The Impact of Online Reference Groups on Shared Green Consumption Behavior: The Mediating Role of Natural Empathy

Ruyi Zhang[1], Supaphorn Akkapin[2]*, and Piyarat Pipattarasakul[3]

[1, 2, 3]Master of Arts Program in English for Professionals, Faculty of Liberal Arts, Rajamangala University of Technology Krungthep, Bangkok, Thailand

* Corresponding author. E-mail address: supaphorn.a@mail.rmutk.ac.th

Abstract

Purpose
This study investigates how informational, normative, and interactional influences from online reference groups (ORG) drive Shared Green Consumption Behavior (SGCB) via Natural Empathy (NE). Grounded in Stimulus–Organism–Response (SOR) theory and the empathy–altruism hypothesis, it addresses a critical gap in understanding affective mechanisms in digital green-marketing.

Methods
A cross-sectional survey of 409 Chinese internet users was conducted in May–June 2024. Data were analyzed using SPSS 27.0 for reliability and descriptive statistics, and Mplus 7.0 for structural equation modeling with bootstrapped mediation (5 000 resamples).

Findings
(1) ORG positively predict SGCB ($\beta = .61$, $p < .001$). (2) ORG foster NE ($\beta = .65$, $p < .001$). (3) NE predicts SGCB ($\beta = .57$, $p < .001$). (4) NE partially mediates the ORG→SGCB relationship (indirect = .53; 95% CI [.54, .71]).

Implications
Green-sharing platforms should combine clear informational content (e.g., usage tutorials) with empathy-evoking storytelling (e.g., conservation narratives) and interactive community features (e.g., live Q&A) to deepen NE and enhance SGCB.

Originality
This research extends the SOR model to digital reference-group contexts and empirically identifies NE as a crucial affective mediator in collaborative green consumption.

Keywords
online reference groups; natural empathy; shared green consumption behavior; SOR theory; empathy–altruism

1 Introduction

1.1 Background and Rationale

China's 2019–2023 Ecological Status Bulletins report marked air- and water-quality improvements following stringent pollution controls, waste-sorting mandates, and renewable-energy investments. Parallel policy measures—green taxation, green finance, and expanded conservation areas—underscore a national "ecological civilization" drive. Against this policy backdrop, **shared green consumption behavior** (SGCB)—collaborative access to green goods/services—emerges as both an economic and social strategy for resource optimization and equitable access.

Concurrently, **online reference groups** (virtual communities and influencers) disseminate product knowledge, social norms, and interactive engagement that powerfully shape consumer decisions (Deutsch & Gerard, 1955; Guan, 2015). Yet while the direct influence of such groups is documented, the internal, affective mechanism—**natural empathy**—by which these stimuli translate into SGCB remains underexplored.

1.2 Research Problem

Can virtual social networks promote SGCB more effectively than traditional marketing? Specifically:

1. Do online reference-group stimuli mirror the influence of face-to-face groups?
2. Does **natural empathy** mediate the impact of online reference groups on SGCB?

1.3 Objectives

1. Examine the direct effect of online reference groups on SGCB.
2. Assess the impact of online reference groups on natural empathy.
3. Test the effect of natural empathy on SGCB.
4. Evaluate natural empathy's mediating role.

1.4 Contributions

- **Theoretical**: Integrates SOR with digital reference-group literature and empathy–altruism theory.
- **Practical**: Guides platform designers to embed empathy-evoking narratives and interactive cues to boost SGCB.

2 Literature Review

2.1 Online Reference Groups

Reference-group theory (Deutsch & Gerard, 1955) identifies two primary pathways through which social circles influence individual attitudes and behaviors: informational and normative. In digital environments, **Online Reference Groups (ORG)**—virtual communities, peer networks, and influencers—extend these mechanisms via three dimensions:

2.1.1 Informational Influence

ORG serve as repositories of user-generated content—product reviews, how-to tutorials, and detailed comparisons—that reduce uncertainty and perceived risk (Guan, 2015). For example, green-sharing platforms often feature community-authored guides on efficient carpool routing or maintenance of shared tools, thereby enhancing users' competence and participation.

2.1.2 Normative Influence

Social approval cues (likes, shares, badges, endorsements) signal in-group acceptance and approval. Park and Lessig (1977) demonstrated that normative pressure drives conformity; online, algorithmically curated feeds amplify these cues. High engagement with eco-friendly content or "green-champion" badges creates implicit social expectations to adopt similar behaviors (Zhou & Zuo, 2012).

2.1.3 Interactional Influence

Beyond one-way broadcasts, modern social media enable **real-time dialogues**—live-stream Q&A sessions, comment threads, and peer-to-peer messaging—that foster relational bonds and co-construct meaning (Xu, 2012). For instance, live environmental webinars allow direct interaction with sustainability experts, enhancing both trust and identification with group eco-goals.

Collectively, these three pathways enable ORG to simultaneously educate, norm, and engage users, making them potent drivers of complex behaviors such as Shared Green Consumption Behavior.

2.2 Natural Empathy

Natural Empathy (NE) is an individual's vicarious capacity to experience the emotional states of the non-human environment, comprising two intertwined dimensions:

2.2.1 Affective Dimension

Immediate emotional arousal—sympathy, compassion, concern—arises when confronted with environmental degradation or the plight of flora and fauna (Schultz, 2001). Vivid imagery of polluted rivers or endangered species in digital content can trigger these visceral responses, prompting pro-environmental intentions (Preylo & Arikawa, 2008).

2.2.2 Cognitive Dimension

Perspective-taking involves understanding ecological interdependencies and imagining the world from non-human viewpoints (Hoffman, 2008). This cognitive empathy underlies moral reasoning: individuals who grasp ecosystems' intrinsic value commit more strongly to sustainable practices (Sevillano, Sánchez, & Mosquera, 2007).

In the SOR framework, NE functions as the **organismic** state that bridges external stimuli (e.g., ORG content) and behavioral responses (e.g., SGCB).

2.3 Shared Green Consumption Behavior

Shared Green Consumption Behavior (SGCB) refers to collaborative models that allow multiple users to access, co-use, or share environmentally friendly products and services (Belk, 2014; Albinsson & Perera, 2012). Four key antecedents shape SGCB:

2.3.1 Environmental Awareness

An individual's understanding of ecological issues—climate change, resource depletion, pollution—and belief in personal efficacy motivate participation in shared use (Mont, 2004).

2.3.2 Economic Incentives

Shared use offers financial benefits—lower costs per transaction, reduced maintenance—making sustainable consumption economically attractive (Moeller & Wittkowski, 2010).

2.3.3 Social Belonging

Participation in sharing platforms fosters community identity and reciprocal obligations. Users who feel part of a cooperative network are more likely to engage and advocate for the service (Albinsson & Perera, 2012).

2.3.4 Platform Affordances

Technological features—user ratings, geo-location, seamless payments—lower transaction costs and build trust. Gamification elements (points, leaderboards) further reinforce positive behavior (Hamari, Sjöklint, & Ukkonen, 2016).

By integrating these drivers, SGCB advances circular-economy principles, reduces the material and energy footprint of consumption, and promotes inclusive resource access. Effective diffusion of SGCB, however, also relies on affective mechanisms—particularly NE—to translate ORG stimuli into genuine collaborative environmental action.

3 Theoretical Framework and Hypotheses

Drawing on **Stimulus–Organism–Response (SOR)** theory (Mehrabian & Russell, 1974) and the **empathy–altruism hypothesis** (Batson et al., 1995), we propose that Online Reference-Group (ORG) stimuli influence Shared Green Consumption Behavior (SGCB) both directly and indirectly via Natural Empathy (NE).

Stimulus (S)	Organism (O)	Response (R)
Online Reference-Group Stimuli:	Natural Empathy	Shared Green Consumption Behavior
• Informational Influence		
• Normative Influence		
• Interactional Influence		

- **H1:** ORG stimuli positively influence SGCB.
- **H2:** ORG stimuli positively influence NE.
- **H3:** NE positively influences SGCB.
- **H4:** NE mediates the relationship between ORG stimuli and SGCB.

Figure 1 depicts the full conceptual framework, showing how Online Reference-Group stimuli are expected to influence Shared Green Consumption Behavior both directly and indirectly via Natural Empathy.
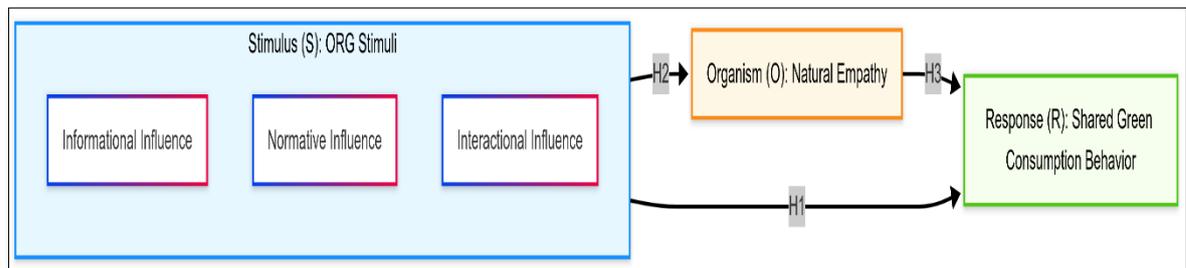

Figure 1. Conceptual Framework of Research

As shown in Figure 1, the three dimensions of ORG stimuli (informational, normative, interactional) serve as exogenous variables, natural empathy as the mediating organismic state, and SGCB as the outcome.

4 Research Methodology

4.1 Population and Sampling

The sampling frame comprised **1.092 billion** internet users in China (CNNIC, 2024). A simple random sample of **400** was calculated to achieve 95 % confidence with ± 5 % precision (Israel, 1992). Data collection via Wenjuanxing (May–June 2024) yielded **409** valid responses.

4.2 Instrumentation

A structured online questionnaire included four sections:

1. **Demographics:** Gender, age, education, occupation, monthly income.
2. **Online Reference-Group Scale (5 items):** Informational, normative, and interactional influences (Guan, 2015; Zhou & Zuo, 2012).
3. **Natural Empathy Scale (4 items):** Affective and cognitive empathy toward nature (Fan, 2014; Zhang et al., 2016).
4. **Shared Green Consumption Behavior Scale (3 items):** Collaborative green-use practices (Wang, 2021).
   All items used a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

4.3 Validity and Reliability

- **Pilot Test:** Expert review yielded perfect Item–Objective Congruence (IOC = 1.00).
- **Reliability (SPSS 27.0):** Cronbach's α = .85–.96; Composite Reliability = .79–.88.
- **Construct Validity (Mplus 7.0):** Standardized loadings = .76–.92; AVE ≥ .79; AVE exceeded squared inter-construct correlations (Fornell & Larcker, 1981).

4.4 Data Analysis

Descriptive statistics profiled respondents. Structural equation modeling (SEM) with maximum-likelihood estimation and 5 000-sample bootstrapped mediation (Mplus 7.0) tested direct (H1–H3) and indirect (H4) effects. Model fit was assessed via χ^2/df, CFI, TLI, RMSEA, and SRMR (Browne & Cudeck, 1992).

5 Research Results

5.1 Sample Profile

Table 1 presents demographic characteristics of the 409 respondents. The sample was balanced in gender (55.3 % male; 44.7 % female) and skewed toward young adults (38.4 % aged 25–34). A majority held a bachelor's degree (31.1 %).

Table 1. Sample Demographics

Variable	Category	n	%
Gender	Male	226	55.3
	Female	183	44.7
Age	18–24	88	21.5
	25–34	157	38.4
	35–44	109	26.7
	45–54	42	10.3
	≥ 55	13	3.1
Education	High school or below	90	22.0
	Associate degree	118	28.8
	Bachelor's degree	127	31.1
	Graduate degree	74	18.1

Source: Survey data, May–June 2024.

5.2 Measurement Model Fit

The measurement model demonstrated excellent fit: $\chi^2/df = 1.98$, CFI = .96, TLI = .93, RMSEA = .05, SRMR = .04. All indices met or exceeded recommended thresholds.

Table 2. Measurement Model Fit Indices

Index	Value	Threshold
χ^2/df	1.98	< 3
CFI	.96	$> .95$
TLI	.93	$> .90$
RMSEA	.05	$< .08$
SRMR	.04	$< .06$

5.3 Hypotheses Testing

Structural paths are summarized in Table 3. All direct effects were significant and positive.

Table 3. Path Coefficients

Hypothesis	Path	β	SE	p
H1	ORG → SGCB	.61	.07	$< .001$
H2	ORG → NE	.65	.05	$< .001$
H3	NE → SGCB	.57	.06	$< .001$

5.4 Mediation Analysis

Bootstrap results (5 000 resamples) confirmed that NE partially mediates the ORG→SGCB relationship (Table 4).

Table 4. Mediation Analysis

Effect	Estimate	SE	95 % CI
Total (ORG→SGCB)	.61	.07	[.47, .75]
Direct (ORG→SGCB)	.32	.06	[.20, .44]
Indirect (via NE)	.29	.05	[.19, .39]

Note: NE accounts for approximately 48 % of ORG's total effect on SGCB, supporting partial mediation (H4).

6 Discussion

The present study offers several important insights into how online reference groups (ORG) influence shared green consumption behavior (SGCB) and the mediating role of natural empathy (NE). Below, we elaborate on the theoretical and practical implications of these findings and suggest avenues for future research.

6.1 Confirmation of the Extended SOR Model

Support for **H1–H3** affirms that ORG stimuli—comprising informational, normative, and interactional influences—directly drive SGCB and also foster NE, which in turn promotes SGCB. This dual pathway extends the traditional Stimulus–Organism–Response (SOR) framework into a digital context, demonstrating that virtual communities function as potent "stimuli" in the online environment. Informational cues (e.g., community tutorials, product reviews) reduce uncertainty and equip users with the knowledge needed to participate in sharing platforms, while normative signals (e.g., likes, endorsements) create social pressure to adopt collaborative green practices. Interactional elements (e.g., live-stream Q&A, peer comments) deepen engagement and reinforce both knowledge acquisition and norm internalization. The strong direct path from ORG to SGCB ($\beta = .61$) underscores that even in the absence of affective mediation, digital stimuli alone can catalyze resource-sharing behaviors in substantial measure.

6.2 The Role of Natural Empathy as a Mediator

The partial mediation observed in **H4** reveals that NE captures an affective channel through which ORG influence SGCB. When exposure to emotionally compelling content—such as vivid environmental narratives or testimonials about the tangible benefits of shared green use—elicits sympathy, concern, and perspective-taking, individuals are more likely to translate online peer influence into concrete sharing behaviors (Schultz, 2001; Preylo & Arikawa, 2008). The indirect effect ($\beta = .29$) highlights that nearly half of the total influence of ORG on SGCB operates through this empathic mechanism. This finding aligns with empathy–altruism theory (Batson et al., 1995), suggesting that emotional resonance with nature compels prosocial, sustainable actions. Importantly, the persistence of a significant direct effect alongside the mediated effect indicates that ORG exert both cognitive/informational and affective/emotional influences, functioning simultaneously as sources of knowledge and as catalysts for empathy.

6.3 Theoretical Contributions

By integrating digital reference-group dynamics with the SOR model and empathy-altruism hypothesis, this study advances theory on several fronts. First, it broadens SOR's applicability by demonstrating that online social environments can serve as "stimuli" that trigger complex organismic responses, including affective constructs like natural empathy. Second, it empirically validates NE as a critical mediator in green-marketing contexts, suggesting that emotional engagement with environmental content is not merely a byproduct of information sharing but a distinct driver of behavior. Third, the research underscores the multifaceted nature of ORG influence—informational, normative, and interactional—thus providing a more granular understanding of how virtual groups shape sustainable consumption.

6.4 Practical Implications

For platform designers and green-marketing practitioners, the findings suggest a dual-track strategy:

1. **Informational and Normative Features.** Deploy comprehensive, user-generated knowledge bases—reviews, tutorials, comparison tools—and highlight community endorsements (e.g., "most-shared" badges) to build credibility and social proof.
2. **Empathy-Evoking Content.** Incorporate storytelling elements that humanize environmental issues—such as short videos of local conservation efforts or first-person accounts of shared green use—to elicit sympathy and perspective-taking. Interactive features, such as live Q&A sessions with environmental experts and real-time polls on sustainability challenges, can further deepen emotional engagement.

By weaving together factual information with emotionally resonant narratives and interactive community exchanges, platforms can simultaneously educate and move users, thereby strengthening both the cognitive and affective drivers of SGCB.

6.5 Limitations and Future Research

Several limitations warrant consideration. The cross-sectional design precludes causal inferences; longitudinal or experimental studies could better disentangle temporal dynamics between ORG exposure, empathic responses, and sharing behaviors. The Chinese sample, while large and diverse, may limit generalizability—future research should replicate the model in other cultural and digital contexts to examine potential boundary conditions. Additionally, this study focuses on NE as the sole mediator; subsequent work might explore other organismic processes (e.g., social identity, trust) or examine possible moderators (e.g., platform familiarity, prior green-use experience).

In conclusion

- **H1–H3 supported:** Confirms that ORG drive SGCB both directly and via NE, validating the extended SOR model in digital contexts.
- **Partial mediation:** Indicates that ORG exert both informational/normative effects and emotion-driven influences through NE.
- **Practical implications:** Platforms should combine factual green-use information with empathy-evoking stories, interactive Q&A, and peer testimonials to deepen NE and foster SGCB.

7 Conclusion

Online reference groups and natural empathy jointly propel shared green consumption. Integrating empathy-evoking content and interactive community features in sharing platforms can substantially enhance sustainable user behaviors.

7.1 Theoretical Implications

- Extends the SOR framework to encompass digital reference-group influences and affective mediators.
- Highlights NE as a critical mechanism in collaborative green consumption models.

7.2 Managerial Implications

- **Content Strategy:** Deploy immersive environmental narratives (e.g., wildlife rescue stories).
- **Feature Design:** Incorporate real-time badges, empathy leaderboards, and peer-recognition systems.
- **Community Building:** Foster reciprocal norms and green-champion recognitions to sustain engagement.

8 Limitations and Future Research

- **Design:** Cross-sectional data limit causal inference; longitudinal studies are recommended.
- **Scope:** Chinese sample—future cross-cultural comparisons would enhance generalizability.
- **Extensions:** Investigate additional mediators (e.g., social identity, trust) and boundary conditions.

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