmental perception ($\beta=0.167$, $p<0.05$) and the indirect effect via

TABLE 1 | Results overview of Study 1a and 1b.

		Path coefficient study 1a/1b	t-value study 1a/1b
Direct effects		Co-creation	
Sustainable image		−0.106/−0.075	1.507/1.039
Environmental perception		0.343/0.387	2.705/2.727
Health perception		0.243/0.284	1.928/2.148
		Environmental perception	
Sustainable image		0.488/0.565	8.864/11.072
		Health perception	
Sustainable image		0.367/0.427	5.787/7.367
Specific indirect effects		Co-Creation	
Sustainable image via health perception		0.089/0.121	1.764/1.997
Sustainable image via environmental perception		0.167/0.219	2.511/2.654
Direct effects		Co-creation	
Controls	Green self-identity	0.095/0.004	1.220/0.073
	Age	−0.133/−0.003	2.082/0.055
	Gender	0.022/−0.003	0.339/0.058
	Education	0.083/0.035	1.167/0.644
	Income	0.021/−0.020	0.284/0.348

health perception ($\beta = 0.089$, $p < 0.10$) of the company's products were significant, though the latter was only marginally significant. Hence, the total indirect effect of sustainable image on co-creation is positive and relatively high ($\beta = 0.257$, $p < 0.01$). In conclusion, Hypotheses 2 and 3 can be confirmed as the direct effect of sustainable image on customer co-creation is fully mediated via environmental and health perception of the company's products. The results of the control variables can be found in Table 1.

2.3 | Study 1b: Idea Contest

2.3.1 | Data, Setting and Measures

To replicate Study 1a's findings, Study 1b employed an experimental design within an online idea contest on the crowdsourcing platform Clickworker. Recruiting participants through commercial market-research consumer panels such as Clickworker is well established in research on idea contests (Ihl and Vossen 2021). Participants were informed that the idea contest was being conducted in collaboration with a German automotive manufacturer and that their participation was entirely voluntary. All respondents received the standard Clickworker compensation simply for completing the initial questionnaire, irrespective of any further engagement, ensuring that this payment served only as a recruitment incentive rather than remuneration for co-creation. In addition to this base payment, participants who voluntarily chose to join the idea contest were offered an additional incentive, as is common in prior research (Boss et al. 2017): a jury-selected evaluation of all submissions,

in which the top three contributors would receive Amazon gift vouchers (100 € for first place, 50 € for second place, and 25 € for third place). Thus, the decision to contribute ideas was driven by the contest prizes and intrinsic interest, mirroring real-world corporate idea contests rather than the necessity to earn the Clickworker fee. Because the base payment was identical for every respondent and assignment to the sustainable vs. non-sustainable scenario was random, any Clickworker-related bias is evenly distributed across conditions, allowing treatment effects to be interpreted meaningfully. As in Study 1a, the replication study (Study 1b) employed an experimental design with sustainability as a between-subjects factor using the same scenarios and manipulations as in the original scenario-based experiment (sustainable vs. non-sustainable image of the fictitious automotive manufacturer Jaro Group). While Study 1a relied on self-reported co-creation intentions, Study 1b aimed to capture actual co-creation behavior. To achieve this, after their random exposure to the scenario descriptions, participants were invited to engage in a three-stage idea contest that included idea generation, idea evaluation, and modification tasks, following approaches used in prior research (Boss et al. 2017).

In the idea generation task, participants were asked to propose innovative features for a future vehicle concept by Jaro Group, describing each feature in a neutral manner, focusing solely on its potential to revolutionize the market. During the idea evaluation task, participants reviewed a set of previously introduced innovative features and provided constructive, neutral feedback on the features, ensuring that their evaluations considered aspects such as feasibility, usefulness, and novelty. Finally, in the idea modification task, participants refined existing innovative features,

proposing improvements that would enhance the probability of market success. Participation in each stage was coded as a nominal variable (0=no participation, 1=participation), resulting in three distinct indicators of co-creation behavior, a common approach in prior research (Bayus 2013). These three binary indicators were modeled as reflective indicators of a latent “Co-Creation Behavior” construct; their factor loadings, composite reliability, and average variance extracted are reported in Appendix A.5. Hence, instead of employing a scale to measure co-creation intentions (Kulviwat et al. 2007) as in study 1a, the latent construct formed from these reflective indicators served as the key dependent variable in Study 1b, providing a behaviorally grounded assessment of co-creation engagement. All other measures, including environmental and health perceptions of the company’s products, green self-identity, and sociodemographic controls, remained consistent with those in the scenario-based experiment in study 1a.

As in the scenario-based experiment of study 1a, data were gathered through an online questionnaire, now integrated into the idea contest. To mitigate the risk of common method bias (Podsakoff et al. 2003), established precautions were again taken before and during data collection. Consistent with Study 1a, Harman’s single-factor test confirmed that no single factor accounted for the majority of variance, suggesting that common method bias was not problematic. Furthermore, attention checks ensured data quality. Out of an initial 210 participants, 9 were excluded due to failing these checks. An additional 4 participants were removed because their submitted content did not represent meaningful participation (e.g., meaningless character strings). Among the remaining 197 participants ($M_{\text{age}}=42.074$; 39% female), the largest proportion held a university or graduate-level degree (53.8%), followed by those with a high school diploma (27.4%) and those who had completed an apprenticeship (13.2%). Furthermore, 43.1% of the participants reported an annual income exceeding €35,000.

2.3.2 | Analysis and Results

In line with Study 1a, partial least squares (PLS) analysis was performed using SmartPLS 3.0. All measures met established reliability and validity thresholds (Fornell and Larcker 1981; Hair et al. 2012; Götz et al. 2009), and the Fornell-Larcker criterion was fulfilled (please see Appendices A.5 and A.6). Assessing heterotrait-monotrait ratios further confirmed discriminant validity, with all values below 0.90% and 95% bias-corrected bootstrap confidence intervals excluding 1 (Henseler et al. 2015; Klein et al. 2021).

The model fit was satisfactory (please see Figure 3), explaining 38% of variance in co-creation behavior ($R^2=0.378$) and displaying predictive relevance ($Q^2=0.249$; Tenenhaus et al. 2005), with no issues of multicollinearity (max VIF=4.643). Following Hayes (2017), the mediation was examined in two steps. First, without mediators, sustainable image positively influenced co-creation ($\beta=0.284$, $p<0.01$), confirming Hypothesis 1.² Second, after adding both mediators, sustainable image significantly impacted environmental perception ($\beta=0.565$, $p<0.01$), which in turn affected co-creation ($\beta=0.387$, $p<0.01$), and similarly affected health perception ($\beta=0.427$, $p<0.01$), which in turn enhanced co-creation ($\beta=0.284$, $p<0.05$). With both mediators included, the direct effect of sustainable image on co-creation became non-significant ($\beta=-0.075$, n.s.). Bootstrapping the indirect effects (Preacher and Hayes 2008) confirmed their significance (environmental: $\beta=0.219$, $p<0.01$; health: $\beta=0.121$, $p<0.05$), indicating full mediation. Consequently, Hypotheses 2 and 3 were supported. To provide a more detailed perspective, the specific indirect effects of sustainable image via environmental and health perception were first calculated separately for each binary co-creation indicator and subsequently summed

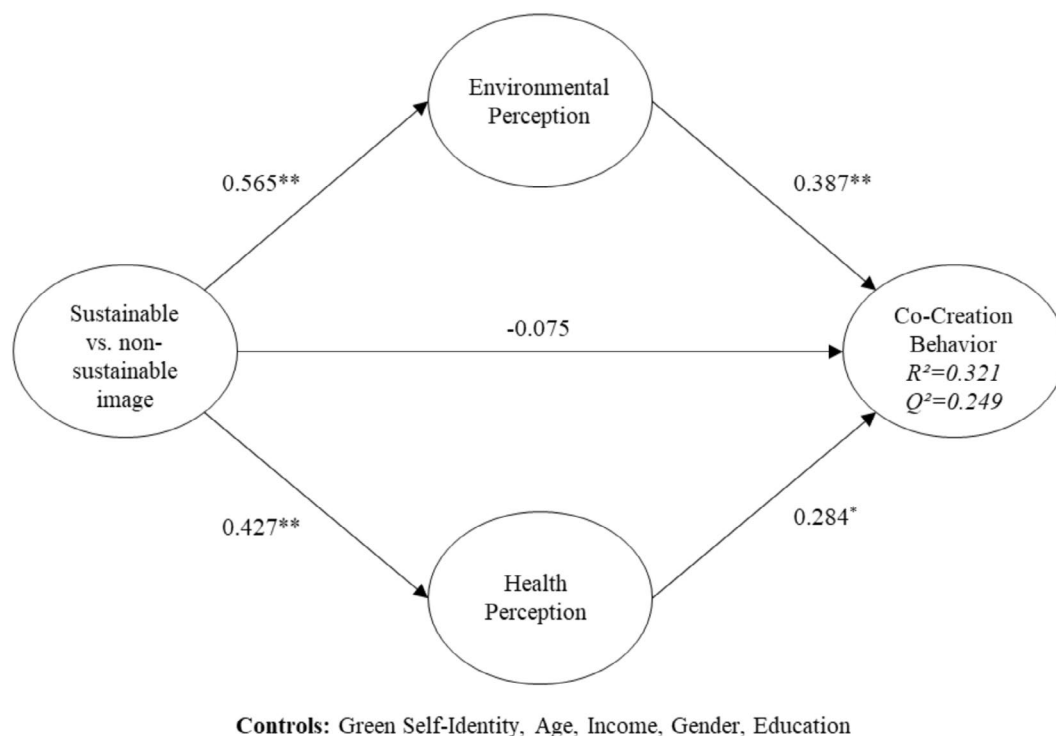


FIGURE 3 | Structural model results of Study 1b.

to evaluate their combined impact on co-creation behavior during idea generation, evaluation, and modification. The strongest combined indirect effect was observed for idea generation ($\beta=0.327$), followed by idea evaluation ($\beta=0.274$) and idea modification ($\beta=0.261$). This result indicates that perceiving a sustainable image particularly encourages co-creation behavior during idea generation. Control variable results are shown in Table 1.

2.4 | Discussion

The results from Study 1a and 1b provide support for the hypothesized relationships within the research model. Complementing prior research that found a positive relationship between CSR perception and co-creation (Iglesias et al. 2020; Liu et al. 2022), the studies found customers' co-creation intentions (Study 1a) as well as behavior (Study 1b) are higher for companies they perceive as having a sustainable image compared to those that do not (Hypothesis 1). Furthermore, the results of the mediation analyses revealed that customers' heightened engagement in co-creation for companies with a sustainable image can be attributed to their perception of the company's products as being environmentally and health-friendly products. Specifically, the relationship between sustainable image and co-creation is fully mediated by customers' perception of the company's environmental impact (Hypothesis 2) or health impact (Hypothesis 3) through its products.

As highlighted in the introduction, companies often struggle to motivate their customers to engage in co-creation activities. Therefore, it is crucial from a managerial perspective to gain knowledge about effective communication measures that enhance customers' motivation to co-create. Based on the findings of Study 1a and b, which identified the psychological mechanisms behind sustainability perceptions leading to higher co-creation intentions and behavior, tailored communication measures addressing these mechanisms can be developed. More specifically, targeted communication of environmental and health aspects could be an effective means to enhance customer co-creation in NPD. Yet, to the best of the author's knowledge, empirical evidence on whether environmental or health-related communication strategies are an effective approach to stimulate customer co-creation in NPD is absent. Thus, the following studies aim to address this shortcoming and close the corresponding research gap.

3 | Effectiveness of Sustainable Communication Strategies

3.1 | Conceptual Development

3.1.1 | Environmental- and Health-Related Information Communication and Co-Creation in NPD

The communication strategy that a company chooses to promote its innovations can have a significant impact on customer behavior in general (Wang et al. 2019; Heidenreich and Kraemer 2016), which in turn affects companies' success (Lee and O'Connor 2003; Chen et al. 2007). However, previous

research has shown that the choice of appropriate communication is not only relevant for the success of innovations but also for the success of co-creation activities (e.g., Gustafsson et al. 2012; Mahr et al. 2014; Islam and Kirillova 2021). Within the research area of customer co-creation and company communication, there is evidence that communication strategies can influence customers' motivation during co-creation activities. For example, Mahr et al. (2014) observed the impact of diverse communication channels on the value of customers' co-created knowledge. Also, Lee and van Dolen (2015) demonstrated that employees' communication styles affect users' sentiment differently in co-creation communities. Finally, findings from Haumann et al. (2015) provide empirical evidence that communication strategies can mitigate negative perceptions of customers during co-creation processes. Thus, communication in the context of customer co-creation seems to enable companies to address certain levers that trigger customer-sided motivational factors and thus affect customers' engagement in co-creation activities.

Within this respect, the VBN theory (Jansson et al. 2011; Stern et al. 1999) provides a theoretical lens to understand how communication strategies can shape customers' values, beliefs, and personal norms, ultimately guiding their co-creation engagement in NPD. By emphasizing environmental or health-related contributions, companies can align with customers' altruistic or egoistic values, respectively, which then form beliefs about the company's sustainable impact and activate personal norms that motivate co-creation. Accordingly, prior research has shown that perceived benefits from co-creation, that is, hedonic, learning, social integrative, and personal integrative benefits, drive customers' engagement in co-creation activities (Nambisan and Baron 2009). In this regard, Study 1 found that customers' environmental and health perceptions are particularly relevant for their co-creation engagement in sustainability contexts as they correspond to customers' altruistic or egoistic orientations. Thus, customers are likely to perceive greater environmental or health benefits when co-creating with companies prioritizing these issues. According to social exchange theory, customers engage in co-creation when perceived benefits outweigh costs (Füller 2010). By applying the VBN theory perspective, such perceived benefits can be seen as norm-reinforcing outcomes that validate customers' initial values and beliefs, thereby intensifying their normative commitment to sustainable co-creation behaviors. Thus, to enhance customer motivation for co-creation in NPD, companies should tailor communication strategies to emphasize their contributions to environmental and health-related issues, thereby increasing perceived benefits and positively influencing the cost-benefit analysis.

With regard to environmental benefits, communicating a company's environmental efforts, such as producing eco-friendly products or using sustainable processes, effectively appeals to customers' altruistic orientations. These communications enhance the company's image as environmentally conscious. By participating in co-creation and contributing to NPD, customers help introduce environmentally beneficial products. Thus, co-creating with such companies allows customers to act in line with their altruistic values by developing eco-friendly innovations (Mansoor and Paul 2022; Yadav 2016). In VBN theory

terms, this alignment with altruistic values and environmentally focused beliefs activates personal norms that further increase the customer's moral obligation to co-create, thereby intensifying their co-creation engagement. In conclusion, it can be expected that companies that prioritize communicating their contribution to environmental issues are likely to elevate customers' perception of the environmental benefits associated with their co-creation activities during NPD. As a result, co-creation in NPD with the respective company is expected to be further amplified.

Hypothesis 4. *For companies communicating their contribution to environmental issues, customer co-creation in NPD will be stronger due to higher perceived environmental benefits.*

Regarding health benefits, communicating a company's health initiatives, such as producing healthy products or using health-friendly materials, effectively appeals to customers' egoistic orientations. This portrays the company as health-conscious, increasing customers' likelihood to engage in co-creation activities that develop health-benefiting products. Thus, participating in co-creation with such companies allows customers to align their actions with their egoistic values by contributing to health-friendly innovations (Yadav 2016; Prakash et al. 2019). When viewed through the VBN theory framework, these communications connect egoistic values with beliefs about personal health benefits, thereby activating personal norms centered on self-interest and well-being. As a result, customers perceive a moral imperative to co-create in order to secure and enhance their health-related benefits, further increasing their co-creation engagement during NPD. In conclusion, by prioritizing communication that emphasize their contribution to health issues, companies have the potential to enhance customers' perception of health benefits associated with participating in co-creation activities. Consequently, this is expected to significantly enhance customers motivation to co-create during NPD with the respective company.

Hypothesis 5. *For companies communicating their contribution to health issues, customer co-creation in NPD will be stronger due to higher perceived health benefits.*

3.1.2 | The Moderating Role of Customers' Regulatory Focus

Prior research indicates that the effectiveness of company communications depends on customer characteristics, particularly regulatory focus (e.g., Luo et al. 2023; Zhao and Pechmann 2007). Regulatory focus theory (Higgins 1997) distinguishes between promotion-focused individuals, who seek growth and positive outcomes, and prevention-focused individuals, who aim to avoid negative outcomes and prioritize safety and responsibility (e.g., Motyka et al. 2014; Crowe and Higgins 1997). These foci significantly influence decision-making (Herzenstein et al. 2007; Werth and Foerster 2007) and the acceptance of persuasive messages (Yeung-Jo Kim 2006). Specifically, the effectiveness of environmental and health-related messages varies with regulatory focus (Bhatnagar and McKay-Nesbitt 2016; Keller 2006; Ku et al. 2012; Pichierri et al. 2020). For instance, Ku et al. (2012) and Bhatnagar and McKay-Nesbitt (2016) found

that pro-environmental advertising impacts behavioral intentions differently based on regulatory focus, while Pichierri et al. (2020) and Keller (2006) showed that the effectiveness of health claims is moderated by regulatory focus. Integrating insights from VBN theory with regulatory focus theory, the impact of communication on customer co-creation can be understood as the interplay between customers' value-driven norms and their goal orientation. Customers' promotion or prevention focus influences how they interpret and internalize messages about environmental and health benefits, either reinforcing or attenuating the personal norms activated by their values and beliefs. Therefore, it seems plausible to assume that the effectiveness of targeted communication regarding environmental and health-related contributions to increase customers' motivation to co-create in NPD is contingent upon individual's regulatory focus.

Promotion-focused individuals prioritize achieving positive outcomes, growth, and advancement, seeking to move beyond the status quo (Higgins 1997; Higgins et al. 2020). Accordingly, they are more motivated to engage in co-creation with companies addressing environmental issues, as this aligns with their desire to create positive change and achieve gains. Co-creating environmentally friendly products fulfills their aspirations for growth and advancement while actively contributing to environmental improvements. Prior research supports this, showing promotion-focused individuals are receptive to environmental benefits (Zhang et al. 2018). From a VBN perspective, highlighting environmental benefits resonates with promotion-focused individuals' aspirational values and beliefs, activating personal norms that emphasize contributing to environmental improvements. Additionally, results of previous research show that promotion-focused individuals are more concerned about long-term consequences (Joireman et al. 2012; Bhatnagar and McKay-Nesbitt 2016), thus, they should rather prefer long-term environmental benefits over immediately available health benefits.

Hypothesis 6. *The effect of environmental benefits on customer co-creation in NPD is stronger for customers with a promotion focus compared to customers with a prevention focus.*

Prevention-focused individuals prioritize safety, avoiding negative outcomes, and maintaining the status quo (Higgins 1997; Higgins et al. 2020). These customers are likely to engage in co-creation with companies addressing health-related issues, as it aligns with their focus on preserving health and avoiding risks like illness. Co-creation may also provide a sense of control by offering insights into product development, further satisfying their need for safety and protection. Thus, prevention-focused customers are more motivated to participate in co-creation when they anticipate health benefits. From a VBN theory perspective, communication emphasizing health benefits aligns with prevention-focused individuals' egoistic values by reinforcing beliefs and norms centered on immediate safety and well-being. In line with this argumentation, prior research has revealed that prevention-focused individuals are more worried about immediate, short-term consequences (Joireman et al. 2012), which suggests that these individuals may prioritize immediate health over long-term environmental benefits.

Hypothesis 7. *The effect of health benefits on customer co-creation in NPD is stronger for customers with a prevention focus compared to customers with a promotion focus.*

Figure 4 summarizes the hypotheses.

3.2 | Study 2a: Scenario-Based Experiment

3.2.1 | Data, Setting and Measures

For the empirical validation of Hypotheses 4–7, again, a scenario-based experiment with sustainability communication (control, environmental, and health) as a between-subjects factor was employed (see Appendix A.1). The same research context (automotive manufacture) as in Study 1a was used. More specifically, the non-sustainability scenario from Study 1a was again utilized as the control group. In the environmental communication scenario, participants were informed that the Jaro Group aligns the production in a way that CO₂ emission per vehicle is minimized as much as possible, which makes a valuable contribution to the improvement of the environment. In the health communication

scenario, participants were told that the Jaro Group tries to maximize the use of biological materials and to avoid harmful materials per vehicle, which makes a valuable contribution to preserving health. Similar to Study 1a, upon reading the respective manipulation, participants were informed that Jaro Group had invited them to participate in a program to involve potential customers of the company in its internal NPD process.

In order to guarantee the realism of the scenarios and evaluate the efficacy of the manipulations, a pretest ($n = 93$) was conducted (Perdue and Summers 1986). The same items were applied for realism check as in Study 1a. Results indicate sufficient levels of realism ($M_{\text{realism}} = 5.581$, $SD = 1.208$). To test the effectiveness of the scenario-specific manipulation of environmental and health communication, three items were used, each adapted from previous research (Gershoff and Frels 2015), to measure participants' environmental and health perceptions of each scenario. The employed operationalizations have demonstrated high measurement quality, as evidenced by surpassing common thresholds for indicator loadings, composite reliability, and average variance extracted (see Appendix A.7 for further details). The manipulations' effectiveness for

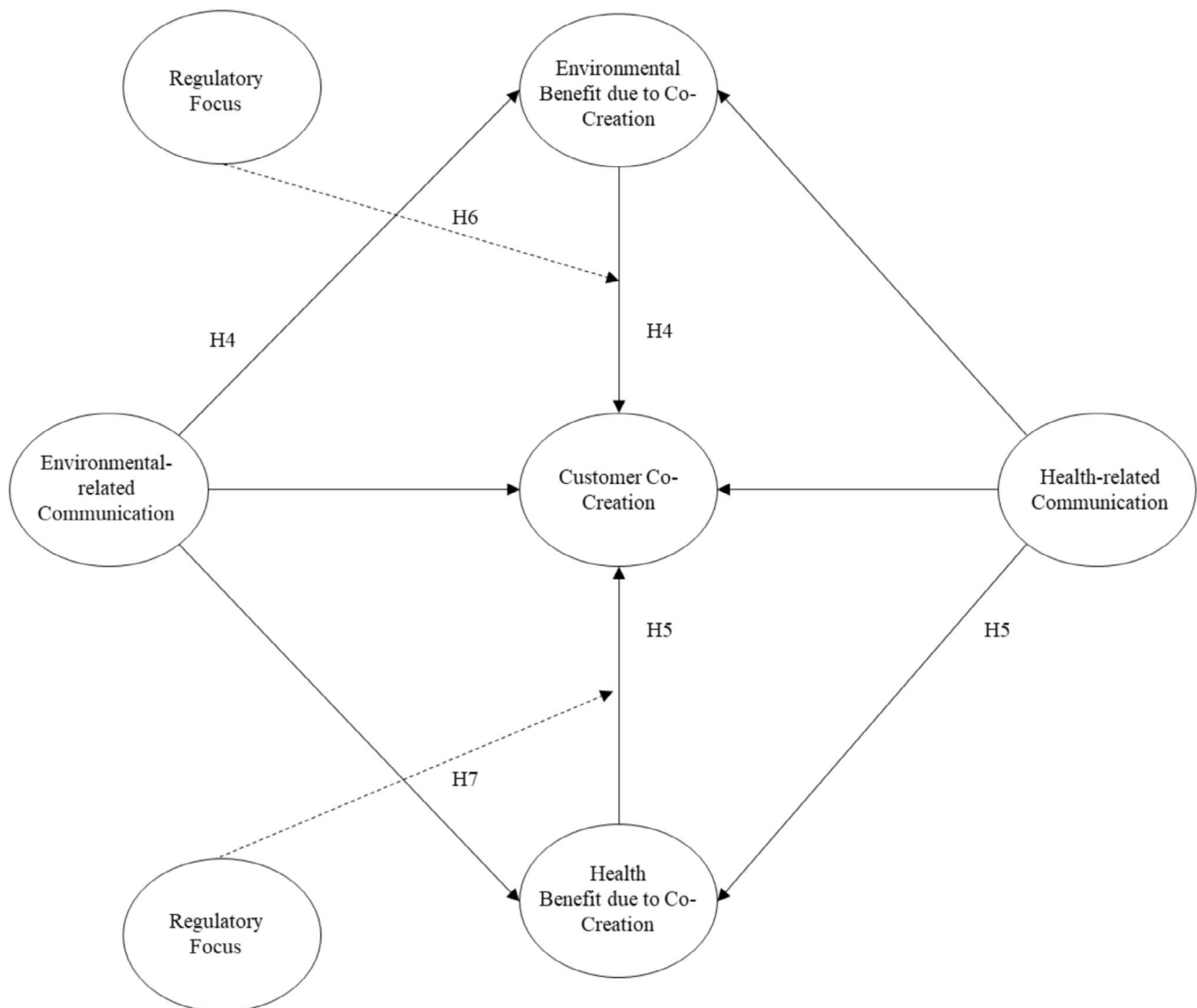


FIGURE 4 | Research model Study 2a and 2b.

both environmental ($M_{\text{Control}} = 3.756$, $M_{\text{Environmental}} = 5.260$; $F(1, 57) = 13.509$, $p < 0.01$) as well as health communication ($M_{\text{Control}} = 3.717$, $M_{\text{Health}} = 5.095$; $F(1, 60) = 11.243$, $p < 0.01$) was confirmed via an ANOVA. Additionally, neither environmental ($M_{\text{Control}} = 3.718$, $M_{\text{Health}} = 3.614$; $F(1, 57) = 0.063$, n.s.) nor health communication ($M_{\text{Control}} = 3.756$, $M_{\text{Environmental}} = 4.409$; $F(1, 60) = 2.031$, n.s.) led to unintended effects, thus confirming discriminant validity of the respective manipulations. A second pretest ($n = 111$) ensured that company innovativeness perceptions did not confound results. Using the same scenarios and measurement (Moreau et al. 2001), ANOVA results showed no significant differences in innovativeness between the control ($M_{\text{Control}} = 3.395$), environmental ($M_{\text{Environmental}} = 3.545$; $F(1, 70) = 0.116$, n.s.), and health communication scenarios ($M_{\text{Health}} = 3.325$; $F(1, 77) = 0.030$, n.s.). Overall, the pretests confirmed the realism, effectiveness, and discriminant validity of the scenario manipulations.

As in Study 1a, a self-administered online questionnaire was used, and participants were recruited via an online crowdsourcing platform (i.e., Clickworker). Randomly assigned to one of the three pretested scenarios, participants indicated their intention to co-create using three indicators adapted from Kulviwat et al. (2007) and Heidenreich and Kraemer (2016). Next, questions on mediators, the moderator, control variables, and socio-demographic data followed. Perceived environmental benefits were measured using items from the measurement inventories of Frank (2021) and Sokolova et al. (2023), and perceived health benefits using items developed from Anisimova et al. (2019) and Dorce et al. (2021); all items were adapted to the firm-customer co-creation context in new product development. Regulatory focus, the moderator, was measured using ten items (five for promotion focus, five for prevention focus) from Haws et al. (2010). To classify whether a participant had a chronic promotion or prevention focus, an established method used in prior studies was applied (Ashraf et al. 2016; Choi and Zhou 2023). Specifically, the mean scores for the promotion subscale and prevention subscale were calculated. Afterwards, the average prevention score was subtracted from the average promotion score. Participants with a positive difference were classified as having a chronic promotion focus, while those with a score less than or equal to zero were classified as having a chronic prevention focus (Ashraf et al. 2016). Green self-identity and sociodemographic variables (age, gender, education, income) were again included as controls, using the same measurements as in Study 1a (see Appendix A.8 for details).

With respect to common method bias, the same procedural remedies from Study 1a were also applied in the questionnaire of Study 2a. Furthermore, the Harman's single-factor test was again run to assess the possible impact of common method variance. However, in line with the results of Study 1a, no single factor emerged that explained more than half of the variance. Hence, common method bias should not have affected the results of Study 2a.

Out of 310 participants who completed the survey, 25 were excluded due to incorrect answers to the attention check question (Abbey and Meloy 2017). Therefore, the remaining sample size was 285 ($M_{\text{age}} = 37.803$; 39.6% female). The most commonly reported level of education was "university degree or other

graduated degree" (45.3%), followed by "high school diploma" (24.6%) and "completed apprenticeship" (15.4%). Additionally, 41.1% of the participants reported an annual income exceeding 35,000€.

3.2.2 | Analysis and Results

Structural equation modeling (SEM) was again applied for data analysis to examine the proposed relationships. Due to the lack of normal distribution in the data ($D(285) = 0.104$, $p < 0.01$), the PLS method was selected (Hair et al. 2012) and SmartPLS 3.0 (Hair et al. 2022) was again utilized for calculations. In order to evaluate the quality of the construct measures, indicator and construct reliability, as well as discriminant and convergent validity, were examined (Hair et al. 2012; Götz et al. 2009). The results demonstrate that all measurements exceeded the common threshold values (see Appendices A.8 and A.9) (Fornell and Larcker 1981). Additionally, all HTMT values for the construct pairs were substantially below the conservative threshold of 0.850 (Henseler et al. 2015). Furthermore, none of the 95% confidence intervals included the value of 1, supporting discriminant validity among the constructs (Hair et al. 2017; Klein et al. 2021).

Afterwards, the structural relationships were assessed. In order to evaluate the hypotheses, path coefficients and the corresponding significance levels were calculated. Overall, the estimations yielded a satisfactory fit with the data. The variance explained (R^2) for customers' co-creation intention was 0.318. Furthermore, the model's predictive power was confirmed with a Q^2 -value of 0.248 (Tenenhaus et al. 2005) (please see Figure 5). The highest variance inflation factor (VIF) observed was 1.843, indicating the absence of any multicollinearity problem.

In order to evaluate the mediation Hypotheses 4 and 5, the same procedures suggested by Hayes (2017) were applied as in Study 1a. Results confirm that a company's environmental communication has a significant and positive effect on environmental benefits due to co-creation ($\beta = 0.298$, $p < 0.01$), which in turn has a significant and positive effect on customers' co-creation intentions ($\beta = 0.349$, $p < 0.01$), providing initial support for Hypothesis 4. Similarly, a company's health communication has a significant and positive effect on health benefits due to co-creation ($\beta = 0.253$, $p < 0.01$), which in turn positively and significantly influences the co-creation intentions of customers ($\beta = 0.223$, $p < 0.01$), lending initial support for Hypothesis 5. To assess the significance of the proposed mediations, the sampling distribution of the indirect effect was bootstrapped (Preacher and Hayes 2008). Both the indirect effects of environmental communication via environmental benefits ($\beta = 0.104$, $p < 0.01$) and health communication via health benefits ($\beta = 0.056$, $p < 0.05$) were significant.

Finally, to assess the moderating role of regulatory focus in the relationship between environmental (health) communication and co-creation, the product-indicator approach recommended by Hair et al. (2022) was applied. The corresponding results of the interaction terms can be interpreted as follows: In case the interaction term of regulatory focus would increase (decrease) by one standard deviation point and thus reflect promotion (prevention) focus, the strength of the relationship

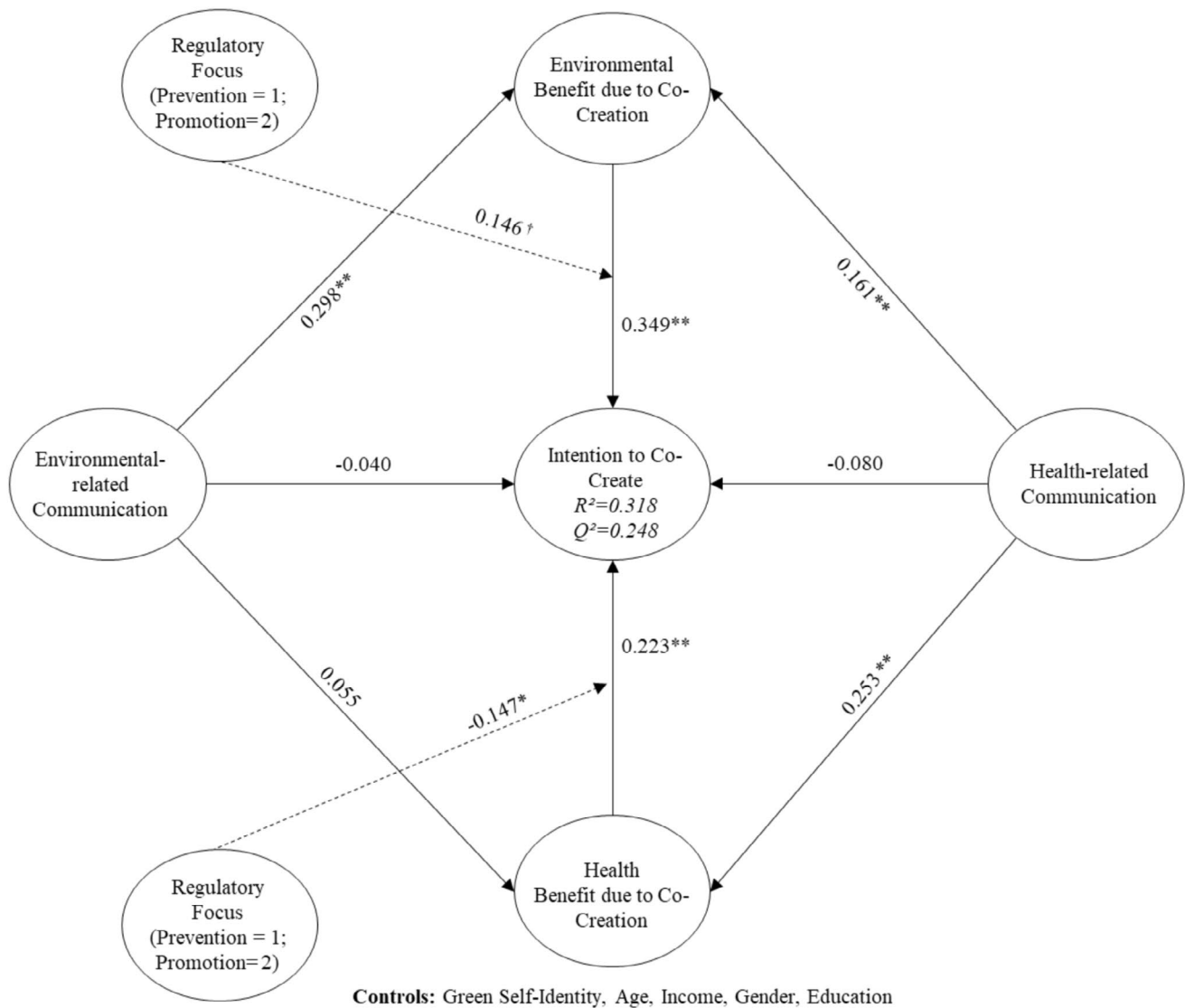


FIGURE 5 | Structural model results of Study 2a.

between environmental (health) benefits due to co-creation and intention to co-create will increase by the size of the interaction term (i.e., $0.349 + 0.146 = 0.495$ for environmental benefits; $0.223 + 0.147 = 0.370$ for health benefits). Hence, the results of the interaction analysis confirm hypotheses 6 and 7. The results of the control variables can be found in Table 2.

3.3 | Study 2b: Idea Contest

3.3.1 | Data, Setting and Measures

To replicate the findings from Study 2a, Study 2b followed a similar approach as Study 1b by conducting an experiment within an online idea contest on Clickworker. Participants were informed that they could voluntarily participate in the contest, which involved collaborating with a German automotive manufacturer. Beyond their standard Clickworker compensation, participants had the chance to win Amazon gift vouchers (100€, 50€, 25€) for the top three submissions (Boss et al. 2017). As in Study 2a, the

replication Study 2b employed an experimental design with sustainability communication (control, environmental, and health) as a between-subjects factor using exactly the same scenarios and manipulations as used in the original scenario-based experiment. Similar to Study 1b, Study 2b replaced self-reported co-creation intentions with a three-stage idea contest, consisting of idea generation, evaluation, and modification tasks, to measure actual co-creation behavior (Boss et al. 2017). Accordingly, each stage's participation was recorded as a nominal variable (0 = no participation, 1 = participation), yielding three distinct indicators of co-creation behavior (Bayus 2013). All other measures were identical to those employed in the scenario-based experiment of Study 2a.

As in Study 2a's scenario-based experiment, data for Study 2b were collected through an online questionnaire integrated into the idea contest. To mitigate the risk of common method bias (Podsakoff et al. 2003), established precautions were implemented before and during data collection. A Harman's single-factor test showed that no single factor explained the majority of variance, suggesting that

TABLE 2 | Results overview of Study 2a and 2b.

		Path coefficient study 2a/2b	t-value Study 2a/2b
Direct effects		Co-creation	
Environmental-related communication		−0.040/0.009	0.731/0.148
Health-related communication		−0.080/−0.087	1.515/1.598
Environmental benefits		0.349/0.245	4.417/3.257
Health benefits		0.223/0.175	2.974/2.348
		Environmental benefits	
Environmental-related communication		0.298/0.394	5.065/7.916
Health-related communication		0.161/−0.086	2.566/1.545
		Health Benefits	
Environmental-related communication		0.055/0.076	0.833/1.424
Health-related communication		0.253/0.185	3.884/3.049
Specific indirect effects		Co-Creation	
Health-related communication via environmental benefits		0.056/−0.021	2.079/1.318
Health-related communication via health benefits		0.056/0.032	2.323/1.718
Environmental-related communication via environmental benefits		0.104/0.096	3.614/3.008
Environmental-related communication via health benefits		0.012/0.013	0.769/1.147
Moderating effects			
Regulatory focus × environmental benefits		0.146/0.178	1.814/2.638
Regulatory focus × health benefits		−0.147/−0.213	2.117/2.949
Direct effects		Co-creation	
Controls	Green self-identity	0.116/0.071	1.706/1.591
	Age	−0.100/0.014	1.894/0.308
	Gender	0.020/0.008	0.401/0.155
	Education	0.044/0.046	0.775/0.987
	Income	0.049/−0.027	0.963/0.570

common method bias was not a significant issue. Additionally, attention checks ensured data quality. Out of an initial 435 participants, 31 were excluded for failing these checks, and another 8 were removed due to nonsensical responses. The final sample comprised 396 participants ($M_{\text{age}} = 39.894$; 38% female), with the majority holding a university or graduate-level degree (48.2%), followed by high school diplomas (28.5%) and completed apprenticeships (17.2%). Furthermore, 46.9% of participants reported an annual income exceeding €35,000.

3.3.2 | Analysis and Results

In line with the previous studies, SmartPLS 3.0 was applied for statistical analyses (Hair et al. 2022). The results demonstrate that all measurements exceeded the common threshold values in terms of construct measures, indicator and construct reliability (see Appendices A.10 and A.11) (Fornell and Larcker 1981; Hair et al. 2012). Additionally, all HTMT values between

construct pairs remained below the conservative threshold of 0.850 (Henseler et al. 2015), and none of the 95% confidence intervals included the value 1, thus confirming discriminant validity (Hair et al. 2017; Klein et al. 2021).

Subsequently, the structural relationships were assessed. The variance explained (R^2) for customers' co-creation behavior was 0.200. Furthermore, the model's predictive power was confirmed with a Q^2 -value of 0.146 (Tenenhaus et al. 2005) (please see Figure 6). The highest variance inflation factor (VIF) was 2.632, indicating no multicollinearity issues. To test the mediation Hypotheses 4 and 5, Hayes' (2017) procedures were applied as in Study 2a. Results revealed that environmental communication significantly and positively influenced environmental benefits from co-creation ($\beta = 0.394$, $p < 0.01$), which in turn significantly and positively affected customers' co-creation behavior ($\beta = 0.245$, $p < 0.01$), supporting Hypothesis 4. Similarly, health communication had a significant and positive effect on health benefits from co-creation ($\beta = 0.185$, $p < 0.01$), which subsequently positively

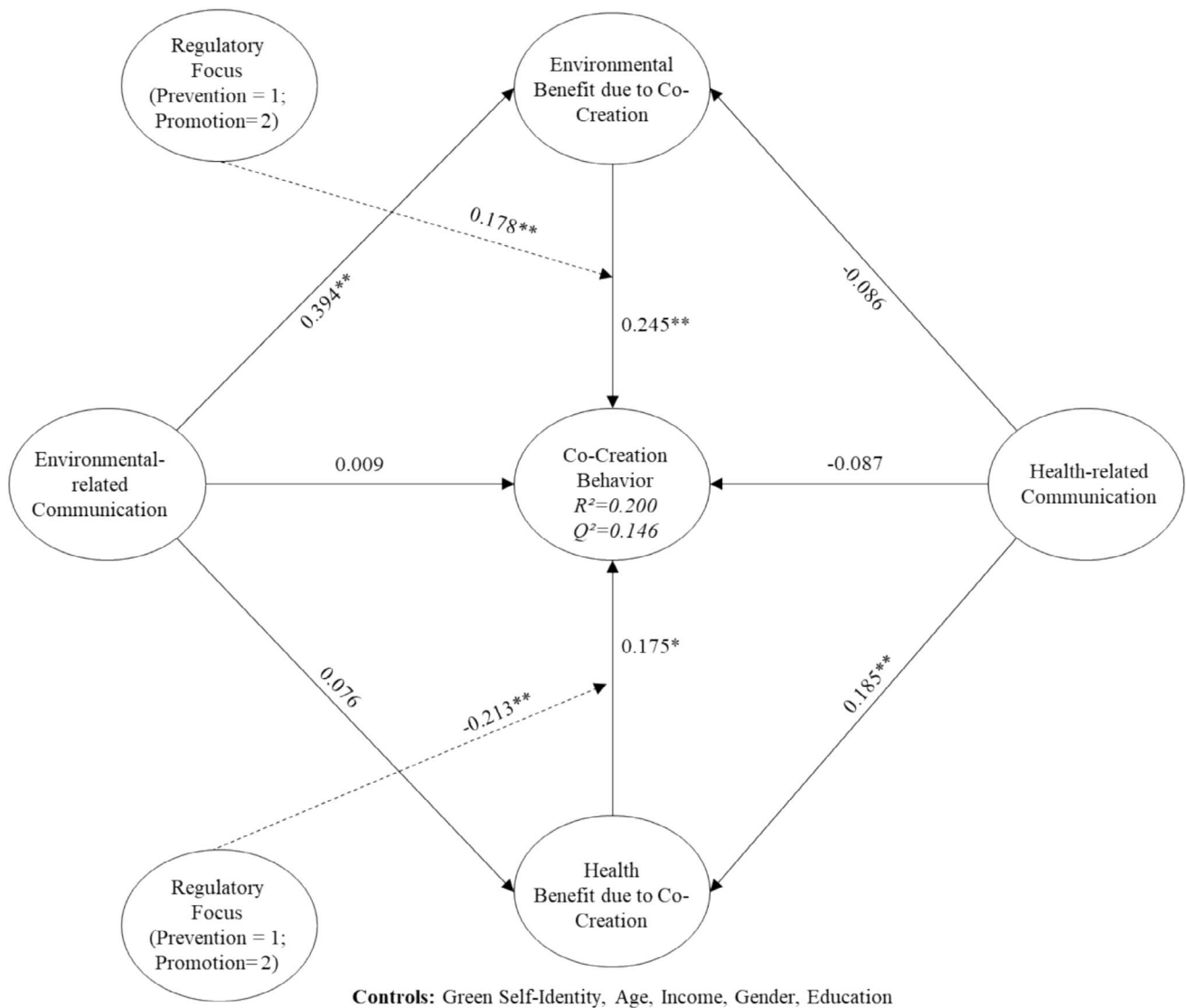


FIGURE 6 | Structural model results of Study 2b.

and significantly influenced customers' co-creation behavior ($\beta=0.175$, $p<0.01$), supporting Hypothesis 5. Bootstrapping the indirect effects (Preacher and Hayes 2008) confirmed that both indirect effects, that is, environmental communication via environmental benefits ($\beta=0.096$, $p<0.01$) and health communication via health benefits ($\beta=0.032$, $p<0.10$), were significant, although the latter was only marginally significant. Thus, Hypotheses 4 and 5 are confirmed. To obtain a more granular view, the specific indirect effects of environmental communication (via perceived environmental benefit) and health communication (via perceived health benefit) were first calculated for each binary co-creation indicator and subsequently summed to assess their combined impact on co-creation behavior during idea generation, evaluation, and modification separately. The strongest combined indirect effect was observed for idea generation ($\beta=0.116$), followed by idea evaluation ($\beta=0.107$) and idea modification ($\beta=0.102$). This finding indicates that sustainable communication particularly stimulates co-creation behavior during idea generation.

With regard to the moderation analysis, the results for the interaction term can be interpreted as follows: A one standard deviation increase (decrease) in the regulatory focus interaction

term, indicating a shift towards a promotion (prevention) focus, strengthens the relationship between environmental (health) benefits and co-creation behavior by the magnitude of the interaction term. Specifically, for environmental benefits, the relationship increases from 0.245 to 0.423 ($0.245 + 0.178$), and for health benefits, it rises from 0.175 to 0.388 ($0.175 + 0.213$). These findings support hypotheses 6 and 7. Results for the control variables are detailed in Table 2.

3.4 | Discussion

Study 2a and 2b confirmed the proposed relationships of Hypotheses 4–7. In line with prior research demonstrating that different communication strategies can stimulate customers' co-creation (e.g., Mahr et al. 2014; Lee and van Dolen 2015), the findings of the present studies revealed that environmental and health-related communication helps to leverage customers' co-creation intention (Study 2a) and behavior (Study 2b). However, it is important to note that this leverage is explained by customers' perception of environmental and health benefits arising from their co-creation activities. More specifically, when

a company's communication highlights the contribution to environmental (health) issues, customer co-creation increases as they perceive higher environmental (health) benefits resulting from their interaction with the respective company, which confirms Hypotheses 4 and 5. Thus, the findings emphasize the importance of perceived benefits within the context of co-creation, aligning with prior research conducted in related fields (Nambisan and Baron 2009). Additionally, regulatory focus was shown to moderate these effects. Promotion-focused customers, who seek to improve the status quo (Higgins et al. 2020) and are sensitive to environmental benefits (Zhang et al. 2018), displayed higher co-creation engagement when companies communicated their environmental contributions, enhancing the effect of perceived environmental benefits on co-creation (Hypothesis 6). Conversely, prevention-focused customers, who aim to maintain the status quo (Higgins et al. 2020), showed greater engagement when companies emphasized health-related contributions, as this supports maintaining their current health state. Thus, the effect of perceived health benefits on co-creation was heightened for prevention-focused customers (Hypothesis 7).

4 | Theoretical Implications

This research advances the co-creation literature by exploring how a company's sustainable image influences customer co-creation behavior. It further uncovers the psychological mechanisms driving this process and assesses the effectiveness of communication strategies, considering customers' regulatory focus. The findings contribute to the broader understanding of user innovation and specifically enrich knowledge on customer co-creation within sustainability contexts.

First, this study diverges from previous research on customer co-creation in the context of environmental sustainability, which primarily concentrated on explaining co-creation outcomes, like the effect of customer co-creation on green innovation performance (Du et al. 2018) or on financial performance (Feng et al. 2021). Instead, this study takes a step back and explains customers' reasons for engaging in co-creation with sustainable companies. The findings not only demonstrate that customer co-creation in NPD is higher for companies perceived as sustainable, but also uncover the psychological mechanism behind this effect. Building on prior work highlighting the role of environmental and health concerns in sustainable behavior (Sadiq et al. 2022; Prakash et al. 2019), the findings revealed that customers' motivation to co-create new products with sustainable companies is mainly driven by their perception of the environmental or health friendliness of the company's products. Drawing on VBN theory (Jansson et al. 2011; Stern et al. 1999), altruistic values (concerns for the collective) align customer behavior with environmentally friendly actions, enabling companies to meet these needs by offering opportunities to co-create eco-friendly products (Kareklas et al. 2014). Conversely, egoistic values (self-oriented concerns) prioritize personal health, motivating customers to engage with companies offering health-friendly products that align with their well-being (Kareklas et al. 2014). Thus, the studies provide the first empirical evidence of the psychological mechanism driving customer co-creation in NPD with sustainable companies, while enriching research on customers' perception of a company as a key driver

for co-creation behavior (Clauss et al. 2019; Kim et al. 2019; Iglesias et al. 2020).

Second, the findings add to previous research taking up a benefits-based perspective to explain engagement in co-creation behavior (Nambisan and Baron 2009). It demonstrates that customer co-creation in NPD is influenced by environmental or health perception of the company's products. Relying on insights from the VBN theory, these perceptions are shaped by customers' values, which inform their beliefs about the benefits of co-creation, thereby activating personal norms that drive their engagement. This aligns with prior research indicating that companies can encourage customer co-creation by enhancing the benefits associated with it (Hoyer et al. 2010). Social exchange theory (Homans 1958) further explains this mechanism: individuals seek a balance between costs and rewards. This theory, applied to the context of co-creation, states that by participating in the company's new product development, customers expect it to be rewarding (Füller 2010). More specifically, while customers anticipate the effort (costs) involved in co-creation, they also perceive tangible benefits, such as contributing to the improvement of the environment (environmental benefits) or preserving personal well-being (health benefits) that outweigh these costs. This enables customers to create an equilibrium between what they invest and what they gain (Homans 1958).

Third, building on the previous point, this study highlights the pivotal role of communication strategies in influencing customer co-creation. It contributes to the literature on the impact of sustainable company communication on consumer behavior (Bashir 2022; Line et al. 2016). Drawing on VBN theory, communication strategies that align with customers' values by emphasizing environmental or health-related contributions reinforce their beliefs about the company's sustainable impact, thereby activating personal norms that enhance their co-creation engagement in NPD. More specifically, communication emphasizing companies' environmental or health-related contributions enhances customers' perceived benefits of co-creation, thereby increasing their engagement. To the best of the author's knowledge, this is the first study to examine how targeted communication strategies foster co-creation in NPD with sustainable companies. Additionally, it extends prior research on communication's role in shaping customers' perception of co-creation processes (Haumann et al. 2015) and their co-creation engagement (Mahr et al. 2014; Lee and van Dolen 2015).

Lastly, the findings offer contributions from a contingency perspective to research on customers' characteristics in the context of co-creation (e.g., Füller et al. 2009; Mahr et al. 2014) by providing insights into the moderating role of regulatory focus. Specifically, the findings of this work show that the presence of a promotion focus has a different effect on customer co-creation with sustainable companies compared to the presence of a prevention focus. In detail, for promotion-focused (prevention-focused) customers, the effect of environmental (health) benefits due to co-creation on their co-creation engagement is strengthened, while the reverse is true for prevention-focused (promotion-focused) customers. From a VBN theory perspective, regulatory focus influences how personal norms are activated and reinforced through environmental and health-related communications, thereby affecting customer co-creation. As

such, the findings also extend prior research that emphasizes the relevance of regulatory focus in environmental or health-related communication efforts (e.g., Bhatnagar and McKay-Nesbitt 2016; Keller 2006; Pichierri et al. 2020), as the present research applies these communication strategies to the context of co-creation in NPD.

5 | Managerial Implications

Understanding why customers engage in co-creation activities is paramount for managers of companies aiming to leverage customer knowledge and support during NPD (e.g., Lee and van Dolen 2015; Nambisan and Baron 2009; Verleye 2015). This becomes particularly critical when considering the obstacles that sustainable innovations encounter in achieving widespread adoption (Ozaki 2011; Heidenreich et al. 2017) and the ongoing challenges companies encounter in attracting customers for co-creation activities (Bughin 2014; Klineciewicz et al., Klineciewicz et al. 2024). The present research addresses these aspects and provides valuable insights and several implications related to customer co-creation in NPD that are important for managers, particularly for those in sustainable contexts.

First, managers should recognize that customers are more willing to engage in co-creation with companies perceived as sustainable. Sustainable companies can leverage this competitive advantage to gain customer knowledge and support more easily. However, it is crucial that customers clearly perceive these sustainability efforts. Market research can help assess customer perceptions, enabling companies to refine their communication strategies. Prior research suggests that communicating specific results, such as CO₂ savings or plastic reduction, is more effective than using vague claims or buzzwords (Reilly and Hynan 2014). For example, Vodafone launched a sustainability-focused co-creation challenge on Xeem, an online platform for external solutions, seeking ideas to optimize its supply chain and develop sustainability projects. As part of this initiative, Vodafone effectively communicated its achievements, such as reducing its ecological footprint by 245,000 tons of CO₂ through the use of green electricity (Xeem 2024). In summary, sustainable companies should ensure their efforts are clearly communicated to stimulate customer co-creation. Companies not yet engaging in sustainable practices should consider adopting them to attract customers for co-creation activities.

Second, findings assist managers in gaining a more profound understanding of the drivers behind customer co-creation for sustainable firms. In detail, customers' environmental and health concerns, driven by their altruistic or egoistic tendencies, play an important role in their co-creation engagement during NPD. Therefore, managers should ensure their sustainable practices are clearly perceived as environmentally and health-related. For instance, sustainable companies might emphasize their use of natural and renewable raw materials instead of harmful alternatives to support the environment. Simultaneously, they could highlight how these natural and renewable raw materials positively impact health. By addressing both environmental and health perceptions of the company's products, companies can enhance customers' motivation to co-create in NPD.

Third, managers should recognize the importance of effective communication strategies to enhance customer co-creation (Haumann et al. 2015; Lee and van Dolen 2015). Prior research highlights that perceived benefits are key to motivating co-creation (Nambisan and Baron 2009). This study shows that sustainable companies can leverage targeted communication strategies, emphasizing environmental or health-related benefits, to enhance customers' perceived value of co-creation in NPD. Specifically, environmental-focused communication increases perceived environmental benefits, while health-related communication amplifies health benefits. Therefore, managers aiming to attract customers for co-creation in NPD should ensure their communication effectively highlights these specific benefits.

Fourth, managers should consider how customer characteristics influence the success of communication strategies (Pérez and del Rodríguez Bosque 2013; Zhao and Pechmann 2007). This study highlights the importance of customers' regulatory focus as a segmentation criterion for sustainable companies. Promotion-focused customers respond better to environmental-focused communication that emphasizes benefits like CO₂ reduction, as they are motivated by environmental gains. In contrast, prevention-focused customers are more motivated by health-related communication, such as using natural, non-harmful materials that promote well-being. To optimize communication strategies, managers should use market research to identify whether promotion- or prevention-focused customers dominate their target market. For promotion-focused segments, prioritizing environmental messaging is more effective, while health-focused communication works better for prevention-focused segments. This tailored approach enhances the effectiveness of communication and strengthens co-creation engagement across different customer groups.

6 | Limitations and Future Research Avenues

As with any research, this study has limitations but also opens avenues for future research. First, the context focuses on an innovative automotive manufacturer, a high-involvement product category (Heidenreich et al. 2017). Future research could replicate and extend these findings to other high-involvement products, such as real estate, high-end consumer electronics, or financial products, to enhance external validity. Moreover, consumer behavior differs between high- and low-involvement products (Holmes and Crocker 1987). For low-involvement products, "the consequences of the decision are often perceived as inconsequential" (Holmes and Crocker 1987, 28), and customers may see fewer environmental or health benefits, potentially reducing their motivation to co-create during NPD. This aligns with prior research showing a positive link between product involvement and willingness to pay for customization (Franke et al. 2009). Future studies could explore whether the observed effects hold true for low-involvement products, such as food or everyday consumer goods, to broaden the scope of these findings.

Second, future research could further investigate the interplay between consumer perceptions of innovativeness and sustainability as drivers of co-creation behavior. While the pretest

confirmed that the companies in the scenarios differed solely in terms of perceived sustainability, isolating its effect on co-creation, sustainability efforts often align with innovation activities (Dangelico and Pujari 2010; Kuhl et al. 2016). Future studies could manipulate innovativeness as an additional factor to explore whether companies perceived as both highly innovative and sustainable generate even greater customer motivation to co-create compared to those viewed as solely innovative or sustainable.

Third, participants in both studies are from German-speaking countries. Thus, they originate from a rather uniform cultural context. To enhance the findings' generalizability, future research could replicate this study in different national settings. For instance, previous research highlighted that for individualistic cultures high environmental concern is a predictor for pro-environmental behavior, while this effect was not found for collectivistic cultures (Eom et al. 2016). Similarly, prior research indicates that the country-specific level of postmaterialistic values affects customers' environmental concern and pro-environmental behavior (Oreg and Katz-Gerro 2006). Germany is a country characterized by both high individualism (Eom et al. 2016; Hofstede-Insights 2024) and high postmaterialistic values (Nový et al. 2017). Hence, it would be valuable to examine whether the effect of environmental perception on customer co-creation found in this study holds in collectivistic countries with lower postmaterialistic values or may diminish for these countries.

Forth, the sample originates from countries with rather higher shares of new electric cars sold (between 22%–31%) compared to the global share (14%) in 2022 (Ritchie 2024). As a result, electric cars, utilized in the sustainable image scenario of this study, are more broadly diffused in participants' countries of origin, which may influence their interest in manufacturers of such cars. Hence, future research could investigate whether similar effects occur in countries with a lower electric car diffusion rate.

Finally, some effects observed in the proposed models were confirmed at a 10% significance level. While for studies that are exploratory in nature, a significance level of 10% is commonly accepted (Hair et al. 2017), future studies might rely on larger data sets and replicate the findings, ideally verifying effects at stricter thresholds (e.g., $p < 0.05$). Such replications would not only yield more precise parameter estimates but also further strengthen the credibility and robustness of the results reported here.

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Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

¹ The direct effect of perceived sustainable image on co-creation intention was replicated by running an ANOVA with the same controls as covariates. The mean co-creation intention score was significantly higher in the sustainable company condition ($M = 5.138$, $SD = 1.544$) than in the non-sustainable condition ($M = 4.607$, $SD = 1.564$); $F(1, 182) = 5.055$, $p < 0.05$.

² The direct effect of perceived sustainable image on co-creation behavior was replicated by running an ANOVA with the same controls as covariates. The mean co-creation behavior score was significantly higher in the sustainable image condition ($M = 0.744$, $SD = 0.349$) than in the non-sustainable image condition ($M = 0.526$, $SD = 0.428$); $F(1, 194) = 13.750$, $p < 0.01$.

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Appendix A

Appendix A.1. Scenario Descriptions and Manipulations

Introduction Jaro Group.

The Jaro Group is a European automotive manufacturer based in Frankfurt am Main, classified as a premium manufacturer since the 2000s. The product range includes cars from various segments, from subcompacts to SUVs. With a turnover of 155 billion euros and around 135,600 employees in the financial year 2021, the Jaro Group is one of the largest commercial enterprises in Germany and, with an annual production of 2.89 million cars in 2021, one of the 20 largest car manufacturers in the world.

Control group Study 1a/b and Study 2a/b	Sustainable image manipulation Study 1a/b
The orientation of the Jaro Group: The company's cars are characterized by high-performance and high-quality combustion engines. At the production sites, the manufacturing process pays attention to efficient and stable process flows using proven production methods. The cars convince with classic and high-quality interior design. Ergonomically shaped seats made of synthetic leather, elegant instrument panels made of high-quality plastic and footwell inserts made of durable synthetic fibers. The Jaro Group and its customer integration programme: For several years, the Jaro Group has established a programme in which potential customers of the company are involved as idea providers and co-developers in internal company new product development processes in return for payment. The central goal of this programme to develop innovative products with the help of customer involvement that better meet market requirements. Customers can contribute their ideas and wishes for future products to the new product concept and actively shape the final product.	The orientation of the Jaro Group: The company's cars are characterized by sustainable and high-quality electric motors. At the production sites, attention is paid to resource-saving and energy-saving process flows using emission-free production methods. The cars convince with sustainable and high-quality interior design. Ergonomically shaped seats made of climate-active virgin wool, elegant instrument panels made of rapidly renewable eucalyptus wood and footwell inserts made of recycled natural fibers. The Jaro Group and its customer integration programme: For several years, the Jaro Group has established a programme in which potential customers of the company are involved as idea providers and co-developers in internal company new product development processes in return for payment. The central goal of this programme to develop innovative products with the help of customer involvement that better meet market requirements. Customers can contribute their ideas and wishes for future products to the new product concept and actively shape the final product.
Environmental communication Study 2a/b	Health communication Study 2a/b
The orientation of the Jaro Group: The company's cars are characterized by sustainable and high-quality electric motors. At the production sites, attention is paid to resource-saving and energy-saving processes during manufacture using emission-free production methods. This enables the production-related consumption of resources and the CO₂ emissions per vehicle to be minimized over the entire life cycle, thus making a valuable contribution to the preservation of our environment. The Jaro Group and its customer integration programme: For several years, the Jaro Group has established a programme in which potential customers of the company are involved as idea providers and co-developers in internal company new product development processes in return for payment. The central goal of this programme to develop innovative products with the help of customer involvement that better meet market requirements. Customers can contribute their ideas and wishes for future products to the new product concept and actively shape the final product.	The orientation of the Jaro Group: The company's cars are characterized by sustainable and high-quality interior design. Ergonomically shaped seats made of climate-active virgin wool, elegant fittings made of rapidly renewable eucalyptus wood and footwell inlays made of recycled natural fibers. In this way, the use of non-biological and harmful materials per vehicle can be minimized over the entire life cycle in order to make a valuable contribution to preserving your health. The Jaro Group and its customer integration programme: For several years, the Jaro Group has established a programme in which potential customers of the company are involved as idea providers and co-developers in internal company new product development processes in return for payment. The central goal of this programme to develop innovative products with the help of customer involvement that better meet market requirements. Customers can contribute their ideas and wishes for future products to the new product concept and actively shape the final product.

Appendix A.2. Items Used for Manipulation Check in Pretest of Study 1a

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Sustainability perception	I believe that Jaro Group is a sustainable company.	5.067 (1.639)	0.962 (48.376)	Lee (2020)
CR=0.964	I believe that the Jaro Group is very competent in the field of sustainability.	5.135 (1.514)	0.968 (74.864)	
AVE=0.900	I believe that Jaro Group has the expertise to address specific sustainability issues.	5.525 (1.382)	0.916 (36.722)	
Realism check	I believe that the described situation could happen in real life.	5.814 (1.360)	0.880 (9.256)	Heidenreich et al. (2016);
CR=0.853				Wagner
AVE=0.744	I could easily imagine the described situation earlier.	4.831 (1.592)	0.845 (8.158)	et al. (2009)

Appendix A.3. Measurement Model Results of Study 1a

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Intention to co-create CR = 0.938 AVE = 0.836	That I would participate in the customer integration program and collaborate with Jaro Group in the future in the area of new product development is...			Heidenreich and Kraemer (2016); Kulviwat et al. (2007)
	...improbable ...probable	4.799 (1.808)	0.929 (71.066)	
	...impossible ...possible	5.293 (1.592)	0.877 (35.731)	
	...unrealistic ...realistic	4.587 (1.739)	0.935 (88.794)	
Environmental perception CR = 0.959 AVE = 0.887	I believe that the products of the Jaro Group can be called environmentally friendly.	4.473 (1.671)	0.936 (76.375)	Gershoff and Frels (2015)
	I believe that Jaro Group products are a good choice for the environment.	4.386 (1.778)	0.953 (114.820)	
	I believe that the production of environmentally friendly products has a high priority in the Jaro Group.	4.636 (1.795)	0.937 (79.070)	
Health perception CR = 0.953 AVE = 0.872	I believe that a person who cares about their health would probably buy Jaro Group products.	4.158 (1.659)	0.897 (34.883)	Gershoff and Frels (2015)
	I believe that the production of health-friendly products has a high priority in the Jaro Group.	4.435 (1.718)	0.956 (129.940)	
	I believe that Jaro Group promotes the production of health-friendly products as a corporate goal.	4.386 (1.725)	0.947 (85.198)	
Green self-identity CR = 0.932 AVE = 0.821	I consider myself a sustainable consumer.	4.652 (1.421)	0.935 (26.193)	Hansen et al. (2018)
	I consider myself a green consumer.	4.299 (1.582)	0.886 (15.381)	
	I consider myself an environmentally conscious consumer.	4.734 (1.399)	0.896 (18.678)	

Appendix A.4. Correlation Table of Study 1a

Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Intention to Co-Create	1.000								
2. Sustainable Image	0.169*	1.000							
3. Environ. Perception	0.504**	0.488**	1.000						
4. Health Perception	0.501**	0.367**	0.799**	1.000					
5. Green Self Identity	0.277**	0.023	0.265**	0.268**	1.000				
6. Age	-0.119	-0.022	0.052	-0.045	0.136	1.000			
7. Education	0.056	0.145*	-0.021	-0.118	0.006	-0.111	1.000		
8. Gender	0.033	0.050	0.016	-0.019	-0.074	-0.028	0.214**	1.000	
9. Income	0.037	0.016	0.105	0.067	-0.067	0.102	0.268**	0.128	1.000

Note: ** = significant at $p < 0.01$, * = significant at $p < 0.05$.

Appendix A.5. Measurement Model Results of Study 1b

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Co-creation behavior CR=0.938 AVE=0.836	Participation (No/Yes) in			Bayus (2013) Boss et al. (2017)
	Idea generation	0.629 (0.483)	0.827 (27.357)	
	Idea evaluation	0.706 (0.456)	0.850 (36.517)	
	Idea modification	0.538 (0.499)	0.868 (37.783)	
Environmental perception	I believe that the products of the Jaro Group can be called environmentally friendly.	4.198 (1.999)	0.974 (198.602)	Gershoff and Frels (2015)
CR=0.959	I believe that Jaro Group products are a good choice for the environment.	4.168 (1.945)	0.974 (224.925)	
AVE=0.887	I believe that the production of environmentally friendly products has a high priority in the Jaro Group.	4.279 (1.969)	0.965 (170.814)	
Health perception	I believe that a person who cares about their health would probably buy Jaro Group products.	3.959 (1.816)	0.954 (109.370)	Gershoff and Frels (2015)
CR=0.953	I believe that the production of health-friendly products has a high priority in the Jaro Group.	4.046 (1.939)	0.967 (161.217)	
AVE=0.872	I believe that Jaro Group promotes the production of health-friendly products as a corporate goal.	4.015 (1.958)	0.971 (204.071)	
Green self-identity	I consider myself a sustainable consumer.	4.766 (1.253)	0.852 (4.625)	Hansen et al. (2018)
CR=0.932	I consider myself a green consumer.	4.122 (1.510)	0.939 (4.557)	
AVE=0.821	I consider myself an environmentally conscious consumer.	4.802 (1.320)	0.820 (4.192)	

Appendix A.6. Correlation Table of Study 1b

Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Co-creation behavior	1.000								
2. Sustainable image	0.259**	1.000							
3. Environ. perception	0.583**	0.565**	1.000						
4. Health perception	0.578**	0.427**	0.857**	1.000					
5. Green self identity	0.130	0.089	0.198**	0.194**	1.000				
6. Age	−0.009	−0.028	−0.020	−0.006	0.007	1.000			
7. Education	0.052	0.068	0.063	0.029	0.065	−0.047	1.000		
8. Gender	−0.018	−0.105	−0.047	−0.022	−0.062	0.000	0.100	1.000	
9. Income	0.009	−0.053	0.031	0.041	0.073	−0.036	0.194**	0.179*	1.000

Note: **=significant at $p < 0.01$, *=significant at $p < 0.05$.

Appendix A.7. Items Used for Manipulation Check in Pretest of Study 2a

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Environmental Perception	I believe that the products of the Jaro Group can be called environmentally friendly.	4.559 (1.874)	0.913 (31.422)	Gershoff and Frels (2015)
CR=0.948	I believe that Jaro Group products are a good choice for the environment.	4.462 (1.891)	0.952 (51.489)	
AVE=0.860	I believe that a person who cares about the environment would probably buy Jaro Group products.	4.537 (1.914)	0.916 (35.196)	
Health perception	I believe that the products of the Jaro Group can be called health friendly.	4.183 (1.811)	0.964 (62.885)	Gershoff and Frels (2015)
CR=0.965	I believe that Jaro Group products are a good choice for my health.	4.161 (1.777)	0.950 (51.039)	
AVE=0.903	I believe that a person who cares about their health would probably buy Jaro Group products.	4.258 (1.799)	0.937 (43.046)	
Realism check	I believe that the described situation could happen in real life.	5.903 (1.260)	0.844 (15.693)	Heidenreich et al. (2016); Wagner et al. (2009)
CR=0.861 AVE=0.757	I could easily imagine the described situation earlier.	5.258 (1.51)	0.895 (20.164)	

Appendix A.8. Measurement Model Results of Study 2a

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Intention to co-create CR=0.940 AVE=0.840	That I would participate in the customer integration program and collaborate with Jaro Group in the future in the area of new product development is...			Heidenreich and Kraemer (2016); Kulviwat et al. (2007)
	...unimaginable	4.642 (1.870)	0.922 (66.221)	
	...impossible	5.168 (1.661)	0.930 (88.419)	
	...unrealistic	4.572 (1.819)	0.898 (57.395)	
Environmental benefits due to co-creation CR=0.969 AVE=0.887	By working with the Jaro Group, I can help develop products that contribute to...			Frank (2021) Sokolova et al. (2023)
	...contribute to the environment	4.937 (1.708)	0.948 (116.204)	
	...contribute to the minimization of environmental pollution	4.772 (1.687)	0.950 (111.119)	
	...contribute to improving the environment	4.751 (1.768)	0.938 (79.600)	
	...contribute to the protection of our resources	4.796 (1.720)	0.931 (78.497)	Anisimova et al. (2019) Dorce et al. (2021)
Health benefits due to co-creation CR=0.971 AVE=0.893	By working with the Jaro Group, I can help develop products that contribute to...			
	...contribute to improving my health	3.965 (1.819)	0.938 (86.032)	
	...contribute to enabling me to lead a healthy lifestyle	3.912 (1.824)	0.962 (175.519)	
	...contribute to my health promotion	3.881 (1.789)	0.942 (88.450)	
	...contribute to the fact that I can live health-consciously	3.729 (1.807)	0.937 (104.588)	
Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Green self-identity	I consider myself a sustainable consumer.	4.729 (1.374)	0.918 (51.590)	Hansen et al. (2018)
CR=0.941	I consider myself a green consumer.	4.235 (1.644)	0.916 (52.633)	
AVE=0.842	I consider myself an environmentally conscious consumer.	4.782 (1.466)	0.919 (54.264)	

Appendix A.9. Correlation Table of Study 2a

Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Intention to co-create	1.000										
2. EC	0.101	1.000									
3. HC	0.086	0.486**	1.000								
4. Environmental benefits	0.477**	0.377**	0.306**	1.000							
5. Health benefits	0.445**	0.178**	0.280**	0.601**	1.000						
6. Regulatory focus	0.023	−0.054	−0.001	0.062	−0.060	1.000					
7. Green self identity	0.257**	0.054	0.062	0.206**	0.350**	−0.030	1.000				
8. Age	−0.110	−0.020	−0.082	−0.049	−0.051	0.207**	0.045	1.000			
9. Education	0.039	0.014	0.005	0.041	0.044	−0.101	−0.037	−0.048	1.000		
10. Gender	0.051	0.037	−0.022	0.040	−0.083	−0.031	0.024	−0.126*	0.248**	1.000	
11. Income	0.045	−0.016	−0.013	0.018	0.009	0.219**	−0.031	0.180**	0.097	0.186**	1.000

Note: EC = Environmental Communication, HC = Health communication; ** = significant at $p < 0.01$, * = significant at $p < 0$.

Appendix A.10. Measurement Model Results of Study 2b

Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Co-creation behavior CR = 0.940 AVE = 0.840	Participation (No/Yes) in			Bayus (2013) Boss et al. (2017)
	Idea generation	0.487 (0.500)	0.896 (62.263)	
	Idea evaluation	0.566 (0.496)	0.887 (58.986)	
	Idea modification	0.439 (0.496)	0.903 (61.393)	
Environmental benefits due to co-creation CR = 0.969 AVE = 0.887	By working with the Jaro Group, I can help develop products that contribute to...			Frank (2021) Sokolova et al. (2023)
	...contribute to the environment	4.106 (1.765)	0.944 (126.363)	
	...contribute to the minimization of environmental pollution	4.063 (1.827)	0.955 (170.674)	
	...contribute to improving the environment	4.048 (1.805)	0.951 (106.653)	
Health benefits due to co-creation CR = 0.971 AVE = 0.893	By working with the Jaro Group, I can help develop products that contribute to...			Anisimova et al. (2019) Dorce et al. (2021)
	...contribute to improving my health	3.679 (1.795)	0.954 (160.227)	
	...contribute to enabling me to lead a healthy lifestyle	3.737 (1.859)	0.968 (267.189)	
	...contribute to my health promotion	3.639 (1.824)	0.966 (123.655)	
	...contribute to the fact that I can live health-consciously	3.626 (1.854)	0.935 (85.128)	
Construct	Item	Mean (SD)	Indicator loading (t-value)	Source
Green self-identity CR = 0.941 AVE = 0.842	I consider myself a sustainable consumer.	4.614 (1.322)	0.895 (10.108)	Hansen et al. (2018)
	I consider myself a green consumer.	3.985 (1.592)	0.900 (11.920)	
	I consider myself an environmentally conscious consumer.	4.548 (1.418)	0.873 (9.085)	

Appendix A.11. Correlation Table of Study 2b

Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Co-creation behavior	1.000										
2. EC	0.070	1.000									
3. HC	−0.002	0.490**	1.000								
4. Environmental benefits	0.375**	0.352**	0.107*	1.000							
5. Health benefits	0.343**	0.167**	0.222**	0.720**	1.000						
6. Regulatory focus	0.078	−0.094	−0.085	−0.052	0.142*	1.000					
7. Green self identity	0.127*	−0.018	0.015	0.101*	0.145**	0.000	1.000				
8. Age	0.076	0.029	0.013	0.134*	0.058	0.033	0.110*	1.000			
9. Education	0.031	−0.042	−0.019	−0.049	−0.039	0.012	0.046	−0.041	1.000		
10. Gender	0.013	−0.058	−0.055	0.007	0.005	0.106*	−0.148**	0.033	0.118*	1.000	
11. Income	−0.041	−0.021	0.007	−0.061	−0.071	0.053	0.020	0.013	0.230**	0.152**	1.000

Note: EC = Environmental Communication, HC = Health communication;

** = significant at $p < 0.01$, * = significant at $p < 0.5$.