

## EXPLORING TATTOO-INSPIRED TEXTILE PRINTS AND GARMENTS AS A SAFER WAY OF ADORNING THE HUMAN BODY

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**Abstract.** Despite the increasing popularity of tattooing, significant risks are associated with its practice, such as infections, allergic reactions and stigma. The purpose of the study therefore is to explore tattoo-inspired textile prints and garments as a safer alternative of adorning the human body. The study employed a multi-phased mixed-method to collect and analyse data. The design process was adopted in a step by step manner to convert tattoo patterns into textile prints and garment designs utilizing Computer-Aided Design (CAD) software. The level of acceptance of tattoo-inspired prints and clothing as safer alternatives to permanent tattoos was assessed using the Structural Equation Model (SEM). The results revealed that embracing tattoo-inspired clothing has a mediating effect on individual perceptions and tattoo-related risks. This means that the more individuals embrace tattoo-inspired garment, the more positive their perceptions about tattoos become and the less they perceive tattoo-related risks. A major finding of the study is that tattoo-inspired clothing may influence an individual's perception about safer ways of adorning the human body with tattoo designs. The researchers therefore conclude that tattoo-inspired prints and garment may help in reducing risks associated with permanent tattoos. The study contributes to the efforts being made by scholars towards the reduction of perceived risks of tattooing. The study is novel because, available literature shows that although there are some studies on tattoo-inspired clothing, no study has been conducted to investigate whether tattoo-inspired textile prints and garments have the capability of reducing risks associated with tattooing. It is recommended that textile designers, fashion designers and all those who matter in the textile value chain shift part of their focus to the production of tattoo-inspired textile prints and garments. By so doing, it is expected that more people will develop interest for wearing tattoo-inspired clothing instead of permanent tattoos.

**Keywords:** *Tattoo designs, textile prints, health risks, garment, design framework.*

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### 1. Introduction

Tattooing is an old practice that has gained increasing popularity in recent years. (Koch *et al.*, 2015). It is a type of alteration on the human body that throws light on how people in different cultures demonstrate their success, loyalty to particular groups, identities and social standing (Gillreath-Brown *et al.*, 2019). The word “tattooing”, which comes from the Tahitian word “tattau”, which means “to mark”, refers mostly to the process of permanently coloring human skin with paint that is injected using sharp

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instruments (Graudenz *et al.*, 2003). A tattoo is a type of body art created by drawing a design on the skin's outer layer using either temporary or permanent pigments. (Graudenz *et al.*, 2003). Therefore, it may be concluded that a tattoo is a form of body art that is done on the human skin, either permanently or temporarily, for cultural or social reasons. There are three categories of tattoos: purely decorative, symbolic and pictorial (Gamble, 2017). In recent times, tattoos can be accidental, cosmetic or therapeutic. It may be used deliberately for cosmetic and therapeutic purposes or unintentionally (traumatic tattoos) in the event of skin injuries. Furthermore, while tattoos are used as a type of “permanent cosmetics” in beauty salons and clinics, teenagers and young adults view them as beautiful and ornamental body art. Additionally, scars from plastic and reconstructive surgery, vitiligo, breast reconstruction following cancer surgery and other conditions have all been camouflaged using medical therapeutic tattooing (Graudenz *et al.*, 2003).

Despite their growing popularity, tattoos pose significant health concerns such as infections, allergic reactions, Hepatitis B (HBV), Hepatitis C (HCV), Human Immunodeficiency Virus (HIV) and skin cancer (Kluger *et al.*, 2017; Giubudagian *et al.*, 2020), particularly for those who get tattooed in unregulated facilities or without sufficient hygienic procedures. These diseases if not avoided can lead to disastrous consequences including death. Some attempts have been made over the years by scholars, preventive health practitioners and researchers to proffer lasting solution to this canker to no avail. Now, the focus is shifting to the adoption of non-permanent forms of tattooing as safer alternatives to permanent tattoos (Koch *et al.*, 2015). These alternatives include temporary tattoos, henna tattoos and other forms of body art that can be easily removed or fade over time (Koch *et al.*, 2015). Textile prints are becoming more popular among the alternative methods being sought to replace permanent tattoos. With this alternative, tattoo designs are developed and printed onto the second skin (fabric) for decorative and protective purposes.

In previous scholarly literature, textile prints were found as alternatives to tattoos (Burke *et al.*, 2019). Tattoo-inspired textile prints and garments are among the artistic interventions that can promote a safer alternative to permanent tattooing. Tattoo-inspired textile prints refer to fabric designs that incorporate elements of tattoo art, such as motifs, symbols and patterns (Acquaye, 2017). The designs draw inspiration from traditional and contemporary tattoos and are characterized by bold lines, intricate designs and patterns and dark colours. These designs are incorporated into clothing, accessories and home décor items (Bliss, 2022). While some works have been done on the conversion of tattoo designs into fabric prints, not much research has been done on possible ways of exploring tattoo-inspired textile prints and garments as a safer means of adorning the human body. This is what makes the study novel and worth researching into.

The goal of this study therefore is to advance knowledge about the potential of tattoo-inspired textile prints and garments serving as a risk-free and safer substitute for permanent tattoos. In addition, the study explores the effectiveness of reducing tattoo-related risks by using tattoo-inspired textile prints and garments as an alternative intervention. The study will also determine the extent to which the designs may contribute to the reduction in the related risks associated with permanent tattoos or otherwise. This will be achieved through the exploration of selected tattoo designs on the human body, conversion of the designs into textile prints and final simulation into garments. The study will employ a multi-phased mixed-method design for data collection and analysis. The designs will be developed and produced following the universally accepted design process.

It is hoped that the findings of this study would inspire textile design professionals to explore tattoos for more innovative designs for textile printing. Through this study, the education sector is expected to challenge design students to be more creative and innovative. It is also anticipated that the study will increase and improve the design base of the textile industries. This study generally contributes to discussions on the use of safer means of addressing related risk issues associated with tattooing. The researchers have the expectation that this study will generally stimulate further studies into other alternative ways of using tattoo designs on the body.

## **2. Review of Related Literature**

### ***2.1. Tattoo as a Ritual Medium***

Designs for tattoos serve a variety of purposes, including identity, personal protection and body decoration or adornment (Sander, 1989; Blanchard, 1991). According to Paquet et al. (2000), people get tattoos for a variety of reasons, from social, rituals to aesthetic goals. Bergh (2016) states that ritual is one of the key roles cited by historians. According to him, getting a tattoo at a rite of passage acts as a physical reminder of the event throughout life.

The Ramnaamis, who are devout followers of Lord Rama in India, reportedly have his name inscribed in Sanskrit on their bodies (IloveIndia, 2022). Further information from this source indicated that Ram's name is inscribed on the skin of the Ramnaamis almost anywhere it is practically conceivable, even on their tongues and inside of their lips.

Hunter (2019) was of the view that getting a tattoo is a long-standing tradition. According to him, the earliest tattoo evidence comes from around 3100 BCE. He claimed that many cultures view the process of tattooing people as an extension of traditional aesthetics or age-old rituals. The Maori, who are the native Polynesians of New Zealand, for example, employ traditional tattoos as social marks rather than merely fashion statements, he further explained. The tattoo identifies them as belonging to a certain family or tribe and their position within the social hierarchy.

Scheindfeld (2007) claims that tattoos are highly valued in a number of religions. His argument is that tattoos have been utilized for thousands of years as essential components of ritual and culture. He went on to state that while tattoos are not widely practised in Judaism, Christianity and Islam, they are extensively used in Buddhism and Hinduism.

### ***2.2. Tattooing and its Associated Health Risks***

Dermatologists have remarked that tattoo pigments in the body might cause uncommon but serious medical consequences. They have also emphasized that people who have tattoos rarely consider the dangers to their health before getting them (Mayo Clinic, 1998). Bäumlér (2016) state that numerous hazards, such as skin infections, allergic reactions and scarring, may result from getting a tattoo. They added that these dangers could arise if a person doesn't visit a certified tattoo artist.

The tattoo itself, which is obtained by piercing the skin of a person, cannot cause fatal diseases like cancer, but the impact of the tattoo ink on human health is of concern. According to certain theories, some of the pigments used in tattooing contain substances that could be categorized as carcinogenic or “have the potential to cause cancer”

(Bäumler, 2016). In 2016, an Australian government study found that 83% of tested black tattoo inks contained polycyclic aromatic hydrocarbons (PAHs), known carcinogens. According to Wellmann et al. (2006), a working group set up by the International Agency for Research on Cancer (IARC) in 1995 came to the opinion that there is a good chance that carbon black can cause cancer in humans. A recently released report from the Joint Research Center (JRC) of the European Union claims that tattoo inks can contain up to 100 different compounds, including carcinogens. Therefore, it is not unexpected that tattoos still result in health issues (Bäumler, 2016). Show et al. (2019) opine that due to the skin-breaching nature of tattoos, problems such as allergic reactions, skin infections and blood-borne diseases are possible.

### ***2.3. Tattoo-Inspired Textile Prints and Garments***

Tattoo-inspired textile prints and garments refer to fabrics and clothing designs that are inspired by traditional and contemporary tattoo art (Murray, 2019). Tattoo-inspired textile prints and garments represent fabric designs and motifs that take inspiration from the art of tattooing. Elements such as skulls, roses, snakes and other traditional tattoo imagery are incorporated into prints with the intention of replicating the look and feel of tattoo art on fabrics. Many of the motifs and designs used in tattoo art have a long history and cultural significance and have been adapted and reinterpreted for use in textile prints (Murray, 2019).

Inspired by traditional and contemporary tattoo art, tattoo inspired textile prints and garment designs are often presented with bold lines, intricate patterns and symbolic imagery (Murray, 2019). According to Murray, a variety of techniques, such as screen printing, digital printing and embroidery, are employed in the creation of tattoo-inspired textile prints. Moreover, they are applied to a wide range of fabrics, including cotton, silk and denim and are often used in the production of t-shirts, dresses and jackets.

This latest trend has gained popularity, especially in the fashion industry and is being embraced by both high-end and fast fashion brands (Harling, 2018). According to Harling, many fashion designers incorporate these designs into their collections. Additionally, there are numerous contemporary designers and brands that specialize in creating tattoo-inspired textiles. Some notable examples include Black Milk Clothing, Killstar and Sourpuss Clothing. Furthermore, Hardy, the well-known tattoo artist who is recognized for having popularized tattoo-inspired aesthetics in textiles and fashion, has had his designs incorporated into a variety of goods, such as apparel, accessories and home décor pieces. Particularly in streetwear fashion, this approach has gained significant traction (Harling, 2018). Overall, tattoo-inspired textile prints offer a unique and edgy style that appeals to those who appreciate the art of tattooing and its aesthetics.

The use of tattoo designs in the Fashion industry is not new. Tattoo designs were first introduced into haute couture in 1971 by Issey Miyake who presented his ground breaking tattoo collection. His now-famous “tattoo dresses” and body suits were flesh-colored clothing adorned in Jimi Hendrix and Janis Joplin pictures in an illustrative tattoo style. The distinction between skin and clothing was blurred by these dresses and bodysuits, giving the impression that this full-body tattoo could be easily put on and taken off. Although this “taboo” technique stunned his audience. In Japan, tattoos were typically used to identify criminals and prostitutes (Ali, 2020).

Using a similar technique, Jean Paul Gaultier created his “Les Tatouges” display in 1994, using mesh clothes covered in tattoo motifs to simulate actual tattoos. Gaultier expanded on Miyake's work by creating tops and sleeves with tattoo-inspired designs

using models who had and did not actually have tattoos. It appeared that various forms of body alterations were essential to this collection, even though the apparel implied that tattoos could be removed or applied (Ali, 2020).

Among the most alluring artistic mediums available today are tattoos. Through this popular art, people express their emotions, cultures and even contemporary challenges. However, tattoos, which were formerly limited to being engraved on the flesh, are increasingly being seen on clothing items like t-shirts (Ray, 2020). Smith (2023) claims that throughout time, tattoo art has grown to have a significant impact on streetwear design. Tattoo-inspired apparel, such as graphic tattoo shirts and tattoo sleeves, is a creative and entertaining way to add edge and flair to any ensemble.

Ed Hardy started what is perhaps one of the most well-known tattoo art clothing brands in the early 2000s. Having been a boundary-pushing tattoo artist since the 1970s, Ed Hardy eventually turned his drawings into fabric, which immediately became popular with both regular people and celebrities. The fact that celebrities like Angelina Jolie and Rihanna are sporting Ed Hardy designs today has cemented the long-term status of tattoo-inspired clothing in the realm of high fashion (Smith, 2023).

In 2004, Audigier joined the fashion line of renowned tattoo artist Ed Hardy after leaving Von Dutch. By embracing tattoos and artistic symbols, Audigier's perspective helped apparel manufacturers to transition into the new millennium. Assuring the incorporation of this beloved art form into regular fashion statements promotes the ongoing development of self-expression and allows both the viewer and the wearer to experience the attraction that tattoo culture skillfully offers. This bold yet elegant fusion of tattoo art and high-street fashion is the endearing meeting point of individuality, self-expression and quite simply, a sincere appreciation for the never-ending innovation of fashion (Guest User, 2021).

Recently, there has been a comeback on the runway for tattoo-inspired clothing. The Comme des Garçons Homme Plus autumn/winter 2015 collection included menswear-inspired suits, sleeves, leggings and even whole outfits with tattoo-style designs. Similarly, to highlight the punk style motifs of his collection, Junya Watanabe used models with tattoos in his spring 2017 runway show. He even gave untattooed women black tattoos (Guest User, 2021).

Guest User (2021) informs that Demna Gvaslia was one of the most recent fashion designers, aside from Victor and Rolf in 2020, to blatantly include tattoos into his 2019 spring collection. This specific collection included a top that evoked the same imagery of tattoos as did Jean Paul Gaultier's spring collection of the 1990s, which featured sheer tattoo tops.

According to Nativ (2022), the sublimation printing technology is utilized to generate tattoos on textiles. In order to tattoo any kind of fabric, including polyester, cotton, silk and leather, the procedure begins with creating actual tattoo designs and transferring them onto a unique transfer paper. This method is known as dye sublimation or heat transfer imprinting.

This novel technique of textile production which was developed by Nativ was influenced by his ever-growing interest for new techniques and new raw materials that could be harnessed to achieve his innovative vision signifying his unwavering commitment to consistently producing cutting-edge designs.

The papers reviewed in this study reveal that the use of tattoo designs in clothing date far back as 1971. It is documented that after the first attempt by Issey Miyake (a Japanese Fashion Designer) to include tattoo in clothing, other designers followed suit

and developed the new techniques further. It was clear in the review that some evidence of the use of tattoo designs for textile prints existed in history but not much has been done to develop it. The review however was silent about the possible role tattoo-inspired textiles prints and garments can play to help curb tattoo-related health risks. This makes our research unique and novel.

### **3. Materials and Methods**

#### ***3.1. Research Design***

The research utilized a multi-phased mixed method design that included both quantitative and studio-based design methods. A multi-phased mixed method research design involves the use of multiple research methods to collect and analyze data (Tsai *et al.*, 2022; Stoecker & Avila, 2021). To acquire a thorough grasp of the research topic, it integrates mixed techniques, quantitative and qualitative approaches. By using the multi-phased mixed method, researchers can triangulate data from several sources and viewpoints, which improves the conclusions' validity and dependability (Baran, 2020). There are various approaches of combining quantitative and qualitative data in mixed methods research, including parallel convergent, sequential and embedded design. (Chali *et al.*, 2022). Depending on their goals and study concerns, researchers can select the appropriate design. Researchers can collect rich and diverse data by using a multi-phased mixed method study design, which leads to a more thorough and nuanced understanding of the research topic (Chang & Son, 2019).

A studio-based method was applied to fully investigate the possibility of creating textile designs from tattoos. Studio-based research in design, according to De Freitas (2002), sheds additional information on the creative processes used to produce a product. This approach made it possible to experiment and change factors in order to get the intended outcomes. On the other hand, whether or not the prints and clothing with tattoo inspiration can lower the risks associated with getting inked was determined using a quantitative method.

#### ***3.2. Population and Sampling***

People who wear tattoo in the Ho Municipality of Ghana constituted the population of the study. They were selected from different inclinations and professions including formal workers, the self-employed, the unemployed, students and apprentices. In all, a total of 115 participants made up of 92 males and 23 females were purposively sampled for the study. For this study, the purposive sampling strategy was selected due to its ability to collect detailed data and concentrate on particular areas of interest within a topic. Therefore, because the researchers feel that tattoo users have sufficient expertise about the research topic, they were purposively chosen for this study.

#### ***3.3. Data Collection***

Two types of data were gathered in light of the study's objectives. Specifically, quantitative and qualitative data. The collection of qualitative data involved observing various tattoo designs online, whereas the collection of quantitative data involved using an online survey tool. Nine (9) distinct tattoo designs in total were observed on various body parts (hand, arm, back, shoulders, chest and hip) and were then transformed into textile designs using computer-aided design (CAD) software. There were two sections on

the survey instrument. Six (6) items: gender, age range, marital status, religious affiliation, higher education qualification and current occupation were included in the first section that addressed the participants' demographic characteristics. Three (3) constructs comprised the second section namely: Cues to Action, Perceived Barriers and Perceived Susceptibility/Seriousness. A minimum of five (5) and a maximum of six (6) constructs were present in each construct. There were 16 items measuring all the aspects, using a five-point Likert scale response format with the following options: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

#### 4. Data Analysis

Two sets of data analysis methods were employed in analyzing data from respondents. IBM SPSS and Smart PLS-SEM software were used for analyzing the quantitative data while the studio-based method was used to present the qualitative data. For the quantitative data descriptive and inferential statistical analyses were carried out to summarize the data collected and test the hypotheses formulated.

##### 4.1. Demographic Characteristics

The demographic characteristics of participants are presented in Table 1.

**Table 1.** Demographic Characteristics of Participants

Variables	Category	Frequency	Percentage (%)
Gender	Male	92	80.0
	Female	23	20.0
Age Range	18 and below	2	1.7
	19-25	34	29.6
	26-35	34	29.6
	36-45	35	30.4
	46 and above	10	8.7
Marital Status	Single	49	42.7
	Dating	16	13.9
	Married	50	43.5
Religious Affiliation	Christianity	110	95.7
	Islam	5	4.3
Highest Educational Qualification	Junior High School	2	1.7
	Senior High School	12	10.4
	Degree	58	50.8
	Masters/MPhil	28	24.3
	PhD	15	13.0
Current Occupation	Formal employment	52	45.2
	Self-employment	13	11.3
	Apprenticeship	4	3.5
	Unemployed	3	2.6
	Student	43	37.4

The results indicate that 80% (n=92) of the participants were male while 20% (n=23) were female, an indication that a greater proportion of men engage in tattooing than women in the study area. The majority of participants (30%) were within the age range of 36-45, suggesting that young adults and middle-aged persons are more engaged in tattooing than younger individuals. The result further revealed that married persons (n=50) have tattoo more than singles (n=49) while persons dating (n=16) were in the

minority. The religious affiliation of participants indicated that majority 95.7% (n=110) were Christians while the minority were Muslims 4.3% (n=5). The participants' educational qualification was dominated by first degree holders 50.8% (n=58) with Junior High School certificate holders being the least 1.7% (n=2).

#### 4.1.1. Cronbach's Alpha and Composite Reliability Test

Cronbach's Alpha and Composite Reliability values in Table 2 indicate the internal consistency or reliability of the respective constructs in the study. According to Taber (2017), Cronbach Alpha values are considered acceptable if they range between 0.58-0.97. Fornell and Larcker (1981), suggest that if the composite reliability exceeds 0.6, the construct demonstrates acceptable composite reliability. In this study, Cronbach Alpha value for embracing tattoo inspired clothing is 0.754, indicating a moderate to good level of internal consistency while the Composite Reliability value is also 0.754, confirming the consistency of the construct. For individual perceptions, the Cronbach's Alpha value is 0.769, indicating a good level of internal consistency with the Composite Reliability value at 0.759, suggestive of a consistent measurement of the construct. The Cronbach Alpha value for Tattoo related risk is 0.667, indicating moderate to good internal consistency. The Composite Reliability value is 0.671 suggesting acceptable reliability. All the values suggest that the constructs measured in the study (embracing tattoo inspired clothing, individual perceptions and tattoo related risk) demonstrate reasonable internal consistency, with Cronbach's Alpha values above 0.7 and Composite Reliability values indicating consistent measurement.

**Table 2.** Cronbach's Alpha and Composite reliability values

	Cronbach's Alpha	Composite Reliability
Embracing tattoo inspired clothing	0.754	0.754
Individual perceptions	0.769	0.759
Tattoo related risk	0.667	0.671

#### 4.1.2. Discriminant Validity Analysis

Discriminant Validity is established when the square of the Average Variance Extracted (AVE) for each construct is greater than its highest correlation with any other construct (Fornell & Larcker, 1981). In this case, the diagonal elements with values 0.778, 0.670 and 0.643 as shown in Table 3, represents the correlations between each construct and its indicators. The off-diagonal elements with values 0.694, 0.566 and 0.835 represent the correlations between constructs. Since the off-diagonal elements are smaller than the diagonal elements, we can confirm that discriminant validity is supported among the constructs.

There is disagreement among academics over the HTMT threshold. Kline (2011) suggests a threshold of 0.90 or below, although Teo et al. (2008) advise a liberal threshold of 0.85. As a result, the HTMT result in Table 3 is below the 0.90 or 0.85 threshold.

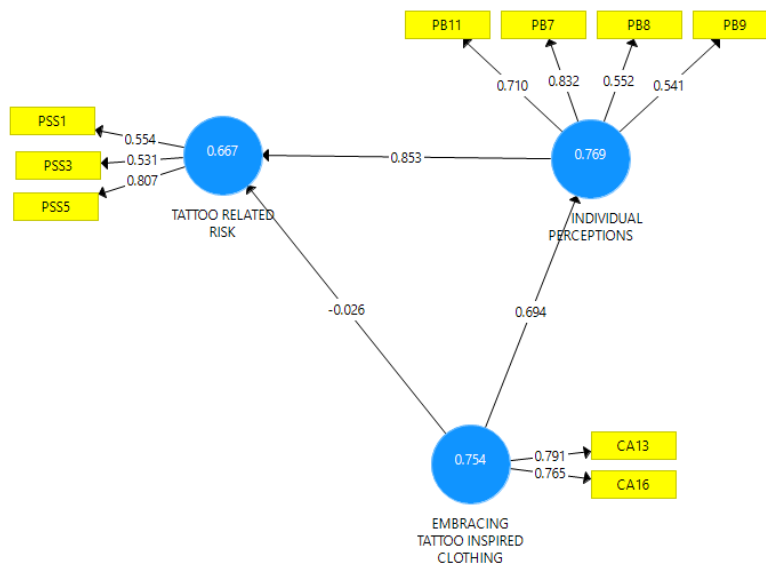


**Table 3.** Discriminant Validity Analysis and HTMT

	Embracing tattoo inspired clothing	Individual perception	Tattoo Related Risk
Embracing Tattoo Inspired Clothing	0.778	<b>0.675</b>	<b>0.535</b>
Individual Perception	0.694	0.670	<b>0.823</b>
Tattoo Related Risk	0.566	0.835	0.643

#### 4.1.3. Structural Equation Model

The study's data analysis method was the Structural Equation Model (SEM). The model appropriateness test was carried out to gauge the structural model's degree of conformance. Standardized Root Mean Square Residual (SRMR) requirements for acceptable fit should be less than 0.08 for satisfactory fitness (Hair *et al.*, 2014). As a result, the model is fit, as indicated by the SRMR (0.067) fitness statistics.

**Figure 1.** The results of the structural equation model analysis

#### 4.1.4. Structural Equation Model (SEM) fit indices:

A model adequacy assessment to evaluate the level of conformity of the Structural Equation Model was undertaken using a Standardized Root Mean Square Residual. According to Hair *et al.* (2014), a Standardized Root Mean Square Residual (SRMR) value below 0.08 indicates better fit. As shown in Table 4, the SRMR is slightly higher for the estimated model (0.071) compared to the saturated model (0.071). This suggests that the model is a good fit.

**Table 4.** Structural Model Assessment

Model Fit indices	Saturated Model	Estimated Model
SRMR	0.071	0.071

#### 4.1.5. Test of Hypothesis

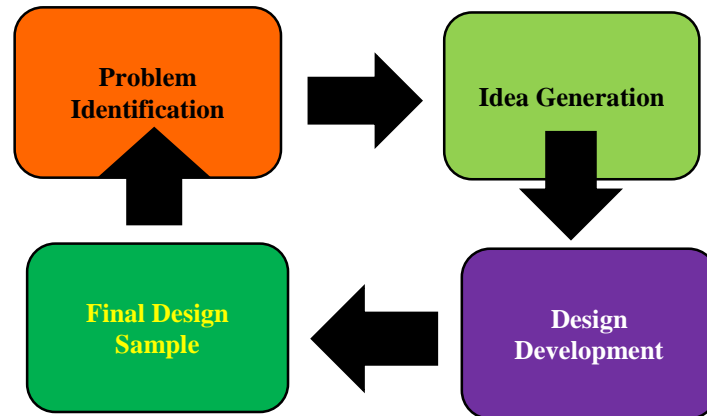
The hypothesis sought to test the mediating effect of tattoo inspired clothing on individual perceptions and tattoo-related risk. Thus, three variables were tested: tattoo-inspired clothing, individual perceptions and tattoo-related risk. The results showed Table 5 that embracing tattoo-inspired clothing has a positive effect on individual perceptions ( $\beta = 0.694$ ,  $t = 8.641$ ,  $p < 0.001$ ). This suggests that individuals who embrace tattoo-inspired clothing tend to have more positive perceptions about tattoos. Moreover, the results also indicate that embracing tattoo-inspired clothing has a positive effect on tattoo-related risk ( $\beta = -0.026$ ,  $t = 4.538$ ,  $p < 0.001$ ). This result even though contradictory at first glance (because of the negative path coefficient), the negative coefficient suggests that as the level of embracing tattoo-inspired clothing increases, the perceived tattoo-related risk decreases. This could imply that individuals who embrace tattoo-inspired clothing may perceive tattoo as less risky or stigmatizing. The results revealed that embracing tattoo-inspired clothing has a mediating effect on individual perceptions and tattoo-related risks. This means that the more individuals embrace tattoo-inspired clothing, the more positive their perceptions about tattoos become and the less they perceive tattoo-related risks. Therefore, tattoo-inspired clothing appears to play a significant role in shaping perceptions and reducing perceived risks associated with tattoos.

**Table 5.** Text of Hypothesis

Hypotheses	Standardized path coefficient	$\beta$ -values	t-values	P Values	$r^2$
Embracing tattoo inspired clothing -> Individual perceptions	0.062	0.694	8.641	0.001	0.769
Embracing tattoo inspired clothing -> Tattoo Related Risk	0.091	-0.026	4.538	0.001	0.754

#### 4.1.6. The Design Process

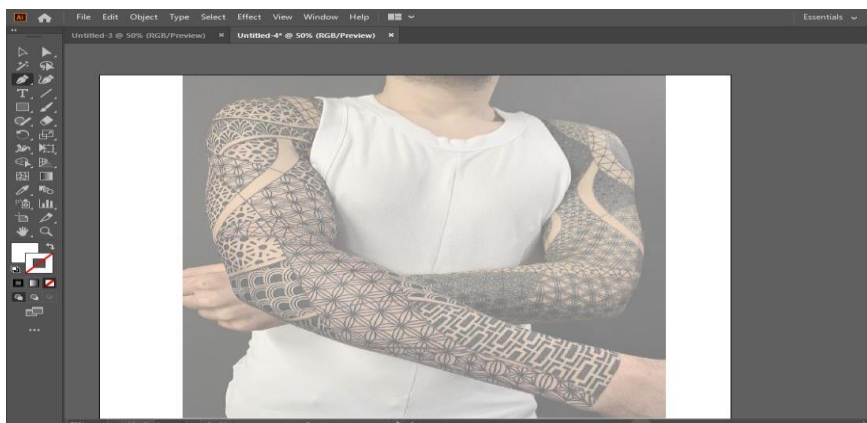
The design process is described by Schön (1983) as “reflection-in-action”, consisting of three separate steps: framing, moving and reflecting. Once a problem has been identified through a design process, designers “frame” it to serve as a guide for subsequent activities or “moves” Herr (2008). Design researchers have come to consider design as a process that can be expressed in the form of a dialogue-based model after creating the idea of design as a process of continual feedback between the designer and context (Herr, 2008). This study incorporates design applications and adopted the design process (Figure 1) as a guide in the creation and manipulation of tattoo inspired designs. The design process comprises four stages: 1) Identifying the Problem; 2) Generating Ideas; 3) Developing the Design and 4) Producing the Final Design Sample. Every stage delineates the different steps that were used to create the fabric designs. The tattoo designs were developed into textile prints and garments using the design process.



**Figure 2.** Researchers' Design framework  
**Source:** Personal construct, 2022

#### 4.1.7. Design Generation and Development

Following the design process (Schön, 1983; Wilson, 2001) the researchers began the creative process by looking at different body tattoos that could be translated into tattoo inspired fabric designs. The researchers looked around the internet for intriguing tattoo designs before executing the final designs. Inspiration was drawn from the colour scheme, forms and design components of fancy African print fabrics available on the market. The tattoos found were dominated by intricate geometric shapes and floral motifs. The tattoos were selected and imported into a Computer Aided Design Software (CAD) specifically, Adobe Illustrator and Adobe Photoshop. CAD software like Illustrator or Photoshop are appropriate for creating artworks, textile designs and other visual designs that incorporate intricate geometric shapes and images. They enable the tracing of objects in a photo, which can be used to recolor or add a sketchy look to a shot.



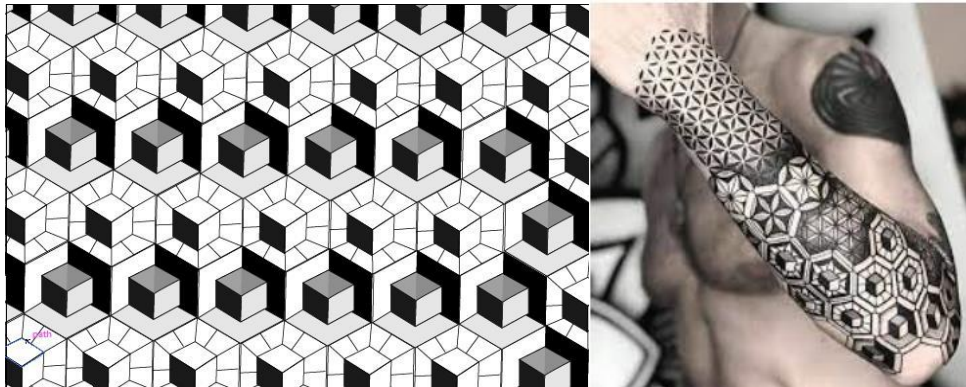
**Figure 3.** Sampled Imported Image Placed on a Template Layer  
**Source:** <https://www.google.com/search?client=firefox-b-d&q=Tattoo+designs>

To create intriguing designs for fabric prints, nine (9) distinct tattoos were manipulated. To create a design that would work for textile printing, each design had to be carefully worked on. As shown in Figure 4 below, the sampled drawings were then loaded into Adobe Illustrator for additional processing.

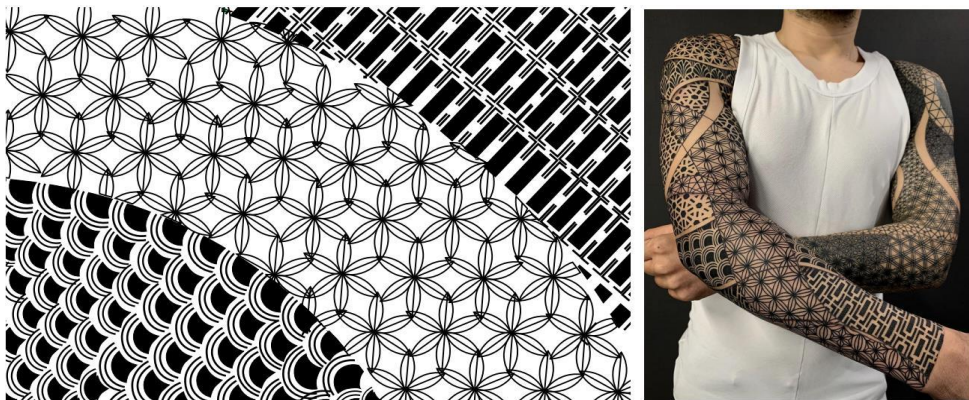
During the design development stage of the design process, the tattoo images were positioned on a template layer in Adobe Photoshop and traced as shown in Figure 3 - Figure 7. The traced shapes and motifs were selected and systematically replicated on a new layer to create patterns. This iterative process was repeated across various models until the desired textile designs were achieved. The tattoo motifs were then duplicated to form pattern designs initially in black and white.



**Figure 4.** Tracing Pattern from Template Layer



**Figure 5.** Sample Design 1 in Black and White Pattern, authors' work (2022)



**Figure 6.** Sample Design 2 in Black and White Pattern, authors' work (2022)

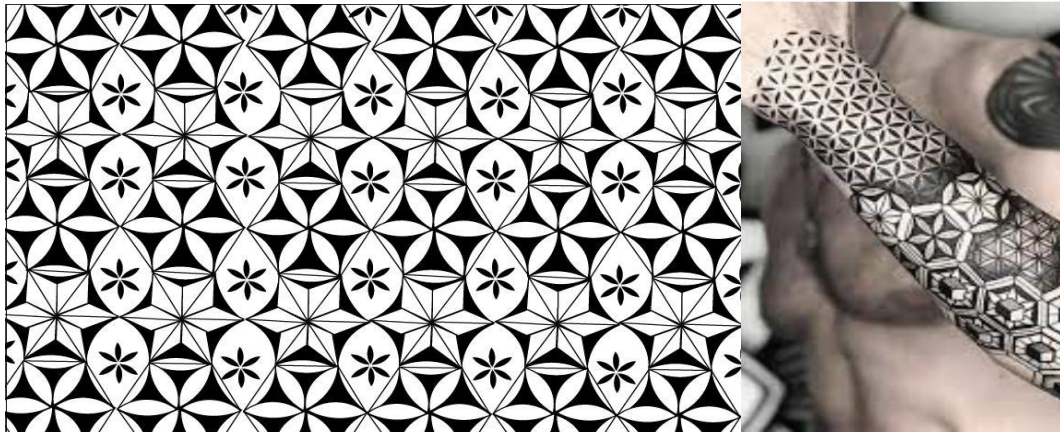


Figure 7. Sample Design 3 in Black and White Pattern, authors' work (2022)



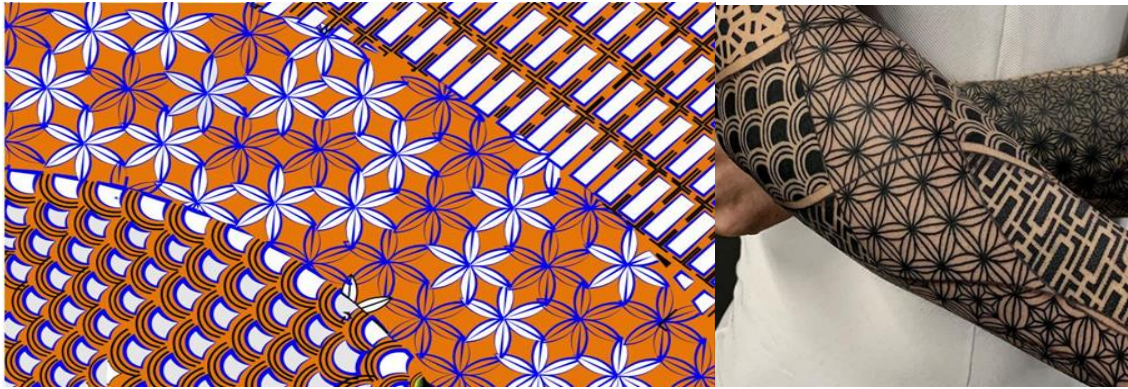
Figure 8. Sample Design 4 in Black and White Pattern, authors' work (2022)

#### 4.1.8. Final Design Sample

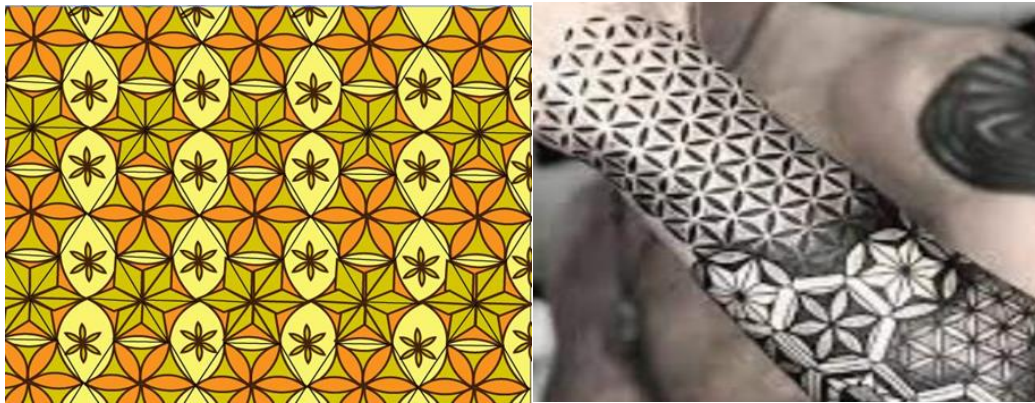
The tattoo designs which were initially in black and white were composed into fabric patterns. Each fabric pattern represents a tattoo-inspired motif. Different colour schemes influenced by fancy African print designs were chosen and applied to the various tattoo-inspired fabric pattern designs. In all, 9 designs were developed. The final designs (Figures 9 to 17) are presented as follows:



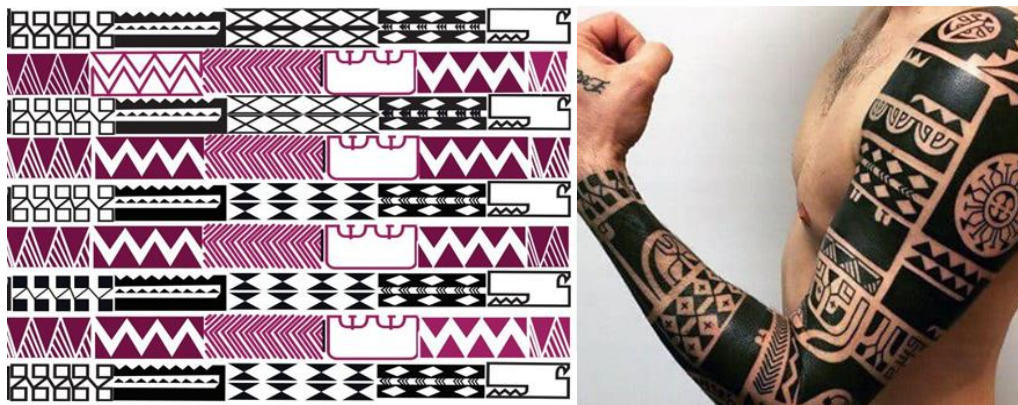
Figure 9. Final design of sample 1 in white, yellow and blue colour scheme, authors' work (2022)



**Figure 10.** Final design of sample 2 in orange, white and blue colour scheme, authors' work (2022)



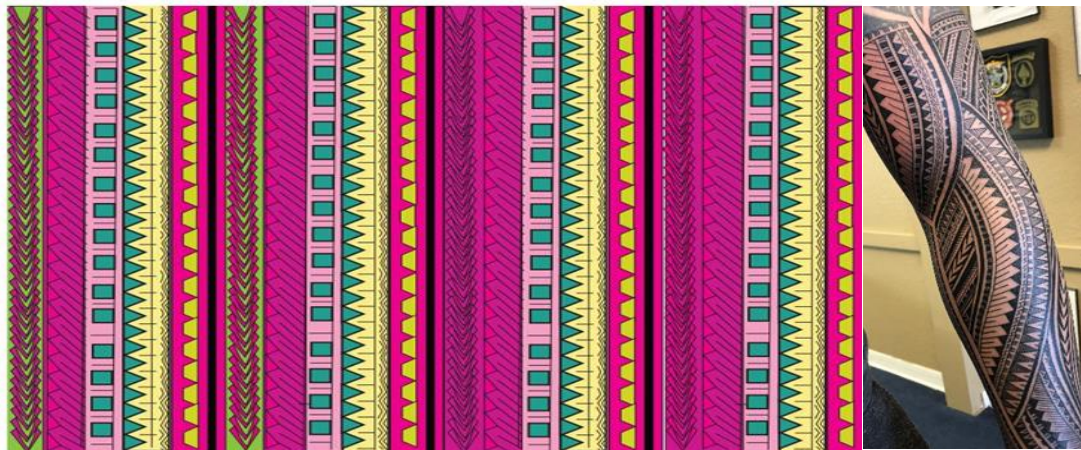
**Figure 11.** Final design of sample 3 in yellow, green and orange colour scheme, authors' work (2022)



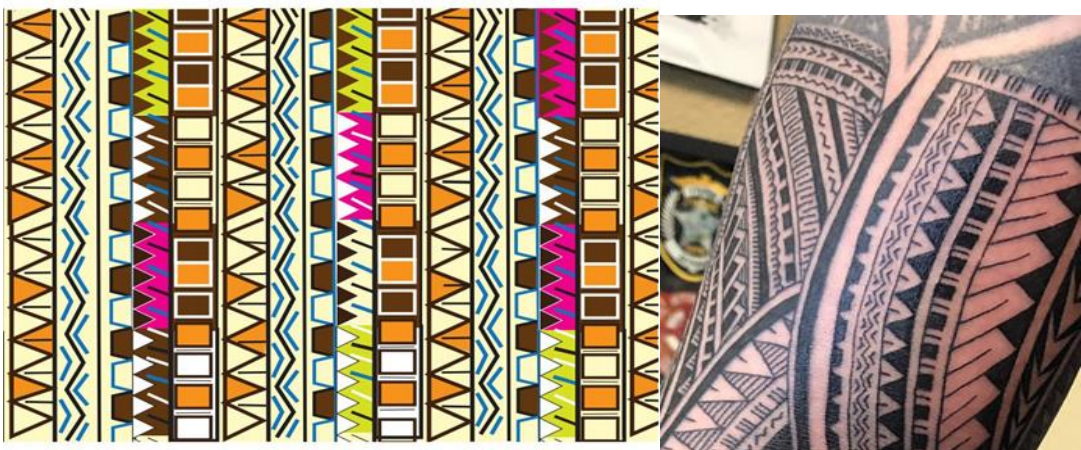
**Figure 12.** Final design of sample 4 on white background with purple and black motifs, authors' work (2022)



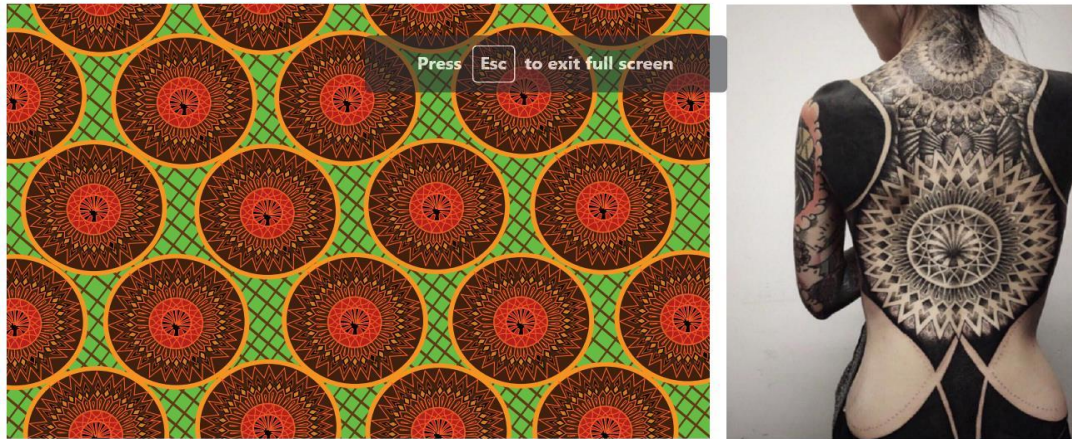
**Figure 13.** Final Design of sample 5 on white background with multiple colour scheme, authors' work (2022)



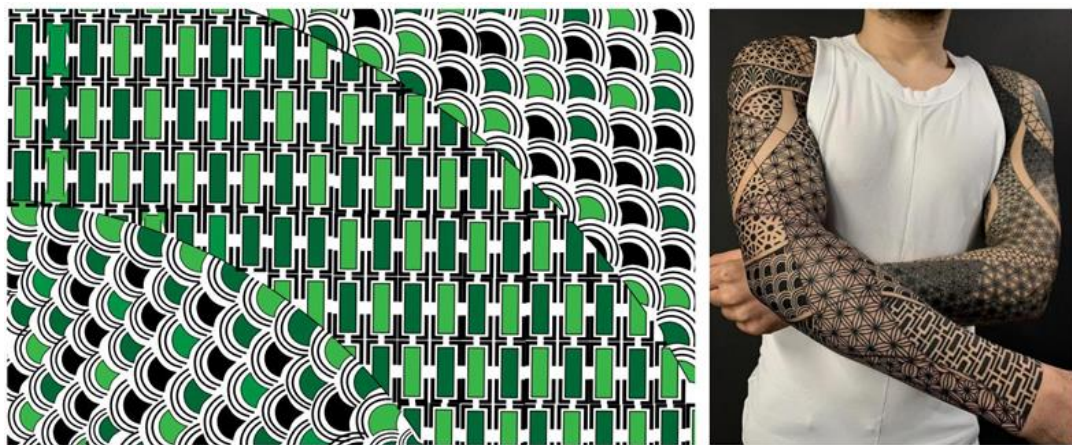
**Figure 14.** Final Design of sample 6 with multiple colour scheme, authors' work (2022)



**Figure 15.** Final Design of sample 7 with multiple colour scheme, authors' work (2022)



**Figure 16.** Final Design of sample 8 in multiple colour scheme, authors' work (2022)



**Figure 17.** Final Design of sample 9 in white, black and green colour scheme, authors' work (2022)

#### ***4.10. Simulation of tattoo-inspired Fabric Designs into Garments***

With the help of a Computer Aided Design (CAD) software the various tattoo-inspired fabric pattern designs were simulated into wearable garments. The integration of computer technology has revolutionized the textile industry by replacing labour intensive manual task with efficient digital processes (Nayak & Padhye, 2015). Fashion and Textile designers now have access to a wide array of computer software for tasks ranging from research and design to production and marketing (Wang *et al.*, 2005; Nayak *et al.*, 2015; Yan & Fiorito, 2002). Therefore, the CAD software seamlessly transformed the tattoo-inspired fabric designs into clothing with precise fit and drape on models. CAD significantly accelerated the creation and visualization of the clothing designs as shown in Figure 18. Fine details in a pre-computed clothing from the standard-size human were transferred onto a customized human with the use of CAD software. This is a helpful method that makes it easy to see how a clothing type fits a personalized body accurately.





Figure 18. Digital Images, authors' work (2022)

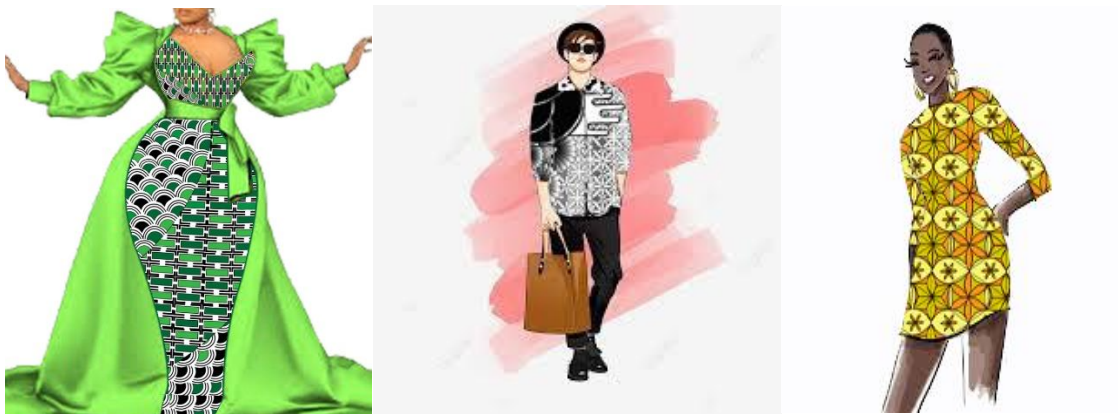


Figure 19. Detailed Garment Draping on Models, authors' work (2022)



Figure 20. Garment Style on Customized Bodies, authors' work (2022)

## 5. Results and discussion

This study explores tattoo-inspired textile prints and garments as a safer alternative to adorning the human body. The results of the quantitative phase of the study indicate that there is a mediating effect of embracing tattoo-inspired clothing on individual perceptions and tattoo-related risk. This implies that individuals who embrace tattoo-inspired clothing have positive perceptions about tattoos and perceive tattoo-related risks less risky or stigmatizing. Essentially, individuals who have preference for clothing styles that are inspired by tattoos tend to perceive related risk differently from those who do not. Consequently, tattoo-inspired clothing may play a role in shaping perceptions and reducing perceived risks associated with tattoos. Castellani (2018) supports the view that tattoos have a close relationship between clothing, personal presentation and identity within the context of apparel and fashion trends. Therefore, tattoos are seen as a form of communication that symbolizes the connection between adornment (clothing) and personal representation (Castellani, 2018). The implication of these findings suggests that interventions such as tattoo-inspired textiles will enhance fashion choices of tattoo enthusiasts and address the related risk perceptions about tattoo. However, there is the need for further research to uncover the intricate mechanisms and underlying factors influencing these perceptions. Fashion designers, textile technologists, policymakers and other stakeholders in the textile industry should collaborate to create environments that will embrace tattoo-inspired textile prints and garments as a safer alternative to permanent tattoos.

According to the major finding of the study, tattoo-inspired clothing may influence an individual's perception about safer ways of adorning the human body with tattoo designs. This therefore has implications for the qualitative part of the study which seeks to explore tattoo designs for conversion into textile prints and garments. The results of the qualitative phase of the study are therefore presented in the next paragraph.

In the qualitative phase, the study utilized Computer-Aided Design (CAD) software to translate tattoo inspired fabric designs into wearable garments, ensuring precision in the drape and fit of the clothing on models. This process involved various experiments to carve contour designs, determine suitable colour blends and texture combinations that complemented each model. The incorporation of CAD software into the design process facilitated the creation and visualization of garment designs ensuring efficient and precise design process. Additionally, the consideration for color blends and textures personalized to each model indicates a tailored approach, enhancing the garments' suitability and appeal to diverse individuals. The significance of this approach lies in its potential to revolutionize the fashion industry's design process. By leveraging CAD software, designers can create bespoke clothing with precision, catering for individual preferences without the need for extensive physical prototyping. This method does not only enhance efficiency but also offers a more sustainable approach to fashion design by reducing material wastage and optimizing resources. The integration of CAD software in translating tattoo-inspired textile prints into wearable garments demonstrates a forward-thinking approach in fashion design. The utilization of this technology showcases its ability to expedite the design process, ensure precision in garment creation and contribute to sustainable practices within the fashion industry. These findings underscore the need to promote tattoo-inspired clothing in enhancing fashion choices and addressing the related risk perception of individuals who are constrained by factors such as professional ethics and societal norms.

In the final design phase of the tattoo-inspired print and garment development, meticulous attention was paid to ensure that the final designs conform to industrial production standards and processes. The process involved selecting patterns and applying various color schemes, drawing inspiration from vibrant fabric samples sourced from the internet and observation of African prints found in shops. The resulting final designs (Figures 9 to 17) showcase the transformation of the black and white tattoo patterns into vivid and colorful renditions. The infusion of vibrant color schemes, inspired by the characteristics of fancy prints, brought life and vibrancy to the previously monochromatic tattoo designs. The design development stage represents a pivotal transformation in the design process, where monochromatic tattoo-inspired patterns evolved into vivid, culturally influenced fabric designs. This creative exploration through vibrant color applications and inspiration from fancy prints showcases the adaptability and potential of tattoo-inspired textile prints in catering for diverse tastes and preferences within the fashion industry.

## 6. Conclusion

This study was carried out to ascertain whether tattoo-inspired textile prints and garments can serve as safer ways of decorating the human body, given the fact that permanent tattoos which are done directly on the human skin predispose the wearer to some risks. The study was approached in a practical manner in which nine (9) different tattoo motifs were developed in gradual stages into textile prints and garment designs using the design process. The ability to effortlessly manipulate tattoo designs into textile designs was made possible by the Adobe Photoshop and Illustrator tools.

Structural Equation Model (SEM) was used to analyse the quantitative data of the study. According to the results of the study, tattoo-inspired clothing may play a role in shaping perceptions and reducing perceived risks associated with tattoos. The findings of this study have implications for the education sub sector and the textile and fashion industries. Textile and fashion students should be challenged to produce more innovative tattoo-inspired prints and garments to promote safer ways of adorning the human skin. By this study, the textile and garment industries will be inspired to produce the tattoo-inspired textile prints and garments on a larger scale which will go a long way to strengthen and accentuate the findings of the study.

It is therefore recommended that fashion designers should adopt the tattoo-inspired designs for the production of interesting garment collections. It is hoped that this novel research would stimulate the interest of design researchers across the world to conduct further research into possible ways of using design as a complement to the array of efforts being made by stake holders to reduce risks associated with permanent tattoos.

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