(e)Textile New Materialities

Abstract: This paper explores the intersections within bodily materialism and future textiles by inquiring into embodied practices and materiality in care. By placing the body as a site of research, it centres around concepts of bodily care and the body as an ecosystem, one that is always in flux and considers the fluidity of bodies and bodily fluids, such as urine, discharge, breath and sweat, as fluids with potential to design *with*. It looks at how bodies are acted upon by outside forces, and explore more-than-human relations as co-creators in co-habiting the space of the body and that around it. To illustrate this, the paper introduces a series of design research artefacts that take a variety of approaches to exploring the materiality of care in the everyday. First, an eTextile toolkit that aims to create bodily awareness through hands-on engagement with textile crafting technology, then a biotextile harvesting toolkit that involves the raw material of the intimate body that explores DIYbio in the context of the home, and lastly a set of wearable living material-based explorations that recognize biomimicry and symbiotic relationships in designing for chronic stress. In embracing notions of bodily materialism, this paper explores the bodily abject i.e. fluids and the more-than-human as crucial to engendering new modes of knowing in intimate and personal care through textile-based materials. The paper engages critically with textile design research and practice by placing *material* that embraces care as ambivalent at the forefront and thus challenging traditional approaches to health and care and, importantly, the design of future textiles.

Keywords: Critical textiles, new materialism, textile intra-activity, intimate care, women's health

1. Introduction

Textiles have long been used in support of intimate and personal health and wellbeing. When in close proximity to the body, textiles have a history of performing a protective function such as that of providing a barrier between the skin and the environment, for example by shielding from rough surfaces or insect bites, as a hygienic barrier when safeguarding from infectious and toxic materials, or protecting us from the weather by helping us keep cool or harm. Textile research and development have paved the way to exploring the boundaries and properties of a myriad of materials and technologies, and textile design and innovation to proliferate in disciplines such as biotechnology, synthetic biology or materials science. Textiles concerned with the health and wellbeing of the body abound, as is the case seen by advances in textile medical applications that aim to ameliorate health care. Examples in research include diagnostic textiles, which embed sensors on or within the body to monitor and observe (Promphet et al. 2020), or antimicrobial compounds in fabric-based products to prevent the transmission of a bacterial infection (Santos Morais, Miranda Guedes, and Lopes 2016). From fabric design to material technology, through to functional and smart materials, textile innovations continue to revolutionize the ways we care for ourselves and others.

In this paper, I explore how a shift toward self-care has contributed to a renewed focus on bodily materiality and intimate knowledge. In turn, this has led to critical explorations with and through the *matter* of textiles. Here, the concept of matter aligns with a broader understanding of "phenomena in their ongoing materialisation" (Barad 2007). As advanced by feminist new materialism, a field that emerged from the humanities and social sciences and which calls for a new understanding of, and an emphasis on, materiality (Coole and Frost 2010), it involves a re-turn to and readdressing of matter as dynamic and in flux, that which has agency. In engaging with this view on materiality, one in which agency means "doing" or "being" in its intra-activity (Barad 2007), I stress the relational engagements of bodily boundaries and textile technologies to explore the entanglement of such dynamics and intra-actions. In other words, textiles 'are made' and materialize through (more-than-human) relations with(in) human bodies and, for example, the physical world/nature or interactive communication e.g. conversations.

Moreover, the paper embraces the feminist concern for embodied and gendered care in addressing the bodily, materiality and matter as approaches that deem the body a (ever-changing) living organism. In doing this, it applies a feminist design research lens to inquire about materiality, while being attentive to what textiles can *do* when intersecting bodily materialism. In this regard, textiles are a product but also a medium for creating critical awareness and producing knowledge in (self-)care.

My previous work explores the biology of the body, bodily materiality, and notions of embodiment as conducive to reimagine modes of knowing in intimate care through textiles (Almeida 2019). The present paper extends this earlier work by focusing on the material-driven explorations and approaches to designing care-full interactions with textiles. In doing this, it explores notions of feminist new materialism to suggest that an intra-active approach to textile research, that which is entangled in the materials of the body, makes possible new understandings of textile. The paper starts by introducing textiles as a resource to knowledge production in bodily care and biology-inspired material interactions to design for and with the living material that is the body. Then, it presents three design-oriented case studies to illustrate how enquiring into material intra-activity and people's bodily boundaries can result in thoughtful textile-based technologies that permeate the dynamic nature of self-care. The studies represent original design work by three different authors, and work that has been developed in the contexts of research in human-computer interaction design, design practice and material futures, or design research. Each is an outcome of a research through design approach and a variety of methods, and range from working toolkits to speculative artefacts, resources for the production of new knowledge

in personal and intimate care. As such, these illustrate textile-oriented intra-activity that is always in flux and unfolding and textiles that emerge from processes that are interior and exterior the body, can enhance capacity and engage in critical materiality.

Finally, I continue to discuss how engaging with new materiality in textiles can provide better care, for our bodily selves and our specific temporal and relational contexts. Such an approach aims to show how inter- and transdisciplinarity in textile design and research, expertise across different fields, is instrumental to innovation and the creation of sustainable futures, and the role of future textiles in such futures. This work contributes to the existing literature in critical textiles that traverses disciplines such as computing, science, philosophy (Berzowska 2018)(Heinzel and Hinestroza 2020)(Strohmayer and Meissner 2017), and future material design research and practice that embraces the volatile materiality of the body.

2. Background and Related Work

In this section, I consider the myriad of ways in which textiles and bodily care have been entwined over the ages, more specifically how textiles have been researched and developed to attend to 'bodywork' and contribute to shaping bodily awareness. Further, I contemplate how bodily fluids and materials of the body are understood and experienced in context.

2.1. Textiles as Knowledge in Bodily Care

Caring for the body can be conflicting and often confusing, particularly when we do not have the resources or knowledge to attend to one's bodily peculiarities, susceptibilities or vulnerabilities. Personal and intimate care is a life-course endeavour, and the more intimate the 'bodywork' is the more it is aligned with bodily taboos and constructs of sexuality, generally associated with 'negativities of the body' (Twigg 2000). Negativities include dirt and decay, for instance, as implied in continence care (Almeida, Comber, and Balaam 2016). Stigmatized health and care issues, such as the cases of incontinence and menstruation, imply everyday material items, such as sanitary pads or protective underwear, to maintain hygiene and prevent leakiness. Typically, these are made of cotton, cloth, or synthetic fibres that offer varying levels of absorbency and sanitation. Most recently, textile technology developed to include novel products that promise to make such events more manageable and sustainable as they are designed around moisture-impermeable, absorbent, wicking layers of 'special' fabrics. Such innovations also started more open conversations about a wider range of neglected health and care issues such as postpartum bleeding (as seen in 'period-underwear' commercial brands[1], e.g. Thinx and Flux). Moreover, wearables that explore textiles as an approach to mitigate health and wellbeing conditions include personal artefacts ranging from digital mobile applications (apps) or Internet-of-Things (IoT) devices, which at times might combine an app with a wearable patch or insertable to collect data on the body, for example when monitoring heart rate or reading body temperature. These medical wearables can also serve to alert their wearer by providing a reminder or directly provide needed medicine or other bodily treatment. Such an ecosystem of wearable medical devices consists of monitoring complex physiological measures and help respond or act accordingly, and are designed to enable people with recurring bodily events or (chronic) conditions to engage in new levels of self-care independently of professional encounters and thus to lead more independent lives.

While consumer-facing products that leverage digital technology address pressing needs, design research that explore new approaches to the materiality of bodies has been investigated in relation to body literacy and embodiment. In taking the example of breast cancer, another stigmatized condition known to cause distress and social and health-related stigma, conceptual wearables such as Intimates (Almeida 2015), have explored the potential for wearable technology and smart materials to

[1] https://www.shethinx.com/; https://www.fluxundies.com/

support breast self-awareness and self-learning through the design of a piece of intimate apparel. In this work, the textile is the medium to promoting wellness education and intimate routines, namely that of a breast self-exam. Furthermore, when exploring new textiles for contact on and with the skin, inter- and transdisciplinarity collaboration becomes critical and fields such as nanotechnology, computer science, or material science engineering provide a wealth of expertise when it comes to advancing conceptual design proposals. A concept proposal as such would be Foxleaf Bra (da Costa 2015), which combines biotechnology with intimate apparel for localized drug delivery for women prone to developing breast cancer. A commercial exemplar can be seen in the ongoing development of Cyrcadia Breast Monitor[2], which integrates smart textiles for diagnosis. This collection of intimate wearables makes visible life events and preventative care practices that are significant to many. They reimagine a new generation of intimate health technologies that dignify the body throughout the life-course, without medicalizing it and outside the event of illness or disease. Rather, they are concerned with designs that are sensitive to the central commitments of feminism such as agency, identity and the self, and empowerment (Bardzell and Bardzell 2011). Similarly, this paper is committed to exploring future textile approaches that contend such principles and takes a feminist materialist design research approach to explore textile-centric designs that support bodily knowledge and care.

2.2. Biological and Living Materials

A feminist materialist perspective engages care and the body with the materiality of fluids that partake in material experiences of living and the bodily processes involved in matter, such as that of anatomy and physiology. For example, in exploring the body in bio(techno)logy, Tomasello and Almeida (2020) investigates the extent to which bodies are built for and require a lifetime of care – care that relies on everyday knowledge, is affected by misconceptions, stigma or taboo. Care that implies bodywork, which often involves parts of the body that are hidden, involved in sexual functioning or human waste, is tabooed to the extent that it can be a barrier to pursue better care. For example, the field of women's health and care, which includes sexual education, nutrition, through to safe abortion, has seen limitations in its development due to social-cultural exclusion or restrictions. In (Almeida 2019), I have enquired about the materiality of bodily fluids, as the leaks and flows that traverse bodily boundaries, to denote how "fluids with no potential" can contribute to change paradigms in women's health more broadly. Historically, bodily fluids held a privileged place within disciplines such as medicine, psychology, philosophy and biology, in their attempt to understand the functioning of humans in terms of "flowing" (Stephens 2014). Prior to advancements in Western medical science, four bodily *humours* (blood, yellow bile, phlegm and "black bile") were understood as "epistemic tools to assist in the representation of the communication between different parts of the body" (Orland 2012). If differently then, understandings of the body as a living material continue to this day and we can bear witness to 'humours' and their diverse qualities being part and parcel of the contemporary (understanding of the) body which is being actively remade by new regimes of pharmaceutics and biotechnologies (Stephens 2014). Moreover, there is a growing body of design research that explores bodily fluids in unconventional or non-traditional ways. Some examples include a home-shared device in which saliva is used as the main indicator to track fertility (Homewood, Bewley, and Boer 2019), an alternative gut-tracking device to inspect gut biota in relation to personal wellbeing (Boer et al. 2020), or a piece of underwear that can recognize inconsistencies in vaginal discharge and help diagnose gynaecological conditions (Che et al. 2019). Whether embedded in an everyday context or within everyday practices, these are research products and devices that appropriate the multiple presences of bodily matter and fluids on the body, and existing functions of, as per the latter, cloth underwear. In doing this, designers

[2] http://cyrcadiahealth.com/

and researchers re-imagine the products and devices to not only collect and contain fluids but to offer renewed meanings and extend the potential of what has been overlooked in bodily fluids. Mostly, these 'devices' require some level of biological exchange which 'lives through' the material that is the body. But, in the process, they also serve to produce knowledge of the ever-changing and living body, a doing that exposes the fluidity of bodies and that of the 'abject' body, the paradoxical concept of that which moves us within and outside the boundaries of disgust and fascination. The abject fluidity, i.e. the leaks, flows, and filtrations that occur across people's bodily boundaries (Longhurst 2001) are central to the textile design work advanced in this paper. It is the fluidity of bodies and bodily fluids, such as urine, mucus and sweat, in their material intra-active capacities of bodily matter (Colls 2007) that are critical participants in the processes of textile materialization, as explored in this paper.

3. Textiles and Material Bodies

In this section, I introduce three cases that illustrate the volatile materiality of bodies in the design of textiles. First, an intimate wearable textile toolkit that includes a series of artefacts designed for research and explores textile materials with electronics for health literacy and self-care. Then, a practice-based design exploration of a DIY toolkit that combines cloth underwear and bacteria to enquire alternative biological practices in support of intimate self-care. Finally, a suite of wearables created in an academic design research context that explore biological living materials and symbiotic design.

1# An Intimate Wearable Toolkit to Promote Knowledge in Intimate Care

The **eTextile Toolkit** is a research study that involved a textile-based toolkit designed to explore the materiality of the body in its anatomy, physiology and morphology (figure 1). The study aimed to tackle continence care in women, a topic in health and wellbeing that is often misunderstood. Further, it is an underrepresented topic in research but also in the everyday life, e.g. conjectures in popular knowledge that incontinence is exclusive to life events such as childbirth or ageing. In doing so, the research focused on preventative care practices and incontinence as a condition that can be assisted (prevented) by pelvic floor exercises ('Kegels'). The body disruption of urinary incontinence entails a lack of control over bodily fluids, i.e. urine. The study focused on preventative care and action, i.e. pelvic floor muscle exercise and training (the goal of pelvic floor muscle exercises is to strengthen and gain control over the pelvic muscles). In practice, the study comprised of a series of four workshops with communities of women aged 15-52. These were two-hours workshops structured around the *eTextile Toolkit* and composed of two activities, 1) a body mapping exercise to support conversations around and about bodily taboos that are problematised by touch and 2) a DIY (do-it-yourself) wearable eTextile consisting of materials to explore the anatomy of the pelvic floor. In engaging with clothing as embodied experience the focus is
the anatomy. In introducing an eTextile component, the focus expands to include the morphology of the pelvic floor muscles. Specifically, the eTextile provides a visual simulation of the muscles contracting and relaxing, a representation intended to stress awareness of the morphology and alert to the biomechanics of the female pelvic floor (Almeida et al. 2019). Generally, the toolkit focused on making with and through DIY artefacts supported by technology-enabled materials while interweaving aesthetics with the material landscape of electronic textiles and the body. It employed clothing underwear as embodied experience to invite women in a workshop setting to express knowledge of the body and to facilitate a conversation(s) around these intimate and private parts (ibid).

Drawing from a conceptualization of feminist biology to situate the work and further explore engagement with materials at hand (a toolkit), the research uses textiles as an experience and interactive material to learn with while aiming to bring to the fore the bodily disruption of urinary incontinence in

women. In moving forward, in (Almeida 2019) I discuss the toolkit as an approach and design intervention to *enabling knowledge through material engagement*. In doing this, I engaged with feminist new materialism as a concept that invites engagement not only with biological processes and behaviours as shaped by the social and the cultural, but also that of the material:

"... (de)constructing these body organs served as a catalyst for discussions around bodily fluids, e.g. urine, that is implicated in the normal functioning of the body but also in its disruption, i.e. incontinence. In the case of this toolkit, it accomplished this by emphasizing learning of the body through making, and while exploring the material landscape of electronic textiles. From this standpoint, conversations evolved around education on the body and the design of technologies that have the potential to promote practice routines and encourage motivation around preventative care practices (e.g. 'Kegels'). It also highlights the need to innovate in methods for dynamic engagement and to design in ways that destigmatise and demystify bodily functions and fluids while promoting situated knowledge." (Almeida 2019)

Figure 1: Engaging with the materiality of the body through (e)textile-based artefacts.

Approaches as such that consider enabling knowledge through material engagement hold the capacity to critically engage with the future of textile surfaces and interfaces. By exploring textile materials in relation to flux, specifically that of the body, or the body as an ecosystem and thus a living material, I aim to understand how the lived material body could have an impact on knowledge (of the self and other) and the design of tools and devices in health and care.

#2. A Wearable BioTextile for Female Intimate Health

One design exemplar of a wearable textile that involves the biological and living material is that of 'Future Flora'. Future Flora is a harvesting kit designed for women to treat and to prevent vaginal infections (figure 2). This kit is composed of an inoculation loop, a spreader, a pipette with freeze-dried bacterial compound and the nutrient agar-agar recipe, plus an instruction leaflet providing the necessary steps to grow and harvest one's own pad at home (Tomasello 2016). Tools as those seen in figure 2 were once institutionalised and only accessible to experts in a lab. Recently, they have become easy to obtain and are widely used by communities interested in e.g. DIYbio or citizen science. It is the delicate interaction of nurturing microorganisms at home, inviting women and anyone with vaginal fluids to become participants in the culture and knowledge of science, using ready to wear familiar accessories (intimate wearables) that may encourage an increasing and well-informed dialogue with our bodies (Tomasello and Almeida 2020). Future Flora attends to the role of the microbiome in human health and consists of a vaginal microbiota-based kit that is "as discrete in size as it is disruptive in terms of social and cultural impact" (Fontana 2019). The microbiome has seen a wealth of research in the past few years, e.g. science enquiring how gut health is interlinked with mental health (Dinan and Cryan 2015) through to design explorations that visualise gut biota as an aesthetic approach to reflection and appreciation of organs that 'are invisible and untouchable' (Boer et al. 2020). According to Future Flora, the existing symbiotic relationship between bacteria and the human body, i.e. the living organism,

provides women with an alternative way to become active participants in making their wellbeing. The body is an ecosystem, and the biological is as significant as the social, cultural, environmental frameworks entangled in our living with a microbial body. It is the fluidity of the bodily material that opens avenues to renewed ways of thinking about matter. The processes through which our bodily processes are managed, including 'fluids with no potential', can contribute to change paradigms in women's health more broadly. *The fabric of the body is a material of care* and, as suggested with this work, practices that traverse fluid boundaries could benefit from, e.g. exploring everyday clothing items and textile surfaces such as knickers. Traditionally, these protect and maintain intimate body parts, or contain any leakiness. Novel textile products already promise to rethink the experience of e.g. menstruation, such as with absorbent and leak-resistant period-proof underwear. Proposals such as Future Flora embrace a similar fluidity of the body by actively *addressing matter;* providing an intimate wearable for a preventative health care practice that includes naturally 'remedy' an (re)occurrence such as a vaginal infection.

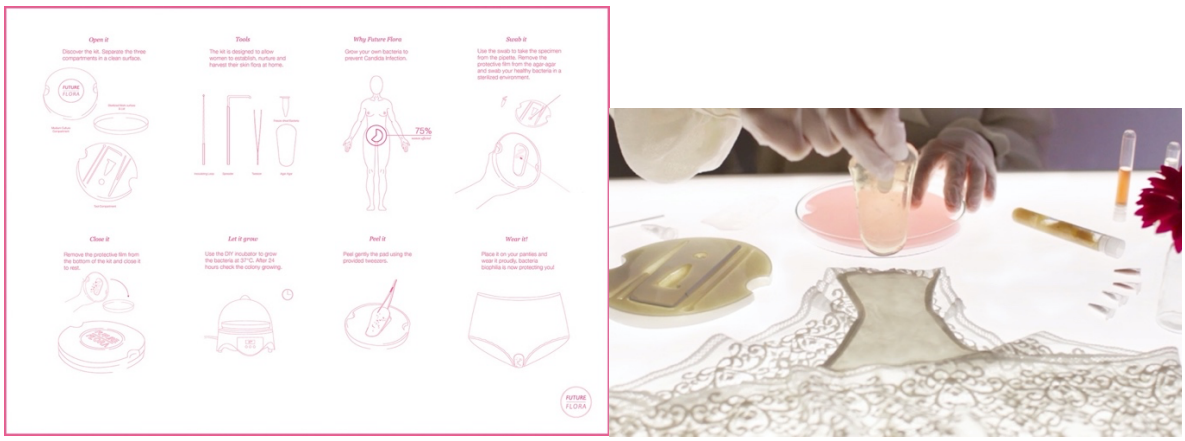

Figure 2: Future Flora (left: tools and instructions; right: the textile product).

#3. Symbiotic Wearables

While Future Flora focuses on the relationship between bacteria and the human body, in Symbionic (Geleff Nielsen 2020) Geleff Nielsen explores biological living materials, specifically mycelium and bacterial cellulose, to propose a series of living wearable textiles that attend to the (dys)regulation of the immune system[3]. Symptoms of a weakened immune system include sensitivity to infections, and a weak immune system can be devastating for vulnerable people, such as people diagnosed with cancer, or most recently for those debilitated by COVID-19. In Symbionic, the biology-inspired materials are used to develop textile-like surfaces that aim to promote one's health and wellbeing. This design research takes inspiration from Geleff Nielsen's personal experience of a low immune system[4] which leads her to live with chronic stress. Chronic stress means that the body is constantly responding to threats, which over time can affect general health. When chronic (stress), the body will constantly be under threat from viruses and bacteria, and vulnerable to everyday illnesses (McEwen and Sapolsky 2006). Acute stress is the 'fight or flight' reaction to a threat, which is a natural reaction that releases hormones such as cortisol and adrenaline.

[3] The immune system is built from our cells, organs, proteins and tissue, and it is the sum of the whole that defend the body against illness (McEwen and Sapolsky 2006).

[4] *Trigeminal neuralgia* is a chronic pain condition that affects the trigeminal nerve (responsible for sensation in the face and motor functions such as biting and chewing).

In practice, these material explorations resulted in three wearable prototypes. These are a set of speculative designs that appropriate the biological materials mycelium and bacterial cellulose (SCOBY: Symbiotic Culture of Bacteria and Yeast) through a material-centred methodology that serves as the basis to start an inquiry regarding the inherent material qualities of these living fungus and bacteria, and how they could support and maintain regular life and health conditions. Moreover, and similarly to the 'negativities of the body' (Twigg 2000), Geleff Nielsen addresses 'abjection' as that which contends dirt or decay as causing a sense of disgust and fear. Here, abjection is seen as that which impacts our sense of self when it feels threatened by the Other. While evoking feelings of the *abject,* the wearables produced through this work also invoke feelings of comfort and solace, as if they can restore a sense of physical and psychological wellbeing. In exploring alternative, sustainable materials as textile surfaces and bodily interfaces, the biological and living qualities surface in unexpected ways. These are entangled in feelings of fear, rejection, or affinity with nature and the natural environment, i.e. living systems, respectively defined as biophobia or biophilia. Therefore, biophobia and biophilia turn attention to subjective understandings and distinct levels of abjection, pending one's appreciation or repulsion of, for example, bodily fluids.

These speculative prototypes question how future materials, in particular those that go on or within the skin, can co-habit, shape, and 'grow' in harmony with an everchanging ecosystem of humans and nature, to sustain a healthy balance between human and non-human actors such as stress hormones, sweat, or fungi.

The wearable prototypes introduced in this section are inspired by natural symbiotic mutualistic relationships, one in which the relationship benefits both partners ("Symbiosis" n.d.). One example is that of the *Bacterial cellulose mask* (figure 3). This is a speculative design stemming from the current situation with COVID-19, during which people all over the world have begun to wear face masks as a way to protect themselves and others from the virus. In exploring the fabric(ated) material, one that is not fully functional as bacterial cellulose is not breathable or easy to disinfect, the aim was to inquire how possible wearers would feel to having a living wearable take care of them. This Bacterial cellulose mask incorporates plants on the inside so that it provides a layer of absorptive material, and in this way to tackle the issue that stems from people generating water in the lungs if they wear the masks for a longer time than recommended.

Figure 3: Bacterial cellulose mask, prototypes

Another set of exemplars is that of the *Cortisol level monitor bracelet and patch* which is an attempt to redesign the more traditional flash glucose monitor, a device that measures a person's sugar (glucose) levels continuously throughout the day. The system design includes a tiny needle that is usually found within the monitor, and that stings the wearer, staying in place, then to notify them if their cortisol level is rising. Instead, with the *Cortisol level monitor bracelet and patch* a wearer or user would be able to rely on the steroid hormone (cortisol) instead, that which regulates the immune response and plays a role in helping the body respond to stress while refraining from pinching under the skin.

Overall, the three prototypes are more or less perceptible by touch as living wearables, some having visible mushrooms sprouting from the mycelium. The prototypes range from a biophobic to a more biophilic design, each representing different levels of abjection, i.e. the biophobic design more explicitly linking to the abject and inner instinctual fear of natural phenomena. This was observed in Geleff Nielsen's interview study with two participants, in which they were asked to try out and comment on the wearables. For example, the feeling of disgust when wearing the bacterial cellulose mask and the smell that may be attached to it, as expressed by one of the participants. Or, as in the case of a more biophilic oriented design, feeling like being in touch and connecting to our instinct for caring and an innate need to be close to nature, as commented by the other participant.

Figure 4: Cortisol level monitor, bracelet and patch (left: biophobia design; right: biophilia design).

4. Discussion and Conclusion

4.1 Engaging with New Materiality in Textiles

The materiality of care in its relation to bodily matters is pervasive across hormones, microbes, vaginas, clothing, to name a few and provided some examples in practice. Routines and behaviours we adopt as part of our every day have an impact on our lives over time. The materials of our everyday life include those in, within, on and around us. There should be little doubt that textiles are integral to our wellbeing when in the world, and that future innovation should be critical of that same world. From soft wearables through to biological textiles, we pursue an understanding of the body as one that is permeable and vulnerable, albeit one through which we live and engage with throughout the life course. As suggested by Puig de la Bellacasa (2017), when thinking speculatively about care new relationships might unfold. It is this profound engagement with the world and fragility of boundaries that open up to new possibilities for caring and therefore to 'knowing more'. Knowing, specifically in this paper, addresses that of understandings of and caring for the lived materiality of the body, which includes the material interchanges within and across the human body but also that of nature and the wider material world (Alaimo and Hekman 2007). As seen in the case studies introduced in the paper, different approaches

can be conducive to promote lived material bodies and fluid boundaries and exchanges. In enabling knowledge through material engagement, for instance through touch and textile as introduced in study #1, the fabric of the body as seen in study #2, or the symbiotic approach explored in case #3, knowledge of the body with (abject) fluids shifts to accommodate novel perspectives of care that partake in material experiences of living. While the materiality of a subject's embodied experience might be impure and uncontrollable (Grosz 1994), it is also what sustains bodily existence and balance, e.g. urinating or sweating are bodily fluids that necessarily need to be produced and expelled to keep regenerating the body.

By emphasizing body materialism through textile surfaces, one can reimagine how future interventions and practices can account for, broadly, a more sustainable mode of living, or more specifically how engagement with textile-based materials offers opportunities for advancing understandings of the biology of the body and the body as an ecosystem. Textiles as an experience and interactive material to learn with and/or live with can be a medium to discover, play, and sustain a good life. As "we seek to understand ourselves as living creatures bound to human and nonhuman creatures, to entire systems and networks of life" (Judith Butler in Yancy 2019), the multiple ways in which textiles can provide for better balance and harmonious co-living is promising. The design research introduced in this paper attempt to live to such expectations and forge the way forward, all the while making knowledge and promoting (self-)care in care-full interactions and attention to the materiality and sociality of the body.

4.2 Materials of Care

Developing a new understanding of the body through the experience of continence care, vaginal infection or chronic stress, might impact self-knowledge and knowledge of the other, but also revolutionize the way we design wearable systems that support bodily care and help maintain good body hygiene and fluid exchanges, even controlling our immunological cells and regulate our immune system. The three cases introduce in the paper required an interdisciplinary approach to design and research, combining the expert knowledge of professionals across fields such as women's health physiotherapy, biotechnology engineering, nursing, and speculative material-centred design. Textiles that go beyond their traditional functions are plenty, and surely collaborations across fields are too. Examples that resonate can be found in Textile Futures (Quinn 2010), where over a decade ago a large number of exemplars deriving from practice and research already showed how promising textiles are when embracing "new types of fabrics and fulfil new roles" (ibid), and interdisciplinary explorations that embark in material science or biology to reimagine fashion, environments, or health care have been expanding ever since. This paper explores notions of textile materiality and the volatility of bodies further by bringing in a research perspective that is situated in critical health and a feminist new materialist approach to the body and textiles. This accounts for perspectives on embodiment that involve the fluidity of the body and looking at *matter* as 'an active participant in the world's becoming' (Barad 2003). For example, in line with Puig de la Bellacasa's view on the many qualities of caring (Puig de la Bellacasa 2017), in that it should account for non-humans, exemplar #3 follows a design process that assists humans in thinking more sympathetically of other species they share nature and the world with. This might include biological living materials such as mycelium and bacterial cellulose, which one might find abject by feelings of fear or disgust.

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