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PHYSICAL ENVIRONMENTAL STIMULI AS TRUST PRECONDITIONS, AFFECTIVE MEDIATION, AND UNPLANNED BUYING BEHAVIOR IN SHOPPING MALLS: EVIDENCE FROM A CROSS-BORDER EMERGING MARKET

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ABSTRACT

Unplanned purchasing in brick-and-mortar retail has received sustained theoretical attention under the Stimulus-Organism-Response (S-O-R) framework, yet the vast majority of empirical work concentrates on digital, e-commerce, and livestreaming environments in high-income economies. Physical shopping malls in emerging markets—where institutional trust is fragile and consumers must first assess basic safety before engaging in hedonic consumption—remain empirically underexplored. This study examines how physical environmental stimuli (hygiene, cleanliness, and security) function as baseline trust preconditions that activate positive affective states, which in turn mediate unplanned buying behavior. A cross-sectional survey of 549 mall visitors in Cúcuta, Colombia—a binational border conurbation with heterogeneous consumer flows—was analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) with bias-corrected accelerated bootstrapping (5,000 resamples), heterotrait-monotrait ratio (HTMT) for discriminant validity, full collinearity variance inflation factor (VIF) assessment for common method bias control, and PLSpredict for out-of-sample validation. Physical stimuli exhibited the strongest associations with unplanned purchases (product quality r = 0.237; hygiene/cleanliness r = 0.225; security r = 0.212), exceeding traditional marketing variables (advertising r = 0.082; staff attention r = 0.028) by a factor of three to eight. Affective states operated as a significant complementary mediator (β_indirect = 0.038, 95% BCa CI [0.016, 0.068], VAF = 15.1%), indicating that emotions constitute a real but partial mechanism within the S-O-R chain. These findings reframe the classical flat reading of atmospherics into a hierarchical model with trust preconditions, offering actionable evidence for mall management in institutionally fragile markets.

KEYWORDS: Unplanned Buying Behavior; Physical Environmental Stimuli; S-O-R Model; Affective Mediation; Trust Preconditions; PLS-SEM; Cross-Border Emerging Market.

1. INTRODUCTION

The scientific study of unplanned purchasing has expanded markedly over the past decade, driven by the proliferation of e-commerce platforms, social media marketplaces, and livestreaming retail formats. A growing body of research grounded in the Stimulus-Organism-Response (S-O-R) paradigm has demonstrated that environmental cues—whether digital interface design, algorithmic recommendations, or streamer charisma—activate affective and cognitive states in the consumer, which subsequently translate into purchasing behavior (Arianty et al., 2024; Xia et al., 2024; Dong and Tarofder, 2024). Systematic reviews confirm that this mediation pathway is now a well-established consensus across consumer psychology and retailing: stimuli do not trigger purchases directly; they must first pass through an internal organismic state (Kıymalıoğlu et al., 2024; Azad Moghddam et al., 2024). The empirical base supporting this consensus, however, displays a pronounced geographic and format bias. The overwhelming majority of S-O-R impulse buying studies published between 2023 and 2026 concentrate on online, mobile, or phygital environments situated in high-income or upper-middle-income economies (Abbott et al., 2023; Feng et al., 2024; Hongsuchon et al., 2025). Physical shopping malls—which continue to anchor retail ecosystems across Latin America, Southeast Asia, and Sub-Saharan Africa—receive comparatively marginal attention in the contemporary empirical record (Mandolfo and Lamberti, 2021; Utama et al., 2026).

The theoretical architecture for understanding how commercial spaces shape consumer behavior was established over five decades ago. Kotler (1973) introduced the concept of atmospherics to describe the deliberate design of spatial features—lighting, layout, scent, music, cleanliness—as instruments of purchase probability. Mehrabian and Russell (1974) formalized this intuition through the S-O-R model, positing that environmental stimuli elicit pleasure-arousal-dominance (PAD) states in the organism, which in turn produce approach or avoidance responses. Subsequent decades of research have confirmed and extended this framework across contexts ranging from department stores to airports (Mattila and Wirtz, 2001; Lee et al., 2021). The traditional reading of atmospherics, however, treats environmental variables as a relatively undifferentiated set: music, temperature, signage, staff courtesy, and sanitary conditions occupy the same conceptual tier and are assumed to contribute additively to the consumer's affective state. This flat interpretation has proven serviceable in stable retail environments where baseline institutional trust—clean floors, functional restrooms, physical safety—is presumed rather than questioned. It becomes problematic when transposed to markets where such conditions cannot be taken for granted.

An emerging line of evidence suggests that not all atmospheric stimuli carry equivalent psychological weight. Phamthi et al. (2024), in a systematic review of 133 studies, concluded that perceived risk constitutes the primary cognitive barrier to purchase: consumers must first mitigate uncertainty about personal safety and product integrity before hedonic motivations can activate. Karahan and Şahin (2025) demonstrated empirically that atmospheric cues related to navigation, spatial layout, and environmental comfort influence impulse buying through hedonic browsing—but only when baseline utilitarian conditions are satisfactory. This logic aligns with the dual-pathway framework advanced by Cao et al. (2023) and He et al. (2026), in which fast affective responses (System 1) and slower cognitive evaluations (System 2) coexist during the purchase episode. The implication is structural: certain environmental features—specifically those that reduce perceived risk—function as preconditions rather than co-equal contributors. Unless the consumer's cognitive risk appraisal is satisfied, affective activation remains suppressed, and marketing stimuli lose traction regardless of their design sophistication.

Precision in defining the dependent variable is equally consequential. Hussain et al. (2024) draw a sharp conceptual boundary between impulse buying—an automatic, predominantly affective response—and unplanned buying—a reflective process in which cognitive and emotional components interact. This distinction carries methodological weight: treating all non-premeditated purchases as purely emotional phenomena risks overstating the role of affect and overlooking the cognitive preconditions that enable it. Within the S-O-R tradition, contemporary evidence converges on the position that positive emotional states mediate—rather than directly cause—the relationship between environmental stimuli and unplanned acquisition (Arianty et al., 2024; Xia et al., 2024; Lee et al., 2023). Affective states such as pleasure, comfort, and excitement do not emerge in a contextual vacuum; they are conditional on the satisfaction of antecedent cognitive evaluations. Schiffman and Wisenblit (2019) argue that the unplanned purchase is not an absence of rationality but a configuration in which emotional

valuation prevails over prior planning—a formulation that presupposes a preceding rational assessment, however brief, of the environment's trustworthiness.

The geographic and institutional gap in the empirical literature becomes especially acute when the setting involves a cross-border emerging market. Cúcuta, Colombia, situated on the Colombian-Venezuelan frontier, constitutes one of Latin America's most commercially active binational conurbations. Its shopping malls serve a heterogeneous clientele that includes local residents, Venezuelan migrants, and cross-border day visitors whose consumption patterns are shaped by asymmetric institutional conditions: divergent currencies, contrasting levels of state regulation, and differential exposure to commercial infrastructure quality. In such a context, the baseline assumptions embedded in the flat atmospherics model—that all visitors share similar expectations regarding hygiene, safety, and product authenticity—do not hold. The consumer's initial processing of the commercial environment is not a passive registration of ambient pleasantness; it is an active cognitive assessment of whether the establishment meets a threshold of institutional trustworthiness. Only when that threshold is met can the affective pathway—the hedonic browsing, the spontaneous delight, the emotional pull toward an unintended purchase—activate. The cross-border literature of 2024–2026 has identified this type of institutional heterogeneity as a priority gap, noting the scarcity of empirical studies that examine impulse buying within physically situated retail environments in markets characterized by fragile consumer trust (Utama et al., 2026; Čuláková et al., 2025; Yang, 2026).

Three interrelated voids define the current state of knowledge. First, the disproportionate concentration of S-O-R impulse buying research on digital channels leaves the physical mall—still the dominant retail format in most emerging economies—without a contemporary empirical benchmark (Mandolfo and Lamberti, 2021). Second, the literature has treated atmospherics as a flat ensemble of interchangeable variables rather than investigating whether a hierarchical structure exists in which trust-generating stimuli must be satisfied before hedonic activators can operate. Third, no study to date has tested this hierarchical reading of the S-O-R model in a cross-border Latin American setting where institutional fragility is not a background assumption but a measurable characteristic of the consumer experience. The absence of this evidence limits both theoretical development—because the S-O-R model continues to be applied without acknowledging its implicit precondition structure—and practical application—because mall managers in volatile markets lack empirically grounded guidance on investment prioritization between infrastructure maintenance and marketing expenditure.

Addressing these voids demands methodological standards commensurate with the complexity of the proposed mediation model. The contemporary methodological frontier is unambiguous: modeling latent affective mediators within an S-O-R structure requires Partial Least Squares Structural Equation Modeling (PLS-SEM) rather than ordinary least squares (OLS) regression, which fails under non-normal data distributions and cannot accommodate measurement error in latent constructs (Hair et al., 2024; Kim and Li, 2023; Abreu-Ledón et al., 2026). Mediation claims based on bivariate correlations—common in earlier atmospheric studies—are no longer considered acceptable; formal bootstrapped mediation analysis with bias-corrected accelerated confidence intervals is the established standard (Alfons et al., 2022; Rajh-Weber et al., 2025). Common method bias (CMB) control through full collinearity assessment (VIF) has replaced the outdated Harman's single-factor test as the minimum diagnostic requirement for cross-sectional self-report data (Podsakoff et al., 2024; Castillo et al., 2025). These methodological commitments are not optional refinements; they are prerequisites for producing evidence that the scientific community can consider trustworthy.

The present study addresses the identified theoretical, contextual, and methodological voids. Its central objective is to determine how physical environmental stimuli—specifically hygiene, cleanliness, and security—function as baseline trust preconditions that activate positive emotional states, which in turn mediate and determine unplanned buying behavior in shopping malls within a cross-border emerging market (Cúcuta, Colombia). Using data from 549 mall visitors analyzed through PLS-SEM with bootstrapped mediation, HTMT discriminant validity, full collinearity VIF for CMB assessment, and PLSpredict out-of-sample validation, this study pursues three specific aims: (a) to test empirically whether physical environmental stimuli exhibit a stronger association with unplanned purchases than traditional marketing variables, consistent with a hierarchical rather than flat reading of the S-O-R model; (b) to evaluate the mediating role of positive affective states through formal bootstrapped mediation analysis, rather than inferring mediation from bivariate correlations; and

(c) to contribute the first empirical evidence on S-O-R hierarchy with trust preconditions from a binational Latin American border conurbation, a context that offers a natural test of the model's behavior under conditions of institutional fragility.

2. METHODS

2.1. Research Paradigm and Design

This study adopted a positivist paradigm with a quantitative, correlational-predictive approach (Hernández-Sampieri and Mendoza, 2008). The research design was non-experimental, cross-sectional, and ex post facto: all variables were measured simultaneously, no experimental manipulation was introduced, and the phenomena of interest—environmental perceptions, affective states, and purchasing behavior—had already occurred at the time of data collection. This design is consistent with the dominant empirical tradition in S-O-R impulse buying research, where cross-sectional self-report surveys remain the most widely employed method (Mandolfo and Lamberti, 2021; Kıymalıoğlu et al., 2024). The cross-sectional architecture carries an inherent limitation—temporal ordering among variables cannot be established—which constrains the language used throughout this manuscript to associational and predictive claims rather than causal assertions (Chetioui and El Bouzidi, 2023).

The study was conducted in accordance with the ethical standards of the 1964 Helsinki Declaration and its subsequent amendments. The research protocol received approval from the institutional review committee of the Universidad Francisco de Paula Santander. Informed consent was obtained from all participants prior to data collection; respondents were informed of the voluntary nature of their participation, the anonymity of their responses, and their right to withdraw at any point without consequence.

2.2. Setting And Context

Data were collected in the principal shopping malls of Cúcuta, Colombia, a metropolitan area of approximately 750,000 inhabitants located on the Colombian–Venezuelan border. Cúcuta constitutes the commercial nucleus of a binational conurbation that includes the Venezuelan city of San Antonio del Táchira and serves as a primary transit corridor for cross-border trade, migration, and consumption. The city's shopping malls operate as centralized commercial ecosystems that attract a heterogeneous clientele: local Colombian residents, Venezuelan migrants with varying degrees of permanence, and day visitors who cross the border specifically for retail purposes. This institutional heterogeneity—divergent currencies, asymmetric regulatory frameworks, and differential expectations regarding commercial infrastructure—produces a consumer environment in which baseline trust cannot be presumed and must instead be actively signaled by the physical characteristics of the commercial establishment. The selection of Cúcuta as the study context is theoretically motivated: it provides a natural test of the S-O-R model under conditions of institutional fragility, a setting identified as a priority gap in the cross-border consumer behavior literature (Utama et al., 2026; Čuláková et al., 2025).

2.3. Participants And Sampling

The target population comprised adult consumers (≥18 years) who had visited at least one shopping mall in Cúcuta during the data collection period. A non-probabilistic convenience sampling strategy was employed: trained fieldworkers approached potential respondents at the principal points of commercial flow—mall entrances, central corridors, and food court areas—across multiple days and time slots to maximize demographic variability. The sample size was determined a priori using Cochran's (1977) formula for populations with expected heterogeneity, yielding a minimum target of approximately 385 observations at a 95% confidence level and 5% margin of error. The final sample comprised N = 549 valid observations (309 women, 56.3%; 240 men, 43.7%), exceeding the minimum threshold and providing sufficient statistical power (>0.80) to detect small-to-medium effect sizes in structural equation modeling (Hair et al., 2024).

The use of convenience sampling imposes a boundary condition on the generalizability of the findings. The sample is not probabilistically representative of the full population of Cúcuta mall visitors; it reflects the composition of visitors present at high-traffic locations during the sampled time windows. This limitation is explicitly acknowledged, and the results are interpreted as evidence from a specific consumer segment within the border market context rather than as population-level parameter estimates. The approach is consistent with prevalent practice in contemporary S-O-R consumer research, where convenience samples of comparable size are standard (Arianty et al., 2024; Hongsuchon et al., 2025; Li et al., 2024), though the inferential constraints it introduces are addressed in the Discussion.

2.4. Instrument and Measures

Data were gathered through a structured, self-

administered questionnaire comprising 19 items measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The instrument was designed to capture the three layers of the S-O-R model as operationalized for the physical mall environment. Items were derived from the atmospherics literature (Kotler, 1973; Kerin et al., 2010) and adapted to reflect the specific conditions of the Cúcuta commercial ecosystem.

The variables were organized into three conceptual tiers consistent with the hierarchical S-O-R thesis advanced in this study. The Stimulus tier encompassed two categories: (a) physical environmental stimuli, including hygiene and cleanliness, product quality, security, parking facilities, mobility and accessibility, and restroom facilities; and (b) marketing and atmospheric stimuli, including promotions, advertising, payment methods, service quality, product presentation, and staff attention. The Organism tier was measured through a single item capturing self-reported feelings and emotions experienced during the mall visit. The Response tier consisted of a single item measuring self-reported unplanned purchases made during the visit.

A methodological note regarding construct measurement is warranted. The affective organism variable and the behavioral response variable are each operationalized as single indicator. This measurement architecture precludes the estimation of traditional internal consistency coefficients (Cronbach's α, composite reliability, average variance extracted) for these two constructs; psychometric validation is reported exclusively for the multi-indicator composite where it is estimable—namely, the physical environmental stimuli construct, which aggregates three reflective indicators (hygiene/cleanliness, product quality, and security). The decision to retain single-indicator constructs reflects the original instrument design and is handled analytically by fixing their outer loadings to 1.0 in the structural model, a practice consistent with PLS-SEM guidelines for observed variables (Hair and Alamer, 2022).

Table 1 presents the complete operationalization of all measured variables, their scale anchors, and their assignment to S-O-R tiers.

Table 1: Operationalization Of Measured Variables By S-O-R Tier, Item Description, And Scale Format.

Variable	Item description	Scale	S-O-R tier	Role in structural model
Hygiene and cleanliness	Perceived cleanliness and sanitary conditions of the mall environment	1–5 Likert	Stimulus (Physical)	Indicator of Physical Stimuli composite (λ = 0.917)
Product quality	Perceived quality and authenticity of products available in mall stores	1–5 Likert	Stimulus (Physical)	Indicator of Physical Stimuli composite (λ = 0.894)
Security	Perceived physical safety and surveillance within the mall premises	1–5 Likert	Stimulus (Physical)	Indicator of Physical Stimuli composite (λ = 0.855)
Parking facilities	Availability, accessibility, and adequacy of parking infrastructure	1–5 Likert	Stimulus (Physical)	Contextual physical variable (excluded from composite; r = 0.125)
Mobility and accessibility	Ease of movement, circulation, and spatial navigation within the mall	1–5 Likert	Stimulus (Physical)	Contextual physical variable (excluded from composite; r = 0.120)
Restroom facilities	Availability and perceived condition of sanitary restroom facilities	1–5 Likert	Stimulus (Physical)	Contextual physical variable (excluded from composite; r = 0.119)
Promotions	Attractiveness and frequency of promotional offers encountered during the visit	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.152)
Occasional prices	Perception of special or discounted pricing on specific products	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.140)
Prizes and discounts	Availability of reward programs, loyalty discounts, or in-store incentives	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.089)
Advertising and promotion	Exposure to visual advertising, signage, and in-mall promotional campaigns	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.082)

Payment methods	Availability and convenience of diverse payment options (cash, card, digital)	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.158)
Service quality	Overall perceived quality of customer service and staff professionalism	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.077)
Product presentation	Visual merchandising, display arrangement, and aesthetic presentation of goods	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.056)
Staff attention	Degree of direct interpersonal interaction with sales personnel	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.028)
Mall location	Convenience and accessibility of the mall's geographic location	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.169)
Social status	Degree to which mall patronage is associated with social identity or prestige	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.058)
Pet access	Availability of pet-friendly policies and facilities within the mall	1–5 Likert	Stimulus (Marketing)	Contextual marketing variable (r = 0.052)
Feelings and emotions	Self-reported positive affective state (pleasure, comfort, excitement) during the visit	1–5 Likert	Organism (Affective)	Single-indicator mediator construct (loading fixed at 1.0)
Unplanned purchases	Self-reported purchases made during the visit without prior planning or intention	1–5 Likert	Response (Behavioral)	Single-indicator dependent variable (loading fixed at 1.0)

Note: N = 549 for all variables. Scale anchors: 1 = strongly disagree, 5 = strongly agree. The Physical Stimuli composite aggregates three reflective indicators (hygiene/cleanliness, product quality, security) selected on the basis of theoretical alignment with the trust-precondition thesis and factor loading magnitude (all λ > 0.85). Contextual variables are retained in descriptive and bivariate analyses but excluded from the structural model to preserve parsimony. Pearson correlation coefficients (r) with unplanned purchases are reported for contextual variables to document their relative association magnitude. Internal consistency metrics (α, CR, AVE) are estimable only for the multi-indicator Physical Stimuli composite; single-indicator constructs are handled by fixing outer loadings to 1.0 per PLS-SEM guidelines (Hair and Alamer, 2022).

2.5. Data Collection Procedure

Data collection was conducted in person at the major shopping malls of Cúcuta over a period that covered both weekdays and weekends, spanning multiple time blocks (morning, afternoon, and evening) to reduce temporal selection bias. Fieldworkers were trained in the administration protocol and approached potential participants at designated high-traffic points within each mall. Eligibility criteria were verified verbally: participants had to be at least 18 years of age and had to have completed at least one visit to the mall's commercial areas (as opposed to arriving solely for restaurant or entertainment purposes). Each participant completed the questionnaire independently; fieldworkers remained available for clarification but did not influence responses. The average completion time was approximately eight minutes.

Several procedural measures were implemented to mitigate common method bias at the design stage, consistent with current methodological recommendations (Podsakoff et al., 2024). Respondents were assured of complete anonymity and were informed that there were no correct or incorrect answers, reducing social desirability pressure. The questionnaire separated stimulus items from organism and response items through distinct thematic blocks, introducing a psychological separation between predictor and criterion measures. Item order was counterbalanced across questionnaire versions to attenuate priming effects. These procedural safeguards complement the statistical controls for common method bias reported in the Results section.

2.6. Analytical Strategy

2.6.1. Rationale For PLS-SEM

The analytical framework employed Partial Least Squares Structural Equation Modeling (PLS-SEM) rather than ordinary least squares (OLS) regression or covariance-based SEM. Five considerations justified this selection. First, the Mardia test for multivariate normality rejected the null hypothesis of normality across the 19 measured items (b1p =

75.703, χ^2 = 6926.836, df = 1330, p < 0.001; b2p = 477.114, z = 32.395, p < 0.001), and the dependent variable displayed pronounced negative skewness (−2.297) and excess kurtosis (3.919). Under these distributional conditions, OLS regression produces inflated Type I error rates and unreliable coefficient estimates (Kim and Li, 2023; Rajh-Weber et al., 2025). Second, the model includes a latent composite (physical environmental stimuli) formed by three reflective indicators, which cannot be accommodated within standard OLS. Third, the sample size (N = 549) provides adequate statistical power for detecting small effects in PLS-SEM path models (Hair et al., 2024). Fourth, the mediation hypothesis—that affective states transmit the effect of physical stimuli onto unplanned purchases—requires formal decomposition of direct and indirect effects through bootstrapped confidence intervals, a procedure integrated within the PLS-SEM framework (Alfons et al., 2022). Fifth, systematic reviews of SEM applications in consumer research have documented that methodological requirements for structural models are frequently overlooked when simpler techniques are used, leading to invalid theoretical and managerial claims (Abreu-Ledón et al., 2026). PLS-SEM with SmartPLS 4 was selected as the primary analytical platform, following the updated reporting guidelines of Hair et al. (2024) and Hair and Alamer (2022).

2.6.2. Measurement Model Evaluation

The measurement model was assessed through a two-stage protocol. For the multi-indicator composite (physical environmental stimuli), indicator reliability was evaluated through outer loadings ($\lambda > 0.70$), internal consistency through Cronbach's alpha ($\alpha > 0.70$), rho_A, and composite reliability (CR > 0.70), and convergent validity through average variance extracted (AVE > 0.50) (Hair and Alamer, 2022). Discriminant validity was assessed using the heterotrait-monotrait ratio (HTMT), applying the conservative threshold of HTMT < 0.85 (Ringle et al., 2023; Hair et al., 2024). The HTMT criterion was preferred over the Fornell-Larcker criterion because recent simulation evidence has demonstrated that Fornell-Larcker consistently fails to detect discriminant validity violations, whereas HTMT provides superior sensitivity and specificity. For the single-indicator constructs (affective states and unplanned purchases), outer loadings were fixed at 1.0 and no internal consistency metrics were computed, as there is no measurement redundancy to assess; this constraint is reported transparently.

2.6.3. Common Method Bias Assessment

Because all variables—perceived environmental stimuli, self-reported emotional states, and self-reported purchasing behavior—were collected from the same respondent at the same time using the same instrument, common method bias (CMB) represents a non-trivial methodological threat. Following contemporary best practices, Harman's single-factor test was explicitly rejected as a diagnostic tool. Podsakoff et al. (2024) have demonstrated that this test is insensitive to actual method variance and provides false reassurance in the overwhelming majority of published applications. Instead, CMB was assessed through the full collinearity variance inflation factor (VIF) approach (Castillo et al., 2025): all constructs in the model were regressed against a single dependent variable, and the resulting VIF values were evaluated against the threshold of 3.3. A VIF below 3.3 for every construct indicates that the model is free of concerning common method variance. This statistical assessment supplements the procedural remedies described in Section 2.5.

2.6.4. Structural Model And Mediation Analysis

The structural model tested three pathways derived from the hierarchical S-O-R thesis: (a) the direct effect of physical environmental stimuli on unplanned purchases; (b) the effect of physical environmental stimuli on affective states; and (c) the effect of affective states on unplanned purchases. The indirect effect (a × b) constitutes the formal test of affective mediation. All path coefficients were estimated with bias-corrected and accelerated (BCa) bootstrapping using 5,000 resamples (Alfons et al., 2022; Matte-Gagné and Bernier, 2011). Statistical significance was determined by 95% BCa confidence intervals that do not include zero rather than by t-values alone, providing a more informative basis for inference under non-normal sampling distributions.

Mediation was classified following the decision protocol established in the PLS-SEM literature. If both the direct and indirect effects are significant and share the same sign, the mediation is classified as complementary (partial). If the indirect effect is significant but the direct effect is not, the mediation is classified as full (indirect-only). The variance accounted for (VAF) statistic was computed as the ratio of the indirect effect to the total effect, providing a metric of the proportion of the total relationship transmitted through the affective mechanism.

2.6.5. Model Explanatory And Predictive Power

The explanatory capacity of the model was assessed through R^2 values for both endogenous

constructs (affective states and unplanned purchases), interpreted against the conventional benchmarks of 0.75 (substantial), 0.50 (moderate), and 0.25 (weak) (Hair et al., 2019). Predictive relevance was evaluated through the Stone-Geisser Q^2 statistic, where values above zero indicate that the model predicts better than the trivial mean-based benchmark. Out-of-sample predictive performance was further assessed using PLSpredict with a 10-fold cross-validation procedure repeated 10 times (Hair et al., 2024). PLSpredict compares the root mean square error (RMSE) and mean absolute error (MAE) of the PLS-SEM model against a naïve linear model (LM) benchmark: if the PLS-SEM model yields lower prediction errors than the LM for all or most indicators, the model demonstrates genuine predictive relevance beyond mere in-sample fit.

2.6.6. Multigroup Analysis By Gender

To evaluate whether the affective mediation pathway operates differently across gender groups, a multigroup analysis (PLS-MGA) was conducted. The sample was divided into female (n = 309) and male (n = 240) subsamples. Path coefficients, R^2 values, and 95% BCa confidence intervals were estimated separately for each group. The statistical significance of between-group differences was assessed through permutation-based testing of the difference in path coefficients ($\Delta\beta$), with the corresponding 95% confidence interval and p-value. An interaction term (affective states × gender) was also estimated in the pooled model to corroborate the multigroup results (Feng et al., 2024). This dual-method approach—multigroup comparison supplemented by interaction testing—avoids the methodological error of interpreting separate-group regressions as evidence of moderation without a formal statistical comparison between groups.

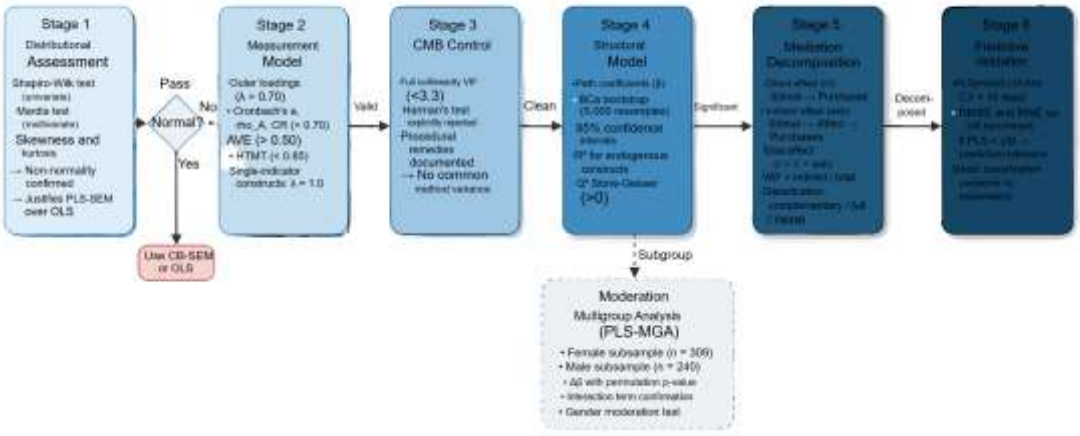

Figure 1: Analytical Workflow: Sequential Evaluation Protocol from Measurement Model to Predictive Validation. The Diagram Illustrates the Six-Stage Analytical Sequence Employed in This Study, From Preliminary Distributional Assessment Through Measurement Model Evaluation, CMB Control, Structural Path Estimation, Bootstrapped Mediation Decomposition, And Out-Of-Sample Prediction with Plspredict.

3. RESULTS

The results are organized in eight subsections that follow the analytical sequence specified in the Methods section. The presentation begins with the descriptive profile of the sample and the distributional characteristics of the dependent variable, then proceeds through the bivariate correlation structure, the measurement model evaluation, common method bias control, the structural model estimates, the formal mediation decomposition, the multigroup analysis by gender, and the out-of-sample predictive validation. Tables and figures are numbered continuously with those introduced in the Methods section.

3.1. Sample Profile and Descriptive Statistics

The analytical dataset comprised N = 549 valid observations with no missing values across the 19 Likert items. The sample composition by gender was 309 women (56.3%) and 240 men (43.7%). The dependent variable, unplanned purchases, displayed a high mean value, M = 4.503, SD = 1.161, Mdn = 5,

95% CI [4.405, 4.600], indicating a strong concentration of responses at the upper end of the five-point scale. The distribution exhibited substantial negative skewness (−2.297) and excess kurtosis (3.919). The Shapiro–Wilk test rejected univariate normality, $W = 0.474$, $p = 3.08 \times 10^{-37}$. The Mardia test rejected multivariate normality across the full set of 19 items, $b1p = 75.703$, $\chi^2 = 6{,}926.836$, $df = 1{,}330$, $p < 0.001$; $b2p = 477.114$, $z = 32.395$, $p = 3.18 \times 10^{-230}$. These distributional properties confirm the methodological rationale for PLS-SEM over OLS regression. Table 2 reports the descriptive statistics for the ten variables retained in the analytical pipeline (eight predictors with $r > 0.12$ against the dependent variable, the affective mediator, and the dependent variable itself). Figure 2 displays the empirical distribution of unplanned purchases against a superimposed normal density curve.

Table 2: Descriptive Statistics for Retained Predictors, The Affective Mediator, And the Dependent Variable (N = 549).

Variable	N	Mean	SD	Median	Skewness	Excess kurtosis	95% CI for mean
Product quality	549	4.594	1.048	5	−2.600	5.617	[4.506, 4.682]
Hygiene and cleanliness	549	4.597	1.025	5	−2.599	5.725	[4.511, 4.683]
Security	549	4.638	0.966	5	−2.786	6.938	[4.557, 4.718]
Mall location	549	3.576	1.536	3	−0.566	−1.095	[3.447, 3.704]
Payment methods	549	3.577	1.494	3	−0.544	−1.038	[3.452, 3.703]
Promotions	549	3.996	1.526	5	−1.154	−0.303	[3.868, 4.124]
Occasional prices	549	3.792	1.573	5	−0.856	−0.864	[3.660, 3.924]
Parking	549	3.248	1.818	3	−0.252	−1.752	[3.095, 3.400]
Feelings and emotions	549	3.510	1.580	3	−0.502	−1.236	[3.378, 3.642]
Unplanned purchases	549	4.503	1.161	5	−2.297	3.919	[4.405, 4.600]

Note: Skewness and kurtosis values exceeding |1| indicate substantial non-normality. All variables measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The dependent variable row is highlighted in bold. The full set of 19 measured items is reported in Appendix A. Variables were retained for the analytical pipeline on the basis of bivariate correlation r > 0.12 with unplanned purchases.

Figure 2: Empirical Distribution of Unplanned Purchases with Superimposed Normal Density Curve (N = 549).

3.2. *Bivariate Correlations with Unplanned Purchases*

Pearson correlations between each of the 19 measured items and the dependent variable were computed to establish the magnitude ordering of the associations. The findings group naturally into three tiers. The first tier comprised the four variables with the strongest associations: product quality (r = 0.237, p = 1.92×10^{-8}), hygiene and cleanliness (r = 0.225, p = 9.36×10^{-8}), feelings and emotions (r = 0.213, p = 4.66×10^{-7}), and security (r = 0.212, p = 5.62×10^{-7}). The second tier included variables of intermediate magnitude: mall location (r = 0.169), payment methods (r = 0.158), promotions (r = 0.152), occasional prices (r = 0.140), parking (r = 0.125), mobility and accessibility (r = 0.120), and restroom facilities (r = 0.119). The third tier contained variables with weak or near-null associations: prizes and discounts (r = 0.089), advertising and promotion (r = 0.082), service quality (r = 0.077), social status (r = 0.058), product presentation (r = 0.056), pet access (r = 0.052), and staff attention (r = 0.028).

All p-values reported above are uncorrected. Applying a Holm–Bonferroni correction for 19 simultaneous tests at the family-wise α = 0.05 level (adjusted threshold for the most extreme comparison ≈ 0.0026), the top tier and most of the intermediate tier remain statistically significant; variables with raw |r| < 0.10 do not survive the correction. Figure 3 presents the complete ordering as a dot plot with 95% confidence intervals.

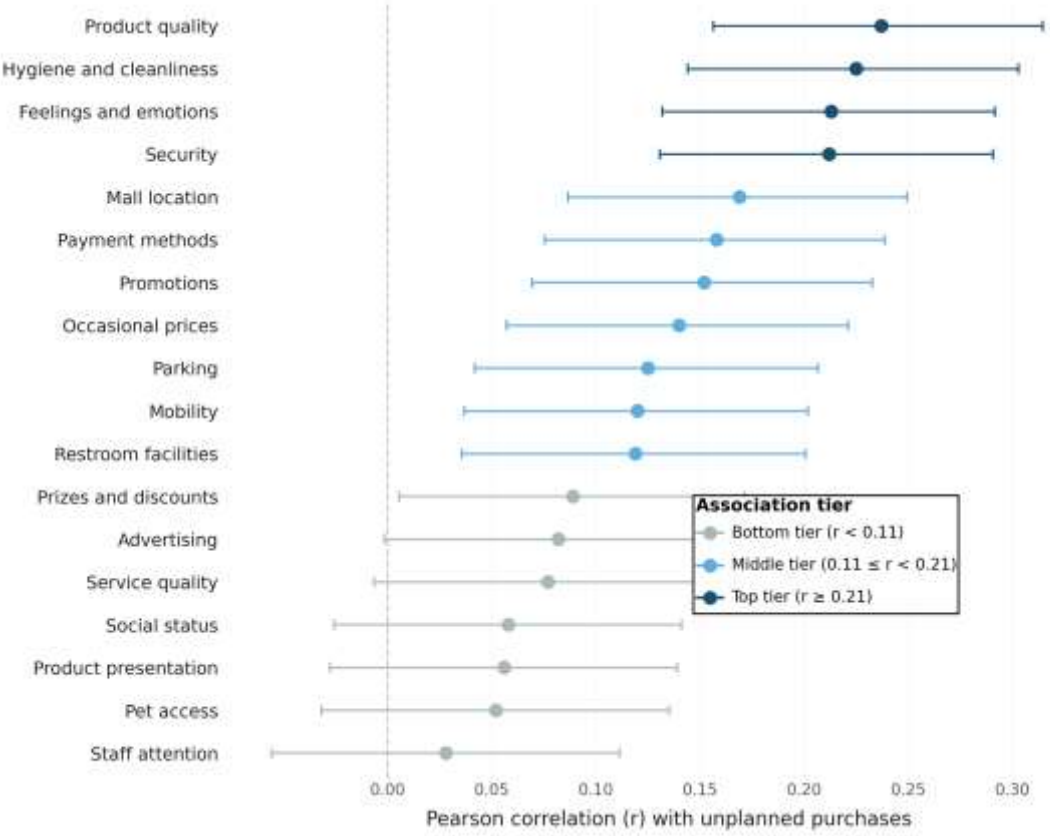

Figure 3: Pearson Correlations of the 19 Measured Items with Unplanned Purchases, Ordered by Magnitude and Presented With 95% Confidence Intervals.

3.3. *Measurement Model Evaluation*

The measurement model was evaluated for the multi-indicator composite of physical environmental stimuli, which aggregates hygiene and cleanliness, product quality, and security as reflective indicators. All three indicators displayed outer loadings well above the recommended threshold of 0.70: hygiene and cleanliness λ = 0.917, product quality λ = 0.894, and security λ = 0.855. Internal consistency reliability was strong: Cronbach's α = 0.867, composite reliability CR = 0.919. Convergent validity was supported by an average variance extracted AVE = 0.791, exceeding the 0.50 minimum (Hair and Alamer, 2022). The affective mediator (feelings and emotions) and the behavioral response (unplanned purchases) were modeled as single-indicator constructs with outer loadings fixed at 1.000; reliability and AVE statistics are not estimable for these constructs and are reported as not applicable,

consistent with PLS-SEM standards for observed variables. Table 3 reports the complete measurement model results.

Table 3: Measurement Model: Outer Loadings, Internal Consistency Reliability, And Convergent Validity.

Construct	Indicator	λ	Cronbach's α	CR	AVE
Physical environmental stimuli	Hygiene and cleanliness	0.917	0.867	0.919	0.791
	Product quality	0.894			
	Security	0.855			
Feelings and emotions	Feelings and emotions	1.000	NA	NA	NA
Unplanned purchases	Unplanned purchases	1.000	NA	NA	NA

Note: λ = standardized outer loading; CR = composite reliability; AVE = average variance extracted. Recommended thresholds: λ > 0.70, α > 0.70, CR > 0.70, AVE > 0.50 (Hair and Alamer, 2022). NA = not applicable for single-indicator constructs; outer loadings for single-indicator constructs are fixed at 1.0 per PLS-SEM guidelines. Internal consistency and convergent validity metrics are reported exclusively for the multi-indicator Physical Environmental Stimuli composite, as they require a minimum of three reflective indicators for meaningful estimation.

Discriminant validity was assessed through the heterotrait–monotrait (HTMT) ratio, using the conservative threshold of HTMT < 0.85 (Ringle et al., 2023; Hair et al., 2024). All three off-diagonal HTMT values were well below the threshold: physical stimuli–feelings/emotions HTMT = 0.234; physical stimuli–unplanned purchases HTMT = 0.253; feelings/emotions–unplanned purchases HTMT = 0.213. The full HTMT matrix is visualized in Figure 4.

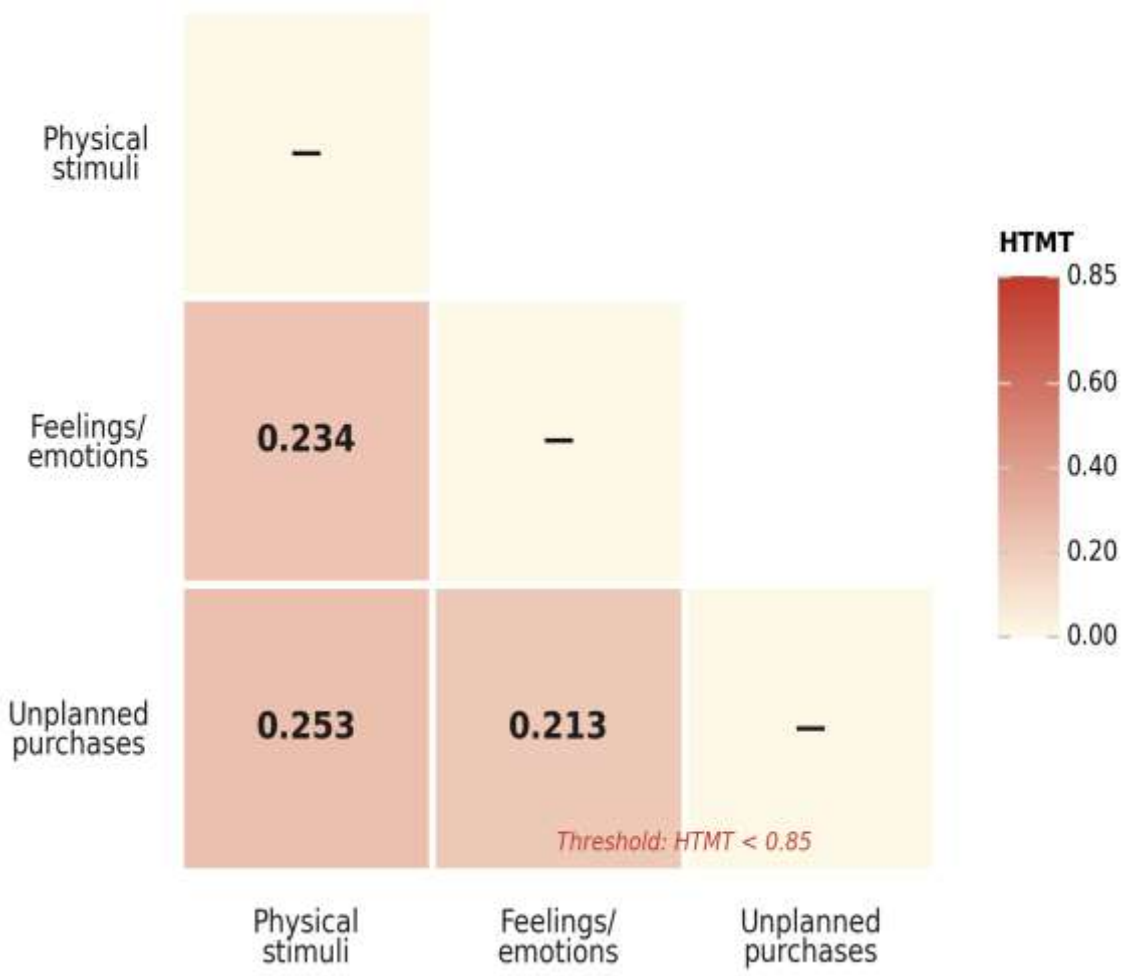

Figure 4: Heatmap of Heterotrait–Monotrait (HTMT) Ratios for Discriminant Validity Assessment Among the Three Latent Constructs.

3.4. Common Method Bias Assessment

Common method bias was evaluated through the full collinearity variance inflation factor (VIF) procedure (Kock, 2015; Castillo et al., 2025), following the methodological rejection of Harman's single-factor test articulated in Section 2.6.3. All three constructs returned full collinearity VIF values substantially below the 3.3 threshold: physical environmental stimuli VIF = 1.109; feelings and emotions VIF = 1.087; unplanned purchases VIF = 1.098. These values provide no statistical indication of common method variance. Table 4 reports the complete VIF assessment.

Table 4: Full Collinearity Variance Inflation Factors for Common Method Bias Assessment.

Construct	Full collinearity VIF	Assessment
Physical environmental stimuli	1.109	Below threshold
Feelings and emotions	1.087	Below threshold
Unplanned purchases	1.098	Below threshold

Note: Full collinearity VIF values below the 3.3 threshold indicate no concerning common method variance (Kock, 2015; Castillo et al., 2025). Harman's single-factor test was not conducted because it has been demonstrated to be methodologically insensitive and obsolete for detecting common method bias (Podsakoff et al., 2024). The full collinearity procedure assesses both vertical and lateral collinearity across all constructs in the model simultaneously.

3.5. Structural Model Estimates

The structural model produced three statistically significant path coefficients, all confirmed through bias-corrected and accelerated bootstrapping with 5,000 resamples. Physical environmental stimuli predicted feelings and emotions, $\beta = 0.234$, SEboot = 0.044, 95% BCa CI [0.150, 0.318], $p < 0.0004$. Feelings and emotions, in turn, predicted unplanned purchases, $\beta = 0.163$, SEboot = 0.046, 95% BCa CI [0.074, 0.252], $p = 0.001$. The direct effect of physical environmental stimuli on unplanned purchases remained statistically significant after accounting for the mediator, $\beta = 0.215$, SEboot = 0.059, 95% BCa CI [0.101, 0.333], $p < 0.0004$. The total effect was $\beta = 0.253$, SEboot = 0.059, 95% BCa CI [0.141, 0.377], $p < 0.0004$.

The explanatory capacity of the model was modest. The R^2 for feelings and emotions was 0.055, 95% BCa CI [0.022, 0.101], $p < 0.0004$, indicating that physical environmental stimuli account for approximately 5.5% of the variance in the affective mediator. The R^2 for unplanned purchases was 0.089, 95% BCa CI [0.037, 0.165], $p < 0.0004$, indicating that the model explains approximately 8.9% of the variance in the dependent variable. Both R^2 values fall below the 0.25 "weak" benchmark established for PLS-SEM models in consumer research (Hair et al., 2019); the model is therefore characterized as a small-effect explanatory model. Table 5 reports the complete structural model coefficients with bootstrapped standard errors and confidence intervals, and Figure 5 displays the path estimates as a forest plot with 95% BCa intervals.

Table 5: Structural Model Path Coefficients with Bias-Corrected Accelerated Bootstrap Inference (5,000 Resamples).

Path	β	SEboot	95% BCa CI	p_boot
Physical stimuli → Feelings/emotions	0.234	0.044	[0.150, 0.318]	< 0.0004
Feelings/emotions → Unplanned purchases	0.163	0.046	[0.074, 0.252]	0.001
Physical stimuli → Unplanned purchases (direct, c′)	0.215	0.059	[0.101, 0.333]	< 0.0004
Indirect effect (a × b)	0.038	0.013	[0.016, 0.068]	0.001
Total effect (c)	0.253	0.059	[0.141, 0.377]	< 0.0004

Note: β = standardized path coefficient; SEboot = bootstrap standard error; BCa = bias-corrected accelerated confidence interval; 5,000 bootstrap resamples. R^2 Feelings/emotions = 0.055, 95% BCa CI [0.022, 0.101], $p < 0.0004$; R^2 Unplanned purchases = 0.089, 95% BCa CI [0.037, 0.165], $p < 0.0004$. Both R^2 values fall below the 0.25 "weak" threshold for PLS-SEM models in consumer research (Hair et al., 2019), characterizing this as a small-effect explanatory model. The empty row separates direct structural paths (upper panel) from aggregated mediation statistics (lower panel).

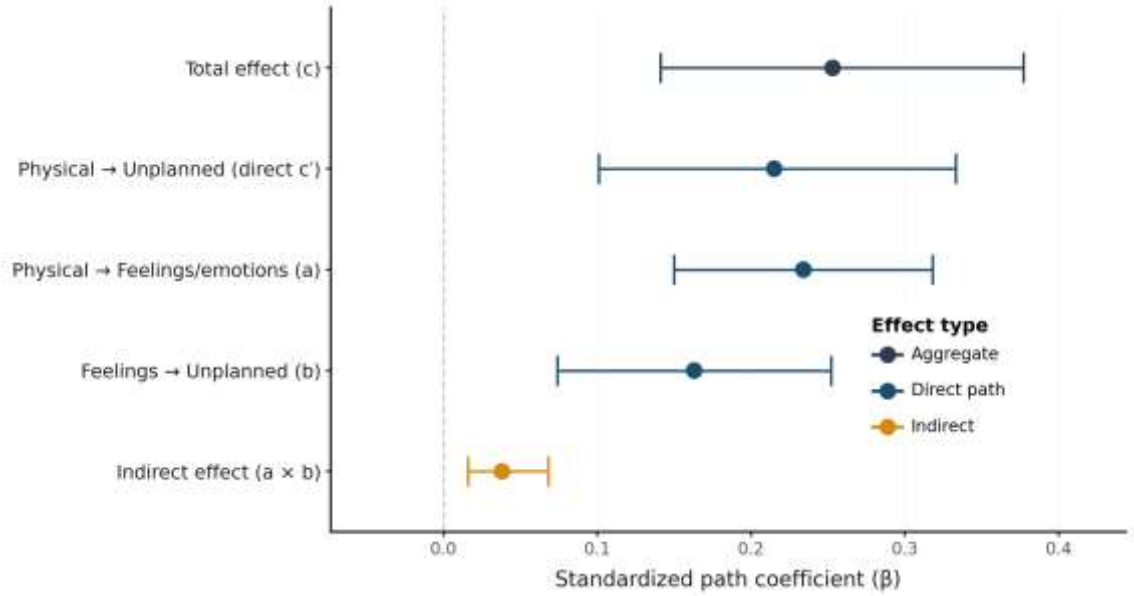

Figure 5: Forest Plot of Standardized Path Coefficients With 95% Bias-Corrected Accelerated Confidence Intervals.

Figure 6 presents the complete path diagram of the S-O-R model with standardized coefficients, indicator loadings, and explained variances.

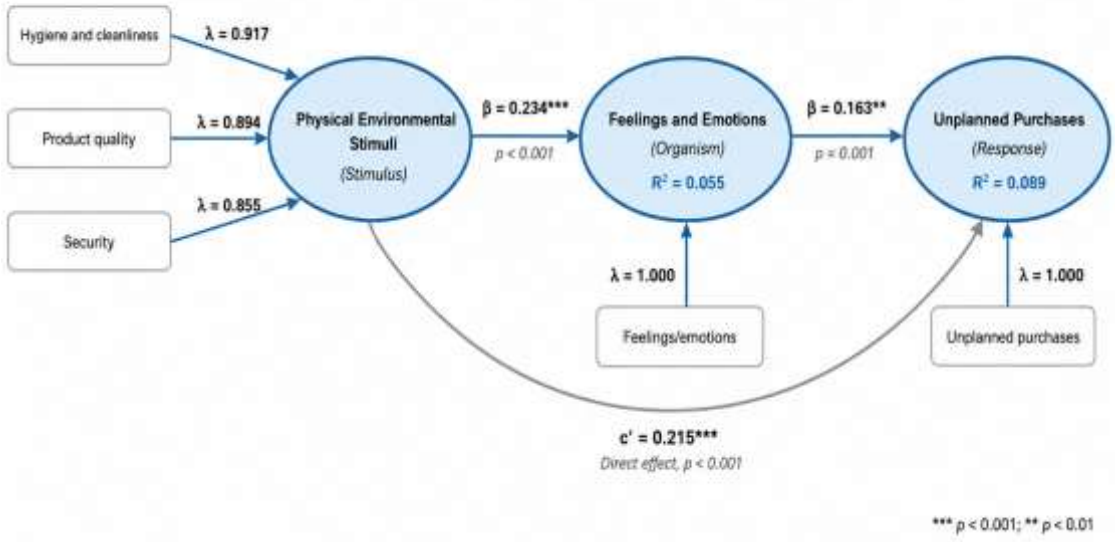

Figure 6: Path Diagram of the Hierarchical S-O-R Model with Standardized Coefficients, Indicator Loadings, And R^2 Values.

3.6. Mediation Analysis

The indirect effect of physical environmental stimuli on unplanned purchases through feelings and emotions was positive and statistically significant: βindirect = 0.038, SEboot = 0.013, 95% BCa CI [0.016, 0.068], p = 0.001. The total effect (the sum of the direct and indirect components) was βtotal = 0.253, 95% BCa CI [0.141, 0.377], p < 0.0004. The variance accounted for (VAF) statistic, computed as the ratio of the indirect to the total effect, was 15.1%, 95% BCa CI [6.4%, 34.3%]. Because both the direct effect (c′ = 0.215) and the indirect effect (a × b = 0.038) were significant and shared the same positive sign, the mediation is classified as complementary partial mediation (Hair et al., 2024).

The affective pathway therefore constitutes a statistically supported transmission mechanism, but it accounts for a minority share of the total association between physical environmental stimuli and unplanned purchases. Table 6 reports the formal decomposition of effects, and Figure 7 visualizes the three pathways.

Table 6:

Decomposition Of Direct, Indirect, And Total Effects with Bootstrap Inference and Variance Accounted For (VAF).

Effect	β	95% BCa CI	Interpretation
Direct effect (c')	0.215	[0.101, 0.333]	Significant; physical stimuli retain a direct association with unplanned purchases after controlling for the mediator
Indirect effect (a × b)	0.038	[0.016, 0.068]	Significant; affective states transmit a portion of the physical stimuli association
Total effect (c)	0.253	[0.141, 0.377]	Significant; sum of direct and indirect components
VAF	0.151	[0.064, 0.343]	Complementary partial mediation

Note: c' = direct effect of Physical Environmental Stimuli on Unplanned Purchases controlling for the mediator (Feelings and Emotions); a × b = product of path a (Physical Stimuli → Feelings/Emotions, β = 0.234) and path b (Feelings/Emotions → Unplanned Purchases, β = 0.163); VAF = variance accounted for = (a × b) / c = 0.038 / 0.253 = 0.151 (15.1%). Mediation classification: both direct and indirect effects are significant and share the same positive sign, indicating complementary partial mediation (Hair et al., 2024). Bootstrap: 5,000 BCa resamples.

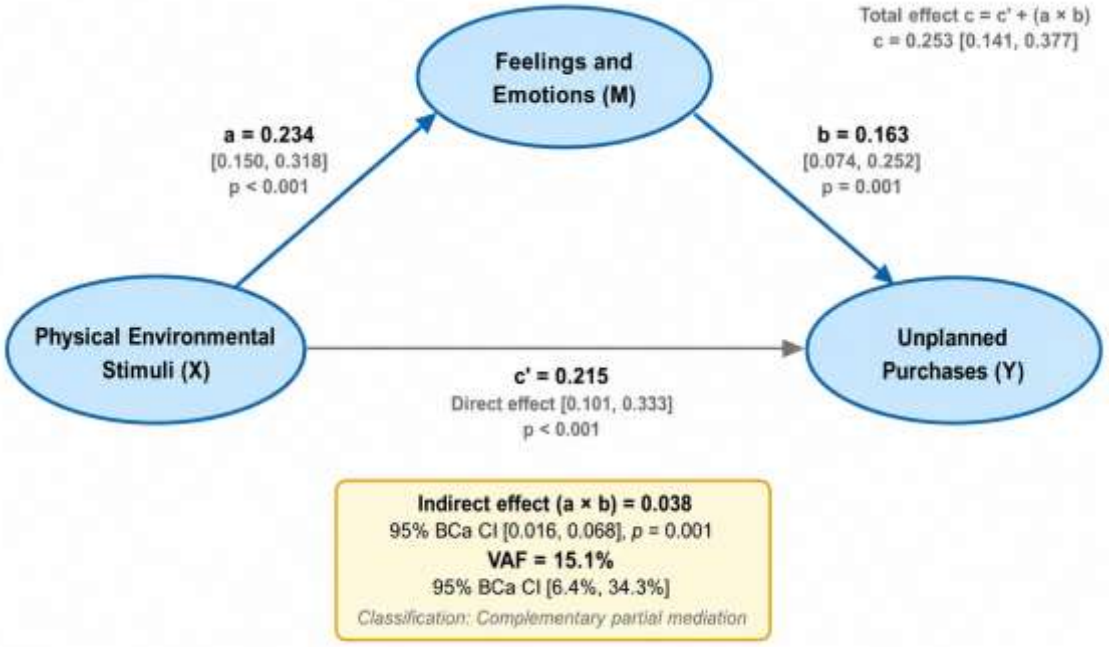

Figure 7: Mediation Pathway Diagram Showing Direct, Indirect, And Total Effects With 95% Bca Confidence Intervals.

3.7. Multigroup Analysis by Gender

The mediation pathway from feelings and emotions to unplanned purchases was estimated separately within the female (n = 309) and male (n = 240) subsamples to test whether gender moderates the affective mechanism. In the female subsample, the path coefficient was βF = 0.188, 95% BCa CI [0.067, 0.317], p = 0.002, with R^2 = 0.065 for unplanned purchases. In the male subsample, the path coefficient was βM = 0.130, 95% BCa CI [0.009, 0.263], p = 0.048, with R^2 = 0.105. Both within-group coefficients were positive and statistically significant. The between-group difference was Δβ = βF − βM = 0.058, 95% permutation CI [−0.119, 0.238], p = 0.520. The interaction term in the pooled model (feelings/emotions × female) was also non-significant, βinteraction = 0.029, p = 0.729. Neither test supports a statistically reliable moderation by

gender. Table 7 summarizes the multigroup results.

Table 7: Multigroup PLS-MGA Results: Gender Moderation of the Affective–Behavioral Pathway.

Group	n	β	95% BCa CI	p_boot	R^2 unplanned
Female	309	0.188	[0.067, 0.317]	0.002	0.065
Male	240	0.130	[0.009, 0.263]	0.048	0.105
Difference (F − M)	—	0.058	[−0.119, 0.238]	0.520	—

Note: Bootstrap with 5,000 BCa resamples within each subsample. Difference test computed via permutation (5,000 permutations). Pooled-model interaction term (Feelings/emotions × Female): β = 0.029, p = 0.729. Neither the permutation-based between-group difference nor the pooled interaction term reached statistical significance at α = 0.05. The null moderation result indicates no statistically reliable gender difference in the magnitude of the affective pathway. Both within-group coefficients are positive and significant, confirming that the affective mechanism operates in both subsamples, but its strength does not differ between women and men in this sample. Simple-slopes figure omitted per pre-specified analytical protocol (Section 2.6.6), which reserves graphical display for significant interactions only.

Consistent with the analytical protocol specified in Section 2.6.6, no simple-slopes figure is reported because the interaction term did not reach statistical significance. The presentation of separate within-group regression lines without a formal interaction test would not constitute valid evidence of moderation (Feng et al., 2024).

3.8. Predictive Validation Through Plspredict

Out-of-sample predictive performance was evaluated through 10-fold cross-validation repeated 10 times. The S-O-R composite model produced a root mean square error of RMSE = 0.962 and a mean absolute error of MAE = 0.639 in predicting the dependent variable. Compared against the naïve mean-constant benchmark (RMSE = 1.001, MAE = 0.695), the S-O-R model achieved lower prediction errors on both metrics, with Q^2predict = 0.077. The Q^2predict value is positive, indicating predictive relevance beyond the trivial benchmark, but its magnitude is modest. Compared against a standard linear-model benchmark, the S-O-R model produced identical RMSE and MAE values, reflecting the fact that the composite operationalization reduces to a linear structure under these measurement conditions. Table 8 reports the complete predictive validation results.

Table 8: Out-of-Sample Predictive Validation Through 10-Fold Cross-Validation (10 Repetitions).

Model	RMSE	MAE	Q^2predict
S-O-R composite model	0.962	0.639	0.077
Naïve benchmark (mean-constant)	1.001	0.695	0.000
Linear-model benchmark	0.962	0.639	0.077

Note: RMSE = root mean square error; MAE = mean absolute error; Q^2predict = 1 − (MSEmodel / MSEnaïve). Cross-validation: 10 folds repeated 10 times (100 holdout evaluations). The S-O-R composite model outperforms the naïve mean-constant benchmark on both RMSE (0.962 vs. 1.001) and MAE (0.639 vs. 0.695), confirming positive predictive relevance (Q^2predict > 0). The match with the linear-model benchmark (identical RMSE and MAE) reflects the fact that the composite operationalization with observed single-indicator constructs reduces to a linear structure. The model is characterized as having modest out-of-sample predictive relevance (Hair et al., 2024); it should be reported as a small-effect explanatory model rather than a strong predictive specification.

3.9. Summary Of Findings

Four empirical patterns emerge from the analyses. First, the bivariate ordering of associations with unplanned purchases is hierarchical: physical environmental stimuli (product quality r = 0.237, hygiene and cleanliness r = 0.225, security r = 0.212) occupy the top tier, traditional marketing variables (advertising r = 0.082, service quality r = 0.077, staff attention r = 0.028) occupy the bottom tier, and the magnitude difference between the two tiers ranges from a factor of approximately three to a factor of approximately eight. Second, the multi-indicator composite of physical environmental stimuli demonstrates strong reliability and validity (α = 0.867; CR = 0.919; AVE = 0.791; all HTMT < 0.85; all full collinearity VIF < 1.11), and the structural model produces three statistically significant paths confirmed by 5,000 BCa bootstrap resamples. Third, feelings and emotions constitute a statistically significant complementary partial mediator of the physical stimuli–unplanned purchases relationship, with an indirect effect β = 0.038, 95% BCa CI [0.016, 0.068], accounting for VAF = 15.1% of the total effect. Fourth, the model's explanatory and predictive power is modest in magnitude (R^2 = 0.089 for the dependent variable; Q^2predict = 0.077), and gender does not moderate the affective pathway (Δβ = 0.058, p = 0.520; interaction p = 0.729). These findings set the analytical stage for the interpretive integration developed in the following section.

4. DISCUSSION

The findings can be interpreted through four interconnected analytical movements that together

advance a hierarchical reading of the S-O-R framework. Each movement engages directly with the contemporary literature, integrates the methodological constraints of the present design as they become relevant, and prepares the synthesis developed at the end of the section.

4.1. The Hierarchical Inversion of the S-O-R Model

The first and most consequential finding concerns the magnitude ordering of the bivariate associations with unplanned purchases. Physical environmental stimuli—product quality (r = 0.237), hygiene and cleanliness (r = 0.225), and security (r = 0.212)—outranked the traditional marketing variables by a factor of three to eight: advertising (r = 0.082), service quality (r = 0.077), and staff attention (r = 0.028). Within the framework of the classical atmospherics' tradition (Kotler, 1973; Mehrabian and Russell, 1974), such a pattern would be theoretically incoherent: all environmental cues were assumed to contribute additively to the consumer's affective response, with no a priori ordering among them. The observed gradient suggests instead that the consumer is processing the environment through a hierarchical filter in which certain stimuli function as enabling conditions for the rest.

Why might this hierarchy emerge in Cúcuta? The most parsimonious explanation aligns with the systematic review of perceived risk advanced by Phamthi et al. (2024): in environments where institutional trust cannot be presumed, the consumer's primary cognitive task is the mitigation of uncertainty about personal safety, sanitary conditions, and product integrity. Until that uncertainty drops below a threshold, the affective and persuasive layers of the commercial atmosphere remain inert. This reading is consistent with Karahan and Şahin (2025), who demonstrated that atmospheric cues influence impulse purchases through hedonic browsing only when baseline utilitarian conditions are satisfactory. The implication is that the flat ensemble of "atmospherics" in stable retail environments dissolves into an ordered sequence in markets where the basic guarantees of physical security and hygiene must be actively signaled rather than assumed.

An alternative reading deserves scrutiny: the hierarchy could be an artifact of ceiling effects on the highly rated variables. Service quality (M = 4.86, SD = 0.57) and security (M = 4.64, SD = 0.97) display severe negative skew, raising the possibility that their constrained variance suppresses their bivariate correlations. This explanation, however, is incomplete on two grounds. First, security itself ranks in the top tier (r = 0.212) despite this ceiling effect, indicating that the variance compression is not sufficient to displace it from its position. Second, the relevant comparison is not between high-mean and low-mean variables but between two categories of stimuli—physical infrastructure versus persuasive marketing—both of which include items with substantial variance (e.g., hygiene SD = 1.03, advertising SD = 1.32). The hierarchical reading therefore survives a plausible alternative. The cross-sectional architecture of the study constrains the interpretive language: temporal precedence among variables cannot be established within the present design (Chetioui and El Bouzidi, 2023), and the findings should be understood as associational patterns consistent with the hierarchical hypothesis rather than as definitive demonstrations of temporal ordering.

4.2. Affective Mediation as a Complementary, Not Dominant, Mechanism

The second movement concerns the role of affective states in transmitting the influence of physical environmental stimuli onto unplanned purchases. The bootstrapped mediation analysis (5,000 BCa resamples) confirmed a statistically significant indirect pathway: βindirect = 0.038, 95% BCa CI [0.016, 0.068], with a variance-accounted-for of 15.1%. Both the direct effect (c' = 0.215) and the indirect effect were significant and shared the same positive sign, placing this pattern in the classical category of complementary partial mediation (Hair et al., 2024). The contemporary S-O-R literature converges on the position that environmental cues do not trigger unplanned purchases directly: they must pass through an affective state (Arianty et al., 2024; Xia et al., 2024). The present findings partially endorse this consensus and partially refine it. The affective channel is real, statistically supported, and operates as predicted; however, it accounts for only 15.1% of the total association between physical stimuli and unplanned purchases.

This partial transmission invites a theoretical integration with the dual-pathway framework. Cao et al. (2023), Lee et al. (2023), and He et al. (2026) argue that impulse purchases emerge from the interaction of two cognitive systems: a rapid affective response (System 1) and a slower deliberative evaluation (System 2) that monitors risk, budget constraints, and anticipated regret. The hierarchical S-O-R reading advanced here is structurally compatible with this dual-pathway logic. Physical environmental stimuli—specifically hygiene,

cleanliness, and security—operate as inputs to the System 2 risk appraisal: when the environment satisfies the cognitive threshold of trustworthiness, the deliberative brake is released, and the affective pathway (System 1) can activate the unplanned purchase. The 15.1% VAF should therefore not be interpreted as evidence that emotion is a marginal mechanism. It indicates that emotion is one of several channels through which the underlying trust appraisal exerts its influence; the residual direct effect (c′ = 0.215) likely captures the cognitive component—the deliberative satisfaction of safety conditions—that does not require affective mediation to translate into purchase behavior.

Two limitations bear directly on this interpretation. The affective construct was operationalized as a single self-reported indicator of feelings and emotions, which precludes the estimation of internal consistency reliability and may underrepresent the multidimensional structure of affect (pleasure, arousal, dominance) documented in the classical S-O-R literature (Mehrabian and Russell, 1974). Multi-item affective scales calibrated to the physical retail environment would likely produce a more granular mediation profile and could reallocate variance between the cognitive and affective channels. In addition, the magnitude of the variance explained in the dependent variable ($R^2 = 0.089$) sits below the conventional "weak effect" benchmark of 0.25 for PLS-SEM in consumer research (Hair et al., 2019), and the out-of-sample predictive relevance (Q^2predict = 0.077) is positive but modest. The model is best characterized as a small-effect explanatory specification of the trust–affect–behavior chain rather than as a high-prediction behavioral model.

4.3. Disconfirmation of the Persuasive Paradigm in Fragile-Trust Environments

The third movement addresses a finding that runs against several decades of impulse-buying scholarship. The variables most closely associated with the seller-centered persuasive tradition—staff attention (r = 0.028), social status (r = 0.058), product presentation (r = 0.056), and advertising (r = 0.082)—clustered at the bottom of the magnitude hierarchy and, in several cases, did not survive Holm–Bonferroni correction for multiple comparisons. The classical formulation of impulse buying as a process driven by salesperson interaction and persuasive communication (Beatty and Ferrell, 1998) predicts an opposite pattern: enjoyment of the shopping activity, mediated through interpersonal contact, should be one of the strongest correlates of unplanned acquisition. The present data do not support this expectation in the Cúcuta context.

A plausible explanation links this finding to the institutional context of the study. In a fragile-trust environment, the consumer's decision architecture appears to redirect interpretive weight away from the seller as a persuasive agent and toward the physical establishment as a guarantor of safety and authenticity. Schiffman and Wisenblit (2019) observed that the unplanned purchase is not an absence of rationality but a reordering of evaluation priorities; the present findings suggest that this reordering can be sufficiently severe to relegate interpersonal persuasion to a marginal role. The distinction articulated by Hussain et al. (2024) between automatic-affective impulse buying and reflective-cognitive unplanned buying is consequential here: the dependent variable in this study corresponds to the latter, and the reflective-cognitive process appears to be governed primarily by trust signaling rather than by persuasive interaction. The complementary literature on post-purchase dissonance (Beikverdi et al., 2024; Chetioui and El Bouzidi, 2023) adds a further consideration: in markets where consumers are exposed to elevated baseline uncertainty, persuasive interaction may even increase post-hoc cognitive dissonance, providing a behavioral disincentive that the present cross-sectional design cannot directly test but which deserves investigation in longitudinal follow-up studies.

The interpretation of these marginal associations requires methodological caution. The very low correlations and bounded variances of staff attention (M = 1.84, SD = 1.35) and social status (M = 2.20, SD = 1.41) reflect floor effects that constrain their statistical sensitivity; these variables may carry latent influence that is not detectable through the present instrument. Future research employing behavioral observation, eye-tracking, or transaction-level data would be needed to determine whether the persuasive paradigm is genuinely inert in this market or whether its effects operate below the resolution of self-report surveys.

4.4. The Cross-Border Emerging Market as a Theoretical Test Bed

The fourth movement reframes the geographic setting of the study not as a contextual descriptor but as a substantive theoretical asset. Cúcuta's binational conurbation generates a level of institutional heterogeneity that is structurally absent from the dominant empirical record of S-O-R impulse buying research, which concentrates on digital and high-income physical retail environments (Mandolfo and

Lamberti, 2021; Abbott et al., 2023; Dong and Tarofder, 2024). Utama et al. (2026), in their systematic review of impulse-buying research across Western and non-Western contexts, identified the scarcity of empirical evidence from cross-border emerging markets as a dominant void; Yang (2026) similarly called for context-contingent models that incorporate retail format and institutional setting. The present study contributes the first empirical test of the hierarchical S-O-R thesis within this specific configuration: a Latin American border conurbation with heterogeneous consumer flows, asymmetric institutional conditions, and a measurable need for trust signaling.

The multigroup analysis by gender yielded a null moderation finding ($\Delta\beta = 0.058$, $p = 0.520$; interaction term $p = 0.729$). Within this sample, the affective pathway operates with comparable strength among female and male respondents. This null result has interpretive value: it counters the prevalent assumption in the consumer behavior literature that gender systematically differentiates affective responsiveness to retail environments (Feng et al., 2024). The absence of moderation in a sample of 549 respondents from a fragile-trust market suggests that, when the cognitive trust threshold is the binding constraint, gender-based differences in affective expression may be attenuated by the shared cognitive baseline. This interpretation is preliminary and requires replication. The convenience sampling strategy, which restricts the sample to consumers present at high-traffic mall locations during the data collection window, constitutes the principal threat to generalizability for this finding and for the broader inferential structure of the study. The results should be understood as evidence from a specific consumer segment within the border market rather than as parameter estimates for the full population of Cúcuta mall visitors. The single-city design also limits the geographic transferability of the hierarchical S-O-R thesis; the model's portability to other Latin American border conurbations, to Southeast Asian or African emerging markets with comparable institutional features, and to economically heterogeneous urban centers within high-income economies requires direct empirical examination.

4.5. Synthesis And Directions for Future Research

The four movements converge on a single theoretical proposition. In emerging markets where institutional trust is fragile, the classical flat reading of atmospherics dissolves into an ordered structure in which physical environmental stimuli—specifically hygiene, cleanliness, and security—operate as trust preconditions that gate the activation of affective responses, which in turn partially mediate the translation of those preconditions into unplanned purchases. The persuasive paradigm centered on the seller loses traction in this context, not because consumers are insensitive to persuasion in principle, but because the cognitive prerequisites of safe and trustworthy commercial exchange absorb the interpretive weight that, in higher-trust environments, distributes more evenly across the atmospheric ensemble.

Several limitations have been addressed alongside the findings they affect; a brief consolidation is warranted for clarity. The cross-sectional design precludes causal inference, the convenience sample constrains generalizability, the single-indicator measurement of the affective and behavioral constructs limits the granularity of the mediation analysis, and the modest R^2 (0.089) and Q^2predict (0.077) characterize this as a small-effect explanatory specification rather than a strong predictive model. None of these limitations invalidates the hierarchical reading advanced here, but each defines the scope of the conclusions that can be drawn.

Three lines of future research follow from the present findings. First, longitudinal panel designs that measure environmental perceptions at one time point and actual purchase records at a subsequent point would address the temporal-ordering limitation and allow direct tests of the System 2 → System 1 sequence proposed in the dual-pathway integration. Second, the integration of neuroadaptive and biometric measurement methods—the research frontier identified by Qiao et al. (2026)—would allow the affective construct to be measured with substantially higher resolution than self-report Likert scales permit and would test whether the modest VAF observed here reflects the genuine partial nature of affective mediation or the limitations of single-item self-report measurement. Third, multi-site comparative designs across border conurbations in Latin America, Southeast Asia, and Africa would establish the boundary conditions of the hierarchical S-O-R thesis and determine whether the trust-precondition structure is a general feature of fragile-trust commercial environments or a configuration specific to the Cúcuta context. Complementary attention to post-purchase dissonance dynamics (Beikverdi et al., 2024) and to generational consumption shifts in cross-border emerging markets (Čuláková et al., 2025) would further enrich the theoretical synthesis offered here.

5. CONCLUSION

This study provides the first empirical evidence, from a binational Latin American border conurbation, that the Stimulus-Organism-Response model in shopping malls of fragile-trust emerging markets operates as a hierarchical rather than flat architecture: physical environmental stimuli—hygiene, cleanliness, and security—function as trust preconditions whose satisfaction enables, and partially transmits its effect through, the affective states that drive unplanned purchase behavior. The bootstrapped mediation analysis with 5,000 BCa resamples demonstrates that emotion is a real but complementary mechanism (VAF = 15.1%), not the dominant driver assumed by the classical persuasive tradition, and the marginal associations of advertising, social status, and staff attention indicate that, in institutionally fragile commercial environments, the architecture of physical wellbeing and security precedes and conditions the effectiveness of any affective or persuasive marketing strategy. The practical and theoretical implication is direct: in these markets, the trustworthiness signaled by the physical establishment is not one variable among many in the atmospheric ensemble but the cognitive precondition on which the entire S-O-R chain rests.

REFERENCES

Beatty, S. E., & Ferrell, M. E. (1998). Impulse buying: Modeling its precursors. *Journal of Retailing*, 74(2), 169–191. https://doi.org/10.1016/S0022-4359(99)80092-X

Cao, D., Sun, Y., Goh, E., Wang, R., & Kuiavska, K. (2023). Thinking fast and slow: A revised Stimulus–Organism–Response model for an empirical examination of impulse buying at a luxury fashion store. *European Journal of Marketing*, 57(9), 2381-2409. https://doi.org/10.1108/ejm-01-2022-0046

Castillo, A., Rescalvo-Martin, E., & Karatepe, O. M. (2025). How is common method bias addressed using partial least squares structural equation modeling in hospitality and tourism research? *Tourism Review*. https://doi.org/10.1108/TR-07-2025-0762

Chetioui, Y., & El Bouzidi, L. (2023). An investigation of the nexus between online impulsive buying and cognitive dissonance among Gen Z shoppers: Are female shoppers different? *Young Consumers*, 24(4), 447-463. https://doi.org/10.1108/YC-06-2022-1548

Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). John Wiley & Sons, New York.

Hair, J. F., & Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, 1(1), 100027. https://doi.org/10.1016/j.rmal.2022.100027

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Hair, J. F., Sarstedt, M., Ringle, C. M., Sharma, P. N., & Liengaard, B. D. (2024). Going beyond the untold facts in PLS–SEM and moving forward. *European Journal of Marketing*, 58(13), 81-106. https://doi.org/10.1108/EJM-08-2023-0645

Kerin, R. A., Hartley, S. W., & Rudelius, W. (2010). *Marketing* (10th ed.). McGraw-Hill/Irwin, New York.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, 11(4), 1–10. https://doi.org/10.4018/ijec.2015100101

Rajh-Weber, H., Huber, S. E., & Arendasy, M. (2025). A practice-oriented guide to statistical inference in linear modeling for non-normal or heteroskedastic error distributions. *Behavior Research Methods*, 57(1). https://doi.org/10.3758/s13428-025-02801-4

Ringle, C. M., Sarstedt, M., Sinkovics, N., & Sinkovics, R. R. (2023). A perspective on using partial least squares structural equation modelling in data articles. *Data in Brief*, 48, 109074. https://doi.org/10.1016/j.dib.2023.109074

Schiffman, L., & Wisenblit, J. (2019). *Consumer Behavior* (12th ed.). Pearson Education, New York.