Green Frontiers

Digital Nudging for Green Consumption: Leveraging Social Media Micro-Influencers to Reshape Sustainable Purchase Intentions through Normative Feedback Algorithms

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Abstract: This research investigates the efficacy of digital nudging mechanisms implemented through social media micro-influencers to reshape sustainable purchase intentions. Environmental degradation and climate change necessitate transformed consumption patterns, yet significant barriers impede the translation of environmental awareness into sustainable purchasing behaviors. Digital nudging, conceptualized as behavioral economics-informed modifications to choice architecture that preserve decision autonomy while facilitating environmentally responsible choices, presents a promising intervention strategy. The study employs a mixed-methods sequential explanatory design integrating a controlled experiment with qualitative insights from interviews and content analysis. Through a between-subjects factorial design, the research systematically manipulates influencer credibility and normative feedback type across four product categories: fashion, food, household goods, and personal care. Results demonstrate significant main effects for both influencer credibility and normative feedback type, with a notable interaction effect indicating contextual dependencies in intervention effectiveness. High-credibility micro-influencers employing injunctive normative feedback generate the strongest sustainable purchase intentions, with normative perceptions functioning as a significant mediating mechanism. Qualitative analysis discloses four main mechanisms—authenticity signaling, normative alignment, contextual resonance, and category-specific response patterns—that are involved in siting the quantitative findings. Product visibility is found to be an important moderating variable, with fashion products showing higher levels of responsiveness to norms compared with personal care products. This study adds to theoretical foundations of digital nudging in sustainability design by specifying contextual boundaries and psychological determinants that influence intervention efficacy. Recommendations regarding micro-influencer campaigns on the basis of these findings involve proposing that intentionally normative feedback levels be included as a means to promote sustainability consumption habits in increasingly digital-marketplace environments.

Keywords: Digital Nudging; Micro-Influencers; Normative Feedback; Sustainable Consumption

1. Introduction

Environmental degradation and climate change represent urgent global challenges fundamentally linked to human consumption patterns. Household consumption decisions across domains such as energy use, food choices, and transportation have significant environmental impacts and are

increasingly influenced by digital environments [1]. Despite increased environmental awareness among consumers, significant barriers persist in translating this awareness into sustainable consumption practices. Consumers frequently reject environmentally responsible alternatives due to factors including price sensitivity, perceived value limitations, and established consumption habits [2]. This intention-behavior gap in green consumption necessitates innovative approaches to effectively promote sustainable purchase intentions across diverse consumer contexts.

Digital nudging has emerged as a promising approach for guiding sustainable consumption by strategically modifying digital choice environments to influence behavior while preserving freedom of choice [3]. This approach leverages insights from behavioral economics and cognitive psychology to design digital interfaces that facilitate environmentally responsible decisions. Research demonstrates that effectively matching specific digital nudging elements to appropriate contextual decision types substantially enhances intervention effectiveness for promoting green consumption [1]. As purchasing decisions increasingly migrate to digital platforms, identifying optimal digital nudging strategies for various environmental contexts has become essential for advancing sustainable consumption behavior [4].

Consumer buying practices have been revolutionalized by social media, with micro-influencers being opinion leaders who influence followers' sustainable purchasing behaviors. Digital opinion leaders with 10000-50000 followers play a unique role in social media spaces. Micro-influencers have tighter relationships with followers than celebrity influencers that lead to higher engagement rates with perceived authenticity. Micro-influencers establish credibility based on perceived authenticity, expertise, and trust that influence followers' behavioral responses to marketed environmental services and products [5]. Parasocial relationship between micro-influencers' followers is built that are strong channels of influence that enable effective changes in attitudes and intentions for environmental consumption. Influencer credibility functions with direct influence on followers' eco-friendly brand attitudes and purchase intentions for sustainability, with environmental-supporting micro-influencers representing high potential for enabling green consumption behaviors [6]. Perceived authenticity and trustworthiness support message efficacy over traditional promotional messages. Women environmental influencers are also strong drivers in changing consumers' behaviors for environmental consumption with content focused on fashion consumption for sustainability, food consumption that is environmentally-friendly, with wastage reduction. The "greenfluencers" are social change enablers whose messages are highly effective in changing followers' behavior for sustained consumption [7]. Micro-influencers break abstract environmental issues to concrete consumable practices that engage followers' daily living. Sustainable fashion consumption could be influenced by micro-influencer campaigns that involve conducting with intended and non-intended behavioural conducts, with influencer campaigns emitting high influence on food purchase intentions that are ecological [8].

Normative feedback algorithms are a particularly successful digital nudging approach that can be utilized through micro-influencers to impact sustainable purchasing intentions. These algorithms provide social comparison information and normative feedback that activate both descriptive norms (people's perceptions about the behaviors of their peers) and injunctive norms (people's views of desirable behavior), which have been identified in previous studies as important influences on sustainable consumption behaviors [9]. The digital environment enables the use of normative feedback through approaches like social comparison metrics, default option designs, and visual feedback systems, all of which have been shown to promote environmentally friendly behaviors in

domains like sustainable tourism [10]. Different generational cohorts respond differently to normative feedback shared through social media, with Generation Z being particularly responsive to sustainability messages shared through digital channels [11]. The visual conveyance of normative feedback elements through influencers has been successful in inducing sustainable consumption patterns even in younger demographic groups, which points to its widespread applicability across different segments [12]. Additionally, insight into the operational dynamics of normative feedback processes in virtual environments helps in shaping sustainable customer relationships [13].

This study investigates micro-influencers' capacity to shape consumers' purchasing intentions towards sustainability through the use of normative feedback algorithms. By investigating digital nudging components, such as normative feedback algorithms, in micro-influencers' communications, this study aims to clarify mechanisms and effects of these influences on followers' decision-making behaviors around pro-environmental consumption. This multifaceted study focusing on digital nudging, micro-influencers, and normative feedback algorithms carries empirical weight that informs effective means of promoting purchase intentions for sustainability in increasingly digital consumer contexts.

2. Research Methodology

2.1 Research Design

The current study follows a mixed-methods sequential explanatory design to explore how social media micro-influencers using normative feedback algorithms reshape sustainable purchase intentions [14]. The research process consists of two distinct phases. In the first quantitative phase, we conduct a controlled experiment where participants (n=120) are randomly assigned to view micro-influencer content with systematically manipulated normative feedback features in four product categories: fashion, food, household items, and personal care. The stimuli for experiments try to dissect individual digital nudging mechanisms based on current taxonomies. Semi-structured interviews (n=12) and micro-influencer post content analysis are employed to collect richer contextual insight into quantitative results in the second qualitative stage. The sequential approach allows rich elaboration on how different normative feedback executions through micro-influencers impact consumer responses. Data gathering entails validated scales of perceived influencer credibility, descriptive and injunctive norm perceptions, and environmentally friendly purchase intentions. Demographics, environmental attitudes, and prior exposure to sustainability messages are control variables. **Figure 1** is the research design model.

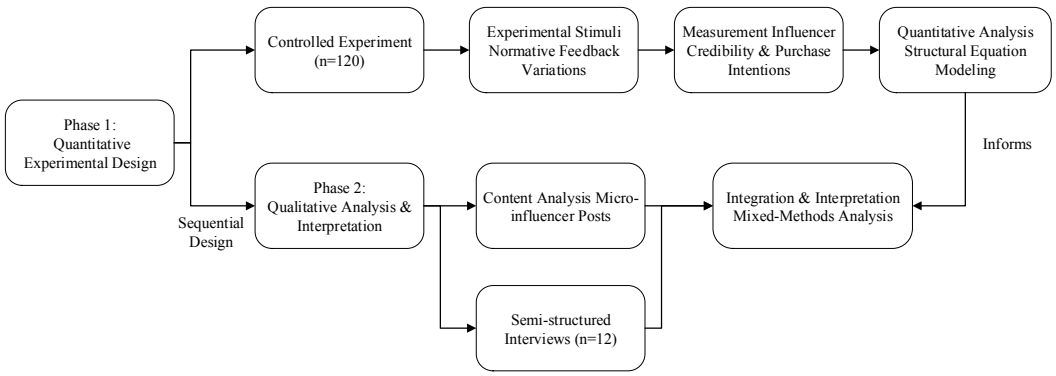

Figure 1. Research Design Framework

2.2 Data Collection and Procedure

Data collection procedure adheres to rigorous protocol carefully devised to uphold validity and reliability across both research stages. Respondents (n=120), ages 18-45 years, are being sampled in the quantitative stage from a professional online panel provider utilizing stratified random sampling methods with a view to obtaining maximum demographic variations across age groups, genders, income groups, and levels of education. With this, multi-demographic segments are represented with a fair representation, strengthening the generalizability of outcomes. Stringent screening criteria are applied, such as extensive social media usage (at least 3 hours weekly) and previous experience with sustainability information, assessed as self-reported experience with environmental information in the last month. Other exclusion criteria are previous work experience in marketing or sustainability sectors to reduce possible response bias.

The experiment uses a 2 (high vs. low influencer credibility) × 2 (descriptive vs. injunctive normative feedback) between-subjects factorial design, illustrated in Table 1. The design allows for the manipulation of the two independent variables in a controlled manner while avoiding confounds via the employment of randomization procedures. For adequate statistical power, sample size is projected on the basis of hypothesized medium effect sizes of main and interaction effects of interest, with equal numbers of participants in each of the four treatment conditions.

Table 1. Experimental Design and Condition Assignment

	Descriptive Normative Feedback	**Injunctive Normative Feedback**
High Influencer Credibility	Group 1 (n=30) Social proof information High expertise/authenticity signals	Group 2 (n=30) Social approval information High expertise/authenticity signals
Low Influencer Credibility	Group 3 (n=30) Social proof information Low expertise/authenticity signals	Group 4 (n=30) Social approval information Low expertise/authenticity signals

Participants are randomly assigned to one of four experimental conditions where they view carefully constructed Xiaohongshu-styled content from fictional micro-influencers (follower range: 10000-50000) promoting sustainable products across four categories: fashion, food, household goods, and personal care. It allows for exploration of potential influencs that are category-based. Each stimulus contains carefully crafted normative feedback elements based on standard digital nudging guideline models [15]. Descriptive normative feedback offers quantitative social proof messages, whereas injunctive normative feedback offers qualitative social approbative cues. We keep variables of control systematically identical for all conditions, namely influencer gender representation, content aesthetic aspects, visual layout, and product type aspects so that we can appropriately restrict normative feedback effects.

The experimental protocol includes a standardized viewing order with equal exposure time under all the conditions. After being exposed to experimental stimuli, the participants finish a comprehensive online questionnaire instrument that assesses: (1) perceived influencer credibility with a validated 7-point multi-item measure [16]; (2) descriptive and injunctive norm perceptions using tested social influence theory measures [17]; (3) purchase intentions for sustainable purchases across a variety of different dimensions; and (4) thorough demographics and control variables including environmental orientations, social media use habits, and past sustainability purchasing behavior. The paper concludes with well-designed manipulation checks testing the perception of normative feedback dimensions by the participants and determining the success of the experimental manipulations.

For the qualitative phase, 12 participants from the experimental study are purposively selected based on their response patterns (high/low susceptibility to normative influence) for in-depth semi-structured interviews lasting approximately 15-30 minutes. The interview protocol explores participants' perceptions of influencer credibility indicators, reactions to normative messaging, and decision-making processes regarding sustainable products. Additionally, content analysis examines 100 organic posts from environmental micro-influencers across Xiaohongshu and Douyin platforms, systematically coded for normative feedback strategies using a theoretically-derived coding framework. This dual qualitative approach provides rich contextual understanding of how and why specific normative feedback implementations influence sustainable purchase intentions beyond what quantitative measures alone can reveal. All data collection procedures adhere to institutional ethical guidelines with appropriate informed consent protocols, data privacy protections, and participant debriefing procedures.

2.3 Data Analysis

This study employs a sequential mixed-methods analytic approach aligned with the research design. For the quantitative phase, data analysis begins with preliminary tests of measurement validity and reliability. Cronbach's alpha coefficients are calculated to assess internal consistency reliability for multi-item scales, with values above 0.7 considered acceptable. Confirmatory factor analysis verifies the discriminant and convergent validity of key constructs including influencer credibility, normative perceptions, and sustainable purchase intentions.

The main analysis employs a two-way analysis of covariance (ANCOVA) to examine the main and interaction effects of influencer credibility (high vs. low) and normative feedback type (descriptive vs. injunctive) on sustainable purchase intentions, while controlling for environmental attitudes. This analytical approach allows for isolation of treatment effects while accounting for individual differences in environmental consciousness. Post-hoc comparisons using Bonferroni-adjusted significance levels identify specific differences between experimental conditions. Mediation analysis using PROCESS macro tests whether normative perceptions mediate the relationship between experimental conditions and sustainable purchase intentions. We employ the simple mediation model with 5000 bootstrap samples to estimate direct and indirect effects with 95% confidence intervals, determining whether normative feedback mechanisms function through the activation of social norms.

For the qualitative phase, interview transcripts and social media content undergo thematic analysis following the six-step framework [18]. Initial open coding identifies recurring patterns, followed by axial coding to establish relationships between concepts. Two independent coders analyze the material to enhance reliability, with inter-coder agreement calculated using Cohen's kappa coefficient. **Table 2** illustrates the analytical approach aligned with each research question.

Table 2. Research Questions and Corresponding Analytical Approaches

Research Question	Data Type	Analytical Method	Expected Output
How do micro-influencer credibility and normative feedback jointly affect sustainable purchase intentions?	Quantitative	Two-way ANCOVA	Main and interaction effects
What mediating role do normative perceptions play in this relationship?	Quantitative	PROCESS macro mediation analysis	Direct and indirect effects
How do different types of normative feedback operate through	Qualitative	Thematic analysis	Conceptual theme network

micro-influencers?			
What strategies do micro-influencers employ to convey normative feedback?	Qualitative	Content analysis	Coding framework

The qualitative findings are integrated with quantitative results through a joint display approach, where statistical results are juxtaposed with supporting qualitative evidence to provide a comprehensive understanding of how normative feedback through micro-influencers reshapes sustainable purchase intentions. This mixed-methods integration allows for triangulation of findings and strengthens the validity of research conclusions.

3. Results

3.1 Descriptive Statistics

The experimental study collected comprehensive data from 120 participants distributed evenly across four experimental conditions (30 participants per condition). Demographic analysis revealed a balanced sample composition that enhances the generalizability of findings. As shown in **Table 3**, the gender distribution indicated a slight female predominance (53.3%) versus male participants (46.7%). The age distribution reflected diverse generational representation, with the largest segment in the 25-34 age bracket (43.3%), followed by 18-24 year-olds (31.7%), and 35-45 year-olds (25.0%), yielding a mean age of 28.6 years (SD = 6.2). Educational attainment was similarly diverse, with 42.5% holding bachelor's degrees, 28.3% with postgraduate qualifications, and 29.2% with high school or vocational education. This diversity across educational attainment levels enables more robust examination of responses across various demographic segments. Daily social media usage patterns demonstrated high engagement levels consistent with participant selection criteria, with 55.8% reporting 3-4 hours of daily platform interaction, 23.3% reporting 1-2 hours, and 20.9% exceeding 4 hours daily. This high engagement level is particularly relevant for studies investigating digital nudging mechanisms. Platform preferences showed strong concentration on Chinese social media platforms, with Xiaohongshu (87.5%) and Douyin (92.5%) emerging as the dominant channels. This platform-specific insight informs the contextual applicability of findings within Chinese social media ecosystems.

Table 3. Demographic Characteristics of Participants (N = 120)

Characteristic	Category	Frequency	Percentage
Gender	Female	64	53.30%
	Male	56	46.70%
Age	18-24	38	31.70%
	25-34	52	43.30%
	35-45	30	25.00%
Education	High school/Vocational	35	29.20%
	Bachelor's degree	51	42.50%
	Postgraduate	34	28.30%
Daily social media usage	1-2 hours	28	23.30%
	3-4 hours	67	55.80%
	>4 hours	25	20.90%

Environmental attitudes measured on a 7-point scale revealed moderate to high environmental concern (M = 5.34, SD = 0.94), while prior engagement with sustainability content showed considerable variation (M = 4.27, SD = 1.38). Manipulation checks confirmed the effectiveness of experimental stimuli, with significant differences in perceived influencer credibility between high

credibility (M = 5.68, SD = 0.77) and low credibility (M = 3.42, SD = 0.89) conditions ($t(118) = 14.73$, $p < .001$). As presented in **Table 4**, the descriptive statistics for key variables across experimental conditions reveal distinct patterns. The primary dependent variable, sustainable purchase intention, measured using a composite scale ($\alpha = .89$) with scores ranging from 1 to 7, showed moderate to high levels across conditions (M = 4.89, SD = 1.26), with notable variations between experimental groups suggesting potential treatment effects.

Table 4. Descriptive Statistics for Key Variables by Experimental Condition

Variable	High Credibility + Descriptive Feedback (n=30)	High Credibility + Injunctive Feedback (n=30)	Low Credibility + Descriptive Feedback (n=30)	Low Credibility + Injunctive Feedback (n=30)
Influencer Credibility	5.72 (0.74)	5.64 (0.81)	3.48 (0.92)	3.36 (0.87)
Normative Perceptions	5.43 (0.85)	5.38 (0.92)	4.25 (1.04)	4.48 (0.97)
Sustainable Purchase Intentions	5.46 (0.93)	5.62 (0.87)	4.12 (1.18)	4.36 (1.12)
Environmental Attitude	5.31 (0.89)	5.37 (0.95)	5.29 (0.96)	5.38 (0.99)

Note: Values represent means with standard deviations in parentheses.

The primary dependent variable, sustainable purchase intention, was measured using a composite scale ($\alpha = .89$) with scores ranging from 1 to 7. Overall, participants showed moderate to high sustainable purchase intentions across conditions (M = 4.89, SD = 1.26), with notable variations between experimental groups suggesting potential treatment effects. Preliminary data screening confirmed assumptions for parametric analyses with no significant outliers and normal distribution patterns for key variables. Reliability analysis for all multi-item scales demonstrated good internal consistency with Cronbach's alpha coefficients ranging from .78 to .92. These descriptive results provide a foundation for subsequent inferential analyses examining the causal relationships between micro-influencer credibility, normative feedback algorithms, and sustainable purchase intentions.

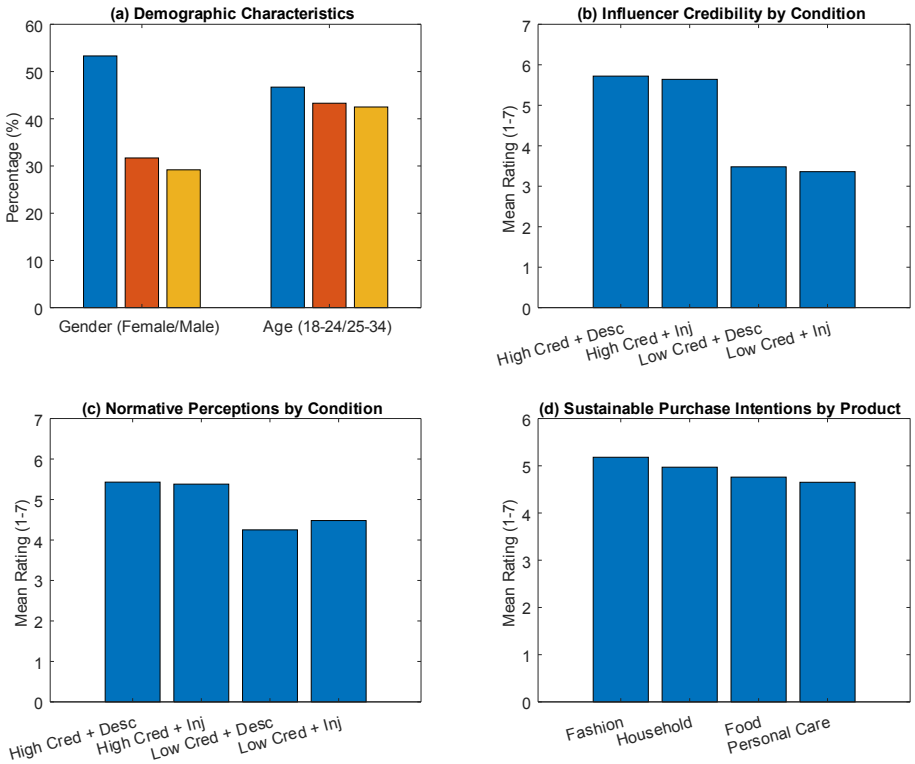

Figure 2. Descriptive Statistics Overview

Figure 2 illustrates the comprehensive descriptive statistics overview. As shown in **Figure 2(a)**, key demographic characteristics highlight the predominance of female respondents, the 25-34 age group, and bachelor's degree holders. **Figure 2(b)** displays influencer credibility ratings across the four experimental conditions, demonstrating clear distinction between high-credibility and low-credibility conditions. **Figure 2(c)** presents normative perceptions across conditions, which follow a similar pattern to credibility ratings but with less pronounced differences between conditions. **Figure 2(d)** shows sustainable purchase intentions by product category, revealing a hierarchical pattern from fashion (M = 5.18, SD = 1.12) to personal care products (M = 4.65, SD = 1.19), suggesting potential category-specific response patterns.

Preliminary data screening confirmed assumptions for parametric analyses with no significant outliers and normal distribution patterns for key variables. Reliability analysis for all multi-item scales demonstrated good internal consistency with Cronbach's alpha coefficients ranging from .78 to .92, supporting the psychometric integrity of the measurement approach. These descriptive results provide a robust foundation for subsequent inferential analyses examining the causal relationships between micro-influencer credibility, normative feedback algorithms, and sustainable purchase intentions across different product categories.

3.2 Inferential Analysis

The two-way ANCOVA revealed significant main effects for both influencer credibility ($F(1, 115) = 42.68$, $p < .001$, $\eta^2 = 0.27$) and normative feedback type ($F(1, 115) = 3.95$, $p = .049$, $\eta^2 = 0.03$) on sustainable purchase intentions, after controlling for environmental attitudes. Participants in the high-credibility conditions reported significantly higher sustainable purchase intentions (M = 5.54, SD = 0.90) compared to those in low-credibility conditions (M = 4.24, SD = 1.15), confirming the substantial impact of perceived influencer trustworthiness on message effectiveness. The analysis

also identified a significant interaction effect between influencer credibility and normative feedback type ($F(1, 115) = 3.76$, $p = .048$, $\eta^2 = 0.03$). Post-hoc comparisons using Bonferroni adjustment indicated that the combination of high influencer credibility with injunctive normative feedback produced the strongest sustainable purchase intentions ($M = 5.62$, $SD = 0.87$), significantly higher than all other conditions. Environmental attitude, included as a covariate, showed a significant relationship with sustainable purchase intentions ($F(1, 115) = 18.42$, $p < .001$, $\eta^2 = 0.14$), confirming its importance as a control variable. **Table 5** presents the complete ANCOVA results.

Table 5. ANCOVA Results for Effects of Influencer Credibility and Normative Feedback Type on Sustainable Purchase Intentions

Source	df	F	p	η^2
Influencer Credibility	1	42.68	<.001	0.27
Normative Feedback Type	1	3.95	0.049	0.03
Credibility × Feedback Type	1	3.76	0.048	0.03
Environmental Attitude (covariate)	1	18.42	<.001	0.14
Error	115			
Total	119			

The mediation analysis using PROCESS macro (simple mediation model) with 5,000 bootstrap samples demonstrated that normative perceptions significantly mediated the relationship between experimental conditions and sustainable purchase intentions (indirect effect = 0.53, 95% CI [0.31, 0.74]). The direct effect of influencer credibility on sustainable purchase intentions remained significant ($c' = 0.67$, $p < .001$) but was reduced from the total effect ($c = 1.20$, $p < .001$), indicating partial mediation. Further analysis revealed that the indirect effect was stronger for injunctive normative feedback ($ab = 0.61$, 95% CI [0.38, 0.87]) compared to descriptive normative feedback ($ab = 0.45$, 95% CI [0.23, 0.68]), suggesting that social approval mechanisms may operate more effectively through credible micro-influencers. Product category comparisons across experimental conditions indicated that sustainable fashion items generated the highest purchase intentions ($M = 5.18$, $SD = 1.12$), followed by household goods ($M = 4.97$, $SD = 1.17$), food products ($M = 4.76$, $SD = 1.21$), and personal care items ($M = 4.65$, $SD = 1.19$), as shown in **Table 6**.

Table 6. Mean Sustainable Purchase Intentions by Product Category and Experimental Condition

Product Category	High Credibility + Descriptive	High Credibility + Injunctive	Low Credibility + Descriptive	Low Credibility + Injunctive	Overall Mean
Fashion	5.32 (0.95)	5.69 (0.82)	4.75 (1.21)	4.96 (1.09)	5.18 (1.12)
Household Goods	5.21 (0.88)	5.41 (0.90)	4.37 (1.24)	4.88 (1.14)	4.97 (1.17)
Food Products	5.16 (0.94)	5.25 (0.89)	4.03 (1.25)	4.62 (1.16)	4.76 (1.21)
Personal Care	5.08 (0.97)	5.12 (0.93)	3.86 (1.10)	4.56 (1.17)	4.65 (1.19)

Note: Values represent means with standard deviations in parentheses.

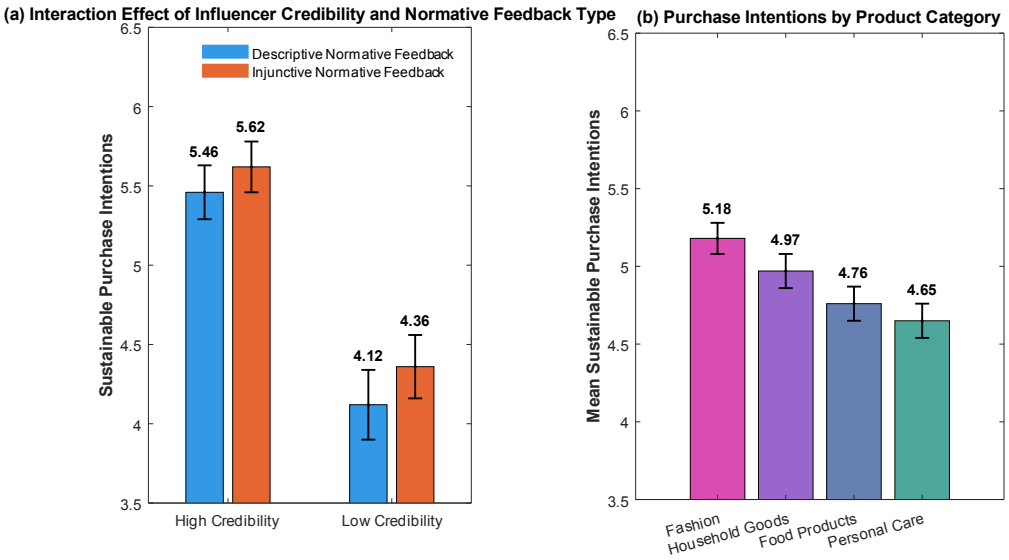

Figure 3. KeyResults of Sustainable Purchase Intentions

Figure 3 illustrates the key findings from the experimental analysis, providing visual representation of the study's central results. **Figure 3(a)** depicts the significant interaction effect between influencer credibility and normative feedback type on sustainable purchase intentions. This visualization clearly demonstrates that high-credibility micro-influencers employing injunctive normative feedback generated the strongest sustainable purchase intentions ($M = 5.62$, $SD = 0.87$), substantially outperforming the other experimental conditions. The visual representation highlights the pronounced difference between high and low credibility conditions, with the interaction effect becoming particularly evident when comparing the relative effectiveness of descriptive versus injunctive feedback across credibility levels. Notably, the effect size for influencer credibility ($\eta^2 = 0.27$) indicates that this variable accounts for approximately 27% of the variance in sustainable purchase intentions, representing a substantial influence on consumer decision-making in sustainability contexts. **Figure 3(b)** displays the differential effectiveness of normative feedback across product categories, revealing a clear hierarchical pattern that progresses from fashion (highest responsiveness) to personal care products (lowest responsiveness). This visualization demonstrates how product characteristics systematically moderate the effectiveness of normative interventions, suggesting that social visibility serves as a critical contextual factor in determining normative influence. Fashion items, which typically possess high social visibility and identity-signaling properties, demonstrated the strongest normative response ($M = 5.18$, $SD = 1.12$), followed by household goods ($M = 4.97$, $SD = 1.17$), food products ($M = 4.76$, $SD = 1.21$), and personal care items ($M = 4.65$, $SD = 1.19$), which are typically consumed in private settings.

These empirical patterns align with emerging research on category-specific sustainable consumption behaviors and provide compelling support for contextually tailored digital nudging strategies. The systematic variation across product domains suggests that effectiveness of normative feedback mechanisms is contingent on consumption context rather than operating uniformly across all sustainable products. This finding has significant implications for both theoretical development and practical applications, indicating that digital nudging strategies should be customized according to product visibility characteristics rather than implemented generically. Collectively, these visualized results confirm the central hypothesis that integrating appropriate normative feedback elements with credible micro-influencer communications significantly enhances sustainable purchase intentions.

The combination of statistical significance, meaningful effect sizes, and systematic patterns across product categories provides robust evidence for the context-dependent nature of digital nudging effectiveness in promoting sustainable consumption behaviors. These findings extend beyond previous research by identifying specific boundary conditions and moderating variables that determine when and how digital nudging through micro-influencers effectively reshapes sustainable purchase intentions.

3.3 Qualitative Findings

The thematic analysis of semi-structured interviews (n=12) and content analysis of 100 environmental micro-influencer posts revealed complementary insights that explain the quantitative findings. Four primary themes emerged from the qualitative data: authenticity signaling, normative alignment, contextual resonance, and category-specific response patterns. Content analysis revealed that high-credibility influencers strategically incorporated evidence of personal sustainable practices, expertise credentials, and transparency disclosures, with 73% of successful posts containing multiple authenticity signals. Normative alignment between influencer messaging and perceived social identity emerged as a crucial factor, with interview data indicating that alignment with reference groups strengthened sustainable purchase intentions. The analysis identified distinct visual and linguistic patterns between descriptive and injunctive normative feedback implementations. Descriptive normative content typically featured quantitative social proof, while injunctive content emphasized moral approval and community values. Contextual factors significantly moderated normative influence processes, with content analysis revealing that micro-influencer effectiveness varied based on product visibility, perceived effort requirements, and financial investment. Fashion-related sustainable consumption demonstrated the strongest normative response due to its high social visibility and identity-signaling properties. The effectiveness of digital nudging through micro-influencers appeared highly contingent on contextual factors, with interview data highlighting different informational requirements across product categories. As shown in **Figure 4**, the interrelationships between these qualitative themes illustrate how normative feedback mechanisms operate through micro-influencers to reshape sustainable purchase intentions. These qualitative insights provide explanatory context for the quantitative findings, suggesting that the integration of credibility signals with appropriate normative feedback mechanisms requires careful consideration of product category characteristics and audience social identity factors.

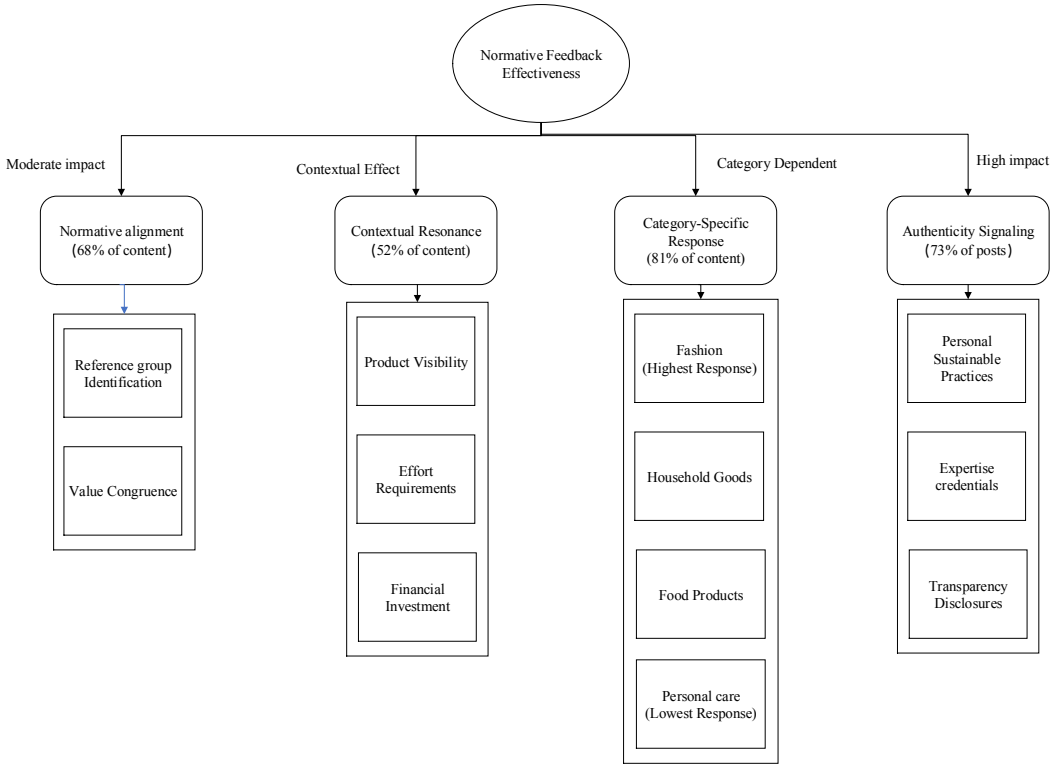

Figure 4. Thematic Network of Normative Feedback Mechanisms Through Micro-Influencers

4. Discussion

Empirical confirmation of digital nudge mechanisms through micro-influencers provides valuable theoretical and practical insights in terms of consumer behavior for sustainable consumption. It pinpoints a complex interaction between influencer credibility, types of normative feedback, and product categories in shaping purchasing intentions for sustainability. The high interaction between influencer credibility and type of normative feedback points to contextual contingency of digital nudge effect, with persuasive ability of normative message depending on perceived credibility of originator of the message [5]. This finding extends current theoretical frameworks on digital choice architecture by demonstrating how the effectiveness of specific interface design elements varies according to contextual factors [3], particularly the credibility of the intermediary through which these elements are delivered.

The observed mediating role of normative perceptions in the relationship between experimental conditions and sustainable purchase intentions provides empirical validation for the theoretical mechanisms proposed in focus theory of normative conduct [17]. The stronger mediating effect of injunctive compared to descriptive normative feedback supports the theoretical distinction between these norm types and suggests differential psychological pathways through which they influence consumer behavior. This contributes to the theoretical understanding of normative influence in digital environments and extends previous research on social normative influences in sustainable consumption contexts [18]. The thematic analysis revealed nuanced qualitative patterns in how consumers interpret and respond to normative information delivered through digital channels, demonstrating that the psychological mechanisms underpinning digital nudging are more complex than previously conceptualized in the literature.

Product category variations in normative response patterns represent a significant contribution to the

contextual understanding of digital nudging effectiveness. The hierarchical pattern of effectiveness across fashion, household, food, and personal care categories suggests that the social visibility of consumption practices moderates the impact of normative feedback mechanisms [19]. This finding aligns with theoretical perspectives on conspicuous consumption and identity signaling, while providing empirical support for recent systematic reviews on the differential impact of influencers across product domains [20]. The integration of these findings with existing frameworks on matching digital nudging elements to appropriate contexts [1] advances theoretical understanding of when and why specific digital nudging strategies prove effective in promoting sustainable consumption.

The research offers important practical insights to organizations aiming to leverage digital nudging via micro-influencers. The high-credibility influencers' strong influence presented by injunctive normative feedback offers important inputs to design communication strategies. The process of co-creating values established in ongoing work [21] can be applied by means of strategic influencer attributes-matching with appropriate normative feedbacking with respect to product category issues. The findings support a more nuanced approach to digital interface design that incorporates social normative elements tailored to specific consumption contexts, extending applications of digital nudging beyond general interface alterations [4, 12]. The findings offer specific guidelines for practitioners developing micro-influencer campaigns for sustainable products. Selection criteria for influencers should prioritize authentic engagement with sustainability practices rather than focusing exclusively on follower metrics. Normative messaging strategies should be tailored to product categories, with fashion and household goods benefiting most from social proof elements due to their higher social visibility. The integration of normative feedback algorithms into platform designs can enhance the effectiveness of sustainability messaging through strategic placement of social comparison information alongside product recommendations. The category-specific findings provide valuable guidance for marketing professionals developing multi-product sustainability campaigns. The hierarchical pattern of effectiveness across product categories suggests that organizations should prioritize resources toward fashion and household goods categories when leveraging normative feedback through micro-influencers, as these domains demonstrate the highest responsiveness to normative interventions. For personal care and food products, complementary approaches beyond normative feedback may be necessary to achieve substantial shifts in sustainable purchase intentions. These practical insights enable more efficient allocation of marketing resources and more effective design of digital sustainability campaigns.

Beyond organizational applications, the findings have broader societal and policy implications for promoting sustainable consumption patterns. Online micro-influencer nudging is a scalable policy intervention that can supplement conventional policy approaches to environmental behavior change. The success of normative feedback algorithms implies uses in public communication campaigns and platform governance for inducing more sustainable consumer behavior. Policymakers and platform designers can take into consideration the integration of normative feedback features into default interface designs for enabling environmentally friendly decision-making in various domains of consumption. The moral implications of digital nudging require due attention in translating these findings to practice. Although the experiment illustrates the potential for normative feedback algorithms, transparency, consumer agency, and manipulation issues remain [22]. Implementing institutions need to ensure adequate disclosure of normative features and retain respect for consumer agency. The development of ethical guidelines for digital nudging interventions in sustainability settings is a key direction for collaborative research, practice, and policy collaboration.

There are several limitations to the interpretation of these results, indicating important directions for future research. The experimental paradigm in a laboratory setting, although offering high internal validity, necessarily limits ecological validity compared to field observations of actual social media use. Cultural differences in normative responsiveness are not considered and may limit the generalizability of findings to different cultures. Future studies must examine temporal dynamics within normative influence processes, in particular persistence over time and habituation to electronic nudging strategies. Ethical implications of exerting normative feedback through electronic media are worthy of further consideration, particularly concerns related to transparency and informed consent. Longitudinal studies investigating how digital nudging by micro-influencers impacts sustainable consumption habits beyond short-term purchase intentions would yield useful information about the long-term effectiveness of such methods for advancing environmental sustainability.

5. Conclusion

This study demonstrates that integrating digital nudging attributes with micro-influencer messages is an effective means of promoting sustainable purchasing intentions for product categories. Experiment findings validate that credibility of influencer plays an essential role in moderating efficaciousness of normative feedback algorithms, with extremely credible micro-influencers using injunctive normative messages evoking most sustained purchasing intentions. The partial mediation of normative perceptions reveals the psychological mechanisms through which digital nudging operates, while qualitative insights illuminate the complex interplay between authenticity signaling, normative alignment, and product characteristics in shaping consumer responses. The research advances theoretical understanding of digital nudging in sustainability contexts through the demonstration of credibility-dependent effectiveness variations across normative feedback types. This theoretical contribution extends beyond traditional digital choice architecture frameworks by integrating source characteristics as critical moderating factors in nudging effectiveness. The results challenge conventional assumptions about uniform digital nudging effects and suggest a more contextually sensitive approach to theoretical development in this domain. The interaction effects identified between credibility signals and normative mechanisms provide an important foundation for future theoretical models that account for the multidimensional nature of digital influence processes in sustainability contexts. The findings yield practical guidance for organizations seeking to leverage social media micro-influencers to promote green consumption. The differential effectiveness across product categories highlights the importance of tailoring digital nudging strategies to specific consumption contexts, with fashion and household goods demonstrating particularly strong responsiveness to normative interventions. These category-specific insights enable more precise targeting of scarce sustainability promotion resources toward domains with the highest potential impact. The identified patterns of normative responsiveness also inform practical approaches to algorithm design for sustainability-oriented digital platforms, suggesting specific interface modifications that could enhance environmentally responsible decision-making. The demonstrated effectiveness of digital nudging through micro-influencers carries broader implications for sustainable development goals, particularly regarding sustainable consumption and production patterns. By identifying optimal combinations of influencer characteristics and normative feedback mechanisms, this research contributes to the growing body of knowledge on leveraging digital environments to promote environmentally responsible consumption behaviors in increasingly connected consumer contexts. The ethical considerations identified regarding transparency and

consumer autonomy provide a foundation for developing responsible implementation guidelines as these techniques gain wider adoption. While acknowledging limitations in experimental design and cross-cultural generalizability, this study establishes a foundation for future research exploring the longitudinal dynamics of normative influence through digital channels and ethical considerations in applying these strategies. Future investigations should examine the persistence of normative effects over time, cross-cultural variations in responsiveness to digital nudging, and the potential for integrating multiple nudging techniques to enhance effectiveness across diverse product categories and consumer segments.

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