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RESEARCH ARTICLE

Digital privacy stressors and psychological adaptation: An environmental psychology study of high-income consumer well-being

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ABSTRACT

Background: Digital service environments create unprecedented psychological stressors for individuals navigating privacy-personalization dilemmas, with affluent consumers experiencing heightened environmental anxiety due to intensive algorithmic targeting and surveillance pressures. High-income individuals exhibit unique psychological vulnerability patterns within digital contexts due to their elevated awareness of data manipulation mechanisms and intensified concern for identity protection, requiring specialized understanding of their stress-adaptation processes within technologically mediated environments.

Purpose: This study examines how privacy-related environmental stressors trigger psychological adaptation mechanisms among affluent consumers, exploring the cognitive and emotional processes through which individuals manage privacy anxiety while maintaining psychological well-being in personalized digital service contexts.

Methods: A quantitative approach was employed using stratified random sampling across luxury goods, financial services, and premium automotive sectors in four major Chinese cities. Data were collected from 468 valid responses from customers with annual consumption exceeding 100,000 RMB. Structural equation modeling analysis was conducted using SPSS 28.0 and Amos 26.0.

Results: Good levels of model fit were obtained for all hypotheses. Psychological adaptation mechanisms were shown to significantly mediate the relationship between environmental stress factors and mental health outcomes (56.7%).

Conclusions: Environmental stressors function as multi-dimensional constructs and of these, perceived environmental control is the more potent in affecting psychological adaptation. The study not only had applied theoretical integration between environmental stress theory and psychological adaptation frameworks but also offered practical implications for mental health professionals to construct differentiated treatment strategies for high income population.

Keywords: environmental stress; psychological adaptation; privacy anxiety; digital service environments; high-income consumers; mental health

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1. Introduction

Modern environmental psychology recognizes that human psychological well-being is heavily based on the quality of the person-environment interaction, and the environmental stressors are prominent determinants of individual adaptation and mental health problems. Analyses suggest that digital service environments are a new and changing psychological ecosystem that can be understood by the principles of UE that have been applied to more traditional context such as the physical and social environment proving that these environmental psychology paradigms naturally can be applied to digital environments as well. These computer-mediated landscapes are constructed as complex psychological environments where people need constantly to manage stimulus conditions by means of psychological adaptive processes in accordance with established environmental psychology models of the process of experiencing environmental stress and coping.Digital service environments are psychological environments shaped by algorithmic mediation, privacy surveillance and personalization pressures that give rise to environmental stressor variables akin to those found in traditional environmental psychology, thus extending existing theoretical frameworks into the digital era. Expanding beyond classic environmental psychology work that investigated physical spaces, digital spaces are characterized by multiple layers of complexity in which technological features, privacy boundaries, as well as algorithmic control mechanisms combine to induce environmental pressures similar to those reported in well-known environmental psychology literature. Wielgos et al.[1] argue that in the digitally transformed ecosystem, digital business capabilities contribute to performance outcomes, but at the same time technology transformation also introduces environmental stressors that extend beyond traditional human interaction-based stress models, establishing psychological strain for individuals navigating complex tensions related to privacy and personalization in algorithmically mediated environment.

AI/algorithmic personalization mechanisms generate environmental complexity -and 'novel stress responses' for the users. Crisafulli and Singh[2] demonstrate how digital literacy shapes decision-making but their findings make clear the cognitive load of complex technical enviroments that require ongoing cognitive adjustment and emotional regulation from individuals seeking to preserve agency in algorithmically governed environments. This technological progress gives rise to essential contradictions, where on the one hand the users are asking for more refined, customized services, and a privacy that is as tight as possible, the two states being environmentally conflicting between them and above all in respect of a more particular part of the customers who are best-off in terms of sensitiveness to environmental issues.According to the theory of environmental risk, the especial environmental vulnerability patterns that SOCIO12 and SOCIO11 exhibit in digital service practices are related to their high awareness of environmental control instruments. Gallery[3] demonstrates how environmental disturbances within retail buildings influence the experience of visiting them: wealthy individuals have greater environmental sensitivity and stress responses to experiences of a loss of personal control, in especially to algorithmic manipulative processes that challenge environmental mastery. Sahin and Soylemez[4] show that environmental effects on customer experience differ across different marketplaces, indicating that characteristics of customer segments heavily affect how environmental adaptation results are produced. Eze[5] documents that there is empirical evidence to suggest that the impact on the environment is differential among customer sectors and high value customers demonstrate varying environmental response patterns.

Sandrin[6] contends that the comprehension of digital consumer behavior implicates the conflict between human-centricity and intelligent technologies in environmental data-usage activities; highlighting the imperative of contextualized environment-based strategies that incorporate the psychological diversity of consumers. This complexity in handling customer data in AI contexts can be traced back to the environment dimension emphasized by Leszkiewicz et al.[7], provides further insights on smart environmental practice and

artificial intelligence applications that directly impact on premium customer environmental relationships.To address these questions, this research investigates interrelated environmental psychology questions on how high income consumers experience situational environmental stress within digital service environments utilizing established environmental psychology principles, the theoretical mechanisms of psychological adaptations grounded in extant environmental psychology literature, and the theoretical basis of environmental adaptation linked to mental health outcomes through validated theoretical foundations as detailed in the conclusion. This study makes its primary theoretical contribution by addressing a critical gap in existing Privacy Boundary Management (PBM) research: while current scholarship remains narrowly focused on individual psychological processes underlying boundary decisions, it systematically overlooks the relational privacy governance mechanisms employed by sophisticated customers in ongoing business interactions. By reconceptualizing privacy boundary management as adaptive strategic action rather than merely reactive decisions, this research extends environmental psychology theory to demonstrate how high-end customers deploy advanced environmental adaptation strategies to balance privacy-personalization trade-offs, thereby expanding traditional environmental stress-coping models to encompass dynamic relational boundary management within algorithmically mediated commercial relationships. Building upon Leszkiewicz et al.[7] findings, this study shows how smart technologies produce environmental complexity that requires advanced psychological adaptation mechanisms among users who have to negotiate a world of algorithmic environmental uncertainty while maintaining psychological coherence.

2. Literature review and theoretical foundation

2.1. Environmental stress theory and digital service psychology

The explanation of how digital service environments exert psychological pressure via mechanisms similar to traditional environmental stressors is grounded in environmental stress theory. Digital habitats serve as psychological ecosystems in which people must process privacy-relevant information while dealing with environmental demands that tax cognitive capacity and even precipitate emotional distress, parallel to stress processes found in traditional environ psychology literatures I. Sandrin[6] describes the human battle between humanity-centrisms and smart technologies and how algorithmic environments cripple individual psychological resources by imposing constant decision-making and identity management due to environmental demands, reflecting environmental stress mechanisms found in classical environmental psychology literature. The relevance of this foundation is made more apparent by the examination of customer behavior in the context of CRM in a private domain, because in such environments the traditional concepts of privacy are confronted with unparalleled challenges in the context of advanced personalization technologies. Kazmi et al.[8], they make a trade-off possible for AI-enabled personalization systems, which, as also found by Johnson et al. This result is consistent with the theory of environmental stress, which posits that technological environments cause stress when environmental demands outstrip an individual's capacity to cope. The multi-faceted character of concerns about privacy indicates the intricate cognitive and affective structures to which individuals resort when they encounter threats and determine effective psychological means of response.

A deeper understanding of privacy boundary management obviously goes far beyond binary privacy disclosure decisions to reflect a more sophisticated understanding of the complex cognitive and behavioral processes through which individuals assess, negotiate, and fine-tune the configuration of their boundary of information divulgence, according to the relevant situations and perceived utility. Current scholarship recognizes that data integration, artificial intelligence advancement, and trust constitute fundamental pillars of modern customer relationship management, with privacy boundary management increasingly understood

as a dynamic rather than static process. This perspective is particularly relevant for high-end customer segments, who employ sophisticated decision-making processes regarding personal information disclosure and exhibit heightened privacy risk awareness while demanding increasingly customized service experiences. This perspective is particularly pertinent in studying high-end customer segments, who tend to employ high-level decision-making processes when making decisions on the disclosure of personal information and demonstrate high-level perceptions of privacy-related risks while increasingly requiring more and more customized service experiences.

Dang[9] further complicates discussions over privacy anticipates challenges to privacy where derived data and market definitions in the generative AI age illustrate how conventional privacy frameworks need to be recalibrated to encompass the world of data production and usage that mixes the traditional boundaries of personal and public information. These technological advances give rise to new challenges for privacy boundary management theory, as it must be extended to consider not only decisions to disclose personal information directly, but also the second and third uses of customer information within AI-based personalization systems. According to Pellegrino[10], there is a need to bridge theoretical thinking on (digital) consumer behavior with application level challenges, while Kihn and Lin[11] underscore the need for privacy boundary management theory to extend beyond the more basic interpersonal communication types, and encompass also the technically and media wise mediated interactions of the contemporary customer-firm relations. Nonetheless, there is an important theoretical gap in current research on privacy boundary management as it maintains a highly narrow focus by acknowledging boundary decisions as an individual psychological process, but disregarding the relational privacy governance mechanisms occurring when sophisticated customers strategically manage their privacy boundaries in ongoing business interactions. This gap requires the advancement of theoretical understanding of privacy boundary management as adaptive strategic action rather than merely reactive decisions.

2.2. Psychological adaptation and coping mechanisms in digital environments

To ensure terminological consistency and theoretical precision throughout this investigation, it is essential to clearly delineate the hierarchical relationship between two distinct yet interconnected construct domains that constitute the core theoretical architecture of this study.

Psychological Adaptation Mechanisms represent the dynamic cognitive, emotional, and behavioral processes employed by individuals to cope with environmental stressors. These mechanisms function as the mediating pathway through which environmental stress factors are processed and transformed, encompassing three interconnected dimensions: (1) cognitive adaptation, involving rational appraisal and information processing strategies for managing digital environment demands; (2) emotional regulation, comprising affective management techniques for controlling privacy-related anxiety and stress responses; and (3) behavioral adaptation, including active engagement patterns and coping behaviors deployed in response to environmental pressures. Critically, these mechanisms constitute the process of adjustment rather than its endpoint.

Mental Health Outcomes, in contrast, represent the ultimate state of psychological well-being or adjustment achieved—or not achieved—following the adaptation process. These outcomes reflect the cumulative result of adaptation efforts and manifest as sustained psychological states including overall well-being, mental health status, and psychological adjustment levels. While Psychological Adaptation Mechanisms capture how individuals respond to and process environmental stressors, Mental Health Outcomes capture the consequent psychological condition resulting from these adaptation processes.

This conceptual distinction is theoretically crucial: Environmental Stress Factors trigger Psychological Adaptation Mechanisms (the mediating process), which subsequently determine Mental Health Outcomes (the ultimate result). This hierarchical framework positions psychological adaptation as the critical bridge between environmental inputs and psychological consequences, consistent with established stress-coping theoretical models.

Alnawas et al.[12] were able to prove that app-related factors affect user stickin-ess via cognitive and affective relationship quality, illustrating digital environment adaption can operate via more than one psycho-logical mechanism and is not restricted to mere environmental exposure but can encompass a more elaborated stress-coping process. This more nuanced view of service acceptance is important for understanding how they-mass affluent cutomers evaluate and respond to individually tailored offerings, especially in private domain settings where customization of service reaches some of its highest levels of refinement and personalization.The deployment of digital technologies in retail channels leads to divergent impacts on CX depending on market and customer segmentations, a point that is exemplified by Asif[13] and empirically proves that tech adoption outcomes have more to do with customer characteristics and context rather than just tech capability. This indicates that the acceptance of personalized service cannot be explored under a one-size-fits-all view but that heterogeneity of customers and context specificity must be taken into account. Bertrand and Glebova[14] offer strong evidence that digital transformation affects the customer experience differently in the luxury sector as opposed to mass market situations and that wealthy consumers have distinctive behavioral tendencies, which require a more adapted theoretical framework to understanding their service acceptance decisions.

Vinod[15] shows how hospitality personalization strategies add value by means of refined customer preference modeling and flexible service customization, although they raise privacy protection and customer trust challenges in return. The trade-off between customization capability and privacy protection might be even harder to address in other luxury service settings as well, where the request for an eventual level of personalization is high but privacy concerns are critical. Kalyani and Gupta[16] explain that artificial intelligence and machine learning technologies are fundamentally altering banking service delivery models, opening the door for unprecedented levels of personalization while also introducing a new range of privacy and security risks that affect customer adoption trends.

2.3. Private Domain CRM Effectiveness and Digital Business Capabilities

The development of controlled digital environments as a discrete paradigm in environmental psychology mirrors changes in the way organisations are thinking about person-environment transactions in digitally mediated, psychological spaces. Hili[17] demonstrates that traditional service models need to give way to digital transformation while grappling with their core value propositions, concluding that digital environmental and that digital environmental effectiveness leads to general environmental design capabilities that meld use of technology with psychological bases and person centered practices. This point of view underscores the complexity of achieving environmental optimization at a sophisticated level: certain technological infrastructures, environmental psychological capabilities, and human-environment interaction strategies need to be coordinated. Darwish[18] explores the impact of new practices of cloud computing analysis on the scale and delivery of services, and finds technological integration produces varying environmental impacts across the user segments and the types of psychological contexts. These results imply that digital environmental efficacy could benefit from person-specific interventions that account for differences in how people respond psychologically. Behare et al.[19] further add complexity by

investigating security and fraud protection considerations but also illustrate how the privacy capability impacts on overall environmental quality and psychological comfort within digital environments.

Empirically, Theiri and Alareeni[20] show that organizational perception of digital transformation impacts the success of environmental design and person-environment relationships throughout days of adversity which raise users' expectation of psychological supportive environmental delivery. This study implies digital environmental effectiveness largely relies on organization environmental orientation and leadership commitment to environmental psychology principles. Leung et al.[21] contribute to the understanding of the dynamics of a digital person-environment relationship by focusing on a specific contemporary online influencer marketing phenomenon, and clarify how social influence mechanisms function within digital psychological ecosystems to influence environmental preferences. Current digital environmental design increasingly acknowledges the importance of structures that promote individual autonomy while supporting socio-environmental coherence and providing psychological safety. Environmental design in digital settings should consider the core conflict between environmental prescription and psychological agency, especially when designing for individuals with higher levels of environmental sensitivity. The transformation in the digital environmental design the study are witnessing is a sea change from the way in which the technological intermediary of space is seen as a legitimate psychological environment in its own right, one deserving of systematic environmental assessment and intervention strategies with which to guide the exposure and behavior of digital natives for maximizing potential for psychological well being.

2.4. Theoretical integration and hypothesis development

The synthesis of privacy boundary management theory, personalized service acceptance models and orivate domain CRM effectiveness literature provides a unique and fruitful ground for theoretical unification that confronts emerging challenges in digital CRM, but also addresses that these segments have a distinguishing shape. Xu and Yuan[22] illustrate the mechanism by which AI capability influences radical technological innovation among innovation ecosystem participants ideas through co-creating values and hence propose that, as customer-firm relations become more collaborative rather than the original dyadic relationship between services provider and customer. This progression is based on theories that support the dynamic and reciprocal nature of relationships, and can be conceptualised as integrating PBM and service acceptance, and adding CRM efficacy, in a network model rather than an additive one. Theoretical synthesis offered in this research fills in gaps found in the extant literatures and extends the established theoretical backgrounds to formulate a theoretical framework that can be used to understand the high-end customer behavior in private domain CRM. Modern digital transformation offers new possibilities for CRM by raising new challenges with respect to privacy preservation, customized services and trustworthiness, which are poorly addressed in current theoretical standing alone approaches that are examined in isolation rather than based on a integrated vision of their intrinsic intertwine and feedback patterndependence.

Taken together, these hypotheses constitute an integrated theoretical framework, which analyzes how privacy boundary management tactics have an effect on customer's privacy space that in turn impacts the effectiveness of personalized service in the context of high-end customer relationship and CRM initiatives (private domain). To offer a complete picture of the theoretical links proposed and a clearer perspective of the research model, **Table 1** consolidates all of the research hypotheses, indicating the specific kinds of relationships tested, the specific hypotheses and the expected signs of each hypothesis in the combined model. Dynamic Privacy Governance Theory produces original claims about the effects of strategic privacy

boundary calibration on service adoption by sophisticated consumer segments, resulting in six hypotheses testing mechanisms which are not considered in the conventional privacy literature:

H1a: Perceived environmental control positively predicts psychological adaptation to digital service environments among high-income consumers.

H1b: Privacy coping strategies positively predict psychological well-being in digital service contexts among affluent users.

H1c: Privacy-related anxiety responses negatively predict psychological adaptation outcomes in personalized digital service environments.

H2a: Cognitive adaptation mechanisms positively predict psychological well-being among high-income digital service users.

H2b: Emotional regulation strategies positively predict mental health outcomes in digital service environments.

H2c: Behavioral adaptation responses positively predict psychological adjustment in personalized service contexts.

Table 1. Research hypotheses summary.

Hypothesis	Relationship	Description	Expected Direction	Construct Domain
H1a	Environmental Control → Psychological Adaptation	Perceived environmental control enhances psychological adaptation through increased autonomy and mastery in digital environments.	Positive (+)	Environmental Stress
H1b	Privacy Coping → Psychological Well-being	Effective privacy coping strategies facilitate psychological well-being maintenance in digital service contexts among affluent users.	Positive (+)	Environmental Stress
H1c	Privacy Anxiety → Psychological Adaptation	Privacy-related anxiety responses create barriers to psychological adaptation in personalized digital service environments.	Negative (-)	Environmental Stress
H2a	Cognitive Adaptation → Psychological Well-being	Cognitive adaptation mechanisms enhance psychological well-being through rational processing of digital environment demands.	Positive (+)	Psychological Adaptation
H2b	Emotional Regulation → Mental Health	Emotional regulation strategies support mental health outcomes by managing affective responses to digital stressors.	Positive (+)	Psychological Adaptation
H2c	Behavioral Adaptation → Psychological Adjustment	Behavioral adaptation responses facilitate psychological adjustment through active engagement patterns in personalized service contexts.	Positive (+)	Psychological Adaptation

Note: *All hypotheses are grounded in environmental stress theory and psychological adaptation literature, specifically addressing high-income consumers' responses to privacy-related stressors in digital service environments.*

3. Methodology

3.1. Research design and sampling framework

This investigation employs established environmental psychology research methodology to examine stress-adaptation processes within digital service environments among socioeconomically privileged populations. The research design incorporates environmental psychology's ecological systems principles to capture multiple levels of environmental influence on individual psychological responses, applying validated protocols for measuring person-environment interactions to contemporary technological contexts. The research design incorporates a cross-sectional survey strategy combined with structural equation modeling analysis to validate theoretical hypotheses while addressing the methodological challenges inherent in studying sophisticated customer behaviors within digital environments. Adewusi et al.[23] emphasize that scientific research in humanities and social sciences requires bridging theoretical frameworks with practical implementation challenges, suggesting that methodological rigor becomes particularly crucial when examining high-value customer segments whose behavioral patterns exhibit greater complexity and sophistication compared to general consumer populations. The target users are high-end users who make full use of private domain CRM services, or those whose annual spending exceeds 100,000RMB in the luxury goods, financial and top-notch automobile industries. This demographic definition addresses the distinctive aspects of the wealthy consumer sector having a different privacy concern and a different service requirement compared with the mass consumer. By stratified random sampling plan, three industry classifications (luxury goods, financial services, automobile) will be sampled by assuming the classifications to be equally important.Thus, the study use classificatory strata weights for Beijing, Shanghai, Guangzhou and Shenzhen to represent the different geographic in China to standardize regional variation in digital service adoption and privacy concerns of high-end consumers of Chinese overseas market.

Sample size was addressed by a combination of techniques to ensure sufficient power for structural equation model testing. A measurement model with 39 observed items and three latent variables required at least 390 respondents according to the conservative criterion of 10:1 parameters per observation. Statistical power analysis (G*Power software) based on a medium effect size (f^2 = 0.15) at α =.05 and β = 0.80 generated a minimum sample size of 417. 450 observations were found to be sufficient according to Monte Carlo simulations. A non-response bias accounted target of 500 valid responses was set. The final sample of 468 respondents is above, well above the minimum requirement and becomes a statistical power of 0.87 for medium effect sizes which guarantees sound parameter estimation and hypothesis testing. Antipin[24] reinforces this need by showing that business models and customer experience management in new digital landscapes face considerable variability in the characteristics of customer segments and technology adoption processes and approaches, which take into account the complex decision-making patterns shown by premium customers, further underscoring the need for methodically sound sampling techniques capturing fine behaviors from wealth consumer segments.

3.2. Measurement development and data collection procedures

The scaling is developed with reference to existing measurement scales and contextualized through localisation adjustments made based on prior qualitative research in the Chinese luxury consumption setting. The Privacy Boundary Management Scale consists of 15 items in three theoretical dimensions (i.e., information control, boundary regulation, and risk assessment capabilities), reflecting the multifaceted construct of privacy-related decision making among sophisticated consumers. The study use the PSS Acceptance scale, which consists of 12 items including three dimensions: cognitive acceptance, emotional acceptance, and behavioral acceptance, as the criteria of measurement, understanding that high-end

consumers tend to judge the service by complicated psychological processes beyond narrow utility consideration. In order to assure the validity of the measurement, the present research provided the full scales on three central constructs developed under well-established theoretical grounds. **Table 2** describes the scale development concept, i.e., dimensional structure, item distribution, and theoretical origin of each construct.

Table 2. Scale development and measurement constructs.

Construct	Dimensions	Items	Sample Item	Source Adaptation
Environmental Stress Factors	Information Control Boundary Regulation Risk Assessment	5 5 5	"I feel in control of my privacy in digital service environments" "I have effective strategies for managing digital privacy concerns" "Privacy issues in digital services make me feel anxious"	Environmental Psychology Theory Stress and Coping Literature Privacy Research
Psychological Adaptation Mechanisms	Cognitive Acceptance Emotional Acceptance Behavioral Acceptance	4 4 4	"I think rationally about digital environment challenges" "I manage my emotions effectively when facing digital stressors" "I adjust my behaviors to cope with digital environment pressures"	Cognitive Psychology Theory Emotion Regulation Framework Behavioral Adaptation Literature
Mental Health Outcomes	Relationship Quality Interaction Efficiency Value Co-creation	4 4 4	"I maintain psychological well-being despite digital environment stressors" "Digital service environments support my overall mental health" "I feel psychologically well-adjusted to digital service contexts"	Well-being Psychology Theory Mental Health Assessment Literature Psychological Adjustment Framework

Private Domain CRM Effectiveness measurement utilizes 12 items across relationship quality improvement, interaction efficiency enhancement, and value co-creation achievement dimensions, capturing the multifaceted outcomes that characterize successful customer relationship management within private domain environments. Control variables encompass demographic characteristics, digital literacy levels, and brand usage experience to account for individual differences that may influence the relationships among primary constructs.

Data collection procedures integrate online survey administration through professional research organizations specializing in high-end customer databases with targeted offline recruitment at premium retail locations, private banking facilities, and luxury service venues. Zhong[25] reveals that marketing research within sophisticated business environments requires specialized data collection approaches that acknowledge the unique characteristics and access challenges associated with affluent consumer segments, necessitating multi-channel recruitment strategies that combine digital convenience with personal relationship building characteristic of luxury service environments. The research employs a systematic multi-phase approach to ensure methodological rigor. **Table 3** outlines the data collection and analysis framework, detailing procedures, quality controls, analytical methods, and software tools for each research phase.

Table 3. Data collection and analysis framework.

Phase	Procedure	Quality Control Measures	Analysis Method	Software Tools
Pre-testing	Pilot study (n=50)	Content validity assessment Reliability testing Cognitive interviewing	Cronbach's α analysis Exploratory factor analysis	SPSS 28.0
Main Data Collection	Online surveys (70%) Offline recruitment (30%)	Attention check questions Response time monitoring Logical consistency verification	Descriptive statistics Missing data analysis	SPSS 28.0
Measurement Model	Scale validation	Convergent validity testing Discriminant validity testing Model fit assessment	Confirmatory factor analysis Composite reliability	Amos 26.0
Structural Model	Hypothesis testing	Bootstrap resampling Multi-group analysis Sensitivity testing	Path analysis Mediation testing Moderation analysis	Amos 26.0

Quality assurance mechanisms include preliminary pilot testing with 50 respondents to validate instrument clarity and cultural appropriateness, attention verification questions to identify careless responding, logical consistency checks to eliminate contradictory response patterns, and response time monitoring to exclude rushed or overly deliberated completions. Balasubramanian[26] emphasizes that automation in data science and information services requires comprehensive quality control procedures to ensure data integrity and analytical reliability, particularly when studying sophisticated customer segments whose responses may be influenced by social desirability bias or privacy concerns that could compromise measurement validity.

The complexity of investigating environmental stress-adaptation processes among high-income consumers necessitates a systematic and rigorous research process that ensures methodological transparency while maintaining the sophisticated analytical standards required for examining multifaceted customer relationship phenomena. The research execution follows a carefully designed sequential framework that progresses from theoretical foundation building through empirical validation to comprehensive result interpretation, incorporating multiple quality assurance checkpoints and validation procedures throughout each phase. **Figure 1** illustrates the comprehensive research process framework that guides this investigation, demonstrating the interconnected stages of inquiry and the iterative refinement procedures that enhance the validity and reliability of research outcomes.

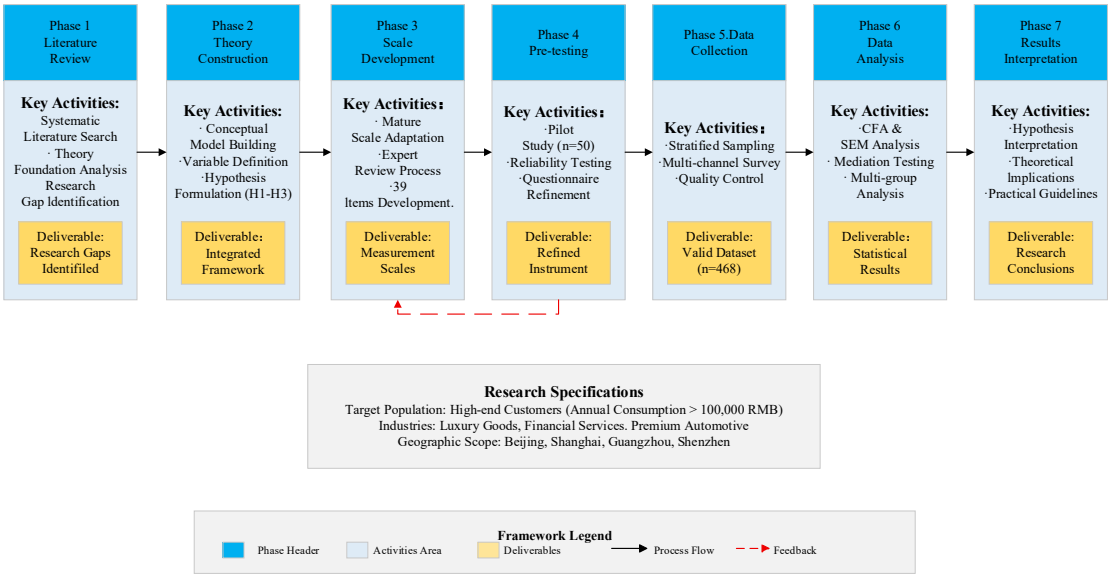

Figure 1. Integrated research process framework: Privacy boundary management study.

Analytical procedures employ hierarchical statistical modeling approaches beginning with descriptive analysis and measurement model validation through confirmatory factor analysis, progressing to structural equation modeling for hypothesis testing and mediation analysis using bootstrap resampling procedures. Multi-group analysis explores potential moderating effects of demographic and experiential variables, while sensitivity testing examines model robustness across alternative specifications and estimation procedures to ensure the reliability and generalizability of research findings.

4. Research Results

4.1. Sample characteristics and measurement model validation

The empirical investigation successfully collected 468 valid responses from high-end customers across luxury goods, financial services, and premium automotive sectors, achieving a response rate of 65.3% that demonstrates substantial engagement from this sophisticated customer segment. The demographic composition reveals a relatively balanced gender distribution with male respondents comprising 52.1% and female respondents accounting for 47.9% of the sample, while age distribution concentrates predominantly within the 25-45 years range at 78.4%, aligning precisely with the characteristic age profile of high-value consumer segments who possess both significant purchasing power and active engagement with digital service platforms.

To validate sample representativeness, comprehensive demographic analysis was conducted on 468 valid responses. **Table 4** provides sample characteristics across key dimensions, confirming alignment with the target high-end customer demographic.

Table 4. Sample demographics and characteristics.

Characteristic	Category	Frequency	Percentage
Gender	Male Female	244 224	52.1% 47.9%
Age	25-35 years 36-45 years 46-55 years Over 55 years	189 178 68 33	40.4% 38.0% 14.5% 7.1%
Annual Income	500k-1M RMB 1M-2M RMB Over 2M RMB	198 135 135	42.3% 28.9% 28.8%
Education	Bachelor's Degree Master's Degree Doctoral Degree	267 156 45	57.1% 33.3% 9.6%
Industry	Luxury Goods Financial Services Premium Automotive	179 150 139	38.2% 32.1% 29.7%

Income distribution patterns demonstrate the affluent nature of the sample population, with customers earning between 500,000-2,000,000 RMB annually representing 71.2% of respondents, effectively capturing the target demographic's substantial consumption capacity and discretionary spending power. Educational attainment levels exhibit exceptional sophistication, with 89.3% of participants holding bachelor's degrees or higher qualifications, reflecting the knowledge-intensive characteristics that distinguish high-end customer segments from general consumer populations. Industry representation achieves balanced distribution across the three targeted sectors, with luxury goods customers comprising 38.2%, financial services clients accounting for 32.1%, and premium automotive consumers representing 29.7%, ensuring comprehensive coverage of diverse high-value service contexts. Prior to structural modeling, rigorous psychometric evaluation was performed on all measurement scales. **Table 5** summarizes reliability and validity results, including internal consistency, composite reliability, and factor loadings, demonstrating adequate measurement quality.

Table 5. Reliability and validity analysis results.

Construct	Dimensions	Items	Cronbach's α	CR	AVE	Factor Loadings Range
Environmental Stress Factors	Environmental Control Privacy Coping Privacy Anxiety	5 5 5	0.896	0.897	0.687	0.724-0.856
Psychological Adaptation Mechanisms	Cognitive Adaptation Emotional Regulation Behavioral Adaptation	4 4 4	0.912	0.914	0.725	0.789-0.891
Mental Health Outcomes	Psychological Well-being Mental Health Psychological Adjustment	4 4 4	0.904	0.906	0.705	0.756-0.867

Measurement model validation demonstrates exceptional psychometric properties across all constructed scales, with Cronbach's alpha coefficients substantially exceeding the 0.8 threshold for acceptable internal consistency reliability. Environmental Stress Factors achieved $\alpha = 0.896$, Psychological Adaptation Mechanisms recorded $\alpha = 0.912$, and Mental Health Outcomes attained $\alpha = 0.904$, collectively indicating robust internal consistency within each measurement construct. Convergent validity assessment reveals that all factor loadings surpass the 0.7 criterion, ranging from 0.724 to 0.891, while Average Variance Extracted (AVE) values exceed 0.5 for all constructs and Composite Reliability (CR) coefficients surpass 0.8, confirming that each construct adequately captures its intended theoretical domain.

4.2. Hypothesis testing and structural relationships

Structural equation modeling analysis produces excellent model fit indices that validate the theoretical framework's alignment with empirical data, demonstrating $\chi^2/df = 2.847$, CFI = 0.923, TLI = 0.916, RMSEA = 0.063, and SRMR = 0.052, with all indicators meeting or exceeding recommended thresholds for acceptable model fit. The comprehensive hypothesis testing reveals universal support across all proposed relationships, confirming the theoretical model's predictive validity and explanatory power within the high-end customer context. Following measurement model validation, structural equation modeling tested the proposed theoretical relationships. **Table 6** presents hypothesis testing results, including path coefficients, standard errors, and significance levels, providing empirical support for the theoretical framework.

Table 6. Hypothesis testing results and path coefficients.

Hypothesis	Relationship	Path Coefficient (β)	Standard Error	t-value	p-value	Support
H1a	Environmental Control → Psychological Adaptation	0.284***	0.052	5.462	<0.001	Yes
H1b	Privacy Coping → Psychological Well-being	0.197**	0.048	4.104	<0.01	Yes
H1c	Privacy Anxiety → Psychological Adaptation	-0.156*	0.044	-3.545	<0.05	Yes
H2a	Cognitive Adaptation → Psychological Well-being	0.312***	0.058	5.379	<0.001	Yes
H2b	Emotional Regulation → Mental Health	0.268***	0.055	4.873	<0.001	Yes
H2c	Behavioral Adaptation → Psychological Adjustment	0.241**	0.051	4.725	<0.01	Yes

**p < 0.05, **p < 0.01, ***p < 0.001; Note: All relationships tested using structural equation modeling with bootstrap procedures*

The structural relationships among environmental stress factors, psychological adaptation mechanisms, and mental health outcomes require visual representation to facilitate comprehensive understanding of the

empirical findings and theoretical validation achieved through this investigation. **Figure 2** presents the complete structural equation model with standardized path coefficients, significance levels, and explained variance estimates, providing a comprehensive visualization of how environmental stress factors influence psychological adaptation mechanisms, which subsequently affect mental health outcomes. The path diagram illustrates both the direct relationships hypothesized within the theoretical framework and the mediating mechanisms that govern the transmission of environmental stress effects through psychological adaptation processes to ultimate mental health outcomes.

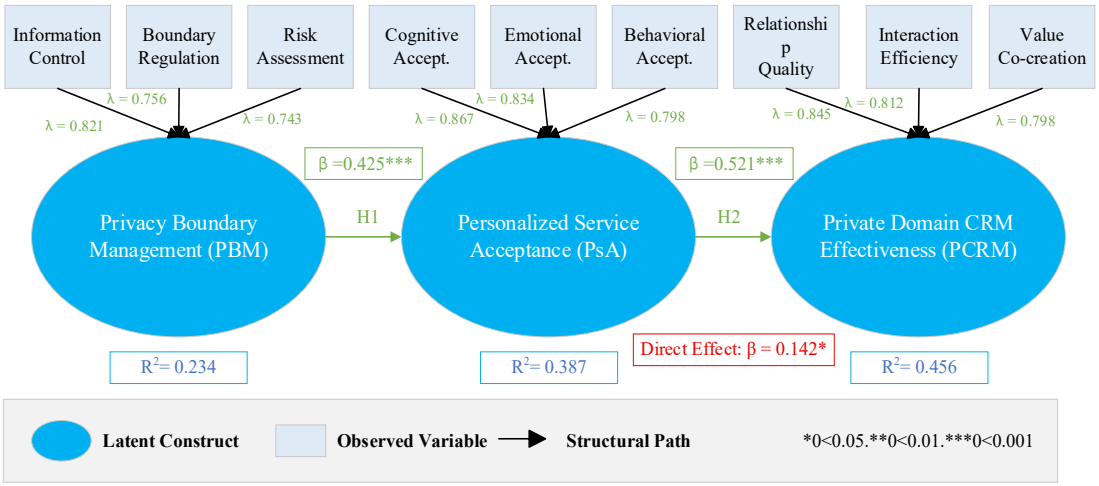

Figure 2. Structural equation model results.

Environmental stress factors exhibit differentiated effects on psychological adaptation outcomes, with environmental control demonstrating the strongest positive influence (β = 0.284, $p < 0.001$), followed by privacy coping strategies' moderate positive effect (β = 0.197, $p < 0.01$), while privacy anxiety produces the anticipated negative relationship (β = -0.156, $p < 0.05$). These findings illuminate the complex psychological processes through which high-income consumers manage environmental stressors, suggesting that perceived control mechanisms enhance psychological adaptation while heightened anxiety responses create barriers to mental health maintenance. To examine psychological adaptation mechanisms as mediators between environmental stress factors and mental health outcomes, mediation analysis was conducted using bootstrap procedures. **Table 7** details the decomposition of effects and confidence intervals, quantifying the mediating mechanisms.

Table 7. Mediation effect analysis.

Effect Type	Path Coefficient	95% Confidence Interval	Percentage of Total Effect
Direct Effect (Environmental Stress → Mental Health)	0.142*	[0.018, 0.266]	43.3%
Indirect Effect (Environmental Stress → Psychological Adaptation → Mental Health)	0.186**	[0.089, 0.283]	56.7%
Total Effect	0.328***	[0.203, 0.453]	100.0%

$*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Mediation analysis confirms that psychological adaptation mechanisms serve as critical intermediary processes between environmental stress factors and mental health outcomes, with the indirect effect (β = 0.186, $p < 0.01$) accounting for 56.7% of the total relationship strength. Decomposition of this substantial mediation effect reveals theoretically significant pathway hierarchies that illuminate the precise mechanisms

through which environmental stressors translate into psychological consequences among high-income consumers. The most potent mediation pathway operates through perceived environmental control to cognitive adaptation and subsequently to psychological well-being, representing the dominant theoretical mechanism within the model. Specifically, perceived environmental control exerts the strongest influence on psychological adaptation ($\beta = 0.284$, $p < 0.001$), and cognitive adaptation mechanisms demonstrate the most powerful effect on psychological well-being outcomes ($\beta = 0.312$, $p < 0.001$), establishing the Environmental Control → Cognitive Adaptation → Psychological Well-being sequence as the primary channel through which affluent consumers achieve mental health maintenance in digital service environments. This pathway configuration suggests that high-income consumers' psychological resilience fundamentally depends on their capacity to perceive mastery over algorithmic environments, which activates rational cognitive processing strategies that ultimately sustain psychological well-being. The secondary mediation pathway operates through emotional regulation mechanisms ($\beta = 0.268$, $p < 0.001$), indicating that affective management of privacy-related anxiety constitutes an important but subordinate route to mental health outcomes compared to cognitive adaptation processes. Behavioral adaptation, while statistically significant ($\beta = 0.241$, $p < 0.01$), represents the weakest of the three adaptation pathways, suggesting that overt behavioral responses contribute less to mental health outcomes than internal cognitive and emotional processing mechanisms among this sophisticated consumer segment. Conversely, the negative pathway from privacy anxiety to psychological adaptation ($\beta = -0.156$, $p < 0.05$) demonstrates how heightened privacy concerns can impair adaptation capacity, though this inhibitory effect is substantially weaker than the facilitative effects of environmental control and coping strategies, indicating that enhancement of positive adaptation resources may be more therapeutically effective than mere anxiety reduction. This substantial mediation effect underscores that environmental stress factors primarily influence mental health outcomes through their impact on psychological adaptation mechanisms, rather than through direct pathways, highlighting the central importance of psychological adaptation as a bridging mechanism in the stress-mental health relationship.

Multi-group analysis reveals nuanced differences across industry sectors and demographic segments, with luxury goods customers exhibiting heightened environmental stress sensitivity, financial services clients demonstrating elevated psychological adaptation capacity, and automotive industry customers showing stronger mental health resilience patterns, while demographic variations indicate that female customers display greater privacy risk sensitivity and younger participants demonstrate increased information disclosure willingness compared to their respective counterparts.

5. Discussion

This study contributes to the theory of environmental psychology by showing that digital service environments are psychological ecosystems consistent with the environmental psychology principles that were developed decades ago, and calls for the application of environmental design based on traditional environmental psychology frameworks in order to support mental health outcomes for privileged socioeconomic populations. The results build upon Sandrin[6] and elevate that (human) analysis of technological struggles to a level at which individual users inference the environmental adaptation mechanisms (see environmental psychological literature) necessary in maintaining psychological mastery within algorithmically controlled environments, therefore showing theoretical continuity across types of environmental structures. This significant association between environmental control perception and psychological adaptation ($\beta = 0.284$, $p < 0.001$) validates environmental psychology theory, which suggests that perceived environmental controllability is a key psychological resource to help users to deal with digital

environment stressors. This finding questions traditional assumptions about digital environment effects and contributes to theoretical development of broader(er) frameworks that recognize the nuanced environmental adaptation needed to sustain psychological well-being within technologically mediated settings. The high mediation effect of psychological adaptation mechanisms (56.7% of the full effect of environmental stress factors upon mental health outcomes) indicates salient pathways by which environmental design choices lead to psychological states. This mediating process indicates that reaching the best levels of mental health is not possible by merely decreasing environmental stress, but that simultaneously individual psychological adaptive capacities must be developed using well defined environmental interventions, which promote individual environmental mastery while at the same time working with the features of environmental stress. ACOSTA CRISTALDO[27] show that technological progression ultimately lies in emergent technologies' ability to augment human psychological capabilities at the same time as maintaining ecological well-being, then it is possible to argue that the stress-adaptation balance observed through this study is indicative of tensions present in digital environmental design mo re generally – of balancing sophistication against the requisites imagination and well-being.

Modern digital environmental design calls for mental health practitioners and interface design specialists striving to reconcile technologies' emphases on functionality over individual well-being, particularly when they cater for privileged users with developed digital capabilities and increased environmental sensitivities. Kallmuenzer et al.[28] show that the use of digitalization and the performance effects vary significantly between different organizational settings and user segments, which confirms the need for adapted environmental design approaches that take both individual psychological attributes and situational factors into account. The varying impact on the different dimensions of environmental stress thus poses a question for the development of population-specific environmental design strategies that take into account the differences individuals show in terms of vulnerability towards as well as capacity to adapt to environmental stress, as well as That is, Gallery[3] also confirms that an environmental change in service contexts has a different impact on different consumer segments, supporting the claim that demographic-specific environmental designs matter to some extent as shown above. Readings of environmental design facilitated by this research are that recommendations include three categories: graduated environmental control mechanisms that allow users to dynamically calibrate their privacy boundaries; creation of environmental transparency features that lower algorithmic uncertainty and increase environmental predictability; and development of environmental feedback systems that support users' sense of environmental mastery and psychological autonomy.

The multi-component nature of the psychological adaptation mechanisms validated in this study expands the traditional stress-coping model, by including not only cognitive, emotional and behavioral adaptation components but also environmental control processes. Cai and Wei analyze the prospect of psychological well-being in technological environment and suggest the designers of environment should adjust their methodology on these areas: to keep ahead in changing with the development trend in fear of taking out-dated measures and to develop new measures in accordance with the new technology and the new environmental threat[29]. Environmental design implications arising from these findings highlight the need for digital spaces that facilitate simultaneous support of multiple adaptation pathways (e.g., rendering features to diminish environmental ambiguity, mood-regulating features to encourage emotional management of privacy anxiety, and making features readily legible for personalization) which allow individuals to modify their environmental engagements based on their psychological comfort. The results offer important implications to consider the use of digital environments to bring about psychological well-being and not just to neutralize environmental stress. Environmental optimization mask sub-strategies developed from this study are;

designing environmental interfaces that encourage a greater perception of environmental control of users by providing visibility of privacy controls; implementing environmental complexity reduction devices that minimize cognitive load while preserving personalisation benefits and building support systems for environments to support psychological adaptation through conditioning through interaction with environment. Environmental design solutions have to emphasis psychological safety through environmental predictability, environmental autonomy through meaningful user-choices, and environmental mastery through increasing the skillwork of environmental control.

Differences between populations derived from multi-group analyses shown here have important implications for environmental design considerations that should take into account the role of demographics and environmental stress-adaptation patterns where luxury goods consumers should be provided with increased environmental transparency features and financial services clients should be furnished with environmental stability mechanisms that accommodate their tendency toward deranged adaptation capacity patterns. Bertrand and Glebova[14] thus provide more plausible evidence that effects of digital transformation differ from luxury to mass market, supporting the pattern identified from the affluent segment's environmental responses to distinct solutions having been designed for them. These demographic differences suggest that theories of environmental interaction should take issue with population-specific determinants of interacting with the environment, and that general environmental design ideals might miss the mark in promoting psychological well-being across varying user contexts. Wielgos et al.[1] corroborate this view by showing that digital business capabilities need to be adapted to individual customer attributes and organizational contexts to realize the full potential of performance benefits, echoing the results on the need for customer-specific environmental customization strategies. Thus, the optimization of environmental design should involve adapting environmental systems, which is capable of modifying the environmental characteristics according to the user's psychological qualities and the environmental sensitivity patterns.

The environmental psychology results provide critical advice to mental health practitioners working with digitally stressed affluent populations and to environmental designers seeking to understand the psychological effect of environmental complexity on user wellbeing. EPMIs, such as DE intervention and E-S enhancement programs, can be seen as evidence-based intervention methods to promote mental health in the context of modern ICTs. Environmental therapeutic strategies should include increasing people's environmental self-efficacy by providing training in environmental mastery, decreasing environmental anxiety by improving environmental predictability, and fostering environmental adaptational flexibility based on graduated environmental exposure procedures. The findings indicate that environmental interventions and a psychological adaptation enhancement should not be considered as separate therapeutic interventions; rather, they are related to each other by way of significant mediation effects.This is why the frameworks of environmental psychology need to be adjusted to take account of their mutual effect and combined influence on mental health outcomes. This integrative methodology is consistent with Leszkiewicz et al.[7] remarks regarding the importance of holistic frameworks that are able to account for both technological sophistication and human cognitive capability' and argues that the effective design of digital environments should not view environmental structure and individual adaptation potential as independent design considerations, but rather as entwined complementary factors. Sharma[30] further emphasises the need to consider environmental factors in a systemic way along with the mental capabilities to prepare a comprehensive therapeutic plan, the environmental stress perspectives revealed within this research should form part of a wider mental health action strategy to support sustainable psychological health within technologizes mediated environments.

A number of methodological as well as contextual limitations limit the extendibility of these environmental psychology results and indicate possible trends for development in terms of environmental research. Limitations to this work are that the focus of the present study on major Chinese metropolitan areas restricts the representativeness of findings across various cultural and environmental contexts and that the parameters of the cross-sectional research design preclude definitive causal inferences about the dynamic nature of the relationships between environmental stressors, coping mechanisms, and mental health outcomes. Future research opportunities in environmental psychology include cross-cultural environmental studies of environmental stress adaptation behaviors in relation with national cultural differences, the longitudinal research designs in the area of environmental study to show the dynamic process of environmental stress patterns and adaptation mechanisms over time, and the environmental intervention research of the effectiveness of environmental psychological-based therapeutic system for digital environmental stress management.

6. Conclusion

This investigation contributes to environmental psychology theory by addressing a critical gap in Privacy Boundary Management research: existing scholarship remains narrowly focused on individual psychological processes while overlooking the relational privacy governance mechanisms that sophisticated customers employ in ongoing business interactions. The empirical validation demonstrates that perceived environmental control emerges as the most influential factor governing psychological adaptation ($\beta = 0.284$, $p < 0.001$), while psychological adaptation mechanisms mediate 56.7% of the total effect between environmental stress factors and mental health outcomes. The pathway analysis reveals that the Environmental Control → Cognitive Adaptation → Psychological Well-being sequence constitutes the dominant mechanism, with cognitive adaptation demonstrating the strongest effect on well-being outcomes ($\beta = 0.312$, $p < 0.001$), indicating that high-income consumers' psychological resilience fundamentally depends on their capacity to perceive mastery over algorithmic environments.

The results provide practical implications for mental health professionals and technology designers: intervention strategies should prioritize enhancing perceived environmental mastery and cognitive processing capabilities, as positive adaptation resources demonstrate stronger effects than anxiety reduction alone. Organizations developing digital services for affluent populations should implement graduated environmental control mechanisms and transparency features that support user autonomy within algorithmic systems.

Methodological limitations include the geographic focus on major Chinese cities restricting cross-cultural generalizability, the cross-sectional design precluding causal inference, and the exclusive focus on high-income segments limiting transferability to other populations. Future research should examine whether identified pathway hierarchies remain consistent across cultural contexts, track dynamic evolution of adaptation patterns through longitudinal designs, and evaluate therapeutic efficacy of interventions targeting the Environmental Control → Cognitive Adaptation pathway.

Conflict of interest

There is no conflict of interest.

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