

**INTERNATIONAL JOURNAL OF
INNOVATION AND
INDUSTRIAL REVOLUTION
(IJIREV)**www.gaexcellence.com/ijirev**DEVELOPMENT AND PILOT EVALUATION OF SARONG
SALIN: AN ISLAMIC-BASED FUNCTIONAL GARMENT
FOR OUTDOOR CLOTHING CHANGE AMONG MUSLIM
WOMEN**Anis Nadiah Baharudin^{1*}, Hasma Ahmad², Maarof Saleh³¹ Department of Fashion Design, Faculty of Art and Design, Universiti Teknologi MARA (UiTM) Cawangan Perak, Seri Iskandar Campus, Perak, Malaysia anisnadiyah@uitm.edu.my <https://orcid.org/0009-0000-0976-0434>² Faculty of Art and Design, Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, Malaysia hasma669@uitm.edu.my <https://orcid.org/0009-0008-3616-2809>³ Department of Fashion Design, Faculty of Art and Design, Universiti Teknologi MARA (UiTM) Cawangan Perak, Seri Iskandar Campus, Perak, Malaysia maarof@uitm.edu.my <https://orcid.org/0009-0008-6288-9534>

*Corresponding Author

Article Info:**Article history:**

Received date: 30.07.2026

Revised date: 27.08.2026

Accepted date: 20.09.2026

Published date: 28.09.2026

To cite this document:

Baharudin, A. N., Ahmad, H., & Saleh, M. (2026). Development And Pilot Evaluation of Sarong Salin: An Islamic-Based Functional Garment for Outdoor Clothing Change Among Muslim Women. *International Journal of Innovation and Industrial Revolution*, 8(26), 725-736.

Abstract:

Outdoor recreation can create clothing-related challenges for Muslim women when private changing facilities are unavailable. This study develops and preliminarily evaluates Sarong Salin, a compact Islamic-based functional garment intended to facilitate clothing changes in outdoor settings while supporting modesty, privacy, comfort, mobility, and portability. A product-development and pilot-evaluation approach was used. Five Muslim women aged 19, 25, 30, 36, and 43 years participated in a preliminary comparative evaluation of five Sarong Salin variations developed using different materials and functional configurations. The evaluation considered fastening, comfort, portability, colour, multifunctionality, microfibre towel availability, and storage. Descriptive preference results showed that SOS 4, made from silver-coloured polyester, recorded the highest percentage of respondent choices at 52%, followed by SOS 5 polyethylene at 30%, SOS 1 silicon nylon at 22%, SOS 2 imitation polyester soft aluminum film at 12%, and SOS 3 210T silver polyester taft at 2%. The findings indicate that the preferred prototype was associated with a combination of lightweight construction, comfort, colour suitability, portability, and functional potential rather than a single design attribute. The study contributes an initial design direction for Islamic-based functional clothing intended for outdoor clothing change and highlights the

importance of integrating privacy, ease of fastening, portability, and multifunctionality in subsequent prototypes. Because the study used a small pilot sample, the findings should be interpreted as preliminary and should not be generalized to the wider population.

DOI: 10.35631/IJIREV.826044

Keywords:

Functional Clothing; Islamic-Based Innovation; Muslim Women; Outdoor Recreation; Privacy; Sarong Salin



© The authors (2026). This is an Open Access article distributed under the terms of the Creative Commons Attribution (CC BY NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact ijirev@gaexcellence.com.

Introduction

Outdoor recreation provides opportunities for leisure, physical activity, relaxation, and engagement with natural environments. In Malaysia, activities such as visits to waterfalls, beaches, rivers, and other recreational locations may involve water exposure and subsequent changes from wet to dry clothing. Although these activities can be accessible and enjoyable, not all outdoor locations provide convenient or private changing facilities. For Muslim women who observe modesty requirements, the absence of an appropriate changing space can create a practical challenge when changing clothing comfortably and privately.

Research on modest activewear has established that Muslim women may require clothing that accommodates physical activity while maintaining modest appearance. Md Zain and Syed Sahil (2018), for example, examined modest activewear for Malaysian women and emphasized the importance of appropriate materials and design features. Saleh et al. (2022) similarly investigated the adaptation of modesty concepts in sportswear design for Malaysian women and identified design considerations intended to support active lifestyles. Hwang and Kim (2020) further found that appropriate concealment, including garment length, loose fit, and fabric coverage, was important in how veiled Muslim women defined modest activewear.

Functional apparel also needs to respond to the interaction between user requirements and design decisions. Lamb and Kallal (1992) proposed the Functional, Expressive, and Aesthetic (FEA) framework, emphasizing that apparel design should respond to users' functional, expressive, and aesthetic needs. In functional product development, direct engagement with users and prototype evaluation can provide information that is difficult to obtain from design assumptions alone (Morris & Ashdown, 2018). These principles are relevant to Sarong Salin because the garment is designed for a specific task: providing temporary coverage during outdoor clothing change.

Outdoor participation adds another layer of practical considerations. Sweidan et al. (2026) reported that Muslim women's outdoor physical activity can be influenced by privacy, clothing, access, environmental conditions, and social circumstances. Pfister (2010) similarly discussed the barriers that women in Islamic contexts may encounter in relation to sport participation. These findings suggest that clothing can function as part of the practical conditions that support participation rather than simply as an aesthetic product.

Within the Malaysian fashion context, modest fashion has developed beyond traditional Islamic clothing and has become a broader design and consumer category. Kamarulzaman and Shaari (2023) identified modest fashion as an evolving area within the Malaysian fashion industry, while Hasma Ahmad and colleagues have examined Islamic fashion and contemporary fashion design from Malaysian perspectives (Ahmad et al., 2018; Ziwei et al., 2024). This context supports the development of functional garments that respond to specific user needs while retaining modesty and cultural considerations.

However, much of the existing research focuses on clothing worn during physical activity, sportswear, activewear, or broader modest fashion consumption. Less attention has been directed towards a garment specifically designed to facilitate changing from wet or activity clothing to dry clothing in outdoor environments where private changing facilities may be unavailable. This creates a design opportunity for a compact and portable garment that provides temporary coverage while incorporating practical fastening, storage, and multifunctional features.

The development of Sarong Salin has also received recognition through several innovation and design competitions. The project was awarded Second Place in the Waste to Wealth Innovation 2023 competition under the Professional Category and received a Silver Award at the Invention, Innovation & Design Exposition (IINDEX) 2022. In 2025, Sarong Salin received a Gold Medal at the 14th International Invention, Innovation & Design Competition (INDeS 2025) and was also awarded Best of the Best under the Design and Creativity theme. In 2026, a subsequent development of the concept, Mini Sarong Salin, received a Gold Medal at the 15th International Invention, Innovation & Design Competition (INDeS 2026). These recognitions provide contextual evidence of the project's development and innovation potential, while the present study focuses specifically on the systematic preliminary evaluation of five Sarong Salin design variations.

Sarong Salin was developed in response to this specific situation. The concept combines a sarong-inspired body covering with an easy-fasten closure system and additional functional elements intended to support outdoor clothing change. The innovation is positioned at the intersection of modest clothing, functional apparel, outdoor recreation, and user-centred product development. This study therefore focuses on the preliminary development and comparative evaluation of five Sarong Salin variations to identify design characteristics that should be retained and refined in subsequent prototypes.

Literature Review

Modesty and Functional Clothing

Modest clothing for Muslim women requires attention to both religiously informed expectations and practical use. Boulanouar (2006) discussed modesty in Muslim women's

clothing as a concept connected with Islamic values and dress practices. In the context of activewear, Hwang and Kim (2020) found that appropriate concealment, longer length, loose fit, and fabric thickness were among the important characteristics identified by veiled Muslim women. Their findings indicate that modesty is not simply a visual quality but is connected with garment construction, material, and user expectations.

Md Zain and Syed Sahil (2018) explored modest activewear for Malaysian women through observation, interviews, questionnaires, and material experimentation. Their study emphasized the need to identify suitable materials and design features for active users. Saleh et al. (2022) likewise demonstrated how modesty concepts can be incorporated into sportswear through deliberate adaptation of design, construction, and material decisions. Collectively, these studies establish the relevance of functional design when developing clothing for Muslim women who participate in active lifestyles.

Hwang and Kim (2021) further examined purchasing behaviours towards modest activewear and found that perceived functionality, expressiveness, aesthetics, and compatibility were associated with attitudes toward modest activewear. These findings are relevant to Sarong Salin because the product needs to perform a practical function while also being acceptable in appearance and use. The FEA framework proposed by Lamb and Kallal (1992) provides a useful design perspective by linking functional, expressive, and aesthetic considerations in apparel development.

Muslim Women, Outdoor Recreation, and Clothing Needs

Outdoor participation introduces environmental and situational conditions that can differ from indoor exercise. Sweidan et al. (2026) identified privacy, clothing, facilities, environmental conditions, and social factors among the considerations affecting Muslim women's outdoor physical activity. These findings support the importance of examining clothing as part of the broader conditions that can facilitate or constrain participation.

Social and cultural conditions also influence participation. Chen and Qiao (2024), in a study involving 301 Muslim women, found a positive relationship between social support and sporting activities and identified psychological adjustment as a mediating factor. Although social support is outside the scope of the present study, the finding reinforces the broader point that participation is shaped by multiple interacting conditions. Clothing innovation can therefore be viewed as one practical component within a larger participation environment.

Sportswear research also demonstrates the close relationship between fashion, innovation, function, and sustainability. Bruun and Langkjær (2016) described sportswear as an area where technical, social, aesthetic, and environmental concerns intersect. For Sarong Salin, this intersection is particularly relevant because the garment is intended to solve a specific practical problem while remaining lightweight, portable, comfortable, and acceptable to its intended users.

Functional Apparel and User-Centred Product Development

Functional apparel development benefits from direct consideration of user needs. Morris and Ashdown (2018) demonstrated the value of involving users in functional apparel product development and prototype evaluation. Their research showed how user participation can

support the development and assessment of apparel concepts when product performance depends on the interaction between garment design and activity.

Morris et al. (2017) similarly demonstrated a user-centred approach in developing a nursing sports bra for physically active breastfeeding women. Their study illustrates how functional apparel can be developed around a specific user group and activity context. This approach is applicable to Sarong Salin because its design problem is similarly specific: providing a practical garment solution for a defined clothing-related need.

Comfort is another important component of functional clothing. Wang (2008) explained that clothing comfort is influenced by material properties, garment design, and conditions of use, and that comfort evaluation can progress from fabric-level properties to complete garment systems. This perspective is relevant to Sarong Salin because comfort should be evaluated together with portability, fastening, coverage, and the outdoor conditions in which the garment will be used.

Material selection is consequently a critical design decision. The five Sarong Salin prototypes were intentionally differentiated by material and configuration, allowing preliminary comparison of user preferences. A systematic approach to material evaluation in future research would provide stronger evidence concerning weight, opacity, water resistance, drying behaviour, drape, durability, packability, and tactile comfort.

Research Gap and Objectives

Existing research provides useful evidence on modest activewear, sportswear design, Muslim women's clothing preferences, functional apparel, and outdoor physical activity. However, the literature reviewed indicates a more specific gap concerning garments designed primarily to facilitate outdoor clothing change. Previous studies generally examine clothing worn during activity, whereas the present study addresses the transition between activity and post-activity clothing. This distinction is important because the garment must provide temporary privacy and coverage while also being portable, easy to fasten, comfortable, and convenient to store. Sarong Salin addresses this design gap by proposing a portable clothing-based solution for situations in which private changing facilities may be unavailable or inconvenient. The study contributes preliminary evidence on how different materials and functional configurations are perceived by a small group of Muslim women and provides a basis for subsequent prototype refinement.

The objectives of this study are to:

- develop five Sarong Salin design variations incorporating different materials and functional configurations;
- explore functional aspects of the designs, particularly fastening, comfort, portability, coverage, and multifunctional features;
- conduct a pilot comparative evaluation of the five design variations among Muslim women; and
- identify the preferred design variation based on the respondents' comparative evaluation.

Methodology

Research Design

This study employed a product-development and preliminary evaluation design. Five Sarong Salin variations were developed with differences in material and functional configuration. The prototypes were subsequently compared through a pilot questionnaire-based evaluation. The exploratory design was intended to identify preliminary user preferences that could guide subsequent product refinement rather than to establish population-level generalizations.

Participants

The pilot study involved five Muslim women aged 19, 25, 30, 36, and 43 years. The participants were selected to provide preliminary feedback on the practicality and suitability of Sarong Salin as an outdoor clothing-change garment. Because the sample consisted of five participants, the results are interpreted descriptively and should not be generalized to the wider population.

Data Collection

The questionnaire collected basic participant information, experiences related to changing attire during outdoor or water-related activities, and the frequency of such activities. Participants were then presented with five Sarong Salin variations and evaluated the designs according to characteristics relevant to outdoor clothing change. These characteristics included colour, fastening method, functionality, availability of a microfibre towel, comfort, portability, and the storage bag.

Design Development

Five Sarong Salin variations were developed using different materials and configurations: SOS 1 (silicon nylon), SOS 2 (imitation polyester soft aluminum film), SOS 3 (210T silver polyester taft), SOS 4 (silver-coloured polyester), and SOS 5 (polyethylene). The design concept incorporated an easy-fasten closure system intended to simplify wearing and fastening while maintaining body coverage. Additional functional elements included a hood, microfibre towel, and storage component to support portability.

SUMMARY OF USING SWOT ANALYSIS FOR UTILITY CLOTHING CHANGES OUTFIT IN ORDER TO IDENTIFY THE CHOSEN SOLUTION IN DEVELOPING THE SARONG SALIN

VARIATION OF SARONG SALIN AND MATERIALS	SOS 1 - SILICON NYLON					SOS 2 - IMITATION POLYESTER SOFT ALUMINIUM FILM					SOS 3 - 210 T SILVER POLYESTER TAFT					SOS 4 - SILVER COLORED POLYESTER					SOS 5 - POLYETHYLENE (PE)				
FEATURES DESIGN DETAILS																									
SARONG SALIN																									
RESPONDENTS	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5	R1	R2	R3	R4	R5
COLOR																									
OPEN FASTEN CLOSURE : STRING WITH STOPPER																									
OPEN FASTEN CLOSURE : ELASTIC ROUND STRING																									
OPEN FASTEN CLOSURE : ADJUSTABLE BUTTON HOLE ELASTIC TAPE WITH BUTTON																									
FUNCTIONAL DETAILS: HOODIE																									
MICRO FIBER TOWEL (1 PCS)																									
MICRO FIBER TOWEL (2 PCS)																									
MICRO FIBER TOWEL (3 PCS)																									
INDIVIDUAL COMFORTABLY																									
THE SARONG SALIN COMPLIMENT WITH BAG																									
PERCENTAGE OF RESPONDENT CHOICES TOWARDS THE DESIGN CHARACTERISTIC	2%	4%	2%	4%	6%	2%	2%	4%	2%	2%						2%	10%	10%	12%	10%	10%	6%	6%	6%	6%
TOTAL PERCENTAGE	22 %					12%					2%					52 %					30 %				
SUGGESTION AND RECOMMENDATION BY THE RESPONDENTS	-Sarong material good because of the softness. - The towel need to change the lightweight. - Material (towel) heavy - No need hoodie add on an opening for hands - Berat mungkin disebabkan tuala tapi design ada style boleh buat baju hujan - heavy material (towel) when it's wet - add on an opening for hands.					- Black colour is perfect while changing - The towel should be in front. - The color is too dark. - Can change to the brighter color - The color is far too dark, resembling plastic garbage. - The elastic too soft					- Heavy due to towel quantity -Sarong is too heavy due to towel quantity - Space limited due to small cutting - Comfortable, lightweight nice in color - Lebar sarong sedikit sempit untuk orang berbadan gempal -Space limited - Because of the number of towels, the sarong is overly heavy. - This sarong can be used as a hammock as well.					- Comfortable, lightweight, colour much better with olive green - Comfortable, lightweight nice in color - Colorful, comfortable, and light are all words that come to mind while thinking about this outfit. - This design also can be used as a hammock as well.					- Comfortable, lightweight, and easy going - Comfortable, lightweight, and portable - Ringan dan luas - Cepat kering kalau terkena benda tajam - Comfortable, lightweight, adaptable				

COLOR CODING
 RESPONDENT 1
 RESPONDENT 2
 RESPONDENT 3
 RESPONDENT 4
 RESPONDENT 5

Figure 1: Five Sarong Salin Design Variations Evaluated in the Pilot Study
Sarong Salin pilot study design evaluation.

Comparative Evaluation and Data Analysis

The five variations were compared using the pilot evaluation results and the SWOT analysis prepared during product development. The comparative assessment considered the strengths and limitations of each variation and the characteristics selected by respondents. The findings are reported descriptively using the recorded percentages of respondent choices. No inferential statistical analysis is claimed because the pilot sample was small and the original evaluation was designed as a preliminary product assessment.

Results and Discussion

Comparative Preference of the Five Designs

The pilot evaluation showed variation in respondents' choices across the five Sarong Salin designs. Table 1 presents the recorded percentages associated with the five design variations. The percentages represent respondent choices across the evaluated design characteristics and are not mutually exclusive.

Table 1: Comparative Percentage of Respondent Choices for the Five Sarong Salin Designs

Design	Material	Percentage
SOS 1	Silicon Nylon	22%
SOS 2	Imitation Polyester Soft Aluminum Film	12%
SOS 3	210T Silver Polyester Taft	2%
SOS 4	Silver-Coloured Polyester	52%
SOS 5	Polyethylene (PE)	30%

Source: Sarong Salin pilot study evaluation.

SOS 4 recorded the highest percentage at 52%, followed by SOS 5 at 30%, SOS 1 at 22%, SOS 2 at 12%, and SOS 3 at 2%. The higher preference for SOS 4 suggests that this variation provided a more favourable combination of characteristics according to the pilot respondents. The result should not be interpreted as evidence that silver-coloured polyester is universally superior because only five participants were involved and several design characteristics were considered simultaneously.

Comfort, Lightweight Construction, and Portability

Respondent feedback highlighted comfort, lightweight construction, colour suitability, and portability as positive characteristics of the preferred variations. This finding is consistent with the functional-clothing literature, which treats comfort as an interaction between material properties, garment design, environmental conditions, and user perception (Wang, 2008). For Sarong Salin, comfort is particularly important because the garment is intended to be used during a practical clothing-change task rather than as conventional fashion apparel.

Portability is also important because the product is intended for outdoor use, where users may already carry personal belongings and activity equipment. A bulky or difficult-to-store garment could reduce its practical value even when it provides adequate coverage. The favourable responses to SOS 4 and SOS 5 therefore suggest that subsequent prototypes should retain lightweight characteristics while improving folding and storage. This direction is consistent with functional apparel approaches that align product features with user activities and contexts (Lamb & Kallal, 1992; Morris & Ashdown, 2018).

Fastening, Privacy, and Ease of Use

The easy-fasten closure is a central functional element of Sarong Salin. The purpose of the closure is not only to secure the garment but also to reduce the effort required to put on and

adjust the garment during a clothing change. The pilot designs explored fastening solutions including string with stopper, elastic round string, and adjustable button-hole elastic tape with button.

From a user-centred design perspective, fastening is closely related to task efficiency and usability. A clothing-change garment needs to be sufficiently secure to maintain coverage while also being simple to operate. This requirement supports iterative prototype evaluation in functional apparel development, where user feedback can inform refinement of construction and functional details (Morris & Ashdown, 2018; Morris et al., 2017). Further testing should evaluate fastening through task time, ease of operation, security during movement, and performance when changing from wet clothing.

Multifunctionality and Integrated Features

Sarong Salin was conceived as a multifunctional garment rather than only a temporary covering. The inclusion of a hood, microfibre towel, and storage component reflects an attempt to combine several outdoor clothing-related needs within one portable product. Multifunctionality may reduce the number of separate items a user needs to carry and can therefore improve convenience during recreational activities.

However, multifunctionality should not create unnecessary complexity. Additional components can increase weight, bulk, manufacturing complexity, or difficulty in folding. Subsequent development should therefore balance the number of functions with the primary purpose of the garment: facilitating a private and practical clothing change. Only features that provide clear user value without compromising portability and ease of use should be retained.

Material Selection and Design Direction

The comparative results indicate that material selection should be considered together with garment construction and user experience. SOS 4 received the highest preference, while SOS 5 also received a comparatively favourable response. The five variations provide exploratory information about how material and configuration may influence perceived comfort, portability, and overall suitability.

Material selection in functional apparel should be guided by the intended task and the physical and perceptual needs of users. Future Sarong Salin testing should therefore examine properties that were not quantitatively assessed in the pilot study, including weight, water resistance, drying behaviour, drape, opacity, durability, packability, and tactile comfort. Such testing would provide a stronger evidence base for final material selection than preference percentages alone.

Design Implications

Several design implications can be derived from the pilot findings. First, privacy and body coverage should remain the primary functional requirements because they define the problem the garment is intended to address. Second, the fastening system should be simple, secure, and adjustable. Third, lightweight construction and compact storage should be retained to support portability. Fourth, comfort should be considered in relation to material, garment construction, environmental conditions, and movement. Fifth, multifunctional elements such as the hood and

microfibre towel should be integrated only when they provide clear user value. Finally, material choices should be validated through systematic testing rather than preference alone.

These implications position Sarong Salin as an initial design direction for Islamic-based functional outdoor apparel. The study demonstrates how a specific clothing problem can be translated into a product-development process involving material variation, functional features, prototype comparison, and user evaluation. Nevertheless, the findings remain preliminary and should be followed by larger-scale usability and wear testing.

Conclusion

This study developed and preliminarily evaluated Sarong Salin as an Islamic-based functional garment intended to facilitate outdoor clothing changes among Muslim women. Five design variations were developed using different materials and functional configurations and were evaluated by five Muslim women. The pilot findings showed that SOS 4, using silver-coloured polyester, received the highest percentage of respondent choices at 52%, followed by SOS 5 at 30%, SOS 1 at 22%, SOS 2 at 12%, and SOS 3 at 2%.

The results suggest that the preference for SOS 4 was associated with a combination of comfort, lightweight construction, colour suitability, portability, and functional potential. The findings also reinforce the importance of an easy-fasten closure, adequate coverage, compact storage, and carefully selected multifunctional features. These characteristics provide a preliminary design direction for subsequent Sarong Salin development.

The contribution of this pilot study lies in identifying a specific functional clothing opportunity at the intersection of modesty, privacy, outdoor recreation, and portable garment innovation. Sarong Salin offers a garment-based approach for situations in which private changing facilities may be unavailable or inconvenient. However, the study is limited by its very small pilot sample and descriptive evaluation. The findings should therefore not be generalized. Future research should involve a larger and more diverse group of Muslim women and should use systematic usability testing, controlled material evaluation, wear trials, and quantitative measures of comfort, portability, ease of fastening, coverage, and task performance.

-
- Acknowledgements:** The authors would like to thank the Muslim women who participated in the pilot evaluation of the Sarong Salin prototypes and provided feedback that supported the preliminary development of the product.
- Funding Statement:** No funding was received for this research.
- Conflict of Interest Statement:** The authors declare that there is no conflict of interest regarding the publication of this paper.
- Ethics Statement:** This study involved five adult Muslim women who voluntarily participated in the preliminary evaluation of the Sarong Salin prototypes. Participants independently tested the prototypes without physical assistance or intervention from the researcher. The purpose of the evaluation was explained to the participants, and their participation was voluntary. Informed consent was obtained prior to participation.
- Author Contribution Statement:** Anis Nadiah Baharudin: conceptualization, methodology, product development, data collection, analysis, and manuscript preparation. Hasma Ahmad: supervision, methodological guidance, critical review, and manuscript revision. Maarof Saleh: supervision, critical review, and manuscript revision. All authors should confirm that this statement accurately reflects their contributions and approve the final manuscript before submission.
-

References

- Ahmad, H., Aris, A., & Ibrahim, S. (2018). The identity of “Islamic fashion”. *International Journal of INTI*, 22(Special Issue), 8–14.
- Boulanouar, A. W. (2006). The notion of modesty in Muslim women's clothing: An Islamic point of view. *New Zealand Journal of Asian Studies*, 8(2), 134–156.
- Bruun, M. B., & Langkjær, M. A. (2016). Sportswear: Between fashion, innovation and sustainability. *Fashion Practice*, 8(2), 181–188. <https://doi.org/10.1080/17569370.2016.1221931>
- Chen, N., & Qiao, F. (2024). Effect of social support on Muslim women’s sporting activities: Mediating effect of psychological adjustment. *Frontiers in Psychology*, 15, 1335886. <https://doi.org/10.3389/fpsyg.2024.1335886>
- Hwang, C., & Kim, T. H. (2020). Religiosity and modesty: How veiled Muslim women in the United States define modest activewear. *International Journal of Fashion Design, Technology and Education*, 13(2), 131–139. <https://doi.org/10.1080/17543266.2020.1753246>
- Hwang, C., & Kim, T. H. (2021). Muslim women’s purchasing behaviors toward modest activewear in the United States. *Clothing and Textiles Research Journal*, 39(3), 175–189. <https://doi.org/10.1177/0887302X20926573>
- Kamarulzaman, Z., & Shaari, N. (2023). A systematic review of modest fashion perspectives in the Malaysian fashion industry. *International Journal of Art & Design*, 7(2), 32–45.
- Lamb, J. M., & Kallal, M. J. (1992). A conceptual framework for apparel design. *Clothing and Textiles Research Journal*, 10(2), 42–47. <https://doi.org/10.1177/0887302X9201000207>
- Md Zain, E., & Syed Sahil, S. A. (2018). Activewear for Malaysian women focusing on modesty style. *International Journal of INTI*, 22(Special Issue), 15–21.
- Morris, K., & Ashdown, S. (2018). Expanding the concept of lead users as collaborators in functional apparel design. *Clothing and Textiles Research Journal*, 36(3), 180–198. <https://doi.org/10.1177/0887302X18765262>
- Morris, K., Park, J., & Sarkar, A. (2017). Development of a nursing sports bra for physically active breastfeeding women through user-centered design. *Clothing and Textiles Research Journal*, 35(4), 290–306. <https://doi.org/10.1177/0887302X17722858>
- Pfister, G. (2010). Women and sport in Islamic countries. *Forum for Idræt*, 26(1). <https://doi.org/10.7146/ffi.v1i1.31586>
- Saleh, N., Mustafa, M. K., AlMurid, D. I. F., Umar, N. F., & Ibrahim, N. I. (2022). The adaptation of modesty concept in sportswear design for Malaysian women. *KUPAS SENI: Jurnal Seni dan Pendidikan Seni*, 10, 15–28. <https://doi.org/10.37134/kupasseni.vol10.sp.2.2.2022>
- Sweidan, F., Sommer, R., Abu-Omar, K., Sand, M., & Ziemainz, H. (2026). Perceptions, barriers, and facilitators of outdoor physical activity among Muslim women living in Germany. *German Journal of Exercise and Sport Research*. <https://doi.org/10.1007/s12662-026-01126-4>
- Wang, L. (2008). Multilevel approach to evaluating the comfort of functional clothing. *Journal of Fiber Bioengineering and Informatics*, 1(3), 173–176. <https://doi.org/10.3993/jfbi12200801>
- Ziwei, Z., Aris, A., & Ahmad, H. (2024). Research on the application of Chinese papercutting craft in modern fashion design. *Ideology Journal*, 9(2), 197–208. <https://doi.org/10.24191/idealogy.v9i2.631>