

Dark Patterns, Purchase Regret and Brand Trust: How Deceptive Digital Design Erodes Consumer Brand Relationships

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ABSTRACT

Background and Objective: The widespread deployment of dark patterns deliberately deceptive user-interface design techniques embedded within digital purchase environments has emerged as a significant concern for consumers, regulators and brand managers alike. Despite a growing body of regulatory attention, the downstream psychological consequences of such practices for consumer well-being and long-term brand equity remain insufficiently understood. This study investigates the mechanisms through which dark-pattern awareness triggers purchase regret and, in turn, progressively erodes consumer brand trust, while simultaneously examining the boundary conditions imposed by individual-level digital literacy and contextual regulatory salience.

Methods: Two pre-registered studies were conducted. Study 1 (N = 487; online experiment, United States adults) employed a 2 (dark-pattern exposure: present vs. absent) $\times$ 2 (digital literacy: high vs. low) between-subjects factorial design. Study 2 (N = 341; two-wave longitudinal survey, United Kingdom adults) examined authentic brand interactions over an eight-week period, incorporating a regulatory-salience manipulation at Time 2. Moderated mediation was tested using the PROCESS macro (Model 14) in SPSS.

Results: Dark-pattern awareness significantly predicted purchase regret ($\beta = .61, p < .001$), which in turn negatively predicted brand trust ($\beta = -.48, p < .001$). Digital literacy moderated the awareness-regret relationship ($\beta = -.27, p = .003$), with high-literacy consumers paradoxically experiencing amplified regret. Regulatory salience strengthened the regret-to-distrust pathway. Brand trust fully mediated the path to reduced repurchase intent ($\beta = .55, p < .001$) and these effects replicated cross-nationally.

Conclusions: Deceptive digital design represents a self-defeating brand strategy. Short-term conversion gains achieved through dark patterns are systematically offset by lasting erosion of consumer trust and brand loyalty. These findings advance a regulatory-psychological model of dark-pattern harm with direct implications for platform governance, consumer education and ethical marketing practice.

Keywords: dark patterns, purchase regret, brand trust, digital literacy, deceptive design, regulatory salience

INTRODUCTION AND LITERATURE REVIEW

Introduction

The digital marketplace has transformed how consumers discover, evaluate and purchase products and services. E-commerce platforms, subscription services and mobile applications now compete intensively for consumer attention and conversion. Within this competitive landscape, a disturbing class of design practices has emerged commonly referred to as dark patterns which deliberately manipulate the user interface to steer consumers toward choices they would not otherwise make freely or knowingly (Brignull, 2010). These practices range from disguised advertisements and misdirected interfaces to trick questions, forced continuity

and hidden costs revealed only at the final stage of checkout. Far from being incidental design oversights, dark patterns are systematically engineered to exploit cognitive biases and bounded rationality in ways that serve platform interests at the direct expense of consumer welfare.

The prevalence of dark patterns has grown considerably in recent years. In a landmark large-scale audit, Mathur et al. (2019) identified deceptive design elements in nearly 11,000 shopping websites, revealing that dark patterns are not marginal anomalies but mainstream practice across the e-commerce sector. Despite this, relatively little empirical attention has been devoted to how exposure to such design manipulation affects consumers psychologically after the transaction is complete—particularly how it shapes post-purchase regret and the broader trajectory of brand trust over time.

This study addresses that gap by proposing and testing a regulatory-psychological model in which dark-pattern awareness functions as the primary antecedent of purchase regret, which subsequently erodes brand trust and ultimately suppresses repurchase intention. The model further examines digital literacy and regulatory salience as theoretically meaningful boundary conditions of these effects. Understanding these mechanisms is not only academically important but has direct relevance for practitioners, platform regulators and consumer advocates seeking to curb deceptive design in digital commerce.

Literature Review

Dark Patterns: Definition and Typology

The concept of dark patterns was formally introduced by Brignull (2010), who defined them as user interface design choices crafted to trick users into doing things they might not want to do. Since then, scholarly attention has refined and expanded this taxonomy considerably. Gray et al. (2018) identified five high-level categories of dark patterns: nagging, obstruction, sneaking, interface interference and forced action. Each category captures a distinct mechanism through which design choices coerce or mislead users without their explicit awareness.

Narayanan et al. (2020) extended this framework by tracing the evolution of dark patterns from early web design through contemporary algorithmic and machine-learning-driven implementations, noting that modern dark patterns are increasingly personalized and therefore harder to detect. Di Geronimo et al. (2020) translated these findings to mobile application contexts, identifying dark patterns in a substantial proportion of popular apps across categories including social media, retail and subscription services. Together, this body of work establishes dark patterns as a pervasive, technically sophisticated and deliberately designed feature of the contemporary digital landscape.

Purchase Regret and Post-Purchase Psychology

Purchase regret is a negative, self-conscious emotion that arises when a consumer perceives, after a transaction, that an alternative course of action would have produced a superior outcome (Zeelenberg & Pieters, 2007). It is distinct from mere dissatisfaction in that it involves a counterfactual comparison—what might have been and carries a stronger motivational force toward behavioral change. Research on regret in consumer psychology has consistently demonstrated its capacity to disrupt ongoing consumer–brand relationships by generating avoidance tendencies and negative word-of-mouth (Zeelenberg & Pieters, 2007).

The connection between dark pattern exposure and purchase regret is theoretically intuitive. When consumers later recognize that their purchase decision was manipulated rather than freely made, the conditions for regret—perceived loss of agency, suboptimal outcome and counterfactual reasoning—are all simultaneously activated. Acquisti et al. (2015) documented parallel dynamics in the domain of privacy violations, showing that users who discovered they had been deceived about data practices experienced sharp retrospective evaluations of their prior choices, closely mirroring the regret process. The present study extends this logic explicitly to deceptive design in transactional e-commerce contexts.

Brand Trust and Consumer–Brand Relationships

Brand trust occupies a central position in relationship marketing theory. Morgan and Hunt (1994) established trust as a cornerstone of commitment in consumer brand relationships, arguing that sustained trust reduces perceived risk and generates the behavioral loyalty that sustains brand equity over time. Delgado-Ballester and Munuera-Alemán (2005) further demonstrated that brand trust is not a simple attitudinal construct but a multidimensional one, encompassing reliability and intentionality dimensions that are differentially sensitive to violations.

The relationship between deceptive practices and brand trust has recently attracted attention in the ethical marketing literature. Baby et al. (2026) demonstrated that ethical marketing—characterised by transparency, accuracy and honest dealing—serves as a direct behavioural signal that promotes and sustains consumer trust and that regulatory frameworks such as ESG disclosure standards further amplify this trust by reducing the risk of misleading communication. By extension, dark patterns, which represent the systematic inverse of ethical marketing, can reasonably be expected to produce a corresponding erosion of brand trust. The present study provides the first experimental and longitudinal test of this prediction in a digital commerce context.

Digital Literacy as a Moderator

Digital literacy—the capacity to critically evaluate, navigate and interpret digital environments—has been identified as a meaningful individual-level moderator of responses to persuasive digital design (Fogg, 2003). One might intuitively expect that digitally literate consumers would be better protected from dark patterns by virtue of their capacity to detect manipulation. However, detection may paradoxically amplify regret: a consumer who recognizes that they have been deceived may experience more acute negative affect precisely because they feel they should have known better. This ironic amplification hypothesis forms a central contribution of the current study's moderation analysis.

Regulatory Salience

Regulatory salience refers to the degree to which consumers are aware that their digital interactions are subject to legal and regulatory oversight (Narayanan et al., 2020). When consumers become aware that a practice they experienced was not merely unethical but potentially unlawful—as dark patterns increasingly are under frameworks such as the EU Digital Services Act and the UK Online Safety Act—the perceived severity of the transgression intensifies, theoretically strengthening the pathway from regret to distrust. The current study tests this prediction empirically through a regulatory-salience manipulation embedded in Study 2.

METHODOLOGY

Overview and Pre-Registration

This research reports two pre-registered empirical studies designed to examine the psychological consequences of dark-pattern exposure in digital commerce environments. Both studies were pre-registered on the Open Science Framework (OSF) prior to data collection to minimise analytic flexibility and enhance the credibility of inferential claims. Ethical approval was obtained from the institutional review boards of the participating universities prior to any participant recruitment. All participants provided informed consent before engaging with study materials.

Study 1: Online Experiment

Participants and Design

Study 1 employed a 2 (dark-pattern exposure: present vs. absent) $\times$ 2 (digital literacy: high vs. low) between-subjects factorial design. A total of 487 adults resident in the United States were recruited through a reputable online panel provider. Participants ranged in age from 18 to 67 years ($M = 34.2$, $SD = 11.4$), with 52.4% identifying as female. A priori power analysis using G*Power (Faul et al., 2007) indicated that a sample of 400

participants would provide 95% power to detect a medium-sized interaction effect ($f = 0.15$) at $\alpha = .05$; the obtained sample exceeded this threshold.

Procedure

Participants were directed to a simulated e-commerce website developed by the research team, which closely replicated the visual and functional characteristics of real online retail environments. In the dark-pattern condition, the checkout process incorporated three validated dark-pattern types: hidden costs revealed only on the final payment screen, pre-ticked subscription opt-in boxes and a countdown urgency timer. In the control condition, the same website was presented with all deceptive elements removed. Following a simulated purchase task, participants completed measures of dark-pattern awareness, purchase regret and brand trust.

Measures

Dark-pattern awareness was assessed using a five-item scale adapted from Mathur et al. (2019), measuring recognition of specific manipulative elements in the checkout experience ($\alpha = .87$). Purchase regret was measured using Zeelenberg and Pieters' (2007) four-item regret scale ($\alpha = .91$). Brand trust was assessed using six items adapted from Morgan and Hunt (1994) and Delgado-Ballester and Munuera-Alemán (2005) ($\alpha = .89$). Digital literacy was measured using the eight-item scale developed by Hargittai (2005) and was subsequently median-split to create high- and low-literacy groups for the factorial design.

Study 2: Longitudinal Survey

Study 2 employed a two-wave longitudinal survey design with a sample of 341 adults resident in the United Kingdom. Participants were recruited from an online panel and completed measures at Time 1 and again eight weeks later at Time 2. At Time 2, a regulatory-salience manipulation was introduced: half of the participants received a brief informational paragraph describing current UK regulatory actions against dark patterns before completing the follow-up measures. Moderated mediation was tested using Hayes' (2018) PROCESS macro (Model 14) in SPSS 29, with 5,000 bootstrap iterations used to construct bias-corrected 95% confidence intervals. Repurchase intention served as the distal outcome variable.

RESULTS AND DISCUSSION

Overview of Findings

The results across both studies provided strong and consistent support for the proposed regulatory-psychological model. Table 1 presents descriptive statistics and zero-order correlations for all primary study variables. Dark-pattern awareness was positively and significantly correlated with purchase regret ($r = .58$, $p < .001$) and negatively correlated with brand trust ($r = -.44$, $p < .001$), providing preliminary evidence for the hypothesised pathways before accounting for moderating variables.

Table 1 :Descriptive Statistics and Zero-Order Correlations Among Study Variables (Study 1, N = 487)

Variable	M	SD	1	2	3	4	α
1. Dark-Pattern Awareness	3.42	0.84	—				.87
2. Purchase Regret	3.61	0.92	.58**	—			.91
3. Brand Trust	2.89	0.97	-.44**	-.51**	—		.89
4. Repurchase Intent	2.74	1.01	-.39**	-.43**	.61**	—	.88

Note. ** $p < .001$. All scales used 5-point Likert-type response formats. α = Cronbach's alpha reliability coefficient.

Main Effects: Dark-Pattern Awareness, Regret and Brand Trust

The primary mediation analysis confirmed that dark-pattern awareness was a robust and significant predictor of purchase regret ($\beta = .61$, $SE = .04$, $p < .001$, 95% CI [.53, .69]). In turn, purchase regret significantly and negatively predicted brand trust ($\beta = -.48$, $SE = .05$, $p < .001$, 95% CI [-.58, -.38]). The indirect effect of dark-pattern awareness on brand trust through purchase regret was significant (indirect effect = $-.29$, 95% CI [-.37, -.22]), confirming full mediation. These findings are theoretically coherent with established accounts of how experiential violations of consumer expectations translate into emotional and attitudinal consequences for the offending brand.

The magnitude of the direct effect from awareness to regret ($\beta = .61$) is notably large by conventional standards in consumer psychology research, suggesting that the subjective recognition of manipulation is a particularly potent trigger of negative post-purchase affect. This aligns with the broader psychological literature on betrayal and perceived intentionality: when consumers attribute a negative outcome to deliberate design rather than to chance or their own error, the emotional response is systematically more intense (Zeelenberg & Pieters, 2007).

Moderation by Digital Literacy

The hypothesised moderation of the dark-pattern awareness–regret relationship by digital literacy was confirmed. The interaction term was statistically significant ($\beta = -.27$, $SE = .09$, $p = .003$), indicating that the relationship between awareness and regret was significantly stronger among high-literacy consumers than among low-literacy consumers. Simple slopes analysis revealed that, among high-literacy participants, each unit increase in dark-pattern awareness was associated with a .74 unit increase in regret; among low-literacy participants, the corresponding estimate was .48. This pattern supports the ironic amplification hypothesis: consumers who possess the cognitive resources to recognise manipulation fully also experience more acute regret, perhaps because they hold themselves to higher standards of decision-making competence.

These findings carry important implications for consumer education policy. A naive reading of digital literacy's protective function would suggest that literacy training inoculates consumers against deception. The present results complicate this view: while literacy may indeed reduce the probability of being deceived in the first instance, those who are deceived despite high literacy suffer disproportionate psychological harm. Platform-level prevention—through design regulation and enforcement—therefore remains essential regardless of literacy-based interventions.

Regulatory Salience and the Regret-to-Distrust Pathway

Study 2 extended the model by examining how regulatory salience affects the relationship between regret and brand trust erosion. As hypothesised, the regulatory-salience manipulation significantly strengthened the pathway from purchase regret to brand distrust ($\beta = .34$, $SE = .08$, $p < .001$). Participants who were informed about active regulatory actions against dark patterns exhibited significantly lower brand trust scores following the regret induction compared to those in the control condition. This finding suggests that when consumers contextualise their deception experience within a broader regulatory frame—one that legitimises their grievance and attributes wrongfulness to the platform—the reputational damage to the brand is meaningfully amplified.

This result resonates with Baby et al.'s (2026) finding that regulatory frameworks such as ESG disclosure standards and transparency mandates actively shape consumer trust perceptions. Taken together, the evidence suggests that regulatory visibility operates bidirectionally: it builds trust when firms comply and accelerates trust collapse when violations are exposed.

Brand Trust as Mediator of Repurchase Intent

The final component of the model examined whether brand trust mediated the downstream effect of the regret–distrust pathway on repurchase intention. Brand trust fully mediated this relationship ($\beta = .55$, $SE = .06$, $p <$

.001, 95% CI [.43, .67]), indicating that the suppression of repurchase intent attributable to dark-pattern exposure operated primarily through its erosion of trust rather than through direct affective routes. These results are consistent with Morgan and Hunt's (1994) commitment-trust framework, which positions trust as the critical mediating variable between relational antecedents and behavioral loyalty outcomes.

Table 2 :Summary of Moderated Mediation Results (PROCESS Model 14, Studies 1 and 2)

Path	β	SE	p	95% CI	Study
Dark Pattern Awareness → Regret	.61	.04	< .001	[.53, .69]	1 & 2
Regret → Brand Trust	-.48	.05	< .001	[-.58, -.38]	1 & 2
Awareness × Literacy → Regret	-.27	.09	.003	[-.45, -.09]	1
Regret × Reg. Salience → Trust	.34	.08	< .001	[.18, .50]	2
Brand Trust → Repurchase Intent	.55	.06	< .001	[.43, .67]	1 & 2

Note. CI = bias-corrected bootstrapped confidence intervals (5,000 iterations). Reg. Salience = Regulatory Salience.

DISCUSSION

Taken as a whole, these findings paint a coherent and troubling picture of the strategic implications of dark-pattern design for brand management. A brand that deploys deceptive design to capture a conversion effectively trades a short-term revenue gain for a disproportionately large and durable erosion of consumer trust. Given that brand trust is the primary mechanism through which prior positive consumer experiences are converted into future repurchase behavior, this trade-off is demonstrably irrational from a long-term commercial perspective.

The cross-national replication of key effects across US and UK samples further strengthens the generalisability of these findings. While cultural and regulatory contexts differ between these two markets, the psychological mechanisms linking dark-pattern exposure to regret and distrust appear to operate with comparable magnitude and reliability. This cross-national consistency is consistent with the view that the emotional and cognitive responses to perceived manipulation are grounded in universal psychological mechanisms rather than culture-specific normative expectations.

CONCLUSION

This research set out to examine a largely overlooked dimension of dark-pattern harm: not simply the immediate consumer frustration or financial loss that deceptive design may cause, but the longer-term psychological damage it inflicts on the consumer–brand relationship. The findings demonstrate, across two methodologically distinct and cross-nationally replicated studies, that dark-pattern awareness is a potent antecedent of purchase regret, that purchase regret is a significant driver of brand trust erosion and that this erosion translates directly into reduced repurchase intention through a trust-mediated pathway.

These findings make several contributions to the existing literature. First, they establish purchase regret as a theoretically important and empirically well-supported mediating variable in the dark-pattern harm process—a link that had not previously been formally tested or modelled. Second, they complicate simple expectations about the protective function of digital literacy by demonstrating that high-literacy consumers suffer amplified regret when deceived, pointing to a paradox that consumer education policy must grapple with. Third, they demonstrate that regulatory salience meaningfully moderates the severity of trust damage, which has direct implications for how regulators communicate enforcement actions to the public.

For brand managers and e-commerce practitioners, the implications are unambiguous: dark patterns are a strategically self-defeating tool. Whatever marginal conversion gains may accrue in the short run are purchased at the cost of lasting brand equity damage. Transparent, ethical design of the kind advocated by Baby et al. (2026) in the analogous context of the insurance sector not only avoids these harms but actively builds the trust that sustains long-term commercial relationships.

For platform regulators, these findings underscore the value of not only prohibiting dark patterns but also ensuring that enforcement actions are communicated clearly and visibly to affected consumers. Regulatory salience, as demonstrated here, amplifies the reputational consequences borne by non-compliant platforms, thereby strengthening the deterrent effect of regulatory action beyond the direct penalty imposed.

This study is not without limitations. The experimental stimuli, while carefully designed, were necessarily simplified relative to real-world e-commerce environments. Future research should examine dark-pattern effects in naturalistic field settings where confounding factors cannot be controlled. Additionally, the reliance on self-report measures of regret and trust, while standard in the literature, is subject to social desirability and recall biases. Longitudinal designs tracking actual purchase behavior and brand engagement metrics would add valuable ecological validity to these findings. Researchers are also encouraged to extend this model to emerging contexts such as dark patterns in social commerce, streaming platforms and artificial intelligence-driven personalization, where deceptive design is increasingly embedded and harder to detect.

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