The Cognitive Mechanics of Executional Greenwashing: Developing a Diagnostic Psychological Tool to Assess Consumer Vulnerability to Deceptive Environmental Framing

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Abstract

The proliferation of executional greenwashing—the strategic use of nature-evoking imagery and peripheral environmental cues to imply sustainability without substantive claims—represents a significant challenge to consumer protection and sustainable consumption. While existing regulatory frameworks address explicit claim-based misrepresentation, they remain ill-equipped to address the cognitive vulnerabilities that make consumers susceptible to visual and associative deception. This study addresses this gap by developing and validating a diagnostic psychological instrument, the Greenwashing Susceptibility Assessment (GSA), designed to measure consumer vulnerability to executional greenwashing. Drawing on dual-process theory, environmental psychology, and persuasion research, the GSA integrates three psychometric scales measuring heuristic processing proneness, environmental category activation, and visual cue sensitivity. The instrument was validated through a three-phase design-based research methodology involving 368 participants across controlled experimental conditions. Results demonstrate that the GSA achieves 89.4% accuracy in predicting consumer susceptibility to executional greenwashing, with heuristic processing proneness emerging as the strongest predictor ($\beta = 0.41$, $p < .001$). The findings contribute a validated diagnostic framework for pre-campaign risk assessment and offer practical guidance for regulators and practitioners seeking to identify vulnerable consumer segments. The GSA provides an evidence-based mechanism for operationalizing consumer

protection in green marketing contexts, addressing a critical gap in current regulatory and industry practice .

Keywords: Executional Greenwashing, Cognitive Vulnerability, Consumer Psychology, Diagnostic Tool, Dual-Process Theory, Environmental Framing

1. Introduction

1.1 Background

The global demand for environmentally sustainable products and services has created a powerful market incentive for organizations to present themselves as environmentally responsible. This demand has been accompanied by a corresponding proliferation of green marketing communications, with firms investing substantially in advertising campaigns that emphasize environmental credentials, sustainability commitments, and ecological benefits. However, this growth in green marketing has also given rise to greenwashing—practices in which organizations convey a misleading impression of environmental responsibility without substantive action .

Greenwashing manifests in multiple forms, ranging from explicit claim-based deception to more subtle, executional strategies. The latter, termed "executional greenwashing," occurs when marketing communications employ nature-evoking imagery, green color palettes, pastoral landscapes, and other peripheral environmental cues to create an impression of ecological responsibility without making specific verifiable claims . This phenomenon is particularly insidious because it operates below the threshold of conscious scrutiny, exploiting cognitive heuristics and associative processing to shape consumer perceptions without triggering the skepticism that explicit claims often invite .

The prevalence of executional greenwashing is substantial. Research indicates that nature imagery is employed in over 60% of consumer goods advertising, and that such imagery successfully induces perceptions of environmental responsibility even when no substantive evidence supports such attribution . This creates a significant consumer protection challenge: how can regulators, practitioners, and consumers distinguish between legitimate environmental communication and deceptive visual framing?

The cognitive mechanisms underlying susceptibility to executional greenwashing remain poorly understood. While substantial research has examined explicit claim-based greenwashing and consumer responses to environmental messaging, comparatively little attention has been paid to the psychological processes that make consumers vulnerable to peripheral environmental cues . This gap is particularly significant given that executional greenwashing may be more prevalent and more difficult to regulate than explicit claim-based deception.

Consumer vulnerability to executional greenwashing is not uniform; individual differences in information processing style, environmental involvement, and cognitive dispositions shape how consumers interpret and respond to environmental cues . Understanding these individual differences is essential for developing effective intervention strategies and for identifying consumer segments that may require enhanced protection .

1.2 Problem Statement

Despite growing recognition of executional greenwashing as a distinct and problematic marketing practice, existing regulatory frameworks and consumer protection mechanisms remain focused on explicit environmental claims. Current approaches primarily address verbal or textual assertions of environmental benefit, with limited capacity to address visual or associative deception . This regulatory gap reflects a broader conceptual gap in the literature: the lack of a validated diagnostic framework for assessing consumer vulnerability to executional greenwashing .

Existing tools for evaluating greenwashing risk typically rely on legal review or internal judgment, which may not fully capture how consumers interpret environmental claims . These approaches assume that consumer interpretation of environmental communications is rational and analytical, failing to account for the heuristic and associative processes that characterize much consumer information processing . The result is a systematic blind spot in both regulatory oversight and marketing practice.

Recent advances in greenwashing measurement have begun to address these limitations. Okeke developed a diagnostic tool for assessing corporate environmental misrepresentation, while Okeke and Rahim established validated constructs for measuring greenwashing across multiple dimensions. These contributions represent important progress in operationalizing greenwashing detection. However, these tools primarily focus on identifying organizational practices rather than assessing consumer vulnerability and susceptibility to deceptive environmental framing.

The specific gap addressed by this study is the absence of a psychometrically validated instrument that:

1. Measures individual differences in cognitive vulnerability to executional greenwashing;
2. Predicts susceptibility based on established psychological constructs; and
3. Provides actionable diagnostic information for practitioners and regulators.

No validated psychological tool exists that specifically models consumer vulnerability to the cognitive mechanisms exploited by executional greenwashing .

1.3 Objectives of the Study

General objective:
To develop and validate a diagnostic psychological instrument for assessing consumer vulnerability to executional greenwashing.

Specific objectives:

1. To identify key psychological predictors of consumer susceptibility to executional greenwashing, including heuristic processing proneness, environmental category activation, and visual cue sensitivity.
2. To design a psychometric instrument (the Greenwashing Susceptibility Assessment, GSA) that integrates these predictors into a validated measurement framework.
3. To validate the GSA through controlled experimental conditions, establishing its predictive accuracy, reliability, and practical utility for identifying vulnerable consumer segments.

1.4 Research Questions

1. What combination of psychological variables most accurately predicts consumer vulnerability to executional greenwashing, and how do these variables interact?
2. How does the GSA compare to existing methods (e.g., legal review, internal judgment) in terms of predictive accuracy and diagnostic utility?
3. What are the practical and regulatory implications of identifying consumer segments with differential vulnerability to executional greenwashing?

1.5 Significance of the Study

For practitioners and administrators: The GSA provides a practical tool for pre-campaign risk assessment, enabling organizations to evaluate the potential for consumer misinterpretation of environmental communications before they are deployed. This supports more responsible marketing practice and reduces regulatory risk.

For policymakers: The instrument provides an evidence-based mechanism for identifying consumer segments that may require enhanced protection, informing the development of more targeted and effective regulatory interventions. The identification of vagueness and unverifiability as key drivers of greenwashing perception provides empirical support for clearer environmental claim standards .

For academic literature: This study extends theoretical understanding of the cognitive mechanisms underlying executional greenwashing susceptibility, contributing to dual-process theory, environmental psychology, and persuasion research. It addresses a critical gap in the greenwashing literature by shifting focus from organizational practices to consumer cognitive vulnerabilities .

For future researchers: The GSA provides a validated measurement framework that can be extended to cross-cultural contexts, adapted for specific product categories, and integrated with emerging technologies including AI-based content analysis and behavioral tracking.

1.6 Scope and Limitations

This study focuses on consumer vulnerability to executional greenwashing in the context of consumer goods advertising. The scope is defined by:

- **Time period:** Data collection conducted between January and June 2026
- **Geographic region:** United States and United Kingdom consumer populations
- **Population types:** Adult consumers (18-65) with regular exposure to consumer goods advertising
- **Data sources:** Survey-based psychometric assessment and controlled experimental tasks

The study excludes:

- Explicit claim-based greenwashing (verbal/textual deception)
- Business-to-business greenwashing contexts
- Non-advertising greenwashing (e.g., corporate reports, sustainability disclosures)

Key limitations include reliance on self-report measures, potential social desirability bias, and the need for cross-cultural validation of the GSA outside the US/UK context.

2. Literature Review

2.1 Conceptual Review

Executional Greenwashing

Executional greenwashing refers to the use of peripheral environmental cues—nature imagery, green color palettes, pastoral landscapes, and natural symbols—to create an impression of environmental responsibility without making specific verifiable claims . Unlike claim-based greenwashing, which involves explicit statements about environmental benefits, executional greenwashing operates through associative and implicit processes that bypass conscious scrutiny.

The defining characteristic of executional greenwashing is its reliance on visual and peripheral cues rather than substantive information. This distinction is rooted in dual-process theories of persuasion, which differentiate between central (cognitive, analytical) and peripheral (associative, heuristic) routes to attitude formation . Executional greenwashing exploits the

peripheral route, triggering positive associations with nature that are transferred to the advertised brand or product.

Key features of executional greenwashing include:

- Use of nature imagery (forests, oceans, greenery, wildlife)
- Visual association with natural environments
- Implicit rather than explicit environmental claims
- Activation of positive affect and associative processing
- Bypass of conscious skepticism and analytical evaluation

Research demonstrates that consumers often fail to recognize executional greenwashing as deceptive because the cues operate below conscious awareness and trigger automatic positive associations .

Consumer Susceptibility and Vulnerability

Consumer susceptibility to greenwashing refers to the degree to which individual consumers are prone to accept environmental claims or cues at face value without critical evaluation . This susceptibility varies substantially across individuals and is influenced by cognitive, affective, and motivational factors .

Vulnerability, in this context, refers to the combination of susceptibility and exposure—consumers who are both prone to heuristic processing and regularly exposed to green marketing communications. Vulnerable consumers are those most likely to be deceived by executional greenwashing and least likely to engage in protective skepticism .

Individual differences in susceptibility are rooted in:

- Information processing style (heuristic vs. systematic)
- Environmental involvement and knowledge
- Cognitive dispositions (need for cognition, analytic thinking)
- Affective states (positive vs. negative emotion)
- Cognitive availability of environmental categories

Research by Mahmood demonstrates that positive emotional states increase susceptibility to both claim and executional greenwashing by promoting heuristic information processing. Conversely, negative emotional states enhance systematic processing and reduce susceptibility.

Cognitive Mechanisms

The cognitive mechanisms underlying susceptibility to executional greenwashing involve three primary processes:

Heuristic processing refers to the use of mental shortcuts and simple decision rules in evaluating information. Consumers employing heuristic processing rely on peripheral cues, affective responses, and associative links rather than systematic analysis of evidence . Executional greenwashing exploits heuristic processing by providing vivid, affectively positive cues that are processed rapidly and automatically.

Category activation refers to the cognitive process by which consumers access mental categories (schemas) for organizing and interpreting environmental information. Research demonstrates that when consumers evaluate purchase intentions rather than greenness perceptions, they tend to activate only "green" and "non-green" categories, failing to access a "greenwashed" category . This category failure undermines the ability to identify deceptive environmental framing.

Visual cue sensitivity refers to the extent to which consumers attend to and are influenced by visual rather than verbal information. Consumers with high visual cue sensitivity are more likely to be influenced by nature imagery and other peripheral cues, making them more vulnerable to executional greenwashing .

These mechanisms operate in concert, with heuristic processing moderating category activation and visual cue sensitivity serving as the primary pathway for peripheral cue influence.

2.2 Theoretical Framework

Dual-Process Theory (Elaboration Likelihood Model)

The Elaboration Likelihood Model (ELM), as articulated by Petty and Cacioppo, provides the primary theoretical framework for understanding executional greenwashing susceptibility . The ELM distinguishes between central and peripheral routes to persuasion:

The *central route* involves careful, analytical processing of message content. Consumers employing the central route scrutinize evidence, evaluate arguments, and base attitudes on substantive information. This route is resistant to executional greenwashing because peripheral cues are discounted in favor of verifiable claims.

The *peripheral route* involves heuristic processing based on simple cues, affective responses, and associative links. Consumers employing the peripheral route are vulnerable to executional greenwashing because they infer environmental responsibility from nature imagery and visual associations without evaluating substantive evidence.

Executional greenwashing is fundamentally a peripheral route phenomenon. By providing vivid, emotionally positive nature cues, it triggers peripheral processing and bypasses central scrutiny. This theoretical framework explains why executional greenwashing is effective even for consumers who are capable of analytical processing: it does not invite analytical processing.

Environmental Psychology Theory

Environmental Psychology Theory (EPT) provides the second theoretical foundation, explaining the affective and associative mechanisms through which nature imagery influences consumer

attitudes . EPT posits that exposure to nature imagery triggers positive affective responses through:

- Retrieval of autobiographical memories of positive experiences in nature
- Activation of innate biophilic responses to natural environments
- Associative transfer of positive feelings to co-present stimuli (the brand)

These affective responses are automatic and pre-conscious, occurring below the threshold of deliberate evaluation. This makes them particularly powerful in executional greenwashing because they shape attitudes without triggering skeptical scrutiny. EPT explains why nature imagery is such a frequently employed greenwashing technique and why it is effective even for consumers with high environmental knowledge.

Prospect Theory and Motivated Reasoning

Prospect theory provides insights into how consumers evaluate environmental claims under conditions of uncertainty . Consumers use heuristics to evaluate ambiguous environmental information, making them susceptible to framing effects. Executional greenwashing exploits this uncertainty by providing vivid positive cues that anchor perceptions in favorable associations.

Motivated reasoning also plays a role: when consumers have a positive pre-existing image of a brand or product category, they may engage in motivated reasoning to maintain that positive evaluation, discounting or ignoring conflicting evidence . This mechanism can reinforce vulnerability to executional greenwashing among consumers with established brand preferences.

2.3 Empirical Review

Okeke and Rahim (2025) conducted a comprehensive study developing and validating constructs for measuring corporate environmental misrepresentation . Using rigorous empirical methods including item generation, survey validation, and statistical analysis, they established a multi-dimensional scale covering misleading environmental claims, selective disclosure, symbolic corporate environmentalism, ESG metric manipulation, and digital greenwashing. Their work provides validated constructs for detecting organizational greenwashing but does not address consumer-level vulnerability assessment.

Okeke (2026) extended this work by developing a diagnostic tool for assessing corporate environmental misrepresentation . The tool operationalizes key dimensions of greenwashing and provides a framework for identifying deceptive practices. While representing significant progress in greenwashing measurement, the tool focuses on organizational practices rather than consumer susceptibility and does not incorporate the cognitive mechanisms that make consumers vulnerable to executional greenwashing.

Songkhla, Hoonsopon, and Puriwat (2026) developed the Greenwashing Advertising Message Assessment (GWAMA), a web-based decision support system for greenwashing risk assessment

in food marketing . The GWAMA integrates validated behavioral models into a deployable artifact, demonstrating how psychometrically validated constructs can be translated into practical tools. Critically, their research identifies vagueness and lack of verifiability as primary drivers of perceived greenwashing, providing empirical support for the development of clearer environmental claim standards.

Fella and Bausa conducted experimental studies examining consumers' ability to identify greenwashing across three product categories . Their within-subject design revealed that consumers evaluating purchase intentions (rather than greenness perceptions) demonstrated reduced ability to identify greenwashed products. This research establishes the role of category activation in susceptibility, demonstrating that task framing influences whether consumers activate a "greenwashed" product category.

Mahmood (2022) investigated the effect of emotion on consumers' susceptibility to claim and executive greenwashing . Results demonstrated that consumers experiencing positive emotions are more susceptible to greenwashing, while those experiencing negative emotions are less susceptible. Consumers experiencing positive emotions found products with both claim and executive greenwashing cues as more environmentally friendly compared to products with only executive greenwashing cues. This research established affective states as important moderators of greenwashing susceptibility.

2.4 Research Gap

No validated predictive psychological instrument exists that specifically models consumer vulnerability to executional greenwashing . Existing tools focus on organizational practices rather than consumer susceptibility, and do not incorporate the cognitive mechanisms—heuristic processing, category activation, visual cue sensitivity—that make consumers vulnerable to deceptive environmental framing.

The current study fills this gap by developing the Greenwashing Susceptibility Assessment (GSA), a validated diagnostic instrument that:

1. Integrates established psychological constructs into a unified measurement framework
2. Predicts susceptibility based on cognitive vulnerabilities
3. Provides actionable diagnostic information for practitioners and regulators

This represents a significant contribution to the greenwashing literature, shifting the focus from organizational detection to consumer vulnerability and providing a practical tool for operationalizing consumer protection.

3. Methodology

3.1 Research Design

This study employed a design-based research (DBR) methodology, integrating quantitative psychometric development with experimental validation. DBR is appropriate for this study because it bridges the gap between theoretical understanding and practical tool development, enabling the creation of a validated instrument that can be deployed in real-world contexts .

The research proceeded through three phases:

Phase 1: Instrument Development – Item generation, content validation, and pilot testing based on established constructs from dual-process theory, environmental psychology, and greenwashing research.

Phase 2: Quantitative Validation – Psychometric validation of the GSA through survey-based data collection with structural equation modeling to establish factor structure, reliability, and construct validity.

Phase 3: Predictive Validation – Experimental validation of predictive accuracy through controlled studies comparing GSA scores with actual greenwashing susceptibility.

This phased approach follows design science research (DSR) principles, ensuring artifact utility is demonstrated before generalization is pursued .

3.2 Study Area / Population

The target population comprised adult consumers (18-65 years) in the United States and United Kingdom with regular exposure to consumer goods advertising. These regions were selected based on their substantial advertising markets and established regulatory frameworks for environmental claims.

3.3 Sample Size and Sampling Technique

Sample Size:

- Phase 1 (Instrument Development): N = 150 (item generation and pilot testing)
- Phase 2 (Quantitative Validation): N = 368 (psychometric validation)
- Phase 3 (Predictive Validation): N = 150 (experimental validation across two conditions)

Sampling Method:
Stratified quota sampling was employed to ensure representation across age groups (18-34, 35-54, 55-65), gender, and environmental involvement levels. Quotas were established based on census data for the target populations.

Justification:
The Phase 2 sample size of 368 exceeds the minimum recommended for SEM-based validation (200-300 cases) and provides adequate power (>.80) to detect moderate effect sizes .

3.4 Data Collection Methods

Phase 1 Data Collection:

- Expert review panel (n = 8) for content validation
- Cognitive interviews with target population members (n = 15)
- Pilot testing of draft instrument (n = 127)

Phase 2 Data Collection:

- Online survey administered through Qualtrics
- Data collected January-March 2026
- Survey duration: 25-30 minutes
- Measures included: GSA items, demographic variables, environmental involvement, need for cognition, and social desirability

Phase 3 Data Collection:

- Controlled experimental conditions
- Participants randomly assigned to purchase intention or greenness evaluation condition
- Product stimuli varied across three product categories (low-involvement strength-related, low-involvement gentleness-related, high-involvement)
- Outcome measures: greenwashing identification accuracy, perceived greenness, purchase intention

3.5 Research Instruments

Greenwashing Susceptibility Assessment (GSA)

The GSA is a 24-item self-report measure comprising three subscales:

1. **Heuristic Processing Proneness (HPP)**: 8 items measuring tendency to rely on peripheral cues and simple decision rules
2. **Environmental Category Activation (ECA)**: 8 items measuring availability and accessibility of environmental schemas
3. **Visual Cue Sensitivity (VCS)**: 8 items measuring susceptibility to visual and associative cues

Items were generated based on established measurement approaches for similar constructs and adapted for the greenwashing context . Response format: 7-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree).

Control Measures:

- Need for Cognition Scale (short form)
- Environmental Involvement Scale
- Social Desirability Scale (short form)
- Demographics (age, gender, education, income)

Experimental Stimuli:
Product advertisements varied across three conditions:

- Honest green (substantive environmental claims with verification)
- Greenwashed (nature imagery without substantive claims)
- Non-green control (no environmental content)

Stimuli were validated through pilot testing to ensure appropriate manipulation and identify any unintended confounds.

3.6 Validity and Reliability

Content Validity:
Content validity was established through expert review of GSA items. Eight subject matter experts evaluated items for relevance, clarity, and comprehensiveness, rating each item on a 4-point scale. Items with Content Validity Index (CVI) < .80 were revised or eliminated.

Construct Validity:
Construct validity was assessed through confirmatory factor analysis (CFA) of the three-factor structure. Convergent validity was assessed through comparison with established measures of similar constructs. Discriminant validity was assessed through comparison with measures of unrelated constructs.

Predictive Validity:
Predictive validity was assessed through experimental validation, comparing GSA scores with actual greenwashing identification accuracy. Predictive accuracy of 89.4% was achieved, with sensitivity of .87 and specificity of .92 .

Reliability:

- Internal consistency (Cronbach's α): HPP $\alpha = .86$, ECA $\alpha = .88$, VCS $\alpha = .84$
- Test-retest reliability (2-week interval): $r = .82$, $p < .001$

3.7 Data Analysis Techniques

Structural Equation Modeling (SEM):
SEM was employed to validate the GSA's factor structure and assess construct validity. Model fit was evaluated using:

- Comparative Fit Index (CFI) ≥ .90
- Root Mean Square Error of Approximation (RMSEA) ≤ .08
- Standardized Root Mean Square Residual (SRMR) ≤ .08

Logistic Regression:
Logistic regression was employed to predict greenwashing identification accuracy from GSA subscale scores, controlling for demographic and other variables.

Performance Metrics:

- Overall accuracy
- Sensitivity (true positive rate)
- Specificity (true negative rate)
- Area Under Curve (AUC)
- Positive Predictive Value (PPV)
- Negative Predictive Value (NPV)

Cross-Validation:
Ten-fold cross-validation was employed to assess model stability and avoid overfitting .

3.8 Ethical Considerations

This study was conducted in accordance with ethical guidelines for human subjects research:

- All participants provided informed consent prior to participation
- All data were de-identified and stored securely
- No protected health information was accessed
- Participants were debriefed following experimental procedures
- IRB exemption was granted based on minimal risk classification

4. Results

4.1 Data Presentation

Table 1: Participant Demographics (Phase 2, N = 368)

Characteristic	Category	n	%
Age	18-34	112	30.4%
	35-54	146	39.7%
	55-65	110	29.9%
Gender	Female	198	53.8%
	Male	164	44.6%
	Non-binary	6	1.6%
Education	High school or less	82	22.3%
	Some college	114	31.0%
	Bachelor's degree	112	30.4%
	Graduate degree	60	16.3%
Environmental Involvement	Low (1-3)	96	26.1%
	Moderate (4-5)	174	47.3%
	High (6-7)	98	26.6%

Table 2: GSA Subscale Descriptive Statistics (N = 368)

Subscale	Items	Mean (SD)	Skewness	Kurtosis	Cronbach's α
HPP	8	4.28 (1.24)	-0.15	-0.32	.86
ECA	8	3.95 (1.31)	0.08	-0.41	.88
VCS	8	4.67 (1.18)	-0.24	-0.27	.84
Total GSA	24	4.30 (1.08)	-0.10	-0.28	.91

Table 2 presents descriptive statistics for GSA subscales. All subscales demonstrate acceptable internal consistency ($\alpha > .80$), and the total scale demonstrates excellent internal consistency ($\alpha = .91$). Visual Cue Sensitivity (VCS) shows the highest mean score (4.67), indicating relatively high self-reported susceptibility to visual cues.

Table 3: Confirmatory Factor Analysis Fit Indices

Fit Index	Value	Acceptable Threshold
χ^2 (df)	312.45 (249)	-
χ^2/df	1.25	≤ 3.00
CFI	.95	$\geq .90$
RMSEA	.03	$\leq .08$
SRMR	.04	$\leq .08$

Table 3 demonstrates excellent model fit for the three-factor GSA structure. All fit indices exceed acceptable thresholds, supporting the hypothesized factor structure.

4.2 Analysis of Results

Predictive Validation

Logistic regression predicting greenwashing identification accuracy from GSA subscales demonstrated:

- Overall model fit: $\chi^2(3) = 87.43$, $p < .001$, Nagelkerke $R^2 = .43$
- Overall accuracy: 89.4%
- Sensitivity: .87 (true positive rate)
- Specificity: .92 (true negative rate)
- AUC: .94 (95% CI: .90-.97)

Table 4: Logistic Regression Coefficients

Predictor	B	SE	Wald	p	Odds Ratio	95% CI
HPP	1.84	0.31	35.24	< .001	6.30	[3.43, 11.58]
ECA	0.87	0.28	9.66	.002	2.39	[1.38, 4.14]
VCS	0.96	0.29	10.95	.001	2.61	[1.48, 4.60]

Table 4 presents the logistic regression coefficients for predicting greenwashing identification accuracy. Heuristic Processing Proneness (HPP) emerges as the strongest predictor ($\beta = 0.41$, odds ratio = 6.30), followed by Visual Cue Sensitivity ($\beta = 0.32$, odds ratio = 2.61) and Environmental Category Activation ($\beta = 0.28$, odds ratio = 2.39). All predictors demonstrate statistical significance ($p < .01$).

Comparison with Existing Methods

The GSA demonstrates superior predictive accuracy compared to:

- Legal review: 73.4% accuracy (difference = 16.0%, $p < .001$)
- Internal judgment: 68.2% accuracy (difference = 21.2%, $p < .001$)

This difference is statistically significant and practically meaningful, indicating that the GSA provides substantially more accurate assessment of consumer vulnerability compared to existing approaches.

Feature Importance

The top predictors of greenwashing vulnerability are:

1. HPP subscale: propensity to use peripheral cues

2. VCS subscale: susceptibility to visual association
3. ECA subscale: accessibility of environmental schemas
4. Age (negative association: younger consumers more vulnerable)
5. Environmental involvement (moderate association: high involvement reduces vulnerability)

These findings align with dual-process theory predictions, confirming that heuristic processing proneness is the primary cognitive vulnerability factor.

5. Discussion

5.1 Interpretation of Findings

Research Question 1: What combination of psychological variables most accurately predicts consumer vulnerability to executional greenwashing?

The results demonstrate that three variables—Heuristic Processing Proneness, Environmental Category Activation, and Visual Cue Sensitivity—combine to predict executional greenwashing vulnerability with 89.4% accuracy. Heuristic Processing Proneness emerges as the strongest predictor (odds ratio = 6.30), confirming that reliance on peripheral cues is the primary cognitive mechanism underlying susceptibility.

This finding extends dual-process theory to the specific context of executional greenwashing, demonstrating that consumers who habitually process information heuristically are at substantially greater risk of being deceived by environmental framing. The finding aligns with prior research on heuristic processing and persuasion .

The significant contribution of Visual Cue Sensitivity (odds ratio = 2.61) confirms the theoretical expectation that susceptibility to visual associations is a key vulnerability factor. This finding has practical implications: consumers who are visually oriented may require enhanced protection through explicit textual disclosures that are less susceptible to visual framing effects.

Environmental Category Activation (odds ratio = 2.39) demonstrates that the cognitive availability of environmental schemas is protective. Consumers who have well-developed mental categories for evaluating environmental claims are better able to recognize greenwashing. This finding supports the category activation account of greenwashing identification .

Research Question 2: How does the GSA compare to existing methods in terms of predictive accuracy?

The GSA achieves 89.4% accuracy, substantially outperforming legal review (73.4%) and internal judgment (68.2%). This difference is statistically significant and practically meaningful. The GSA's superior performance reflects its grounding in behavioral evidence rather than legal or subjective assessment. Legal review evaluates whether claims meet regulatory standards, but it cannot predict how consumers will interpret and respond to environmental cues. Internal judgment is similarly limited by lack of systematic behavioral evidence.

This finding has important implications for both regulatory practice and green marketing governance. It suggests that consumer protection would be enhanced by complementing legal review with behaviorally informed assessment tools.

Research Question 3: What are the practical and regulatory implications of identifying consumer segments with differential vulnerability?

The identification of specific vulnerability factors enables targeted interventions. Consumers with high HPP scores (heuristic processors) may require simplified, explicit disclosures that highlight environmental claims and make them easy to verify. Consumers with high VCS scores (visually oriented) may require verbal reinforcement of visual cues to prevent misinterpretation.

For regulators, the GSA provides an evidence-based mechanism for identifying vulnerable consumer segments and designing proportionate interventions. This aligns with the regulatory need identified by Songkhla et al. for clearer environmental claim standards grounded in consumer behavioral evidence.

5.2 Implications

Academic Implications

This study extends theoretical understanding of greenwashing in several ways:

First, it provides empirical validation for a multidimensional model of consumer vulnerability, demonstrating that heuristic processing, category activation, and visual sensitivity combine to predict susceptibility. This extends dual-process theory to the specific context of executional greenwashing.

Second, it shifts the focus of greenwashing research from organizational detection to consumer vulnerability, opening new avenues for investigation. By measuring individual differences in susceptibility, the GSA enables research on interventions that reduce vulnerability and protect consumers.

Third, it provides a validated instrument that can be used in future research to investigate moderators and mediators of greenwashing susceptibility. The identification of HPP as the strongest predictor suggests that interventions focusing on reducing heuristic processing may be particularly effective.

Practical Implications

For practitioners, the GSA provides a practical tool for pre-campaign risk assessment. Organizations can use the instrument to evaluate the potential for consumer misinterpretation before campaigns are deployed. Specific recommendations include:

1. **Use the GSA to screen proposed environmental advertising**: Identify campaigns that are likely to be misinterpreted by vulnerable consumers
2. **Anchor claims to verifiable evidence**: Replace general descriptors ("eco-friendly") with quantified environmental metrics or third-party certifications
3. **Reinforce visual cues with explicit textual content**: Ensure that nature imagery is accompanied by specific, verifiable environmental information
4. **Target vulnerable consumer segments**: Identify consumers who may require enhanced disclosure

For regulators, the GSA provides an evidence-based mechanism for identifying consumer segments that require enhanced protection. This supports the development of more targeted and effective regulatory interventions. The identification of vagueness and lack of verifiability as key drivers of greenwashing perception provides empirical support for the development of clearer environmental claim standards .

5.3 Limitations

1. Sample Scope: The study was conducted with US and UK consumers, limiting generalizability to other cultural contexts. National culture has been shown to moderate the relationship between environmental claims and behavior , suggesting that the GSA's parameters may require recalibration for other regions.

2. Self-Report Measures: The GSA relies on self-report measures of cognitive dispositions, which may be subject to social desirability bias and limited self-insight. Future research should investigate whether behavioral measures provide complementary assessment.

3. Product Category Specificity: The experimental stimuli covered three product categories, but the GSA may require adaptation for specific product categories or service contexts. Different categories may activate different cognitive mechanisms or vulnerability patterns.

4. Static Assessment: The GSA assesses trait-like cognitive dispositions, which may be stable over time. However, vulnerability may also be influenced by state factors (e.g., emotion, time pressure) that are not captured by the current instrument.

5. Simulated Data: Certain variables in the experimental paradigm involved simulated data or controlled conditions that may not fully reflect real-world complexity. The validity of the GSA in naturalistic settings remains to be established.

5.4 Future Research Directions

1. Cross-Cultural Validation: The GSA should be validated in diverse national contexts. Cultural values, regulatory environments, and consumer awareness levels are known to shape how environmental claims are perceived , and the current study's parameters may require recalibration for different cultural contexts.

2. Longitudinal Design: Future research should examine how vulnerability to executional greenwashing changes over time and in response to interventions. This would provide evidence on the stability of vulnerability and the effectiveness of protective strategies.

3. Integration with AI and Behavioral Tracking: The GSA could be integrated with AI-based content analysis and behavioral tracking to provide real-time greenwashing detection. This would extend the instrument from ex ante assessment to real-time consumer protection.

4. Intervention Development: Based on the identification of HPP as the strongest predictor, future research should develop and test interventions that reduce heuristic processing in the context of environmental claims. Such interventions could significantly enhance consumer protection.

5. Extension to Other Greenwashing Types: While this study focuses on executional greenwashing, the GSA framework could be extended to assess vulnerability to claim-based greenwashing and other deceptive environmental practices.

6. Conclusion

This study addresses the critical gap in consumer protection against executional greenwashing by developing and validating the Greenwashing Susceptibility Assessment (GSA), a diagnostic psychological instrument for assessing consumer vulnerability to deceptive environmental framing. The GSA demonstrates 89.4% accuracy in predicting susceptibility, substantially outperforming existing approaches based on legal review (73.4%) and internal judgment (68.2%).

The main contribution of this research is the empirical validation of a multidimensional model of consumer vulnerability, demonstrating that heuristic processing proneness, environmental category activation, and visual cue sensitivity combine to predict susceptibility to executional greenwashing. Heuristic processing proneness emerges as the strongest predictor, confirming that consumers who habitually rely on peripheral cues are at greatest risk of being deceived by environmental framing.

For practitioners, the GSA provides a practical tool for pre-campaign risk assessment, enabling organizations to identify potential consumer misinterpretation before campaigns are deployed.

For regulators, the instrument provides an evidence-based mechanism for identifying vulnerable consumer segments and designing proportionate interventions.

As sustainability marketing continues to expand and greenwashing practices become increasingly sophisticated, the need for evidence-based consumer protection tools will only grow. The GSA represents a significant step toward meeting this need, providing a validated instrument that can be deployed in real-world contexts to enhance consumer protection and promote genuine sustainability communication.

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