

EXPLORING FUNCTIONAL EXPECTATIONS AND PERFORMANCE FEATURES OF SPORTSWEAR AMONG SPORTSWEAR USERS

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ABSTRACT:

This research investigates the functional expectations and additional features of sportswear as perceived by sportswear users in Mumbai and Mumbai Suburbs. Over time, sportswear has evolved significantly—from basic athletic garments to sophisticated apparel designed to enhance performance, comfort, and self-assurance. Contemporary sportswear users prioritize sportswear that meets essential functional criteria such as durability, breathability, moisture management, flexibility, lightweight construction, and thermal regulation. In addition, there is increasing interest in advanced attributes including ultraviolet (UV) protection, antimicrobial and antiviral finishes, odour control, and resistance to staining. To examine these preferences, primary data was gathered from 160 individuals actively participating in diverse sporting activities such as gym training, running, cricket, and walking. Structured questionnaires were employed to assess respondents' expectations regarding both performance-oriented and technologically enhanced or aesthetically appealing features of sportswear. The analysis indicates that while conventional functional aspects remain fundamental to athletic performance, there is a notable shift toward health-conscious and innovation-driven features that reflect contemporary sporting lifestyles. These findings offer valuable insights for sportswear designers and manufacturers seeking to address region-specific and specialized consumer demands, thereby contributing to the development of apparel that aligns with evolving user expectations and enhances overall athletic experience.

Keywords: Sportswear, Functional Expectations, Additional Features.

INTRODUCTION:

In recent years, sportswear has undergone a significant transformation, evolving from basic athletic attire into a vital element that enhances both performance and comfort for sportswear users. The integration of advanced textile technologies, ergonomic tailoring, and personalized design features has elevated sportswear to a central role in contemporary sports culture. Today's sportswear users seek apparel that not only supports their physical exertion but also aligns with their psychological well-being and aesthetic preferences. This shift is particularly evident in India, where the growing emphasis on fitness and athleticism has spurred innovation within the sportswear industry. As a result, understanding the expectations of sportswear users—especially in dynamic regions like Mumbai and Mumbai suburbs—has become increasingly important for stakeholders aiming to meet the evolving demands of this segment.

The functional expectations of sportswear users primarily revolve around performance-enhancing attributes such as breathability, moisture-wicking capability, flexibility, durability,

and effective temperature regulation. These features are critical in optimizing athletic output, minimizing fatigue, and preventing injuries during training and competition. For example, garments designed to maintain thermal balance or provide muscle support can significantly improve endurance and recovery. Recognizing these core requirements enables manufacturers to tailor sportswear to the specific needs of various sporting disciplines. However, functionality alone no longer suffices. Sportswear users are increasingly drawn to additional features that extend beyond performance—such as smart technology integration, sustainable materials, ease of maintenance, and visual appeal. These elements contribute to the athlete's sense of identity, confidence, and professionalism, making them essential considerations in sportswear design and selection.

Mumbai and Mumbai suburbs presents a compelling context for this research due to its diverse athletic population and expanding sports infrastructure. Their insights offer a valuable suggestion into the preferences of sportswear users in semi-urban and urban environments. This study aims to analyze both the functional and supplementary features of sportswear as perceived by these individuals, with attention to variables such as sport type, gender, age, and competitive level. The findings are expected to enhance product development and marketing strategies for sportswear brands, enabling them to better align their offerings with localized consumer expectations. Furthermore, the research contributes to academic discourse on consumer behavior in the Indian sportswear market, ultimately recommending strategies to bridge the gap between athlete needs and industry provisions.

REVIEW OF LITERATURE

Functionality & Performance

Physiological comfort is fundamental to sportswear performance, shaping endurance, recovery, and user satisfaction. Research shows that fibre type, fabric structure, and finishes critically influence functionality. Synthetic fibres such as polyester, nylon, and elastane offer durability, elasticity, and quick drying, while cotton, wool, modal, and Tencel provide softness and breathability. Blends and seamless constructions enhance moisture management and thermal regulation. Functional finishes, including moisture-wicking agents, antimicrobial coatings, UV protection, and phase change materials (PCMs), further improve comfort and performance. However, issues of wash durability, sustainability, and user-perceived comfort remain, highlighting the need for multifunctional, adaptive, and eco-responsible innovations (Navalgund & Dedhia, 2025). Claussen et al. (2021) underscore the multidimensional nature of sportswear quality, noting that athletes evaluate apparel not only based on tangible attributes such as breathability and durability but also through intangible factors including comfort, visual appeal, and brand perception. This perspective emphasizes the importance of integrating both objective performance metrics and subjective user experiences in sportswear design. Textile malodour in sportswear arises from microbial activity and chemical interactions with sweat, leading to unpleasant odours and reduced garment appeal. These processes involve complex interactions between skin microbiota, fabric, and perspiration, making odour control a key area for functional innovation in sportswear (Van Herreweghen et al., 2020). Building on this, Bajpai et al. (2021) highlight the intricate relationship between physiological, ergonomic, biochemical, and psychological elements in the development of functional athletic apparel. Their research demonstrates that technical textiles can significantly enhance athletic performance by providing moisture management, flexibility, muscle support, and overall comfort—particularly when customized to meet individual user requirements. Collectively, these studies advocate for a comprehensive design approach that harmonizes functional efficiency with emotional and psychological satisfaction, thereby addressing the evolving expectations of modern athletes.

Technological Innovation

Tang et al. (2025) showcased the potential of AI-integrated textile strain sensors in capturing biomechanical data for real-time fitness monitoring. Their study positions smart sportswear as a pivotal innovation in enhancing training efficiency and reducing injury risk, emphasizing the growing necessity for intelligent systems that align with the dynamic needs of athletes. Complementing this, Cheng et al. (2022) employed long short-term memory (LSTM) neural networks to investigate the impact of tight-fitting sportswear on comfort during physical activity. Their findings reveal that comfort perception is fluid, shaped by factors such as fabric pressure, moisture accumulation, and thermal regulation. This research supports the advancement of adaptive apparel technologies capable of responding to real-time physiological fluctuations, thereby reinforcing the role of smart textiles in personalized athletic performance.

Inclusivity & User-Centric Design

Sportswear fabrics, while often praised for their moisture-wicking abilities, frequently fail to deliver consistent thermal comfort, as users report sensations of heaviness, clinginess, and overheating in warm conditions, with only moderate satisfaction in colder climates. These shortcomings highlight the urgent need for technological innovation in fabric design to align with consumer expectations and performance demands. Emerging approaches such as nanotechnology finishes, smart textiles, and advanced fiber engineering are increasingly being explored to enhance breathability, temperature regulation, durability, and sustainability (Navalgund and Dedhia, 2025). Beyond material science, research emphasizes the role of inclusivity and personalization in sportswear innovation. For instance, there is potential of combining finite element analysis, 3D body scanning, and athlete participation in the design of a Paralympic shooting jacket, achieving an effective balance of function, aesthetics, and expressive qualities. Their findings illustrate how user-centered design not only improves comfort but also enhances confidence and performance among adaptive athletes (Hobbs Murphy et al., 2024). Similarly, a narrative review (Sports Medicine–Open, 2022) underscored the importance of thermoregulation and moisture management in hot environments, recommending that advanced textile technologies be integrated with sensory evaluations to improve endurance under heat stress. Together, these insights emphasize that future innovations must merge material performance with inclusive, user-focused design.

RESEARCH GAP

Current literature on sportswear innovation largely emphasizes global advancements and generalized athlete populations, focusing on comfort, quality attributes, and functional performance of materials (Cheng et al., 2022; Claussen et al., 2021; Bajpai et al., 2021). While valuable, these studies often overlook localized preferences, regional climatic influences, and cultural practices shaping apparel choices. Moreover, limited attention is given to how functional attributes such as breathability, flexibility, and temperature regulation interact with aesthetics, brand perception, and psychological comfort at semi-professional and grassroots levels. This reveals a critical research gap, highlighting the need for region-specific investigations among sportswear users.

RESEARCH METHODOLOGY

Research Design

The study employed a descriptive research design to systematically examine the preferences and expectations of sportswear users regarding sportswear in the Mumbai and Mumbai

suburbs. This approach was chosen to capture detailed insights into user perceptions, functional requirements, and psychological drivers influencing apparel selection.

Sampling Technique and Participants

A purposive sampling method was utilized to ensure the inclusion of individuals actively engaged in diverse physical activities. The sample comprised 300 respondents, distributed across various sports disciplines including gym workouts, running, cricket, walking, and other physical activities. The demographic profile included male ($n = 218$) and female ($n = 82$) participants.

Data Collection Instrument and Analysis

Data were collected using a structured questionnaire, designed to assess both functional expectations—such as durability, moisture-wicking capability, and temperature regulation—and additional features including UV protection, odour control, and antimicrobial finishes. The reliability was tested using Cronbach's Alpha to ensure relevance and clarity. The collected data was analyzed using frequency distribution, mean ranking, and Friedman Chi-square test to identify significant differences in expectations and to rank the importance of both functional and advanced features of sportswear.

Rationale and Scope

This methodological framework facilitated a comprehensive exploration of both performance-driven and psychological determinants influencing sportswear preferences among sportswear users in the Mumbai and Mumbai suburbs. The insights derived from the study hold significant relevance for apparel designers, marketers, and manufacturers seeking to develop products that resonate with the specific needs and expectations of end users.

Data Analysis

The analysis draws upon data collected from a purposively selected sample of 300 sportswear users actively participating in a range of physical activities. The distribution of respondents across disciplines—gym workouts (32.3%), running (24.3%), cricket (14%), walking (22.3%), and other forms of exercise (7%)—reflects the diversity of athletic engagement in the region. The demographic profile reveals a predominance of male participants (72.7%) and a significant representation of youth, with 45% of respondents under the age of 25 years followed by 25.7% aged 26–35 years. This age highlights the growing interest in fitness and sports among younger populations in urban and semi-urban contexts. The following sections present and interpret the findings related to functional expectations and additional features of sportswear, highlighting key trends, preferences, and implications for product development and consumer engagement.

Demographic Profile and Activity Patterns

The demographic analysis reveals a pronounced gender disparity among respondents, with 72.7% ($n = 218$) identifying as male and 27.3% ($n = 82$) as female, indicating a higher male engagement in physical activities within the surveyed population. Age-wise, the data reflects a youth-centric trend: 45% of participants were aged up to 25 years, followed by 25.7% in the 26–35 age group, 15.7% between 36–45 years, and 10.7% in the 46–60 bracket. Only 3% were above 60 years, suggesting that younger individuals are more actively involved in sports and fitness routines.

In terms of activity preference, gym workouts emerged as the most favored form of exercise, accounting for 32.3% of responses. This was followed by running (24.3%), walking (22.3%), and cricket (14.0%), while 7% engaged in other physical activities such as yoga, dance, or

recreational sports. The frequency of sportswear usage further emphasizes the integration of fitness into daily life: a substantial majority (78.3%) reported wearing sportswear daily, while 12% used it three to five times per week. Only 7.7% and 2% respondents each wore sportswear one to two times weekly or occasionally, reflecting a strong alignment between active lifestyles and consistent apparel usage

RELIABILITY TEST

Reliability testing ensures a measurement tool consistently delivers accurate outcomes over time. In survey research, it confirms that instruments capture intended constructs without significant error by assessing the internal consistency of questionnaire items to verify they collectively measure the same underlying concept.

Table No. 1:

Reliability test using Cronbach's Alpha

Sr. No.	Variable Name	No. of statements	Cronbach's Alpha Value	Results
1.	Functional expectation	9	0.834	Accepted. The scale is valid and reliable.

As presented in Table 1, the Cronbach's Alpha values for all variables included in the study exceed the threshold of 0.700, indicating a high level of internal consistency. This statistical benchmark confirms that the items within each construct are reliably correlated and suitable for further analysis. Consequently, the reliability test validates the use of the Likert scale in the questionnaire, affirming its robustness and acceptability for capturing respondents' perceptions and expectations.

Functional expectation of the Sportswear by users

Table 2 exhibits the functional priorities of sportswear users associated with sportswear, based on their responses across key performance features.

Table No. 2:

Functional expectation of the sportswear

Sr. No.	Feature	Poor	Fair	Moderate	High	Excellent
1	Durability	42	65	20	102	71
2	Breathability	124	35	29	87	25
3	Moisture-wicking	83	60	20	99	38
4	Flexibility/ Stretchability	97	62	12	111	18
5	Lightweight Design	47	56	9	135	53
6	Temperature Regulation	106	50	6	102	36
7	Style/Design	37	131	103	25	4
8	Brand Reputation	49	73	11	99	68
9	Reasonable Price	22	86	42	83	67

The survey results highlight the varying importance of different attributes in sportswear selection. Durability ranked high, with 34% expecting high and 24% excellent performance, confirming longevity as a priority. Lightweight design also showed strong demand, with 45% rating it high and 18% excellent, reflecting the value placed on comfort and ease of movement. Flexibility/stretchability was valued by 37% (high) and 6% (excellent), though 32% rated it poor or fair, suggesting uneven satisfaction. Moisture-wicking attracted 33%

high and 13% excellent responses, yet 28% rated it poor, highlighting unmet expectations in sweat management. Breathability showed the weakest outcome, with 41% rating it poor and only 29% rating high or excellent, emphasizing ventilation as a major gap. Similarly, temperature regulation faced challenges, with 35% poor and 17% fair ratings, though 34% still demanded high or excellent performance. Style/design appeared secondary, with 44% choosing fair or moderate expectations, and only 10% high or excellent, suggesting consumers prioritize function over fashion. Brand reputation remained influential, with 33% high and 23% excellent expectations, reinforcing trust in established labels. Price sensitivity was evident, with 28% high and 22% excellent, reflecting consumer demand for affordable yet quality products. Collectively, these findings highlight durability, lightweight design, and brand reputation as strengths, while breathability and temperature regulation require urgent improvement.

This study investigates whether sportswear users exhibit specific functional expectations from their sportswear. To test this, a hypothesis-driven approach was adopted using the **Friedman Test**.

- **Null Hypothesis H_{01} :** There are no specific functional expectation for the sportswear among sportswear users in Mumbai and Mumbai suburbs.
- **Alternate Hypothesis H_{11} :** There are specific functional expectation for the sportswear among sportswear users in Mumbai and Mumbai suburbs.

Table No. 3:

Statistical analysis – Fredman Test

Friedman Test Statistics	
N	300
Chi-Square	155.290
df	8
P-value	.000

Since the p-value < 0.05 , the result is statistically significant. This leads to the rejection of the null hypothesis (H_{01}) and the acceptance of the alternate hypothesis (H_{11}). Thus, it can be concluded that sportswear users in Mumbai and Mumbai suburbs do indeed have specific functional expectations from sportswear.

Conclusion: The statistical analysis confirms that sportswear users in Mumbai and Mumbai suburbs prioritize certain functional attributes in sportswear. These preferences are not random or uniform but reflect distinct expectations based on performance, comfort, and brand perception. Overall, the results underscore the need for sportswear that aligns with the practical and psychological demands of users, offering insights for targeted product development and marketing strategies.

To further understand the nature of these expectations, the mean rank scores from the Friedman Test were analysed. These scores represent the relative importance assigned to each functional feature by the respondents. The table no. 4 and the figure no. 1 show the mean ranking of the features based on the responses.

Table No. 4:

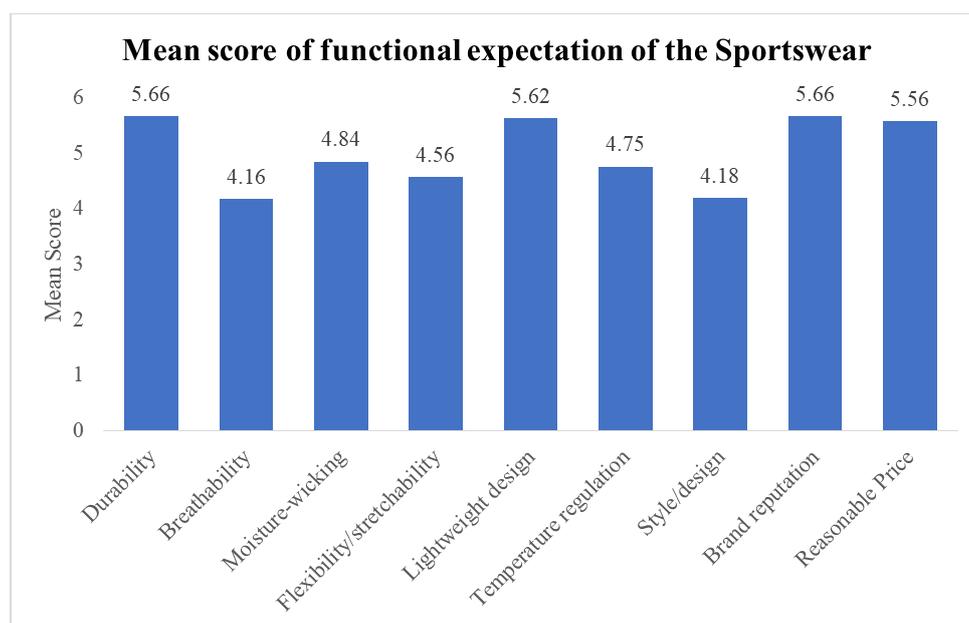
Features and the mean ranking

S.No.	Feature	Mean Rank
1	Durability	5.66
2	Breathability	4.16
3	Moisture-wicking	4.84
4	Flexibility/stretchability	4.56
5	Lightweight design	5.62
6	Temperature regulation	4.75
7	Style/design	4.18
8	Brand reputation	5.66
9	Reasonable Price	5.56

Based on the revised mean rank values, the analysis highlights a clear hierarchy of consumer expectations for sportswear in Mumbai and suburban regions. Durability, brand reputation, and lightweight design emerged with the highest mean ranks, suggesting that consumers strongly prioritize long-lasting performance, trusted brands, and comfort through lighter fabrics. Reasonable price also ranked highly, emphasizing the need for affordability alongside quality, making cost-effectiveness an important determinant of purchase decisions. In the mid-range, moisture-wicking and temperature regulation reflect consumer interest in sweat management and thermal comfort, but these features remain secondary compared to durability and brand credibility. At the lower end, flexibility/stretchability, style/design, and breathability recorded comparatively modest ranks, indicating that while they contribute to overall satisfaction, they do not dominate decision-making. Overall, the results suggest that sportswear users in this region attach greater weight to functional longevity, brand trust, lightweight comfort, and reasonable pricing, while secondary performance aspects and aesthetics are considered desirable but less critical.

Figure 1:

Features and the mean ranking



Expectation of Enhanced Features for the Sportswear by users

Table 5 illustrates the anticipated enhanced features that sportswear users consider important in sportswear.

Table No. 5:

Expectation of Additional Features

Sr. No.	Feature	No	Yes
1.	UV Protection	173	127
2.	Odour Control	28	272
3.	Antimicrobial	113	187
4.	Antiviral	122	178
5.	Soil Resistance	171	129

The statistical analysis of enhanced features highlights clear consumer priorities. Odour control was endorsed by 90.7% of respondents, making it the most valued attribute and underscoring strong demand for freshness and hygiene in sportswear. Health-oriented features also received considerable attention, with 62.3% supporting antimicrobial properties and 59.3% endorsing antiviral functions, reflecting heightened awareness of health and safety considerations. In contrast, UV protection (42.3%) and soil resistance (43.0%) were rated lower, as less than half of the respondents considered them essential. These findings indicate that while sportswear users in Mumbai and Mumbai Suburbs place dominant emphasis on hygiene- and comfort-enhancing features, protective and maintenance-oriented attributes are viewed as secondary in shaping consumer expectations.

To assess whether sportswear users in Mumbai and Mumbai suburbs hold specific expectations regarding these advanced features, a hypothesis-driven statistical analysis was conducted.

- **Null Hypothesis (H₀₂):** Sportswear users in Mumbai and Mumbai suburbs do not have specific expectations regarding additional features in sportswear.
- **Alternate Hypothesis (H₁₂):** Sportswear users in Mumbai and Mumbai suburbs do have specific expectations regarding additional features in sportswear.

To test this hypothesis, the Friedman Test was applied to rank the perceived importance of various functional features.

Table No. 6:

Statistical analysis – Friedman Test

Friedman Test Statistics	
N	300
Chi-Square	199.960
df	4
P-value	.000

The p-value of 0.000 is significantly below the threshold of 0.05, leading to the rejection of the null hypothesis. This confirms that sportswear users in Mumbai and Mumbai suburbs have specific expectations regarding additional features in their sportswear. The statistical evidence supports the alternate hypothesis: there are distinct expectations for advanced features in sportswear among sportswear users in Mumbai and Mumbai suburbs.

The mean rank scores of each feature were analyzed and summarized in the table 7.

Table No. 7:

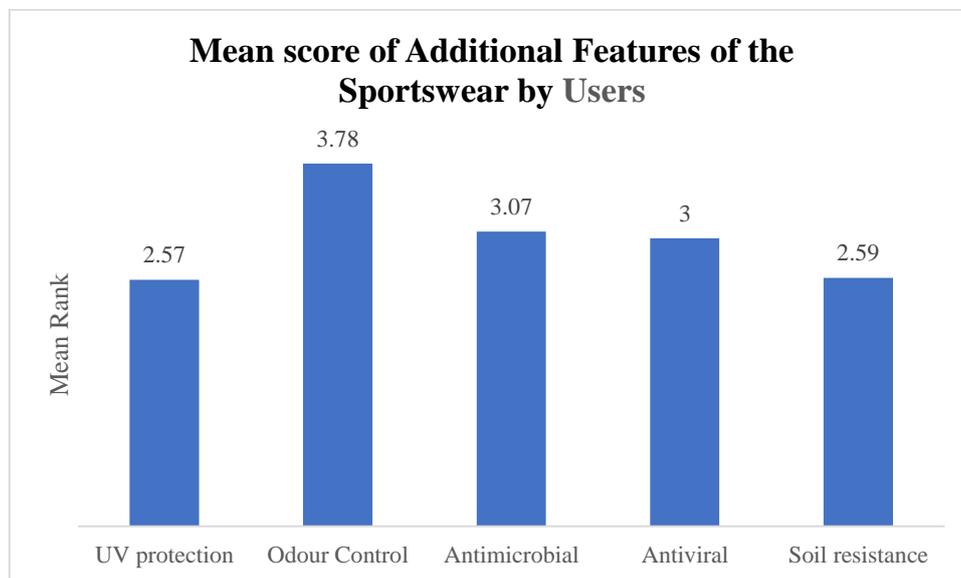
Additional features and the mean ranking

\	Features	Mean Rank
1.	UV protection	2.57
2.	Odour Control	3.78
3.	Antimicrobial	3.07
4.	Antiviral	3.00
5.	Soil resistance	2.59

The mean rank analysis indicates that odour control is regarded as the most important advanced feature among sportswear users in Mumbai and the suburban regions, highlighting a strong preference for freshness and hygiene. This is closely followed by antimicrobial and antiviral properties, both of which are considered highly relevant and reflect increasing consumer awareness of health and safety in sportswear. In contrast, soil resistance and UV protection occupy relatively lower positions in the ranking, suggesting that although these attributes are beneficial, they are not prioritized to the same extent as hygiene- and comfort-oriented features. Overall, the results underscore a clear consumer inclination toward advanced functionalities that directly enhance cleanliness, well-being, and overall performance.

Figure 2:

Additional features and the mean ranking



CONCLUSION

The study concludes that sportswear users in Mumbai and its suburban regions exhibit well-defined and structured expectations, encompassing both traditional functional attributes and modern advanced features. Among functional characteristics, durability, lightweight design, brand reputation, and reasonable price emerged as the most critical factors, indicating a strong preference for apparel that is reliable, comfortable, and cost-effective, while being associated with trusted brands. Performance-related features such as moisture-wicking and temperature regulation occupy a mid-level priority, whereas flexibility, breathability, and

style/design are relatively less emphasized. This pattern highlights that users value practical and performance-oriented aspects over aesthetic considerations.

Regarding advanced features, odour control was identified as the most valued, followed by antimicrobial and antiviral properties, reflecting a growing consumer awareness of hygiene and health in sportswear. In contrast, UV protection and soil resistance were ranked lower, suggesting that maintenance-oriented attributes are of secondary importance. The rejection of null hypotheses for both functional and additional expectations confirms that consumer preferences are structured and deliberate rather than random. Overall, the findings emphasize that sportswear brands should focus on integrating durability, comfort, hygiene, and affordability into their products while addressing regional consumer needs, thereby enhancing user satisfaction and ensuring alignment with the expectations of sportswear users in semi-urban contexts like Mumbai and its suburbs.

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