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Adopting an emotionally durable design approach, to develop knitted prototypes for women living with Raynaud's syndrome

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Abstract: This paper reports on an aspect of current research into designing knitwear products for Raynaud's Syndrome: a condition triggered by the cold or a drop in atmospheric temperature; causing numbness, pain, dexterity and mobility issues. Participatory research with a group of women, between the ages of 26 and 68 who suffer from Raynaud's, has identified a range of 'design issues' within existing products, some of which fail to mitigate the effects of cold and poor circulation effectively. In addition, many available products have limited appeal in terms of style, colour, pattern and texture. By considering the identified needs of this group, a range of knitted garment prototypes have been developed that respond to users' practical, aesthetic and emotional needs. This emotionally durable design approach, informed by IPA (Interpretative phenomenological analysis) builds on recent research into the development of new collaborative methodologies and business models that support product attachment and longevity (Townsend et al 2017 & 2018).

Introduction

In Raynaud's sufferers, narrowing of the blood vessels in the extremities occurs more quickly and extremely than normal. The process can cause numbness, pain and chilblains which can be irritating and uncomfortable, making everyday tasks and activities difficult and frustrating. This paper reports on an aspect of current research into design of knitwear products in response to knowledge and understanding of the daily experiences of women living with Raynaud's syndrome. For these women, living and coping with Raynaud's requires constant strategic management to remain warm through the careful selection and layering of clothing and accessories. However, not all products meet the women's physical wellbeing needs in terms of material performance, fit of the garment and comfort. Neither do products meet their psychological desires to feel stylish, to be provided with choice in aesthetics of a garment and to feel less self-conscious.

The paper begins by presenting a theoretical framework that underpins the human-centered methodology adopted in the research project. The methods and findings are reported, before describing how the needs and desires of the user are translated into design (knit) prototypes, including interim feedback from two participants of the prototypes.

Theoretical Framework

"as people become more sensitive to dimensions of products that go beyond traditional aspects of usability, the need to create emotional resonance between people and products increases"

(DiSalvo, 2004, p.251)

There is potential in products to generate psychological happiness as well as stimulating physiological wellbeing (Demibilek and Sener, 2003). In *Emotionally Durable Design*, Chapman (2005) urges industrialists to consider emotional durability alongside physical durability in new product development, to avoid product replacement or discard, due to customer dissatisfaction. Users' needs, and expectations of a product are changing and becoming more sophisticated as they increasingly seek a *"psychological lift"* (Tyagi and Goel, 2013, p312). Catering towards the potential for products to generate psychological

wellbeing or happiness, increases the strength of the relationship between product and consumer, preventing functional products being discarded (McDonagh-Philip et al, 2009). There are many theories as to how emotions are important in social and creative cognition (Neidderer and Townsend, 2014), how emotions are influenced by experience (Dewey, 1934), and how emotions elicited by a certain situation attract an individual's continuous engagement with that situation or stimulus (Frijda, 2009).

Within Desmet and Hekkert's (2007) product experience framework, three contributing elements are identified that affect the relationship between a user and product: aesthetic experience, experience of meaning and emotional experience. The aesthetic aspect is the sensorial feedback from the way a product looks, feels, sounds and smells. What a product means to its user, is defined through his/her cognitive processes *"like interpretation, memory retrieval, and associations"* assigned to the product (Ibid, 2007, p.4). And lastly, a product has the capacity to elicit emotions such as joy and desire, or fear and unpleasantness when using or imagining its usage.

Jordan argues that *"pleasure-based approaches to product design consider all of the potential benefits that a product can deliver – those of practical, emotional and hedonic benefits"* (2000, p12). Designing for product durability, goes beyond the physical mechanisms of artefacts, *"moving away from rational and practical issues to more subjective fields of experience"* (Mattelmaki, 2003, p119). The different elements of product attachment discussed by previous authors, underpins a design philosophy, to include a *"wearer's physical, psychological and social preferences"* (Moller and Kettley, 2017, p35). Implementing a human-centered design approach supports communication, interaction and empathy methods to develop a deeper understanding of the needs, desires, daily experiences and aspirations of participants (Giacomin, 2014, Bush, 2015). Gathering information on what is labelled as 'emotional' data (Crossley, 2003), includes terms such as feelings, aspirations, and emotional needs, by empathic design techniques and tools, such as in-depth interviews (Postma et al, 2012). Therefore, the project adopted a semi-structured interview method informed by IPA (Interpretive Phenomenological Analysis) (Smith and Pietkiewicz, 2012). This builds on recent research into emotional design to support product attachment and longevity (Townsend et al 2017 & 2018).

Method

The project carried out a series of in-depth, semi-structured interviews (Oct 2017-July 2018) with ten female participants living and coping with Raynaud's Syndrome. The interview schedule consisted of open-ended questions about different aspects of the women's experience with Raynaud's, to understand the meaning of living and coping with the condition: how the condition affected them; what daily challenges they faced; how they self-managed the condition; and their thoughts and feelings on topics discussed (Hassenzahl, 2008). Additionally, the inclusion of personal objects (Klepp and Bjerck, 2014; Townsend and Sadkowska, 2017), chosen by the interviewee prompted personal stories of meaningful experiences, making for a more productive interview (Martin and Hanington, 2012).

Findings: emergent themes

Analysis of the interviews generated three overarching themes: (1) Self-management strategies, (2) Material Affairs, and (3) Social Awareness. Theme (1) is concerned with how the women select and wear garments and accessories, to self-manage symptoms and support their physical well-being. The women's concern is for their health when reaching *"that level of cold"* where blood flow is restricted, causing numbness and pain. This impression of change to wardrobes is repeated across different women's testimony, as the women focus on *"being warm and comfortable"* (Louise, 61) as a prevention strategy. (Note that the names given for participants are pseudonyms.) Several of the women commandeer men's jumpers and jackets as they are more 'fit' for the women's needs. The sleeves and hem are longer, the fabric is warmer and there is room for layering underneath the garments. Furthermore, to augment practical design elements, the women make items such as wrist bands and toe covers to provide extra warmth. Bands on socks are stretched over bottles to ease tightness around the ankle. Additionally,

leggings and socks are worn inside out to avoid discomfort from the toe seam when the women's feet are cold. Additionally, the women had difficulty with standard fastenings such as buttons and zips when their hands are cold. Consequently, the women describe their wardrobe change from *"fashionable"* or *"stylish"* clothing, to *"practical"* or *"utilitarian"*. However, in doing so, there is a sense of compromise in *"style decisions"* (Mandy, 26).

Analysis of theme (2) finds that, whilst warmth and comfort are important for the women to self-manage their health, choosing clothing solely for warmth is mundane. According to Valerie, she's *"a bit boring"* in her selection of clothing, for this reason, Valerie seeks to find an alternative to fleece material. In similar vein, Carol explains that fleece fabric helps keep her warm, however she does not *"feel very smart in them"*. Margaret confesses that she does her best to search for *"aesthetics but thinking around my[her] health"*. Brenda (57) conveys her desire for more interesting and colourful garments, so much so that it's almost an addiction *"I, I'm almost… addicted to buying summer clothes that I can't wear just because they, they look so lovely and bright and, the textures, the textiles are so lovely"*.

Theme (3) highlights the women's awareness of how *"dressing accordingly"* for their condition, affects them in social situations, or in the company of others. Jane (35) highlights an issue with layering, which is common throughout the testimonies: layering might be an effective approach to keeping warm, however, this causes the women to "*sweat an incredible amount"* underneath the arms, which is *"really embarrassing"*. At times, Jane is reluctant to layer, which results in her feeling cold. Brenda describes a blue and white striped summer jumper. The jumper allows her to remain warm, but more importantly, it provides Brenda with a sense of fitting in, as the colours *"seems quite acceptable, that lots of people have blue and white shirts"*. Daisy (28) prefers gloves with a Velcro fastening, however, she is self-conscious of the sound they make whilst removing them in-doors. Daisy feels attention is drawn to her when she removes the gloves during meetings, *"hey, look at me, signing what everyone else signed without needing to wear gloves"*. Similarly, Jessie (51) expresses a desire for gloves and garments which blends into an everyday wardrobe *"something that's functional, you can wear every day, that, that, you're not gonna look odd"*.

The findings show the women self-manage the symptoms of Raynaud's by dressing strategically. 'Design issues' which the women contend with are highlighted. These inform knitted garment design solutions: a cardigan, a jumper and a pair of socks. The solutions include the lengthening of sleeves and hems for extra coverage; resolution of irritation of seams on socks; and the tightness of the band around the ankles. The requirements for fabrics are: warm, lightweight and aesthetically pleasing; and helping to prevent underarm sweating. Style, colour and texture are taken into consideration to produce attractive garments. And lastly, alternative fastenings to buttons and zips are explored to make it easier for the women to open and close the garment when their fingers are cold and painful.

Informed Knitted Prototypes

Figure 1 shows a knitted cardigan prototype, with a 'plush' knitting technique, where loops in the fabric create pockets of space to capture air for insulation purposes. This is located on the inside of the garment, except for the under-arm panels, as shown in Figure 2(D). These sections are knitted using a 'plating' technique, where two yarns were knitted side by side, creating a lined fabric. These panels reduce excess fabric under the arms and enhance breathability to reduce overheating. The collar (Figure 1(A)) and the wrist panels (Figure 1(C)), incorporate 'plush' on both sides of the fabric. This allows the fabric to be slightly rigid, allowing the collar to stand up, providing extra neck coverage. The cardigan's sleeves have extra length and Figure 2(E) shows the shaping of the cuff to provide extra coverage over the top of the wearer's hand.

The design elements of the cardigan responds to the women's desire for more stylish and warm clothing. The cardigan contains variations of texture and colour: teal coloured bespoke panels under the arms which contrast with the peach colour and baby pink collar and wrist panels. The grey centre front pockets (Figure 1 (B)) contain magnets to fasten the cardigan.

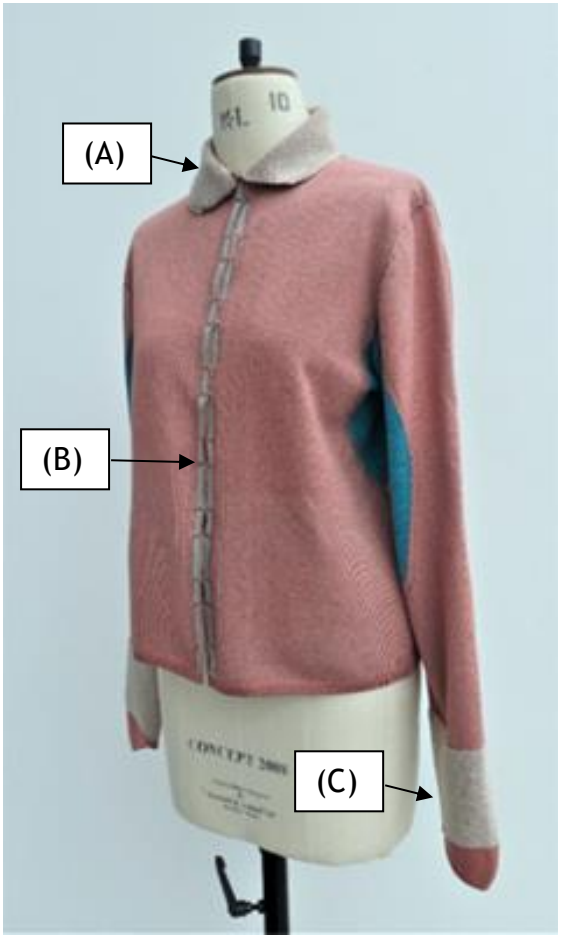

Figure 1. Knitted Cardigan Prototype, Lisa Shawgi, 2019

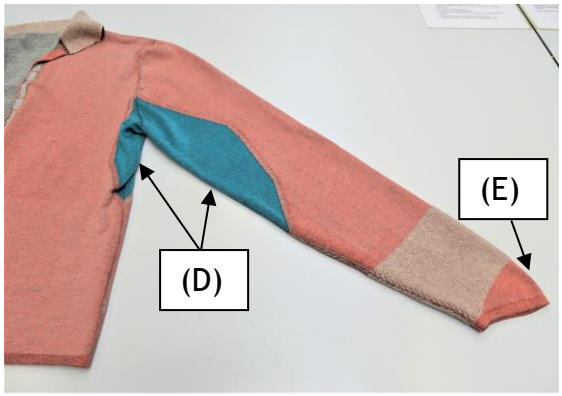

Figure 2. Knitted Cardigan Prototype, Lisa Shawgi, 2019

Figure 3 shows a knitted jumper prototype. The jumper combined 'plush' and 'plating' knit techniques in one fabric. Figure 3(A) shows the 'plush' side of the fabric and Figure 3(B) shows the 'plated' side of the fabric. The large collar, attached to a boat neck, allows the wearer to drape the collar over the shoulders, or bring it up to cover the head, similar to a hood, as seen in Figure 3. The jumper has extended sleeves to cover the hands with thumb holes, seen in Figure 4, and can be folded back on itself to create a cuff like effect (Figure 3(C)).

The jumper is designed to be reversible, allowing the wearer to have the 'plush' side close to the body to feel the warming benefits of this knit technique; or to have the 'plating' on the inside. As the viscose feels cooler to the touch, the wearer can reduce the sensation of being uncomfortably warm, by reversing the garment. Additionally, the jumper provides a sense of playfulness, as the shape can be altered by styling with a belt or the collar reoriented for a more off-the shoulder effect. The delicate pink stripes enhance the visual aesthetic and attractiveness.

Figure 3, Knitted Jumper Prototype, Lisa Shawgi, 2019

Figure 4, Close up of cuffs on the jumper (reversed) fully extended to cover the hands, Lisa Shawgi, 2019

Figure 5 shows a prototype of a pair of knitted summer socks. The sock design contains the knitting techniques 'plush' (Figure 5 (A)), and 'plating' (Figure 5(B)). The 'plush' fabric provides extra warmth and a cushion effect. The outside yarn in the 'plating' section (Figure 5(B)) is a combination of Lycra© and Crimp Nylon. This provides stretch, to give a more comfortable fit around the ankles and to improve durability. The band of the sock is knitted using a 'tubular' technique, as seen in Figure 4(C), it allows for a more comfortable fit around the ankles. The seam along the toes is brought further back along the foot (Figure 6(D)). The sock is shaped to accommodate a left and a right foot, see Figure 6, it creates a bespoke fit, conforming to the natural shape of the toes. The toe seams are linked 'point-to-point' to produce a flat seam and the front seam is hand sewn to prevent irritation due to bulky seams.

The sock is designed to provide extra warmth and comfort around the toes, sole and heel of the foot. The women's feet got cold in single layered socks, and when they do, the toes became sensitive to seams that come across the toe area. The moving of the seam and shaping the toe section to mirror a left and right foot, means the seam is below the toe line. The colours adds to the visual appearance of a fresh and light summer style, with a zig-zag eyelet lace pattern along the top. The inside of the band is a soft baby pink yarn, which adds to the sensual feel of the sock around the ankle and gives a contrasting visual effect.

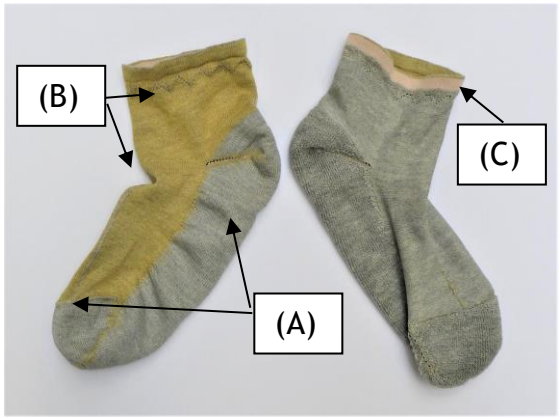

Figure 5, Side View of Knitted Socks Prototype, Lisa Shawgi, 2019

Figure 6, Top View of Knitted Socks Prototype, Lisa Shawgi, 2019

Interim Feedback

Interim feedback from two participants offered insights into the level of success in developing designs to meet the physical and subjective attributes of the prototypes. Both women commented on the aesthetical, sensorial and functional qualities of the prototypes, describing the garments as warm but lightweight and flexible, making them comfortable to wear. They referred to the garments as stylish, yet very practical in the design detail of the sleeves and collars. They appreciated design considerations to help with over-heating under the arms in the cardigan and were pleasantly surprised at how cool they felt wearing the jumper with the viscose close to their bodies. The sock felt comfortable to wear around the toes and ankle, and both noted the lace feature. A suggestion was made for a winter sock, knitted entirely in the 'plush' fabric and longer in length. Additionally, both women commented on how the magnetic closing feature on the cardigan would greatly help when their fingers are too cold to open and close buttons and zips. Another request was to increase the size of the collar on the jumper, to add more coverage for the head, as it is a design feature they liked. Both women found the prototypes to be refreshing and exciting to wear.

Discussion

By adopting a human-centered design approach, the project considers the emotional dimension when understanding women's experience with Raynaud's. Using IPA methods to analyses the data, rich qualitative narratives are produced to explore the role textiles play for the women physically and psychologically. The findings lead to a design approach, to create a harmonious product relationship, where the technical coincides with the aesthetic properties (O'Mahony, 2011) for a higher chance of a successful product user attachment on an emotional level (Chapman, 2014).

The research illustrates the importance of designing for the emotional needs of the user, to enhance the subjective wellbeing of the wearer. The knitted prototypes developed considers the emotional durability alongside the usability of a product. This is achieved by considering comfort, style and aesthetics within the knitted prototypes. The cardigan, jumper and socks are designed to be functional, yet stylish and allow for a more positive experience when wearing the garments. The interim feedback from two participants corroborated the level of success the prototypes meet their emotional needs to feel good physically and psychologically. The outcomes are elegant, sophisticated, contemporary women's knitwear samples, engineered to enhance emotional durability through positive experience. Further discussion with a focus group will inform future practical and theoretical recommendations when designing for product longevity.

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