

From Touch to Purchase: How Fabric Tactile Properties Drive Consumer Evaluations Through Cognitive and Emotional Pathways

Wen Zhang

How to cite: Zhang W. From Touch to Purchase: How Fabric Tactile Properties Drive Consumer Evaluations Through Cognitive and Emotional Pathways. Textile & Leather Review. 2026; 9:5468-5490. <https://doi.org/10.31881/TLR.2026.5468>

How to link: <https://doi.org/10.31881/TLR.2026.5468>

Published: 27 April 2026



From Touch to Purchase: How Fabric Tactile Properties Drive Consumer Evaluations Through Cognitive and Emotional Pathways

Wen Zhang

College of Finance and Economics, Minxi Vocational&Technical College, LongYan 364000, China
zhangwenyaya2936@sina.com

Article

<https://doi.org/10.31881/TLR.2026.5468>

Published 27 April 2026

ABSTRACT

This study investigates how tactile properties of functional apparel fabrics influence consumer purchase intentions through cognitive and emotional pathways, and whether these pathways differ across fabric types. In a between-subjects laboratory experiment, 450 participants (N = 150 per group) were randomly assigned to evaluate one of three fabric stimuli: soft-elastic nylon-spandex knit, structured-tech nylon woven shell, or thermal-brushed polar fleece. Participants rated tactile perceptions across five dimensions (softness, elasticity, smoothness, thickness, thermal feel), emotional comfort, cognitive performance evaluation, and purchase intention using validated 7-point Likert scales. Structural equation modeling yield good fit (CFI = .986, RMSEA = .035, SRMR = .085), with cognitive and emotional responses fully mediating the relationship between tactile inputs and purchase intention ($R^2 = .828$). Multi-group analysis demonstrated significant fabric type moderation: the cognitive pathway was stronger for Structured-tech ($\beta = .702$) than Soft-elastic ($\beta = .442$; $\chi^2 = 6.89$, $p = .009$), while the emotional pathway was stronger for Thermal-brushed ($\beta = .637$) than both Soft-elastic ($\beta = .322$, $p = .049$) and Structured-tech ($\beta = .344$, $p = .044$). These findings reveal that different fabric textures activate distinct consumer psychology routes, offering theoretical implications for sensory marketing literature and practical guidance for product design and retail merchandising strategies.

KEYWORDS

tactile perception, fabric hand feel, structural equation modeling, purchase intention, multi-group analysis, functional apparel, consumer psychology

INTRODUCTION

Touch is the only sense that is inherently bidirectional, as one cannot touch without being touched in return. In apparel consumption contexts, tactile interaction with fabrics constitutes a primary channel through which

consumers form product evaluations. When visual information is ambiguous or insufficient, haptic cues serve as diagnostic signals for quality inference, emotional comfort, and purchase decision-making [1,2]. Despite growing recognition of haptic marketing as a subfield within consumer psychology, the mechanisms linking specific tactile dimensions to downstream purchase behaviors remain inadequately theorized, particularly for heterogeneous functional fabric categories.

Functional apparel fabrics encompass a diverse material landscape, ranging from soft-elastic active wear knits to structured-tech outerwear shells and thermal-brushed insulating fleeces, each offering a distinct tactile fingerprint. These fabrics vary systematically across perceptual dimensions such as softness, elasticity, smoothness, thickness, and thermal feel. However, prior research has largely examined holistic tactile effects, failing to account for how fabric-specific textures engage distinct cognitive and emotional processing pathways. This gap is theoretically significant because, as dual-process theories of consumer behavior suggest, product evaluations can proceed through either rational, attribute-based routes or affective, experiential routes, with the relative dominance of these pathways potentially contingent upon the sensory properties of the stimulus itself [3,4].

Our study try to address three related gaps. First, whereas most prior research treats tactile perception as a unidimensional construct, we decompose it into five theoretically motivated dimensions and examine each dimension's independent contribution to cognitive and emotional outcomes. Second, we test a full structural mediation model in which functional cognition and emotional comfort jointly mediate the path from tactile inputs to purchase intention, allowing us to quantify the relative weight of each pathway. Third, we employ multi-group structural equation modeling to test whether these mediation structures vary across three objectively distinct fabric types — a question of direct relevance to product design and retail strategy[5].

Our findings contribute to the growing body of haptic marketing research by demonstrating that: (a) the tactile-to-purchase pathway is fully mediated by cognitive and emotional appraisals, (b) the cognitive pathway predominates for performance-signaling fabrics [6], while the emotional pathway predominates for comfort-signaling fabrics (Thermal-brushed), and (c) these pathway differences reached significance and of medium effect size. Practically, the results provide evidence-based guidance for fabric developers and apparel marketers seeking to align material properties with consumer decision-making processes.

LITERATURE REVIEW AND HYPOTHESES

Tactile Perception and Its Dimensions

The hand feel of a textile — the complex sensory impression formed through active and passive touch — has been studied for several decades across engineering, psychophysics, and consumer behavior. Early research established a multidimensional structure of textile hand, typically comprising softness (resistance to compression), smoothness (surface friction), and bulk or thickness [7,8]. Subsequent work extended this framework to include thermal properties [9] and elasticity [10], yielding the five-dimensional model adopted in the present study.

These dimensions are empirically distinct and not reducible to a single underlying factor. Softness and smoothness are correlated but separable, as are thickness and thermal feel, as a thick fleece fabric may register as warm, while a thick technical membrane may feel cool and rigid. Consumers' ability to discriminate among these dimensions is shaped by individual factors including age-related sensory decline [11], need for touch NFT, and material familiarity. Women have consistently been found to score higher than men on both instrumental and autotelic need for touch [12], indicating that gender moderates the intensity with which tactile information is encoded and used.

From Touch to Cognition: Tactile Cues and Performance Evaluation

A well-established literature demonstrates that haptic information serves as a diagnostic cue for inferring unobservable product quality attributes [13,14]. Allowing consumers to touch products improves product evaluation in categories where tactile input is diagnostic of substance properties such as texture, weight, and structural integrity. In the apparel domain, consumers actively use tactile cues including fabric weight, surface texture, and structural rigidity, as proxies for durability, technical performance, and material quality. This inference process is largely cognitive in nature, drawing on stored schemas linking material properties to functional value. Structured, dense fabrics with a firm hand feel tend to be associated with durability and technical reliability, while soft, drapery fabrics are more strongly linked to comfort and sensory appeal, regardless of objective performance specifications.

Among the five tactile dimensions, smoothness and thermal feel are theoretically expected to carry the greatest weight in cognitive performance evaluation, as they are most directly legible as signals of material processing quality and functional differentiation. Moreover, the strength of these associations is expected to

vary across fabric types: structural and performance-related cues are particularly salient for fabrics positioned as technical outerwear materials [13].

H1a: Among tactile dimensions, smoothness and thermal sensation will positively predict cognitive performance evaluations.

H1b: The relationship between tactile properties and cognitive evaluation will differ across fabric types, with structural cues being more diagnostic for performance-oriented fabrics.

From Touch to Emotion: Affective Responses to Texture

The affective dimension of haptic experience is well-documented. Warm, soft, and smooth textures reliably evoke positive hedonic valence and approach motivation, while cold, rough, or hard textures tend to elicit avoidance responses and lower affective comfort [15]. In the context of fabric evaluation, softness and thermal warmth are primary drivers of emotional comfort, that is, the subjective sense of bodily well-being arising from pleasant material contact. Consistent with that affective reactions can precede and operate independently of deliberate cognitive appraisal, emotional responses to textile touch are partly automatic, arising from low-level sensory features rather than elaborate inference[4].

Among the three fabric types studied here, thermal-brushed fleece characterized by high thickness, high thermal retention, and a plush surface is predicted to generate the strongest emotional response, as it combines the two primary affective drivers (softness and warmth) simultaneously. Soft-elastic fabric, while high on softness, lacks the thermal warmth dimension; structured-tech fabric is low on both, predicting weaker emotional outcomes.

H2a: Softness and thermal feel, in particular, will positively predict emotional comfort.

H2b: Thermal-brushed fleece will generate a stronger emotional pathway to purchase intention than either soft-elastic or structured-tech fabric, reflecting its combined softness and thermal warmth profile.

Dual Mediation and Purchase Intention

Building on the cognitive and emotional pathways reviewed above, this study proposes a dual mediation model in which tactile properties influence purchase intention exclusively through their effects on cognitive performance evaluation and emotional comfort, with no significant direct pathway remaining once both mediators are accounted for. This model is grounded in [1] integrative framework, which demonstrated that haptic diagnosticity shapes both cognitive and affective appraisals, which in turn drive behavioral intentions. Prior SEM studies in haptic marketing have consistently found full mediation through cognitive and affective

routes, with direct tactile-to-intention effects attenuating to non-significance once mediators are included in the model [5,6].

The relative weight of the two pathways is, however, theoretically expected to depend on fabric type. Cognitive evaluation is predicted to dominate for structured-tech fabric, given its strong performance-signaling cues, whereas emotional comfort is predicted to carry greater relative weight for thermal-brushed fabric, which elicits a more direct affective response.

H3: The influence of tactile properties on purchase intention is hypothesized to be fully transmitted through cognitive and emotional channels, with no remaining direct effects once both mediators are accounted for.

H4: Fabric type is expected to moderate the dual mediation pathways: the cognitive route will prevail for structured-tech fabrics, whereas the emotional route will dominate for thermal-brushed fabrics.

METHOD

Participants and Design

A total of 450 participants were recruited through a convenience-based sampling procedure in China. Initial recruitment was conducted via students, who invited adult friends and family members to participate, resulting in a sample spanning multiple age cohorts.

Participants were assigned to evaluate one of three fabric stimuli ($n = 150$ per group) in a quasi-random manner based on the order of participation during data collection. The sample comprised 241 women (53.6%) and 209 men (46.4%), with a mean age of 32.58 years ($SD = 7.91$, range = 18–57). Group comparisons indicated no reliable differences in gender and need-for-touch scores (all $p > .20$; see Table 1). However, a remarkable difference in age was observed across groups ($F(2,447) = 85.53$, $p < .001$), reflecting recruitment patterns rather than experimental manipulation. To assess the potential impact of this imbalance, a supplementary SEM including age as a covariate was conducted (see Section 5.4). The core mediation structure remained substantively unchanged, indicating that the main findings are robust to this variation. Descriptive statistics for the full sample and by experimental group are presented in Table 1.

Fabric Stimuli

Three fabric stimuli were selected to represent distinct functional apparel categories, with technical specifications verified against manufacturer documentation.

Soft-elastic (SE): A matte warp-knit four-way stretch fabric composed of 82% nylon and 18% spandex (210 g/m², 160 cm width; yarn specification: 40D × 75D). The fabric featured a smooth, full-dull surface without brushing or coating. This material is representative of activewear and compression garment fabrics.

Structured-tech (ST): A high-density plain-weave nylon fabric composed of 100% polyamide (130 g/m², 148 cm width; density: 290T; yarn specification: 70D × 200D), finished with a durable water-repellent (DWR) treatment. The fabric exhibited no elastic stretch and presented a moderately firm hand feel typical of lightweight outerwear shells.

Thermal-brushed (TB): A double-brushed polar fleece fabric composed of 100% polyester (310 g/m², 165 cm width; specification: 150D/144F). The fabric featured a knitted construction with a double-sided brushed surface, producing a soft, plush, thermally insulating hand feel.

Measures

Fabric swatches (10 cm × 10 cm) were cut from the same production batch and presented without visual or branding information. Data collection took place from April to October in 2025 and spanned different seasons. During this time, participants evaluated the sample for 120 seconds at constant room temperature and humidity. There is no statistical evidence that the time of data collection (season) significantly affects the results of our study, thus ruling out the potential interference of seasonal factors.

All items were measured on 7-point Likert scales (1 = strongly disagree / very low, 7 = strongly agree / very high).

Tactile perception (5 items, manipulation check). Five items assessed the five core tactile dimensions [8], [9],[10]: softness (“This fabric feels soft to the touch”), elasticity (“This fabric feels stretchy and resilient”), smoothness (“The surface of this fabric feels smooth”), thickness (“This fabric feels thick”), and thermal feel (“This fabric feels warm to the touch”).

Cognitive performance evaluation (4 items, $\alpha = .87$). Items assessed perceptions of functional value and technical performance: suitability for sports (PV2), high-performance appearance (PV3), technical reliability (PV4), and felt durability (PV5). Following standard practice, items were z-scored and averaged into a composite index.

Emotional comfort (4 items, $\alpha = .81$). Items assessed affective responses to fabric touch: physical comfort (EC1), relaxation (EC2), pleasantness (EC3), and bodily comfort (EC4). Items were z-scored and averaged [17].

Purchase intention (3 items, $\alpha = .82$). Items assessed willingness to purchase apparel from the fabric (PI1), recommendation willingness (PI2), and willingness to pay a premium (PI3), adapted from . A composite index and individual items (buy1–buy3) were used in analyses[16].

Need for Touch (6 items, $\alpha = .79$). The NFT scale measured instrumental (NFT1–NFT3) and autotelic (NFT4–NFT6) touch motivation. The composite NFT score served as a control variable[5] .

Analytical Strategy

Analyses were conducted in Stata 17. Preliminary analyses included descriptive statistics, Pearson correlations, independent-samples t-tests, one-way ANOVA, and chi-square tests to characterize the sample and verify randomization. Regression models examined demographic predictors of key outcomes.

Prior to the structural model, measurement quality was evaluated through a confirmatory factor analysis (CFA) of the three-latent-variable model (Cognition, Emotion, Purchase). Internal reliability was assessed with Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Discriminant validity was examined by comparing the square root of each construct's AVE to inter-construct correlations [18], and through competitive model comparisons (three-factor vs. two-factor vs. one-factor). Common method bias was assessed using single-factor test[19] .

The primary structural equation model was specified with maximum likelihood estimation using Stata SEM command. The measurement model included three latent variables: Cognition (indicators: func1- func4), Emotion (indicators: emo1- emo4), and Purchase (indicators: buy1-buy3). The structural model specified paths from five observed tactile dimensions to the two latent mediators, from the two mediators to the Purchase latent variable, and direct paths from tactile dimensions to Purchase. Model fit was evaluated using χ^2/df , RMSEA with 90% confidence interval and pclose, CFI, TLI, and SRMR. Mediation was formally tested using bootstrapped indirect effects (500 replications) with bias-corrected percentile confidence intervals.

Multi-group SEM was then estimated with ginvariant(none), allowing all parameters to vary freely across the three fabric groups. Pairwise group differences in specific path coefficients were tested using Wald chi-square tests and lincom for confidence intervals. Effect sizes for path differences were computed as Cohen's q ($= \text{atanh}(r_1) - \text{atanh}(r_2)$), with $|q| < .10$ interpreted as negligible, $.10 - .30$ as small, $.30 - .50$ as medium, and $> .50$ as large [20].

RESULTS

Preliminary Analyses and Manipulation Check

Table 1 presents sample characteristics by group. Age was the only demographic variable to differ significantly across groups by design ($F = 85.53, p < .001$), with Soft-elastic participants being substantially younger ($M = 36.71$) than Structured-tech ($M = 35.41$) and Thermal-brushed ($M = 35.63$) participants. Gender, income, education, and NFT scores were balanced across groups.

Table 1. Sample Characteristics by Fabric Group

Variable	Category	Soft-elastic n(%)	Structured-tech n(%)	Thermal-brushed n(%)	$\chi^2/F (p)$
Gender	Female	87 (58.0%)	79 (52.7%)	75 (50.0%)	$\chi^2=2.00 (.368)$
	Male	63 (42.0%)	71 (47.3%)	75 (50.0%)	
Age group	18–24	54 (36.0%)	8 (5.3%)	17 (11.3%)	$\chi^2=117.60 (<.001)$
	25–34	84 (56.0%)	58 (38.7%)	48 (32.0%)	
	35–44	12 (8.0%)	72 (48.0%)	66 (44.0%)	
	45+	0 (0.0%)	12 (8.0%)	19 (12.7%)	
Age (mean±SD)		26.71±5.08	35.41±6.62	35.63±8.17	$F=85.53 (<.001)$
NFT score (mean±SD)		4.26±0.61	4.31±0.58	4.23±0.53	$F=0.71 (.490)$

Note. SE = Soft-elastic; ST = Structured-tech; TB = Thermal-brushed. $p^* < .05, p^{**} < .01, p^{***} < .001$.

Table 2 presents the manipulation check results. The three fabric groups differed substantially on all five tactile dimensions, confirming successful experimental differentiation. Soft-elastic fabric received the highest ratings on softness ($M = 6.32$) and elasticity ($M = 6.15$), Thermal-brushed received the highest ratings on thickness ($M = 6.83$) and thermal feel ($M = 6.81$), and Soft-elastic received the highest smoothness rating ($M = 6.09$). Structured-tech fabric was rated lowest on softness, elasticity, and thickness, consistent with its dense, non-stretch construction.

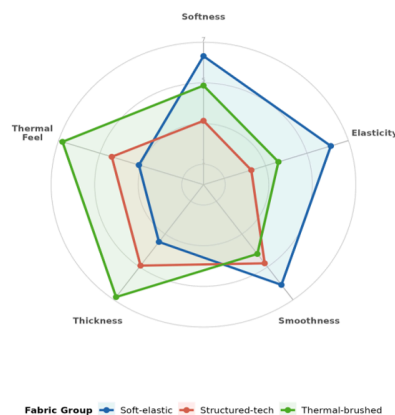


Figure 1. Tactile Dimension Profiles by Fabric Group

Table 2. Tactile Perception Means by Fabric Group (7-point Likert scale)

Dimension	Soft-elastic M(SD)	Structured-tech M(SD)	Thermal-brushed M(SD)	Overall M(SD)	Pattern
Softness	6.32 (0.93)	2.51 (0.67)	5.56 (0.93)	4.80 (1.85)	SE>TB>ST
Elasticity	6.15 (0.92)	2.20 (0.57)	3.89 (0.78)	4.08 (1.79)	SE>TB>ST
Smoothness	6.09 (0.90)	4.65 (0.82)	4.99 (0.81)	5.24 (1.04)	SE>TB>ST
Thickness	4.05 (0.71)	2.52 (0.56)	6.83 (0.41)	4.47 (1.87)	TB>SE>ST
Thermal feel	2.97 (0.64)	3.93 (0.76)	6.81 (0.41)	4.57 (1.74)	TB>ST>SE

Note. SE = Soft-elastic; ST = Structured-tech; TB = Thermal-brushed. All between-group differences were statistically significant (ANOVA F-values > 150, $p < .001$ for all dimensions).

Correlations and Demographic Effects

Table 3 presents the Pearson correlation matrix for key study variables. The five tactile dimensions showed varied intercorrelations: softness and elasticity were highly correlated ($r = .747, p < .001$), as were thickness and thermal feel ($r = .739, p < .001$), while thermal feel was negatively correlated with elasticity ($r = -.268, p < .001$). Among the mediators, cognitive and emotional composites were moderately correlated ($r = .394, p < .001$), and both were significantly associated with the purchase intention composite (cognition: $r = .833$; emotion: $r = .668$, both $p < .001$). Smoothness was the tactile dimension most consistently associated with both mediators.

Table 3. Pearson Correlation Matrix for Key Study Variables

Variable	1	2	3	4	5	6	7	8
1. Softness	—							
2. Elasticity	.747*	—						
3. Smoothness	.410*	.535*	—					
4. Thickness	.548*	.239*	.036	—				
5. Thermal feel	.078	-.268*	-.265*	.739*	—			
6. Cognition (z)	.061	.095*	.223*	-.005	.052	—		
7. Emotion (z)	.197*	.133*	.268*	.014	-.001	.394*	—	
8. Purchase (z)	.178*	.149*	.287*	-.003	.030	.833*	.668*	—

Note. * $p < .05$. N = 450.

Preliminary regression analyses confirmed several demographic associations. Women scored marginally but non-significantly higher than men on NFT ($t(448) = 1.41, p = .160$). Age predicted thermal feel ratings ($\beta = .363, p < .001$) and elasticity perceptions negatively ($\beta = -.428, p < .001$), consistent with literature on age-related tactile sensitivity shifts [11]. Income significantly predicted purchase intention, with higher-income participants expressing greater willingness to purchase ($\beta = 1.344, p < .001$) and pay a premium ($\beta = 1.786, p < .001$). Education predicted cognitive evaluation scores ($\beta = 1.902, p < .001$) and functional value ratings ($\beta = 1.809, p < .001$), suggesting that graduate-educated respondents applied more differentiated performance criteria.

Measurement Validation

Prior to structural estimation, a stand-alone CFA was conducted to assess the quality of the three-factor measurement model. Table 8 compares three nested model specifications. The hypothesized three-factor model fit the data well: $\chi^2(41) = 46.24, p = .265$; RMSEA = .017 [90% CI: .000, .038], $p_{close} = .998$; CFI = .998; TLI = .998; SRMR = .022 — representing an excellent fit across all indices. Collapsing Cognition and Emotion into a single factor produced dramatically worse fit ($\chi^2(43) = 864.14, p < .001$; RMSEA = .207; CFI = .735; LR test $\Delta\chi^2(1) = 33.67, p < .001$), and the one-factor model was similarly rejected. This competitive comparison confirms that the three constructs are empirically distinguishable.

Table 8. CFA Model Comparison

Model	$\chi^2(df)$	p	RMSEA	CFI	TLI	SRMR
Three-factor (hypothesized)	46.24 (41)	.265	.017	.998	.998	.022
Two-factor (Cognition+Emotion merged)	864.14 (43)	<.001	.207	.735	.686	.188
One-factor (all merged)	897.81 (44)	<.001	.212	.724	.672	.194
LR test: 3-factor vs. 2-factor	$\Delta\chi^2(1) = 33.67, p < .001$					

Note. Three-factor model is the hypothesized model with Cognition, Emotion, and Purchase as separate latent variables.

Table 9 presents reliability and convergent validity indices. All three constructs exceeded the threshold criteria recommended [21]: Cronbach's alpha ranged from .862 to .893 (all > .70); composite reliability (CR) ranged from .85 to .89 (all > .70); average variance extracted (AVE) ranged from .65 to .67 (all > .50). These values collectively indicate strong internal consistency and satisfactory convergent validity.

Table 9. Reliability and Convergent Validity Indicators

Construct	α	CR	AVE	$\sqrt{\text{AVE}}$	Threshold
Cognition (func1–func4)	.893	.89	.67	.82	All > inter-construct r \checkmark
Emotion (emo1–emo4)	.883	.88	.65	.81	All > inter-construct r \checkmark
Purchase (buy1–buy3)	.862	.85	.66	.81	All > inter-construct r \checkmark
Threshold	> .70	> .70	> .50	>	r

Note. α = Cronbach’s alpha; CR = composite reliability; AVE = average variance extracted; $\sqrt{\text{AVE}}$ = square root of AVE. All thresholds based on [21] and [18].

Table 10 presents the Fornell-Larcker criterion matrix for discriminant validity [3]. The square root of each construct’s AVE (diagonal) exceeded all inter-construct correlations (off-diagonal), confirming that each latent variable shares more variance with its own indicators than with other constructs. The highest inter-construct correlation was between Cognition and Purchase ($r = .80$), which remained below Cognition’s $\sqrt{\text{AVE}}$ of .82.

Table 10. Fornell-Larcker Discriminant Validity Matrix

	Cognition	Emotion	Purchase
Cognition	.82 ($\sqrt{\text{AVE}}$)		
Emotion	.47 (r)	.81 ($\sqrt{\text{AVE}}$)	
Purchase	.80 (r)	.67 (r)	.81 ($\sqrt{\text{AVE}}$)

Note. Diagonal entries are the square root of AVE; off-diagonal entries are inter-construct correlations. Discriminant validity is supported when diagonal values exceed all values in the same row and column.

Common method single-factor test . An exploratory factor analysis of all 11 measurement items revealed two factors with eigenvalues greater than 1.0. The first factor accounted for 52.85% of the total variance[21]. While this value exceeds the conservative 50% threshold often cited in methodological literature, this criterion is widely considered a liberal indicator rather than a definitive test. More importantly, the second factor (eigenvalue = 1.99) distinctly captured the Emotion construct items (factor loadings ranging from 0.550 to 0.584), clearly separating them from Cognition and Purchase items and confirming a multi-factor solution. These results suggest that common method bias does not pose a serious threat to the validity of the observed construct relationships.

Overall Structural Equation Model

The pooled-sample SEM was estimated with all 450 observations.

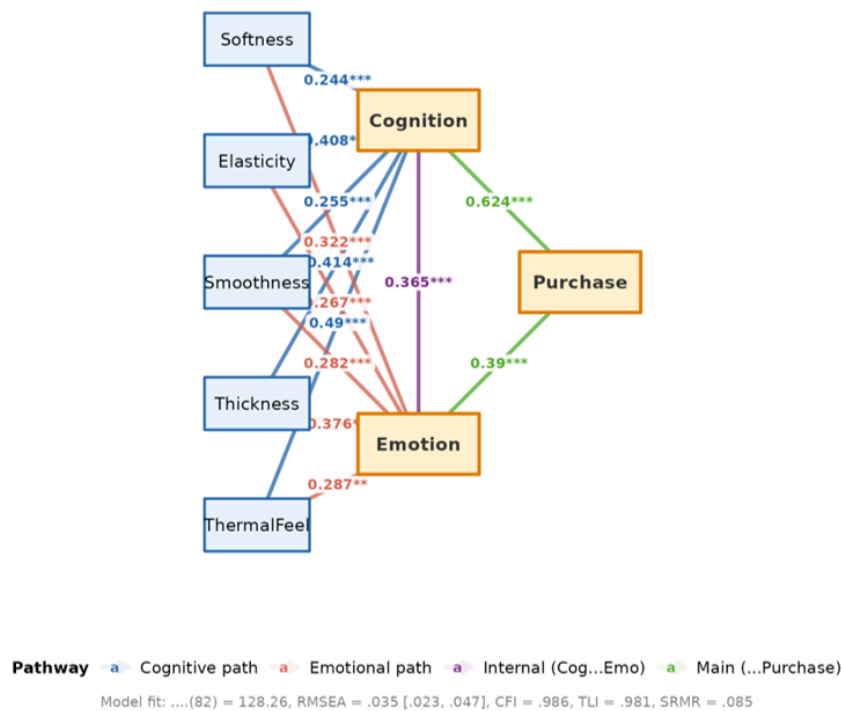


Figure 2. Structural Path Model of Fabric Tactile Properties on Purchase Intention (Notion: ** p < 0.01, *** p < 0.001. Non-significant direct paths omitted.)

Table 4 presents global fit statistics, and Table 5 presents standardized path coefficients.

Table 4. Overall SEM Model Fit Statistics

Fit Index	Value	Acceptable threshold	Good fit criterion
χ^2/df	128.26/82 = 1.56	< 5.0	< 2.0
RMSEA	.035	< .08	< .05
90% CI for RMSEA	[.023, .047]	—	—
pclose (RMSEA ≤ .05)	.983	—	> .50
CFI	.986	> .90	> .95
TLI	.981	> .90	> .95
SRMR	.085	< .10	< .08
AIC	18010.79	Lower is better	—
BIC	18216.26	Lower is better	—

The model fits well across all indices: $\chi^2(82) = 128.26$, $p = .001$; RMSEA = .035 [90% CI: .023, .047], pclose = .983; CFI = .986; TLI = .981; SRMR = .085. All factor loadings were significant (range: .773–.854 for Purchase indicators; .799–.854 for Cognition; .809–.816 for Emotion), providing support for construct validity.

Table 5. Standardized Path Coefficients — Pooled SEM Model (N = 450)

Path	β	SE	z	p	95% CI
Tactile → Cognition					
Softness	.040	.089	0.45	.652	[-.134, .213]
Elasticity	.126	.087	1.45	.148	[-.045, .296]
Smoothness	.255	.055	4.61	<.001	[.147, .364] ***
Thickness	-.414	.104	-4.00	<.001	[-.617, -.211] ***
Thermal feel	.490	.094	5.22	<.001	[.306, .673] ***
Tactile → Emotion					
Softness	.322	.086	3.72	<.001	[.152, .491] ***
Elasticity	-.078	.087	-0.90	.370	[-.248, .092]
Smoothness	.282	.055	5.15	<.001	[.175, .389] ***
Thickness	-.376	.103	-3.64	<.001	[-.579, -.174] ***
Thermal feel	.287	.096	2.99	.003	[.099, .475] **
Latent → Purchase					
Cognition → Purchase	.747	.031	24.28	<.001	[.687, .807] ***
Emotion → Purchase	.433	.039	11.10	<.001	[.357, .510] ***
Direct: Tactile → Purchase (all n.s.)					
Softness	.112	.060	1.89	.059	[-.004, .229]

Note. $p < .05$, $p < .01$, $p < .001$. All coefficients are standardized.

In the structural portion of the model, smoothness ($\beta = .255$, $p < .001$) and thermal feel ($\beta = .490$, $p < .001$) were the strongest positive predictors of cognitive evaluation, while thickness exerted a significant negative effect ($\beta = -.414$, $p < .001$). For emotional comfort, softness ($\beta = .322$, $p < .001$), smoothness ($\beta = .282$, $p < .001$), and thermal feel ($\beta = .287$, $p = .003$) were significant positive predictors, with thickness again negative ($\beta = -.376$, $p < .001$). Both mediators strongly predicted Purchase intent: cognitive evaluation ($\beta = .747$, $p < .001$) and emotional comfort ($\beta = .433$, $p < .001$). Critically, all direct paths from tactile dimensions to Purchase were non-significant (all $p > .05$), supporting a full mediation structure consistent with Hypothesis 3.

Bootstrap Mediation Analysis

To formally test the mediation structure identified in the pooled SEM, bootstrapped indirect effects were estimated using 5,000 resamples. Table 11 presents the results. The indirect effect of Cognition on Purchase via Emotion was significant ($b = .143$, Boot SE = .026, 95% percentile CI [.098, .196]), confirming that the emotional pathway constitutes a genuine mediating mechanism. The direct effect of Cognition on Purchase remained substantial and significant ($b = .623$, 95% CI [.536, .705]), indicating partial mediation rather than full mediation through the single Emotion path modelled here. The indirect effect accounted for 18.7% of the

total effect, while the direct cognitive path retained predominance. This finding aligns with the pooled SEM results, in which the cognitive route ($\beta = .747$) substantially exceeded the emotional route ($\beta = .433$).

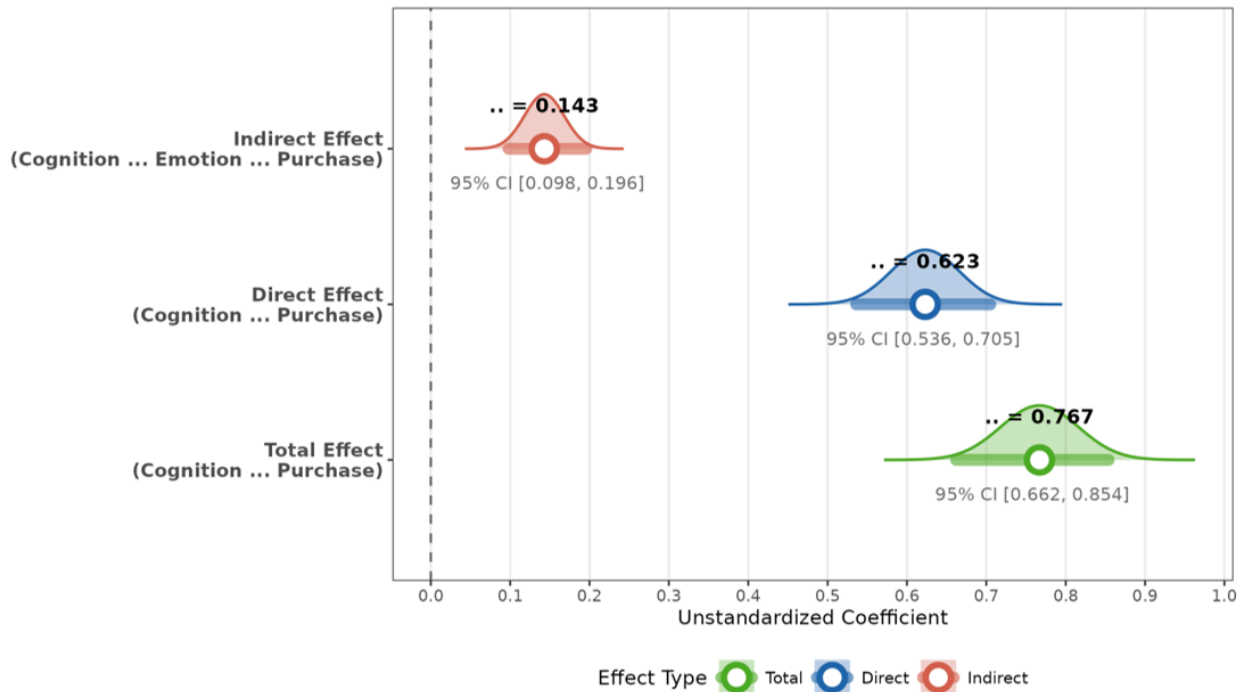


Figure 3. Bootstrap Indirect Effect Analysis (500 Replications) (Notation: Points .. refers to estimates; thick bars refer to 95% percentiles CI; shaded area refer to sampling distribution)

These bootstrap results complement the full mediation finding from the five-predictor SEM, where direct tactile-to-purchase paths were uniformly non-significant, by clarifying the internal structure of the cognitive to purchase relationship: while emotion partially mediates this link, the cognitive appraisal pathway has a substantial component that operates independently of emotional response. Taken together, both sets of results confirm that tactile input affects purchase intention only through higher-order evaluation processes, cognitive or affective, with no evidence of a direct sensory-purchase effect. While the overall model supports full mediation of tactile inputs through cognitive and emotional pathways, the relationship between cognition and purchase intention exhibits partial mediation via emotion. This distinction reflects different levels of analysis within the model and does not constitute a contradiction.

Table 6. Bootstrap Indirect Effect Analysis (500 replications)

Effect	b	Boot SE	z	p	95% CI (P)	Interpretation
Indirect effect (via Emotion)	.143	.026	5.59	<.001	[.098, .196]	Significant mediation
Direct effect (Cognition→Purchase)	.623	.045	13.85	<.001	[.536, .705]	Partial mediation
Total effect	.767	.050	15.28	<.001	[.662, .854]	
Indirect/Total ratio	18.7%					Partial mediation confirmed

Note. b = unstandardized coefficient; Boot SE = bootstrap standard error; CI (P) = bias-corrected percentile confidence interval. Bootstrap model: Cognition → Emotion → Purchase, controlling for demographic covariates.

Multi-group SEM: Pathway Differences by Fabric Type

The multi-group model with ginvariant(none) was estimated to allow all parameters to vary across the three fabric groups. The model achieved acceptable fit: $\chi^2(246) = 290.72, p = .027$, indicating some statistically detectable misfit relative to the saturated model but acceptable practical fit given the three-group, unconstrained parameterization. Table 6 presents structural path coefficients for each group, and Table 7 presents effect size estimates for pairwise pathway differences.

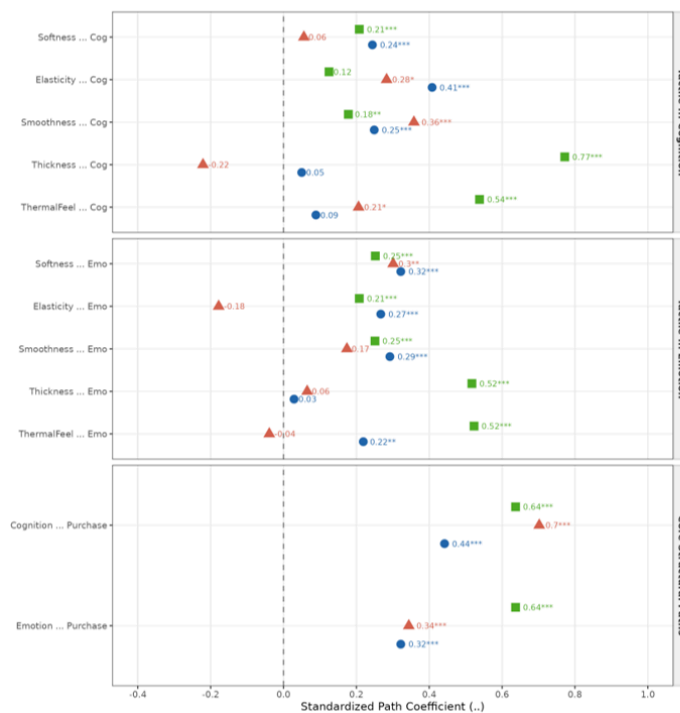


Figure 4. Multi-group Standardized Path Coefficients (Notion * p < 0.05, ** p < 0.01, *** p < 0.001.)

Table 7. Multi-group SEM Structural Path Coefficients by Fabric Type

Path	Soft-elastic β	Structured-tech β	Thermal-brushed β	Sig.	Pairwise Wald tests
Cognition → Purchase	.442***	.702***	.637***	✓	SE<ST: $\chi^2=6.89$, $p=.009$; SE<TB: $\chi^2=2.36$, $p=.124$; ST≈TB: $\chi^2=0.27$, $p=.602$
Emotion → Purchase	.322***	.344***	.637***	✓	SE≈ST: $\chi^2=0.05$, $p=.821$; SE<TB: $\chi^2=3.88$, $p=.049$; ST<TB: $\chi^2=4.05$, $p=.044$
Softness → Cognition	.244***	.056 n.s.	.208***		
Elasticity → Cognition	.408***	.283*	.125 n.s.		
Smoothness → Cognition	.249***	.358***	.178**		
Thickness → Cognition	.050 n.s.	-.221 n.s.	.772***		
Thermalfeel → Cognition	.089 n.s.	.206*	.538***		
Softness → Emotion	.445***	.301**	.252***		
Elasticity → Emotion	.267***	-.178 n.s.	.208***		
Smoothness → Emotion	.292***	.174 n.s.	.251***		
Thickness → Emotion	.029 n.s.	.065 n.s.	.517***		
Thermalfeel → Emotion	.219**	-.039 n.s.	.523***		

Note. SE = Soft-elastic (n = 150); ST = Structured-tech (n = 150); TB = Thermal-brushed (n = 150). $p < .05$, $p < .01$, $p < .001$. Wald tests use lincom. n.s. = not significant.

Table 8. Effect Sizes (Cohen’s q) for Between-group Path Differences

Comparison	Cognition→Purchase q	p	Emotion→Purchase q	p
Soft-elastic vs. Structured-tech	.397 (medium)	.009	.025 (negligible)	.821
Soft-elastic vs. Thermal-brushed	.278 (small)	.124	.419 (medium)	.049
Structured-tech vs. Thermal-brushed	.118 (negligible)	.602	.394 (medium)	.044

Note. Cohen’s q = $|\text{atanh}(\beta_1) - \text{atanh}(\beta_2)|$. Benchmarks: $< .10$ = negligible; $.10-.30$ = small; $.30-.50$ = medium; $> .50$ = large (Cohen, 1988).

Cognitive pathway. The cognitive route was significantly stronger for Structured-tech ($\beta = .702$) than Soft-elastic ($\beta = .442$; $\Delta\beta = -.259$, $z = -2.62$, $p = .009$; $|q| = .397$), representing a medium effect size and supporting Hypothesis 4. The cognitive pathway for Thermal-brushed ($\beta = .637$) was intermediate and did not differ significantly from either Soft-elastic ($p = .124$) or Structured-tech ($p = .602$).

Emotional pathway. The emotional route was significantly stronger for Thermal-brushed ($\beta = .637$) than for Soft-elastic ($\beta = .322$; $\Delta\beta = -.315$, $z = -1.97$, $p = .049$; $|q| = .419$) and Structured-tech ($\beta = .344$; $\Delta\beta = -.293$,

$z = -2.01$, $p = .044$; $|q| = .394$), both with medium effect sizes, supporting Hypothesis 2b. No meaningful difference was observed between Soft-elastic and Structured-tech on the emotional pathway ($p = .821$).

Tactile-to-mediator paths. The paths from tactile dimensions to the two mediators also exhibited fabric-type specificity. For Soft-elastic fabric, softness ($\beta = .445$, $p < .001$) and elasticity ($\beta = .408$, $p < .001$) emerged as the strongest cognitive predictors, reflecting a texture profile dominated by stretch and plush properties. For Structured-tech fabric, smoothness ($\beta = .358$, $p < .001$) dominated the cognitive path, consistent with the fabric's dense, planar weave structure. For Thermal-brushed fabric, thickness ($\beta = .772$, $p < .001$) and thermal feel ($\beta = .538$, $p < .001$) were the strongest predictors of both cognitive and emotional mediators, aligning with the fabric's primary functional identity as a warming insulator.

DISCUSSION

Full Mediation and the Dual Pathway Structure

The finding that all direct paths from tactile properties to purchase intention were non-significant provides strong support for a full mediation account of haptic consumer behavior. Consumers do not directly convert tactile sensations into purchase decisions; rather, they first construct cognitive appraisals of performance value and affective appraisals of emotional comfort, which together explain the vast majority of variance in purchase intention ($\text{var}(e.\text{Purchase}) = .172$, implying approximately 82.8% explained variance in the pooled model). This finding aligns with Ranaweera' (2021) framework and extends it by demonstrating dual mediation with five tactile inputs and a three-latent-variable outcome model [1].

The cognitive pathway ($\beta = .747$) was substantially stronger than the emotional pathway ($\beta = .433$) in the pooled model, suggesting that performance evaluation is the primary route through which tactile experience influences purchase decisions for functional apparel overall. This contrasts with findings from luxury or hedonic product categories, where emotional and aesthetic pathways typically dominate [22,23]. Functional apparel is positioned primarily on performance grounds, and consumers appear to process tactile information through a performance-evaluation lens.

Fabric-Type Moderation: Distinct Activation Routes

The multi-group results reveal that the aggregate pattern conceals important fabric-type heterogeneity. The Structured-tech fabric generated the strongest cognitive pathway ($\beta = .702$), consistent with the hypothesis that performance-signaling textures recruit systematic, attribute-based processing. This fabric's tactile profile

(firm, crisp, non-stretchy, moderately cool) arguably functions as a physical embodiment of technical performance cues, activating schemas about durability, water-resistance, and structural integrity. The finding that smoothness was the dominant tactile predictor of cognitive evaluation for Structured-tech further supports this interpretation, as the DWR finish creates a distinctive surface quality that consumers may associate with high-performance coatings.

The Thermal-brushed fabric produced the most pronounced emotional pathway ($\beta = .637$), and the difference from both other groups reached medium effect size. This fabric's tactile profile (warm, thick, soft, and plush) maps directly onto the attributes most strongly associated with positive affective responses in the touch literature. Warmth and softness are among the most reliably hedonically positive tactile qualities, and their simultaneous presence in the fleece may have produced an amplified emotional response. Importantly, the emotional pathway for Thermal-brushed was equivalent in magnitude to its cognitive pathway ($\beta = .637$ vs. $.637$), suggesting that this fabric type uniquely activates parallel rather than sequential processing routes. The Soft-elastic fabric showed the weakest cognitive pathway, perhaps because stretch fabrics are familiar to consumers as everyday activewear materials, reducing the novelty-driven cognitive elaboration that might otherwise occur. Its emotional pathway was intermediate, consistent with the fabric's pleasant but not exceptionally distinctive tactile profile.

Dimension-Level Insights

The finding that thickness exerted a strong negative effect on both cognitive evaluation ($\beta = -.414$) and emotional comfort ($\beta = -.376$) in the pooled model deserves attention. At first glance, this appears inconsistent with the notion that thermal-brushed fleece (the thickest fabric) produced positive outcomes. The resolution lies in statistical control: when all five dimensions are simultaneously entered, thickness's negative coefficient reflects the fact that, holding thermal feel constant, greater thickness per se may signal heaviness or bulk rather than comfort or performance. The strong positive effect of thermal feel ($\beta = .490$ for Cognition, $\beta = .287$ for Emotion) in the pooled model is consistent with the thermal-brushed fabric's distinctive profile, and in the fabric-specific models, thickness was a strong positive predictor for Thermal-brushed participants, for whom thickness and warmth are conceptually intertwined.

Smoothness was the most cross-fabric-consistent positive predictor of cognitive evaluation, reflecting its role as a proxy for material quality and processing refinement. This finding has practical implications: fabric

finishing treatments that improve surface smoothness (DWR coatings, calendaring, anti-pilling treatments) may enhance perceived performance value independently of other tactile properties.

The higher thermal feel rating for Structured-tech ($M = 3.93$) relative to Soft-elastic ($M = 2.97$) should be interpreted with the scale midpoint (4.0) in mind: both fabrics were perceived as cool to neutral, with Structured-tech being less cool rather than actively warm. This difference is consistent with established principles of contact thermal transfer. Initial cool/warm perception (i.e., thermal feel rating) is conceptually linked to the maximum transient heat flux (Q_{max}) at the skin–fabric interface, as established in [24]. The Soft-elastic knit, due to its higher conformability to skin topography, tends to increase effective contact and is associated with greater initial heat flux, producing a cooler sensation. In contrast, the Structured-tech fabric presents a more rigid and less conformable interface, which may reduce effective contact and slow initial heat transfer, resulting in a relatively higher thermal feel rating. It should be noted that the present measure of thermal feel captures immediate contact sensation rather than broader thermal performance during wear. Functional properties such as moisture-wicking and thermoregulation, which are particularly relevant for elastic knit fabrics, may shape cognitive evaluations in extended use contexts and warrant further investigation.

Demographic Moderators

To assess whether the age imbalance across groups threatened the validity of the mediation results, a supplementary SEM was estimated that added age as a direct predictor of all three latent variables. The core mediation structure was robust: age had no significant effect on Cognition ($\beta = .001$, $p = .863$) or Emotion ($\beta = -.004$, $p = .407$), and its effect on Purchase was marginal and non-significant at the conventional threshold ($\beta = -.005$, $p = .075$). The model fit remained good ($\chi^2(49) = 54.47$, $p = .274$), and the latent path coefficients (Cognition→Purchase: .624; Emotion→Purchase: .390) were virtually unchanged from the main model. This robustness check confirms that age differences across groups do not confound the primary findings.

The absence of a significant gender difference in NFT in this sample is worth noting, given that prior research has found female advantage in tactile need for touch [11]. The overall mean NFT score ($M = 4.26$) suggests a moderately touch-engaged sample, and the small gender difference observed ($t = 1.41$, $p = .160$) may reflect sampling characteristics or cultural context.

Limitations and Future Directions

Several limitations should be acknowledged. First, the experimental setting required participants to evaluate fabric swatches in isolation without the contextual information (garment design, brand, price) that accom-

panies real purchase decisions. Future research should examine whether the mediation structure identified here replicates in more naturalistic retail settings or online environments where touch is absent.

Second, the age distribution across groups was uneven due to the convenience-based recruitment procedure, which may limit causal inference regarding age-related differences in pathway strength. Although supplementary analyses controlling for age indicated that the core mediation structure remained robust, future studies with age-balanced designs could further disentangle the independent effects of fabric type and age. Additionally, the sample did not include consumers over the age of 60, which may limit the generalizability of the findings to older populations with potentially different tactile sensitivities and consumption patterns. Third, while the multi-group SEM showed acceptable fit, the LR test against the saturated model was significant ($p = .027$), indicating some model misspecification that may be addressed in future research by incorporating additional covariates or interaction terms. Fourth, all data were collected in a single session with a single rater, precluding test-retest reliability assessment. Longitudinal designs could examine whether tactile-based purchase intentions translate into actual purchase behavior.

Future research might also extend the present framework to digital touch interfaces (haptic feedback devices, fabric simulation technology), which are increasingly used in e-commerce contexts to compensate for the absence of physical touch. The dual pathway model developed here could serve as a theoretical anchor for understanding how simulated tactile cues map onto cognitive and emotional consumer responses.

CONCLUSIONS

This study provides one of the first demonstrations that the relationship between tactile fabric properties and consumer purchase intention is fully mediated by cognitive performance evaluation and emotional comfort, and that this dual mediation structure is significantly moderated by fabric type. For functional apparel, the cognitive route is primary in the aggregate, but performance-oriented fabrics strengthen it further, while comfort-oriented fabrics amplify the emotional pathway to comparable magnitude.

These findings carry actionable implications. For fabric developers, the results identify which tactile dimensions are most important for each pathway: smoothness and thermal feel for cognitive activation, softness and warmth for emotional activation. For apparel marketers, the fabric-type-specific pathway profiles suggest that advertising copy and in-store sensory merchandising should emphasize performance cues for technical outerwear and affective comfort cues for thermal insulating products. For retail design, allowing customers

to handle fabrics before purchase — rather than relying solely on visual and brand cues — may be particularly important for performance-oriented fabrics where tactile diagnosticity feeds the dominant cognitive pathway. More broadly, the study contributes to haptic marketing theory by demonstrating that touch-to-purchase pathways are not uniform across product categories but depend systematically on the tactile signature of the material itself. The next challenge for this field is to identify the boundary conditions of this moderation and to develop tactile profiles that can be matched to consumer segments by their dominant processing style.

REFERENCES

- [1] Ranaweera AT, Martin BA, Jin HS. What you touch, touches you: The influence of haptic attributes on consumer product impressions. *Psychology & Marketing*. 2021 Jan;38(1):183-95. doi: 10.1002/mar.21433
- [2] McCabe DB, Nowlis SM. The effect of examining actual products or product descriptions on consumer preference. *Journal of Consumer psychology*. 2003 Jan 1;13(4):431-9. doi: 10.1207/S15327663JCP1304_10
- [3] Epstein S. Integration of the cognitive and the psychodynamic unconscious. *American psychologist*. 1994 Aug;49(8):709. doi: 10.1037/0003-066X.49.8.709
- [4] Zajonc RB. Feeling and thinking: Preferences need no inferences. *American psychologist*. 1980 Feb;35(2):151. doi: 10.1037/0003-066X.35.2.151
- [5] Kawabata S. The standardization and analysis of hand evaluation. 2nd ed. Osaka: Textile Machinery Society of Japan; 1980.
- [6] Cardello AV, Winterhalter C, Schutz HG. Predicting the handle and comfort of military clothing fabrics from sensory and instrumental data: development and application of new psychophysical methods. *Textile Research Journal*. 2003 Mar;73(3):221-37. doi: 10.1177/004051750307300306
- [7] Li Y, Wong ASW, editors. Clothing biosensory engineering. Cambridge: Woodhead Publishing; 2006 Apr 24. doi: 10.1201/9781439824276.ch18
- [8] Kyzymchuk O, Melnyk L. Stretch properties of elastic knitted fabric with pillar stitch. *J Eng Fibers Fabr*. 2018;13(4). doi: 10.1177/1558925018820722
- [9] Drewing K. Perceptuo-affective organization of touched materials in younger and older adults. *Plos one*. 2024 Jan 22;19(1):e0296633. doi: 10.1371/journal.pone.0296633
- [10] Peck J, Childers TL. To have and to hold: The influence of haptic information on product judgments. *Journal of marketing*. 2003 Apr;67(2):35-48. doi: 10.1509/jmkg.67.2.35.18612
- [11] Workman JE. Fashion consumer groups, gender, and need for touch. *Clothing and textiles research Journal*. 2010 Apr;28(2):126-39. doi: 10.1177/0887302X09356323
- [12] Klatzky RL, Lederman SJ. Multisensory texture perception. In: Goldstein EB, editor. *Encyclopedia of perception*. Thousand Oaks: SAGE; 2010. p. 611-4. doi: 10.1007/978-1-4419-5615-6_12
- [13] Peck J, Wiggins J. It just feels good: Customers' affective response to touch and its influence on persuasion. *Journal*

- of Marketing. 2006 Oct;70(4):56-69. doi: 10.1509/jmkg.70.4.56
- [14] Grohmann B, Spangenberg ER, Sprott DE. The influence of tactile input on the evaluation of retail product offerings. *Journal of Retailing*. 2007 Apr 1;83(2):237-45. doi: 10.1016/j.jretai.2006.09.001
- [15] Hertenstein MJ, Keltner D, App B, Bulleit BA, Jaskolka AR. Touch communicates distinct emotions. *Emotion*. 2006 Aug;6(3):528. doi: 10.1037/1528-3542.6.3.528
- [16] Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*. 1981 Feb;18(1):39-50. doi: 10.1177/002224378101800104
- [17] Harman HH. *Modern factor analysis*. 3rd ed. Chicago: University of Chicago Press; 1976.
- [18] Cohen J. *Statistical power analysis for the behavioral sciences*. routledge; 2013 May 13. doi: 10.4324/9780203771587
- [19] Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. *European business review*. 2019 Jan 14;31(1):2-4. doi: 10.1108/EBR-11-2018-0203
- [20] Dodds WB, Monroe KB, Grewal D. Effects of price, brand, and store information on buyers' product evaluations. *Journal of marketing research*. 1991 Aug;28(3):307-19. doi: 10.1177/002224379102800305
- [21] Spence C, Puccinelli NM, Grewal D, Roggeveen AL. Store atmospherics: A multisensory perspective. *Psychology & Marketing*. 2014 Jul;31(7):472-88. doi: 10.1002/mar.20709
- [22] Hirschman EC, Holbrook MB. Hedonic consumption: emerging concepts, methods and propositions. *Journal of marketing*. 1982 Jul;46(3):92-101. doi: 10.1177/002224298204600314
- [23] Kim J, Bang H, Campbell WK. Brand awe: A key concept for understanding consumer response to luxury and premium brands. *The Journal of Social Psychology*. 2021 Mar 4;161(2):245-60. doi: 10.1080/00224545.2020.1804313
- [24] Pac MJ, Bueno MA, Renner M, El Kasmi S. Warm-cool feeling relative to tribological properties of fabrics. *Textile Research Journal*. 2001 Sep;71(9):806-12. doi: 10.1177/004051750107100910