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Sustainable Knowledge from Consumer Perspective Addressing Microfibre Pollution

Abstract

Purpose: This research investigates sustainable knowledge from a consumer perspective, thereby focusing on the issue of microfibre pollution (MFP) within the context of the athleisure wear industry.

Methodology: This research is exploratory in nature and supports its findings with 15 in-depth semi-structured interviews with consumers who have an invested interest in athleisure wear and either have a fashion or textile science background.

Findings: The results provide an insight into how different types of knowledge influence one another and which ones can act as barriers to acting more sustainably and more specifically in reducing MFP.

Research Limitations: Although the sample size is relatively small, participants were selected carefully to have different backgrounds and lifestyles, thus, providing valuable insights that can be explored further in the future.

Practical Implications: Communication is a key issue that has been identified, and which needs to be carefully addressed by providing both quantity and quality.

Originality: This research identifies interlinks between different knowledge types and potential barriers that need to be overcome in order to act more sustainably.

Keywords: Sustainable knowledge, Microfibre pollution, MFP, consumer perspective, athleisure wear, fashion

Paper type: Research paper

Introduction

Microfibre pollution (MFP) has emerged as a buzzword in the past decade and has centred media attention on the fashion industry, which is seen as one of the largest contributors to the problem (e.g. Parliament, 2018). The term *microfibre* is context dependent, within textile manufacturing it is a consciously created material that has a textile linear density of one denier or less and possesses valuable properties, such as softness, durability, and high absorbency. It can also refer to pollutants that are threadlike pieces measuring less than 5mm in size and are released predominantly from synthetic clothing during the aftercare process (e.g. laundering) into the water system (Yan *et al.*, 2019). *Microfibres* can have different origins and be categorised into regenerated cellulosic, natural, and synthetic *microfibres*, the latter is the focus of this paper, due to two-thirds of textile products today being made from synthetic fibres (e.g. polyester, polyamide, acrylic) (Henry *et al.*, 2019).

The athleisure wear market has grown dramatically since its emergence in 1979, having been forecasted to contribute £2.5bn in 2017 to the UK fashion industry (Yau, 2019). Athleisure is a combination of athletic, leisure, functional, and fashionable wear and caters for all sexes, ages, and cultures (Hayes and Venkatraman, 2016). The athleisure market is predicted to continuously grow, fostered by a change of lifestyle that includes sports (e.g. yoga), which promote healthy eating and wellbeing. Brands including Lululemon, Outdoor Voices, and fast-fashion retailers (e.g. ASOS, H&M), sell athleisure wear that is made from synthetic materials (e.g. polyester, nylon), due to being a comparatively cheap raw material and possessing valuable performance properties (e.g. durability, stretchability, moisture-wicking) (Medium, 2018). A question however is whether our (the consumers') urge for wellbeing could contribute to destroying the planet, as it could be argued that the increasing frequency with which these garments are being bought are contributing to MFP.

Although MFP has received increased attention, the majority of research centres on identifying the sources, pathways, and impact of *microfibres* on the natural environment, and measuring *microfibre* shedding rates (Leonas, 2018; Henry *et al.*, 2019). Research lacks focus from the consumer perspective of MFP, this could provide insights into the deep-rooted causes and provide feasible solutions to reduce long-term *microfibre* release (ibid). Although past research has highlighted potential *microfibre* mitigation strategies that can be implemented by consumers, such as reducing synthetic clothing consumption and changing maintenance behaviours during washing, these are not always implemented as these strategies require related knowledge that may not be readily available to consumers (Han *et al.*, 2017; Laitala *et al.*, 2018). We address this gap by investigating what sustainable knowledge consumers have in relation to MFP and how they gained this knowledge. Tackling MFP would imply changing existing consumption patterns, which can be achieved through communication strategies that tackle sustainable knowledge (ibid). Sustainable knowledge implies what a person knows about specific environmental issues (Chan and Lau, 2000). Thøgersen and Schrader (2012) highlight in order for consumers to actively act on more sustainable practices, it is vital to gain more knowledge for the initiation, diffusion, and improvement of the right actions.

This research contributes to broaden the lens of sustainable knowledge through categorising types and sources of sustainable knowledge in the context of MFP in the athleisure wear industry:

- 1) What types of sustainable knowledge related to MFP do consumers have?
- 2) What are the sources of these knowledge types?

Background – Microfibre Pollution (MFP)

Within the textile industry plastics play a key role, as synthetic fibres, such as polyester in particular polyethylene terephthalate (PET), polyamide and acrylic, account for two-thirds (64.9%) of the global production process (IVC, 2017) and thus, can be seen to contribute to the overall issue of MFP (Browne *et al.*, 2011; Leonas, 2018). The use and demand for polyester-based clothing has grown significantly; it is predicted that polyester will make up 95% of the future global synthetic fibre production growth by 2025 to reach 84 million metric tons (TechnonOrbiChem, 2014). The athleisure market has contributed to this growth, as it relies heavily on synthetic materials/fibres. Commercially, synthetic fibres are abundant in the market due to their cheap prices and performance properties (e.g. durability, water-repellent) (Hayes and Venkatraman, 2016). When washing plastic-based synthetic clothing/textiles, these fabrics (polyester, nylon, Spandex) release tiny plastic fibres, which are eventually transported to the marine environment in the form of *microfibres* (Hartline *et al.*, 2016).

Media attention has raised awareness of MFP in the marine environment, yet overall there is a lack of coherent information as to what MFP is and how the information is synthesised (OIA, 2016; Henry *et al.*, 2019). Current research into MFP focuses on textile technology research (Tanaka *et al.*, 2013; Leonas, 2018), potential existing solutions addressing this issue centre on sources, pathways of *microfibres*, and measuring *microfibre* shedding rates (Leonas, 2018; Henry *et al.*, 2019). To address the fact that *microfibres* are released predominantly during the laundry process, the following strategies have been developed in order to reduce the amount of fibres entering the wastewater stream:

- a) Washing clothes in front load washing machines;
- b) Wash full loads;
- c) Decrease temperature and spin speed;
- d) Reduce detergents;
- e) Use '*microfibre catchers*'.

It is questionable whether these strategies can always be implemented within both consumer households and industrial contexts. Furthermore, it is unclear whether consumers are aware of '*microfibre catchers*' (e.g. Cora Balls, Guppyfriend Bag), which are designed to filter *microfibres* during the laundering process. A key challenge is the lack of information telling users of these products and how to dispose or treat those entangled *microfibres* after washing. Although there are intentions to take *microfibres* out of the laundering process and thus, prevent them from entering the wastewater treatment system and ultimately the ocean, consumers are hindering the process by simply emptying the captured microfibrils into the sink spoiling efforts made to reducing their impact (e.g. Kart, 2019). In order to adapt those approaches requires related knowledge that is readily available and accessible for consumers (Han *et al.*, 2017; Laitala *et al.*, 2018). Yet, this is currently not addressed in research.

Literature review

Sustainable knowledge types

Sustainable knowledge has stirred debate since the 1980s, when it was defined as factual information that individuals have about the planet's ecology (e.g. Kong *et al.*, 2016). With sustainability becoming a top priority nationally and internationally, not only in the textile/fashion industry (UN, 2018a), it is vital to understand what underpins sustainability and how manufacturers, producers, and consumers can achieve it. Sustainability is concerned with social equity and human wellbeing; aspects such as availability of and access to environmental information, public participation, environmental education, and training (UN, 2018b) have seen increased attention over time. It is not surprising that sustainable knowledge has evolved from viewing nature as being separate from society and culture, to starting to categorise sustainable knowledge types (Murdoch and Clark, 1994; Kong *et al.*, 2016).

Previous research has solely focused on general sustainable knowledge of specific areas such as, the use of organic materials, energy saving, and hazardous chemicals. Kang *et al.* (2013) and Harris *et al.* (2016) criticised that this approach does not go far enough, as sustainable knowledge itself is complex. Heeren and Singh (2016) concur highlighting that there is a need to investigate one specific environmental problem and its related behaviours/actions. Past research (Aman *et al.*, 2012; Heeren and Singh, 2016) predominantly focuses on two or less different sustainable knowledge types, which is seen to not be sufficient in investigating the convergence of knowledge (Kaiser and Fuhrer, 2003). For consumers to be able to make an informed decision, information/knowledge needs to be broadcasted in a clear and coherent manner (Han *et al.*, 2017). Thus, to transfer sustainable knowledge effectively is not only a question of the content, but also the right way to communicate it with regards to format, timing, and context. Thus, the sources of sustainable knowledge are as important as the types of sustainable knowledge (Thøgersen and Schrader, 2012).

Within the fashion industry sustainable knowledge has gained momentum in the early 2000s; Chan and Lau (2000) emphasise that sustainable knowledge is the amount of knowledge a person has regarding specific environmental issues. This definition has been extended within the fashion industry over the past two decades to further categorise it into declarative, procedural, effectiveness, social, environmental, and consumer knowledge (Table 1) (Kong *et al.*, 2016). Yet, research remains limited.

Table 1: Different types of sustainable knowledge, explicit examples, and key literature gaps (Authors' own)

Insert Table 1 here

Declarative knowledge is based on scientific facts and includes definitions, causes, and consequences (Kaiser and Fuhrer, 2003; Kong *et al.*, 2016). In relation to the fashion industry this type of knowledge is appealing when it addresses environmental issues (e.g. climate change, biodiversity, plastic pollution). Declarative knowledge usually contains answers about an environmental system; thus, could

reduce uncertainty and encourage people to take actions. However, it has been criticised for being applied too narrowly, and not necessarily predicting sustainable behaviour (ibid). Procedural knowledge provides individuals with 'how-to' behavioural options, thus, a hands-on approach on changing patterns. Procedural knowledge is seen as a more appropriate determinant of sustainable behaviour than declarative knowledge (Aman *et al.*, 2012; Heeren and Singh, 2016). Effectiveness knowledge looks at the benefit cost ratio, in that it weighs up whether potential drawbacks of ecological benefits (e.g. higher cost) outweigh monetary value and effort (Kaiser and Fuhrer, 2003). Social knowledge or common knowledge could be seen as a type of peer pressure, in that it is a reaction that is influenced by others. In order to be seen as sustainable and gaining social approval of the 'in-group' individuals may act more sustainably (Kaiser and Fuhrer, 2003). This type of knowledge plays a crucial role in influencing behaviour by restraining a person from behaving unsustainable (e.g. Connell, 2010).

Environmental knowledge combines declarative knowledge with what the average consumer knows about a specific environmental issue, which they may have gained from media, for example, the 'fashion industry is the second most pollutant industry' (Chan and Lau, 2000; Haron *et al.*, 2005). Authors (Connell, 2010; Kang *et al.*, 2013) have argued that environmental knowledge has moved away from scientific facts and is more product and/or issue related, as consumers may read up on certain products/issues, if they have an invested interest on the topic. Consumer knowledge is closely linked to environmental knowledge in that it focuses on more specific aspects linked to a product/service. It goes further, by incorporating objective information stored in an individual's memory that relates to purchase, use, and disposal of products/services (Blackwell *et al.*, 2006; Han and Stoel, 2016). Consumer knowledge can be sub-divided into (ibid):

- a) *Product knowledge* – e.g. the raw material components of a product. It can affect consumer's attitude toward purchasing sustainable apparel;
- b) *Purchase knowledge* – e.g. price variance;
- c) *Consumption/usage knowledge* – e.g. how a product/service can be consumed, including use and maintenance;
- d) *Self-knowledge* – e.g. represents the individual's understanding of her/his own cognitive mental processes.

Sustainable knowledge sources

Sources of sustainable knowledge refer to the key communication channels that consumers utilise in order to gain information about sustainability and/or sustainable products (Kong *et al.*, 2016). Blackwell *et al.* (2006) indicated that different knowledge types utilise different knowledge sources for different purposes. They categorised product or service-related information sources into three areas: consumer (non-business controlled), marketer (business controlled), and public dominated sources (personal or impersonal). Research lacks to investigate whether sources of consumer/product knowledge can also be sources of sustainable knowledge, which we address. Table 2 provides a summary of general knowledge sources that could also be attributed to sustainable knowledge (Okur and Saricam, 2019; Zhou *et al.*, 2019).

Table 2: The sources of sustainable knowledge (adapted from Blackwell et al., 2006; Zhou et al., 2019)

Insert Table 2 here

Marketer dominated sources, which are controlled by the marketers, include face-to-face marketing through trained salespersons and traditional media outlets (e.g. magazines, billboards, advertising) (Mitra et al., 1999; Zhou et al., 2019). With the emergence of technology, electronic communication has become increasingly dominant (Cheung and Thadani, 2012). In the fashion industry social media plays a key part in developing marketing communication strategies (Zhou et al., 2019). Authors (Han et al., 2017; Okur and Saricam, 2019) indicate that social media is an effective tool to provide sustainable information to a wider audience. The emergence of opinion leaders, who are influencers that are seen to be knowledgeable about trends and/or specific topic areas, have further impacted on consumers' perceptions, awareness, and knowledge towards sustainability. Some opinion leaders manage to influence individuals' opinions, beliefs, values, and behaviours, and thus, have the power to change behaviours and attitudes (social knowledge), as consumers seek to enhance self-image or self-concept (consumer knowledge) (Zhou et al., 2019). Marketers have recognised the influential power of fashion opinion leaders and thus collaborate with them for electronic word-of-mouth (eWOM) marketing campaigns to promote products (ibid). Companies like Roxy and Patagonia are using social media platforms (Instagram) along with their brand ambassadors to promote general sustainable practices with little selling purpose (Patagonia, 2019; Roxy, 2019). Thus far, it is unknown how effective these opinion leaders are in communicating sustainable knowledge.

Marketers generally do not have any influence on consumer dominated sources, as these predominantly involve interpersonal communication (offline and/or online) and refer to word-of-mouth (WOM) and eWOM recommendations (Blackwell et al., 2006). WOM is regarded as one of the most influential factors affecting consumer behaviour, it is also considered as the most important information source in consumers' purchasing intention and decision-making process (Cheung and Thadani, 2012). As previously alluded to eWOM predominantly takes place on electronic platform such as online discussion forums, consumer review sites, and blogs, and is an informal online communication process between consumers addressing the use or information of products/services (ibid). A key advantage of eWOM is the fact that any consumer, who has access to the internet can share their experiences, opinions, and knowledge with others (Huete-Alcocer, 2017). Public sources are neither controlled by businesses nor consumers (Mitra et al., 1999) and are thus seen as more conservative in marketing and advertisement. Huete-Alcocer (2017) indicates that consumers seem to put more faith in sustainable information or knowledge offered by non-profit organisations (NPO), non-government organisation (NGO) or government bodies, as they are seen to be more objective and fact based compared to consumer opinions and retail messages.

Although there are various types of sources available, Han *et al.* (2017) believe that marketers can generate more product information and stories behind the sustainable products that appeal to consumers through a more personal connection. For instance, through in store dialogue with salespersons, they are able to convey messages in a more persuasive manner. However, consumers seem to lack trust in the actions that brands put forward in terms of sustainability, as it is unclear whether brands are engaging for a commercial purpose or for the general good (Blackwell *et al.*, 2006). Personal experience also seems to be a strong influencer and source of sustainable knowledge, as the best way to learn about a product is through consumption (*ibid.*).

Sustainable knowledge and consumer's attitude and behavioural intention

Knowledge can help change attitudes and stimulate actions; in addition, awareness levels of certain environmental issues can increase, which may lead to more favourable attitudes and behaviours (Aman *et al.*, 2012). Previous research studied the relation of sustainable knowledge and consumers' attitudes and behavioural intentions towards sustainable fashion or/and sustainable products, thereby mainly focusing on general sustainable knowledge, such as using organic and fair trade materials, energy saving, fair wages, and reduction of hazardous chemicals. Kang *et al.* (2013) and Harris *et al.* (2016) criticised this approach as sustainable knowledge encompasses more and is rather complex. It is questionable whether consumers consider all aspects incorporated in sustainable knowledge as these are manifold and could be hard to decipher/act upon (Henninger *et al.*, 2016; Evans and Peirson-Smith, 2018). Heeren and Singh (2016) and Evans and Peirson-Smith (2018) suggest that further research could investigate one specific environmental problem and its related behaviours. The majority of research addressing sustainable knowledge solely focuses on the purchasing process, and thus, disregards the product consumption (use and maintenance) stage (Okur and Saricam, 2019). We address this gap and investigate sustainable knowledge about MFP.

Past studies are inconclusive, for example, Haron *et al.* (2005) insist that consumers avoid situations in which they have insufficient knowledge to guide their sustainable behaviour and as a result could lead to confusion. Similarly, Evans and Peirson-Smith (2018) argued that the current level of knowledge is unsatisfactory for increasingly sophisticated consumers. Yet, it is unclear what 'insufficient knowledge' and 'not enough' imply and whether they concern simply the quantity of knowledge or the convergence of different types of knowledge. Moreover, previous research (Aman *et al.*, 2012; Heeren and Singh, 2016) rarely included more than two types of different sustainable knowledge and it has been seen as not sufficiently investigating the convergence of knowledge (Kong *et al.*, 2016). It is not the quantity of sustainable knowledge available that encourages sustainable behaviours, but the convergence of different forms of knowledge. Thus, it is valuable to understand the extent to which the different types of sustainable knowledge actually could affect customers' attitudes and behaviours differently, in addition to effectively encourage sustainable behaviours different forms of knowledge need to be considered together towards the common ecological goal (*ibid.*). Evans and Peirson-Smith (2018) suggested that effective sustainable communication needs to use more tangible concepts where sustainable

actions and benefits are clearly laid out and achievable. Connell (2010) highlights that there is a lack of knowledge of product or fibre properties and their impact upon the environment, as well as purchase knowledge such as 'where' to purchase these sustainable products, which could be barriers for consumers to make more sustainable purchase decision. Kang *et al.*'s (2013) study shares a similar result; they indicate that when consumers have more sustainable product knowledge and have directly experienced the product, they are likely to have more positive attitudes and purchase intentions towards the product. Thus, product knowledge that links to the use of material and its impact on environment, as well as product knowledge that is based on direct product experience of consumption may have a significant role in formulating consumers' attitudes and behavioural intentions: the higher level of product knowledge and environmental knowledge is, the higher willingness will be shown towards sustainable apparel purchase (Kang *et al.*, 2013; Okur and Saricam, 2019).

Methodology

Past research focusing on the interplay between sustainable knowledge and consumers' attitude-behaviour intention, has predominantly been quantitative (Heeren *et al.*, 2016; Kong *et al.*, 2016). Although this approach enhances the examination of key factors, it lacks deep-rooted understanding for underpinning attitudes/behaviours, and thus, fails to fully unravel the phenomenon under study (Nam *et al.*, 2017). This qualitative research explores the consumers' perspective of MFP and what sources of knowledge are used to get a better understanding of the phenomenon. In-depth semi-structured interviews were conducted with 15 participants, in order to explore more detailed reasons and to address new insight into consumers' perceptions of different types of sustainable knowledge and attitude-behaviour gap relate to the issue.

A combination of purposive and snowball sampling was implemented to recruit UK based fe/male participants, who have previously purchased athleisure wear, have an invested interest in the fashion industry and are over the age of 18. The final sample showed an even split between female and male participants, with a broad demographic spectrum, lifestyle, and cultural background (Table 3). Although the sample size is relatively small, it is deemed appropriate for the following reasons: 1) the phenomenon under investigation has only recently gained mainstream media attention, with people who have an invested interest in the fashion industry being more familiar with it; 2) in line with Apegyei (2008) and Apegyei *et al.* (2013) choosing a small clothing/fashion consumer sample is beneficial as they have specific perceptions and expectations that garments need to fulfil, which has an impact on the level of informedness and decision-making; 3) research by Yan *et al.* (2019) on a similar topic employed a similar sample, which allowed for in-depth discussions and exploring various angles of MFP. The sample in this research was purposively chosen to gain insights into MFP and allow participants to share their personal as well as professional experiences. Within this selected sample, the saturation point was met, highlighting that no further sources of sustainable knowledge were identified.

Table 3: Summary of Interviewees

Insert Table 3 here

The interviews, which averaged 55 minutes, were accompanied by photo prompts, to stimulate further discussions and provided insights into preferred channels of communication and perceptions of visual communication. The images were selected based on a pilot study, conducted prior to this research, in which the most prominent images identified were Justin Hofman's *Sewage Surfer*, which was the 2017 finalist for the Wildlife Photojournalist Award (NHM, n.d.), and showcases a seahorse holding a plastic cotton bud with its tail. The second image has featured in a BBC report on marine plastics and shows a seabird that had ingested plastic derbies (Gill, 2018). Easterby-Smith *et al.* (2015) emphasised that using visual materials as prompts may help interviewees express complex emotions, overcome discomfort, and encourage in-depth discussions.

Interviews were carefully transcribed, with each author coding a sample of the data independently, before discussing the emerging themes and patterns as a team, which allowed for intercoder reliability. Easterby-Smith *et al.*'s (2015) seven step guide of familiarisation, reflection, open coding, conceptualisation, focused re-coding, linking, and re-evaluation was utilised, as it allowed for *a priori* codes to emerge naturally. Any discrepancies were reviewed, discussed, and re-coded, with the first author conducting the majority of the data analysis, in order to ensure greater consistency.

Although the sample size may be seen as a limitation, the results provide insights into a new and emerging phenomenon that currently lacks research and a clear-cut definition. As such, this research provides thinking points and provides areas of further exploration. Moreover, participants with an invested interest in fashion may hold more knowledge about MFP than the general public, yet Cash *et al.* (2003) argued that effective knowledge system needs to integrate the perception of experts and non-experts together.

Findings and Discussion

The first observation concerned *microfibres* in more general terms, in that there is a difference between perceptions held of participants that are working in the industry and those that have a textile science background. The former highlight that microfibres were a key invention that has moved the fashion industry forward and provides opportunities to create garments that have soft texture. It is a valuable raw material that was intentionally created. Those participants without a textile science background indicate that they have heard about *microfibres* either through direct consumption or on the news. Participants had positive experiences with *microfibres* prior to hearing about MFP, as they are used in everyday products (cleaning utensils) and the luxury fashion industry. P4FA states: "*the first time I heard about microfibre was from my cleaning cloth, it's called microfibres, so you can clean things such as glass easily with this cloth*". From the interview it becomes apparent that P4FA has a positive connotation towards the product and *microfibres* as it allows them to clean with less chemicals, due to the cloth's performance properties. P10MI highlights "*I noticed that inside many luxury bags the lining is microfibres, which feels soft*". Thus, it is seen to contribute to

the luxury feel. Both participants claim that that they have never heard of MFP and cannot explain how their products would pollute the environment any more than other products that can be purchased. Other participants insist *“I don’t know much. I think it’s extremely thin fibres, it’s synthetic, it’s made of plastic basically, which is useful for industry purpose I think, it’s really durable as a material... I remember the problem of it is the manufacturing of it’s quite polluting”* (P12ML). It is interesting to note here that the pollution process is associated with the early stages of textile manufacturing, rather than the end-stages (use, maintenance).

Participants highlighted that they gained knowledge from news outlets (e.g. TV, news apps, newspapers). Some also indicated that they read articles about MFP that were shared by their friends on social media *“probably through the news or social media, I think I’ve seen my friends share it as well”* (P14MI). *“It was the news on TV, I probably saw it on social media as well”* (P2FA). It is implied that visuals help in attracting the participants’ attention to wanting to read an article – presuming that it is easily understood. Although social media has been seen as a key communication outlet, it was not seen as effective for communicating the MFP issue, as it is not a ‘trendy’ topic. There are two key findings: 1) the majority of participants gain either social knowledge through consumer dominated or public sources or consumer knowledge through the actual user experience (impersonal market controlled); 2) the knowledge sources (e.g. media, user experience) can act as influencers in that they provide consumers with information about MFP, which transforms into knowledge that can create intention to act upon it.

Towards the end of the interview participants were briefed of what MFP is according to the literature. We observed a shift in that even though participants claimed previously that they had never heard of MFP stated: *“I don’t know why, I kind of ignore it when it comes to new things. If it had been talked about for a long time by a lot of people, then I’ll have more interest in getting to know about it”* (P11FA). This highlights that although MFP is featured in news articles, it does not seem to be a key discussion point in everyday conversations. A reason could be that MFP is an almost an ‘intangible thing’. Whilst news reports indicate that our drinking water contains *microfibres*, they cannot be seen without a microscope. Thus, they may be removed from the consumers’ conscious mind and not part of a daily conversation. A further explanation could be that *“I think it’s because I don’t really know what it is, I don’t know a lot about it... I’ve never felt that motivated to read about it”* (P8FA). It is noteworthy that although all participants have an invested interest in the fashion industry, with some having textile science background, they indicated that they lack objective knowledge of microfibres. This highlights that people tend to avoid situations that seem too complex and where they have insufficient knowledge (Haron et al., 2005). Thøgersen and Schrader (2012) insist that sustainable knowledge needs to be both available and effectively communicated, implying that the format, timing, and context need to be right. This is supported within our data, with P3MI insisting *“I think it’s because last time when I heard about it, it was not a serious situation, it was just a simple casual conversation”*. This implies that current communication strategies may be insufficient in terms of providing enough detail about the severity of MFP.

Only few participants were able to highlight ‘where’ *microfibres* come from, ‘how’ they are emitted, ‘where’ they go, and ‘what’ it affects. *“Basically it’s like plastics*

got washed and went into water system, like affecting animals (P2FA). “*It’s like a mini shape of plastic fibres...I know they’re released in washing machines, a lot microfibres or microplastics come from every washing, and go out into the sea, and sea animals get them into their system*” (P1MI). From the interviews it becomes apparent that these participants read up on the issue, as they felt a need to understand what the issue is and how it impacts their personal wellbeing/health, which indicates a high level of environmental knowledge. Contrarily, other participants only had fragmented environmental knowledge, in that although they have seen news and social media reports, they were unable to fully recall the information. “*Is that the little thing that comes out from the clothes when you put them in the washing machine. Is that right? Then they kind of end up in the water*” (P12MI). “*It’s impacting the ocean, it goes into water, somehow, I don’t remember exactly how, but it actually changes water life in ocean, and marine lives is going to be in danger*” (P15MI). Although some information could be recalled in relation to MFP, the participants were unable to provide any fact-based figures, which suggests that either there is a lack of declarative knowledge that is communicated within the source channels they are using (Haron et al., 2005), or declarative knowledge is available yet communicated inefficiently and thus, cannot be recalled/understood. Data highlight that participants without a textile science background only act upon their knowledge through media and consumer experience, if they can see benefits in them (e.g. monetary gains, health related aspects). Thus, it could be suggested that whether or not these participants read up more on an issue and gain a better understanding of the general subject matter is dependent on effectiveness knowledge, in that if there is no obvious benefit, it will not be acted upon.

Participants seemed to be unsure of what *microfibres* are and whether they are the same as microplastics, or if there is a distinction to be made. “*A lot microfibres or microplastics come from every wash... I guess it’s like one of the worst pollution at the moment, microfibres or microplastics*” (P1MI). The latter issue, of using the terms almost interchangeably, could be explained in that current media widely focus on reporting on the impact of synthetic *microfibres* on MFP without explaining that synthetic *microfibres* are made from plastics and are petroleum based, as such they are microplastics. This highlights that effective and efficient communication is needed to avoid confusion and provide a better understanding of the issue (Evans and Peirson-Smith, 2018). Participants with a textile science background demonstrated more factual knowledge and were able to provide a more critical insight into the MFP issue. They indicated that MFP is not only concerned with synthetic *microfibres*, but also *microfibres* from other material types. “*Clothing does not matter what material is, as you wear it and as you wash it, those fibres start to untangle from the garment. So any type of fabric has this microfibre release problem, but I suppose synthetic fibres they are plastics so they do not breakdown*” (P6FA). They further insisted that “*it is not just one existing single pathway as ‘from washing machine to wastewater streams to ocean’, microfibres are coming out in the air because of the fraction*” (P6FA). “*From the manufacturing process, from washing, drying, even just normal rubbing when wearing, all the textile products actually release microfibres*” (P9FA). It is interesting to note that although P6FA and P9FA have a high level of environmental and declarative knowledge they were unaware of how to prevent or reduce shedding and the resulting microfibres to get into the wastewater stream, by for example using

inventions such as Cora Balls and the Guppyfriend Bags. This demonstrates a lack of procedural knowledge. Thus, it may not be surprising that participants felt frustrated towards the MFP issue. *"It is everywhere, it's almost inevitable, it's a big problem, and I have no idea how to solve it"* (P9FA). *"I don't know if there's anything available out there can solve this... All the information on social media is about the fact and the fear, but yet there is no solution, you feel lost actually"* (P6FA). This implies that current communication strategies focus on environmental knowledge that covers facts, but if there is no procedure knowledge offered, simply increasing awareness seems meaningless.

From the data it emerges that consumers feel procedural knowledge is vital in order to create a balance between knowing about an issue and being able to act upon it accordingly. A majority of participants stated: *"when reading too many scientific facts I always feel like we need to know about solutions, like practical things that people can implement in their everyday life"* (P13FI). *"People will only know the fact there's pollution, but don't know what to do with it, and then keep their habits"* (P5MA). Participants insist that they are struggling to gain information on how they personally can tackle MFP: *"It's really hard to get this information, I wouldn't know if you didn't tell me. Even I have more awareness than some other people, but still I don't get this kind of information"* (P4FA). P8FA further highlights that they shop at Patagonia, who sell a laundry bag that contains microfibres, yet *"I didn't know there is this kind of laundry bag out there"*. Although participants were previously not aware of any potential alternatives that could help preventing microfibres getting into the wastewater stream, they insist that *"it feels better knowing that there are some options"* (P13FI). *"I mean if I knew about that I would probably do that already. It's just if there are solutions, it's a bit ensuring"* (P12ML). P12ML suggest *"if there are solutions then they should make it known to people, and hopefully people should try to adapt them and use them as often as they can"*. Yet, a key determinant of actually acting upon these intentions is the availability of the product and the price: *"for the laundry bag, if it's easy to get then I will do that, but if it's on certain websites and cause a lot efforts to buy it then I might wait till it becomes 'easy to get'"* (P11FA). *"The laundry bag from Patagonia I feel like it's a good option, and of course if it's affordable price then I will..."* (P13FI). It is noteworthy that whilst participants felt positive about the Coral Balls and the Guppyfriend Bag, they did not believe that decreasing washing temperature and spin cycle, washing less frequently and using less detergent were feasible solutions. An explanation that was provided was a feeling of *'cleanliness'* and *'hygiene'* (P11FA). Interestingly, participants with a textile science background were not as easily convinced, as rather than focusing on the value-for-money aspect they demanded more objective knowledge, in terms of how the microfibre catchers work and how consumers can dispose of the caught microfibres. *"How does this bag catch the microfibres? If it's just mechanical filter system, then how do they get caught from clothing?"* (P9FA). P7FA further raised questions on what to do with used products that have absorbed microplastics. This finding is consistent with Cervellon and Wernerfelt's (2012) statement that consumers with expertise may expect to receive concrete factual information with measurable outcomes.

It can be said that if participants gained more environmental and/or declarative knowledge two barriers remain in order to translate it into procedural knowledge: 1) whether or not it is cost effective and the perceived benefits outweigh any drawbacks (effectiveness knowledge), 2) information that is communicated about potential solutions to reduce MFP. The latter is a key issue, as this communication barrier

implies that a majority of these participants, including those who have more relevant declarative and environmental knowledge, were unaware that they could reduce MFP through using 'microfibre catchers' (e.g. Guppyfriend Bag, Coral Balls). Participants insisted that a radical change in consumption patterns may be the only way forward, which links to self-knowledge. *"I'm the person who likes to take care of something and keep something as long as I can. I don't think that being wasteful is a good thing, so from consumer's point of view, buy less, keep it for longer, this is what we can do"* (P9FA). *"I think I'm a minimalist, it's nice mentally and physically in a way that you don't need too many things, you don't feel like you have to buy things all the time, and then you feel you are not doing bad to the environment"* (P4FA). All participants showed environmental concern and willingness to contribute to reduce the impact of MFP, which supports Fraj and Martinez (2006), who indicated that psychological variables that relate to a balanced conservative lifestyles and environmental concern may have evident influence on sustainable attitude and behavioural intention, since people with these variables showed more willingness to contribute to society improvements.

Tackling MFP requires the convergence of different types of knowledge to be ready to communicate to public, from our findings it shows only having any exclusive form of knowledge alone is not significant to predict sustainable attitude and behavioural intention. Additionally, effective knowledge systems need to be embedded in sustainable communication that take both the general public and experts into consideration (Cash et al., 2003). When observing the nature of the knowledge shared, we note that participants with textile science backgrounds hold higher levels of declarative and procedural knowledge, thereby showing interest in gaining more concrete and scientific facts and alternatives. Thus, experts require more breadth (different types) and depth (scientific facts) of sustainable knowledge within the communication provided.

Figure 1 summarises the findings, outlining that social knowledge can encourage consumers to gain both environmental and declarative knowledge. The more an issue is discussed in public, the more individuals will read up on the issue in order to be part of the conversation. Media is responsible for creating a buzz around an issue and provide easily accessible information. At the same time consumers may acquire knowledge through personal experience, by using products and reading up on their information. In order to act upon the knowledge gained, procedural knowledge needs to be available, which allows actively making changes. Few studies (Kaiser and Fuhrer, 2003; Kong et al., 2016) have shown that social knowledge can still restrain a person from conducting further research even when all other forms of knowledge are present. Murdoch and Clark (1994) indicate that once an understanding is established of what forms of knowledge emerge, appropriate (communication) tools can be implemented to encourage execution and ideally action. Our framework (Figure 1) highlights what type of knowledge is in existence, as well as the barriers that emerge, thereby highlighting that simply providing sustainable knowledge is not enough, but rather solutions also need to be present that fit with both value-for-money aspects, as well as factual knowledge that indicates how these solutions work and what their implications are.

Figure 1: Required sustainable knowledge types to tackle MFP

Insert Figure 1 here

Conclusion and Implications

This research contributes to sustainable knowledge by highlighting how different knowledge types interlink and which can act as (double) barriers to acting upon their (consumers') gained knowledge. Thus, our research systematically categorised different types of sustainable knowledge within the context of MFP in the fashion industry, and provided clear definitions and justifications for each type. From the participants in our research it becomes apparent that general consumers have a relatively low understanding and knowledge of MFP. Contrarily, participants with a textile science background have more declarative knowledge of MFP and demand more scientific facts, proofs and alternative solutions. Communication is key, as without any source of information, knowledge cannot be accumulated. The effectiveness of knowledge that is gained depends not only on the how (source) is communicated, but also what is communicated (content), as well as who the audience is (knowledge breadth and depth), this needs to be carefully balanced, which might be a challenge for marketers. Within the data set it became apparent that outcome driven communication is valuable, and potentially most effective. Outcome driven communication implies that the information provided is not only factual thus, providing information about an issue, but also highlights how this can be addressed. In this case – how can MFP be reduced? Thus, it is vital to provide carefully designed marketing strategies by addressing this aspect. When developing sustainable communication addressing MFP, companies should take into account that consumers vary from general public to experts in relevant fields, thus, a variety of communication channels and different knowledge levels are needed to engage consumers. Although the sample for this study was relatively small, it provides an insight into key issues from people with a varied background – future research could test the developed model and provide more generalizability to the research conducted. We further provide a framework that can be tested in the future, which could provide insights into the strength of the relationships created and whether there are any mediators that need to be addressed.

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