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Sustainability Information Processing Biases and Sustainable Consumption Behavior: Testing a Moderated Mediation Model

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Abstract

Sustainability information processing biases distort how people interpret sustainability information; however, research on how these biases influence sustainable consumption behavior remains limited. The study aims to examine how biases in the processing of sustainability information shape sustainable consumption attitudes and behaviors, using a moderated mediation approach. This study adopted a post-positivist approach with purposive sampling. Structural equation modelling was used to examine the direct, indirect, and moderated mediation effects with data from a survey of 407 respondents. The study revealed a significant positive influence of sustainability information processing biases on sustainability consumption attitude and behavior. Further, it revealed significant moderated mediation effects of sustainable consumption attitude and environmental knowledge, improving the effect of information processing biases on sustainable consumption behavior. Regrading integrating cognitive bias theory and environmental behavior research, the study suggests that clear and credible sustainability communication helps consumers process environmental information effectively, thereby strengthening the sustainable attitude-behavior relationship.

Keywords: Cognitive biases, environmental knowledge, sustainability attitude, sustainability consumption behavior, sustainability information processing biases

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Introduction

Sustainability information processing biases refer to systematic cognitive tendencies such as selective attention, confirmation bias, and motivated reasoning that shape how individuals interpret and respond to sustainability-related information, often leading to discrepancies between environmental awareness and actual behavior (Frank et al., 2024); however, a key research gap remains in empirically clarifying how these biases interact with contextual and psychological factors to influence sustainable consumption behavior across diverse cultural and socioeconomic settings.

Consumption without considering adverse effects on environmental quality is the most dominant global challenge, as global shopping is skyrocketing every year (Munro et al, 2023); however, the inverse relationship between sustainability and unsustainable consumption is still to be explored, resulting in a continuously degrading environment and climate change, which is an emerging global concern (Nasrullah et al., 2026). Global concern has been raised to ensure ecological balance by promoting sustainable consumer practices, reducing excessive resource use, waste generation, and the preference for environmentally harmful products (Arora & Mishra, 2023).

Consequently, promoting sustainable consumption behavior (SCB), i.e., reducing the discrepancy between consumers' attitudes and behavior, has become a central pillar in achieving sustainable development goals (Udodiugwu et al., 2025). A persistent discrepancy between consumers' favorable attitudes towards sustainability and their actual purchasing and usage behaviors, commonly described as the attitude–behavior gap, cannot be reduced without increasing environmental awareness globally (Vermeir & Verbeke, 2006; Jacobs et al., 2018; Welinder & Hultman, 2025). This inconsistency challenges scholars and policymakers continuously who envision fostering meaningful behavioral change for sustainability. Investigating how consumers are motivated in SCB is crucial for making financial and cognitive investment decisions that support effective changes in consumption behavior. While prior research shows that sustainability information can shape consumer behavior, findings remain inconsistent, suggesting that how individuals process such information, potentially through cognitive biases, remains insufficiently understood.

Sustainable consumption studies grounded in the Theory of Planned Behavior (TPB) have been argued to be rational decision-making frameworks that assume consumers process information systematically and behave sustainably when they possess positive attitudes, supportive subjective norms, and perceived behavioral control (Xu et al., 2022; Witek & Kuźniar, 2023). Grounding TPB, researchers argue that these models demonstrate substantial explanatory power; however, behavioral decision theory suggests that individuals frequently rely on heuristics, i.e., they use shortcuts rather than complex cognitive processes when confronted with complex information environments (Gigerenzer & Gaissmaier, 2011). Heuristics can lead to systematic information biases, including confirmation bias, availability

bias, anchoring bias, framing effects, and information overload, which may skew sustainability-related evaluations and weaken the translation of pro-environmental attitudes into behavior (Frank et al., 2024).

The sustainable attitude–behavior gap (Munro et al., 2023) cannot be fully explained by rational models alone (Duong, 2022), as many consumers express strong sustainability intentions yet fail to act accordingly due to psychological and contextual barriers (Dursun et al., 2019; Tawde et al., 2023), for instance, empirical evidence in sustainable clothing consumption shows that favorable environmental attitudes do not necessarily translate into actual purchasing behavior (Wiederhold & Martinez, 2018; Ertz et al., 2023). Such findings emphasize an integrated model that incorporates behavioral-bias perspectives into sustainable consumption research and explains consumers' decision-making processes.

In addition, environmental knowledge enhances consumers' ability to evaluate environmental claims and reduces reliance on heuristic processing (Frick et al., 2004; Pagiaslis and Krontalis, 2014). Knowledgeable consumers are more likely to translate pro-environmental attitudes into actual behavior and less likely to be influenced by cognitive distortions (Kollmuss and Agyeman, 2002). Therefore, environmental knowledge is expected to play a buffering role in the relationship between information biases and SCB.

The challenge of changing consumption behavior into consciously sustainable behavior becomes more complex, especially within emerging economies. Rapid expansion of digital information channels and the proliferation of green marketing claims have significantly increased the volume and ambiguity of sustainability-related information available to consumers (Tudor et al., 2025; Katoch, 2026). In many Asian markets, consumers are exposed to inconsistent environmental messages and varying credibility of eco-labels; for instance, 78% consumers do not trust eco-labels (Dzreke, 2026), which heightens reliance on heuristic processing and increases vulnerability to information biases.

In Nepal, sustainable consumption is gaining increasing policy and societal importance amid rising concerns over plastic waste, urban pollution, and resource depletion (Chaudhary, 2024; Bhandari et al., 2025). Though consumers are increasingly exposed to environmental campaigns, eco-labels, and digital sustainability communications, the Nepalese market is characterized by information asymmetry, uneven environmental literacy, and limited regulatory monitoring of sustainable consumption behavior, creating a high degree of uncertainty in consumption decisions. However, most empirical research in Nepal has largely examined environmental awareness, social norms, and demographic factors; the behavioral bias perspective remains underexplored.

Environmental knowledge becomes a critical cognitive resource (Langenbach et al., 2020; Wan & Du, 2022) that shapes pro-environmental behavior. Higher environmental knowledge is more capable of evaluating environmental claims, less susceptible to misleading information, and more likely to engage in sustainable consumption practices (Mostafa, 2007; Joshi & Rahman, 2015). Environmental knowledge not only directly influences green

behavior (Langenbach et al., 2020) but may also serve a buffering role by reducing consumers' dependence on heuristic processing (Lanero et al., 2020; Dreijerink et al., 2023) and equips them to scrutinize sustainability information, thereby potentially weakening the adverse effects of information biases (Frank et al., 2024). Despite its theoretical relevance, prior research has not adequately acknowledged the moderating role of environmental knowledge in bias-behavior relationships.

Sustainable consumption manifests a higher-order construct, a reflex of multiple behavioral domains, including green purchasing, responsible usage, ethical consumption, and recycling behavior; however, existing literature conceptualizes it as a unidimensional construct. Scholars (Quoquab et al., 2019; Wu et al., 2025) increasingly recommend modelling SCB as a multidimensional higher-order construct to capture its dimensions and improve explanatory precision.

Actual purchasing behavior often falls short, even though consumers increasingly express pro-sustainability attitudes, creating a persistent intention–behavior gap. The existing body of research has largely focused on informational and attitudinal drivers, implicitly assuming rational decision-making. However, this assumption neglects the role of systematic cognitive biases in distorting how sustainability information is processed. Without accounting for these biases, our understanding of SCB remains incomplete. It is necessary to develop a comprehensive model to address several explicit research gaps.

Theoretically, this study integrates the heuristic biases theory with the sustainable consumption literature to examine how consumers use mental shortcuts, i.e., information biases, to develop sustainability-related attitudes and behaviors. Further, the study conceptualizes SCB as a second-order multidimensional construct comprising green purchasing, responsible usage, ethical consumption, and recycling behavior. It also investigates the mediating role of attitude towards sustainable consumption and the moderating role of environmental knowledge in explaining how information biases translate into behavioral outcomes.

Thus, this study contributes to the sustainable development goals of the emerging economies by offering practical insights for policymakers, practitioners, and sustainability advocates seeking to design more effective environmental communication strategies.

Literature Review

The study offers an integrated framework for understanding SCB by integrating insights from behavioral decision theory (Tversky & Kahneman, 1974; Jain et al., 2023) and environmental behavior, arguing that information-processing biases distort SCB. Behavioral decision theory suggests that individuals rely on cognitive shortcuts or heuristics when processing complex information (Tversky & Kahneman, 1974; Piotrowski & Bünnings, 2024), which can lead to systematic biases in judgment and decision-making (Tversky & Kahneman, 1974; Gigerenzer & Gaissmaier, 2011).

In sustainability contexts, consumers are increasingly exposed to diverse environmental information; consequently, biases such as information overload, confirmation bias, availability bias, and anchoring bias may shape how individuals interpret sustainability-related information and ultimately affect their purchasing behavior (Pearce & Moscardo, 2025), limiting consumers' ability to make rational and environmentally responsible choices (Gaspar, 2013; Frank et al., 2024). This model also incorporates sustainable consumption attitudes as a mediating variable and environmental knowledge as a moderating variable, acknowledging that consumers with strong attitudes and higher levels of knowledge are more highly committed to SCB as they can interpret environmental information and overcome biased decision-making processes (Frick et al., 2004; Pagiaslis & Krontalis, 2014; Wan & Du, 2022).

Environmental knowledge strengthens the relationship between pro-environmental attitudes and behavior by reducing cognitive barriers and improving decision quality (Dursun et al., 2019; Dreijerink et al., 2023). In this way, this model provides a more comprehensive explanation of SCB by integrating cognitive biases and knowledge-based capabilities (Hilbert, 2012; Joshi & Rahman, 2015; Munro et al., 2023).

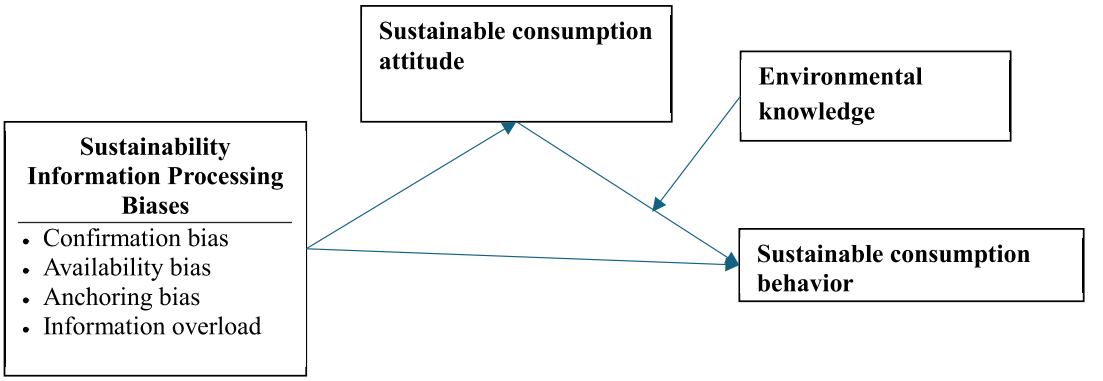
Sustainable Development Goals primarily focus on sustainable production and responsible consumption patterns (Gunawan et al., 2020), i.e., consumer actions that minimize environmental harm while supporting social and economic sustainability (Arora & Mishra, 2023; Nasrullah et al., 2026). Scholars conceptualize SCB as a multidimensional construct (Quoquab et al., 2019) encompassing various environmentally responsible actions such as green purchasing, responsible usage, ethical consumption, and recycling behavior. Such behaviors are influenced by multiple factors, namely environmental concern, attitudes, knowledge, and social norms (Joshi & Rahman, 2015), which indicate that SCB extends beyond simple purchasing decisions and reflects a broader pattern of environmentally responsible lifestyle behaviors.

Conceptual Research Model

This study proposed an integrated conceptual model (see Figure 1) incorporating behavioral decision theory and sustainable consumption literature to examine how information biases influence SCB. Specifically, the model investigates second-order construct information biases reflected by information overload, confirmation bias, availability bias, and anchoring bias as antecedents of SCB. In the model, SCB is conceptualized as a second-order construct reflected in multiple environmentally responsible consumption practices: environmentally responsible purchasing, resource conservation, and sustainable product use. In sustainability contexts characterized by information complexity, uncertainty, and moral framing, these biases tend to co-occur and jointly influence decision-making. Modeling them as a higher-order construct enables a more parsimonious and theoretically coherent representation of their shared variance, while avoiding fragmentation into disconnected effects. This approach also allows the study to capture the overarching influence of biased information processing on SCB, rather than limiting the analysis to bias-specific pathways. Further, sustainable consumption attitude and environmental knowledge are considered mediators and moderators, respectively.

Figure 1

Research Model



Behavioral Decision Theory and Information Biases

Traditional economic theories assume that consumers make rational decisions based on complete and accurate information (Becker, 1962; Grandori, 2010); however, behavioral decision theory suggests that individuals often rely on heuristics or mental shortcuts when processing complex information (Grandori, 2010; Gigerenzer & Gaissmaier, 2011; Piotrowski & Bünnings, 2024). When consumers face complex information, cognitive biases are particularly relevant in environmental decision-making contexts. Environmental education and sustainability studies highlight that cognitive biases can distort individuals' interpretation of environmental information, leading to misperceptions and suboptimal environmental decisions (Frank et al., 2024; Tudor et al., 2025; Katoch, 2026).

Sustainability marketing and eco-labeling have gained momentum globally (Sharma & Kushwaha, 2019; Rashid et al., 2025); however, these practices complicate consumer decision-making. Digital marketing channels and sustainability campaigns are often exposed to a large volume of environmental information (Kollmuss & Agyeman, 2002; Katoch, 2026); however, widely varying credibility and transparency of sustainability claims create misleading communication and greenwashing. In such situations, consumers evaluate environmental claims using heuristics, resulting in biased perceptions of product sustainability (Dzreke, 2026) and responses to sustainability-related messages (Langenbach et al., 2020). For instance, consumers evaluate organic claims using heuristic cues rather than systematic analysis, particularly when they lack sufficient environmental knowledge or motivation to process detailed information (Lanero et al., 2020), which may significantly influence consumers' sustainability-related attitudes and behavioral decisions.

Sustainable Consumption Attitude and Consumption Behavior

The discrepancy between consumers' environmental attitudes and their actual behaviors is the most widely documented phenomenon in sustainable consumption research (Terlau & Hirsch, 2015; Wang, 2017; Do & Do, 2025). Empirical studies have shown that

attitudes toward sustainability do not necessarily translate into behavioral intentions or purchasing decisions (Araújo et al., 2025; Welinder & Hultman, 2025). Attitude–behavior gap exists because consumers' strong support for environmental protection is not reflected in their purchasing decisions (Wiederhold & Martinez, 2018). However, environmental knowledge, situational constraints, and personal values interact in complex ways that influence pro-environmental behavior (Kollmuss & Agyeman, 2002). To understand the attitude–behavior gap, it is essential to examine the cognitive processes underlying environmental decision-making to know whether biases in information processing and decision heuristics may play a crucial role in shaping SCBs (Munro et al., 2023).

Consumers often rely on heuristics when making decisions about sustainable consumption, which may introduce systematic biases; as a result, consumers fail to translate positive environmental attitudes into actual purchasing and consumption behaviors. Information overload (exposed to excessive or complex sustainability-related information), confirmation bias (tendency of individuals to favor information that confirms their existing beliefs and ignoring contradictory evidence), availability bias (most easily recalled from memory), and anchoring bias (rely heavily on initial information or reference points when making judgments) affect the environmentally responsible actions such as green purchasing, and responsible product use, ethical consumption, and recycling behavior as suggested by Vermeir and Verbeke (2006). Based on the argument, the following hypotheses are proposed:

H1: Information biases significantly influence sustainable consumption behavior.

Sustainable Consumption Attitude as a Mediating Factor

Sustainable consumption attitudes are the consumers' evaluations of environmentally responsible products and practices (Langenbach et al., 2020). Pagiaslis and Krontalis (2014) suggested that individuals with favorable environmental attitudes are more likely to engage in pro-environmental consumption behaviors. The attitude–behavior framework helps explain the mediating role of sustainability consumption attitude, which posits that beliefs and cognitive evaluations influence attitudes and subsequently guide behavior. It is often reported that people frequently demonstrate environmental concern but fail to behave accordingly, creating the attitude–behavior gap (Kollmuss & Agyeman, 2002; Araújo et al., 2025; Welinder & Hultman, 2025).

More recent research (Munro et al., 2023) suggests that attitudes act as a key mechanism linking environmental cognition to behavioral outcomes. Environmental knowledge and environmental concern influence SCB through attitudinal pathways (Mostafa, 2007; Wan & Du, 2022). In addition, the formation of sustainability attitudes may be influenced by processing sustainability-related information. By shaping consumers' evaluations of environmentally responsible actions, sustainability attitudes help explain how cognitive factors ultimately translate into sustainable consumption practices (Joshi & Rahman, 2015; Ertz et al., 2023).

The formation of sustainability attitudes may be influenced by processing sustainability-related information. Attitudes act as a key mechanism linking environmental cognition to behavioral outcomes. Sustainability attitudes help explain how cognitive factors ultimately translate into sustainable consumption practices (Joshi & Rahman, 2015; Ertz et al., 2023). Thus, a sustainable consumption attitude serves as an important mediating mechanism that links environmental knowledge, information processing, and SCB. Based on the argument, the following hypotheses are proposed:

H2: Sustainable consumption attitude mediates the relationship between information biases and sustainable consumption behavior.

Environmental Knowledge as a Moderating Factor

Environmental knowledge has been widely recognized as a key determinant of pro-environmental behavior (Frick et al. 2004; Wan & Du, 2022). Understanding of environmental issues, ecological systems, and the environmental consequences of consumption behaviors compose environmental knowledge. Greater environmental knowledge enables individuals to evaluate environmental information more accurately and make informed consumption decisions (Wan & Du, 2022): adapting conservation behaviors (Frick et al., 2004) and green purchasing behavior (Mostafa, 2007). Environmental knowledge is a predictor of consumers' sustainability attitudes (Pagiaslis & Krontalis, 2014), thereby fostering positive attitudes toward environmentally friendly products and encouraging green consumption.

In addition, informational resources can enhance environmental knowledge and promote pro-environmental behavior within communities (Dursun et al., 2019; Wan & Du, 2022). It can mitigate cognitive distortions and reduce rebound effects in environmental decision-making (Dreijerink et al., 2023). In this way, environmental knowledge may function as a moderating factor in the relationship between cognitive biases and consumer behavior. Furthermore, objective and subjective environmental knowledge can help overcome psychological barriers to energy conservation and other pro-environmental behaviors (Dursun et al., 2019). Therefore, environmental knowledge may reduce the influence of information biases on consumer attitudes and behavior (Dursun et al., 2019; Geiger et al., 2019), thereby strengthening the relationship between pro-environmental attitudes and sustainable consumption practices.

Environmental knowledge is responsible for shaping pro-environmental attitudes and SCB (Frick et al., 2004). Environmental knowledge may mitigate the influence of information biases by encouraging consumers to evaluate sustainability attributes more carefully rather than relying solely on price or brand anchors. Therefore, environmental knowledge may act as a boundary condition that weakens the negative effects of information biases on behavior (i.e. SCB). Based on the argument, the following hypotheses are proposed:

H3: Environmental knowledge moderates the relationship among information biases, sustainable consumption attitude, and sustainable consumption behavior.

Research Methods

Adopting a post-positivist approach, this study aims to examine the causal relationships among study variables such as information biases, sustainable consumption attitude, environmental knowledge, and SCB. The study employs a causal (explanatory) research design to examine structural relationships and test the proposed hypotheses within the conceptual framework.

A cross-sectional survey was conducted using a four-point Likert scale structured questionnaire, adapting previously validated measurement items from existing literature and contextualizing them later. All constructs were measured using five items for each variable with a four-point Likert scale ranging from 1 = strongly disagree to 4 = strongly agree, which allows respondents to express their level of agreement without a neutral midpoint and encourages more definitive responses. This approach is particularly relevant in sustainability research, where respondents may otherwise default to neutral positions due to social desirability or ambivalence.

The questionnaire included items measuring information biases (information overload, confirmation bias, availability bias, and anchoring bias), sustainability attitude, environmental knowledge, and SCB. Some of the representative statements are as follows: Confirmation Bias (*I prefer environmental information that supports my existing beliefs;* Lanero et al., 2020; Frank et al., 2024), Availability Bias (*Recent environmental information influences my purchasing decisions*; Gigerenzer & Gaissmaier, 2011; Lanero et al., 2020), Anchoring Bias (*My first impression about a product's environmental claim influences my decision;* Lanero et al., 2020; Frank et al., 2024), Sustainability Attitude (*Buying environmentally friendly products is important to me*; Pagiaslis & Krontalis, 2014; Jacobs et al., 2018), Environmental Knowledge (*I understand the environmental impact of many consumer products;* Frick et al., 2004; Dursun et al., 2019; Wan & Du, 2022), and SCB (*I try to purchase environmentally friendly products whenever possible*; Quoquab et al., 2019; Joshi & Rahman, 2015; Witek & Kuźniar, 2023).

The study population comprised all consumers who are involved in purchasing and consumption decisions. A purposive sampling technique was employed to select respondents who possessed experience in purchasing decisions and had exposure to sustainability-related information. Data were collected from 407 respondents, using self-administered questionnaires distributed both physically and online in September, 2025. Respondents were informed of their consent for involvement in the research and use of data for aggregate interpretation regarding the privacy of respondents' information.

Covariance-Based Structural Equation Modeling (CB-SEM) was employed using statistical software such as SPSS and AMOS for data analysis. CB-SEM was used to test a theoretically grounded moderated mediation model rather than to maximize predictive accuracy, which is particularly suitable for enabling the assessment of overall model fit, which is central to evaluating the proposed conceptual framework. Given that the constructs are modeled reflectively, and the sample size (n = 407) is sufficiently large, CB-SEM is considered more

appropriate. The analysis involved measurement model assessment, including reliability, validity, and model fit, followed by structural equation modeling (SEM) for hypothesis testing based on confirmatory factor analysis (CFA).

Result and Analysis

Respondents' Demographic Profile

A total of 450 questionnaires were distributed to potential respondents; however, only 410 completed responses were received. Three responses were incomplete and had double tick marks, so only 407 (9.44% response rate) respondents were included in the survey. The sample size of 407 is considered adequate for covariance-based structural equation modeling given the complexity of the proposed model, which includes multiple latent constructs and indicators. It exceeds commonly suggested thresholds for SEM and provides sufficient statistical power to detect meaningful relationships among variables. Among the respondents, 56.51% were male and 43.49% were female. In terms of age distribution, 38.57% were below 30 years, 36.85% were between 30 and 45 years, and 24.27% were above 45 years. Regarding occupational status, 2.88% were government employees, 51.60% were private-sector employees, and 27.52% were engaged in business or self-employment.

Descriptive Statistics

This study proposed a model incorporating information biases, sustainable consumption attitude, environmental knowledge, and SCB, in which information biases are measured as a second-order construct incorporating confirmation bias, availability bias, anchoring bias, and information overload. Table 1 provides respondents' understanding of each variable in the framework.

Table 1

Mean satisfaction and standard deviation on the dimensions

Variables	Mean	S. D
Information overload (IO)	2.71	.78
Confirmation bias (CB)	2.63	.75
Availability bias (AB)	2.59	.72
Anchoring bias (AnB)	2.66	.74
Sustainability attitude (SA)	3.18	.76
Sustainable behavior (SB)	3.11	.81

Each variable was measured using five statements on a four-point Likert scale; the average value greater than 2.5 provided evidence of respondents' strong agreement on the respective statements. Respondents reported a positive perception of each variable, as the average response value was greater than 2.5.

Table 2

Model Fit Analysis

Factors	Estimated Model	Threshold
P-value	.000	
Chi-Square/df	1.706	< 3
RMSEA	.046	< .0
GFI	.945	> .90
AGFI	.924	> .90
SRMR	.048	< .08
NFI	.901	> .90
TLI	.942	> .90
CFI	.945	> .90

Table 2 presents the goodness-of-fit analysis, which indicates that all criteria were met and provides evidence for further examination of the proposed framework, with a p-value indicating good model fit.

Assessment of Measurement Model

Table 3
Assessment of Measurement Model

Construct	Factor loading	CR	AVE	IO	CB	AB	AnB	SA	EN	SB
Information overload (IO)	.73 - .74	.81	.612	1						
Confirmation bias (CB)	.70 - .73	.85	.616	.46**	1					
Availability bias (AB)	.71 - .76	.82	.581	.41**	.42**	1				
Anchoring bias (AnB)	.72 - .75	.84	.602	.43**	.41**	.44**	1			
Sustainability attitude (SA)	.73 - .80	.86	.606	.47**	.40**	.42**	.41**	1		
Environment knowledge (EN)	.79 - .82	.87	.591	.39**	.41**	.53**	.47**	.45**	1	
Sustainable behavior (SB)	.75 - .82	.87	.572	.46**	.23**	.51**	.32**	.47*	.43**	1

Table 3 shows that there is evidence of good internal consistency (α > .70) for the constructs, and composite reliability (CR) above .80, confirming reliability. The results also fulfill convergent validity, as average variance extracted (AVE) values exceed .50. A Multitrait–Multimethod (MTMT) correlation matrix was used to test the discriminant validity. The inter-construct correlations below .60 provided adequate discriminant validity of measures. The positive, significant inter-construct correlations of moderate magnitude provided evidence of theoretical alignment without evidence of multicollinearity.

Second-Order Construct Assessment

The second-order measurement model (See Table 4) indicates that four dimensions, i.e., information overload, confirmation bias, availability bias, and anchoring bias, represent information biases as the second-order construct. Loading of each variable exceeding the recommended threshold of .70 and being statistically significant ($p < .001$) indicates that the sustainability Information bias is well reflected by these variables. The CR = .91 and AVE = .67 further confirm the reliability and convergent validity of the higher-order construct.

Table 4

Second-Order Construct Assessment

Higher-Order Construct	Dimension	Loading	*t-value*	*p-value*	CR	AVE
Information biases (IB)	Information overload (IO)	.81	13.62	<.001		
	Confirmation bias (CB)	.79	14.03	<.001		
	Availability bias (AB)	.73	12.88	<.001		
	Anchoring bias (AnB)	.84	15.21	<.001		
Information biases (IB)					.91	.67

Hypothesis Testing

Table 5 presents the direct, indirect, and conditional indirect effects to test the hypotheses formulated to examine the moderated mediation effect on the predicting relationships between information biases and SCB.

The results show that information biases significantly influence sustainability consumption attitude ($\beta = .44$, *LLCI* = .337, *ULCI* = .538), and SCB ($\beta = .29$, *LLCI* = .193, *ULCI* = .384). Likewise, the result revealed a significant influence of sustainability consumption attitude on SCB ($\beta = .48$, *LLCI* = .372, *ULCI* = .558). The interaction effect between sustainability attitude and environmental knowledge was significant ($\beta = .17$, *LLCI* = .091, *ULCI* = .248), confirming the moderating effect of environmental knowledge. More importantly, the indirect effect of information biases on SCB via sustainable attitude was significant ($\beta = .211$, *LLCI* = .132, *ULCI* = .293). Further, the results suggest that the mediation effect of sustainability attitude

can be strengthened by increasing environmental knowledge, as the index of conditional indirect effect was significant (*index = .059, LLCI = .021, ULCI = .103*).

Table 5

Direct Effects, Indirect Effects, and Conditional Indirect Effects

Path	**Effect (β)**	**Boot SE**	**LLCI**	**ULCI**	**Decision**
IB -> SA	.44	.052	.337	.538	Supported
SA -> SB	.48	.055	.372	.588	Supported
IB -> SB	.29	.049	.193	.384	Supported
SA x EN -> SB	.17	.041	.091	.248	Supported
Indirect Effect (Mediation Test)					
Effect	**β**	**Boot SE**	**LLCI**	**ULCI**	**Result**
IB->SA->SB	.211	.041	.132	.293	Significant
Conditional Indirect Effects at Levels of Environmental Knowledge					
Environmental Knowledge	**Indirect effect**	**Boot SE**	**LLCI**	**ULCI**	
Low (-1 SD)	.158	.039	.083	.236	
Mean	.211	.041	.132	.293	
High (+1 SD)	.276	.048	.182	.369	
Index of Moderated Mediation					
Index		**Boot SE**	**LLCI**	**ULCI**	**Interpretation**
.059		.021	.103	.14	significant

Discussion

The study examined how information biases influence consumers' SCB, taking a moderated mediation model with sustainability attitude as mediator and environmental knowledge as moderator. Since the questionnaire items were focused on how people process environmental information, develop attitudes, and behave sustainably, the expected results theoretically align with the positive aspect.

The findings indicate that information biases significantly affect sustainability attitudes, confirming that cognitive constraints shape the formation of environmental attitudes. Respondents reported higher chances for information processing because of abundant sustainability claims (information overload), preferentially attending to information that aligns with existing beliefs (confirmation bias), relying on easily recalled environmental information (availability bias), and over-weighting initial information about product sustainability (anchoring bias). These biases influenced their attitudes toward sustainable consumption

and their decisions regarding environmentally responsible purchasing. These findings align with prior research emphasizing that heuristic and biased information processing can distort consumers' perceptions of sustainability (Gigerenzer & Gaissmaier, 2011; Lanero et al., 2020; Frank et al., 2024), their attitudes, and behavior towards sustainable product purchase.

The findings supported the claim that a sustainability attitude strongly predicted sustainable consumption behavior. Respondents reported higher scores on items such as "protecting the environment is an important part of my purchasing decisions" and "I feel positive about supporting environmentally sustainable products", which supported the idea that people who have a positive sustainability attitude are more likely to behave positively by preferring recyclable products, avoiding environmentally harmful items, and reducing waste. This finding is consistent with prior studies demonstrating that attitudes are critical determinants of pro-environmental behavior (Vermeir & Verbeke, 2006; Pagiaslis & Krontalis, 2014; Jacobs et al., 2018). This result highlights the need to maintain a sustainable consumption attitude to encourage environmentally responsible purchasing, highlighting and strengthening the behavioral decision theory.

More importantly, the study focuses on the indirect effect of sustainability attitude, i.e., mediating the relationship between information biases and SCB. Information biases indirectly influence behavior through their impact on attitudes. People who are heavily influenced by anchoring or availability biases tend to form sustainable consumption attitudes based on selective or initial information, which in turn affects their likelihood of making sustainable purchasing decisions. This result highlights a psychological mechanism explaining the attitude–behavior gap in sustainable consumption, consistent with prior research on heuristic influences and attitudinal mediation (Kollmuss & Agyeman, 2002; Munro et al., 2023; Tawde et al., 2023).

The study revealed a moderating effect of environmental knowledge on the relationship between sustainability attitude and SCB. It is highlighted that people with good knowledge of pollution, product impacts, and eco-certifications can translate positive sustainable consumption attitude and sustainable behavior, while those who have little environmental knowledge are more susceptible to cognitive biases, weakening the attitude–behavior link. This finding supports prior evidence that knowledge enhances the ability to overcome psychological barriers and make informed decisions (Frick et al., 2004; Dursun et al., 2019; Wan & Du, 2022). This study, thus, extends the behavioral decision theory connecting environmental cognition process.

Finally, the moderated mediation analysis showed that the indirect effect of information biases on SCB through sustainability attitude strengthens with higher environmental knowledge. This establishes that people with greater environmental knowledge are better able to process sustainability information, reduce the distorting effect of biases, and allow attitudes to guide behavior effectively. This highlights the dual role of environmental knowledge: it enhances the translation of attitudes into behavior and mitigates the negative influence of cognitive biases. Thus, the findings demonstrate the importance of integrating cognitive, attitudinal, and knowledge-based factors to understand SCB (Dreijerink et al., 2023; Tawde et al., 2023).

Theorizing the findings suggests that information processing biases significantly influence SCB both directly and indirectly through sustainable attitudes. Specifically, biases positively shape attitudes, which in turn drive behavioral outcomes, highlighting the role of heuristic-driven decision-making in sustainability contexts. The mediation analysis confirms that attitude serves as a key mechanism through which biases affect behavior. Furthermore, environmental knowledge significantly moderates the attitude–behavior relationship, with higher levels of knowledge strengthening the link. The conditional indirect effects demonstrate that the influence of biases on behavior via attitudes becomes more pronounced as consumer knowledge increases. While these findings suggest that biases can facilitate pro-sustainability behavior, they also raise concerns that such behavior may be driven by simplified or heuristic-based processing rather than fully informed decision-making, potentially leaving consumers vulnerable to greenwashing.

Conclusion and Implications

This study examined how sustainability information processing biases influence sustainable consumption behavior through a moderated mediating framework. The study concludes that consumers' sustainability information processing biases significantly influence sustainable consumption behavior through sustainability attitudes. Environmental knowledge further strengthens this relationship, enhancing the positive effect of sustainability attitudes on sustainable consumption behavior. The findings highlight the combined importance of cognitive processing, attitudes, and environmental knowledge in promoting sustainable consumption behavior. This study highlights that a greater understanding of environmental issues can enhance positive attitudes towards SCB and shape sustainable consumption practices.

This study contributes to the literature on SCB by integrating sustainability information processing biases, sustainable consumption attitude, and environmental knowledge. Almost all traditional studies on sustainable consumption assume rational information processing; this study integrates sustainability information processing biases, i.e., cognitive bias perspectives, to exhibit that people rely on heuristic-based information processing. The study supports sustainability behavior investigation by empirically validating the mediating role of sustainability attitude in the relationship between sustainability information processing biases and SCB. Furthermore, this study provides deeper insight into how sustainable consumption attitudes can influence SCB with environmental knowledge. By integrating sustainability information processing biases (cognitive biases), attitudes, and knowledge into a single framework, the study offers a more comprehensive explanation of the mechanisms underlying sustainable consumption decisions.

The findings have practical implications for policymakers, marketers, and organizations seeking to promote sustainable consumption. The results highlight the importance of clear and accessible sustainability information that supports consumers in processing environmental claims. This study suggests that simplifying sustainability communication and reducing excessive or conflicting information can help consumers form an accurate consumption attitude for sustainability.

This study also provides empirical evidence for organizations and marketers to develop effective and sustainable communication strategies that positively shape consumers' environmental perceptions, attitudes, and behaviors. Sustainable communication strategies help consumers evaluate sustainability information, credible eco-labels, and sustainability certifications during sustainability information processing, shaping favorable sustainability attitudes.

More critically, the study emphasizes the role of environmental knowledge in strengthening SCB. This study suggests that educational institutions, governments, and environmental organizations should initiate formal academic course content, awareness campaigns, and sustainability education to improve consumers' understanding of environmental issues, eco-labels, and product life-cycle impacts.

Limitations and Future Research

Despite its contributions, this study has a few limitations. The study relies on self-reported survey data, which may be influenced by social desirability bias and subjective perceptions of their own behavior. Future studies could incorporate behavioral or observational data to validate self-reported SCB. The study followed a cross-sectional design that could limit the ability to establish causal relationships among the variables; future studies should adapt longitudinal or experimental research designs.

In this study, sustainability information processing biases were examined as a second-order construct representing multiple cognitive biases, including information overload, confirmation bias, availability bias, and anchoring bias, measuring a comprehensive view. Future studies could investigate the individual effects of each bias to understand their distinct roles in sustainability decision-making. Further, future studies should examine the context-specific impact on environmental education.

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Conflict of interest statement

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