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Fabric, Fitness, and Femininity:
A New Materialist Analysis of the Activewear Phenomenon

A thesis
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of the requirements for the degree
of
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ABSTRACT

Activewear refers to casual clothing designed specifically for both function (enables and supports movement) and fashion. Since the early 2000s (and arguably earlier), activewear has seen a dramatic increase in popularity amongst women described, by some, as a fundamental change in women's dress. Although often dismissed as simply the latest fashion trend, the activewear phenomenon can be understood as a complex entanglement of branding, fabric, skin, fat, muscle, consumption, environmentalism, gender, healthism, neoliberalism, and politics. While extremely prevalent in popular culture, there is limited socio-cultural scholarship on this complex phenomenon. This research seeks to better understand the connection between activewear, women's fitness, and broader ideas around women's moving bodies and femininity using a new materialist theoretical framework.

New materialisms refer to a series of theories and concepts that are part of the posthumanist turn in social sciences. Although the approaches vary, in general, feminist new materialisms emphasise the vitality and liveliness of nonhuman matter, centralise the relationship between humans and nonhumans, see research processes as co-implicated in the production of knowledge, and maintain a political orientation towards the doing of gender. While many have discussed the theoretical implications of new materialisms, only recently have scholars begun exploring how to put new materialist concepts into practice in the research process. Therefore, this thesis contributes to a growing body of literature on the empirical possibilities of new materialisms. In particular, I use new materialist feminist physicist, Karen Barad's theory of agential realism.

Bringing together an array of humanist-based (interviews, focus groups, photo diaries) and creative methods, this research explores the potential of Baradian theory for studying the activewear phenomenon. Using three Baradian concepts (spacetime-mattering, intra-action, and entanglement), I examine the material-discursive production of gender, fit femininity,

and feminist politics within the activewear phenomenon. More specifically, I show how Barad's spacetime-mattering allows for an understanding of the ways activewear is entangled with previous iterations of femininity and works to rearticulate femininity as strong and powerful. Next, I bring together the material (i.e., clothing and bodies) with the discourses around activewear to emphasise how fit femininity and idealised bodies are produced through an entanglement of leggings, clothing, bodies, advertisements, and discourses. Finally, I use Barad's concept of entanglement and writings on bodily boundaries to reimagine women's moving bodies as phenomenon comprised of human and nonhuman entities. The thesis concludes with a discussion of the possibilities and challenges of using Baradian theory within feminist sport sociology. In particular, I describe how Barad's agential realism allows for an understanding of activewear as a vital force in the production of boundaries around acceptable femininity. I also speak to some of the tensions and challenges scholars may experience when working with Baradian theory, such as issues with accessibility, representation, and time. In using new materialisms to understand activewear, this thesis contributes to the socio-cultural study of women's fitness using a novel and innovative approach, in addition to advancing the literature on new materialisms and its empirical implications for feminist scholars of the moving body.

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As I come to the end of my doctoral journey, I look back and reflect over the past three years. The tangible product of this journey may be a thesis and a degree, but my doctoral experience has been about so much more. It has been an experience and education in how to be a critical, compassionate, and caring feminist scholar.

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CHAPTER ONE

Introduction

It's 9pm and I'm packing my gym bag for tomorrow. *First up? I'm taking BodyAttack. Top? Check. Bottoms? Black spandex shorts with the holes in them or the black and turquoise high waist that won't fall down?* I grab the turquoise pants from my drawer and stuff them in my bag. *Bra? BodyAttack has running and high knees, I definitely need the Moving Comfort one.* Rummaging through my drawers. *Where is it?* I race to the garage where it's been drying since yesterday's workout. Pulling the stretchy pink Lycra to my nose for a brief whiff, *eghh, it'll just have to do. At least it's dry.* *Next up. I have to teach cycling and BodyPump at night, so I need a top that isn't too low cut and, long pants so my legs don't rub on the seat, and a moderately tight sports bra? The pink one!* Zipping up my bag, I throw it on the floor of my bedroom. *Ready for tomorrow. My nightly ritual.*

"30 more seconds, keep going" Jo yells from the stage of the aerobics studio at Les Mills. *I can't do mountain climbers for another 30 seconds!* My pants are slowly making their way towards my ankles and this top has turned into a true crop top. I feel my midriff becoming exposed. *Damn it!* I stop the climbers, kneel, and pull my pants up to their rightful position. As I stand there readjusting, I look around. All I see are bodies moving; legs pumping, butts bouncing, torsos and heads bobbing. I'm surrounded by long, short, thin, wide, and more and less muscular limbs squeezed into tight, black capri pants; backs that are cut into segments of flesh by the bondage inspired straps of sports bras, the skin of torsos peeking through the cut-outs on the tops. "DONE" Jo yells, interrupting my moment of reflection. Bodies slump back and the studio is filled with the huffing breaths of activewear clad gym goers. Class is over, thank goodness. Off to the locker-room. Showered, I pull on my stretched-out, but oh-so-soft leggings and the tight, deodorant-marked matching quarter zip. I pack my sweaty clothes back into my bag where they will stay, zipped away for the day, until I get home tonight to unpack and repack for tomorrow.

Bedroom floors, couches, gyms, grocery stores, yoga studios, cafés, runways, sidewalks; these are some of the many physical spaces where activewear lives. While activewear¹— also known as athleisure, sportswear, athletic-wear, and fashionable leisure clothing— is an umbrella term used to describe clothes designed for physical activity, Lipson et al. (2020) refer to a traditional athleisure outfit as one that “consists of a form-fitting top and bottoms; the top often exposes a significant amount of skin or emphasises a woman’s figure and the

¹ There are disagreements over whether athleisure and activewear are synonymous (see Wilson, 2018) but for the purpose of this thesis, I use them interchangeably.

standard bottoms are leggings² or spandex shorts” (p. 5). Since roughly the early 2000s (and arguably earlier), activewear has seen a dramatic increase in popularity amongst women with one report estimating the global market to be valued at over 350 billion USD and growing exponentially (Driver, 2020; Lipson et al., 2020). As titles of popular press articles have noted, “Athleisure is not just a trend — it’s a fundamental shift in how people dress” (Green, 2017), describing it as “an emerging fashion statement that is becoming the new normal” (Hanson, 2017). However, activewear is more than just a fashion statement. It is a complex entanglement including branding, marketing, fabric, skin, sweat, fat, muscle, consumption, capitalism, environmentalism, gender, sexuality, social media, healthism, neoliberalism, and politics.

In March of 2019, a mother of a male student at Notre Dame University in the United States wrote an open letter to women on the campus saying, “Leggings are so naked, so form fitting, so exposing. Could you think of the mothers of sons next time you go shopping and considering choosing jeans instead?” (Tiffany, 2019, para 2). She argued that leggings displayed too much of women’s bodies which was causing her son and other boys to be distracted in class. This is not an isolated incident nor the first time that women wearing activewear have been shamed for their clothing and bodies. Just five months prior to the Notre Dame letter, the head football coach at Rowan University began a tirade against the coach of the women’s track and field team after the female athletes began to run in their sports bras on a hot afternoon (Minsberg, 2018). As Stripling (2019) reports, “How was Accorsi [football coach] supposed to get 18 year old boys to concentrate on X’s and O’s when their eyes were ‘going back and forth’ at the sight of ‘girls running out here with sports bras’” (para 3). In the United States and Australia, some middle and high schools have

² Activewear companies use different terminology for their pants: running pants, yoga pants, tights, and leggings. In this thesis, I use leggings as a broad term to describe tight-fitting pants designed for physical activity.

enforced dress codes preventing girls from wearing leggings, labelling them as “inappropriate” and contributing to a poor learning environment (Fisher, 2014; Tiffany, 2019). In Aotearoa³ New Zealand, cafés have barred people from wearing Lycra (O'Reilly, 2016; Roy, 2016). These incidences are a continuation of a long history of the objectification and policing of women’s bodies (Chesney-Lind, 2017; Flavin, 2008).

An article in *Marie Claire*, a popular press fashion magazine, mapped the history of patriarchal societies dictating women’s fashion back to 2500 BC where wealthy women were forced to wear veils to show they were “publicly available” to men (Redfern, 2016). However, alongside this policing and objectification, lies a rich history of resistance to these patriarchal demands. For example, in Puerto Rico in 1919, writer and activist Luisa Capetillo, frustrated by the ban on women being allowed to wear pants, wore a man’s suit in public knowing that she would be jailed for her resistance. Today, such acts of resistance have continued in response to the criticism of women wearing activewear in public. For example, there was a “Leggings Pride Day” at the University of Notre Dame (Alesali & Zdanowicz, 2019) and a yoga pants parade in Rhode Island protesting against “misogyny and men dictating how women should dress” (“Hundreds of women,” 2016, para 3) after a man wrote an op-ed piece criticising women wearing leggings. There have also been written pieces such as, “Hell yeah, we’re fighting about leggings again” (Lutkin, 2018) and “It’s possible leggings are the future. Deal with it” (Friedman, 2019). These protests and stories go beyond the actual leggings, but are concerned with the ways women’s bodies (and clothing) have been scrutinised and policed in public spaces. As Friedman (2019) says in her counter protest piece, “One of the great gotchas of fashion is that what may appear superficial or unimportant

³ To acknowledge the Indigenous ancestral history of New Zealand, I use both the Te Reo Māori and English names for locations. Aotearoa is the Te Reo Māori name for New Zealand, Kirikiriroa is the name for Hamilton, and Te Ika-a-Māui refers to the North Island.

(leggings!) is, in fact, representative of a more complicated, harder to express reality” (para 14).

Athleisure is also a material phenomenon with fabric and materiality playing a key role in the rise in popularity of this clothing style. In the past 20 years, advances in technology have led to the development of new fabrics and materials that are advertised as affecting (and improving) physical performance. For example, lululemon (controversially and now disproven), stated that their seaweed clothing had “therapeutic and performance benefits” (Ratner, 2007). Similarly, in a description of their new UA Rush fabric, Under Armour states that that they are “changing the performance apparel game by introducing responsive textiles and gear, scientifically designed to enhance performance” (“Scientifically Proven”, 2019, para 1). It is now common for companies to have entire pages of their websites devoted to descriptions and detailed information on the fabrics and technology they have developed to improve physical activity performance (e.g., muscular support, increased blood circulation, improved body temperature regulation). In athleisure, the material and fabric itself have played a crucial role in the rise of this phenomenon.

Although omnipresent in today’s Western societies, and a part of so many factions of society, the athleisure phenomenon has rarely been explored as an *entire* nexus from a socio-cultural perspective and, even more specifically, studied in relation to women’s experiences of fitness (for an exception, see Lipson et al., 2020). Therefore, this thesis addresses this gap in knowledge by exploring the relationship between athleisure and women’s embodied experiences of fitness. Recognising the various dimensions of activewear and the importance of materiality in this phenomenon, I use new materialisms to think through this phenomenon. New materialisms are theoretical approaches that have gained recent attention for their focus on the vitality of matter and for their desire to build upon previous ways of knowing and doing research (Alaimo & Hekman, 2008a; Coole & Frost, 2010b; van der Tuin, 2011).

These theories can be seen as part of the posthumanist⁴ ontological turn in the social sciences that question anthropocentrism and urge a renewed focus on matter (Alaimo & Hekman, 2008a; Fox & Alldred, 2017; St. Pierre et al., 2016). While new materialisms have been popular among social scientists, particularly in the field of education (Allen, 2018; Mazzei & Jackson, 2017; McKnight, 2016; Rich, 2010; Taylor, 2013), they have only recently been used by scholars working in feminist sport sociology (Baxter, 2018; Baxter, 2020; Fullagar, 2017; Jeffrey, 2020; Jette et al., 2020; Markula, 2019b; McDonald & Sterling, 2020; Thorpe & Clark, 2019). As of yet, there are even fewer projects that have used new materialisms from the very onset of the research project and explored their implications for the entire research process. Therefore, this project began with a desire to accomplish two tasks: (1) understand the complexity of the activewear phenomenon from a socio-cultural-material perspective; and (2) explore the possibilities for conducting feminist sport sociology research using Karen Barad's agential realism. The research questions underpinning this project are as follows:

Primary Research Question:

How does Karen Barad's theory of agential realism contribute to ways of knowing the activewear phenomenon?

Secondary Research Question:

In what ways does Baradian theory inform the qualitative research process?

In the remainder of this chapter, I go into greater detail about the history and rise of the activewear phenomenon. This is followed by a brief introduction to new materialist theory, feminist new materialisms, and Barad's theory of agential realism. This introductory chapter

⁴ Amongst the literature, scholars often write posthumanist or postqualitative with a hyphen (i.e. post-humanist and post-qualitative). However, in this thesis, I have chosen to write it as one word to demonstrate the entanglement between posthumanism/humanism and postqualitative/qualitative, which is more in line with the relational ontology of agential realism.

concludes by describing how new materialisms have impacted the research project and layout of this thesis.

Activewear Defined

In 2015, the well-known Australian comedy group, SkitBox, posted a two minute paradoxical video of the activewear trend on YouTube, amassing over 6.5 million views (SkitBox, 2015). The video is a mashup of various women doing a range of activities, all in their activewear with a continuous line of “doing [activity] in my activewear” being sung in the background. It is paradoxical as the activity being shown is rarely fitness-related but instead features lines such as “Smoking on the street in my activewear,” “Being hungover in my activewear,” “Doing literally nothing in my activewear,” “Going to the movies in my activewear” (see Figure 1).



“Smoking on the street in my activewear”



“Being hungover in my activewear”



“Having coffee with my friends in my activewear”



“Never exercising in my activewear”

Figure 1: Screenshots from “Activewear” by SkitBox

While this video is a parody, it is, for some, an accurate representation of reality as seen by the various comments on the video: “Literally 95% of the women in my city” (NemRaps), “haha I’M SO GUILTY OF THIS! 100%ME+ majority of Australia” (Elle Taylor) and “Literally the most true thing I have ever seen :p” (gnty). Some research supports the belief that, recently, yoga leggings (and ensemble) have been used more for non-yoga activities than yoga. For example, the *Wall Street Journal* describes how in 2014 the sales of yoga pants increased by 45%, yet actual participation in yoga only grew by 4.5% (although many women do yoga at home rather than in studios) (Germano, 2014). Leggings, Lycra shorts, sheer tops, and sports bras have moved from fitness studios to the home and the street where it is now common for women (and increasingly men) to don activewear in their daily activities. The trend has become so pronounced that in 2016, the word “athleisure” was added to the Merriam Webster.

The influence of sporting/physical activity clothing (uniforms, shoes) has on women’s mainstream fashion has a long history (Schultz, 2014; Warner, 2006, 2013). For example, fashion historians have noted how the increased physical activity of women and popularity of bicycling in the late 19th century led to various fashion reforms such as the rise in popularity of bloomers (Park, 1989; Warner, 2006). Within the elite sporting world, Schultz (2014) has described how as women’s tennis gained popularity in the 1920s, there was a shift in acceptable women’s clothing in other domains of society which began to mimic tennis outfits (shorter skirts and sleeves) with an eventual acceptance of exposure of wrists, ankles, and the “emancipation of the legs” (p. 28). The current activewear trend does not seem to be linked with changes in physical activity or sport, but is often credited as beginning with the development of Canadian-based company, lululemon, in the early 2000s (Segran, 2018). Recognising the growing importance of health in mainstream society, as well as the increasing number of women college graduates and the higher incomes young women were

earning, lululemon founder, Chip Wilson, decided to create a company and product directly marketed to these young, affluent customers. Using his background in developing functional snowboarding and skateboarding clothing, Wilson began experimenting with various combinations of fabrics describing himself as a “fabric scientist of sorts” (Raz, 2018) until he developed a comfortable, thick, moisture wicking material. Unlike other large brand names, which previously followed the motto “Shrink it and pink it”⁵ for their women’s products, Wilson designed his clothing specifically for (primary thin) women’s bodies (Chitrakorn, 2017). Since starting in 2000, lululemon has exploded onto the market and become a juggernaut within the activewear industry.

As lululemon gained in popularity and sales, other companies soon took notice of lululemon’s tactics and began to tap into this newly found market of young, female professionals. Since the 2000s many large athletic brands (e.g., Nike, Under Armour, Adidas) have spent millions investing in their women’s “standard” and “plus-size” lines and are in constant competition with each other to develop the latest innovation in women’s activewear (Chitrakorn, 2017). For example, Christine Day, strategic advisor for Adidas, and former chief executive officer for lululemon, recently said, “The women’s market is a crowded space and we have to make sure that we’re staying ahead of evolving trends” (para 3). This has resulted in Adidas developing female centric advertisement campaigns using sportswomen (which previously predominantly used male sports stars) and the launching of their Pure Boost X sneaker (an athletic shoe developed with motion tracking technology) specifically designed for the female foot (Chitrakorn, 2017). It is not only sporting companies either, as

⁵ For many years, athletic products for women were designed following the motto “Shrink it and pink it” meaning companies would take a men’s clothing item, make it smaller and change the colour. Most of their design investment went into men’s products.

there has since been significant development of athleisure at more affordable department stores, such as Kmart, The Warehouse,⁶ and Target.

While the newly developed materials and improved technology have undoubtedly helped to popularise activewear, there is limited academic research as to why activewear has become such a phenomenon (for exceptions, see Brice and Thorpe, 2021a). Popular press sources occasionally point towards the impact of healthism⁷ and the need, especially for younger generations, to embody a lifestyle which centres on health and well-being which includes apparel choices (Green, 2017). Other reasons offered for the popularity of athleisure include the rise of millennials in the workforce with some having a greater disposable income allowing them to spend more money on gym memberships (and corresponding clothes), as well as the omnipresence of social media which is filled with images of celebrities and fitness influencers in activewear (Hanson, 2017).

As activewear began to gain popularity across Western society, some scholars began to conduct socio-cultural analyses of this growing phenomena (Horton et al., 2016; Lavrence & Lozanski, 2014; Lipson et al., 2020; Nash, 2016). Much of this research focuses on the advertising of large activewear brands, exploring the ways companies contribute to principles of healthism, neoliberalism, and postfeminism (Horton et al., 2016; Lavrence & Lozanski, 2014; Nash, 2016). Along with analysing advertising, some scholars have begun to explore particular groups of women's (e.g., larger women, CrossFit participants) perceptions and experiences of wearing activewear clothing (Greenleaf, Hauff, et al., 2019; Hauff et al., 2021; Hauff, 2016; Saied & Creedon, 2021). Within these bodies of literature, activewear is often positioned as a passive object where scholars are interested in the meanings assigned to the

⁶ The Warehouse is a discount department store chain with locations across all of Aotearoa New Zealand and in parts of Australia.

⁷ Healthism, as a concept, is most often attributed to Robert Crawford (1980). In response to the various movements of self-care and holistic care in the 1970s, combined with neoliberalism in the 1980s, health became understood and situated at the level of the individual. This will be explained in greater depth in Chapter Five.

clothing. Yet, as the personal narrative in the beginning of this thesis suggests, activewear clothing is a vital component in women's fitness practices: enabling certain movements, constricting others, squeezing fat, and holding in breast tissue. It plays a role in women's movements, systems of oppression, the production of discourses of neoliberalism and fit femininity, gender relations, and science and technological developments. Therefore, this project approaches activewear using new materialisms which creates space for, and recognises, athleisure as not only being agentic and lively, but as a phenomenon comprised of multiple overlapping and entangled components.

New Materialisms

New materialisms have developed as part of the posthumanist turn within the social sciences and humanities. While there are various genealogies of posthumanism and multiple definitions of the term, in general it is seen as a philosophy which “thinks in relational and multi-layered ways, expanding the focus to the non-human realm in post-dualistic, post-hierarchical modes” (Ferrando, 2003, p. 30). As part of this posthumanist turn, new materialisms question the “ontological and epistemological assumptions that underpin notions of human subjectivity, human/nonhuman and digital relations, embodiment, and the significance of affect in the circulation of power” (Fullagar, Pavlidis, et al., 2019, p. 34). In addition to challenging the anthropocentrism and logocentrism within Western thought, new materialist scholars critique some ontologies for failing to recognise the importance of matter and the material world (Monforte, 2018). Coole and Frost (2010a) note that although humans live in “an ineluctably material world” (p. 1), humans and researchers often take matter for granted and instead, they underscore matter's agentic role in the world's becoming. Therefore, across the many new materialist approaches, concepts, and theories, there is a common focus on matter (Coole & Frost, 2010a; Monforte, 2018; St. Pierre et al., 2016). Current, colloquial understandings of matter are rooted in 17th century philosophy in which

Descartes defined matter as “a corporeal substance constituted of length, breadth, and thickness...Material objects are identifiably discrete; they move only upon an encounter with an external force or agent” (Coole & Frost, 2010a, p. 7). However, as new materialists envision a new ontological underpinning of nonhuman matter, matter becomes re-envisioned as “something more than ‘mere’ matter: an excess, force, vitality, relationality or difference that renders matter active, self-creative, productive, unpredictable” (Coole & Frost, 2010a, p. 9). There is an understanding of matter as agentic and an “emphasis on the resiliency of matter and productivity in concert with the human, challenging our basic humanist assumptions” (St. Pierre et al., 2016, p. 101).

Another important feature within new materialisms is relationality and connectivity. There is a focus on the interconnection and interdependence between humans and materiality. Humans are not predefined, distinctly bounded entities separate from other beings and materiality, but are inter-connected and a part of the material world around them (Davies, 2018). According to Coole and Frost (2010a), critical materialist approaches “situate citizens, ideas and values (as well as theorists themselves) within the fields of material forces and power relations that produce and circumscribe their existence and co-existence” (p. 28). However, it is more than simply including nonhuman or more-than human forces, but new materialist approaches create potential for politics that “rework understandings of human subjectivity, making it clear how the human is always enmeshed in more-than-human worlds” (Clare, 2016, p. 61). Therefore, new materialisms are about exploring the vitality of matter and the various human-nonhuman entanglements in the world’s becoming.

This shift towards a focus on matter and the matter-human-nonhuman relationship has partly occurred because of the political, social, and ethical complexities of world crises today (e.g., climate change, COVID-19) (Coole & Frost, 2010a; St. Pierre et al., 2016; Weedon, 2020). As research points more and more towards the impact of humans on the planet and the

problems caused by human-centred ways of thinking and acting, posthumanist and postanthropocentric scholars are calling for research and ontologies that decentre the human and instead place greater focus on the agency of matter and webs of connections (Braidotti, 2013a, 2019). In particular in the wake of COVID-19, many scholars have been turning towards new materialisms, recognising its potential to “reimagine humanist objectives through a posthumanist accounting of the complex, enduring relations between people, ecologies, and nonhumans actors” (Clevenger et al., 2020, p. 561; Fullagar & Pavlidis, 2020; Lupton et al., 2021; Lupton & Willis, 2021; Sikka, 2020; Thorpe, Brice, et al., 2021). In the preface to her book on vital materialism, Bennett (2010) asks, “How would political responses to public problems change were we to take seriously the vitality of (nonhuman) bodies?” (p. viii). She ponders how policies would be created and how power would be redistributed if they accounted for the agency of matter rather than focusing solely on implications for humans. Similarly, Clare (2016) criticises the current human-centred political framework writing, “the issue is that humans are not separable from the nonhuman world and thus democratic theory is misguided to the extent that it imagines humans otherwise” (p. 63).⁸ New materialisms are about envisioning a different form of politics and ideologies to allow for a more complex and relational approach to the multi-dimensional issues facing societies and the increasingly connected world.

Feminist New Materialisms

This project locates itself within new materialisms, but more specifically within feminist new materialisms. Before delving into what feminist new materialisms entails, it is important to recognise the varying ways feminist research has been understood. There is ample literature which addresses the question, “What makes something feminist?” with most researchers

⁸ These critiques of Westernised anthropocentric ways of knowing are not new and have a long history within ecofeminist and Indigenous scholarship (Hokowhitu, 2021a). The critique of new materialisms by Indigenous scholars is discussed in Chapter Two.

concluding there is not one simple definition of feminist research (or feminism) as it has been defined and used in varied and diverse ways (Barbour, 2018; Collins & Jackson, 2007; Cooky, 2016; Hargreaves, 2004; Mansfield et al., 2018; Pilcher & Whelehan, 2017; Reinhartz, 1992; Wheaton, 2002). Although there are various ideas about what is considered feminism and feminist research, it is generally agreed upon that feminists and feminist research share a commitment to ending female oppression (Pilcher & Whelehan, 2017). For many scholars, their feminist research is a political act as it works to challenge structures and ideologies of inequality, and recognises the need to use research to enact and promote social change for women and oppressed groups (Brooks & Hesse-Biber, 2007). Therefore, there is a strong commitment to social justice and bettering women's lives within society. This thesis began with a recognition that athleisure is a gendered phenomenon that can be seen as both oppressive and liberating for women. I wanted to study activewear using a theory that could lead me into the previously unthinkable to potentially develop a different feminist political orientation and understanding of activewear.

This desire to affect politics and improve women's lives is a key impetus for feminist new materialisms. Similar to feminism more broadly, there is no single definition of feminist new materialisms. But, in general a feminist new materialist approach builds upon previous feminist, queer, and materialist theory to create knowledge not only about women, but to “produce different ways of knowing and becoming through the body, beyond dualistic categories and with reference to gendered practices of othering difference, as well as those that diffract and trouble the normative” (Fullagar, 2017, p. 250). As with many previous feminist approaches, feminist new materialisms troubles binary understandings of gender and recognises the importance of the active material body (and materiality, more broadly) in the construction of sex and gender. It is an approach that merges materiality, “cultures, nature, and biology into an indistinguishable mix” (Hekman, 2010, p. 80), and shifts focus towards

“what bodies can ‘do’ and how matter ‘acts’” (Fullagar, 2017, p. 250). Therefore, feminist new materialisms rearticulate understandings of power and agency away from their humanist orientations and towards definitions that are based on flows and relationships. The recognition of materiality, rearticulation of power and agency, and rethinking of how gender and sex come to be, creates the potential to develop new feminist projects, politics, and understandings of how power is imbued in materiality.

There are many theorists working under the umbrella of new materialisms, but at the forefront is physicist-philosopher scholar, Karen Barad, described as “one of the most influential and important representatives of contemporary materialist scholarship” (Lemke, 2014, p. 5). Barad is a leading scholar in feminist new materialisms with their⁹ concepts being used across a range of feminist scholarship (Fullagar, 2020a; Hekman, 2010; Hird, 2009; Ingram, 2021; Lenz Taguchi & Palmer, 2013; Linghede, 2018, 2019; Shelton et al., 2019; Thorpe, Brice, & Clark, 2020; van der Tuin, 2011; Warfield, 2016). Hekman (2010) even describes that Barad’s goal of “giving an account of materiality as an active and productive factor in its own right, is essential to the future of feminism” (p. 73). This project draws upon Barad’s agential realism (and interconnecting concepts) to study the activewear phenomenon. Bringing together quantum physics with feminist and queer theory, agential realism can be understood as an ethico-onto-epistemological approach which “takes as its central concern the nature of materiality...[It] entails a reformulation of both its terms-agency and realism-and provides an understanding of the role of human and nonhuman factors in the production of knowledge” (Barad, 1998, p. 89). Agential realism underscores the “profoundly relational nature of being and knowing and mattering” and encourages scholars to see the “inseparable entanglement of discourse and materiality in both our phenomena of research

⁹ Karen Barad uses gender nonbinary, they/their pronouns. Therefore, this thesis also uses they/their pronouns when referring to Karen Barad.

and our processes for research and data production” (Ringrose et al., 2019b, p. 2). Thus, agential realism has implications for both the research process and how we understand phenomena of interest. Throughout this thesis, I explore the implications of agential realism and the Baradian concepts of spacetimemattering, intra-action, and entanglement for studying and producing knowledge about the athleisure phenomenon.

Thesis Outline

New materialisms have been primarily studied from a theoretical view exploring their ontological implications for how social sciences and humanities scholars understand phenomena from a materially-based perspective (Coole, 2013; Fullagar, 2017; Newman et al., 2020b). There is much less research, although growing, on the epistemological implications and how to pragmatically conduct a qualitative (or postqualitative) research project that follows the tenets of new materialisms and agential realism. As this thesis uses new materialisms from the beginning to the end, it takes on a more experimental tone to explore how new materialisms change and affect the research project. Throughout the thesis, I continuously play with what “methods” and “analysis” are when using a posthumanist, new materialist lens and how this new materialist ontology affects the research process. As scholars begin to work through how new materialisms affect research, one aspect that is consistently emphasised is the need to use theories and methods that ontologically align rather than selecting from a toolbox of standardised qualitative methodology (Giardina, 2017; Lather & St. Pierre, 2013; St. Pierre, 2011, 2014; St. Pierre & Roulston, 2006). Therefore, the methods and research process have been developed in response to the theoretical and ontological underpinnings of Barad’s agential realism.

In line with the cited scholars above, Barad (2007) critiques some constructivist research processes as prioritising epistemological concerns over ontology, writing that “ontological issues have not been totally ignored, but they have not been given sufficient

attention” (p. 41). Their ethico-onto-epistemology, thus, rejects the separation of theory/method, object/observer, researcher/researched, ontology/epistemology, and focuses on how the research process is an entangled ethical act of knowing and being. Within a Baradian approach to research, the various components of research (i.e., literature review, methods, analysis) all intra-act and it becomes difficult to separate theory from method, “data”, analysis, and representation (Brice & Thorpe, In Press). In this thesis I do have discrete chapters (introduction, literature review, methodology), but it is important to recognise that the varying components are constantly intra-acting.

This thesis begins by locating this project at the intersection of feminist sport sociology and feminist new materialisms. In so doing, Chapter Two serves as both a literature review and theoretical overview. In this chapter, I explore theoretical approaches and common empirical themes within the socio-cultural study of women’s fitness, sportswear, and activewear. As well as highlighting the importance of this work, I identify some limitations and make a case for new materialisms which then leads to a brief overview of some of the key approaches under the new materialisms moniker. The chapter finishes with a discussion of Barad’s agential realism. The next two chapters (Chapters Three and Four) focus on the research process and methodology. While this project is primarily about exploring the possibilities of using new materialisms to study the activewear phenomenon, it is also about the impact of new materialisms on the research process and feminist sport sociology, more broadly. Therefore, I have devoted two chapters to the methods and research process. Chapter Three addresses the broad approaches new materialist scholars have used regarding methods in new materialisms (i.e., continue using humanist-based methods or developing alternative and creative methods). Here, I also speak to the various methods within this thesis inspired by these broad approaches. Building from this discussion, Chapter

Four explores the meaning making and “analytical” approach I use based upon Barad’s concept of diffraction.

The second half of the thesis (Chapters Five through Seven) was developed using specific Baradian concepts to think about how to expose “the movement, vitality, morphogenesis, and *becoming* of the material world, its dynamic processes as opposed to the discovery of immutable truths” (Pitts-Taylor, 2016, p. 4). Each of these conceptually inspired chapters showcase the possibility of using a Baradian concept for thinking about activewear and women’s fitness. Importantly, these chapters are a product of my performative and lively intra-actions with Baradian theory and concepts. As Murriss (2020a) writes, “concepts are like clay or playdough: they are malleable, and their form and substance are affected by the strength of the hands, the warmth of the body and the intensity of the ideas explored and expressed collaboratively” (p. 12). Therefore, it must be recognised that many other scholars are using similar Baradian concepts and ideas, but in different ways—“with different hands”— than I have used them here.

Chapter Five draws upon Barad’s concept of spacetime mattering to think through the ways activewear affects understandings of femininity and feminist politics (Brice, In Press). Recognising the entangled nature of past, the present, and the future, in this chapter I explore how various codes of femininity from previous centuries and the phenomena of the “eternally wounded woman” (Vertinsky, 1994a) are entangled with women’s experiences when they wear activewear. In Chapter Six, I use the concept of intra-action to explore the material-discursive production of fit femininity. Exploring three aspects of fit femininity— (1) the flat stomach/lack of “muffin top”; (2) the “booty”; and (3) being sweat free— I show how the intra-actions between discourse, the body, and activewear are agentic in producing feelings of shame, disgust, and excitement among the women in this study, and (re)enforcing bodily and gender ideals. Finally, Chapter Seven thinks through bodily boundaries using the entangled

relationship between women and their sports bras. Focusing on three entanglements—(1) sweat, bacteria, and the sports bra; (2) mechanical forces, movement, fat, bodies, and the bra; and (3) memories, fabric, and emotions—I explore the ways the moving body can be reconceptualised as an entanglement of human and nonhuman “entities.” The concluding chapter draws the thesis together, touching upon the strengths, challenges, and potential of using agential realism for knowing women’s bodies and for conducting qualitative research.

CHAPTER TWO

Women's Fitness Practices and the Turn to New Materialisms

New materialisms, and Baradian theory, stress that research is an onto-epistemological project whereby theory and concepts are woven throughout the entire research process. Therefore, this chapter bring together literature and theory, locating this project at the intersection of feminist sport sociology and feminist new materialisms. Since the 1980s there has been a vast amount of research conducted on women's fitness, often focusing on the discursive construction of fit femininity and how women experience their bodies and exercising practices. Recently, some scholars have begun to explore the ways in which the activewear phenomenon contributes to this discursive construction and the various ideals and ideas perpetuated by activewear companies within society. Although this research has been invaluable in critiquing the fitness industry and illuminating the various flows and forms of power within it, it often ignores the productive role nonhuman matter plays in fitness cultures and ideals. The nonhuman material aspects of exercise are often figured as passive agents that represent (or symbolise) ideas, rather than understood as active on their own. Activewear clothing is often seen primarily as a representation of ideals rather than as a co-participant in the production of various discourses. Therefore, in this thesis, I use new materialisms in an attempt to explore this agentic matter and activewear's vital role in women's experiences of fitness and ways of knowing, and doing, gender.

This chapter begins with an overview of some of the theoretical approaches and the prominent themes within research on the socio-cultural study of women's fitness. Following this is a review of the literature within sport sociology around objects. This leads to a discussion of the feminist research on sportswear/uniforms, and the literature on women's activewear, to date. This is then followed by a discussion of how some within sport sociology, and women's fitness, are turning towards new materialisms. The second half of the

chapter explores new materialisms in greater depth, describing some of the central concerns and various theoretical strands that align with the posthumanist turn. Finally, the chapter provides a brief overview of Barad's agential realism. Woven throughout this discussion of new materialisms, is a literature review of those (feminist) scholars in sport sociology who have begun to engage with new materialisms.

Feminist Approaches to Fitness and Activewear

Historically, feminist sociology has had a precarious relationship with the corporeal body as often biology and natural sciences were used to justify women's inferiority and to legitimate certain domestic roles for women (Birke, 2003; Grosz, 1987; Lennon, 2018). As Grosz (1987) writes, "Patriarchal oppression justifies itself through the presumption that women, more than men, are tied to their fixed corporeality. They are thus considered *more* natural and biologically governed and *less* cultural, to be more object, and less subject than men" (p. 5, emphasis in original). Because of this, feminist sociologists have understood and theorised the body in varying ways, yet always with an intention to counter patriarchal ways of knowing women's bodies and give voice to women's experiences (Pilcher & Whelehan, 2017). Some feminists, such as Shulamith Firestone (1970) and Luce Irigaray (1985; 2004), recognise the female body as a natural biological entity that is responsible for demarcating gender. Others, such as Simone de Beauvoir (1953), reject the role of biology and instead focus primarily on the social construction of gender. Within feminist sport sociology and physical cultural studies, scholars have echoed these broader ideas, and taken up these, and many other, approaches in theorising women's moving bodies. Here, I focus primarily on the theoretical approaches and scholarship around women's everyday fitness practices (i.e. women's physical activity that does not fall into the category of "sport" and includes activities such as running, group fitness, exercise at fitness centres, cycling, and at-home workouts).

Research on Women's Fitness Practices

The history of feminist theorising of the moving body extends beyond the 1970s, but it was in the late 1970 and 1980s that feminist scholars, primarily within English speaking countries (i.e., United States, Canada, United Kingdom, Europe, Australia, and Aotearoa New Zealand), began to establish feminism as a legitimate lens for researching and theorising women's embodied experiences of fitness and physical culture (Caudwell, 2011). Prior to the late 1980s, academic interest in women's participation in sport and fitness was loosely "atheoretical" as scholars were focused more on proving the existence of gendered inequalities in sport as means to legitimise their research and field. However, by the late 1980s, feminist sport scholars began to draw upon various fields (e.g., cultural, media, and gender studies) to theorise and conduct research about sportswomen (Birrell, 1988, 2000).

Research into women's fitness practices, more specifically, also began in the 1980s, and can be categorised into two main themes; media representations of the fit body and lived experiences of the exercisers (Markula & Kennedy, 2011). Scholars have emphasised the role of the media (and broader societal discourses) in the creation of an ideal female body and how women's fitness has become a means for shaping and disciplining women's bodies towards this ideal (Markula & Kennedy, 2011). Across the field, there have been various theoretical approaches, such as phenomenology and embodiment (Allen-Collinson, 2011; Dimler et al., 2017; Hockey & Allen-Collinson, 2007; Lokman, 2011; Parviainen, 2011, 2018), but most popular has been the use of poststructuralist theories and theorists, such as Judith Butler, Michel Foucault, and Pierre Bourdieu (Maguire, 2002, 2008; McGannon et al., 2011; Rich et al., 2011). One of the more prominent poststructuralist theorists within the sociocultural study of women's fitness is Michel Foucault.

There are many reasons why fitness scholars have been drawn to Foucauldian theory. His concepts of discipline and surveillance have been particularly popular. Early influential

scholars during this time, such as Susie Orbach (1979), Susan Bordo (1990), and Sandra Bartkey (1988), drew upon Foucault to highlight the ways the media's representation of a thin, toned feminine ideal affected women's eating habits and physical activity behaviours. Since this early work, there has been substantial engagement with Foucault's theories, particularly regarding discipline, power, surveillance, and the panopticon in women's fitness and the entire fitness-nexus (Duncan, 1994; Dworkin & Wachs, 2009; Lloyd, 1996; MacNeill, 1988, 1998; Maguire, 2006; Markula, 1995, 2001, 2006c; McDermott, 2011; Morry & Staska, 2001; Rail & Harvey, 1995; Rysst, 2010; Theberge, 1991; Wright et al., 2006). Pirkko Markula, a prominent feminist scholar in the field of fitness sociology, has written extensively on the disciplinary nature and surveillance that occurs within fitness studios in which participants are expected to represent and perform normalised gendered behaviour and appearances (Markula, 2006c; Markula & Chikinda, 2016; Markula & Pringle, 2006). Similarly, Duncan (1994) draws upon the work of Foucault to analyse the disciplinary effects produced by discourses created by *Shape* fitness magazine. *Shape* and other fitness media populate the idea that women should engage in self-transformation practices (diet and exercise) and create an unrealistic body ideal that women then internalise and use to self-discipline and as a means of self-surveillance. More recently, scholars have been using Foucault to explore the power of social media and "fitspiration" (fitness related inspiration) on women's physical activity practices and understandings (Depper & Howe, 2017; Magladry, 2018; Riley & Evans, 2017).

When exploring women's fitness practices, other scholars have been interested in how dominating systems (e.g., neoliberalism, healthism, fatism, hegemonic femininity and heterosexuality) and structures of thought have affected media representation of fitness and women's lived experience (Bolin, 2003; Dworkin, 2003; Maguire & Mansfield, 1998; Mansfield, 2011a, 2011b; Martschukat, 2021; Wiest et al., 2015). This research does not

necessarily draw upon specific theories, but rather takes a constructionist approach often using discourse analysis or ethnography. There has been extensive research that examines the embedded neoliberalism and healthism logic that has contributed to women's participation in fitness and the influence of health clubs, the media, and branding in reinforcing these ideologies (Dworkin & Wachs, 2009; Lavrence & Lozanski, 2014; Nash, 2016; Wiest et al., 2015). Other research has used ethnographic methods to show how women's fitness practices contribute to hegemonic femininity, in addition to the ways in which muscled female bodies can (at times) challenge feminine bodily ideals (Bolin, 2003; Dworkin, 2003; Heywood, 1998; Lloyd, 1996; Mansfield, 2011b). For example, Dworkin (2003) shows how social discourses around acceptable women's bodies (thin, toned, and not overly muscular) affect women's fitness practices within health clubs. In her research, female participants primarily conducted cardiovascular exercise (rather than weightlifting) for fear of "bulking up" and getting muscular which would be in contrast to hegemonic feminine body ideals.

Other research has tended to focus on more marginalised communities and on the experiences of women who do not conform to the "fit ideal." Much of this work has drawn upon sociological, psychological, and behavioural theories, particularly ideas from well-known sociologists, such as Erving Goffman and Norbert Elias. One prominent area of interest has been scholarship focused on larger bodied women's experience in the fitness world and fat-phobia in the fitness industry (Greenleaf, Klos, et al., 2019; Groven et al., 2011; Hauff, 2016; Mansfield, 2011a; Martschukat, 2021; McGannon et al., 2011; Murray, 2008; Scott-Dixon, 2008). For example, Mansfield (2011a) draws upon Erving Goffman's concept of the stigma and Norbert Elias' socio-dynamics of stigmatisation to explore how the fitness industry (re)produces a "distaste for fat" (p. 82) which "reinforces established conceptions of female bodily perfection and is a site for the stigmatization and marginalization of fat women" (p. 98). A smaller, but growing area of scholarship explores

the marginalisation of women of colour in the fitness industry where scholars have drawn upon Black feminist thought and theories of intersectionality to explore the overlapping systems of power that operate in and through fitness and health (Azzarito, 2009, 2019; Lau, 2011).

As this brief section has shown, there has been extensive research conducted on media representations of the fit ideal and fit femininity and women's experiences of fitness. This research draws from many different fields (i.e., sociology, cultural studies, and Black feminist thought) and has often, but not exclusively, drawn on the work of poststructural theorists to analyse the distribution of power within women's fitness practices. One topic that has not been as greatly explored within this body of literature is the relationship between women and nonhuman matter and objects in women's exercising practices. Therefore, this thesis builds upon this scholarship to look at the intimate relationship between fitness, activewear, and gender.

Sporting Objects, Clothing, and Uniforms

While the role of objects has not been greatly explored within the scholarship on women's fitness, within sport sociology, more broadly, many scholars have conducted research on the relationship between humans and sporting/material objects (see Chamberlain and Lyons, 2017, for an extensive overview). A prominent approach has been to use theories from leisure and cultural studies, such as the circuit of culture (Du Gay et al., 1997), to explore the symbolic and cultural meanings assigned to sporting objects (Andon, 2011; Hallinan & Jackson, 2008; Miner, 2009; Ohl & Taks, 2007; Wheaton, 2000). For example, Miner (2009) brings together ideas from cultural studies and history to explore the commercialised, racialised, and gender production of sneakers. Through his analysis, he emphasises how "sneakers have come to exemplify the heterodox application and multidimensional creation of masculine identity, emerging from both the practices of everyday resistance and from

dominant modes of being” (p. 103). Similarly, many scholars have conducted historical analyses of the role of sporting objects in the development of sporting communities, in the commercialisation of sport, and in producing particular historical narratives (Borish & Phillips, 2012; Huggins, 2012; Johnes & Mason, 2003). Within these approaches, scholars often propose that, “One cannot hope to understand game rules, league dynamics or heroic performances without embracing the objects below the rhetorical surface” (Hardy et al., 2009, p. 130).

Other scholars have explored the intimate and deep connection athletes experience with objects, particularly in sports where movement only occurs through the use of an object, such as ice skating (Gravestock, 2013), surfing (Booth, 2008; Ford & Brown, 2006), and windsurfing (Dant, 1999; Dant & Wheaton, 2007). In a particularly interesting piece, Gravestock (2013) uses the “theory of hugging” (Hann, 2012) from costume studies to explore the relationship between ice skaters and their skates, emphasising how the ice skate is a key contributor to performances (in both negative and positive ways). Through her analysis, Gravestock (2013) describes “the ‘porousness’ between the figure skater and each ice skate exists because ice skates are, in one moment, an indistinct part of the body of the skater and, in another, objects that are separate from that skater” (p. 64).

Also interested in the deep connection between sporting objects and humans, other scholars have looked towards phenomenology and non-representational theory to explore the deep connection humans have with sporting objects (Allen-Collinson, 2011; Allen-Collinson & Hockey, 2010; Barnfield, 2016; Jackson & Csikszentmihalyi, 1999; Kerr, 2014). For example, Barnfield (2016) uses Nigel Thrift’s non-representational theory to emphasise the importance of nonhuman matter (shoes, watches, GPS devices, heart rate monitors, music) in people’s experiences of running. Through his analysis, he draws attention to how the “human body acts and is acted upon with devices that modify the experience of recreational running”

(p. 1131). There is extensive literature which has explored the role of sporting objects in physical cultures using theories and approaches from cultural studies, leisure studies, history, phenomenology, non-representational theory, and many others. These scholars, in varying ways, recognise how objects play critical roles in movement and physical cultures. One particular object that has garnered extensive attention is sportswear and uniforms.

Sportswomen and Clothing Research

Across many fields and disciplines (i.e., fashion studies, history, sport sociology, and cultural studies), feminist scholars have been interested in the ways sportswear and uniforms are related to identity, femininity, and gender (Beaver, 2014; Bozsik et al., 2018; deJonge et al., 2021; Flanagan, 2014; Fuller, 2021a, 2021b; Gat, 2010; Hudson, 2010; Schultz, 2014). As discussed in the introduction, one theme within this literature has been to trace the historical developments of sportswear and uniforms, and their connections with particular understandings of femininity and with social progress (Phillips & Phillips, 1993; Rosoff, 2021; Schultz, 2014; Warner, 2006). For example, Phillips and Phillips (1993) conduct a historical analysis of women's undergarments worn during sport and leisure activities highlighting some of the advancements (e.g., bloomers, elastic, sanitary pads, corsets) that have played a critical role in providing sportswomen more mobility and comfort.

There is also a large body of ethnographic research exploring how clothing within sporting cultures operates as part of the female apologetic. The female apologetic is premised on the belief that “by emphasising femininity through their uniforms, make-up, and hairstyles, women could/[can] participate in a ‘masculine’ activity while also proving that they were/[are] still ‘essentially’ feminine” (Beaver, 2014, p. 641; Cahn, 1994; Ezzell, 2009; Griffin, 2002). Within this scholarship, a primary focus has been on the ways sporting organisations, policies, and regulations (rather than players) have encouraged the use of revealing clothing to attract audiences (Cantelon, 2010; Theberge, 2000; van Ingen &

Kovacs, 2012). In so doing, these structures contribute to the continuing trivialisation and sexualisation of sportswomen.

In particular, scholars have looked at the role of clothing in the sexualisation and objectification of women in sports where athletes tend to wear minimal or very tight clothing, such as surfing (Booth, 2001, 2004; Knijnik et al., 2010; lisahunter, 2018), gymnastics (Fairchild & Gregg, 2021), rollerderby (Beaver, 2014), and volleyball (Cantelon, 2010; Steinfeldt et al., 2013; Weaving, 2012). Interested in female athletes' perceptions of their revealing clothing, Fairchild and Gregg (2021) explore female collegiate gymnasts' attitudes about their tight-fitting uniforms and leotards. They found that while opinions greatly differed across their sample, most participants wished they could make changes to their uniform to make them less revealing and less hyperfeminine (e.g., ability to wear shorts, less focus on hair and make-up). Interestingly, shortly after this research was published, a German gymnast—Sarah Voss—made global headlines for wearing a full-body suit at an international competition taking a stand against the sexualisation of girls and women in gymnastics leotards ("German gymnasts' outfits," 2021). Here, we can see one example of the ways sportswomen are using their clothing to enact resistance against (some) dominant sporting discourses.

A large body of work on sportswear clothing has focused on the importance of attire in the production of sporting and gender identities (Anderson, 2016; Beal & Wilson, 2004; Dashper & St. John, 2016; Devonport et al., 2019; Dickinson & Pollack, 2000; Grindstaff & West, 2006; Hauff et al., 2021; Thorpe, 2011; Wheaton, 2004). In her Bourdieuan analysis of snowboarding, Thorpe (2004, 2011) explores the significance of clothing in developing gendered identities within the physical culture. In her research, she describes how female participants would often modify clothing in hybridised ways (i.e., wearing bright pink studded belts or crocheted bandanas as opposed to "urban gangster" bandanas) to challenge

ideas around masculinity and femininity in snowboarding. Moving away from action sports, but still interested in clothing and identity, Dashper and St. John (2016) use an ethnographic approach to explore the meanings, significance, and value of the highly formal attire required by equestrian athletes in Britain. They show how the uniform was important for riders' sense of identity as a competitive horseperson and in wearing the outfit, the participants felt connected to the long history of horse riding in the United Kingdom. This large body of research stresses how "dress is an important part of social interaction and how we attempt to manage, communicate and police identities in different contexts and social spaces" (Dashper & St. John, 2016, p. 237).

Similar to sporting and gender identities, some scholars have explored the connection between sport, clothing, and racial/ethnic/cultural identity (Harkness & Islam, 2011; McDonald & Togliola, 2010; Saied & Creedon, 2021). For example, the use of the hijab in sports has sparked intense controversy. Harkness and Islam (2011) describe, "The hijab's newfound chic, along with the rise in sport participation, has turned this piece of clothing into a cranial combat zone upon which culture wars are waged" (p. 65). There has been debate around the hijab as some Western feminists have described it as a symbol of oppression, while for many sportswomen who wear the hijab, it is a symbol of "honour connected to faith and respect" (Harkness & Islam, 2011, p. 65). Capitalising upon the prevalence of the hijab and its surrounding controversies, in 2018 Nike released its "Pro-Hijab" for female Muslim athletes leading to many scholars analysing the rhetoric and various marketing tactics used within the campaign (Bahrainwala & O'Connor, 2019; Grubic, 2021; Moore, 2018). Although Nike may appear to be supporting Muslim women's right to wear a hijab, Bahrainwala and O'Connor (2019) argue that Nike's marketing around the hijab "deploys Whiteness to render Muslim bodies and texts safe, palatable and 'moderate' in an increasingly anti-Muslim landscape in the United States" (p. 1). Thus, the hijab (and various

other pieces of clothing) have become symbols of the racial, ethnic, and cultural debates and tensions occurring within and outside of sport.

As shown, there are many scholars working at the intersection of sportswear/uniforms, gender, and identity. Much of this literature showcases the important role of clothing, often focusing on its symbolic significance or the ways it contributes to dominating discourses around gender. In this way, clothing,

communicates broader political and social concerns, gestures towards the wearer's class and occupation and reveals much about the significance of the body and the location of its boundaries within society ... dress "embellishes" a body, offering layers of meanings through each fold of the fabric and carefully placed stitch (Magdalinski, 2009, in lisahunter, 2018, p. 1384).

Here, clothing is often rendered a passive recipient of meaning that comes to represent particular ideas about femininity and gender.

While much of the literature connects clothing to larger discourses and ideologies, some scholars, particularly in fashion studies and some in sport sociology, are interested in the intimate relationship between the body and clothing. One of the most influential works within fashion studies which spurred this trend was Joanne Entwistle's (2000b) *The Fashioned Body* which expands upon previous identity work drawing upon Foucault, Merleau-Ponty, Goffman, and Bourdieu to examine the linkages between fashion and the meanings ascribed to the body in culture. Building on this, fashion scholars have paid attention to the blurring of boundaries between clothes and humans using a range of different theorists (Entwistle, 2016; Fernandez, 2016; Parkins, 2008; Ruggerone, 2017). For example, Ruggerone (2017) draws upon Spinozian and Deleuzian theory describing them as "different tools to analyse what happens when a body is dressed" (p. 585) and new ways to understand the symbiotic relationship between clothes and the body.

Similar to fashion studies, some sport sociology scholars have been interested in the affective, material relationship between sportswomen and their clothing (Baxter, 2020;

Dashper & St. John, 2016; Flanagan, 2014; Roy, 2013a, 2013b). In the article referenced above around equestrian uniforms, Dashper and St. John (2016) describe how for some of their participants, putting on the equestrian uniform “triggered some kind of internal transformation in how they felt, turning them into a ‘proper’ rider” (p. 242). They continue describing how by “wearing competition dress they [participants] actually *became* a competition rider” (p. 242, emphasis in original). Here, the clothes are more than a symbol, but are active in the rider’s physical and mental transformation as they prepare for competition. Looking more towards recreational use of sporting clothing and towards the materiality of clothing, Flanagan (2014) draws upon poststructuralist theory (primarily Foucault) to imagine the skort (combination of skirt and shorts) as a technology of the body that enables women to achieve idealised forms of femininity. Conducting a materialist poststructuralist analysis, Flanagan (2014) underscores the importance of the skort itself in producing gender. She writes how “this seemingly innocent yard or two of fabric may not physically constrict the body, but a skort can hegemonically reproduce a system of power relations that ultimately oppresses more than it liberates” (p. 510). In this way, scholars have, and continue to, explore the importance of clothing and materiality in the production of gender and femininity within sporting cultures.

Activewear Scholarship

While the research on sportswomen and uniforms/clothing is quite expansive, recently scholars have begun to focus more closely on clothing in a fitness setting. Much of this academic literature that has focused on activewear has tended to examine the neoliberal, healthism ideologies within activewear companies’ marketing. With healthism playing an increasingly significant role in many people’s lives, research has focused on how companies have used the healthism lifestyle and principles of neoliberalism—individualism, consumer citizenship, self-improvement—as branding and marketing mechanisms (Horton et al., 2016;

Lavrence & Lozanski, 2014; Nash, 2016). For example, scholars have conducted discourse analyses on the Australian based activewear company Lorna Jane (Nash, 2016) and Canada's lululemon (Lavrence & Lozanski, 2014; Stokes, 2008) to show how these companies have used concepts of empowerment, independence, self-care, discipline and body work to sell their products. From a business and marketing perspective, some research has examined and developed ways to improve activewear companies' sales. This research has focused on store attributes that affect the selling and purchasing of activewear (Hyo Jung et al., 2015), trends of women's physical activity and implications for marketing (O'Sullivan, 2017), and women's perceptions of and preferences for different activewear brands (Zhou et al., 2018).

Recently, Linda Fuller (2021a, 2021b) edited a two-part anthology bringing together feminist scholars from an array of fields to explore the relationship between gender, sport, and clothing. While most of these chapters focus on uniforms and sportswomen, a small number have taken up issues regarding activewear and fashionable sporting clothing (Brice & Thorpe, 2021a; deJonge et al., 2021; Grubic, 2021; Hauff et al., 2021; Malin, 2021). The majority of the authors have conducted discursive analyses exploring the ways in which activewear, as a cultural phenomenon, has been produced and understood in specific communities and contexts. For example, scholars have looked at the media coverage of the Nike Hijab (Grubic, 2021), "plus-size" apparel marketing (Hauff et al., 2021), and sportswear clothing in Arab countries (Saied & Creedon, 2021). A similar approach has been used in other scholarship where the researchers focus on activewear clothing in specific groups, conducting qualitative and quantitative analyses to explore the experiences of women who do Cross Fit (Hauff et al., 2021; Knapp, 2015), beginner exercisers (Fisher et al., 2018), and "plus-size" women (Greenleaf, Hauff, et al., 2019; Shin, 2021).

Few academics have been interested in activewear as a phenomenon in relation to women's experiences in broader society. Two notable exceptions are Hauff (2016) who

draws upon objectification theory to explore women's perception of activewear in relation to their exercising behaviour in the United States and Lipson et al. (2020) who are interested in how women engage with athleisure. Conducting interviews with 20 women from Westernised countries (United States, Canada, Australia, Aotearoa New Zealand, and the United Kingdom), Lipson et al. (2020) discuss how activewear has had an influence on women's behaviours, thoughts, and feelings, particularly around diet and exercise. They also describe how their participants stated that by wearing activewear in public, women are communicating an adherence a fit lifestyle. My collaborative publication around activewear as the uniform of the 21st century neoliberal woman mirrors Lipson et al. (2020) as we describe how wearing activewear has become a visual symbol of women's adherence and conformity to socially valued ideas around health and fitness (Brice & Thorpe, 2021a).

A Call for New Materialisms

As shown, feminist scholars interested in women's fitness have explored a range of topics using poststructuralist and sociological theories and ideas from various academic fields (e.g., cultural studies, Black feminist thought, and media studies). While vast, much has tended to focus on the discursive production of fit femininity and ideas produced within the fitness industry, as well as women's lived experiences. Regarding the research on activewear more specifically, similar trends are seen as scholars have looked at activewear advertising, social media, and how particular women understand and experience sports and fitness clothing. Scholarship in this area has been instrumental in illustrating the multiple ways power operates in and through women's moving bodies and within the fitness nexus. While this research has been extremely important, the nonhuman matter that is part of being an active, moving body is, at times, ignored or devalued. Women's physical activity and fitness practices are a material practice with sweat, clothing, equipment, bodies, discourses all playing a role in this phenomenon, yet often the physical body, the clothing worn, and the

equipment used when exercising are examined from a representationalist standpoint, and their “agency” and vitality often overlooked. Therefore, studying women’s fitness and activewear from a primarily discursive perspective (as much previous research has done) fails to fully recognise the material nature of the experience.

Some are arguing there is a need within women’s fitness studies (and social sciences) to develop and use an approach that incorporates insights from the linguistic turn “without falling into its error of rejecting the material” (Hekman, 2010, p. 4), while also able to “describe the complex interactions of language and matter, the human and the nonhuman” (ibid, p. 4). Echoing Hekman (2010), Baxter (2018) describes how feminist scholars have a responsibility to “effectively attend to the complexity of female sporting bodies” by using new theoretical approaches and methodologies that, she suggests, can result in “a far greater and richer understanding of the transformative power of sport [and fitness] for women” (p. 50). Therefore, interested in a more discursive-material approach to fitness phenomena, some sporting scholars, and those interested in women’s fitness have turned towards new materialisms and posthumanist approaches (Baxter, 2018; Baxter, 2020; Brice, In Press; Brice & Thorpe, 2021b; Clark & Thorpe, 2020; Fullagar, 2017; Fullagar, Pavlidis, et al., 2019; Markula, 2019b; Newman et al., 2020b; Thorpe, Brice, & Clark, 2020).

Understanding Feminist New Materialisms

In an introduction to a special issue on new empiricisms and new materialisms, St. Pierre et al. (2016) write that it is impossible to summarise what new materialisms are because they are “in process and... not one thing” (p. 99). New materialisms have been theorised and conceptualised differently by scholars, many of whom do (did) not identify as new materialist although their work is broadly in line with the ontological shift. In this section, I provide a brief overview of the development of new materialisms and its central tenets, in addition to some of the many approaches that align with this ontological turn. In so doing, I highlight just

some of the work using these posthumanist approaches within feminist sport sociology and health. I then address some of the critiques of new materialisms, before going into greater depth around Barad's agential realism.

Tenets of New Materialisms

Various scholars have critiqued previous ways of knowing that rely primarily on language and linguistic construction as inadequate since these approaches fail to recognise the material dimension of the world (Barad, 2007; Coole & Frost, 2010b; Hekman, 2010; Newman et al., 2020b; Pitts-Taylor, 2016; Thorpe, Brice, & Clark, 2020). Hekman (2010) emphasises that there has been a "dogmatic adherence to linguistic construction" (p.2) within social sciences which is limiting as it "cannot account for the reality and agency of that world" (p. 2). Similarly, Coole and Frost (2010a) describe the dominant constructivist, language based approaches that have occupied social sciences as being exhausted and "inadequate for thinking about matter, materiality, and politics" (p. 6). In response, scholars have looked towards alternative approaches that explore the "complex interactions of language and matter, the human and nonhuman" (Hekman, 2010, p. 4). One such approach has been the move towards new materialisms.

New materialisms refers to a series of theoretical approaches and concepts interested in the agentic capacities of matter and its role in shaping worldly phenomena. Recently, in an attempt to provide entry points into new materialist and posthumanist approaches, there has been an increase in anthologies and texts that explore new materialisms across disciplines (Alaimo & Hekman, 2008b; Coole & Frost, 2010b; Dolphijn & van der Tuin, 2012; Murriss, 2020c; Thorpe, Brice, & Clark, 2020). Within this and other work, some scholars have attempted to condense new materialisms into tenets or guiding principles whilst also recognising that scholarship within new materialisms is vast and varied (Fox & Alldred, 2018b; Lupton, 2019c; Thorpe, Brice, & Clark, 2020). In our collaboratively written book on

feminist new materialisms, we (Holly Thorpe, Marianne Clark, and I) also provide our interpretation of the main principles of feminist new materialisms. However, in so doing, we are not attempting to offer definitive characteristics, but rather describe three overarching ideas that have been influential in our collaborative work. We describe them as: (1) lively matter; (2) entangled bodies; and (3) relational politics and vital respondings (Thorpe, Brice, & Clark, 2020). These served as guiding principles for this thesis and my own work on the activewear phenomenon.

A key tenet with new materialisms is an emphasis on matter as lively and agentic. Although previous research, and many theoretical approaches and theories (e.g., Marxism, embodiment, Bourdieu, Butler), have looked at materiality and the material body, it has typically been done in ways that reassert matter and the body as a “passive base that has been infiltrated and animated by various cultural practices” (Davis, 2009, p. 73). For example, Hird (2009) summarises the differences between new materialisms and previous material feminist theories writing:

[Marxist feminism] is concerned with women’s material living conditions...These analyses in broad brushstrokes, draw attention to the often mundane, repetitive, and tedious daily activities of daily life...[and] tend not to engage with affective physicality of human-nonhuman encounters and relations. What distinguishes emerging analyses of material feminism...is a keen interest in *engagements* with matter (pp. 329-330, emphasis in original).

It is specifically this engagement, the recognition of the “resiliency of matter and its productivity in concert with the human” (Coole & Frost, 2010a, p. 4) that helps distinguish new materialisms from previous material approaches. Within new materialisms, matter is not inert but is lively and “saturated with agentic capacities and existential significance” (Coole, 2010, p. 92). Matter refers to bodies, the environment, and human/nonhuman entities that are continuously implicated in a “field of force relations” (Markula, 2019, p. 1) that actively shape social phenomena and human lived experience in unpredictable ways. By looking towards the vitality of matter, feminist sport sociologists can expand their foci beyond the

human to the nonhuman materialities within physical culture that work together to produce phenomena. For example, influenced by new materialisms, scholars have explored and focused primarily on nonhuman entities, such as whey protein in fitness (King, 2020; King & Weedon, 2020a, 2020b), a ribbon in rhythmic gymnastics (Kerr, 2014), and sand in golf courses (Millington & Wilson, 2017). Thus, approaches within new materialisms allow for “an extension of the sociological imagination beyond its limited concerns with ‘social forces’ ...to address a wide range of materialities” (Fox & Alldred, 2017, p. 160).

Another central feature of new materialisms is challenging anthropocentric ways of thinking that prioritise human agency, voice, and experience. Rather, humans are understood as being in relationships with the nonhuman world. Through this, “bodies (both organic and non-organic), environments, ecologies, technologies, and objects emerge as vital forces that demand our attention as they become part of the unfolding of the world” (Thorpe, Brice, & Clark, 2020, p. 9). Rather than only examining human experience, scholars are asked to look at the connections and entanglements between humans and nonhumans and the various nonhuman vital forces. Thinking more relationally (as opposed to dichotomously) challenges boundaries between nature/culture, human/nonhuman, and mind/body, instead seeing boundaries as created through interactions, rather than predetermined and fixed. Importantly, this does not mean new materialisms advocate a flat ontology where all humans are ontologically equivalent to nonhuman matter or where the human race and experiences are homogenised. Rather, “a new materialist approach challenges predefined terms and identities based on difference, and instead explores human and nonhuman assemblages that give rise to the appearance and reproduction of difference” (Thorpe, Brice, & Clark, 2020, p. 12).

Finally, specific to *feminist* new materialisms, this approach continues a long history of feminist scholarship concerned with the workings of power and sex/gender. Feminist new materialisms is a political project interested in different ways of knowing and understanding

with a goal of influencing and creating change. Pitts-Taylor (2016) describes that within feminist new materialist research, scholars must be aware of and ask questions such as,

In what ways is matter involved in, or shot through with, sex/gender, class, race, nation, citizenship, and other stratifications? How are these power relations involved in the understanding and management of biology or 'life itself,' and how do they materialise in bodies, corporeal processes, and environments? What sort of theoretical and methodological innovations are required to address matter as thusly situating and situated? (p. 2).

While politics and power are conceived in a range of ways across new materialisms, feminist new materialisms offer possibilities for “‘creatively reimagining’ the politics of the moving body as vibrant matter always entrenched within (not beyond) power, politics, knowledge, and discourse” (Newman et al., 2020a, p. 23). Similarly, Fullagar, O'Brien, et al. (2019) describe how feminist new materialist and material feminist ways of knowing “offers another way to re-turn to the ‘personal as political’ as an embodied and conceptual problematic, while also proliferating analytic practices that are critical, affective, creative, hopeful and even playful” (p. 8).

Interested in new materialisms and the implications of the posthumanist turn for the socio-cultural study of sport, some within physical cultural studies have begun to apply these new materialist tenets to study an array of sporting phenomena (Newman et al., 2020b; Thorpe, Brice, & Clark, 2020). In Newman et al.'s (2020b) anthology on sport, physical culture, and posthumanism, contributing scholars use different new materialist theoretical approaches (e.g., Object Oriented Ontology, Deleuze and Guattari's assemblage theory) to study various topics, including Rio de Janeiro's polluted waterways in the 2016 Olympics (McDonald & Sterling, 2020), fitness tracking and corporeal data (Adams, 2020; Jette et al., 2020), sport for development organisations (Darnell, 2020), and geomatter at Bondi beach (Booth, 2020). Recently, there has been an increase in sporting scholars interested in using new materialisms to explore the relationships between sport, the moving body, and nonhuman matter in response to COVID-19 (Clevenger et al., 2020; Fullagar & Pavlidis,

2020; Lupton & Willis, 2021; Thorpe, Brice, et al., 2021). In our contribution to this topic, Holly Thorpe, Marianne Clark and I draw upon Barad's writing on boundaries to critically explore how COVID-19 prompted new questions around the risks of physically active bodies and the "trail" of contagion that the body disperses in the environment (Thorpe, Brice, et al., 2021). The scholarship that sits at the intersection of new materialisms and sport sociology is a continuously growing field, with much more of this literature woven into the remainder of this chapter and this thesis.

Lines of Flight in New Materialisms

As mentioned above, new materialisms do not refer to one general approach, but rather encompass literature and theoretical concepts from various scholars. There is a "heterogeneity of approaches and intellectual resources" (Wingrove, 2016, p. 461) that align with the ontological shift new materialisms call for that share a commitment to disrupt the anthropocentric underpinnings of much social science. Here, I describe some of the many approaches that share new materialisms' ontology. Although not all these theorists consider themselves new materialists, their concepts and theories have been influential in the posthumanist turn.

Corporeal Feminism, Biological Feminism, and the Bio-Cultural

One topic of scholarship within new materialisms centres on the agentic role of the biological body and bringing the social and biological together (in line with, and developed from, embodiment). Feminist reengagements with the biological body in Western social sciences began in the late 1990s and 2000s, spearheaded by scholars such as Elizabeth Grosz (1994), Moira Gatens (1996) Lynda Birke (1999), Donna Haraway (1991), Elspeth Probyn (1993) and Anne Fausto-Sterling (2000). Their central argument was that "we need a way to talk about the materiality of the body as itself an active, sometimes recalcitrant, force" (Alaimo &

Hekman, 2008a, p. 3). These scholars have all addressed the need for a recognition to “bring biology back” (Birke, 2003, p. 39),¹⁰ but differ in their views of how to do this. Some of these approaches directly echo new materialisms while others can be understood more as a precursor and have contributed to new materialist conversations.

In this approach, the body is recognised as a biological-social entity and there is a desire to engage with a biology that is active, malleable, and changing. Feminist scholars, such as Lynda Birke (1999, 2003) and Elizabeth Grosz (1994), advocate for understandings that see organisms (including humans) as “not simply *being*, but *becoming*. It is always in the process of becoming and always making over its environment” (Birke, 2003, p. 45, emphasis in original). Building upon this work, more recently there has been a series of books that have developed new vocabulary and concepts, but still reiterate and showcase the need to investigate and include the biological body and body in process. Some of these texts include Samantha Frost’s (2016) *Biocultural Creatures: Towards a New Theory of the Human* which emphasises how living creatures are affected by *both* social and material habitats, and Elizabeth Wilson’s (2015) *Gut Feminism* which recognises the agency of biological parts of the body. Based upon Frost and Wilson and in line with new materialisms, Thorpe and Clark (2019) and Thorpe, Clark, et al. (2021) have researched and written about the entanglement of the biological and social in female triathletes and female rugby sevens¹¹ players’ experiences of amenorrhea and Relative Energy Deficiency in Sport (RED-S). This work built off previous research by Thorpe (2014, 2016) that discusses how to bring the biological body (and specifically hormones) into the conversations around the sociological body in sport settings. In a different vein, Heywood (2011) brings together gender studies, socio-cultural

¹⁰ There is a long history of biology being used to explain inequalities between men and women. Therefore, there has been a tendency for some feminist scholars to reject biological explanations and instead look towards structural, cultural, and symbolic forces that influence the construction of gender (Thorpe et al., 2020).

¹¹ Rugby sevens is an abbreviated form of Rugby Fifteens where there are seven players on the field that play for two seven-minute halves. It is a professional sport in Aotearoa New Zealand, popular in many countries around the world, and part of the Summer Olympic Program.

perspectives, neuroscience, and psychology to provide a detailed account of emotional processing and to develop a biocultural model of eating disorders. All of this research emphasises the role of the biological and physiological body and attempts to extend the concept of embodiment to recognise the agency of corporeality.

Bruno Latour and Actor Network Theory

Bruno Latour's Actor Network Theory (ANT) was developed within the science and technology fields as Latour, in association with John Law and Michel Callon, was interested in the sociological study of scientific knowledge production (Quinlan, 2012). From their observations and various case studies, the scholars eventually developed ANT, defined by Law (2009) as:

...a disparate family of material-semiotic tools, sensibilities, and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations (p. 141).

ANT recognises that everything—social, natural, material, humans—exists in systems of relations (networks) comprised of heterogeneous actants and that there is no outside to these multiple networks. While ANT shares characteristics with other new materialist theories, Law (2009) is careful to define ANT not as a theory, but as a way to tell “stories about ‘how’ relations assemble or don’t” (p. 141), and should be understood as a “sensibility to the messy practices of relationality and materiality of the world” (p. 142). Therefore, ANT does not necessarily require an ontological shift, but is about encouraging sociologists to orient their view towards the material as part of the humanist story.

ANT has been used by various scholars within physical cultural studies, (Dant, 1999; Darnell, 2020; Kerr & Obel, 2018; Weedon, 2015), but less so by feminist sport scholars (for exceptions, see Kerr, 2016; Lagesen, 2017; Quinlan, 2012). Many feminists have been critical of ANT arguing that it has disregarded gender and power inequalities and critiqued its

apolitical orientation (Quinlan, 2012). One notable exception to this is Rosslyn Kerr (2014), who has been a prominent supporter and ANT scholar in sociology of sport. In a particularly new materialist lens, she draws upon ANT to theorise gymnastics and power. Using ANT, she describes the agentic role of nonhuman actants—video camera, equipment, ribbons, bars—in mediating how the gymnast performs and practices. She gives an example of a ribbon malfunctioning in a competition (such as having a knot) and the effect this knot would have on the entire performance, to show the ways in which networks of human and material items work/do not work together. Through a mapping of the human and nonhuman networks within gymnastics, Kerr (2014), and ANT, encourage a new materialist inspired view to better understand the world as socially and materially produced.

Jane Bennett and Vital Materialism

Echoing similar themes and ontologies as other influential new materialist scholars, political theorist, Jane Bennett, has contributed to the new materialist conversation in varying ways, but is often noted for her concept of vital materiality. In her foundational text, *Vibrant Matter* (2010), she shifts attention from the way humans interact with matter to matter itself, or what she describes as “things.” She highlights the agency of “nonhuman or not-quite human things” (Bennett, 2010, p. ix) in order to focus more on the “vital materialities that flow through and around us” (ibid, p. x). Drawing upon historical modern vitalists (e.g., Bergson, Driesch), Bennett (2010) explores the notion of materiality where “matter is figured as a vitality at work” (p. 62) that exerts thing-power. Thing-power refers to how things/objects/matter “speak to us” and the “curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle” (Bennett, 2004, p. 351). However, Bennett makes clear that single nonhuman actants are not agents in the creation of power alone, but rather that agency is located in a “complex interinvolvement” (Khan, 2009, p. 102) of humans and

nonhumans. In this way, she is similar to Deleuze and Guattari's concept of assemblages and Barad's notion of intra-action and agency.

There is a strong political element within Bennett's work, more explicit and pronounced than some other new materialist theorists. She critiques current political theory that, she argues, often frames materiality through human social structures and construes matter exclusively from a human perspective. Her goal is to emphasise the agency of nonhuman factors "in an attempt to counter the narcissistic reflex of human language and thought" (Bennett, 2010, p. xvi). For Bennett, politics must change to address the complex network of phenomena in order to remove agency from being a solely human based quality.

Bennett's work is often cited within feminist new materialist scholarship alongside other scholars such as Deleuze and Guattari, and Barad, but rarely used as the sole scholar of focus. One notable exception is Lupton (2019b) who engages with thing-power and vital materialisms using various case studies from previous research to think differently about how people live with digital health technologies, and to explore the thing-power generated through human-health app assemblages. Although there is potential in using Bennett's theorising to help theorise politics within new materialisms, her work has been heavily critiqued for not being comprehensive and fully developed. Lemke (2018) summarises this critique of vital materiality writing, "It is not sufficient to celebrate the move from dead and passive to vibrant and active matter; we need an analysis of how matter is differentially mobilised and to what ends" (p. 45). According to Lemke (2018), while Bennett proposes a move towards the recognition of the vitality of things, and emphasises a nonhuman matter political orientation, she does not provide a practical way to move in this direction and how to mobilise this political orientation. Her ideas have contributed to new materialist thought, especially regarding discussions around agency and politics, but have not been as thoroughly developed and used as widely as Barad.

Gilles Deleuze and Felix Guattari and Assemblages and Affect

Among the most prominent theorists used within new materialisms are Gilles Deleuze, a well-known philosopher, and Felix Guattari, a psychoanalyst and political activist. Together, Deleuze and Guattari have published a series of texts that are often cited within (and outside) of new materialisms and serve as the inspiration for other new materialist theorists, such as Rosi Braidotti (2013a), Elizabeth Grosz (1994), Manuel DeLanda (2006), and Nigel Thrift (2007). Although Deleuze and Guattari did not consider themselves materialists, their concepts and ideologies are often found within new materialist literature in part due to their emphasis on multiplicity, materiality, and rhizomatic thought (Alldred & Fox, 2015; Connolly, 2010; Fox & Alldred, 2016; Jackson, 2016). One of their most popular conceptual tools within new materialist literature is “assemblages,” defined as “a multiplicity which is made up of many heterogeneous terms and which establishes liaisons, relationships between them across ages, sexes and reigns—different natures” (Deleuze & Parnet, 1987, p. 69). Essentially, it is an ordering of various elements that work together for a period of time and is defined by the relations between and within the multiple aggregates. It is in line with new materialisms because it rearticulates relationality to be thought of not simply as between humans, but humans and matter into a network of agency.

Feminist scholars have found the assemblage, in addition to other Deleuze-Guattarian concepts, useful to think through many different sporting and physical cultural phenomena. Leading Deleuzian (and Foucauldian) scholar, Pirkko Markula, has published extensively about the possibilities of using Deleuze and Guattari within sport sociology, drawing upon a range of Deleuze-Guattarian concepts (e.g., the Body without Organs, assemblages, rhizome, stratum) to study various topics, including the dancing body, fit femininity, the disabled sports star, and the moving body, more generally (Markula, 2006a, 2006b, 2013a, 2013b, 2019a). In her book on Deleuzian theory and physical activity, Markula (2019a) attempts to

explore how Deleuze's concepts are helpful for sport sociologists as they "can serve as a framework for the active mapping of how physical activity is practiced as an assemblage of both material and thought elements in specific force fields" (pp. 6-7).

Recognising the potential of Deleuze and Guattari, several feminist scholars have used Deleuze and Guattari to think about the production of femininity, identity, and gender within physical culture and sport (Coffey, 2019; Liao & Markula, 2016; Markula, 2006a, 2006b; Woodward, 2009). For example, Coffey (2019) uses the concept of assemblage to think through the ways in which gender is produced and negotiated within young people's physical activity and their relationships with their body. Through this, Coffey (2019) shows how gender can be "understood as something that must be actively assembled rather than as a property of bodies" (p. 13). She continues, "In this way, both the dynamics of gender and embodiment can be understood as produced through intra-actions between the various interconnecting aspects of life and experience, including objects, materials, spaces, affects and entities" (p. 13). In addition to using Deleuze and Guattari to rethink gender, some feminist new materialist scholars have drawn upon Deleuze and Guattari's work to explore online transformation images¹² (Coleman, 2014) and the relationship between bodies and technology (Currier, 2003). Other scholars have used the concept of the assemblage to think about the relationship between athletes and nonhuman material, particularly within surfing cultures where surfers come together with their boards and the ocean to "form one coherent unit for the lifetime of the ride" (Anderson, 2012, p. 570; Roy, 2013a). Along with this array of literature, Deleuze and Guattari's writings have been used to-revisit the research process and empirical practices within the new materialist ontological turn (Alldred & Fox, 2015; Dewsbury, 2011; Evers, 2019a; Fox & Alldred, 2015; Mazzei & Jackson, 2017). For

¹² Coleman (2014) describes transformation images as those which showcase the "possibility of a better future via a transformation of the body" (p. 30). These images help to promote an ideal where transformation of the body or self is important and desirable.

example, Fox and Alldred (2015) use the concept of assemblage as a metaphor for the research process describing methodology as a research assemblage, composed of multiple, flowing machines that work together (see Chapter Three).

In addition to Deleuze and Guattari's assemblage theory, many feminist and new materialist scholars have been drawn to their related writing on affect (Coffey, 2021; Fullagar & Pavlidis, 2020; Fullagar et al., 2021; Hickey-Moody, 2013; Munro-Cook, 2021; Reade, 2020; Roy, 2013b, 2014; Thorpe, Brice, & Clark, 2020). Deleuze and Guattari's understanding of affect draws upon Spinozist philosophy, seeing affect as a flow of relations or a "force that moves between human and nonhuman entities creating change in bodily capacity" (Thorpe, Brice, & Clark, 2020, p. 104). Deleuzian translator, Massumi (1987), elaborates, defining affect as "an ability to affect and be affected. It is pre-personal intensity corresponding to the passage from one experiential state of the body to another and implying an augmentation or diminution in that body's capacity to act" (p. vii). Thus, Deleuze and Guattari's understanding of affect is not located within the human or requiring of human agency, but rather is understood as an "assemblage of flows, material and forces of desire that move the subject in ways that exceed intention, consciousness, and language" (Fullagar & Pavlidis, 2018, p. 455).

The focus on flows and the movement away from the conscious human has meant various feminist new materialist scholars have been drawn to affect to reimagine understandings of certain phenomena. For example, Munro-Cook (2021) turns to affect to expand understandings of WNBA (Women's National Basketball Association) games beyond heteronormativity and gender. Instead, she explores the affective forces of nonhuman materials within the sporting arena, seeing the WNBA game as an "assemblage of the built environment, technology, professionalism, discourse, and biological bodies" (p. 284). Looking more towards the possibilities of affect within new materialist methods and the

research process, Coffey (2021) explores the affective potential of photography in her research on body image, youth, and gender. In her work, she understands photos and images as affective as they “engage the body through the intensity of feeling” (Coleman, 2013, as cited in Coffey, 2021, p. 30) and have an ability to “‘open up’, an emotion, a memory, a new understanding...” (Bell, 2012, as cited in Coffey, 2021, p. 30). Seeing images as affective in research methods has the potential to “explore different register of experience—including sensations, embodiment, thoughts, feelings—and potential to communicate the unsayable” (p. 45). Thus, in line with many new materialist approaches, there is less emphasis on the human voice and language as the source of all meaning, and rather focus is on the many forces and flows within assemblages.

Rosi Braidotti and Posthumanism

Influenced by Deleuze and Guattari and feminists, such as Simone de Beauvoir and Donna Haraway, Rosi Braidotti’s research has been at the forefront of the posthumanist turn (Bozalek & Zembylas, 2016). Frustrated by the “arrogance of anthropocentrism” (Braidotti, 2011, p. 139) within social sciences and feminist scholarship, and aware of changing contemporary society, Braidotti (2013b, 2019) has written about the possibilities of posthumanism and feminist scholarship. Posthumanism developed from a critique of Humanism accusing it of creating the normative subject as a White, heterosexual, able-bodied male who exists apart from nonhuman nature (Fullagar, 2017). A posthumanist approach moves away not only from male as the normative, but from humanity itself and moves the focus outward towards nonhuman elements. However, in so doing, Braidotti is careful to warn against essentialising understandings of the human recognising that “not all humans are equal and the human is not at all a neutral category. It is rather a normative category that indexes access to privileges and entitlements” (Braidotti, 2020, p. 2).

In some of her recent work on the posthuman, Braidotti (2019) argues for the need for a critical posthumanist approach in light of the various problems facing the world: environmental degradation, industrial revolution, and advanced capitalism. Within critical posthumanism, scholars are asked to step outside of the anthropocentric mindset, to reject power hierarchies, move away from universalist thinking, and to see the posthuman subject as always in a state of becoming. As she writes, posthumanist thinking is “about increasing our relational capacity, so as to enhance our power (potential) for freedom and resistance. Posthuman thinking is post-identitarian and relational: it turns the self away from a focus on its own identity into a threshold of active becoming” (Braidotti, 2019, p. 79). A posthumanist approach offers possibilities for “creating new ways of thinking and increases our ability to locate positive, alternative, non-hierarchical, respectful ways of interacting within such assemblages” (Koole, 2020, p. 1055).

Although Braidotti is not as widely taken up within new materialist literature as some other scholars, her contributions are significant and have laid a strong foundation for the posthumanist “turn.” Through her nomadic thinking, that challenges binaries and oppositional epistemologies, she encourages research and understanding that is more complex and that is “capable of grasping the chaotic multiplicities” of our time (Ringrose et al., 2019b, p. 8). Her contributions to posthumanist thought and critique of the Eurocentric subject of Western humanism has encouraged a more critical analysis of how scholars understand humanity and the priority and position of the human in the locus of their research—an ontological pillar of new materialisms. Murriss (2020b) draws upon Braidotti’s posthumanist writing and the “missing people” of humanism to make an argument for the importance of children’s voices in the production of knowledge. She describes how children’s voices have been missing from new materialist analyses, yet they offer great potential for rethinking binaries between nature/culture, life/death, heaven/earth. In a different direction, both Jeffrey (2020) and

Buckingham (2017) draw upon Braidottian concepts—nomadic thinking, affirmative ethics, the posthumanism—to think, in varying ways, about women’s experiences in yoga (Buckingham, 2017, p. 143). As Ringrose et al. (2019b) describe, Braidotti’s nomadic thinking and writings on posthumanism “challenge[s] binary and oppositional epistemological in favour of complexity capable of grasping the chaotic multiplies” (p. 8) present in today’s society.

Donna Haraway and the Material-Semiotic

Similar to other influential new materialist scholars, Donna Haraway may not explicitly label herself as a new materialist, but her contribution is strongly felt throughout this ontological turn (and within Barad’s agential realism). Trained in zoology, biology and physiology, a primary contribution of Haraway has been her ability to combine traditional sciences with the humanities as a way to oppose the dualisms which have characterised academia and understandings of the world. Through her work, she reveals the “gendered power relations that shape the construction and deployment of nature in scientific and cultural discourse” (Merrick, 2017, p. 101) combining her passion for socialist feminism with her love for biology and the “natural world.” Running throughout all of her work is a focus on materiality and the relationship between materiality and society.

Haraway does not attempt to provide a grand theory, but instead encourages a way of thinking and “acting together that begins to change the way humans and the many others to whom they are connected know and live together now and in the future” (Schneider, 2005, p. 21). Featured heavily within her work is the questioning and collapsing of boundaries: cyborg (human, machine); naturecultures; material-semiotic; and figural realism (realism versus relativism). Haraway urges feminists to disrupt the boundaries and to take seriously biology, life, and matter as active and generative in knowledge production. However, she also recognises the difficulties this creates and how “naturecultures are made and inhabited not

only for, or by, humans” (Merrick, 2017, p. 107) but a host of nonhuman actants as well. Therefore, for Haraway, the question becomes, “How do we designate radical otherness at the heart of ethical relating?” (Haraway, 2004a, p. 143) and account for the material.

Importantly, Haraway’s work around objectivity within the research process has been particularly influential to Karen Barad and others interested in the production of knowledge. Haraway (1988) writes that feminist scholars need to find a way to “have simultaneously an account of radical historical contingency for all knowledge claims...and a no-nonsense commitment to faithful accounts of a ‘real’ world” (p. 579). Thus, she introduces the concept of situated knowledges as a form of feminist objectivity, a “doctrine of embodied objectivity that accommodates paradoxical and critical feminist science projects” (p. 581). While multi-layered and complex, situated knowledges generally acknowledge that all “knowledges are always situated, always produced by positioned actors working in/between all kinds of locations, working up/on/through all kinds of research relation(ship)s” (Mayhew, 2015, n.p.). In her later work, she expands upon her thinking of objectivity, reflexivity, the research process, and production of knowledge by engaging with the concept of diffraction. For her, diffraction is a more “critical consciousness” than reflexivity where scholars pay attention to the “interference patterns on the recording films of our lives and bodies” (Haraway, 1997, p. 16). Inspired by Haraway’s writings, diffraction has become a key component in Baradian theorising (see Chapter Four).

In positing these questions and concepts, Haraway laid the foundation for new materialist thinking and her concepts have been inspiration for other new materialist thinkers, such as Jane Bennett and Karen Barad. Therefore, within new materialist sporting literature, it is common to see Haraway mentioned alongside Barad and other scholars inspired by her writings. For example, within feminist sport/health sociology, both Clark and Thorpe (2020) and Baxter (2020) utilise Barad’s diffractive methodology to study motherhood and Fitbits,

and the boxing glove (respectively). However, since Barad's diffractive methodology is inspired by Haraway, all authors also pay tribute to Haraway's critique of reflexivity and notion of difference. Within new materialist health literature, Lupton (2013a, 2017) has drawn on Haraway (in combination with Barad, Bennett and Braidotti) in her work on the digital, quantified self. Much of Lupton's work has focused on how the increase in digital/mobile health technology has resulted in a blurring of the lines between humans and technologies.

Critiques of New Materialisms

Although many are excited at the possibilities of new materialisms, the field does face a number of critiques and challenges. One of the most prominent critiques of new materialisms is its alleged "newness" (Ahmed, 2008; Petersen, 2018; Rekret, 2016, 2018). Well-known feminist scholar, Sara Ahmed (2008), is one of various academics who have accused feminist new materialisms of "forgetful feminism" (p. 32) and argues that new materialisms ignore the important biological, historical materialisms, and body/matter focused feminist work that has come before (Ahmed, 2008). However, as I and others have argued, new materialisms do not reject previous feminist understandings of the body and of matter, but rather seek to build upon this expansive lineage of theories and pay homage to theorists, such as Elizabeth Wilson, Judith Butler, Michel Foucault, and poststructuralism, more broadly. For example, in an interview with Juelskjær (2012), Barad describes how agential realism was developed by reading the philosophy of physics through feminist poststructuralists theorists, and therefore, new materialisms are "not a breaking with the past, but rather a dis/continuity, a cutting together-apart with a very rich history of feminist engagements with materialism" (p. 13). They go on to describe how "new materialisms are of course deeply indebted to Marx, and to others indebted to Marxism, including Foucault and a generation of feminist engagements with Marxist insights that travel under names 'materialist feminisms,' 'feminist science

studies,' to name a few" (p. 13). There is no definitive line between new materialisms and previous ways of knowing, but rather they are entangled, inform each other, and intra-act.

Dolphijn and van der Tuin (2012) summarise the relationship between previous understandings and new materialisms as a "yes, *and* to all of these intellectual traditions, traversing them all, creating strings of thought that, in turn, create a remarkably powerful fresh 'rhythm' in academia today" (p. 89). Similarly, Davies (2018) writes that new materialisms present "new concepts and new ways of thinking-doing our research, which do not run against poststructuralist philosophy [and other ways of knowing], but with it at the same time bringing new emphases and new priorities" (p. 13). It is these new emphases and new priorities that help to differentiate the nuanced ways of knowing within new materialisms. In this way, new materialisms resemble Berbary's (2017) description of "post" theories:

post* theories¹³ are *palimpsests*—the overwriting of one text on another partially erased text—of humanist theories, borrowing upon critical theories, expanding them, reorganising them to show their limits, and reworking them to think and live differently (p. 722, emphasis in original).

Therefore, feminist new materialisms are about developing (potential) new ways of thinking by adapting and building upon previous approaches. They create space for growth, creativity, and freedom to continue pushing the boundaries of feminist scholarship.

A second, and growing, critique of new materialisms is their lack of engagement with Indigenous ways of knowing and Indigenous scholarship which has many overlaps with new materialisms' ontology (Clary-Lemon, 2019; Hokowhitu, 2021a, 2021b; Ravenscroft, 2018; Rosiek & Snyder, 2020; Rosiek et al., 2019; Tompkins, 2016). For example, new materialisms align with some Indigenous cultures' ideologies, particularly regarding the vitality of nonhuman matter. Watts (2013) explains how various Indigenous cultures believe

¹³ New materialisms are part of the posthumanist ontological turn in social sciences and therefore, can be considered a post theory.

“that nonhuman beings choose how they reside, interact, and develop relationships with other nonhumans. So all elements of nature possess agency, and this agency is not limited to innate action or casual relationships” (p. 23). New materialisms and (some) Indigenous thought also often privilege ecocentrism over anthropocentrism and have worked to “challenge dualistic understandings of nature society relationships” (Thomas, 2015, p. 975). Because of these ontological similarities, some Indigenous scholars have critiqued new materialisms. For example, Indigenous scholar, Brendan Hokowhitu (2021a) passionately describes how engaging with new materialist scholarship, “only tended to infuriate me in terms of the west’s continued claim to knowledge, ENTIRELY” (p. 144, emphasis in original). He compares the nomenclature of “new” to the colonisation of Indigenous lands, writing that new materialisms’ “claims to temporal ownership of those ideas that already existed in multiple Indigenous philosophies reminds me of the doctrine of discovery where already discovered lands only became meaningful through a White captive narrative” (p. 130).

However, other scholars have offered less critical views and, rather, caution new materialist scholars against “failing to acknowledge and seriously engage the Indigenous scholars already working with parallel concepts” which risks “practices of erasure of Indigenous cultures and thought” (Clary-Lemon, 2019; Martin, 2017; Ravenscroft, 2018; Rosiek et al., 2019, p. 332; Todd, 2016; Watts, 2013). These scholars see potential in bringing together new materialisms with Indigenous ways of knowing where these bodies of literature “inform one another, extend their respective influence, and bring what benefits are latent within them to local and global communities” (Rosiek et al., 2019, p. 332). Addressing these critiques and the possibilities of collaboration, there is a small but growing number of scholars who are working at this intersection of Indigenous knowledges and new materialisms to think about environmental concerns in the 21st century (Celermajer et al., 2020; Norman et al., 2020; Thomas, 2015; Yates et al., 2017). Using the case study of the

Hurunui River in Aotearoa New Zealand, Thomas (2015) brings together the worldviews of the Ngāi Tahu (Māori tribe) with more-than-human approaches to rethink the ethical relationships between humans and the environment. In so doing, she “illuminates opportunities for, and challenges to, democratic processes that create space for multiple understandings of nature to exist, and particularly those understandings situated within relational ethics” (p. 975). In our own work, Holly Thorpe, Marianne Clark, and I discuss the potential we see in bringing together these broad fields to explore the meanings and capacities of sporting matter and objects, such as a lacrosse stick, waka ama paddle, alaia/surfboard (Thorpe, Brice, & Clark, 2020). Yet in so doing, we also recognise that this scholarship (new materialisms and Indigenous understandings), and these conversations, should be led by those from Indigenous communities.

Interestingly, Karen Barad’s concept of diffraction (discussed in Chapter Four) also offers possibility for scholars interested in exploring the complex relations between new materialisms and Indigenous knowledges. While there are similarities between these fields, there are also important incommensurable differences that must be explored, which might be enabled by a diffractive approach of reading such knowledge systems through each other. Bozalek and Zembylas (2017) emphasise the productive capabilities of this Baradian approach, describing how diffraction is:

regarded as an ethical and socially just practice, in that it does not do epistemological damage, pitting one theory/position/stance against another, but carefully and attentively doing justice to a detailed reading of the intra-actions of different viewpoints and how they build upon or differ from each other to make new and creative visions (p. 118).

Diffraction can provide a way for scholars from both areas of study to think through the similarities and differences between new materialisms and Indigenous ways of knowing in an affirmative and productive manner. Therefore, while such critiques of new materialisms are valid, there is a growing number of scholars (Mayes, 2019; Rosiek & Snyder, 2020; Thomas,

2015) whose interests and areas of expertise reside in this intersection and are using various approaches to explore the possibilities of using new materialisms and Indigenous knowledges.

Karen Barad and Agential Realism

Thus far, within this chapter, I have described many of the different theoretical approaches within new materialisms. In writing about the turn to posthumanist approaches, Hekman (2008) argues for new theories and ways of knowing that incorporate the material into research practices. She writes that although the linguistic turn has been important for feminist research, “We have learned much about the social construction of ‘woman’ and ‘reality.’ But the loss of material is too high a price to pay for that gain” (p. 88), urging feminist scholars to engage in research practices that acknowledge the role of materiality in addition to language. Following Hekman’s (2008) call, for this research, I turned toward the work of feminist physicist Karen Barad.

While many have discussed the political possibilities of Baradian theory (Fullagar, O’Brien, et al., 2019; Hekman, 2010; Thorpe, Brice, & Clark, 2020), Parkins (2008) makes a particularly engaging case for how Barad’s scholarship can be helpful for feminist scholars interested in fashion. Recognising the deep attachment between bodies and garments, Parkins (2008) describes how Barad’s “anti-dualistic framework gives us some clues to understanding such attachments if we consider that they are attachments to dress not as separate from but as *part of the self*” (p. 507, emphasis in original). She continues that agential realism “is so useful for thinking about dress” because “the case of dress foregrounds an instance in which the intelligibility of each–thing and body–depends on the other” (p. 507). Fashion and the inseparability of human and fashion, “call attention to humans’ performative shaping by matter” (p. 507) and agential realism’s ontological inseparability provides a way to think through this entangled relationship. In line with Parkins (2008), I find

Barad's intense focus on nonhuman matter and the ways they emphasise the fluidity of the boundary and the self, to be particularly useful for exploring the relationship between women's moving bodies and activewear.

Also, agential realism emphasises how all intra-actions and all forms of matter are important regardless of their "size." In an article on the nuclear bombs of World War II, Barad (2017) describes how "even the smallest bits of matter—for example, electrons, infinitesimal point particles with no dimensions, no structure—are haunted by, indeed, constituted by, the indeterminate wanderings of an infinity of possible configurings of spacetimemattering in their specificity" (p. G113). Every bit of matter, every intra-action has endless possibilities for its impact and for its entanglements. Therefore, agential realism encourages scholars to explore topics that are often ignored and to see inanimate matter as agentic and vibrant with unlimited potentialities. Thus, Barad's agential realism provides justification and encouragement to study and see athleisure as an active force in the production of gender and fitness, even though it is a topic that is often seen as trivial.

Finally, I was attracted to agential realism because it "offers a unique epistemological position" in that it takes a "performative rather than a representationalist approach to analysing 'sociocultural' practices and challenge[s] methodological assumptions that may go unnoticed in some disciplinary fields" (Calvert-Minor, 2014, p. 123). Within agential realism, there is the "understanding of research processes as co-implicated in world-making rather than simply 'representing' the truths of experience or social worlds from some kind of objective or subjective position" (Fullagar, O'Brien, et al., 2019, p. 15). This approach continues a long line of feminist thinking in challenging (not always explicitly) dominant patriarchal, Humanistic, and colonialist systems of knowledge production and troubling ways of knowing that maintain categorical differences. Agential realism encourages scholars to explore how differences come to matter through intra-actions at the relational level (Brice et

al., 2020) and encourages scholars to pay attention the fine details of the research process and worldly phenomena. Hekman (2010) describes how Barad's "approach offers feminists and science critics a wholly new way to address questions of truth and knowledge. Her [sic] theory breaks new ground not only for feminists but for all theorists concerned with the future direction of knowledge" (p. 72). As shown, there are many other scholars who are working towards this goal of recognising matter as a productive and active role, but Barad has shown to be a leader within new materialist thought.

Understanding Agential Realism

Agential realism is greatly inspired by influential poststructuralist and feminist scholars such as Foucault, Butler, and Haraway, in addition to various physicists and scholars interested in the philosophy of science. In this way, agential realism can be understood as a diffractive reading of poststructuralism, queer and feminist theory, philosophy of physics, and feminist science studies. Inspired by Niels Bohr's "philosophy of physics" (Hollin et al., 2017, p. 7) and his re-conception of the relationship between ontology and epistemology (discussed in Chapter Four), Barad developed agential realism as an ethico-onto-epistemological framework. It is an approach which provides "an understanding of the role of the human and nonhuman, material and discursive, and natural and cultural factors in scientific and other socio-material practices" (Jackson & Mazzei, 2011, p. 114). Agential realism questions pre-established boundaries, privileges neither the material nor the social, recognises matter as agentic, and focuses on ontological inseparability and the entangled nature of the world. This ontological inseparability means that phenomena/objects/concepts do not exist as predetermine defined entities that researchers seek to understand. Rather, the boundaries around these entities are produced through research and other boundary making practices. There is no "real" reality that we are researching or a part of, but rather how we see and live in the world is created through specific (and indeterminate) agential cuts. In other words,

...particular agential cuts are made that enable the individuation of phenomena. This means that it is not possible to describe a pre-given reality as such, but only an agential reality. It is only through agential cuts made within a certain apparatus that make something look like a determinate entity separate from its environment (Irni, 2010, p. 85).

Therefore, the base ontological unit within agential realism is not a bounded predefined “thing,” but phenomena defined as the “the ontological inseparability of agentially intra-acting components” (Barad, 2003, p. 815). Importantly, the measuring apparatus, the researcher, and the research process are part of these “agentially intra-acting components,” and therefore, agential realism has many implications for the research process (described throughout this thesis). Warfield (2016), summarising agential realism, writes, “agential realism is interested not in interactions between predefined entities, but the *intra-actions* that occur within the entanglements of phenomenon that *enact* boundaries, which then demarcate entities as separate from one another” (p. 2, emphasis added).

As objects, things, and ideas are not predefined entities, Barad uses the term intra-action as opposed to interaction when referring to relationships. Interaction assumes there are two distinct boundary-ridden objects relating to each other whereas intra-action presents the inseparability of those objects. Højgaard and Søndergaard (2011) write, “The concept of intra-action demands a thorough co-constitutional thinking... It is the co-constitution—the intra-action of subject and object—that forms the subject matter (so to speak) of the analysis” (p. 347). The various implications of Baradian theory and her concepts of entanglement, intra-action, boundaries, the material discursive, and the research process will all be explored in the following chapters with regards to activewear and women’s fitness.

As mentioned, Barad’s agential realism was greatly inspired by the work of Niels Bohr, Donna Haraway, and other feminists working within feminist technoscience studies (also known as feminist science studies). Since the 1970s, various feminist scholars have been interested in applying feminist analyses to scientific practices and technology, exploring

the “sociocultural [and material] embeddedness of all scientific and technological theories and practices” (Åsberg & Lykke, 2010, p. 299; Mayberry et al., 2001). Within this large body of work, scholars have often shared the assumption that “‘pure’, ‘basic’ science is entangled in societal interests, and can be held politically and ethically accountable” (Åsberg & Lykke, 2010, p. 299). In recent work, scholars are “forcefully drawing attention to the ways in which the discursive and material aspects of sociotechnical relations and processes of materialization are inextricably intertwined” (ibid, p. 299). There are various ways in which Barad has been influenced by feminist technoscience studies, particularly seen in how they understand reflexivity/diffraction, their emphasis on the relationship between ontology and epistemology, and the material-discursive nature of agential realism. More specifically, Haraway’s work has been extremely influential as Barad draws upon Haraway’s writings on the material-semiotic, boundary blurring, and Haraway’s critique of representation and movement towards diffraction.

Agential realism was also produced from Barad’s readings of poststructuralist theorists, primarily looking at Michel Foucault and Judith Butler. Barad draws upon Foucault and his understanding of power and discourse, and focus on the material body. For Foucault, discourses are not limited to the linguistic construction of knowledge, but instead are “material conditions that define what counts as meaningful statements” (Barad, 2007, p. 63). Similarly, he underscores the materiality and biology of the body describing it as the site at which discourse, power, and discipline intersect: “the locus of productive forces” (Barad, 2007, p. 65). The recognition of the role of the biological and social body, along with the critique of a representationalist view of discourse, rearticulation of discourse, and his view of power as relational, all align with new materialisms and Barad’s agential realism.

Similar to their admiration of Foucault, Barad was influenced by Judith Butler. Butler strongly emphasises the dynamic relationship between matter and language. In Butler’s

(1993) words: “Language and materiality are fully embedded in each other, chiasmic in their interdependency, but never fully collapsed into one another...language and materiality are never fully identical nor fully different” (p. 69). Butler shows how the two (matter and discourse) are linked while Barad, expanding upon this, shows how they are mutually implicated and inseparable. Ten years after Butler discussed language and material, Barad (2003) wrote, “materiality is discursive..., just as discursive practices are always already material” (p. 822). Both Butler and Barad emphasise the connection between materiality and discourse.

While Barad draws upon Butler and Foucault, they also critique Butler and Foucault’s work and use these critiques to develop agential realism and its central concepts. Barad argues that both Foucault and Butler remain too anthropocentric and fail to fully recognise matter as active and lively. They summarise their critique of Foucault’s work, writing,

He fails to offer an account of the body’s historicity in which its very materiality plays an *active* role in the workings of power. This implicit reinscription of matter’s passivity is a mark of extant elements of representationalism that haunt his large postrepresentationalist account (Barad, 2007, p. 64, emphasis in original).

Similar to this, they state, “while Butler correctly calls for the recognition of matter’s historicity, ironically, she seems to assume that it is ultimately derived (yet again) from the agency of language or culture” (Barad, 2007, p. 64). Foucault and Butler were moving in the direction of new materialisms, but Barad believes that ultimately neither pushed far enough into materiality and were limited by their primary focus on language, culture, and the human. In response, Barad (2003) developed agential realism which emphasises a “robust account of the materialization of *all* bodies—‘human’ and ‘nonhuman’—and the material-discursive practices by which their differential constitutions are marked” (p. 810).

Barad has been taken up widely by feminist scholars in education (Bozalek & Zembylas, 2016; Hofsess & Thiel, 2017; Larsson, 2014; Ringrose et al., 2019a; Scantlebury et al., 2019; Taylor, 2013). Interestingly, some within education have begun bringing together

Barad's intra-action and writings on identity and diffraction with Kimberlé Crenshaw's work on intersectionality (Allegranti & Silas, 2021; Shelton et al., 2019). For example, Shelton et al. (2019) use the term intra-actionality (combination of intra-action and intersectional) that "acknowledges the multiplicities of identities with/in intra-action" (p. 117) in their research on women's experiences as doctoral students. Similarly, Allegranti and Silas (2021) found intersectionality a useful addition to their Baradian analysis of Capoeira viewing the "intersectionality of oppression as fundamentally *intra-active*" (p. 5) as participants spoke to the intersections of their bodily practices in Capoeira with race and gender.

Within feminist sport sociology and women's fitness, there has been a growing interest in the possibilities of using Barad for thinking about various physical cultures and ideas of the body. This scholarship has spanned an array of topics such as female athlete health (Thorpe, Clark, et al., 2020), the dancing body (Clark, 2020), women's mental health (Fullagar, 2020a; Fullagar, O'Brien, et al., 2019), fit femininity (Brice & Thorpe, 2021b) and the gender binary in sport (Linghede, 2018). Not necessarily looking at physical culture, but interested in women's and girls' bodies, Ingram (2021) brings together Barad and affect theory in her analysis of gender, beauty, and the school ball (prom). Through this Baradian (and Deleuzian) approach, Ingram (2021) showcases how beauty can be conceptualised as "an intra-active affective material process" (p. 12) which provides a way to "to account for the multiple and open-ended becomings of beauty and ball-girl-bodies that include material-affective forces" (p. 5). Other scholars have been inspired by Barad to conduct analyses that focus more on nonhuman elements of women's fitness and sporting practices such as the boxing glove (Baxter, 2020), yoga mats (Jeffrey, 2020), and sports bras (Brice et al., 2020). The research in feminist sport sociology that relies primarily on Barad (versus new materialisms, more broadly) is a small field, but is continuously developing.

Conclusion

When reviewing the socio-cultural literature on women's physical activity, and more specifically, women's fitness, it is evident that there has been extensive engagement with the discursive production of fit femininity and women's lived experiences. These themes have been echoed in the literature on activewear, as well, which primarily has focused on activewear advertising. Missing from this research is an exploration into the material dimensions of being a clothed moving female body and the impact of nonhuman matter on fit femininity, fitness, and women's experiences. In the scholarship that has explored the role of objects and clothing sport, the nonhuman matter is primarily (but not exclusively) studied in relation to how objects come to represent identity with human knowledge and intentionality still prioritised. While some theories have attended to the body (e.g., embodiment and phenomenology) and the vital role of objects (e.g., non-representationalist theory), "contemporary sociologists have yet to provide a theoretical approach that satisfactorily explains the material [human and nonhuman] dimensions of the body" (Newman et al., 2020a, p. 11). In this thesis, I look towards the possibilities of new materialisms for engaging with the nonhuman matter—activewear clothing—that is co-participant in women's fitness practices.

Some have argued that new materialisms allows scholars to move "beyond practices of critique that endlessly reassert over generalised explanations for social problems and reify processes through the use of explanatory concepts, such as neoliberalism and patriarchy" (Fullagar, 2017, p. 250). There is a need for research that examines women's fitness that does not revert back to popular (even hegemonic) ideologies and concepts such as neoliberalism, discipline, or surveillance, and instead considers women's fitness from different ontologies and uses new methodologies. This project works to address this gap using new materialisms to think about the activewear phenomenon and to experiment throughout the entire research

process. Diverging from traditional constructionist epistemologies, “encourages the possibility of other alternative methodologies and theoretical inputs that will highlight different features and present different emphasis for the women who partake in sport [and fitness]” (Baxter, 2018, p. 50).

However, in looking towards different ways of knowing, this thesis should not be understood as a break from previous approaches or ways of understanding women’s bodies and fitness practices. In the preface and acknowledgements to *Meeting the Universe Halfway*, Barad (2007) writes “to be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence” (p. ix). This is true when thinking about new materialisms, Baradian theory, and the series of theoretical approaches that have come before, some of which have been described in this chapter. Agential realism does not exist in isolation, nor does it simply combine ideas from previous feminist theorists and other new materialists. Instead it reads theories through each other, and is constantly changing and developing. Therefore, in new materialisms (and Barad) one can feel the essence and recognise previous ways of knowing in combination with new concepts and ways of thinking. This project is working at this dis/continuous moment which draws from previous ways of knowing, but also looks towards the unthought, and experiments with the research process using new materialisms.

CHAPTER THREE

Thinking Through Methods in New Materialisms

This thesis focuses on exploring the possibilities and potential of using new materialisms to study the activewear phenomenon. Embedded within this project is the challenge of how to employ new materialist empirical practices that are consistent with a new materialist ontology, a framework that does not privilege human experience, but views the world as a series of complex material-discursive entanglements and recognises matter as agentic (Barad, 2007). Within the new materialist scholarship, thus far, there has been a great amount of literature approaching new materialisms from a philosophical, theoretical standpoint (Alaimo & Hekman, 2008a; Coole & Frost, 2010b; Monforte, 2018; Newman et al., 2020b). It has only been in the last few years that scholars have begun to grapple with the challenge of translating new materialist theoretical concepts and ontological implications, more broadly, into empirical practices (Allen, 2018; Bastian et al., 2017; Coffey, 2020, 2021; Evers, 2019a; Fullagar, O'Brien, et al., 2019; McKnight, 2016; Ray, 2019; Thorpe, Brice, & Clark, 2020; Warfield, 2016). This thesis contributes to the growing body of literature of new materialisms by exploring different empirical practices within qualitative research. The following two chapters detail my experience with new materialist empirical practices. Individually and together, these chapters explore the process of doing new materialist inspired research detailing the methods, methodology, and the overall journey.

Over the past twenty years, researchers in varying fields have called attention to the highly structured and institutionalised nature of qualitative research (Giardina, 2017; Lather, 2015; St. Pierre, 2011). According to St. Pierre (2015a), it is ironic that qualitative research has become so formalised and conventional since qualitative research initially began as an “interpretive social science” (p. 75). In an introduction to a special issue on new empiricisms, Lather and St. Pierre (2013) write, “At some point, we have to ask whether we have become

so attached to our invention—qualitative research—that we have come to think it is real. Have we forgotten that we made it up? Could we just leave it behind and do/live something else?” (p. 631). New materialisms provide an opportunity to experiment and to “do something else” or to do the same, but differently. Since agential realism decentres human experience and language, understands matter as an active agent comprised in multiple relations, and advocates ontological inseparability, it requires a rethinking of the research process and empirical practices. New materialisms push qualitative researchers towards methods that explore “how ‘matter’ is thought and constituted through entanglements of human and nonhuman bodies, affects, objects and cultural practices” (Fullagar, 2017, p. 248). They encourage a return to theory and philosophy to allow for theories and methods that are ontologically and epistemologically congruent.

There is a growing body of scholarship that has begun to engage with the “reequipping” of methods using a wide array of techniques for thinking about the human (and human experience) within new materialisms (Allen, 2018; King, 2020; McKnight, 2016; Ray, 2019). There are varying approaches, methods, and opinions regarding the types of methods that should be used in new materialist inspired research. One branch of thought suggests that new materialist scholars can use humanist-based qualitative methods, but that the analytical process needs to be “re-engineered” (Fox & Alldred, 2017). An opposing line of thought, spearheaded by education scholar Elizabeth St. Pierre (2015a) and colleagues, encourages researchers to reject humanist-based methods and be “methodology free.” Through a deep immersion with theory, researchers can employ new and different empirical practices that align ontologically with the chosen theorist and/or paradigm. In this chapter, I explore the methods used in this thesis based upon these two approaches (humanist and creative) to think about the activewear phenomenon. This chapter is not set out as a comparison between the two but, rather, highlights the opportunities and challenges of these approaches as

encountered in this research. The first half of this chapter explores the use of humanist-based social sciences methods, arguments made for how and why they should be used, and how I use these methods within this project. The second half follows a similar structure, but explores more innovative and creative methods. The chapter concludes with a discussion of the various challenges and opportunities that arose using both the approaches during the research process.

Humanist-Based Methods in New Materialist Research

This section explores the use of humanist-based methods within new materialist research. It begins with a brief overview of those advocating for this approach and their understandings of methods and the research process within new materialisms. Included in this is a brief review of some of the various humanist-based methods scholars within new materialisms have been using. The second part of this section explores the humanist-based methods used within this thesis: focus groups; photo diaries; individual interviews; and moving methods. Within this section, I also outline the participant recruitment strategies used, the demographics of the participants, and the ways these methods have been adapted to be more in line with agential realism.

Advocating for Humanist-Based Methods

There are many scholars who advocate for the use of humanist-based methods in new materialist and posthumanist research, arguing that the methods can remain the same, but the analysis and ways the methods are understood in the larger research process can be revised.

For example, Fox and Alldred (2015, 2017, 2018a) describe,

We would suggest that we need not yet dispense with the entirety of the social research apparatus at our disposal. A materialist understanding of research allows us to peer inside the research-assemblage, and more significantly, to tinker with it. To that end, we can find ways to offset some of the impact of particular research techniques and tools... (Fox & Alldred, 2018a, p. 201).

Rather than abandoning humanist methods, they propose conceptualising the research process as an assemblage, which “discloses the affective flows between the many elements involved in research” (Fox & Alldred, 2015, pp. 410-411). Such a methodological approach shifts analysis away from individuals and towards the different nonhuman and human elements within both the research and event assemblage, as well as focusing on the flows within and across the hybridisation of these assemblages (research and event). Therefore, for Fox and Alldred (2017), empirical data sources are “‘dredged’ to identify the relations and affects that comprise assemblages of bodies, things and social formations” (p. 172).

Similar to Fox and Alldred’s research assemblage, lisahunter and Stoodley (2020) propose a cyborg theory-method approach, which they describe as a “more-than-human hybrid human-machine-element and time assemblage” (p. 93). This approach incorporates the researcher’s intensions, the physical elements that are part the environment (i.e., ocean for their surfing research), time, and technology. In their research on surfing and wellbeing, their goal was to “extend embodied methodologies research to the in-the-moment context of bluespace...specifically through the more-than-human surfing experience” (p. 96). In so doing, they brought into dialogue various methods (i.e., self-interviews, body mapping, audio-visual elicitation, and sensory [auto]ethnography) and adapted some methods to “attend to participants’ lived experience as practice, in situ, and from multiple more-than-human perspectives” (p. 92). For example, they created a self-interview method by adapting the “go-along” form of mobile methods (researcher participates with the participant). Rather than having the researcher go with the participant, the participant is given a camera and question sheet to interview themselves when surfing. This allows the participant to not only think about surfing, “but also seeing, hearing and feeling it: the smells and sounds of the coast, the temperature and movement of the water, and the taste of salt in the air” (p. 95). Through their adaptation of methods and multi-method approach, they were better able to

understand how humans, technology, and the sea intra-act. Thus, they advocate for an approach that modifies existing methods and brings multiple methods in dialogue with each other to better account for the more-than-human.

In their scholarship on theory and qualitative methods, Jackson and Mazzei (2011) explore the possibilities of using common humanist-based methods (primarily interviews) with different poststructuralist and new materialist theorists (Deleuze, Derrida, Spivak, Foucault, Barad). When writing about Barad, they discuss Barad's emphasis on the material-discursive and use this to think about interviews, methods, and data, more broadly. They argue that interviews can still be used, but need to be reframed as more than discursive.

According to Jackson and Mazzei (2011), with Baradian thinking, there is a need to

move away from thinking the “interview” and what is “told” discursively, toward a thinking of the interview and what is “told” as discursive, material, as discursive *and* material, as material ↔ discursive and as constituted “between” the discursive and the material in a posthumanist becoming (p. 126, emphasis in original).

For them, qualitative methods in their current form (centring the subject and human experience, narratives understood as a truth) have limits regarding their use in new materialisms. However, that does not mean “we reject such practices; instead we work the limits (and limitation) of such practices” (p. ix).

“Re-Engineering” Qualitative Methods in New Materialisms

In line with the approaches described above, many new materialist scholars have used more common qualitative methods in their new materialist inspired research. For example, various scholars have explored the possibilities of doing media analysis using new materialisms (Reade, 2020; Renold & Ringrose, 2019; Warfield, 2016). In general, these scholars tend to disrupt representational paradigms where text and images are seen as separate from the bodies that produce them. Rather, media production can be seen as assemblage of human and nonhuman forces (i.e., bodies, discourse, language, cameras, and text). Similarly, some

scholars have recognised the interview itself as a phenomenon of entangled agencies (Fullagar, O'Brien, et al., 2019; Lupton, 2019a; Mazzei, 2013; Monforte, 2018). For example, engaging with the ideas of Deleuze and Guatarri, Mazzei (2013) offers the concept of the Voice without Organs (VwO) as an alternative approach to analysing interview data. A VwO approach removes agency and voice from the human alone, instead viewing voice as an “assemblage, a complex network of human and nonhuman agents that exceeds the traditional notion of the individual” (p. 734). This includes the researcher and the research apparatus, such that the voice from the interview does not “emanate from a singular subject but is produced in an enactment among research-data-participants-theory-analysis” (p. 732). Drawing upon Mazzei (2013) in their research on women’s recovery from depression, Fullagar, O'Brien, et al. (2019) conduct interviews with women, where they see voice not as “transparent articulations of unmediated truth that we can access” but rather “consider what voices do and how voices have material effects within human and nonhuman assemblages” (p. 18).

Others have conducted “object interviews” in an effort to account for the vitality of nonhuman matter (Nordstrom, 2013; Woodward, 2015). An object interview is understood as an “entangled conversational interview of objects and subjects,” through which both “subjects [humans] and objects produce knowledge” (Nordstrom, 2013, p. 243). This is similar to posthumanist scholars who have been using participatory methods where nonhuman matter (e.g., bees, dogs, and water) is seen as a co-participant in the production of knowledge (Bastian et al., 2017). Other more common qualitative methods such as autoethnography (Dickinson, 2017; Hammor, 2019; Ray, 2019) and focus groups (Safron, 2019; Shelton et al., 2019) have also been adopted and used by new materialist scholars. For example, in his autoethnography of the Australian Football Club, Ray (2019) clarifies that he chose to use autoethnography “as a way to engage with the live surface of the world rather

than fall back onto a modernist understanding of the researcher as an objective observer” (p. 91). He, thus, uses autoethnography to recognise the researcher as “entangled within the assemblages of study” (Coleman & Ringrose, 2013, cited in Ray, 2019, p. 94). This approach enabled him to discuss the human and nonhuman objects within Australian football—bodies, jumpers, ball, beer—that work together to create a particular Australian masculine identity.

In a different vein, scholars have looked towards more interdisciplinary and transdisciplinary approaches. For example, within feminist sport sociology, more specifically, Markula (2019b) has brought together dance, sociological theory, and understandings from other Kinesiology sub disciplines (i.e., biomechanics and anatomy) to think differently about movement and theory. Elsewhere, Holly Thorpe, Marianne Clark, Stacy Sims, and I (Thorpe, Clark, et al., 2020) have described our transdisciplinary approach to female athlete health where we used interviews in dialogue with more quantitative methods around women’s moving bodies (i.e., DEXA, RMR, blood tests).

Thus, as shown, many scholars recognise the value of continuing to use more common qualitative methods (e.g., interviews, focus groups, autoethnography, transdisciplinary research) and do not believe these methods have to be abandoned (Fullagar, O’Brien, et al., 2019; Jackson & Mazzei, 2008, 2011; Lisahunter & Stoodley, 2020; Mazzei, 2013; Mazzei & Jackson, 2017; Ray, 2019). Instead, they are seeking a way to adapt and renovate methods in line with new materialist ontologies. Inspired by this line of thinking, this thesis uses a series of humanist-based qualitative methods—focus groups and various types of interviews—developed using new materialist concepts (described below). However, I utilise a diffractive approach (see Chapter Four) to think about the connections and interactions between these methods and other aspects of the research process.

Methods in Activewear Research

This project began by conducting focus groups with women from across Kirikiriroa

Hamilton, Aotearoa New Zealand, followed by participants creating photo diaries, which were then used in individual interviews. Along with the interviews with participants, I conducted interviews with research members of the lululemon Enlite Sports Bra Development Team (these occurred during the “living with the sports bra” project described below) (Brice et al., 2020). In addition to focus groups, photo diaries, and individual interviews, I also piloted two moving methods interviews. This section details the specific methods used with participants—focus groups, photo diaries, interviews, moving methods—beginning with the participant recruitment strategies.

Participant Recruitment Strategies

With the aim of understanding how different women experience activewear, I recruited widely with few limits on participant requirements. To recruit participants, I used both criterion-based and snowball sampling (Sparkes & Smith, 2014). There were three requirements for participants. They were:

- 1) Participants self-identified as a woman. Although the athleisure phenomenon does affect men and genderqueer people, part of this project entails building upon previous research about the societal discourse on women’s bodies and women’s embodied experiences of fitness (Bordo, 1990; Dworkin & Wachs, 2009; Markula, 2006c). Therefore, I limited this study to people who self-identified as women.
- 2) Participants were at least 18 years old. Although this was quite open ended, I wanted to understand how women of multiple ages and at varied stages of life understood and experienced the athleisure phenomenon.
- 3) Participants had to be consumers of the athleisure phenomenon defined as owning at least five pieces of athleisure clothing. For the purposes of this project, I defined athleisure clothing as clothing that was designed with the intent of physical activity such as sports bras, stretchy pants, lightweight and breathable tops.¹⁴ Since this study was examining the athleisure phenomenon, it was vital that participants were active consumers and wearers of the clothes allowing them to speak at length about their experiences. While high-end activewear brands market towards middle-class professional women, it is important to note that many lower cost activewear clothing options are available (e.g., The Warehouse; K-Mart).

¹⁴ Please note that on the recruitment flier and materials, this definition of athleisure was defined and accompanied by visual images.

To advertise the study, I primarily used the networks I had established during my time in the Waikato. I was employed as a group fitness instructor at both the UniRec Facilities at the University of Waikato and at Les Mills in Kirikiriroa Hamilton's city centre. As an employee, I was familiar with the administrative staff at both locations and was, therefore, able to recruit participants from both health clubs. At the University of Waikato's UniRec facility, a flier was posted in the women's locker room and distributed to all employees. At Les Mills, a short video was posted to the staff Facebook page to outline the project and requirements. However, to expand and reach those who did not have fitness club memberships, I also employed an array of strategies:

- 1) Created and posted fliers¹⁵ in various cafés, Pilates studios, and gyms across Kirikiriroa Hamilton;
- 2) Contacted professors/lecturers and departments across the university to advertise to their students;
- 3) Posted on social media pages of various fitness clubs and groups throughout Kirikiriroa Hamilton;
- 4) Emailed local fitness and women's organisations registered with Hamilton City Council;
- 5) Contacted *Sport Waikato*¹⁶ and had them distribute fliers/emails to their staff.

Through this broad range of recruitment tactics, I attracted a diverse sample in terms of age, ethnicity, and body shape. Overall, I recruited 35 participants (21-63 years old) and conducted five focus groups. From the 35 women who participated in the focus groups, 18 self-identified as Pākehā (Aotearoa New Zealander of European Descent), four as Australian, three as Pākehā/Māori, three as European (i.e., Ireland, Italy, United Kingdom), two as Iranian, two as a mix between Pākehā and Pasifika, one as Asian, one as American, and one

¹⁵ Fliers included photographs that featured a range of body sizes, ages, ethnicities as well as featuring a range of differently priced companies and products (e.g. The Warehouse and lululemon).

¹⁶ Sport Waikato is the government sponsored sporting (and recreational) organisation for the Waikato region of Aotearoa New Zealand.

did not report. Out of all 35 participants, 25 were born and raised in Aotearoa New Zealand while the remaining 10 had migrated to Aotearoa New Zealand for various reasons (e.g., family, education, and jobs) and ranged in how long they had been in the country (one year to 20 years). More information is provided about all the participants in Table One.

Table 1: Participant Information

<i>Pseudonym</i>	<i>Age (at beginning of project)</i>	<i>Self-identified Ethnicity or Nationality</i>	<i>Occupation</i>	<i>Physical Activity(ies)</i>	<i>Photo Diaries and Interview (Y/N) & Number of Photographs</i>
Barbara	21	Māori/ Pākehā	Sales Associate/Fitness Instructor	Weightlifting/Boxing	N
Steph	22	Pākehā	Student/Athlete	Not Specified	N
Anna	23	Pākehā	Accountant/Fitness Instructor	Weightlifting/Aerobics	N
Sherry**	24	Pākehā	Nurse	Yoga/Crossfit	Y-8
Janice**	25	Pākehā	PhD Student	CrossFit	Y-17
Shana	25	South Korean	PhD Student	Recreational sport	Y-7
Sophie	27	Pākehā/Fijian-Indian	Credit Controller	Not specified	N
Bethany	28	Māori/Pākehā/Dutch	Student	Not specified	N
Lily**	29	Australian	University Lecturer	Yoga/Aerobics	Y-13
Fiona	30	American	PhD Student	Aerobic/Mountain Biking	Y-31
Tina*	30	Iranian	Student	Aerobic/Weightlifting	Y-11
Caroline	31	Māori/Pākehā	Physical Activity Community Educator	Boxing	Y-11
Katherine	31	Irish	Group Fitness Instructor	Aerobics	Y-30
Winona*	31	Pākehā	Marketing Coordinator	Aerobics	Y-13
Brenda	32	Māori	IT Administrator	Touch Rugby	Y-9
Maretta	32	Pākehā	MA Student	Not specified	N
Holly	33	Pākehā	PhD Student	Not specified	Y-12
Rachel	33	Not Reported	Not reported	Aerobics	N
Dana	34	Iranian	PhD Student	Aerobics/Weightlifting	Y-22
Karlie	34	Pākehā	PhD Student	Cycling/Aerobics	N
Mary	34	Australian	Exercise Physiologist	Aerobics	N
Lana	36	Pākehā	Pharmacy Retail Manager	Aerobics/Weightlifting	Y-15
Jan	37	Pākehā	Soil Scientist/University Lecturer	Cycling	Y-8
Danni	40	Māori/Pākehā	Administrator	Not specified	N
Vivian	40	Italian	EOE Teacher	Running	Y-11

<i>Pseudonym</i>	<i>Age (at beginning of project)</i>	<i>Self-identified Ethnicity or Nationality</i>	<i>Occupation</i>	<i>Physical Activity(ies)</i>	<i>Photo Diaries and Interview (Y/N) & Number of Photographs</i>
Tara	44	Pākehā	Accountant	Aerobics/Cycling	Y-10
Hannah	50	Pākehā	Finance Officer	Aerobics/Weightlifting	Y-8
Kae	52	Pākehā	Not reported	Cycling/Running	Y-13
Lola	52	British	Marketing Manager	Not Specified	N
Megan	54	Pākehā	University lecturer	Walking/Hiking/Pilates	Y-16
Georgia	55	Australian	Teacher	Aerobics	Y-11
Isla	55	Pākehā	Receptionist/Administration	Aerobics	N
Rita	56	Pākehā	Sport Capability Advisor	Aerobics	Y-9
Dina	62	Pākehā	Accountant	Not specified	N
Nina	63	Pākehā	University Lecturer	Cycling/Swimming/Aerobics	Y-9

Pākehā: Aotearoa New Zealander of European Descent
Māori: Indigenous Polynesian people of Aotearoa New Zealand
Aerobics: Any cardiovascular activity conducted at a fitness centre, or at one's home
* Women who participated in "moving methods"
**Women who participated in "cutting together-apart"

Focus Groups

The first method I used was focus groups which served multiple functions and informed later aspects of research. Focus groups have been shown to be effective and are often used as a starting point of a project because they are a means for exploring how participants talk about events, objects, and phenomenon (Stewart et al., 2007). As a foreigner to Aotearoa New Zealand, I wanted to learn more about activewear consumption in Aotearoa New Zealand so that future stages of the project would be culturally and contextually specific (e.g., appropriate brands, terminology). Therefore, participants were co-constructors and helped to develop concepts and objects of inquiry in later stages of research. During the focus groups, I used multimedia (SkitBox Activewear video, see Chapter One) and pre-written questions (see Appendix A) to spur conversations amongst the participants. Within each group, there was discussion about what is and is not considered athleisure, about how it is read and interpreted in public spaces, about its emancipatory and/or disciplining properties for women, and its comfort, yet tightness, to the body.

Focus groups were also used as a way to increase the attention participants paid to their engagement with activewear believing that this would lead to deeper insights during the individual interviews. In the focus groups, participants and I discussed basic topics around human consumption and experience (characteristics women like/do not about activewear, social media experiences, clothing choices) which created space in the personal interview to have other discussions about more than just human experience since this was already covered in the focus groups. The focus groups also helped women become more attentive to their activewear practices which was helpful in the individual interviews. Therefore, the focus groups served multiple functions and interacted with/affected multiple aspects of “data” collection. In total, there were five focus groups which ranged from having four to ten participants.

Although the focus groups were intended to provide a foundational background from which to proceed, as well as create space for “different” conversations in individual interviews, they had unintended consequences as well. Recognising the potential of methods, Fox and Alldred (2017) write that methods have “micro political capacities that extend beyond the objectives for which they have been designed, and that the former can undermine and even on occasions act against the latter” (p. 196). One of the “micro political capacities” of the focus groups was how excited and engaged participants became in the project. Initially, I estimated that 10 women would be interested in conducting the photo diary and individual interview, but after the focus groups and the conversations within those groups, 22 women created photo diaries and met with me for an interview. Another unintended consequence of the focus groups was the problematisation of the term “activewear.” Every person and in every focus group had a different understanding of what activewear meant, ideas of who was wearing activewear, and beliefs around the social acceptability of activewear. I found myself more confused about activewear after the focus groups than I was before. The experiences and interpretations of activewear were far more diverse than I had anticipated. However, this vast array of understandings showcased the complexity of activewear, its ever-changing nature, and how studying activewear requires a theoretical-methodological approach that addresses and allows for the fluidity of this material-discursive phenomenon.

Visual Methods: Photo Diaries

After the focus groups, many of the participants developed their own photo diaries taking photos of activewear in their everyday lives. A broad definition of visual methods are any methods that utilise visual evidence (Harrison, 2004; Phoenix, 2010). Phoenix (2010) describes the importance and possibilities of using visual methods within physical cultural research, writing that “they can offer a different way of ‘knowing’ the world of physical culture which goes beyond knowledge constructed and communicated through written and

spoken word alone” (p. 94). Photos can be used as part of a photo-elicitation strategy which “refers to the use of a single or sets of photographs as stimulus during a research interview [that] aims to trigger responses and memories and unveil participants’ attitudes, views, beliefs, and meanings or to investigate group dynamics” (Meo, 2002, p. 150). The benefits of using photo elicitation interviews are that they “spur meanings that otherwise might have remained dormant in a face to face interview...[photographs] can trigger meaning for the interviewee” (Clark-Ibáñez, 2004, p. 1513).

Photo elicitation strategies (and photographs, in general) have also been used by new materialist scholars interested in the relationality between humans and nonhumans in various phenomena (Coffey, 2019; Hultman & Lenz Taguchi, 2010; Safron, 2019; Warfield, 2016). For example, in Coffey’s (2019) exploration into young people’s experiences of wellbeing, gender, and their bodies, participants took photos of objects, spaces, and environments related to their understandings of wellness prior to participating in an individual interview. During the interview, the photos enabled participants to “speak about the process and sensations related to the taking of the photo, and how it intra-acted with their thoughts and interpretation of the task in relation to wellbeing” (p. 13). Within this thesis, using photo diaries was an attempt to move beyond language and to focus on the multiple entanglements and intra-actions within women’s activewear practices.

For the photo diaries, women had three versions they could choose. Participants were also able to choose to complete one, two, or all three of the following visual methods for a period of two to three weeks (aiming for a total of 10-15 photographs). Examples of each method were provided during the focus group (see Appendix B):

- (1) *Photo diary comprised of selfies*: This was designed for participants who were avid social media users and posted online frequently. They were asked to take selfies¹⁷ of themselves when wearing activewear with a short caption describing

¹⁷ Selfies were clearly described to participants as photos of themselves wearing athleisure. However, they did not have to be full-body shots or even include one’s face.

why they took this image, how they felt, their thoughts on their clothes, or just general ideas they would like to share.

- (2) *Collection of screenshots/photos of advertising/branding*: A second visual method included a screen grabbing method, inspired by the “scroll-back” method developed by Robards and Lincoln (2017). Robards and Lincoln (2017) use the “scroll back” method in their research where participants and researchers “scroll” through participants’ Facebook pages together to co-analyse women’s digital traces. In my particular project, the screen grabbing method had participants who were very aware of brands and advertising campaigns take screen shots of the activewear discourse they saw whether it was on a social media feed, billboards, magazines, or television.
- (3) *Photos of participant’s activewear clothing*: This visual method was for women who were not engaged in/with social media, and/or did not feel comfortable taking selfies. This group tracked the “life of athleisure” by taking photos of their athleisure clothing throughout a two to three week period. For example, this could be a sports bra in a wardrobe, then in the laundry basket, then in the washing machine, etc.

Throughout the photo diary period, participants sent photos directly to me using Facebook Messenger, WhatsApp and/or email, depending on their preference. All the photos sent to me were then stored on a password protected app (Secret Folder) until the interview. While the participants were given an option of these three types of photo diaries, many conducted a hybrid approach, combining the options (see Table Two). In total, the amount of photographs participant sent ranged from seven to 31, with an average of 13 photographs per photo diary. Although initially the photo diary was supposed to span two weeks, in reality the photos were sent over a three to four week period (the time period between the focus group and individual interview).

Table 2: Details of Participants' Photo Diaries

Photo Diary Option	Number of Participants
Only selfies	8
Only screenshots of advertising/branding	0
Only participant's activewear clothing (no human in photo)	2
Selfies and photos only of participant's activewear clothing	7
Selfies and collection of screenshots/photos of advertising/branding	2
Selfies, activewear branding and advertising, and only participant's activewear	2

Individual Interviews

After the women completed the photo diaries, I conducted a short, semi-structured individual interview with each of them (See Appendix C for interview guide). In total, 22 interviews were conducted, lasting between 40-60 minutes at a neutral (quiet) location of the participants choosing. I used a semi-structured interview style which allowed for both a very general sense of uniformity across all interviews (similar topic and question themes) and enough flexibility and space to explore different topics with each woman and for a more free-flowing dialogue (Atkinson, 2012).

Interviews are one of the most preferred “data” collection methods within feminist research because they allow women to contribute to research through their own words. Having women participants’ voices present is especially important “because in this way learning from women is an antidote to centuries of ignoring women’s ideas altogether or having men speak for women” (Reinharz, 1992, p. 18). Interviewing is also important within

feminist research, especially when viewed as more of a conversation than formal interview, because it helps to develop a sense of connection between researcher and participant.

In line with a feminist research practice, during the interviews and focus groups, I recognised how some of my characteristics affected the distribution of power in the research and my relationships with my participants. I was aware of my role as the researcher and leader of focus groups/interviews; my ethnicity and status as a foreigner to Aotearoa New Zealand; my body shape and size; my role as a fitness instructor which many participants were aware. I took steps to change the power inequalities because of these traits. For example, focus groups were used because I realised as a foreigner my understanding of athleisure is very American-centred and focus groups are an effective way to shift the balance of power (Wilkinson, 1998). At the focus groups, I sat down with participants and allowed conversation to flow between participants without my direction. Also, women had a choice in whether they wanted to participate in the photo diaries and if they did, what method they would like to use. For those participants who participated in interviews, the women chose the location of the interview. While a majority of the interviews occurred in my university office, four of them took place in the participants' work-spaces. In addition, all women had the option to bring a supportive companion as I understood that some women might have been apprehensive to do one-on-one interviews. As I was looking for a diverse group of women, and wanted to give value to all women's experiences, the option was made explicit and available. While they were made aware of this option, no participants chose to bring a companion.

Although interviews can be very helpful in research, they can be in contrast to new materialisms' ontological foundations. This is because primarily interviews privilege language and are predicated on the beliefs that (1) "knowledge about the world is gained by asking people about how they view, experience, and see the world" (Atkinson, 2012, p. 115),

and (2) are used as a technique to gain knowledge about how humans assign meaning to their thoughts and actions. While acknowledging the ontological incongruency between interviews and new materialisms, some scholars do not believe this means abandoning the interview altogether, as discussed earlier. Mazzei (2013) highlights this writing that using theorists such as Deleuze and Guattari or new materialist scholars “does not mean that interviewing must be abandoned as a method, although some might say it should. However, it certainly demands a de-centring and a de-privileging of the interview in social science research” (p. 738).

Therefore, I used the interview in combination with multiple other methods and attempted to explore the new materialist themes via the questions I asked. The interview was understood as always being in dialogue with the various other methods used in an effort to “disclose the relations within [research] assemblages, and the kinds of affective flows that occur between these relations” (Fox & Alldred, 2015, p. 402). The photo diaries, participants’ relationship with the materiality of their clothing, and interviews worked with each other to generate new discussions and new lines of inquiry.

In addition to placing the interview in “conversation” with other methods, the interview questions were developed based around concepts within new materialisms and Baradian theory, such as intra-action and entanglements. I was interested in the inseparability of women and their clothing and was inspired by Monforte (2018) who re-read the interview data he had collected with a spinal cord patient. When re-reviewing his data, he focused more on the materiality present within the interview, effectively “flattening the relations between humans and nonhuman elements in the stories, reading them horizontally, rather than vertically” (p. 385). In an attempt to “flatten relations,” I rewrote questions in the interview that would allow for the existence of materiality. However, writing and thinking of questions that would allow the interview to move beyond questions of human experience and feelings proved highly challenging. I conducted two pilot interviews that confirmed my suspicions of

the difficulties of this type of research. The questions fluctuated from being too literal (How does the material of your leggings feel?) and simple (How do you wash activewear?), to being too difficult for participants to articulate an answer for (How does activewear influence your movement?). Most Western countries ideologies are based around humanism where the human is placed in the centre and the ways in which people act, talk, and express themselves begin with the human. Therefore, it was, at times, challenging to determine how to lead the interview, how to articulate ideas in line with new materialisms (e.g., agency, intra-action), and how to ask questions that go against dominant ways of knowing the human.

After the pilot interviews, I changed some of the questions in an attempt to better explore the vitality and power of the activewear in the stories shared. I took inspiration from Taylor's (2013) examination of classroom gender dynamics where she encourages researchers to ask questions around the agency of objects. For example, when asking questions like "What does a chair do?" or "What does a bottle do?" it "prompts a reconceptualisation of things, bodies, and pedagogic spaces as an assemblage of intra-active, ongoing and productive happenings entailing multiple agencies" (p. 692). Therefore, questions were modified to focus on the liveliness of activewear, asking participants questions such as "What does your activewear say about you? What is your favourite clothing's life story? How does your activewear feel about your relationship?" Many of the participants were amused with these questions, often initially laughing or giggling about the "absurdity" of animating activewear. However, after a few minutes many began to think more deeply about their relationship with activewear resulting in a range of responses. For example, Shana¹⁸ (25 years old, South Korean, recreational sports) said, "they should be happy that they get worn" whereas Kae (52 years old, Pākehā, cycling/running) responded

¹⁸ Please note all participant names are pseudonyms. The first time the participant is mentioned in a chapter, their age, self-identified ethnicity, and physical activity(ies) are provided. Table One provides more information on the participants.

with “Thrashed, worn out, used. You’re getting your money’s worth out of me.” Megan (54 years old, Pākehā, hiking/Pilates) really enjoyed the question and provided a more lengthy answer:

They would say to me...“Why don’t you wear me more? I’m sick of going to that class, give me some more things to do.” What else would these say to me?...They would say to me “Why don’t you actually take up the hem properly rather than just turning it up?” cause I’ve never got around to doing that. This is hilarious. What would this pair say to me? It would say “Come on, you look okay in me. I support you.” That’s a good question.

The photographs were also used to elicit conversations by having participants go back into the moment the photograph was taken to encourage them to recall the feeling of activewear on their body, the air in the room, and the other objects that had come into play with them at that moment. I was inspired by Hultman and Lenz Taguchi (2010)’s research where they challenge the habitual anthropocentric gaze used when analysing photographs. They describe how often researchers’ primary focus (when looking at a photograph) is on the human being with other matter playing a supporting background role. In their work, they show multiple images of children playing and suggest that the images not only be understood as children playing, but as an assemblage of overlapping forces (i.e., children, weather, toys, and sandboxes). Things, objects, and people are then understood as relational and blurred together, thereby disrupting an object/subject binary and creating space for new ways of thinking. In my research I asked questions about the nonhuman objects (e.g., shoes, leggings, sports bras, bags) in the participant’s photographs in an effort towards decentring the human. In fact, many of the photographs that women took did not have humans in them at all. Asking participants to go back into that moment when the photograph was taken and to think about taking the photograph, resulted in very interesting answers that did not revolve completely around the human. For example, Lily (29 years old, Australian, yoga/aerobics) described how when she took one of her photographs, “I was also thinking about the interactions of me and the rest of the, the setting of the photo. Me and the environment so it was a 3 way, the

clothes/me/the environment. Well 4 with the text.” Similarly, Janice (25 years old, Pākehā, CrossFit) described how in taking the photographs (and reflecting back on the process), she was made more aware of how activewear affects her dogs:

With this first one with the dog, I hadn’t thought about it but I whenever I put my activewear on, they get really really excited. Less so the clothes, but the shoes. As soon as they saw the shoes they were like “oh this means we’re going somewhere” and got really excited but occasionally you’d be going out in your shoes without taking them and they’d get really sad.

Overall, many of the participants enjoyed reflecting back on the pictures and it was a productive way to move away only from the human and towards the other nonhuman elements that were part of their photographs and experiences in athleisure.

To expand on the various questions, I had participants physically draw a map of their own activewear entanglements by placing one of their favourite articles of the clothing in the centre of the page and mapping the clothing’s intra-actions and their personal connections with the piece (see Figure 2).

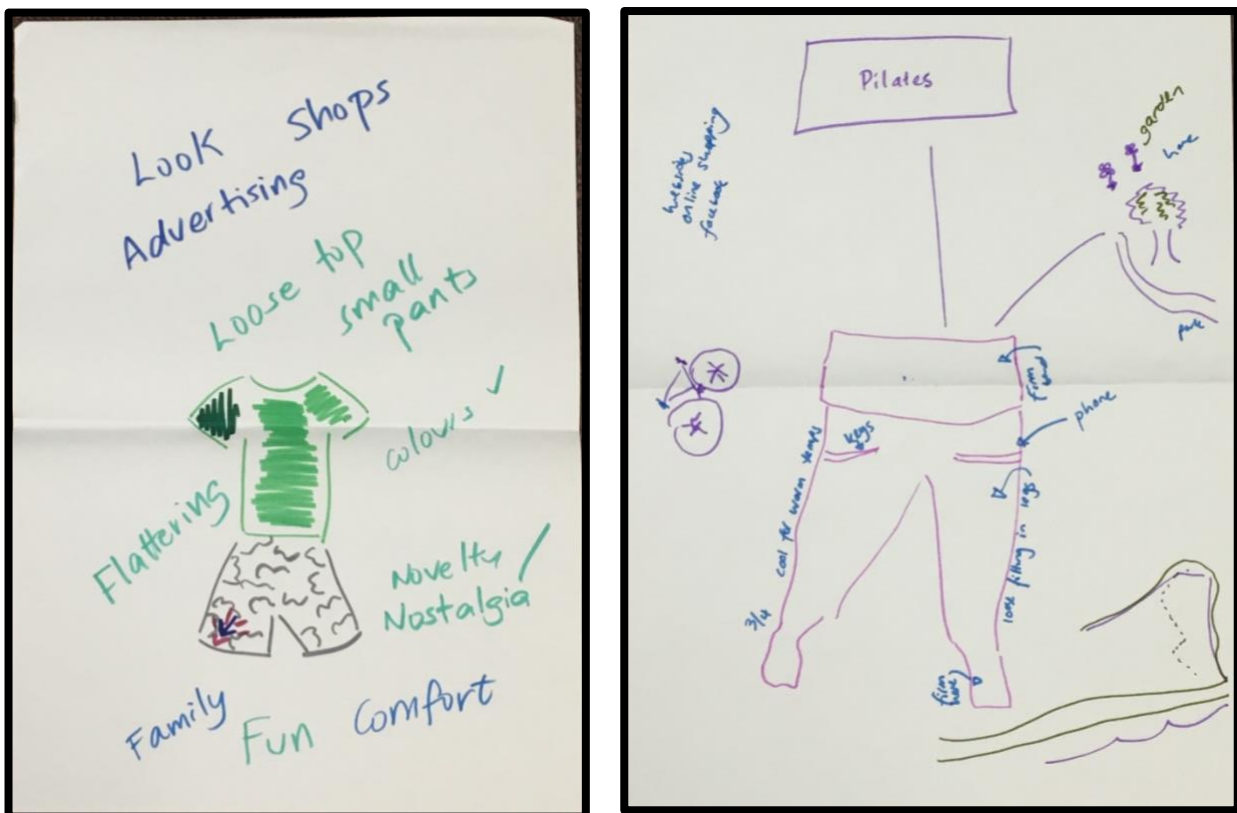


Figure 2: Examples from participants mapping their activewear entanglements

However, I quickly abandoned this effort as I found speaking about the mapping as effective as drawing the map with participants expressing frustration with having to draw. As I continued to conduct interviews and read Baradian and new materialist theory, I continued to change the questions and include more of the intra-actions between the body and the clothing. For example, I asked questions about the changing body (e.g., pregnancy, age, weight loss/gain) and its dynamic relationship with clothing and about the emotional connections formed with particular items of clothing.

The interviews were both encouraging and frustrating. Throughout the interviews there were data that “glowed” (MacLure, 2013a), ideas and stories participants told that were interesting and resonated with new materialisms. For example, one woman discussed the physically supportive role her activewear pants played when she had a back injury and the mutual entanglement of the fabric, muscles, bones, and pain. Other participants discussed the effect of the colour of their pants on their confidence and experiences of exercising. During these discussions, new materialisms were in play and concepts explored. Although the discussions were positive in that they did reinforce the material-discursive nature of activewear, I did, at times, find myself slipping back into an anthropocentric social constructionist paradigm, leaning towards questions about human experience and social discourses. It was a struggle during the interviews to challenge myself to ask different questions, to think about new materialist concepts, and to articulate follow up questions to data that “glowed” that would allow me to push an idea further. However, such tensions and challenges are to be expected in new materialisms where there is no clear direction or guideline for “how to” do research.

Moving Methods

As part of this research is about exploring the possibilities and implications of new materialisms for social sciences research, I was interested in a method that would lend itself

towards a deeper engagement with the dynamic relationship between the material body and activewear. Challenges around bringing the body into research have been present for the last 30 years (Chadwick, 2017) and there have been a range of embodied methodologies aimed at addressing this challenge. For example, researchers have proposed using sensory based questions and sensory prompts in interviews (similar to some of the questions I asked such as how something feels on the body) (Harris & Guillemin, 2012). Other researchers have utilised the moving body within the interview such as work by Francombe-Webb (2017) in her research on gender and digital and physical culture spaces. This echoes the vast number of sporting ethnographic studies that have been conducted which utilise a participant observation method where researchers move with their participants as a form of “data collection” (Evers, 2006; Falcous, 2017; Knapp, 2012; Olive & Thorpe, 2011; Shipway et al., 2012; Thorpe, 2011; Wheaton & Tomlinson, 1998). Similar to Francombe-Webb (2017) and sporting ethnographic literature, many have used walking methods (Evans & Jones, 2011; lisahunter & Stoodley, 2020; Palmer, 2016). Although none of these methods tend to be classified as new materialist, they do represent an attempt to conduct interviews differently where the “sensuous body, its fleshy sinews, its movement and its (in)activity” (Francombe-Webb, 2017, p. 183) become a part of, and present, in the interview. Taking inspiration from those scholars, I piloted two moving method interviews.

These moving method interviews were conducted with participants who had completed the focus group, photo diary, and individual interview. I chose to use women who had already completed the focus groups and interviews because we had already established a relationship and spoken at length about their bodies, activewear preferences, social media usage and overall experiences with their activewear. For both moving methods, participants and I met before we “moved” and did a short pre-movement interview (Appendix D). This was followed by a movement activity, and then a post-movement interview. In both cases, the

participants and I wore activewear. In both the pre and post interviews, participants discussed feelings of their body in the activewear, their disposition to wearing activewear, and their body awareness. The goal in both these interviews was to explore the dynamism of body-material intra-actions; how the sweat, flesh, fabric, wind, rain affected how women felt and how the body moved during exercise.

During both of the moving methods, participants and I decided to go hiking, where we sweated, talked, slipped, muddied ourselves, and moved with/in our activewear. We made the decision to go hiking together, rather than exercise in a fitness centre or go for a run because, in general, hiking is a low-intensity exercise that is conducive to talking, activewear is often worn, and was an opportunity for participants and I to go into nature and experience activewear in different scenarios than we normally would in the city. During the moving methods, the body and activewear were very “present” in the interview as compared to the previous interviews inspired by the photo diaries. Participants and I experienced the intense interaction between heat, weather, sweat, and clothing, and the role that weather and activewear plays in hiking movements. For example, when I went hiking with Dana (34 years old, Iranian, group fitness instructor) at one point she slipped and fell into a stream causing her whole backside and undergarments to get wet. We talked a little about this unpleasant feeling, but found that as we continued on our hike, the wetness made itself known as Dana began to shiver and become uncomfortable with her wet backside. While the moving methods were interesting as a way to think about the intra-actions between bodies, activewear, and the environment, the participants voiced that they had reached a point of saturation. By participating in the focus groups, photo diary, and individual interview, they described how they were unable to say anything different about activewear and, while enjoyed the hike, expressed (nicely) that they felt it was not worth their time. Therefore, out of respect for my participants, I only completed two moving method interviews.

The methods I've described thus far (i.e., focus groups, interviews, photo diaries, and moving methods) are all common methods used by many sport sociologists and qualitative researchers. I attempted to modify or "re-equip" them by bringing theory into the method, changing interview questions, using photo diaries to focus more on nonhuman matter and, having multiple stages of "data collection" with the same participants to attempt to go "beyond" experience. However, many may still critique the use of these methods as centring the human questioning how they are posthuman. In order to account for these critiques, I used multiple methods and diffraction (see Chapter Four) where the methods and their "findings" are brought together and read through each other (more in the following chapter). In addition, I conducted creative methods described below.

Creative Methods

While some scholars have advocated for the use of humanist-based methods, others have called upon scholars to reject previous methods and look towards new, creative research approaches. This section explores one such unique approach, postqualitative inquiry (PQI), and how it inspired me to conduct a series of different methods. Similar to the section above, I begin with an overview of postqualitative inquiry, followed by an account of my methods.

Postqualitative Inquiry (PQI)

Elizabeth St. Pierre (2011, 2016) has offered, what to some may seem, a radical approach to empirical practices. In this ontological turn St. Pierre argues that scholars cannot continue with humanist-based qualitative methods when using new materialist and posthumanist because these methods prioritise human voice and experience which is in contrast to new materialist ontology. In many qualitative methodological approaches (e.g., interpretivism and constructionist theory), the human is positioned as the "source of all meaning and enables the researcher to construct a coherent and interesting narrative, bound by themes and patterns

understood to emerged from data” (Lenz Taguchi, 2012, p. 269). However, in new materialisms, there is a decentring of the human experience, and rather the human is always seen as positioned within an entanglement of other human and nonhuman factors. St. Pierre (2016) summarises this idea, writing that “If we no longer believe the individual, the person, the knowing subject of humanist empiricisms can be the point of departure in our inquiry, I am at a loss to see how anything we’ve learned about humanist empirical social science research is possible in the new empiricism” (p. 112). She advocates for flexibility and creativity where researchers are not constricted by methodological frameworks and structures, but rather open to experiment with research practices that align more closely with theoretical ontological implications. In 2011 she coined the term “postqualitative inquiry” in an attempt to destabilise what she called “conventional humanist inquiry.”¹⁹ In a 2019 keynote at the International Congress of Qualitative Inquiry, St. Pierre (2019b) said that “postqualitative inquiry is not a rejection of qualitative inquiry or any other pre-existing social science research methodology. It’s something different altogether” (n.p). Rather, “It must be invented, created differently each time. The goal of postqualitative inquiry...is to experiment and create something new and different that might *not* be recognizable in existing structures of intelligibility” (St. Pierre, 2019b, n.p., emphasis in original).

Although postqualitative inquiry is fluid and different for every researcher, St. Pierre’s PQI advises researchers to begin with theory, rather than methodology or familiar methods. St. Pierre (2015a) writes “Instead of beginning with methodology, I recommend putting the concepts and theories of experimental ontology to work using the conceptual practices that are appropriate for a particular study” (p. 92). In this approach, researchers are called upon to extensively study theoretical concepts, and it only through this intense depth

¹⁹ Importantly, this should be understood as a critique of *some* forms of qualitative research, but certainly not all. There is a range of research approaches that fall under the moniker of qualitative research that do not follow prescriptive and linear forms of research design (i.e. ethnography, grounded theory, arts-inspired research).

and understanding that acceptable methods (conceptual practices) might be created. She lays out specific steps when thinking through PQI: “refusing qualitative methodology, reading, beginning with theory/concepts instead of methodology, and trusting ourselves in not knowing” (St. Pierre, 2015a, p. 86). Within such an approach, there is space for the researcher to try different things, make mistakes, and to attempt a “new” way of conducting research.

St. Pierre is not the only academic to call for a renewed focus on the relationship between methodology and theory. In his work on (post)qualitative inquiry in sport and health, Giardina (2017) writes about the dangers of the “toolbox” method approach where there are a set number of methods (a toolbox) that researchers choose to use in their projects. This toolbox approach “reduces the conduct of inquiry solely to the technical execution of particular methods: that is; a *methods-driven* approach to research” (Giardina, 2017, p. 262) which privileges methods as a starting point for research rather than “invoking theoretical engagement” with a topic. Similarly, Scott and Garner (2013) describe the relationship between theory and method as “dynamically intertwined, mutually influential, and constantly changing” (p. 87) stressing their inseparability. These scholars, and many others, echo the importance of congruency between methods and theory (Denzin, 2008, 2010; Jackson & Mazzei, 2011; Koro-Ljungberg, 2015; Lather, 2013). St. Pierre builds upon this work to discuss the implication of the theory-method relationship in this new materialist turn and how in order to maintain ontological congruency, new methods that do not rely on representational accounts and language must be developed.

In addition to questioning the humanist ontological assumptions underpinning much qualitative research and the standardisation of qualitative methods, a desire to *do research differently* stems from new materialisms’ critique of representationalism. Barad describes representationalism as the “belief in the ontological distinction between representations and

that which they purport to represent” (Barad, 2007, p. 46). Said differently, representationalism is the belief that there is an external world that research is attempting to understand where methods are designed to gather information about this world. Within representationalism, research is understood as a “process of data extraction from a human or non-human world that can then be represented as an unproblematic ‘truth’” (Fullagar, 2020b, p. 119). Scholars within new materialisms and across many other disciplines (e.g., feminist and queer studies, philosophy of science) have critiqued representationalism for ignoring the constitutive effects of the research process on the knowledge produced. Barad (2007) describes how research processes should be understood as “material engagements that participate in (re)configuring the world” (p. 91) while others in new materialisms describe research as a process of “thinking-making-doing” (Springgay & Truman, 2018). Research is not seen as a way to represent the world, but it *creates* worlds. Importantly, within new materialisms, the research act of “thinking-making-doing” does not refer only to the actions of the researchers or humans, but explores how all human and nonhuman components in the research process contribute to the production of knowledge. In order to account for these intra-acting elements in research, various new materialist scholars have looked towards creative and alternative methods.

One approach has been to use methods that incorporate arts-based and creative practices (Coleman et al., 2019; Hickey-Moody et al., 2016; Höppner, 2021; Springgay & Truman, 2017a). Leading scholar in this field, Anna Hickey-Moody (Hickey-Moody et al., 2016; Hickey-Moody & Willcox, 2019; Hickey-Moody, 2018) has often relied on creative methods, such as painting and collaging with her participants. In her work, she describes how “knowledge generation is always collaborative” (p. 725) between humans and nonhumans, explaining that in arts-based projects, “the materials that are molded, and craft practices that are employed in the process of making, are collaborators, and the physical nature of their

form is central to how making happens” (p. 725). Similarly, in her postqualitative exploration of the *Shape Your Life* program (a recreational boxing program for trans survivors), van Ingen (2016) and her participants experiment with painting used pieces of canvas from the boxing ring. Participants in van Ingen’s (2016) research were not given formal instructions, but rather asked to paint anything they wanted about their experiences. Van Ingen (2016) describes how the “painting project was deeply improvisational and as a result it brought something new into being” (p. 476) that did not rely on interpreting human voice or assigning meaning to the paintings. Unlike in representationalist methods where art could be seen to represent a reality or truth, in these approaches, the art is seen as a productive force in developing particular understandings.

There are others who are turning towards more embodied methods where the human body is understood as both a performative and generative force in knowledge production. In such approaches, “theory, matter and movement are entangled through methodological practices as they trouble conventional ways of knowing ‘the world’” (Fullagar et al., 2021, p. 118). For example, Springgay and Truman (2017b) explore a more-than-human approach to walking methodologies where walking is seen as a process of “walking-with” queer, feminist, Black, and Indigenous theories. Here, their walking-methods are not solely understood as a way to learn about participants’ experiences, but are a productive force in disrupting the White-cis-hetero-ableist notions present within much walking scholarship. In a different vein, Fullagar et al. (2021) explore a range of different embodied methods (e.g., dance, sport, bodymapping) in their posthumanist, new materialist workshop with postgraduate students and feminist academics. Through these methods, they encouraged participants to “trace the affective contour of their movement lives in new ways...in the entanglement of human and nonhuman worlds” (p. 188). In so doing, “these approaches to knowledge production begin and end with the *listening through the body*” (p. 188, emphasis in original). Within and

across these approaches, there is a desire to do research differently that does not rely on standardised methods or procedures and where there is ontological congruency between the theory/concepts and methods. For those in new materialisms, it entails developing methods that are open to the relationality of the world, that see nonhuman matter as active and lively, and recognises humans as always entangled with the nonhuman.

Creative Methods in Activewear Research

Inspired by postqualitative inquiry and the desire to do research differently, throughout the project I worked to develop creative methods. Drawing upon St. Pierre, Fullagar (2017) describes this approach as “not one of developing a recipe to follow, but thinking about concept as method” (p. 252). Therefore, I did not develop these methods with a linear, pre-constructed plan, but was instead open to the unknown and allowed theoretical concepts to drive the empirical practices. In this section, I discuss two such methods: “living with the sports bra”; and “cutting together-apart.”

“Living with the Sports Bra”

When thinking about how to approach methods and empirical practices, St. Pierre (2015a) advises her doctoral students “not to begin with methodologies but with theory(ies) or a concept or several related concepts they’ve identified in their reading that helps them think about whatever they’re interested in thinking about” (p. 89). Therefore, for this part of the project, I looked towards the overarching principles within new materialisms and Barad’s agential realism. In particular, I drew upon the emphasis on understanding matter as agentic where nonhuman matter “are considered active participants...in the world’s becoming as they too ‘perform actions, produce effects, and alter situation” (Bennett, 2004, in Monforte, 2018, p. 680). Recognising the vital role that the sports bra plays in many women’s moving behaviours, I was interested in using new materialisms to know the sports bra as lively and

agentic. In order to do this, I led a year-long collaborative “experiment” with Holly Thorpe and Marianne Clark, two feminist scholars at the same university who were also reading and engaging with Baradian theory (Brice et al., 2020). Inspired by St. Pierre’s PQI, we embarked on an exercise in thinking and “living with the sports bra” where we all wore the same brand (lululemon) and model of sports bra (Enlite) for a year and engaged in an online digital dialogue, in addition to visiting a lululemon store and participating in a virtual yoga class together.

We chose to use lululemon’s Enlite sports bra because of its complex material and discursive nature. Enlite is a multi-functional, high supportive sports bra designed and produced by lululemon that differs from the company’s more traditional low-impact, yoga-based bras. According to marketing materials and interviews with staff at lululemon headquarters, Enlite is a result of three years of research involving a variety of material and human agents (neuromechanics, sewing machines, thread, biomechanics, machinery, computers, designers, statisticians) that culminated in the production of a so-called “revolutionary bra” (lululemon 2017). With its newly developed fabric and unique shape (encapsulated, pronounced cups, wide straps that both cross and sit straight along the back, free cut edges), the distinctive Enlite design was the result of a team of scientists working at the intersection of physics, biology, neurology, textiles, and statistics.

While lululemon is a global leader in the activewear industry, it has also been critiqued for its use of neoliberal hyper-individualism and self-help rhetoric (Brice & Thorpe, 2021a; Lavrence & Lozanski, 2014; Stokes, 2008). Popular press articles have also critiqued lululemon for catering to only particular women, describing the brand as an “elite fitness status symbol for the skinny and wealthy set” (Wakeman, 2013, para 7). Lululemon has a history of fat-shaming as exemplified by comments made by their former CEO and is known to have an extremely high price point (Kim, 2015; Moore, 2013; Peterson, 2014). However,

Enlite is interesting as it is marketed differently than other lululemon bras. It is positioned as decidedly “high-tech” as well as inclusive, available in 20 sizes and promoted as a bra for “every woman” with lululemon using a range of models that vary in both skin colour and body size. From a new materialist perspective, Enlite emerges as meaningful through the specific entangled intra-activity with other social and cultural forces, materialities, and knowledges.

The first step in “living with the sports bra” was to gain a better understanding of where Enlite “lived” and its intra-actions with other humans and nonhumans before it met us (i.e., the wearers). This led to a visit at the lululemon research headquarters (White Space laboratory) in Vancouver, Canada where I was given a tour and spoke with their head Research Director. This meeting was designed to both gather information from the Research Director, and the other people involved in Enlite, but also to better grasp the materiality of this bra. During my tour of the top-secret White Space facilities, I took note of the materiality of the space: fabric scraps throughout the facility; bodies moving and pulling on fabrics; the advanced machinery used to test various qualities of the fabric; and the extra bras stacked upon one another ready to be destroyed after having failed their biomechanics test. In addition to adopting a multi-sensory approach—using my fingers and hands to touch fabrics, nose to smell materials and chemical processes in different spaces, and ears to listen carefully to staff chatter, machinery operating, and music floating above the action—I also documented parts of my experience through photography and immediately following the tour, recorded and documented my notes²⁰ (see Figure 3).

²⁰ I had to sign a non-disclosure agreement with lululemon and am therefore limited regarding how much information from this tour, and the interviews with lululemon researchers, I can use within this thesis.



Figure 3: Pictures from the lululemon headquarters, Vancouver, Canada (2018)

Along with the tour, I conducted phone interviews with two of the lead designers and researchers for Enlite, including an Innovation Manager (Neuromechanics Researcher) and a Research Scientist (Biomechanics Researcher) at White Space. In each of these interviews, I used a semi-structured approach, drawing upon my experiences at White Space and what I had seen online and heard at various fitness centres (see Appendix E). The questions were primarily around the development of Enlite —the participants’ specific involvement with Enlite, the narrative of Enlite’s development, challenges/successes of Enlite, the uniqueness of Enlite and more. Interestingly, although we were discussing a product to help women’s movement, women (humans) were a very minor part of the conversation and instead the interviews primarily were around science, technology, and materiality of the sports bra.

Once I had conducted the interviews and tour of White Space, I shared my observations with Holly Thorpe and Marianne Clark. We then began our journey of “living with the sports bra” (Brice et al., 2020). While our project was inspired by new materialist theory and our interest in the feminist possibilities for knowing women’s moving bodies differently, the process was fluid and unscripted. We began by visiting the lululemon pop-up store in Kirikiriroa Hamilton’s city centre where we “met” the Enlite bra and tried on various sizes and colours. Once we received our Enlite bras (donated by lululemon) we embarked on a seven month digital dialogue using Facebook messenger, collectively posting over 100

messages in the private digital forum and 58 images where we shared our experiences and reflections of the bra, inspired by Baradian thinking (see Brice et al., 2020, for more on the process). Ultimately, this experimental process revealed the value in feminist collaboration for helping to understand the possibilities of new materialist theory, embodied methods, and alternative approaches to doing research. It also led to new insights around the various human and nonhuman sports bra entanglements, which are explored throughout the conceptually-inspired chapters of this thesis (Chapters Five through Seven).

“Cutting Together-Apart”

Although the various methods used are presented here chronologically, many of them were happening simultaneously, affecting and intra-acting with each other. During the collaborative Enlite project discussed above, we experimented with Barad’s concept of “cutting together-apart” (Brice & Thorpe, In Press) as part of the meaning making process. This is described in greater detail in the following chapter. However, importantly for this chapter on methods, the experience of “cutting together-apart” inspired an arts-based method I conducted with participants from earlier parts of the project and with feminist colleagues. In Hickey-Moody’s (2018) research on arts-based methods and new materialisms, she emphasises how “knowledge generation is always collaborative” (p. 725) referring to the ways in which nonhuman matter can be seen as co-collaborators. Continuing, she explains that in arts-based projects, “the materials that are moulded, and craft practices that are employed in the process of making, are collaborators, and the physical nature of their form is central to how making happens” (p. 725). In “cutting together-apart” I was interested in the ways playing with the materiality and fabric of activewear could create different ways of knowing activewear, of new “lines of flight,” that had not yet been explored.

In total I conducted two “cutting together-apart” focus groups with two different groups of women; previous participants and feminist colleagues. In the first “cutting together-

apart” focus group, three participants (marked as ** in Table One) from the previous parts of the research process participated (all interview participants were asked to participate through an email invitation). In the second “cutting together-apart” focus group, three feminist colleagues and I came together. Both focus groups followed the same procedure. Participants were asked to bring old activewear that could be cut up and for those who did not have any, I provided some acquired from thrift stores and donation websites. As I collected extra activewear for the study, I ensured that I had a range of pieces in terms of brands, prices, and sizes. During the “cutting together-apart” group, the first task was to have participants take a moment to reflect upon the piece of clothing. This was accomplished by filling out a short, colourful worksheet with two questions about the significance (and/or assumed history) of the piece and why they brought/chose it (see Appendix F). As a group, we then shared and reflected on the pieces before actually cutting them up. I gave participants very little direction and just asked them to cut the fabric any way they would like. There were various interpretations of this: cutting along the seams to deconstruct the piece into its patterned parts; turning “ugly” clothes into something they would wear by removing fabric; cutting random chunks off the clothing. During this time, I also played music and recorded the conversations we had to ensure a relaxed, comfortable environment. I asked participants questions about what and why they were cutting certain ways, if they had any feelings while cutting, what they were thinking, and how the material felt in their hands.

Once participants seemed content with their cuts, I gave them another task: individually or collectively combine the pieces together in any way they would like. I provided double-sided tape, Cellotape, sewing kits, fabric glue, staplers, magazines, a live mannequin (I was dressed in black and they had the opportunity to build a garment around my body). In the focus groups with feminist colleagues, the women did not feel the need to put the clothing scraps back together and instead we had a conversation around the

environmental impact of activewear (see Brice & Thorpe, 2021d; In Press). For the focus groups with the previous participants, the women did put the clothing back together but decided to work individually as one had already started tying fabric pieces together and wanted to see her project through to the end. Another participant used magazines and began redesigning the advertisements using the fabric scraps and the third participant enjoyed tying fabric into a braid and gluing pieces of fabric together (see Figure 4). Similar to the cutting portion, I asked questions along the way in order to obtain a running commentary on participants' actions and thoughts. At the end, participants shared what they had done and any final comments about their involvement in the entire project.



Figure 4: Example of projects created by participants during “cutting together-apart”

There were not any predefined research questions or explicit purpose going into “cutting together-apart,” but instead this was about the possibilities of using alternative methods to

explore materiality. I wanted to bring materiality into the method along with the physical body as to not prioritise the use of language. I was unsure of what would come from this activity, but was open to not knowing. According to St. Pierre (2019a) when conducting PQI, one “begins with a concrete encounter with the real, not a research question” (p.12) and that researchers must “assume an affirmative attitude of trust in the world and experiments” (p. 10). After conducting the activity and speaking with the participants, one participant, Sherry (24 years old, Pākehā, CrossFit and yoga) mentioned how this activity made her realise that activewear is just fabric. She has had a complicated relationship with her body, physical activity, and activewear and commented on how through this activity she began to distance herself from the fear and negative association she had with activewear. It was realisations and moments like these that arose from this particular open-ended method and from cutting apart the fabric.

Final Thoughts

As new materialisms are a relatively new field and are in a constant state of becoming, there have been a range of methods used. Some scholars argue that humanist-based methods can still be used, but the entire research process itself must be reconceptualised (Berbary & Boles, 2014; Fox & Alldred, 2017). Others contend that methods *and* the qualitative research process need to be changed to be more congruent with new materialisms’ ontological and epistemological implications (St. Pierre, 2015a, 2019a). In my research, I took inspiration from both “approaches” to methods, using humanist-based methods (i.e., interviews, focus groups, photo diaries) and more creative methods (i.e., “living with the sports bra” and “cutting together-apart”). The purpose of using both approaches was not to prove the superiority of one over another, but rather to offer my own reflections on some of the challenges and opportunities offered by using both.

Using common humanist-based research methods offer researchers more familiarity

and guidance to think about the “data” collected and how different aspects of the research work with and through each other. This familiarity and structure is one of its strengths as it provides researchers with a starting point from which to adapt and develop their methods in ways that might align with new materialisms. It provides direction and makes the new materialist research process less daunting and more accessible to those who are new to new materialisms and posthumanist research. Within my work on women and activewear, this approach and the methods I used (i.e., interviews, focus groups, moving methods) were crucial in the beginning stages of the project. These methods created a foundation of knowledge about activewear, and it was through these and reading Barad that I was able to develop the later methods (i.e., “living with the sports bra” and “cutting together-apart”).

The familiarity of humanist methods not only benefits researchers from a practical standpoint, but from one of authenticity and validity within the academic world. Berbary and Boles (2014) note that although there is excitement in using more innovative and different approaches to conducting research, there has also been much critique with some arguing that an unstructured approach can result in “‘anything goes’ and ‘anything is research’ mentalities” (p. 402). The structure suggested by “acceptable” humanist methods approach is an attempt to balance the academic and political requirements of research with the innovation required for new materialisms. In concluding their descriptions of the eight points of research, Berbary and Boles (2014) write:

While we encourage experimentation with newer and even more complex postinquiries, we also feel that providing these “definite steps, definite turns, and prescribed patterns” (Janesick, 2000) helps to “legitimise” our choices within the current academic climate even as we step away from prescribed methodology and move on towards more fluid, improvisational inquiries (p. 417).

They (and this approach more broadly) attempt to work within the constraints of research in academia whilst also pushing the boundaries and making space for different types of methods and knowledge producing practices.

While a great strength of using humanist-based methods is its structure and familiarity, I did find myself experiencing dissonance between the methods and new materialist ontology. Humanist-based methods are based on the “assumption that the perspectives of others is meaningful, knowable, and able to be made explicit” (Patton, 1990, p. 278) and these perspectives can be understood through speaking to people. However, in new materialisms the human “no longer has priority as the knowing subject or the single organiser of the knowledge production” (Ringrose et al., 2019b, p. 11) and therefore, interviews (and the other methods) are in contrast with new materialisms’ ontology. I felt this struggle and tension whilst conducting these methods. Hence, one of the greatest weaknesses of using humanist-based methods is that they do not fully overcome the challenge of new materialist empirical practices. This was also a critique raised by various reviewers as I submitted work from this research for publication. Other scholars have expressed their hesitation in relation to the use of humanist-based methods, such as Markula (2019b) who writes:

Unlike Fox and Alldred (2017), I do not find myself quite satisfied with the familiar methods of data collection only to conceptualise analysis techniques differently. Instead of neo-rationalism or re-revised conceptual analysis, could we not imagine new ways of collecting empirical material from the world through postqualitative inquiry? (p. 7).

As Markula (2019) suggests, there may be more promise and possibilities for ontological congruency using postqualitative inquiry and St. Pierre’s approach.

Taking my cue from St. Pierre, I buried myself in new materialist literature and theory(ies) and sought to develop methods that were more in line with new materialist ontology. A central feature of new materialisms is the recognition that humans are simply one part of phenomena and that it is important to expand one’s attention and focus to factors outside the human. Another feature of new materialisms is the emphasis on matter. Using a postqualitative approach, and having the freedom to develop methods, meant I was able to

design various methods that would enable matter to be both present and play an active role in the production of knowledge, as well as explore the many entanglements of humans and nonhumans.

Overall, I found benefits of using both of these approaches and succeeded in gathering rich and nuanced information about activewear and women's bodies, and about empirical practices using new materialisms. Although using humanist methods provided me with more direction and support during the beginning stages of the research process, I found that as the project developed, I gravitated towards St. Pierre's more open ended, flexible and creative approach. Taking inspiration from St Pierre helped me create space to put new materialist concepts into practice and to try new methods, being comfortable with the possibility that such endeavours might not always be "successful." This thesis is about exploring potentials and possibilities of new materialisms including its impact on empirical practices, and I was able to make steps towards accomplishing this by using both humanist-based methods approach and postqualitative inquiry. In this thesis, I bring all of these various methods and "data" together to think differently about activewear and women's fitness practices using Baradian theory. In the following chapter, I explain the meaning making process of this thesis using Karen Barad's concept of diffraction.

CHAPTER FOUR

Diffraction and Meaning Making

New materialisms, and the entire posthuman ontological turn, greatly influence how scholars design and conduct research in the social sciences. New materialisms are about accounting for the ways both humans and nonhuman matter intra-act in the production of material-discursive phenomena. While human experience, language, and discourse are considered important, they are not prioritised, but rather placed in conversation with “lively” nonhuman matter. These ontological shifts affect the *doing* of research. As St. Pierre et al. (2016) emphasises, “The empirical and the material are so imbricated they must change together, and with those changes comes a rethinking of ontology... As we rethink matter, we must rethink the empirical (about knowledge) and ontology (about being)” (p. 99).

Recognising this, together Chapters Three and Four speak to how I have addressed these onto-epistemological implications in this thesis. While Chapter Three looks at specific methods, here I explore what is often labelled as the “analysis” or “meaning making” stage of research. In much social science research, scholars often code data and conduct a thematic analysis, organising data into a set of key findings. Yet, some have argued that coding and thematicising “assumes that words can contain and close off meaning (and essences) that can be identified and subsumed into categories” (St. Pierre, 2016, p. 118). Such an approach is in contrast to the open ended, fluid, and material nature of new materialisms where the world is always in a state of becoming. Hence, many scholars have looked towards different ways of conceptualising the research process and meaning making. Also, similar to various other research approaches (e.g., ethnography, grounded theory), in new materialisms the research process is not sequential. It does not follow the process of research question, data collection, data coding, analysis, and dissemination. Instead the stages are entangled, blurred, often happening simultaneously. Therefore, an approach is needed which can help account for the

complex and entangled nature of the research process and of phenomena in new materialisms. For this project, I use Barad's diffraction to help guide the research process, and particularly the "analysis" or meaning making stage.

Importantly, within a diffractive approach, the *inherent* differences and boundaries around (and within) research are not predetermined or fixed, but rather, produced through intra-actions. Therefore, there are no distinct and determinate boundaries between theory, method, or analysis, and these phases in the research process are not limited to certain stages or time periods. Instead, theory, method, and analysis are always intra-acting, diffracting from and through each other, such that new understandings are generated "from different disciplinary [or research] practices in conversation with another" (Barad, 2007, p. 92). Therefore, within this thesis, meaning-making did not take place at a particular time in the process, but occurred throughout as data, theory, and projects all came together and dispersed in different directions.

This chapter begins with a brief overview of some of the research design approaches being proposed with posthumanist, new materialist research, before moving into Barad's diffraction. This is followed by how diffraction is used as a form of meaning-making in this thesis. Within this section on diffraction in this project, I also explore the research apparatus, agential cuts, and ethics within a Baradian approach to research. Finally, this chapter explores how diffraction contributes to and expands upon traditional feminist methodological concerns, primarily regarding reflexivity.

Posthumanist and New Materialist Approaches to the Research Process

Within new materialisms and posthumanist research, there are a range of different approaches to the research process. One such approach has been advocated for by professor of qualitative research, Mirka Koro-Ljungberg (2015), who proposes "methodologies without methodology," referring to "researchers simultaneously working within and against existing

methodological structures, ideas, and established methodological literature” (p. 6). This type of methodology is fluid, working outside the constraints of predetermined methods and instead creates space, “forces, events and practices that might build from theoretical, cultural, and methodological traditions but at the same time move beyond documented tools of data collection and analysis, thus expanding the notions of normative research” (Koro-Ljungberg, 2015, p. 80). In a methodologies without methodology, Koro-Ljungberg is not providing scholars with a prescriptive, detailed approach to research, but rather encourages scholars to experiment and look for alternative possibilities for how we understand and use methods.

Also working within the postqualitative moment, Nordstrom (2018) introduces antimethodology which operates in the middle ground between conventional qualitative research and posthumanist theories. Similar to PQI (see Chapter Three), antimethodology “resists an approach ordered definition of reason and practices. Rather it is a product of what a study does” (Nordstrom, 2018, p. 223). Continuing, Nordstrom (2018) describes antimethodology as a creative and generative methodology occurring as a result of various deterritorialising and reterritorialising factors and flows, with the researcher playing just one part. During the research process, there are various human and nonhuman entities as well as structures/forces that affect what and how the research occurs. Materialising “in between these forces” (p. 215), antimethodology does not follow particular steps or sequences, rather the research process is “an open system that is available to constant modification” (p. 223).

Preferring, a slightly more structured approach to qualitative research, Berbary and Boles (2014) suggest the use of the metaphor of *qualitative scaffolding* as a technique. They propose eight essential points they believe are necessary for qualitative research, but leave space for creativity, innovation, and improvisation. Berbary and Boles (2014) encourage researchers to pay attention to these eight traditional steps of research (i.e., ontology, epistemology, theory, methodology, data collection, analysis, representation, and conclusion),

but emphasise creativity within each step. For example, they discuss how in their own work, they developed a new method called “collective narrative refraction” (p. 409) which allowed them to bring different methods together in ways that aligned with their poststructuralist ontology. The fluidity between and amongst the steps created room for theory (and other important steps/aspects) to “influence the ways in which each concept ultimately understands, critiques, or deconstructs notions of purpose, truth, language, identity, voice, authority, representation, binaries, and subjectivity” (p. 404).

These three approaches are just some of the many attempts of scholars to move into a more posthumanist and creative process within social sciences research. In so doing, they provide scholars interested in new materialisms the freedom to develop methods (and research processes) that are more ontologically congruent with new materialisms. Contributing to this body of work, Barad offers diffraction as yet another way to reconceptualise the research process and production of knowledge.

Diffraction

In their seminal text, *Meeting the Universe Halfway*, Barad (2007) builds upon the work of feminist scholar, Donna Haraway, who introduced diffraction to work through and beyond reflexive paradigms. For Haraway (and Barad) the practice of reflexivity results in sameness, in replication and is predicated on a belief of representationalism. In its stead, Haraway (1992) discusses diffraction which she describes as “a mapping of interference, not of replication, reflection, or reproduction. A diffraction pattern does not map where differences appear, but rather maps where the effects of difference appear” (p. 300). Barad (2007) builds upon Haraway’s notion of diffraction reading it through the physical phenomenon of diffraction which is concerned with “the way waves combine when they overlap and the apparent bending and spreading out of waves when they encounter an obstruction” (p. 74) (see Figure 5).



Figure 5: Diffraction of waves through opening in a barrier. Copyright from Paul Doherty & Exploratorium

McKnight (2016) poetically links diffraction as physical phenomenon to methodology by writing, “Barad chooses diffraction as her [sic] trope, guiding her [sic] to think about the nature of nature, and of entanglement by reading approaches through each other, as waves pass through the narrows of a rocky outlet, and are transformed, heading in different directions, making new patterns” (p. 197). With each encounter, the waves are altered and dispersed differently, so the outgoing pattern is always different from the incoming pattern (see Figure 6). However, and importantly, the “old” pattern/s are always part of the expression of the “new” pattern. There are no binary distinctions made between what is “old” and “new” within the diffractive method. Rather, multiple patterns and knowledges refract from one another in order to imagine alternative possibilities (Thorpe, Brice, & Clark, 2020). Geerts and van der Tuin (2021) describe how in this approach:

Rather than employing a hierarchal methodology that would put different texts, theories and strands of thought against one another, diffractively engaging with texts and intellectual traditions means that they are dialogically “read through one another” (Barad, 2007) to engender creative, and unexpected outcomes. And that all while acknowledging and respecting the contextual and theoretical differences between the readings in question (p. 175).

Therefore, a diffractive approach means multiple theoretical perspectives, encounters, and knowledges are thought alongside and with one another rather than being understood in opposition.

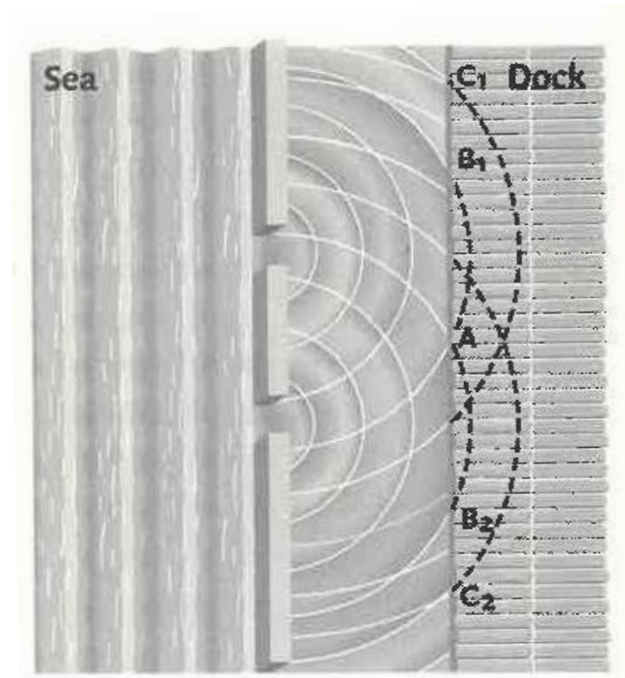


Figure 6: Image from of superimposition and interference of waves passing through multiple barriers. Image from Barad (2007, p. 78), used with permission

There is no one determined way to understand diffraction or how to conduct a diffractive methodology/analysis. Conducting research in this space is “both experimental” and “a space of encounter” (Davies, 2014, p. 740), and therefore, multiple scholars have rephrased, interpreted, and used diffraction slightly differently (Clark & Thorpe, 2020; Davies, 2014; Handforth & Taylor, 2016; Hickey-Moody et al., 2016; Jenkins et al., 2020; Lenz Taguchi, 2012; Linghede, 2018; McKnight, 2016; Murriss & Bozalek, 2019a; Phillips & Larson, 2013). Some scholars have understood diffraction as a tool to bring together different fields of thought, such as McKnight (2016) who connected poetry, swimming, and posthumanist theory. Others have used diffraction as a way to animate materiality and look at the entangled webs of material objects (Davies, 2017; Taylor, 2013). In Taylor’s (2013)

research on objects in the classroom, she writes that for her, diffraction “offers a critical practice of interference and which pays attention to what we don’t normally see, to what is excluded” (p. 692). Similarly, Langhout (2016) understands diffraction as a way to look towards relationality, webs, and patterns that are often ignored, describing diffraction as a “way to study the entangled effects differences makes...[it] allows for a reconfiguring of patterns and draws attention to movement and patterns rather than stagnation” (pp. 325-326). Although diffraction is being used somewhat differently by each of these scholars, it could be argued that this is Barad’s intent. They write that diffraction “does not concern homologies but attends to specific material entanglements” (Barad, 2007, p. 88). Researchers are part of *specific* material-discursive entanglements which are “highly specific configurations” and “change with each intra-action” (ibid, p. 74). There is no one prescribed methodology or analytical tool, but rather diffraction is a framework and a push to move beyond representation, to become part of the world, and to explore how differences come to matter.

Diffraction and Athleisure

Barad’s ethico-onto-epistemology of agential realism is fundamentally concerned with how we know and produce knowledge. In this way, they continue a long lineage of scholars within the philosophy of science who explore the ontological and epistemological foundations of science studies. Embedded within their theory of agential realism are important methodological and philosophical ideas regarding research practices. Their concepts of the research apparatus and agential cuts speak directly to the research process and are crucial aspects when conducting a Baradian inspired diffractive methodology. The following sections elaborate on Baradian concepts of apparatus, agential cuts, and ethic and how I use them within this project, before a discussion of my diffractive analysis.

The Research Apparatus, Agential Cuts, and Ethics

The apparatus is a central component of Barad's theory of agential realism focusing on the ways in which "measurement tools" (data collection techniques) are a prominent component within the production of knowledge. Agential realism is greatly inspired by Niels Bohr's work within quantum physics and the question of measurement. Bohr challenges the ontological assumptions embedded within Newtonian classical physics (strict determinism) and calls upon researchers to recognise the effect of the measuring equipment on the variable being measured. Through his analysis of waves and particles, Bohr argues that, unlike in classical physics, there is not an independent reality with well-defined properties that can be measured, and instead shows that the properties "realised in an experiment depends on considering how the *whole* measuring apparatus is set up" (Pinch, 2011, p. 436, emphasis in original). Hence, the measuring apparatus plays a role in knowledge production. Pinch (2011) summarises this writing:

do an experiment to search for particles and lo and behold you will find particles; set up an experiment to study waves and you will find waves...the sort of phenomenon the physicist is looking for in an experiment becomes actualised according to how the experiment is set up (p. 436).

The argument is that measurement apparatuses are not "passive observing instruments," (Barad, 2007, p. 142), but rather play a productive role in what is being measured and what knowledge is being created. Thus, for both Barad and Bohr, the primary ontological unit—the primary unit of study—is not an independent object, but a phenomenon; multiple intra-acting entities, including the measurement apparatus.

Based upon Bohr's insight into the role of the measurement tools, Barad (2003) defines apparatuses as follows:

Apparatuses are not inscription devices, scientific instruments set in place before action happens...not mere static arrangements *in* the world, but rather *apparatuses are dynamic (re) configurings of the world, specific agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted* (p. 816, emphasis in original).

In their later work they describe apparatuses as the “material conditions of possibility and impossibility of mattering” (Barad, 2007, p. 148) that are not just assemblages of humans and nonhumans, but part of the “ongoing dynamism of becoming” (ibid, p. 142). Therefore, *how* research is conducted is integral to *what* knowledge is produced.²¹

Boundaries of a Research Apparatus and Agential Cuts

Barad (2007) makes clear that apparatuses are not “static laboratory setups” (p. 167) or strict methodological practices, but are “ongoing, open ended, entangled material practices” (p.167) that lack inherent determinate boundaries. Although there are no *inherent* boundaries, this does not mean that boundaries are not created and there is not an outside of an apparatus or phenomena (Hollin et al., 2017). Rather, the boundaries of the apparatus are made through, what Barad defined as, agential cuts. Warfield (2016) writes that “agential cuts are ‘boundary drawing practices’ (Barad, 2007) demarcating, like a sculptor with a knife, what ‘makes the cut’ ... and what does not make the cut” (p. 3). In a slightly different vein, Allen (2018) describes agential cuts as a “practice of interference” (p. 353) where different cuts result in different phenomenon. These agential cuts are not the act of individuals alone, but various material-discursive entities that become entangled with the research process. Barad (2007) describes how “cuts are agentially enacted not by wilful individuals but by the larger material arrangement of which ‘we’ are a ‘part’” (p. 178). It is through these agential cuts—specific intra-actions— that the boundaries of the apparatus (and therefore phenomena) are known.

In writing about apparatuses and agential cuts, Barad uses the example of the Stern-Gerlach experiment, a seminal experiment in quantum physics, to elaborate on boundaries of the apparatus. Otto Stern had a desire for cheap cigars and it was this cigar smoke that

²¹ Importantly, this point is shared by many other scholars and has been a focus within feminist research methods literature (Haraway, 1988; Harding, 1987, 1994), feminist science studies (Asberg & Lykke, 2010), and in the philosophy of science (Nelson, 1996).

affected the experiment by “turn[ing] silver into easily visible silver sulphide, and thus allowed scientists to see their result, the silver atom beam in a plate held by Stern in his hands” (Irni, 2010, p. 100). Barad (2007) describes the importance of the cigar smoke in the experiment writing,

As the example of Otto Stern’s cheap cigar makes quite poignant, taking for granted that the outside boundary of the apparatus ends at some “obvious” (visual) terminus, or that the boundary circumscribes only that set of items we learn to list under “equipment”. . . makes one susceptible to illusions made of preconceptions, including “the obvious” and “the visible” (p. 165).

While this example highlights the fluidity of the apparatus’ boundaries, it also emphasises how there are a myriad of factors that impact results, findings, and meaning-making. In our transdisciplinary research on female athlete health, Thorpe, Clark, et al. (2020) describe how it was the athletes’ voices around cultural ways of knowing menstruation that were the “cigar smoke,” the nodal point, which prompted us to “revisit our own preconceptions as White researchers entangled in a transdisciplinary project steeped in Western ways of knowing” (p. 15) and altered the course of the research, including a cross-cultural collaboration exploring the intersection of Indigenous culture and high performance sport (Thorpe, Brice, & Rolleston, 2020). There are occasions in the research process when something (phrases in an interview, fragments of field notes, an object) begin to “glow” (MacLure, 2013b) such that it “seems to reach out from the inert corpus (corpse) of the data, to grasp us...they exert a kind of fascination, and have capacity to animate further thought” (p. 228). It is moments such as these— data sources, ideas, “cigar moments”— that enact agential cuts to rework the boundaries of the apparatus.

Within this thesis, there were various “cigar moments” that changed and affected the boundaries of the research apparatus and enacted agential cuts. For example, this project was being conducted at a university in Aotearoa New Zealand which comes with particular university requirements (e.g., ethical approval before conducting “data collection,” bi-yearly

progress reports, a written thesis/photography/creative artwork). All of these structural requirements affected how I conducted research (deadlines, ethical considerations, writing the thesis, using the English language) which intra-acted with other elements in knowledge production. For example, this thesis was conducted and written in English which enacted particular boundaries around the knowledge produced as seen when I was conducting interviews. During the interviews, I had a participant describe how although she prefers to speak in English, she thinks in her native language and often finds there are times when there is no English word for what she is thinking. Writing in English and conducting the interviews in English enacted particular cuts around what could be understood which might have been different if in another language.

Also, different forms of technology enacted cuts around what was (and not) included in the research apparatus, and thus affected the specific knowledge produced. Nordstrom (2015) describes the agentic role of a tape-recorder in an interview. For example, it creates “arbitrary” beginnings and ends to interviews, it can make some people nervous, it can “erase” part of the interview when it is muffled and poor quality. In this research, the recorder enacted boundaries around the interviews producing a particular narrative of the entire interview experience excluding the good bye “chats.” I can vividly remember one particular interview where I turned off the recorder and walked the participant out of the building. It was when we were walking out, that she talked about the how she ties her activewear shirt in a knot to better show off her “booty.” This statement was not recorded and I faced an ethical choice of how and if to include it because it was said “off the record.” The recorder became entangled with ethics and what “counts” as transcript. Similarly, the computer was a boundary-making practice as it intra-acted with language and with me to enable particular representations of knowledge. There were also text messages with friends, coffee chats with

advisors, and TikTok videos, at different times glowed and affected the direction of the analysis and changed the boundaries of the research apparatus.

Ethics in Agential Realism

While the apparatus boundaries change, agential realism also means that scholars must be aware of the ethical considerations that are part of these agential cuts and changing boundaries. Within agential realism, ethics within the research apparatus greatly differs from principle ethics which is favoured by many university ethical review boards. Principle ethics can be understood as the “most established approach to health and social science ethics...based on rights-based approaches and traditional social just theories, which tend to favour universal rules” (Bozalek, 2020, p. 138). Within principle ethics, the primary concern is to anticipate and mitigate any ethical issues that may develop in a clearly designed research project, particularly regarding the care and autonomy of the human participants. But this type of approach prioritises individuals so that ethical considerations are located within individuals “rather than in relationships or in the interests of the collective” (Bozalek, 2020, p.139) and assumes the researcher is an “objective scientist from an unmarked, invisible position who ‘mirrors reality’” (p. 139). In agential realism, the researcher has a responsibility (an ability to respond to the other) to not only humans, but also to the “lively relationalities [entanglements of humans and nonhumans] of becoming, of which we are a part” (Barad in interview with Dolphijn & van der Tuin, 2012, p. 69). Ethics are not something that can be anticipated completely before a project, but are “born of situated response, ethics enacted in the pulse and pause of attentiveness” (Beausoleil, 2015, p. 2). To summarise, Bozalek (2020) writes how within new materialisms, “ethics emanate from intra-actions, practices or enactments/doing in relationship not what ethical committees and their codes of conduct are prescribing” (p. 140).

Within this project, there were many times when ethical questions arose that I had not anticipated. For example, in one of the meaning-making processes (“cutting together-apart” described below), I literally cut apart the participant’s photo diaries. When cutting apart the diaries, there was a sense of guilt that developed. Participants had spent a considerable amount of time taking and collecting these photographs, and yet I cut (re-printed versions of) these research objects into pieces that were (at times) unrecognizable, cutting across bodies, heads, objects, landscapes. As I took the scissors and cut across their heads and bodies, I felt guilty and unsure about the ethical considerations in repurposing their photo diaries. Each participant had signed a (humanist-oriented) consent form aware of the goals of the project and permission for photo diaries to be used for publication, but how would they feel knowing I was cutting up their photographs? Relatedly, I was left with a bag of scrap fabric after the “cutting together-apart” activity with participants (see Chapter Three). I was (and still am) conflicted over the ethics of “throwing away” these leftover pieces of activewear that now sit in my office. Agential realism means recognising how those scraps are entangled with the research project, with theory, with the human participants, and with the environment and landfills (Brice & Thorpe, 2021d). Similarly, in “living with the sports bra,” Holly Thorpe, Marianne Clark, and I explored the many ethical considerations of Enlite’s intra-actions: thinking about the women in the Global South who make the sports bra; the negative impact washing Enlite will have on the environment as it releases micro plastics into the ocean; the women who will suffer the most climate change and environmental degradation; the ways wearing Enlite (re)produces ideas around fit femininity (Brice et al., 2020). With agential realism, ethics is about tracing these intra-actions and entanglements.

Diffraction Analysis

In this project, diffraction was primarily used a way to think through my “data” and to see the many intra-acting components it encompassed. In this section, I go into greater detail about

the specifics of using diffraction within this thesis. This is followed by a smaller section in which I discuss my use of diffraction in a more creative, visual way to analyse the data.

Diffractive Thinking

Although diffraction was present throughout the entire research process—using multiple methods, attempting to think about difference beyond a categorical sense—I found diffraction to be particularly useful after having conducted the focus groups, photo diaries, and interviews. After transcribing the focus groups and interviews (and receiving participant’s approval of the transcripts),²² I had to take pause and think about what to do with these data, and how to engage with this material in a way that was consistent with new materialisms, and particularly Barad’s agential realism. Common qualitative analysis has been described as

...an artful and scientific interpretive process of meaning-making that begins at the outset of the investigation. It involves transcription, data management, immersion in collected data, a concern with what is in the data or how it is constructed, an examination of any possible interrelationships, and a reflexive awareness of the process of writing and representation (Sparkes & Smith, 2014, p. 115).

As briefly discussed earlier in this chapter, much of the time, data are coded and thematised and meaning extracted from these themes. Although this particular technique of coding and thematising is useful for organising data, the ontological belief that we can “code” data and artificially fragment the world into neat and tidy themes is antagonistic to new materialisms. It assumes that data are fixed and stable whereas in new materialisms the world, humans, data, and the whole research process are entangled and constantly changing. New materialisms “de-centre the illusion of the stable, rational, conscious subject as the architect of sociality and action” (Coffey, 2019, p. 79) and therefore, coding data ignores the multiple and changing intra-actions that are occurring in the research process. Rather than coding the data, I turned towards a diffractive “analysis.”

²² All participants were emailed a copy of their transcript and given a period of three weeks to make any edits or deletions they felt were necessary. Ultimately, only one participant responded and asked that some identifying information be removed.

Meaning making and diffraction began at the very beginning of this project on activewear. While I was conducting various methods, I was also reading and immersing myself in new materialist theory and agential realism. As I read the transcripts, looked at the photo diaries, skimmed social media, there were certain pieces of data that intra-acted with particular concepts. During this process, specific concepts provided a way to think about those particular pieces of data that “glowed.” Hence, it was a process of reading theory and “collecting data” and seeing these overlaps that led to the three Baradian concepts (intra-action, entanglements, spacetime-mattering) used for the conceptual chapters (Chapters Five through Seven). For example, during the interviews, some women described the ways their leggings “held them” in and sucked in their “muffin top.” This echoed discussions had with advisors around activewear about how athleisure, similar to shapewear, works to control and form the body. Intra-action was a way to think about how the materiality of activewear works to physically hold, suck, and mould the body into discursively produced ideas around the ideal body shape. Therefore, this began a diffractive analysis where participant quotes were placed alongside and read through activewear advertisements and social media, discussions around fabric developments in the activewear industry, focus groups, and theory. Similarly, Chapter Seven of this thesis, which addresses the relationship between women’s bodies and sports bras, developed from conversations had in the focus groups and interviews around second hand sports bras. There were impromptu discussions in the focus groups around second hand clothing and how women can feel wearing other women’s clothes. This was then echoed in the interviews when some of the participants felt disgusted at the possibility of wearing another woman’s sports bra because of the intimacy between women and bras. Barad’s entanglement and their writings around bodily boundaries greatly resonated with these ideas and provided a way to think through this affective relationship. This diffractive

process involved mapping the similarities and differences across the data “collected” from various methods using theoretical concepts to guide the thinking process.

Importantly, the various “entities” that are part of these diffractive analyses are not limited to the interviews or focus groups. While I was transcribing the interviews and photo groups, I was also simultaneously conducting various other methods (“living with the sports bra,” “cutting together-apart,” interviews with lululemon design teams), reading Baradian theory and new materialist scholarship, co-writing *Feminist New Materialisms, Sport and Fitness* (Thorpe, Brice, & Clark, 2020), and living through a pandemic (i.e., COVID-19). Therefore, “data” is not limited to only the interview data, but includes a range of other human and nonhuman entities (e.g., other research projects, conversations with advisors, activewear clothing, text messages with friends, theory, other new materialist scholarship, research on activewear’s material properties). Not limiting data to just human experience (i.e., interviews, focus groups) was an attempt to “take account of matter’s dynamism” (Barad, 2007, p. 135) and see nonhuman matter as “ontological actors in the material practices” (Taylor, 2020, p. 28) of the research process.

In reading all these various forms of data through each other, I found my diffractive thinking similar to Linghede (2018) who brought together texts and concepts (posthumanist theory, letters, newspaper articles, policy documents, research, media clips) in her diffractive analysis of the gender binary in sport. She describes, “I have been a surfer taking advantage of the ‘diffraction patterns created by the rocks or pieces of lands that stick out near the shore...literally riding the diffractive pattern wave after wave in different directions’ (Barad, 2007)” (Linghede, 2018, p. 575). This riding of the waves in different directions is similar to my diffractive research process; following the interference and superposition patterns of data and theory.

This diffractive “analysis” did not occur at a specific time or step in the research project, but was rather a process that included ideas from the very onset of the project, to the final stages of writing. Thus, it is important to recognise the proactive role writing took in this diffractive analysis. In her analysis of “writing as method,” St. Pierre (2015b) describes the many ways in which writing can be understood as a method of data analysis. I quote her at length here because her description of writing as analysis neatly summarises my experience in this project. She writes:

Writing allows us to think things we might not have thought by thinking alone. Writing takes us places we might not have gone if we had not written. We must think in order to write the next word, the next sentence, the next theory. An idea simply thought may seem brilliant until it is written. A brilliant unthought idea may appear as we write. Writing forces us to textualise the rigorous confusion of our thinking and that work is analysis (pp. 2-3).

There were various times where I saw Barad’s concepts come to life in the data, yet when I tried to write through the idea bringing together different sources, I found the ideas and presentation did not make sense. I would keep the same basic idea but look towards other ways of diffractively bringing together sources. This meant that Chapters Five through Seven each went through four to five iterations. Each version of the chapter used the same Baradian concept and overarching idea, but changed as a result of advisor feedback and discussions, the influence of other projects happening simultaneously, and newly published feminist literature engaging with similar ideas and concepts. Therefore, writing became a crucial act within this diffractive meaning making process.

In each of the following conceptual chapters (Chapter Five through Seven), I show the entangled nature of these diffractive processes as I bring together multiple “data” in conversation with each other. In so doing, there is less “empirical” data presented than in many other qualitative research projects—fewer quotes from participants, observations, images. However, by using a diffractive approach, I have been able to look at the fine details—the everyday practices and intra-actions that are often overlooked and taken-for-

granted—that are part of the activewear phenomenon and women’s moving bodies. I have also been able to decentre human experience and, instead, showcase how the humans are always enmeshed in more-than-human worlds. Throughout this diffractive process, the boundaries between theory/method/analysis and researcher/researched were blurred and changed. In this way, this diffractive research process aligned with agential realism and research as an “ethico-onto-epistemological” process.

A final point to mention regarding this diffractive meaning making process, was that I made many agential cuts which have impacted the production of knowledge in the conceptual chapters. I borrow from Ringrose et al. (2019b) in saying it was my “active agential scissors” that have made particular decisions and cuts throughout this project “in order to tell only a few of many possible stories” (p. 1). While Barad emphasises that agential cuts are not the result of individuals alone, but are material-discursive intra-actions, in writing, in bringing together particular knowledges, in choosing the Baradian concepts, I played an active and agentic role in the production of the ideas presented in the following chapters. Therefore, the following chapters are not to be understood as “truths” or “findings” about activewear and women’s fitness practices, but experimentations in using theory to think differently about phenomena. They are performative experiences in knowledge-making where knowledge is not “a thing—separable, contained, over and done with“ but knowledge is understood as “a doing, an unfolding, a process that is open, nomadic, unfinished and perhaps unfinishable” (Taylor, 2020, p. 30). Thus, these chapters provide possibilities for alternative ways of knowing women’s bodies, yet they are just some of the many incomplete “stories” of activewear (Ringrose et al., 2019b).

“Cutting Together-Apart”

In addition to this diffractive thinking process, I explored ways to diffract some of the research materials (i.e., photo diaries, interviews, fabric of activewear) as part of the meaning

making process in an activity called “cutting together-apart” (Brice & Thorpe, In Press). This practice was loosely inspired by Barad’s writing on diffraction and their idea of “cutting together-apart.” Barad (2014) discusses “cutting together-apart” as a way to think about entanglements, boundaries, and difference. They write, “entanglements are not unities. They do not erase differences; on the contrary, entanglings entail differentiatings, differentiatings entail entanglings. One move-*cutting together-apart*” (Barad, 2014, p. 176, emphasis in original). “Cutting together-apart” is about challenging predetermined boundaries and separations, and rethinking those separations. For example, in their article about “cutting together-apart” and diffraction, Barad (2014) challenges the artificial separation between academic fields and diffractively reads feminist writers’ works—Donna Haraway, Gloria Anzaldua and Trinh Minh-ha—through the field of quantum physics. Barad essentially cuts pieces from these different fields and puts them back together showing their overlaps and entanglements, and how this challenges conventional notions of difference. During the “living with the sports bra” project (Brice et al., 2020), we drew upon this concept to help make meaning of all the conversations, digital dialogues, images, and ideas we had shared over seven months. One afternoon, we began cutting apart all the discussions and photos from the online digital dialogue and experimented with putting them back together in different ways (see Figure 7).

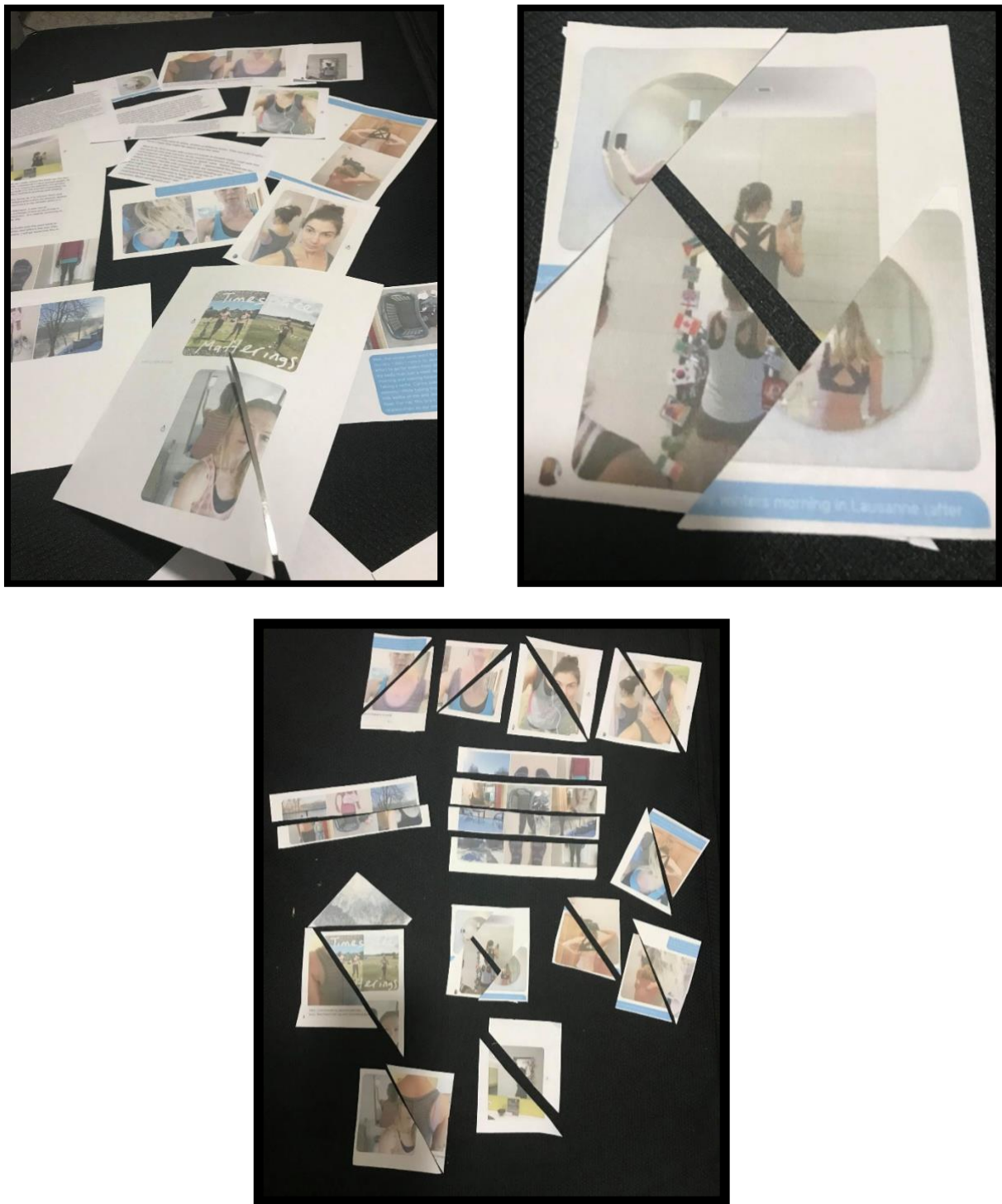


Figure 7: Examples of “cutting together-apart” from “living with the sports bra” project

This technique began without a formalised plan, but was more about playing with data and reading the photographs and dialogue from our digital dialogue through Barad’s writing. Taking inspiration from this collaborative experimental approach to analysis, I then took to cutting the fabric from a collection of “retired” activewear (my own older clothing and pieces

I collected at the opportunity charity shop), as well as participants' photo diaries. There was no clear intent on the direction of the cuts or the shapes that were created, but rather paid attention to the feelings and reflections this exercise evoked. At certain times, I would simply pull the fabric in different directions, allowing the tearing to be dictated by the thread and fabric. In putting the segments of cloth and paper back together, I produced a collage comprised of the photo diaries, fabric, advertisements, and material tags. I did not follow a particular pattern, but rather allowed the shapes of the materials to fit together in new shapes and arrangements, experimenting with playfulness throughout the process (see Figure 8).

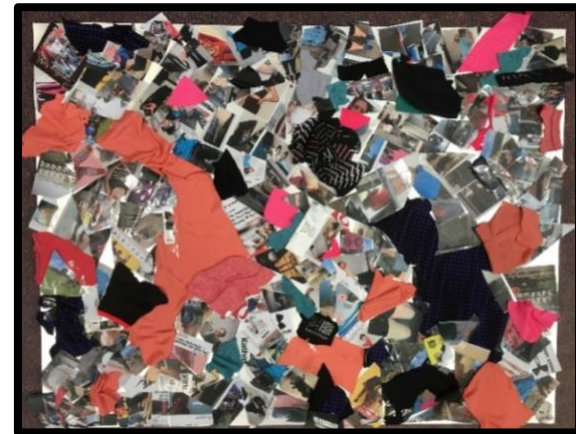


Figure 8: Examples from “cutting together-apart” fabric and participants' photo diaries

In these exercises, diffraction took a physical form as data, fabric, and materials came together, intra-acted, and made new patterns. Here the human was decentred and rather, entanglements of humans and nonhumans highlighted. There were no “aha” moments or moments that “glowed” directly from “cutting together-apart,” but it did serve as inspiration

for a “cutting together-apart” method with participants (as discussed in Chapter Three). However, the method itself did bring up ideas around ethics, participatory methods, and the vitality of matter within the research process that I have expanded on in detail elsewhere (see Brice & Thorpe, Under Review). It was this type of process that occurred throughout the research, where I brought together different sources and followed the lines of flight towards new ways of thinking about activewear.

Methodological Considerations in Diffraction: Diffraction, Feminist Reflexivity, and Positionality

Thus far, this chapter has discussed the implications and practices of a diffractive research process. In this final section, I discuss the ways in which diffraction influences feminist research practices, primarily looking at reflexivity. There is no uniform definition or standardised format for feminist research practices. There have been diverse views around the appropriate methods for conducting feminist research, beliefs around the knowledge feminists should produce, and whether there even is a distinct feminist methodology (Harding, 1987; Reinharz, 1992; Taylor, 1998). Although diverse, a key tenet for many feminist researchers is an emphasis on reflexivity (Olive & Thorpe, 2017; Taylor, 1998). However, within Baradian theorising, diffraction is often positioned in opposition to reflexivity as evidenced by a table in *Meeting the Universe Halfway* (Barad, 2007) where diffraction and reflection are literally positioned against each other. In a footnote in their later work Barad (2014) clarifies that “reflection and diffraction are not opposites, not mutually exclusive, but rather different optical intra-actions highlighting different patterns, optics, geometrics that overlap in practice” (p. 185). Therefore, they remind readers that the separation line in the table in *Meeting the Universe Halfway* (Barad, 2007) is not a dividing line, but rather should be seen as a “cutting together-apart” where these “entanglings and differentiating always go together—there are no clearly bounded units” (Serra Undurruga, 2021, p. 4). Although they attempt to make this clarification, often their work is understood

as positioning the two in a dichotomous relationship (Bozalek & Zembylas, 2017; Davies, 2014; Serra Undurraga, 2021). Recognising the prominence of reflexivity within feminist theorising, it is important to interrogate how diffraction contributes to (re)thinking reflexivity.

Since the 1960s and 1970s, there has been an increased focus on and use of reflexivity within qualitative research (sometimes labelled the “reflexive turn” in social sciences) (Pillow, 2003; Pringle & Thorpe, 2017). Very broadly, Davies (1999) defines reflexivity as “a turning back on oneself” and the “ways in which the products of research are affected by the personnel and process of doing research” (p. 4). However, reflexivity has been interpreted and used differently by scholars across varying fields (Palaganas et al., 2017; Pillow, 2003; Pringle & Thorpe, 2017). Feminists’ focus on the concept of reflexivity was developed, in part, due to critiques of traditional and social science research that privileged masculine ideals of objectivity, detachment, and neutrality (Bordo, 1987; Fox Keller, 1995; Harding, 1987, 1991, 1992; Oakley, 1981; Olive & Thorpe, 2011). Prominent feminist scholars, such as Ann Oakley, Sandra Harding, and Donna Haraway have critiqued mainstream objective, scientific methods for failing to recognise “all the broad, historical social desires, interests, and values that have shaped the agendas, contests, and results of the sciences” (Harding, 1991, p. 143). In response, reflexivity has been developed as a way to think through the relationship between researcher and researched, and the role of the social in knowledge production. In addition to exploring the role of one’s positionality in the research process, feminist reflexivity is interested in the various flows of power that occur within research and affect the knowledge produced. Thus, feminist approaches to reflexivity are “not only about investigating the power embedded in ones’ research, but also about ‘doing research differently,’ including more equitable relationships with participants, creating research that is empowering for women, and always linked to political action” (Pillow, 2003, p. 178).

Within this research project, there were various ways in which my own “self-location”—my interests, my positionality, and my characteristics—influenced the research project (Pillow, 2003, p. 178). One such example is my familiarity and involvement within the fitness industry as I’ve worked as a group fitness instructor in Kirikiriroa Hamilton, Aotearoa New Zealand for three years and have been in the business in various positions since 2012. My experience and knowledge of the industry has greatly aided and affected different parts of the projects, such as the diversity of participants. I was able to ask fellow fitness instructors and use my networks at the gyms to recruit participants which did affect the composition of women. For example, three of the participants were my co-workers at the time and five of the women were all members of the gyms where I worked and participants in the classes I taught. In the interviews, for some women our familiarity allowed them to share more of their experiences, yet for others, there was discomfort in sharing personal details about their life. Similarly, before even beginning this thesis I was very familiar with activewear brands, fashion trends, and advertising. This familiarity, at times, blinded me to different perspectives on activewear. During the interviews, I found it very easy to converse with women who shared my love for comfortable activewear clothing as we talked about similar experiences and situations. However, it was difficult, at times, to maintain that familiarity with women who hated activewear and thought it inappropriate. When I was interviewing Sherry (24 years old, Pākehā, CrossFit and yoga), she mentioned that she never liked wearing activewear in public because she felt like a fraud as someone who had never been interested in fitness and sport. In interviews with Kae (52 years old, Pākehā, cycling/running) and Georgia (55 years old, Australian, aerobics), they both described how they found it rude and indecent to wear activewear anywhere outside of the gym. Ironically, I was wearing activewear while conducting these interviews with Kae and Georgia which made me feel more uncomfortable and more reserved in the interviews. During these

interviews, I experienced tension between being someone who is very comfortable in activewear unwilling to concede that activewear was inappropriate or unacceptable, yet also a feminist researcher interested in women's experiences. In these situations, my biases were illuminated and I had to take a step back to reflect on how my experience in the fitness industry was shaping the direction of the research and my critical sensibility.

In addition to being very knowledgeable about the fitness industry, I am a White, physically-able bodied cisgender woman who easily fits the demographic of the activewear consumer. Because of this alignment, I often did not notice all the ways in which activewear advertising and the industry produces boundaries around acceptability. My biggest critique often was around body size and shape as my own body did not align with those bodies of activewear models, and will admit that this, at times, overshadowed critiques around race, gender, or dis/ability. However, this blind spot was brought to my attention in an interview with a Māori participant who described liking the advertisements at Rebel Sport because “they use NZ athletes...you can relate to that person.” I realised that while my body differs from many of the activewear models' bodies, I have often connected with activewear advertising as I share the same skin tone and often participate in the same activities they're doing (e.g., running, squatting, jumping). She later went on to describe Hine Collection as her favourite brand because “She [Hine Owner] uses normal people, normal Māori women, as well, that are probably like her friends and her whanau (extended family).” The participant's comment made me question the ways in which my positionality has resulted in a particular analysis of certain brands (often mainstream American-base brands) and affected my critiques which primarily revolve around body shape and size. Recognising this, in the intra-action chapter (Chapter Six), I sought to explore the racialised and problematic nature of the fitness industry's cultural appropriation of African American, Latina, and Pasifika bodily ideals. This has also resulted in me beginning to write a paper on the Hine Collection and

other activewear brands which are challenging the Whiteness of the activewear industry. My experience in the fitness industry, my own relationship with activewear, and my positionality have all played a role in how this research process and knowledge production have unfolded.

Although reflexivity has been important within qualitative research and advancing the research process, the notion of reflexivity has also been critiqued as a practice of self-indulgence and its usefulness questioned (Bozalek & Zembylas, 2017; Patai, 1994; Pillow, 2003). One critique has been that self-reflexivity can be self-indulgent, placing the researcher at the centre of research thereby distracting attention from more important issues (Bondi, 2009; Kobayashi, 2003; Patai, 1994). Haraway (2004b) and Barad (2007) do not necessarily critique reflexivity for its self-indulgence, but that it is based on representation and the belief that “practices of representing have no effect on the objects of investigation and that we have a kind of access to representations that we don’t have to objects themselves. Reflexivity, like reflection, still holds the world at a distance” (Barad, 2007, p. 87). Barad describes how in reflexivity, the researcher takes a step back and reflects at a distance from the outside of the data assuming there is an “I” separate from the world (Bozalek & Zembylas, 2017; Lenz Taguchi, 2010). However, in a diffractive methodology there is no “I” as the researcher is not an independent subject but rather part of the phenomena. Diffractive methodology, agential realism and new materialisms all require a shift away from “identifying bodies as separate entities with distinct borders to think in terms of processes of entanglements and interdependencies in processes of an ongoing co-constitutive co-existence of different kinds of bodies” (Alaimo, 2010b; Barad, 2007; Lenz Taguchi, 2012, p. 271). There is not a separation between object and subject and therefore, researchers cannot step back to reflect on how they’ve affected the process since diffraction is a “way of understanding the world from within and as part of it” (Barad, 2007, p. 88). Thus, Barad advocates for a shift towards diffraction.

However, many feminist scholars are not as quick to move away from reflexivity and have instead advocated for more blended, hybrid approaches between the two (Bozalek & Zembylas, 2017; Lennon, 2017; Serra Undurraga, 2021). For example, Bozalek and Zembylas (2017) argue that researchers “need to acknowledge that the ‘entanglement’ of reflexivity and diffraction is one that includes continuities and breaks rather than a ‘story’ of one vs. the other” (p. 118). This is in line with Barad’s footnote (mentioned above) where the relationship between reflexivity, performativity, and diffraction should be seen as “dis/continuous” or said differently, a way of “thinking about change that doesn’t presume there’s either more of the same or a radical break” (Interview with Barad in Juelskjær, 2012, p. 16). Other scholars have proposed bringing reflexivity and diffraction together, introducing the concept of “diffracted reflexivity” (Serra Undurraga, 2021). Lennon (2017) recognises that some academics may take issue with using diffraction and reflection together as they stem from different ontologies. She describes how using them together “could be considered an anathema to theoretical pursuits” yet also “contends that such unrest lies in nervousness associated with ‘being found,’ overstepping some imaginary, yet heavily fortified and preordained, epistemological line” (p. 537). While understanding the hesitation of using diffraction and reflexivity together, I also find great value in reflexivity and the possibility of using insights from each.

In my diffractive research process, I took inspiration from Serra Undurraga’s (2021) “diffractive reflexivity” in which diffraction and reflexivity blur into each other during the research process. As she describes it, a diffractive reflexivity is a reflexivity that “holds a thoroughly relational ontology, a reflexivity understood as always relating to oneself, ways of relating that produce this very self and a world in the movement of making sense” (p. 6). Therefore, “we keep on needing to ask what is going on with ourselves and also needing to escape a fixed and trapping grasping of ourselves” (p. 12). There is a balance between

recognising how our identity and positionality are entangled within the research process, but also that these traits are never autonomous or fixed.

In this way, the self is always changing, always diffracting across and with the research process. In a diffractive reflexivity, “there is no longer an already-formed self, waiting to be represented” (Serra Undurraga, 2021, p. 3). Barad echoes this sentiment in an interview with Juelskjær (2012) when asked about their research trajectory and path. Barad responded, saying:

Who is this “I” that would attempt to narrate my research trajectory? Perhaps if you allow me to turn your question inside out, as it were, and ask: what material forces were contributing to the reiterative materialization of this “I”? What political forces and texts that I was reading helped constitute “me”?...it’s crucial to raise the question of how the “individual,” including any particular individual, is iteratively (re)constituted (p. 11).

While I have yet to come across literature that provides a tangible example of a diffractive reflexivity (even Serra Undurraga, 2021, offers a more theoretical exploration), this quote provides a way to think of how I have been entangled within this research apparatus and have been “constantly (re)constituted” during the research process.

One example to think through a diffracted reflexivity is about my “role” as an American (United States) conducting research in Aotearoa New Zealand. While in a more reflexive approach, I might describe how my American nationality and being a foreigner impacted the research process and production of knowledge, this would position my “American identity” as something permanent and fixed that is exterior to the research process. But “identity is not essence, fixity or givenness, but a contingent iterative performativity” (Barad, 2014, p. 174). Attention is paid to the intra-actions and agential cuts that are performed that (re)constitute individuals. Thinking through this means exploring those intra-actions throughout the research project that enacted boundaries around my “foreignness” and that impacted my entanglement (and relationship) with the United States and Aotearoa New Zealand. For example, in an interview with Georgia, she used the term

“dag”²³ and laughed at my quizzical look, having to explain the term. While it was just a word uttered in an interview, it was an agential cut that enacted a (temporary) boundary of insider/outsider, “reaffirming” my position as a foreigner. In another example, after learning about the Hine Collection from my participant, I decided to purchase a Hine Collection sweatshirt. Wearing the sweatshirt around town and at gyms across Aotearoa New Zealand, I would meet and see other women wearing the same sweatshirt or clothing by Hine Collection. The very materiality of our bodies wearing the same clothing was an intra-action that created a (temporary) sense of my belonging in Aotearoa New Zealand. In a diffracted reflexivity, there is no “absolute boundary, a clear dividing line, a geometry of exclusion that positions the self on one side, and the other, the not-self—on the other side” (Barad, 2014, p. 169). A diffracted reflexivity queers the binary of insider/outsider researcher, American/New Zealander, instead calling attention to the ways the “processes through which the identities and agencies are constantly made and re-made” (Serra Undurraga, 2021, p. 6). These intra-actions (e.g., not knowing slang terminology, wearing Aotearoa New Zealand-specific activewear) enacted temporary agential cuts in how I understood myself in relation to the United States, to Aotearoa New Zealand, and within this project.

A diffracted reflexivity also provides a way to think about my role as a fitness instructor. Above I discuss how being an instructor and someone familiar with activewear affected the recruitment of participants, the brands highlighted, and various other aspects. However, a diffracted reflexivity does not see this position as static but diffracted and changing. Throughout this research, I often felt tension around my status as someone in the fitness industry and a feminist scholar critiquing the fitness industry and activewear. These tensions occurred at different times throughout the project and in different spaces. For example, when I was in the fitness studio teaching classes or as a group fitness participant, I

²³ An Australian and Aotearoa New Zealand slang term for being unfashionable or unkempt and scruffy.

was often upset with the activewear around me. The literature critiquing the activewear industry (Lavrence & Lozanski, 2014; Nash, 2016) diffracted off the bodies of other gym goers, off the walls of the fitness centres. I became frustrated by the activewear industry, the intense consumption of clothing by women, the amount of money women at the fitness centres spent, the fact that black leggings and crop top became the “uniform” of the regular gym members and served as a visual indicator of those who belonged. Yet, when I was in my office writing about the activewear industry, wearing comfortable leggings and reading other feminist critiques of the fitness industry, I was defending activewear and the fitness industry. Throughout this project, I was both an insider and outsider in the fitness industry, both a critical feminist scholar and a gym participant. However, within diffraction, these boundaries (insider/outsider, self/other) are not absolute. Within a physical diffractive light pattern, “the pattern has light in the shadows and shadows in the luminous areas...there are no absolutes just darker and brighter zones and you cannot pinpoint where exactly the shift occurred” (Serra Undurraga, 2021, p. 5).

In this section, I have spoken to the debates and discussions around reflexivity and diffraction. While Barad advocates for a diffractive approach, many are hesitant to move away from reflexivity and instead offer approaches that bring together principles from reflexivity and diffraction. Near the end of the section, I discuss a diffractive reflexivity and the ways I am entangled with the research process and knowledge production. A diffractive reflexivity encouraged me to pay attention to the fine details of the research project and the ways in which I have and continue to be shaped by the research process. As many feminist scholars have explored, identity, subjectivity, and positionality are fluid and changing. Barad’s diffraction, and particularly diffractive reflexivity, work to explore how these changing “positions” are always entangled and part of the research process.

Conclusion

There is no “one way” to conduct a diffractive methodology as seen by the wide array of approaches taken by those in academic working in this space (Clark & Thorpe, 2020; Davies, 2017; Dejmanee, 2016; Linghede, 2018; McKnight, 2016). Within my research, it meant expanding the boundaries around the research apparatus, rethinking what constitutes “data,” and bringing many different elements (i.e., data, theory, conversations, social media, fabric, and activewear) together to think about activewear and the research process. Using this diffractive, agential realist approach resulted in various new noticings and data which glowed, inspiring new ways of thinking which will be explored in the remaining chapters.

Diffraction offers great possibilities for feminist scholars interested in doing research in creative ways. Importantly, within diffraction, scholars must be attentive to the fine details of the research process and knowledge productive. For Barad (2007), being attentive is the “ongoing practice of being open and alive to each meeting, each intra-action, so that we might use our ability to respond, our responsibility, to help awaken, to breathe life into our ever new possibilities for living justly” (p. x). It encourages an appreciation for how *all* intra-actions, of varying shapes and size, matter and are entangled with larger systems and ways of knowing. Therefore, something as mundane as a sweaty sports bra becomes a catalyst for producing new knowledge around women’s moving bodies and femininity.

The remaining chapters of this thesis show how a diffractive approach to research allows for theoretical concepts to be thought with, and through, the “data.” Recognising the entangled nature of the research process, the following chapters are not organised around themes or key findings, but rather about how Baradian concepts inspires thinking about activewear. Using this diffractive approach means that the following chapters are not based solely on the interviews, the Enlite project, or myself as a researcher, but about how the methods, “data” and theory were read through each other to understand the activewear

phenomenon from a different, and perhaps new, perspective. These chapters are a result of the multiple waves of this project washing back and forth, and diffracting from each other in a fluid and multidirectional process.

CHAPTER FIVE

Spacetime mattering, Activewear, and Feminist Politics

Samantha Brennan, April 2019, The Conversation: Different items of clothing cause controversy because they spotlight aspects of women's lives and bodies that make us uncomfortable. I think the backlash against leggings stems from our discomfort in seeing women in athletic wear in general... Usually, women are tacitly rewarded for not taking up too much space, for being inconspicuous. Leggings... can contravene those expectations in delightful ways (p. 1).

Lily, October 2018, Activewear study participant: A friend of mine said, "Oh I don't like to wear loud things because it feels like it causes a lot of attention."... For me, I never thought about it like that, I just thought that you wear whatever leggings you like and if you wear bright colours, go for it. If I'm wearing those bright patterns that are exciting, it just makes me feel really confident.

Every morning, women around the world participate in the mundane task of dressing themselves in activewear as they prepare for the day's activities: exercising at the gym; grabbing coffee; running errands; caring for small children; and going for a walk. While activewear may seem inconsequential, as Lily's friend says (stated above), activewear can result in unwanted attention particularly in certain spaces. As Samantha Brennan discusses in her piece for *The Conversation*, some people have become uncomfortable with women wearing leggings as it calls attention to their fleshy bodies. There have been a series of debates around the acceptability of activewear in public spaces—cafés, churches, school drop off zones—with many (both men and women) saying that activewear should only be worn in more private spaces, such as fitness centres or the home (Alesali & Zdanowicz, 2019; Brennan, 2019; Farzan, 2019). This debate builds off a long history of society dictating what constitutes appropriate feminine behaviour for women in public and private spaces.

While some scholars have critiqued the conceptualisation of space into private and public spheres (Abraham, 2010; Armstrong & Squires, 2002), many feminist scholars have found it a useful way to think through gender roles and relations in society and how these

separate spheres are often socially constructed as masculine and feminine spaces²⁴ (Molina & Grundström, 2012). In many Westernised countries (drawing from Enlightenment philosophy), locations such as the state, market, places of discussion, and government are seen as public spaces, linked with men's roles in society and masculine traits (e.g., competition, intelligence, justice). The home, places related to childcare, and areas of intimate relations are considered private and seen as more feminine spaces (Duncan, 1996b). This belief in the gendered nature of space has been used as justification for women's and men's roles in societies where women take on more domestic duties and men occupy more public positions of power (Ghigi, 2011; Landes, 1998; Thompson, 1999). Similarly, sports and physical activity have historically been understood as a masculine, male-dominated space with many women being excluded from such spaces and instead relegated to more domestic realms of society (Hargreaves, 1994; Vertinsky & Bale, 2004). When women do participate in sport and physical activity spaces they are often positioned as "athletic intruders" (Bolin & Granskog, 2003) or "space invaders" (Brown, 2015; Puwar, 2004) and met with criticism and/or treated like imposters (Adjepong & Carrington, 2014; Ahmad & Thorpe, 2020; Brown, 2015).

In public spaces, there have historically been many restrictions, both formally and informally, placed on women, particularly around dress. For example, in the 5th century BCE in Athens, when women left the house and entered public space they were required to cover their bodies from head to toe including wearing veils to cover their face (Yalom, 1997). In 19th century Europe and the United States, upper class women were seen as beautiful objects—passive, submissive, and delicate—and therefore, expected to wear clothing that accentuated tiny waists and their appearance (i.e. corsets, long petticoats). Yet,

²⁴ Although discussed as public/private and masculine/feminine at times throughout this chapter, it must be recognised that neither are a strict binary but, rather, interact and are constantly changing and developing.

simultaneously this 19th century clothing was constricting, inhibiting movement, and often making it difficult for women to walk, breath, and move their limbs (Roberts, 1977). Roberts (1977) argues that the fashion during this period contributed to women's inferior position in society. While the corset²⁵ and uncomfortable dress from the 19th century is less popular in modern society, restrictions on women's dress and appropriate gendered behaviour in public spaces still exist. Recognising the role of clothing in the production of femininity and in gender dynamics across histories, in this chapter I use Barad's spacetimemattering to think through the ways activewear contributes to particular forms of femininity and feminist politics. In so doing, I diffract the historical ideas of femininity and dress in public spaces with contemporary movements and activities—both human and nonhuman—in the activewear phenomenon.

This chapter begins with a brief overview of Barad's concept of spacetimemattering. After this, the chapter is broken into three sections to show how in the activewear phenomenon “discursive-material intra-actions and non-human agentic matter such as space, objects and even time shape the constitution of gender” (Ringrose & Rawlings, 2015, pp. 80-81). In the first section, I offer a discussion of the ways in which leggings challenge a long history of appearance-based femininity. The next section explores how the presence of bodies in activewear in public spaces contrasts with a history of the female body being seen as weak and passive. The last section differs from the previous two, focusing on how the objectification of women is still prevalent in the activewear phenomenon. Throughout these chapters, I show how Barad's spacetimemattering provides a way to understand the activewear phenomenon as (re)articulating the boundaries around femininity in various ways.

²⁵ Although corsets were primarily worn in Western countries between the 16th and early 20th century, since the late 2000s, they have been becoming more popular amongst some women (Rawlings, 2019).

Barad's Concept of Spacetime-mattering

Throughout history, there have been many scholars and entire disciplines²⁶ devoted to the study of time and space (Fraassen, 1970; Soja, 1989). From physicists (e.g., Albert Einstein) to philosophers (e.g., Jacques Derrida and Immanuel Kant) to more contemporary scholars (e.g., Rosi Braidotti, Nigel Thrift, and Henry Lefebvre), scholars have been interested in the ways time and space are inextricably linked and provided various theories to think through these concepts. Within sporting scholarship, there is extensive work that looks at the relationship between sport and space in multiple ways (Borden, 2001; Friedman & van Ingen, 2011; Johnston, 1996; Koch, 2017; Marfell, 2016, 2019; Tangen, 2010; van Ingen, 2003; Vertinsky & Bale, 2004) with few scholars exploring both time *and* space in sporting cultures (for an exception, see Bale, 2004).

Barad contributes to this rich history of time and space conceptualisations in their theory of agential realism and their concept of spacetime-mattering. According to Barad, much of the world uses a specific apparatus to think and “know” time and space. Time is measured through clocks using chronological units, whereas space is seen as “a container/context for matter in motion—spatial coordinates mapped via projections along axes” (Barad, 2001, p. 76). Although Barad does not explicitly mention it, there is a long lineage of feminist cultural geographers and sporting scholars who have explored the complexity of space also challenging this particular understanding of space (Duncan, 1996a, 1996b; Johnston & Longhurst, 2010; Massey, 1994, 2005; Nast & Pile, 1998; Rose, 1993; van Ingen, 2003). In their book on gender, space, and sexualities, Johnston and Longhurst (2010) comment that when they refer to space it is “*not* to something that is abstract, absolute, static, empty, ‘just there,’ ultimately measurable, and able to be mapped, but to something that is complex, changeable, discursively produced, and imbued with power

²⁶ Within Western philosophy, there is a branch of study titled “Philosophy of Time and Space” which explores the different ways in which time and space have been conceptualised throughout history.

relations” (p. 22).

Similarly, there are many Indigenous cultures where time is not a linear narrative or about unidirectional progress (Stewart-Harawira, 2005; Whyte, 2018). Stewart-Harawira (2005) describes how, “Within Māori ontological and cosmological paradigms it is impossible to conceive of the present and the future as separate and distinct from the past, for the past is constitutive of the present and, as such, is inherently reconstituted within the future” (p.42). This resonates with Aboriginal Australian understandings where time is seen as circular and cyclical, understood as “multidimensional and can be described: ‘as a pond you can swim through—up, down, around’” (Janca & Bullen, 2003, p. S41). Similarly, many feminist scholars have looked towards reconceptualisations around time as more cyclical and fluid (Browne, 2014; Felski, 2000). For example, Bardsley (2018) showcases the importance of Luce Irigaray’s fluid mechanics and Michel Serre’s liquid histories for understanding history. By diffractively bringing them together, she develops a “feminist, fluid, material historical model, which views the subjects of history as processes and rethinks historical time as multiple and nonlinear, ultimately subverting the narrative trappings of progress, loss and return” (p. 15).

In line with this scholarship, Barad proposes a fluid and relational understanding of history, time, and space. Their theorising is unique as they not only question fixed understandings of space and time, but also emphasise the need to reconceptualise time, space, *and* matter together. They articulate this in their concept of spacetime mattering where:

Time is not a linear entity, and neither is space reserved to physical boundaries, but rather ideas around time and space are created through intra-actions which themselves mater to the making/marking of space and time... Time is out of joint. Dispersed. Diffracted. Time is diffracted through itself (Barad, 2007, p. 180).

Time and space are continuously made and remade, the boundaries around and within them being challenged, broken, and rearticulated. They go on to argue that phenomena are not located in a specific place or time, but are “material entanglements enfolded and threaded

through the spacetime-mattering of the universe” (Barad, 2010, p. 261). Importantly, within spacetime-mattering, matter is seen as a co-participant in the production of phenomena. Hence, spacetime-mattering brings together the terms space, time, and “practices of mattering” to “acknowledge that these concepts are infinitely overlapping, interlaced, and co-constitutive” (Ringrose & Rawlings, 2015, p. 90). Within this way of thinking, there is a capacity to develop an understanding of time, space, and athleisure that is not bounded by an apparatus of linearity or structure, but is fluid and complex.

The concept of spacetime-mattering is heavily featured in Barad’s (2010, 2013, 2017) work around quantum entanglements and dis/continuity. Particularly, they use an electron as an example to think through the “materialisation of time” and to play with “possibilities for new imageries for time” (Barad, 2013, pp. 1-2). Barad describes how electrons can be used to think differently about space and time because electrons do not live in the world in a fixed fashion. Electrons are in constant motion in a cloud surrounding the nucleus and will randomly “move” between energy levels during quantum jumps. When an electron does “leap” between energy levels it does so in a “discontinuous fashion,” it is initially at one level and then at another “*without having been anywhere in between*” (Barad, 2013, p. 5, emphasis in original). When we think differently about time and space, and about the electron “moving,” Barad (2013) says that, “The point is not merely that something is here-now and there-then without ever having been anywhere in between, it’s that here-now, there-then have become unmoored—there’s no given place or time for them to be” (p. 14). Hence, when thinking about time and space, there must be a movement from a conceptualisation based on linearity towards one that is more dynamic and entangled, disrupting boundaries between the past, present, and future and that recognises the vitality of nonhuman matter.

Within feminist new materialisms, some scholars have begun to explore the possibilities of spacetime-mattering for thinking about various phenomena, such as mental

health recovery (Fullagar, O'Brien, et al., 2019), school attendance systems (Bodén, 2016), and the production of gender through education (Juelskjaer, 2013). For example, Bodén (2016) describes how a school attendance software program (re)produces time, place, space, and matter in a Swedish school. Through this, she shows how the software program works to affect how absence/presence is understood and the relations through which “human” and “student” are produced. Similarly, Fullagar, O'Brien, et al. (2019) use spacetimemattering to critique the linear narrative of women’s recovery from depression often popularised in biopsychology research and discourse. They show how “space, time and matter are intra-active processes that produce depression-recovery experiences through the life course” (p. 62) and how “such entanglements require different ways of tracing and writing the multiple temporalities that shape the movements of more-than human subject formation—beyond linear assumptions and transparent subjects” (p. 62). Many of these scholars have used spacetimemattering to think about human subjectivities and how the self is dispersed across time and space within the contemporary moment. Rather than looking at human subjectivity and identity, this chapter uses spacetimemattering to think about the various intra-actions and entanglements between historical events and the activewear phenomenon that contribute to the production of femininity (and feminist politics) in the 21st century.

To accomplish this, within this chapter I diffract data from the individual interviews with participants with scholarship on the history of women’s dress/moving bodies and current activewear advertising. The particular advertisements were selected as they represent some of the world’s biggest activewear companies (e.g., Nike, Adidas, Under Armour, Reebok) (Shahbandeh, 2020), were part of these companies’ larger advertising campaigns, and represent the general female empowerment and themes of feminism present in many activewear companies’ recent advertisements (Åkestam et al., 2017; Cross, 2020). Even though many of the advertisements come from the United States context, while the interviews

were conducted in Aotearoa New Zealand, the United States is a major influence within Aotearoa New Zealand popular culture with participants often citing American celebrities and brands during the interviews (Ayson & Phillips, 2012).

In line with spacetime mattering, this chapter does not follow a linear historical trajectory, but rather weaves together events, ideas, and matter from different spatiotemporalities in an effort to “represent” the entangled nature of space, time, and matter in the production of femininity. This chapter draws inspiration from Barad’s (2014) writing on quantum entanglements as they splice together scenes from quantum physics history, agential realist theory, and writings from Derrida. In their writing, the scenes are not placed in chronological order, nor is there a clear description of each scene and its importance. Rather, as they state, the article should be understood as an experiment with an aim to:

provide the reader with an opportunity to engage in an imaginative journey that is akin to how electrons experience the world: that is, a dis/orienting experience of the dis/jointedness of time and space, entanglements of here and there, now and then, a ghostly sense of dis/continuity with a *quantum dis/continuity*, which is neither fully discontinuous with continuity or even fully continuous with discontinuity, and in any case, surely not one with itself (p. 244, emphasis in original).

Similar to Barad, this chapter is dis/jointed, jumping between and across time, spaces, and ideas to work with the entangled nature of spacetime mattering. Therefore, while I have attempted to provide clarity in thought, this chapter should be understood as being about “about joins and disjoins—cutting together-apart—not separate consecutive activities, but a single event that is one” (p. 244). It is an experiment in thinking, in representing, and in knowing the politics of activewear.

In so doing, it must also be acknowledged that the ideologies represented in these different temporalities and spaces are not universal and do not represent the very diverse experiences and histories of all women and people. However, I have chosen to highlight particular historical ways of thinking about gender that currently intra-act with the activewear

phenomenon. In choosing only specific events, I am using my “agential scissors” (Ringrose et al., 2019b) to enact cuts, producing boundaries around a *particular* form of femininity.

Spatiotemporal Matterings: Weaving Together Activewear Past-Present-Futures

This section is split into three parts. The first two sections use spacetimemattering to think about how activewear, in some ways, is (re)articulating understandings of femininity. The first explores how activewear challenges appearance-based femininity. The second looks at the ways activewear increases the visibility of the (un)moving, fleshy female body. The final section differs from the previous two as it explores the threats and risks to women in public spaces when wearing activewear. In so doing, this chapter speaks to agential realism’s contributions to understanding the many flows of power and politics that exist within the activewear phenomenon.

More Than a Pretty Face: Activewear and Appearance-Based Femininity

Throughout history, fashion and clothing have served as important social markers within societies and been instrumental in reinforcing gender roles and understandings. As Vincent (2003) describes, clothing has “certain implications for both the body within, and its relationships to other bodies, and to space” (p. 28). Although clothing has changed throughout different time periods and in different cultures, in many Western cultures, upper class/socio-economically privileged women’s clothing was often used to create a narrative about women as objects of beauty, things to be viewed and admired by men, particularly if they entered public, masculine dominated spaces. Scholars have argued that, historically, fashion has been used to ensure women’s submission to men in patriarchal societies (Erkal, 2017; Robinson, 2002; Torrens, 1999). Robinson (2002) writes how during the Industrial Revolution in Europe and the United States (1780s-1820s) “Corsets could be pulled so tightly that ribs were broken, lungs were punctured, and organs were squashed. Necklines were high

and skirts long” (p. 20). The clothing often restricted the body such that upper class women had difficulty walking, climbing steps, and moving in and out of carriages, often needing a man to assist them (although this did vary based on one’s social class). The expensive cost of the clothing also meant that women depended on a man’s (father or husband) income and the immobility of the clothing made it difficult to move in public to look for work. In this way, the clothing itself and its material properties (boning in the corset, corset lacing, giant ruffled and heavy skirts, large skirt hoops) worked to co-produce power imbalances between genders. This was socially acceptable because the “code of femininity” during this time meant that women were to be seen as “objects and decorations, rather than functional human beings integrated in their bodies” (Torrens, 1999, p. 80). Therefore, women were expected to strongly focus on their appearance and conform to particular beauty and fashion standards when in public spaces.

During this time, femininity could be understood as appearance-based femininity which refers to a “range of behaviours with which women must comply in order to signal their femininity...including cosmetics, fashion, hair dyes, fitness clubs, cosmetic surgery, and special or restrictive diets” (Leavy et al., 2009, p. 265). A woman’s femininity became linked with how much she valued her appearance and complied with society’s beauty standards. This was true in Aotearoa New Zealand, as well, even though femininity in Aotearoa New Zealand differed slightly than its British and American counterparts at this time. Within Aotearoa New Zealand, femininity often combined Victorian British attitudes with the rugged, physical lifestyle required of the farming country (Marfell, 2019). However, elite fashion in Aotearoa New Zealand mimicked that of the United States and Europe as fashion extracts from British periodicals were often printed in Aotearoa New Zealand magazines and newspapers, and quickly gained favour (McKergow, 2013).

Although fashion has changed since the age of corsets, appearance-driven femininity is entangled with understandings of femininity today as women are continuously pressured to focus on their appearance and comply with specific beauty standards in public (Bushe, 2016; Elias et al., 2017; Forbes et al., 2007). Elias et al. (2017) argue that beauty pressures have actually intensified in the 21st century as media and cosmetics now target younger women and girls holding them to certain beauty expectations, in addition to an expanding beauty industry (e.g., skin rejuvenation, hair removal, teeth whitening, and cosmetic surgery). One's femininity is often linked with both her appearance and the value she places on maintaining her appearance. However, in my discussions with participants about beauty standards, over half of the women said they cared less about their appearance when wearing activewear compared to when in other clothing and cared more about the functionality and comfort of the clothing. Importantly, those women's bodies that voiced the importance of function over appearance did not necessarily align with "fit femininity" (i.e., young, thin, toned bodies), but came from women of varying ages, body shapes/sizes, and fitness levels:

Hannah (50 years old, Pākehā, aerobics/cycling): I wore [to a gym class] my very old and very faded shorts and top. I quite like the fit of them both which is why I haven't thrown them out.

Nina (63 years old, Pākehā, aerobics): I might care about what they [people] think about my professional work but what I wear? What's it got to do with anybody?... for me, it's entirely about function.

Jan (37 years old, Pākehā, cycling): I wear whatever I wear to the gym because it's the most functional stuff and I don't give a shit what I look like and I don't care if people are looking or not. I don't feel conscious of how I look because I'm wearing it so I can get the most out of my workouts.

Hannah, Nina, and Jan were all avid and devoted gym goers for many years and each had competed in various races (i.e., triathlons, cycling, running events). When they were discussing their clothing choices, it was primarily in relation to going to the gym, a place that has historically been a hypermasculine, male-dominated space (Coen et al., 2018; Craig & Liberti, 2007; Johansson, 1996). Although, today gym memberships tend to be comparable

between men and women (Whaley & Mullen, 2010), overall, gyms continue to maintain a strong masculine presence where women often are seen as intruders and made aware of their “outsider” status, particularly in weight rooms. In Coen et al’s (2018) study on the socio-spatial configuration of fitness centres, the authors highlight a range of micro-aggressions women experience in gyms, such as enduring sexualised gazes and stares from men. Other scholars have noted how gyms reaffirm hyperfemininity and hypermasculinity through clothing, body techniques, spaces (the cardio room as women-dominated and weight room as male-dominated), and advertising (Dworkin, 2003; Johansson, 1996; Sassatelli, 2010). Regarding clothing, Dworkin (2003) notes that many women in cardiovascular rooms “wear what might be considered (hetero)sexualised aerobiciser outfits—cropped, tight tops and tight shorts or spandex with thongs” (p. 138). Therefore, gyms can be a place where women are subjected to particular appearance standards and where acceptable femininity is tied to women’s clothing and appearance choices.

However, as shown, some of my participants offered an alternative understanding. For them, choosing athleisure was less influenced by appearance or embodying femininity and beauty standards, but was about the functionality of the clothing. They (un)consciously resisted the need to conform to a particular ideal when entering public, male-dominated spaces hinting at the ways some women are challenging a history of beauty standards in public spaces. Activewear clothing allowed them to move and exercise without feeling restricted and in so doing, allowed them to focus on their athletic performance and fitness rather than their appearance. Similarly, while activewear clothing is created often with the intent to “flatter” women’s bodies, a large part of many companies’ design process is around developing fabrics and technologies to aid in women’s movement. For example, one of the reasons why lululemon has become such a juggernaut in the activewear industry and is credited as starting the current activewear trend, is because it was one of the first companies

to prioritise functionality in women’s fitness clothing. They provided women with comfortable, thick, moisture wicking leggings that were both stylish and functional for exercise (Raz, 2018). Since then, technology and fabric development have improved with many brands focusing on the functionality of the clothing. Activewear clothing—its performative functions, its stretchiness, its moisture-wicking abilities—“is agentive...[it] actively interact[s] with, resist[s] and co-shape[s] other entities” (Schouwenburg, 2015, p. 65). Activewear clothing’s functional emphasis and participants’ feelings about activewear are productive and can be seen, in one way, as shifting understandings of femininity away from being linked with appearance and towards one that values performance and movement.

Similarly, some activewear companies are challenging traditional gender ideologies around women’s beauty in their advertising. For example, in this 2015 Under Armour Ad, the caption reads: “I will be more than a pretty face. I will—not be stereotyped. I will—not be pigeonholed. I will continue to break new ground. I will exceed your expectations. I will because I am. Hello, I am Gina Carano”²⁷ (see Figure 9).



Figure 9: Example of Gina Carano Under Armour Ad

²⁷ Gina Carano is a former martial artist and fighter on WMMA.

There are multiple ways to view this advertisement. In one regard, Under Armour and this advertisement can be seen as capitalising upon feminist values of strength and independence as a means to sell clothing and make a profit. Many scholars have shown how sportswear companies develop advertising campaigns based around a “good cause” (e.g., racism, gender inequality) as a way to gain public support and target a wider consumer base (Andrews, 1996; Cole & Hribar, 1995; Helstein, 2003; Lucas, 2000; McKay, 1995). For example, in their advertising for women, Nike often promotes concepts of empowerment, strength, courage, and increased sporting opportunities for women (Helstein, 2003; Lucas, 2000). Through this, scholars argue that Nike marketing has worked to strip women of agency (Lucas, 2000), commodify feminism (Cole & Hribar, 1995), and reinforce particular ideas of femininity and the female athlete (Helstein, 2003). This same critique of Nike can be applied to this advertisement as some could argue that Under Armour is not attempting to challenge gendered stereotypes around beauty and physical activity, but is simply producing advertisements they believe will increase profit. Here, companies work to modify “what is perceived as political action and generate identities invested in the status quo” (Cole & Hribar, 1995, p. 366). Therefore, power remains within the activewear companies where capitalistic gains are valued over humanitarian values.

However, Barad’s spacetimemattering offers another, but not exclusive, way to understand this advertisement. While the advertisement does conform to traditional, socially constructed definitions of beauty, there is also a focus on women being productive and powerful rather than something to be viewed for beauty and grace. Gina Carano describes how she is “*more than a pretty face*” with less emphasis on appearance and more on performance. Whereas corsets, petticoats, and clothing from the late 1800s were developed with an intent to make women appear beautiful, activewear can be understood as focusing on function and allowing women to exercise and move freely. This is not to deny that there are

fashion trends today that are uncomfortable or that clothing in the current era does not continue to objectify women. However, as activewear becomes more popular and is worn in more public spaces, ideas about women as objects are challenged as it becomes more common for women to care about functionality of the clothing, rather than appearance. These advertisements and women valuing function over appearance in their activewear choices intra-act with the corsets and “code of femininity” from the early 1800s. They are not isolated events but rather are entangled in the creation of femininity in public spaces. This entanglement—history, contemporary activewear, women’s bodies, advertising—is agentic in that it moves ideas of femininity away from only valuing appearance towards appreciating independence, strength, and boldness.

The popularity of activewear today is not the only time in Western history when women’s fashion choices have challenged conventional understandings of beauty and femininity. Although most upper class women wore restricted dress in the late 1800s and early 1900s, there were many feminists who were frustrated with the cumbersome and painful clothing. They recognised the ways their clothing played a pivotal role in their oppression in society, often arguing that the clothes were “politically at fault because the burden of fashion prevented women from partaking in the public world of politics, business and commerce” (Cunningham, 2003, p. 204). Here, the cumbersome clothing was “an active force in the process of materialisation” (Barad, 2007, p. 183) as it maintained women’s inferiority and continuously produced a femininity based around appearance.

Feminists at this time recognised their domestic duties but also championed for women to “become engaged in the world” (p. ix) which meant wearing clothing that allowed for more movement to walk or ride bikes in public (Marks, 1990). In response to the women’s rights movements (along with women’s health movement), between the 1850s and 1900s in the United States, Europe, and Aotearoa New Zealand, many women began to wear

what was described as “reform dress.” Reform dress is a broad category, but generally focused on challenging “conventional dress to highlight the role of clothing in the negotiation of power relations between the sexes” (Fischer, 2013, p. 4). Reform dress became popular at different time periods across Western countries and was taken up differently by various cultures, but the overall purpose of reform was similar. It was a political movement designed to enable women to “take control of their appearance, to distance themselves from a primarily ornamental identity, primarily dependent on men and devoted to pleasing men” (ibid, p. 4). Women began to wear looser clothing, shorter skirts, more comfortable underwear, and some even wore trousers and bloomers. Women were able to move more freely in public spaces which many believed would grant them more opportunities within the public sphere.

In Aotearoa New Zealand, reform dress coincided with the “New Woman” social movement. Simpson (2001) describes the New Woman as a woman who “played sport, wore her skirts above her ankles, loosened her corsets, wanted a good education, expected to marry and have children, but also wanted a life beyond her home, maybe even a career” (p. 54). One popular “New Woman” was Freda Du Faur. She became the first woman, and fastest person, to climb Aoraki Mount Cook (highest peak in Aotearoa New Zealand) popularising mountaineering among wealthy woman and leading to the development of the “new independent woman mountaineer” in the 1920s and 1930s (Morin et al., 2001, p. 127). Interestingly, Du Faur and other mountaineering pioneer women were often held to a particular set of social standards for dress (long bulky dresses) and would therefore, covertly change into pants and “more suitable sporting outfits despite convention” (Morin et al., 2001, p. 125) when out of site from lodges. The late 1890s and early 1900s represented an interesting time for many women who were seeking new adventures and opportunities, but were also very aware of traditional gender roles and conventions.

While reform dress and the New Woman Movement were liberating for many, the

clothing did create a massive uproar in cities around the world. Traditionalists critiqued reform dress believing it posed a threat to the social structure with women who wore bloomers being seen as engaging in “illicit” activity and deviant (Torrens, 1999). Banner (1980) writes that the “opposition was more vitriolic than anything feminists had yet experienced” (p. 56) and therefore, even many suffragists abandoned the trousers and bloomers (which received the most critique). As women pushed for more rights both in dress and in broader society, they were continuously faced with a strict gendered ideology which relegated them to private spheres of society and worked to restrict them from gaining power and becoming productive in public life. They were expected to maintain the home and primarily be ornamental in public.

The intense regulating of women’s bodies and the resistance to bloomers and cycling is not relegated to past but is an active force today as women’s bodies are still policed in public. In the past ten years, there has been many opinion pieces published in various periodicals, such as *The Washington Post* (Folan, 2016), *The New York Times* (Jones, 2018), *The Vancouver Sun* (Wexler, 2011) and *The Observer* (White, 2019) where the authors argue that leggings and activewear in public spaces are “disrespectful” and “inappropriate.” As discussed in the introduction, in the United States women were told at both Notre Dame University and Rutgers that they should not be wearing activewear as it was distracting to males on campus. In 2015, the “yoga pants” law was (unsuccessfully) proposed in Montana, United States which attempted to expand the state’s indecent exposure law to include “buttocks, genital, pelvis or female nipples” (Bock et al., 2019, p. 60) restricting what is “acceptable” feminine dress in public. It is not simply that activewear is critiqued for being informal in certain situations (e.g. church, school) but because it is too revealing of women’s bodies, not congruent with “respectable femininity.”

In response to such public statements of disapproval, many women have worn

leggings and activewear as a conscious political act. Within the activewear phenomenon, there have been many women (predominantly White, Western, middle-class) who have worn activewear as an explicit, public form of politics. In a satirical, tongue-and-cheek letter responding to the Notre Dame incident referenced above and in Chapter One, blogger Jessica Trump (2019) writes:

I would have spent the rest of my life wearing my love-handle hidiers with confidence, but thanks to you, I realise my personal comfort takes a backseat to my real purpose – to dress in such a way that the world is a more accommodating place for men. I’m an enlightened woman now; as we speak I’m making plans to commission the Amish for some flattering new frocks. Once my male-repellent apparel arrives, I’ll destroy all of my leggings, right along with my hard-earned career and right to vote.

Her response is an explicit political act, where she is choosing to wear leggings and activewear as a way to protest a culture that has continuously told women they need to dress in a modest way as to not distract men. Another response to the Notre Dame letter was by students at Notre Dame who developed “The Leggings Protest,” “Love Your Leggings Day” and “Leggings Pride Day,” a series of protests where all students were invited to “make a conscious choice to wear leggings and thus affirm your right and ability to do so... because what you wear is completely your own choice” (Farzan, 2019). In a similar demonstration, 300 women in Rhode Island protested and wore their leggings in town after a letter written by a 60 year old man was published describing Lycra in public spaces as “tacky” and “ridiculous” (“Hundreds of women,” 2016). In such instances, wearing activewear is a deliberate political act challenging a history of women being told what to wear and how to act. This political act can be seen as a material-discursive entanglement where both discourse (i.e. ideas about respectable femininity) and materiality (i.e. clothing, bodies) come together to enact different “possibilities for worldly reconfigurings” (Dolphijn & van der Tuin, 2012, p. 55) that creates other ways of knowing femininity.

Importantly, many feminist scholars have looked at how clothing and materiality have become meaningful and historically been used to resist (or reinforce) the ideological construction of femininity in varying ways (Al-Mahadin, 2013; Ramirez, 2009). Barad's spacetime-mattering adds to this literature, by emphasising how "every bit of matter, every moment in time, every location...is diffractively/differentially constituted" (Barad, 2017, p. G.110). Agential realism and spacetime-mattering asks scholars to look at the entangled nature of "resistance" and performative femininity seeing how women's bodies, clothing/matter, discourse, and spaces from different time periods all intra-act and to value the co-participatory nature of nonhuman matter in producing social worlds. Although corsets are a clothing item more than a century old, their implications are still felt today. Barad (2001) writes, "temporality is produced through the iterative enfolding of material-discursive phenomena just as rings of trees mark the sedimented history of their intra-actions within the world" (p. 90). The constricting fabric and ideology from the 1900s and the resistance faced during the reform dress period is woven into the anti-activewear movements and the constant policing of women's bodies today. In mainstream society, appearance-based femininity is still present where women are expected to care about their appearance, to wear clothing that society deems acceptable, to be objects of desire and beauty rather than wear clothes that are functional and comfortable. Importantly, this is not a case of "history repeating itself," but of a history "that is thickly threaded through with all other moments" (Barad, 2017, p. G113).

Yet, at the same time as women began to wear trousers and bloomers as a form of resistance, women today wear their leggings and activewear in public spaces challenging these antiquated social discourses that are very much part of contemporary society. Wearing leggings in public can be conscious political act taken by some women (i.e. Jessica Trump and protestors), but can also be unconscious and not involve human intentionality at all. Leggings (in some ways) are not about appearance or conforming to appearance standards,

but are about being comfortable, being able to function throughout the day, about strength and power. Therefore, through spacetimemattering it can be seen the act of going out in public spaces and choosing to wear activewear for function over appearance, is political as it resists a continuing legacy of appearance-driven femininity. It is not simply the clothing that acts as a form of resistance, but rather an entire entanglement of space, time, and matter is agentic as it challenges and produces agential cuts and boundaries around femininity.

Activewear and a History of Fragility

As the name implies, activewear clothing is designed for physical activity. The fabric has been technologically developed to allow for movement in that it has the capability to stretch, to dry quickly if sweaty and wet, and to allow for heat evaporation. This development has progressed alongside an increase of women participating in a range of physical activities from walking to yoga to weightlifting. However, women have not always been encouraged to move, their bodies long thought to be weak and fragile. Vertinsky (1994a, 1994b) describes histories of medical discourses and social norms being used to discourage women from vigorous exercise and from developing muscular bodies. The activewear phenomenon contradicts this by not only encouraging women to exercise, but putting the moving female body—in various sizes and shapes—on display, in and out of public spaces.

Historically, and arguably today, women's primary role within society has been connected with childbearing and domesticity. Therefore, over the past century many ideas around women's physicality were associated with how physical activity would negatively affect and impact a woman's reproductive system. In the late 19th century, the medical community began to use scientific research to justify their recommendations for how women should move and act, particularly in public spaces (Vertinsky, 1994a). However, many of these recommendations primarily applied to upper class White women. Women of colour and White women of lower classes were seen as inferior to the upper classes and their lives often

involved much more physical labour. Scientific and medical discourses only applied to women they believed to be the most civilised and upstanding (i.e. the wealthy and White) (Hargreaves, 1994). Vertinsky (1994b) writes that the Victorian scientific and medical discourses “idealised women as reproductive vehicles and focused upon pathology, limitation and disability, casting the feminine body as the malfunctioning organism that embodied society’s ills. Being female became a natural indisposition” (p. 150). However, doctors did suggest that women should engage in light to moderate exercise and therefore, women were active in a range of activities in both public and private spaces. In public, the main leisure activities upper class women pursued—tennis, golf, skating, horse-riding—focused on women’s elegant, graceful movements and ensured that women did not exert a great amount of energy for fear of harming their bodies and reproductive abilities (Hargreaves, 1994; Vertinsky, 1994a; Winkworth, 1989). Even in Aotearoa New Zealand, where women “display[ed] domesticity, heterosexuality and femininity whilst also being ready, willing and able (fit) to perform the most laborious of chores and often in rural and rugged environments” (Marfell, 2019, p. 579), sport and excessive physical activity were widely discouraged for fear of potential health risks (Burroughs & Nauright, 2000).

While the dominant narratives about women’s physically active bodies have evolved since the 1890s and early 1900s, these discourses are still present and intra-act with life in contemporary society. There is discontent with women playing more contact sports such as rugby or boxing for fear of women being injured and their bodies unable to handle the physical nature of the game (Broad, 2001). For example, Lindner (2012) describes how some people argued against women participating in boxing in the 2012 Olympics because “their bodies aren’t ‘made’ for the kind of violent bodily contact that boxing entails” which reinforces “understandings of the female body as ‘naturally’ weak” (p. 466). The activewear

phenomenon (women's experiences, clothing, advertisements) intra-acts with this ideology, challenging it and presenting another view of femininity.

Within some activewear advertising, rather than emphasising women as “reproductive vehicles” and how “being female becomes a natural indisposition” (Vertinsky, 1994b, p. 150), advertisements define femininity as being strong and powerful (Åkestam et al., 2017). For example, Reebok's 2018 *Be More Human* campaign featured various influential female celebrities with advertisements with text such as, “I am unlimited. My strong goes on and on” (Reebok: *Be More Human*, 2018). Similarly, in an advertisement from Nike's 2005 (controversial) *My Body Parts* Campaign, the text next to an image of a woman's leg reads:

I have thunder thighs. And that's a compliment because they are strong, and toned, and muscular and though they are unwelcome in the petite section, they are cheered on in marathons. Fifty years from now, I'll bounce a grandchild on my thunder thighs and then I'll go out for a run. Just do it.

In many ways these and other advertisements continue a long history of women's bodies being objectified and producing unrealistic standards of femininity. They can be considered characteristic of postfeminist sensibility where there is a strong emphasis on women's empowerment and independence (rather than systems of inequality) and “a preoccupation with expressions of hetero-sexy femininity” (Toffoletti et al., 2018, p. 4). In advertisements such as these, women gain power by immersing “themselves in the pleasures of femaleness, to find self-fulfilment and carnality, rather than to dismantle, critique, expose, or challenge systematic discrimination and violence” (Nguyen, 2013, p. 158). Through this lens, activewear and these advertisements can be seen to employ a postfeminist politics that is not focused on collective action to combat inequalities, but individual women making their own choices about how they would like to live their life, embracing its hyperfemininity and sexualising features.

However, Barad's spacetime-mattering provides another way of thinking about these advertisements and how they are entangled with the historical medical narrative of women's

bodies as weak. In these advertisements, the focus is on the physical capabilities of women, not weakness, fragility, or appearance. Even the term “thunder thighs,” which socially has been a negative term for larger legs, is reclaimed as a positive signifier and is used to emphasise the strength and endurance of this woman. Engaging with Barad’s spacetime-mattering, the “eternally wounded woman” (Vertinsky, 1994b) narrative is never “in the past” but is made and remade through intra-actions. This narrative intra-acts with the activewear industry and phenomenon today, and therefore, we can see how activewear advertising (in some ways) contradicts and resists this belief that women are weak by popularising the strong, powerful image of femininity.

Changing ideas around women’s moving bodies was also seen in the early 1900s with the development and popularity of the bicycle in the 1900s. At the turn of the century, bicycling became a popular activity for both men and women, but was particularly important for women. The bicycle offered women a newfound freedom as it provided them with a sense of mobility allowing them to cycle through towns, country sides, and various other public spaces without chaperones (Simpson, 1998; Simpson, 2001; Winkworth, 1989). *The San Francisco Chronicle* published a column about the popularity and freedom of the bicycle in 1895 writing:

It really doesn't matter much where this one individual young lady is going on her wheel. It may be that she's going to the park on pleasure bent, or to the store for a dozen hairpins, or to call on a sick friend at the other side of town, or to get a doily pattern of somebody, or a recipe for removing tan and freckles (Lafrance, 2014, n.p.).

Women took advantage of the freedom the bicycle offered in both transgressing the public/private boundary and the opportunity for more vigorous physical activity. Although the bicycle was very popular and increased visibility of women’s moving bodies, many were nervous that “the appearance in public of the panting, active woman” (Winkworth, 1989, p. 106) threatened appropriate feminine behaviour. The bike “might cause women not just to glow but to sweat profusely” (Winkworth, 1989, p. 106). When women cycled, “the legs

were still outlined for all to observe, accentuated by the physical action of pedalling, and making the public ‘witness of the physicality of women’s bodies’” (Simpson, 2001, p. 63). There was public outrage at the visibility of women’s moving athletic bodies in public spaces.

While this narrative is still present in some aspects of modern society, there has been a big shift in contemporary times regarding the acceptability and visibility of women’s moving bodies. There are many reasons for this shift, but here I discuss the implications of neoliberalism, healthism, and the cultural obsession with health. In the 1970s and 1980s, Margaret Thatcher and Ronald Reagan implemented neoliberal economic policies which had wide-reaching effects on different factions of society including health and fitness. Neoliberalism removes responsibility of social problems from the state (via social welfare programs) and places that responsibility on individuals and private companies. As a result, themes around individualism, freedom of choice, and personal responsibility began to circulate and become prominent within society (Andrews & Silk, 2012). This was especially true in health and fitness where individuals were seen to have a moral responsibility to maintain their health through consumption choices and physical activity regardless of any potential structural barriers (i.e., race, gender, sexuality, ethnicity, economic class). This contributed to the development of healthism defined as the “preoccupation with personal health as a primary—often *the* primary—focus for the definition and achievement of well-being; a goal which is to be attained primarily through the modification of life styles” (Crawford, 1980, p. 368). During this time (and continuing today) it became a moral and societal obligation for an individual to follow—or at least *appear* to be following—societal codes for health maintenance through normalised health measures (physical exercise, healthy eating). Therefore, the body (including the clothed body) became/is a symbol and site for

which health is inscribed, a physical manifestation of socially accepted behaviours (Brice & Thorpe, 2021a; Lipson et al., 2020; Lupton, 2013b; Roy, 2008; Wright et al., 2006).

It was also around this time that group fitness classes gained popularity in many Western countries which contributed to the cultural obsession with health and fitness. In 1968, Kenneth Cooper introduced the concept of aerobic exercise which emphasised the physical benefits of exercise and using it as a means of disease prevention (Wing, 2014). This led to increased public attention to the importance of physical activity for one's health and a growing interest in aerobic movements. In the United States, Judi Sheppard Missett felt the impact of Cooper's book when the numbers from her women's dance class began to dramatically decrease. She realised that women were becoming more interested in exercise and aerobic movements than dance choreography. Therefore, she developed Jazzercise, a fusion of dance, kickboxing, and yoga which quickly gained popularity across the United States and is credited with launching the group fitness movement (Black, 2013). The fitness craze of the 1980s in the United States was mirrored in Aotearoa New Zealand where women's aerobic classes gained popularity leading to the development of "fitness centres" (Green, 2013). While many of the group fitness classes reinforced a particular standard for women's bodies (and continue to do so), they simultaneously challenged ideas about where and how women should be exercising (Black, 2013; Petrzela, 2018). The development of fitness studios and women-centred fitness classes in the 1980s and 1990s "became a vehicle for women to question received attitudes about femininity and to reject their relegation to the less visible, private sphere" (Petrzela, 2018, p. 99). Therefore, in some ways, group fitness did work to rearticulate boundaries of femininity making it more acceptable for women to exercise in public spaces and to value movement and fitness. However, it simultaneously contributed to the production of unattainable idealised bodies, "reproducing

heteronormativity by ‘feminising’ women’s physical activity” (Markula & Kennedy, 2011, p. 2).

Although many scholars have critiqued the cultural obsession with health and fitness (Andrews & Silk, 2012; Francombe-Webb & Silk, 2012; Gard & Wright, 2005; Lavrence & Lozanski, 2014; Wiest et al., 2015), the rising popularity of fitness led to an increase in visibility of sportswear clothing and women’s (in)active bodies in public. Whannel (1992; 2002) describes the development of “fitness chic” in the 1980s where it became fashionable to look fit regardless of one’s actual state of fitness. This “fitness chic” has manifested into the activewear trend today. Activewear clothing being tight and revealing, emphasises the shape of women’s bodies. While it can be argued that this continues to reinforce dominant tropes of femininity, it simultaneously allows for women’s fleshy, *active*, and strong bodies to be visible in both public and private spaces. Unlike in previous generations where women were told to cover their “weak” bodies (and/or hide their strong bodies), some of the participants in my study described how they liked wearing activewear to display their bodies to themselves and others:

Dana (34 years old, Iranian, group fitness instructor): When I wear those kinds of things [racerback tops] and the back is quite open, it nicely shows the muscles.

Caroline (31 years old, Māori/Pākehā, amateur boxing) on why she wore her crop top to the gym: I kinda got changed, popped it on and I must have caught myself and saw the abs and thought ‘Damn’.... I feel like I look really fit and healthy.

Rita (56 years old, Pākehā, aerobics): Actually I like that [tightness and openness of activewear] cause if you’re doing something and look in the mirror and go ‘Oh look, I can see muscle definition’ whereas if I just had a baggy t shirt on, I wouldn’t.

Participants valued their (strong) bodies and liked that activewear allowed them to show it off. Arguably other clothing also reveals women’s fleshy bodies and muscular bodies.

However, activewear is entangled with discourses around movement, physical activity, and strength which intra-acts with the body when worn. In Lipson et al.’s (2020) study on women and activewear, they found that “athleisure appeared to encourage participants to perceive

those who wore it as people who engaged in regular physical activity” (p. 8) even when the wearer was outside of physical activity spaces. Therefore, when a woman’s body is on display in activewear, there is a connection made between that body, physical activity, and strength. In so doing, this entanglement—clothing, bodies, discourses—challenges ideas of women as “eternally wounded” and works to (re)articulate ideas about women’s bodies and femininity.

From a critical feminist perspective, it could appear that the participants are primarily only focusing on “looking better,” on continuing to value their appearance in their lives, and feeling “good” only when their bodies conform to societal ideas around fit femininity. Research has shown that perceptions about the health and physical activity of the woman wearing activewear differ based on the size of her body (Lipson et al., 2020). In Lipson et al.’s (2020) research, participants describe how if a thin, toned woman wore activewear, she was perceived to have a “healthy” lifestyle. Yet, if a larger body is wearing activewear, “the clothes no longer identified the wearer with the cultural obsession with health and fitness; instead, athleisure communicated laziness” (p. 11). When I spoke to my participants about who they saw wearing activewear and where they saw it, they provided mixed answers. Some women discussed particular thin, toned bodies that fit the “norm” of who should (and does) wear activewear, while other participants believed it a trend for everyone, seeing bodies of all shapes and sizes. For example, I began my interview with Rita with her wanting to show me a YouTube video of a Zumba class she participated in to highlight the various ages, ethnicities, and sizes of the participants wearing activewear. When I asked her about activewear companies’ target audiences she said, “I don’t think they’re excluding anyone, even bigger women. I mean, The Warehouse clothing goes up to a 24/26.” She followed this by saying that Aotearoa New Zealand is accepting of bigger women wearing activewear because “it’s becoming more the norm...it doesn’t look out of place going around wearing

that stuff whether you are going to the gym or exercising, walking, biking or not. I don't think it looks out of place." Therefore, an argument is made that not only does activewear display the moving, active female body, but also shows a wider range of body sizes and shapes in public spaces.

This section began with the medical discourses around women's frailty and has ended with a discussion of the range of bodies wearing activewear today. The various historical events around women's bodies are not simply stepping stones in the evolution of femininity, but instead actively intra-act with ideas from today. As Barad (2007) states, "the past is never left behind, never finished once and for all...the past and the future are enfolded participants in matter's iterative becoming" (p. 181). Therefore, the activewear phenomenon today is entangled and intra-acts with historical medical discourses from the late 1800s, with the bicycle from the early 1900s, the increasing importance of health in the 1970s and 1980s, and other historical events. Thinking about activewear as entangled throughout space and time, provides a way to view activewear as pushing back against the historical entanglements that have seen women as passive objects whose bodies were too fragile and weak to engage in vigorous exercise. Instead activewear clad bodies in public spaces demonstrates that women (and their bodies) are strong, bold, and powerful. When thinking through space and time, Barad (2001) writes that "intra-actions are temporal not in the sense that the values of properties change in time, but rather *the properties themselves are redefined through time*" (p. 91, emphasis added). As these historical material-discursive events—medical discourses, bicycles, neoliberalism, activewear clad bodies—intra-act and come together, a particular version of femininity in public and private spaces is being created that values strength and movement.

Policing Women's Bodies

The previous two sections have discussed how activewear entanglements across various spatiotemporalities challenge appearance-based femininity and increases the visibility (and acceptance) of the moving female body. In so doing, these sections have enacted agential cuts and boundaries around a particular understanding of femininity. However, within agential realism, Barad (2007) argues that, “one can't simply bracket out (or ignore) certain issues without taking responsibility and being accountable for the constitutive effects of these exclusions” (p. 58). Therefore, while this chapter's use of spacetime-mattering has emphasised activewear as (re)making boundaries of femininity, there must also be a recognition of how activewear is also entangled with the sexualisation, objectification, and policing of women's bodies in public settings.

As this chapter has shown, throughout history, there have been societal restrictions placed on women, particularly around their dress and bodies. Many of these restrictions are a result of the deep rooted sexualisation ideology that runs throughout cultures where a woman's “value comes only from her sexual appearance or behaviour, to the exclusion of other characteristics” (Lerum & Dworkin, 2009, p. 251). Coupled with this sexualisation “is the idea that somehow an electromagnetic, biological (or affective) force will stir up crazed, uncontrollable hormonal sexual desire [in men] when in the company of women” (Ringrose & Renold, 2012, p. 334). Therefore, women continue to be seen as the “bearers of morality” and the “female body is believed to be a tool of sorcery and seduction” (Ringrose & Renold, 2012, p. 334). Women's dress and their appearance are part of a history of sexualisation of women's bodies, with public spaces as traditionally masculine spaces, and with patriarchal systems where male desires and needs are valued above women (and other genders).

Activewear clothing and activewear-clad bodies are entangled with this history of sexualisation as seen in online spaces, the media, and in women's everyday experiences, to

name a few. For example, there are countless articles and blog posts where men discuss how attractive women are in yoga pants and their love for activewear since it accentuates the female form. In one online post, the male author writes:

Dear Yoga Pants, Obviously....Thank you! Like really, thank you big time. As in big booty time. What a world we live in when it's totally cool for a woman to walk around in skin tight thin material that is designed to emphasise the size and shape of her derriere. Well, that's the way I see it. What other purpose could there be for these pants other than to make a woman's butt look good? That's what the guy brain says (Byron, 2019, paras 1-3).

In a similar post, titled "15 Reasons why men love women who wear leggings," the author suggests that men like yoga pants because, "Guys like being teased, it provides easy access, leggings are super seductive, leggings support the perfect shape" (Bwayo, 2017, para 8).

Similarly, on mainstream media, women are being sexualised in leggings. In 2015, a segment aired on the United States conservative talk show, *Fox and Friends*, where a panel of "dads" were brought in to judge women wearing activewear and whether that would be appropriate clothing for their daughters and other women to wear. During the segment, as women modelled leggings, there were cheers and whistles from the audience and responses from the dads such as, "You gotta cover your tail," "Your physique—you've earned that, god bless you," and "She needs more coverage" (Sieczkowski, 2015). Statements and ideas such as these continue the policing of women's bodies and reaffirm women as primarily sexual objects. When a woman wears activewear in public, "she no longer belongs solely to herself. All too often, if her body meets the very confining set of physical standards that are currently exalted, our culture steals her very sexuality, transforming her into an object of male fantasy" (Robinson, 2002, p. 83).

Many of my participants (and I) described the sexualisation they felt when wearing activewear and discussed experiences of either being catcalled when walking or running in public, or having males comment on their outfits:

Karlie (34 years old, Pākehā, cycling/aerobics) (response to a follow-up question after explaining that she changed her underwear before leaving the house): I think it goes back to my running days when we, us girls would always get the shit taken out of us if we had underwear on rather than G-strings on from the guys. It was a big thing when I was running because we'd be doing starts and stuff on the track and so all the girls would go at once and then guys are waiting for their turn and they're behind us.

Kae (52 years old, Pākehā, cycling/running): This top here ...as soon as you sweat, you see your bra, everything. At spin I don't tend to worry about it probably cause it's darker but if I'm out running on the road, I guess as a teenager there used to be this, I was involved in a club and we use to go running and I had a couple of really negative experiences with being yelled at and catcalled and that as a teenager, so I try and avoid drawing attention to myself.

My field notes (Walking in Kirikiriroa Hamilton): I'm walking to the gym today along a pretty busy road. I'm wearing Enlite to the gym and it definitely shows in the front and back. I've not had a problem showing off the sports bra or wearing short shorts... Yet as I write this I just got whistled at, so that then makes me feel more insecure and as if I should be covering up.

Karlie, Kae, and I discuss how our bodies have been the subject of male commentary.

Importantly, the place of the occurrences have been in traditionally male dominated spaces—athletic fields, streets. As Kae implicitly stated, she would be fine showing her sports bra in a spin studio, a space that is predominantly occupied by women, but as soon as she enters public spaces, she is reminded her body is not her own. The experience of being whistled and jeered at while in public, is not simply a linguistic act, but it is a material-discursive entanglement. The words intra-act with the clothing being worn, the anxious sensation in the stomach, memories from childhood, the heightened bodily senses, the increased heart rate, the history of women being policed, the threat of danger. Both Karlie and Kae describe how experiences from childhood affected their future activewear and movement choices as adults. For Karlie not wearing underwear with visible lines stems back to her track days when male athletes would comment on her body, whereas Kae continued to have painful memories of being catcalled as a teenager running.

Barad (2014) describes how “there is no moving beyond, no leaving behind. There is no absolute boundary between here-now and there-now” (p. 168). These histories, both

women's own experiences and those inherited from previous generations, become embedded and embodied when women wear activewear. These histories do not go unnoticed and many women are aware that activewear is entangled with the risk of simply being a woman in public whose body is "public property, open to all forms of comment and criticism" and where "the entire army of pedestrians, cabmen, and small boys feel privileged to stare at her and pass remarks" (Simpson, 2001, p. 59, emphasis in original). Yet, despite such risks, many women continue to unapologetically wear activewear in these public spaces and therefore, whether they are conscious or not, are resisting and actively pushing back against the policing and sexualising of women's bodies.

In her work on women, sexuality, and sport, Robinson (2002) describes women running in public as a political act. She writes:

...women who run are engaging in a public act of freedom. They are also claiming a space in public space—space that has not always been open to women...They sweat, they spit, they allow their bodies to function freely and their faces to grimace and laugh (pp. 151-152).

Public spaces have not always been safe space and accepting of women, and still are not today as seen by the many comments and stares women wearing activewear encounter. The experiences of being catcalled, the history of women's clothes being restricted, the ogling as women walk, are parts of history that "never rest but are reconfigured within and are dispersed across and threaded through one another" (Barad, 2013, p. 3). Therefore, while leggings do allow more freedom and movement, they are simultaneously entangled with the continuing threat against women's safety, as many in society continue to dictate and comment on women's behaviour and appearance in public spaces.

Conclusion

The activewear phenomenon is complex with multiple material-discursive intra-acting elements that work to produce and maintain various forms of powers and politics. As other

scholars and I have argued elsewhere (Brice & Thorpe, 2021a, 2021b; Lipson et al., 2020) and as alluded to throughout this chapter, in many ways activewear does reproduce a patriarchal system of power in which women's value is tied to their appearance and conforming to socially acceptable understandings of femininity. When wearing activewear, women's bodies can be criticised and ridiculed, yet simultaneously sexualised and objectified in public spaces. Also, the activewear industry continues to perpetuate and produce unrealistic bodily standards and use postfeminist rhetoric and ideology to sell their clothing and increase revenue (see Chapter Six and Brice & Thorpe, 2021b). However, Barad's spacetimemattering also offers a different way to think about the power flows and feminist politics within the activewear phenomenon. Barad's agential realism encourages scholars to explore the fine details and intra-actions of *both* the material and discursive within and *across* spatiotemporalities in sporting phenomena. In so doing, Barad's spacetimemattering has a "*generative capacity* [emphasis in original]" (Fullagar, 2017, p. 250) to produce (alternative) ways of *knowing* sporting phenomena.

Within a spacetimemattering conceptualisation, the present moment never exists in isolation but is entangled with the past and future. Barad (2014) emphasises that "'Now' is not an infinitesimal slice but an infinitely rich condensed node in a changing field diffracted across spacetime in its ongoing iterative repatterning" (p. 169). In other words, the past, present, and future are not following a linear trajectory but are constantly intra-acting across spatiotemporalities affecting each other and the world's becoming. Applying this to activewear means recognising the ways historical materialities and ideas intra-act with material-discursive events in the current moment. When women wear activewear in public spaces, their bodies are intra-acting with the resistance against reform dress and trousers in the 1900s. When activewear advertisements feature strong, powerful women, the messages intra-act with the history of medical discourses popularising the belief in women's weakness

and inferiority. Therefore, while it has been over 120 years since corsets and petticoats were extremely popular and women forced to rely on men for the simple act of walking or climbing stairs, those ideas, realities, and material constraints on women's bodies still exist and intra-act with the activewear phenomenon.

When women across the world put on activewear, it is often not with a deliberate intent to engage in feminist politics and rather it is more often conceived as simply comfortable clothing that allows them to function easily throughout the day. However, when read through spacetimemattering and the history of women's bodies across different spatiotemporalities, wearing activewear can be understood as a performative political act. Key to agential realism is giving "matter its due as an active participant in the world's becoming, in its ongoing intra-activity" (Barad, 2007, p. 136) and to move away from privileging language alone. The presence of Lycra fabric which accentuates women's active bodies in public spaces is a *material political act* that does not require women to use language, or even to consciously engage, to challenge ideas about women's bodies in public space. It is not simply that women (un)consciously assign meaning to their clothes to then resist dominant tropes of femininity. Rather it is the clothing and the discursive coming together; the way the clothing allows women to move, to be active, to focus less on appearance and more on functionality; the way the female body is put on display, and the history and continuing legacy of society policing women's bodies and constructions of acceptable femininity. The material itself becomes an active participant, intra-acting with different spatiotemporalities. Femininity becomes (re)articulated away from understandings of women as weak and passive, to strong, powerful, and mobile.

Scholars have shown how other pieces of clothing —hijab, pants, zoot suit—are understood as political acts negotiating societal and cultural ideas of femininity (Al-Mahadin, 2013; Crane, 2000; Cunningham, 2003; Entwistle, 2000a; Flanagan, 2014; Ramirez, 2009;

Takolia, 2012). Many of these political acts utilise clothing coded as masculine worn on feminine bodies troubling the gender binary. However, activewear is interesting in that it is socially coded as feminine yet, through Barad's spacetime-mattering we can still view it as a political act transgressing gendered stereotypes and understandings. This is in part because activewear (unlike other clothing) is entangled with discourses of fitness, physical activity, and the moving body. As Lipson et al. (2020) found in their research on activewear, when women wear activewear, people in society view the body as one that is active whether or not this is in a gym setting. Activewear is an object recognised as being *both* feminine and associated with movement, strength, and activity. When diffracting this entanglement through the historical (and present) narrative of women's bodies as objects of beauty and weakness, activewear, in some ways, is a political tool that produces particular boundaries around understandings of femininity.

As this chapter has shown, there are various forms of power operating in and through the activewear phenomenon. Activewear, women's experiences of fitness, and society's understandings of femininity are complex and entangled with history. This entanglement "require[s] different ways of tracing and writing the multiple temporalities that shape the movements of more-than human subject formation" (Fullagar, O'Brien, et al., 2019, p. 62). Diffracting women's experiences today with events from the past—the corsets from the 1800s, the bicycle, medical discourses—means recognising how the "simple" act of wearing leggings is "not simply here-now" but is "always already threaded through with anticipation of where it is going but will never simply reach and of a past that has yet to come" (Barad, 2010, p. 244). The corsets from the 1800s, the bicycle, spandex, medical discourses, shaming of women in public spaces, leggings protests, racerback tops in cafés; these events are entangled. Therefore, while the everyday task of a woman wearing activewear may seem mundane, through spacetime-mattering, such practices can be understood as subtle ways of

resisting appearance-based femininity and women's bodies seen as "eternally wounded." Thus, spacetimemattering allows for a way to explore the nuances and complex entanglements across spatiotemporalities that contribute to women's experiences, gender politics, and particular understandings of femininity in the 21st century.

CHAPTER SIX

The Lively Intra-Actions of Activewear: Material-Discursive Constructions of the Fit Female Body

I do a quick scan of my Facebook newsfeed. Nothing new, just the usual; CNN articles, tourist photographs, leggings ads. Hmmmm, this one is new, an “anti-cellulite leggings” ad—— I hop on TikTok for a bit, scrolling through the random videos. Cute dogs, random pranks, dancing families, workouts for your abs, workouts for your butt, workouts for your arms ——I wait in line at the grocery store looking at the candies, at the magazine covers, skimming all the headlines; “Katy Perry Opens up at about pregnancy,” “I lost 7kgs of fat on this weight lifting program,” “7 reasons your butt isn’t changing no matter how much you workout.”

I head to the gym glancing at the new promotional posters they just put up. It looks the same as the others; a beautiful, thin, tanned woman with an amazing six pack doing a deadrow. I wiggle into my leggings and can feel the waistband digging into my stomach, seeing the way the skin and fat bulges around my midsection. Immediately, the anti-cellulite leggings pop into my head, the videos of sit-ups, planks, the article headlines scroll through my brain. I know those anti-cellulite leggings don’t work, that sit-ups are great for strength but I’m never going to look like those fitness models, I know many of those fitness models are photoshopped images and that “real” bodies will rarely look like that. Yet, the more I move, the more the roll makes itself known, spilling over my pants, poking out through my t-shirt. I feel the flab, I feel the fat, I feel the tightness of the pants, I feel shame, I feel anger at myself for even feeling this way, I feel embarrassed by my “normal,” yet not accepted body, I feel disgusted.

Since the 1980s, feminist scholars have studied women’s fitness practices within society with a particular emphasis on the discursive construction of the idealised female body and the impact this has on women’s experiences of exercise and their bodies (see Chapter Two for a review of literature on this topic). Primarily research has focused on how magazines, social media, fitness manuals, exercise regimes, diets, and broader fitness discourses work as an “increasingly important tool for shaping the body into a narrowly defined, singular feminine ideal” (Markula & Kennedy, 2011, p.2; Duncan, 1994; Dworkin & Wachs, 2009; Markula, 2006c). Scholars have shown how this “singular feminine ideal” is neither universal nor static, shifting across time, space, race, age, culture, and more. However, within many Western cultures, the mainstream idealised female body continues to be one that emphasises fitness and athleticism, described by Markula (1995) as “firm but shapely, fit but sexy, strong

but thin” (p. 424). In the 21st century, some scholars and popular press have described the ideal female body one that has a small, toned waist (emphasis on strength and thinness), but a larger backside and wide hips (Appleford, 2016; Bamed & O’Doherty, 2019). It is often credited to celebrities like Kim Kardashian and Jennifer Lopez (this will be explained and explored more in the “Intra-action #2: ‘Booty’ Support” section of this chapter).

Critical analyses of athleisure have acknowledged its role in the construction of the feminine ideal highlighting how athleisure has become “a visual image of fashionable female modernity” that works to intensify the “symbolic value of an active body” (Horton et al., 2016, p. 191). Contributing to this, scholars have explored the neoliberal, postfeminist, and healthism discourses presented in companies’ advertising that often targets women emphasising ideas around body-transformation, self-help, and empowerment through diet and exercise (Brice & Thorpe, 2021a; Horton et al., 2016; Lavrence & Lozanski, 2014; Lipson et al., 2020; Nash, 2016). Much of this research focuses on how activewear discourses reinforce normative femininity often using images of thin, young, White women. While athleisure contributes to the construction of idealised female bodies, it also affects women beyond simply representing fit bodies or feminine traits. It plays an active role in women’s experiences of fitness as fabric, sweat, bodies, fat, and flesh become entangled when a woman is moving.

In Barad’s theory of agential realism, there is an emphasis on the ways in which *both* the material and discursive play a role in the creation of phenomena and how the two are intertwined and inseparable. This chapter uses Barad’s concept of intra-action to think about the material-discursive nature of the activewear phenomenon looking at the important role of athleisure (and its entanglements) in the construction of fit femininity and women’s feelings about their bodies. This is accomplished by focusing on three bodily aspects of the fit ideal:

(1) the flat stomach and lack of the dreaded “muffin top”; (2) the sculpted “booty”²⁸; and (3) the sweat-free body. I have chosen these three features as they were discussed throughout many of the interviews with participants. During the interviews, some of the women described using activewear as a form of shapewear, particularly helping them avoid a “muffin top” and to give them the appearance of a firm, toned, and shapely “booty.” Barad’s intra-action provides a way to explore in more depth these aspects of fit femininity. In line with a diffractive methodology, this chapter does not rely solely on one source of “data” but reads different data through each other and therefore, uses participant interviews and photo diaries in conjunction with examples from advertising and promotional materials from the activewear industry. The chapter begins with a brief description of Barad’s concept of intra-action which is then followed by the three examples of intra-action within activewear. This leads to a discussion of a Baradian understanding of agency within the activewear phenomenon.

Defining Intra-action

One of the most defining features of Barad’s agential realism is their concept of intra-action (briefly discussed in Chapters One and Two). Intra-action is based upon the fundamental belief that entities, things, humans are not autonomous objects but rather emerge through their relations. Although it may seem similar to the notion of interacting, Barad makes it clear that an intra-action differs from colloquial understandings of interaction. An interaction is where two separate entities interact with each other, yet they maintain their autonomy. An intra-action, however, is about the “utter inseparability of entities” (Barad, 2001, p. 99) where objects become inseparable and the previously erected boundaries between them are undone.

²⁸ The terms “muffin top” and “booty” are explained in greater depth later in the chapter.

Intra-action is the justification for Barad's emphasis on the material-discursive. They argue that we cannot examine language or discourse alone because the material is always present and intra-acting. As they explain, "discourse and material phenomena do not stand in a relationship of externality to one another; rather the material and the discursive are mutually implicated in the dynamics of intra-activity" (Barad, 2007, p. 149). Through this mutual implication, they argue that we cannot privilege one more than the other, and instead must focus on the "conjoined material-discursive nature of constraints, conditions, and practices" (Barad, 2007, p. 152). Therefore, according to Barad, approaches that only focus on the discursive are not adequately accounting for the materiality of those discourses and are incomplete. From this perspective, the scholarship on the fit ideal and construction of women's bodies could benefit from a deeper exploration into the material-discursive nature of this phenomenon. The remainder of this chapter discusses material-discursive intra-actions in the athleisure phenomenon that produce a narrow version of an acceptable female body in mainstream Western society.

Intra-actions within the Activewear Phenomenon

Feminist scholars have shown the powerful effects that the discursively constructed "singular feminine ideal" can have on a woman's exercising and health practices, with embodied responses ranging from a fear of bulking up (Bolin, 2003; Dworkin, 2003), to disordered eating practices (Krane et al., 2001), to low body self-esteem and confidence (Furnham et al., 2002; Koyuncu et al., 2010). Important to note is that while men are also subject to socially (and materially) constructed corporeal ideals and standards, it is more often women's bodies that are scrutinised for failing to meet these expectations (Kennedy & Markula, 2011). Here, I build upon this literature to explore the agentic role matter has within women's experiences and broader discursive constructions of women's bodies looking at the "muffin top," "booty," and sweat.

Intra-action #1: “Muffin Tops,’ Bulges, and Rolls...Oh my!”

There are varying histories of the origin of the term “muffin top,” but many have suggested that it can be dated back to the 2000s as a result of the increased popularity of hip-hugging, low rise jeans (Freundlich, 2009; Tashjian, 2018). A “muffin top” has been defined as “A roll of fat visible above the top of a pair of women’s tight-fitting low-waisted trousers” (“Muffin top,” 2011, n.p.). However, the “muffin top” is not simply a roll of fat, but is created through both fabric and skin where the waistbands of tight fitting pants cut into women’s flesh, pushing skin up to places it does not “naturally reside.” There is an intra-action occurring that gives rise to the phenomenon, yet in popular press this intra-action is ignored, and rather the “muffin top” is used as another way to critique women’s²⁹ fleshy, unruly, undisciplined bodies. A journalist writing for *The Guardian* summarises this critique as follows: “Terms such as ‘muffin top’ and so on suggest not only that these body parts are barely part of a human being, but that they are there purely to be scrutinised and mocked by onlookers. ‘Muffin top! Funny name – hilarious body part! Hahahahaha!’”(Freeman, 2013, para 4). This idea of “barely part of a human being” is seen across history where fatness has been used to differentiate the “civilised” (Farrell, 2011; Lupton, 2018).

Within many Western countries, fatness has historically been associated with “undesirable characteristics such as passivity, weakness, dependence and unattractive bodies” (Mansfield, 2011a, p. 97). In her work on fatness and shame, Farrell (2011) describes how this negative view of fatness can be traced back to the 1880s where slimming diets became more popular and the first liposuction was performed as a means to obtain a more “desirable” thinner figure. The anti-fat movement gained much traction in the 1920s when advertisements and magazines began to “tap into and exacerbate fat denigration” by “including countless ads for diet products and numerous cartoons lampooning fat people” (p.

²⁹ While the term does sometimes apply to men, “muffin top” is primarily used to scrutinise women’s bodies

3). Even during the women's rights movement in the United States throughout the 19th century, fatness was often used to insult suffragists and anti-suffragists alike. Suffragists often depicted anti-Suffragist women as "fat, inferior, and resistant to progress" (Farrell, 2011, p. 83), while the same tactic was used by anti-suffragists who would use propaganda that framed suffragists as "unsexed, fat women's advocate(s)" (p. 88). Both sides would use fatness to insult and de-feminise the other and "exacerbate the narrative of the [female] 'civilised body' as a thin body" (p. 112). Civility became linked with a thin body whereas fatness often became associated with gluttony, immorality, and the lower socioeconomic class.

Fatness has also been connected to race and class, where the slim (White) body has been idealised and constructed as the most civilised, while "Other bodies are contrasted against this ideal, and often found lacking" (Lupton, 2018, pp. 47-48; Azzarito, 2009; Herndon, 2005). Lupton (2018) describes how in 19th century America, "a predisposition to fatness was viewed as part of the inherited traits of the 'lower classes' ... positioned as 'inferior' and 'primitive' compared to the 'superior' and 'civilised' middle-class and upper-class White Americans" (p. 42). Therefore, within many societies fatness and the appearance of fat bodies (bulges, rolls) are stigmatised, "culturally repellent" (Lupton, 2018, p. 3), something to be avoided for fear of the negative association between fatness and incivility. In contemporary Western societies, fat has been perceived as "indicative of laziness, lack of discipline, unwillingness to conform, and absence of all those managerial abilities that, according to the dominant ideology, confer upward mobility" (Bordo, 1993, p. 195).

In particular, it is more often women's (fat) bodies than men's bodies that are scrutinised for failing to meet social standards and are expected to use fitness and diet to discipline their bodies to ensure "upward mobility." This is seen within the fitness industry where "larger" women's bodies are often shamed and gossiped about "on the basis of their so

called ‘flabby’ or ‘wobbly’ bodies and their assumed physical inability” (Harjunen, 2019; Harman & Burrows, 2019; Mansfield, 2011 a, p. 94; McGannon et al., 2011; Rich & Mansfield, 2019; Scott-Dixon, 2008; Willis & Knobloch-Westerwick, 2014). Women’s value and femininity become tied to a particular construction of the female body that values leanness, a body void of the “muffin top,” rolls or bulges. In her highly personal account of her experiences as a large woman, Murray (2005) describes how “Every time society reads my fat body, it lets me know that I am defective. Society ‘knows’ my body, as a site of undisciplined flesh and unmanaged desires” (p. 265). There is an all too common social requirement in which women’s bodies are expected to be lean, toned, and free of excess flesh. Against such norms, the “muffin top” has been associated with the lower classes and “resistant to cultural norms” of idealised femininity (Bordo, 1993, p.203).

Poststructuralist analysis of the “muffin top” and fatness would (and do) primarily view it as a discursive construction, its negative associations created through language and symbolism. However, a new materialist inspired analysis encourages scholars to examine *both* the material and discursive and how the two are entangled and work together to produce certain understandings, meanings, and phenomena. Here, I bring together the material and discursive to explore the agentic qualities of activewear and intra-actions between flesh, fabric, and discourse.

Activewear Industry: High-Waisted Leggings to the Rescue

Recently, high-waisted leggings—characterised by a larger waistband designed to rise and sit above a woman’s hips—have become a staple and featured piece within almost all athleisure brands. One of the defining features of high-waisted leggings is their ability to sit high enough on the body to prevent women from having a “muffin top.” There are numerous articles and blog posts instructing women on “the best yoga pants for avoiding a muffin top” (Carrington, n.d.) and which pants offer a flattening, smooth-appearing mid-section (Canning

& Belfiore, 2021). Part of high-waisted leggings' popularity has been this ability to prevent the "muffin top" as fashion consultant, Devina Foley, summarises saying, "everyone realised they sucked everything in at all the right places... they're just more flattering and more functional on more people" (Brunch, 2017, paras 2-3).

High-waisted leggings have been developed using compression style fabric and constructed (the waist band itself) in a way that works to hold the body in "for optimal support and flattering fit" (UnderAmour, 2020). Although compression fabric has been associated with an ability to aid in recovery and performance (Cox, 2017; Trott, 2018), in high-waisted leggings' descriptions, compression fabric is not only promoted for its functional capabilities, but also its ability to create a flattering fit on the female body. Table Three has examples of the descriptions of different high-waisted leggings from some of the most popular larger activewear chains, such as Reebok, Champion, and Under Armour. In each description, there is an emphasis on the ways the high-waisted fabric "supports" the body by sucking in fat and flesh to produce a flat looking midsection, preventing a "muffin top" from occurring (bolded and italicised in Table Three). Thus, fabric is developed with an intent to prevent the "muffin top." The negative discourses surrounding fatness, rolls, and femininity intra-act with the material of high-waisted leggings to villainise the "muffin top."

Table 3: Examples of High-Waisted Leggings’ Descriptions from Companies’ Websites

<i>Brand/Leggings</i>	<i>Legging’s Description</i>
Reebok’s Lux High-Rise tights	<ul style="list-style-type: none"> • Speedwick technology wicks sweat away from the body to help you stay cool and dry • Best for training and everyday wear • Antimicrobial lined gusset prevents odour build-up • Flat locking stitching sits flat against the skin and prevents chafing • <i>High rise construction offers support and a flattering fit</i>
Champion’s Infinity High Rise Tights	<ul style="list-style-type: none"> • Arm up your training with seamless Infinity Tights that let you move freely without distractions. • <i>On trend high-rise waist keeps your look sleek with crop tops and sports bras.</i> • Doubly Dry technology wicks sweat for cooler, drier comfort. • On trend, ankle skimming 7/8 length.
Under Armour’s ColdGear Doubleknit Hi-Rise leggings	<ul style="list-style-type: none"> • Compression: Ultra-tight, second-skin fit for a locked-in feel. • Lightweight knit ColdGear® fabric is breathable and stretches for superior mobility but is still incredibly warm • Material wicks sweat and dries really fast • 4-way stretch construction moves better in every direction • <i>Shaped, high-rise waistband for optimal support and a flattering fit</i>

Along with fabric development, activewear companies primarily use models with flat stomachs, even when using “plus-size” models, to advertise their clothing. Increasingly, activewear brands are featuring “plus-size” models which was a strong attraction for many of my participants. For example, Brenda (32 years old, Māori, recreational sports) described how she purchased AIM’N leggings primarily because she “loves the fact that they actually use real women.” Similarly, companies such as Fabletics, Gymshark, and retail stores, such as Kmart, have begun to use “plus-size” models outside of the specific “plus-size” lines (see Figure 10).

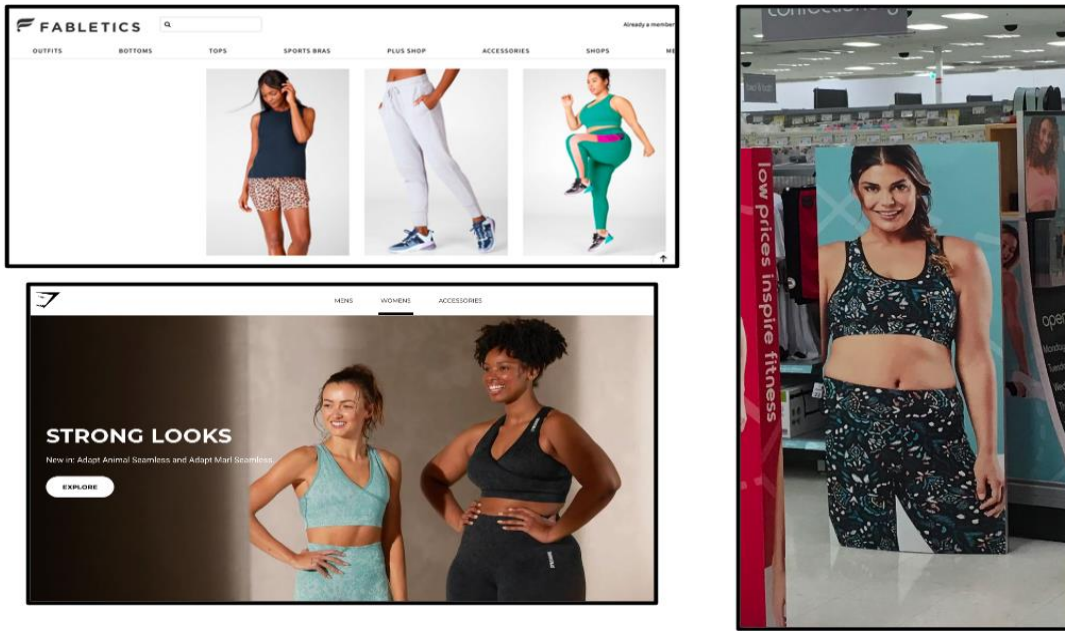


Figure 10: Examples of “plus-size” models. Screenshots from Fabletics (Top) and Gymshark websites (Bottom). Author photo at Kmart, Kirikiriroa Hamilton, 2018 (Right)

Although these companies are using “plus-size” models, these models’ bodies still, to an extent, conform to the traditional fit ideal. The bodies are bigger, but their bodies are still void of flab, fat rolls, or the “muffin top.” When discussing the bodies that wear activewear and who she sees in advertising, one of my participants, Lily (29 years old, Australian, yoga/aerobics) described how although she thinks advertising is more diverse (in terms of ethnicity and body size) than previously, there is “a little bit of deception.” She continued, “the whole concept of having a flat stomach is an important one” where “plus-size” models still conform to the “really hour glass looking [shape]—big hips and big boobs and being really sexy.” Activewear companies continue to privilege bodies that align with mainstream conceptions of fit femininity (lean, toned bodies) and have developed clothing to allow women to be shaped into this figure.

One notable company that is an exception to this trend is Hine Collection. Owned and operated by Miria Flavell, a Māori woman in Te Ika-a-Māui North Island of Aotearoa New Zealand, Hine Collection launched in 2018 with a mission statement and aim to “represent all

women through our brand. To also motivate as many women to feel confident in their own skin.” They have used a variety of different shaped and size models (see Figure 11), in addition to Black Fern Sevens player, Stacy Fluhler (Waaka), as a brand ambassador.



Figure 11: Main image from Hine’s website (June 2020)

Hine Collection is an anomaly amongst activewear brands for its use of models not only of different sizes, but different shapes that show rolls, cellulite, and fat (although it does use traditionally feminine, beautiful cisgender women). However, in general, activewear companies use flat-stomached models, emphasising and advertising high-waisted leggings as a means for preventing the “muffin top.” During interviews and focus groups with participants, without specifically prompting, many of the women alluded to their preference for high-waisted leggings and their effects on their body. It is these “effects” and relationship between high-waisted leggings and women’s bodies that I turn to now.

Avoiding the “Muffin Top,” Hiding the Rolls

In discussions with participants, many women described strategies used to actively prevent the appearance of the “muffin top.” One tactic was for women to avoid wearing “muffin top-creating” pants all together. For example, Katherine (31 years old, Irish, group fitness instructor) described how she is particular about leggings, only buying high-waisted pants

that “hold me in around my belly,” and consciously avoiding “anything that is below the belly and too tight.” For Katherine, the fear of the latter was the dreaded “muffin top look” produced through the intra-action of tight pants and fleshy “overflow.” Similarly, Winona (31 years old, Pākehā, aerobics) described her favourite pair of leggings as “like a second skin... They have a nice band that holds the ‘muffin top’ in.” For Winona, her favourite pair of pants created a more flattering shape, preventing a “muffin top” and producing the appearance of a flatter stomach. This corporeal intra-action—the elastic band of the pants cutting into flesh in the creation of the “muffin top”—becomes entangled with negative discourses and effects around the “muffin top,” fatness, and class resulting in particular actions: only buying and wearing certain clothing. The “muffin top” itself (roll of fat) does not have meaning without the discourses around fatness and femininity. Yet, language and discourses of the “muffin top” do not have meaning without the presence of the materiality of the fleshy “muffin top” on women’s bodies. Hence, the “muffin top” is a phenomenon produced through the inseparability of the material *and* discursive.

Another participant, Hannah (50 years old, Pākehā, aerobics/cycling), discussed two strategies she uses for avoiding the “muffin top.” Similar to Winona and Katherine, at times, she would not wear clothing that produced a “muffin top.” She recalled a time when she told herself “Oh I shouldn’t be wearing this top with these pants” which was because “it was all tight, tight, tight and I felt there was a bit of a roll that you could see in the middle so I’m a bit careful with that.” Interestingly, in discussions with Hannah, she did not mention rolls or bulges of her corporeal body in itself, but it was the roll “which gets pushed up a little over the waistband” that frustrated her. She said, “If you can see it [“muffin top”], I would either avoid those pants or wear a looser top to cover it.” During the interview Hannah also described how she did not like seeing fat rolls or “muffin tops” on other women. When describing “bigger” bodies at the gym, Hannah applauded women for exercising but also

went on to say, “girls wearing casual clothes and everything is hanging out, I think they’re asking to be judged basically. Why are they doing that? That’s any size really.” Again, it is not the body itself, but the rolls created through the fabric-body intra-actions. Hannah followed up her previous statement saying, “I think it’s what they wear and how they wear it.” The tightness from the clothing and the way it intra-acts with flesh results in “everything hanging out” and becomes entangled with discourses about appropriate femininity and the (un)disciplined body.

Another strategy Hannah and some of my participants (all over the age of 40) adopted if they felt at risk of exposing this bodily taboo—the “muffin top”— was to hide their bodies with bigger clothing. Vivian (40 years old, Italian, running) discussed how athleisure increased her bodily awareness and at times, resulted in feelings of discomfort:

I am more aware of my body and where the weaknesses are. I can see them [flaws] more than in normal pants. It shows my imperfections... When I put on activewear, I usually try to hide the inside of my tights, and yeah my bottom and my belly because I gained weight during the years. I’ve got fat... I can see myself in the mirror [and] I can see the rolls. I don’t like them, so I try to hide them. I don’t think people like to look at them either.

Despite the comfort and functionality of the clothing, the tightness of athleisure and the ways in which it intra-acted with Vivian’s body prompted “ugly feelings” (negative feelings resulting from a gendered neoliberal context³⁰) (Coffey, 2020). In her analysis of women’s experiences of “ugly feelings,” Coffey (2020) uses a new materialist inspired framework to examine the affective tendencies of these “ugly feelings” and “what do they do?” (p. 7). She discusses how these “ugly feelings” experienced by her participants “got under the skin” causing her participants to take action (dieting, exercise). These “ugly feelings” are “highly

³⁰ According to Coffey (2020), a gendered neoliberal context refers to the contemporary moment in which it is “‘mainly women who are called on to transform themselves’ (Elias, Gill & Scharff, 2017) because of the importance of the body’s appearance as the key locus of value in ideal feminine subjectivities” (p. 1). In this context, women’s physical appearance becomes valued over previous idealised feminine capacities, such as motherhood and/or caring.

productive in meeting the demands of a gendered neoliberalism by encouraging heightened awareness and responsibility in maintaining an ideally feminine bodily appearance” (p. 11).

In my research, the “muffin top”—the intra-action of fat, flesh and fabric that produced a roll— was “highly productive” resulting in participants feeling upset with their bodies or covering them up. Importantly, these feelings are not simply the result of social media or magazines or from humans alone, as suggested by many feminist scholars adopting critical media analysis and poststructural analysis. Rather, these negative affective relations are created by the materiality of the clothing intra-acting with the flesh that is always entangled in discursive constructions of femininity, health, beauty, and success. As Vivian said, when she wore activewear she became more aware of her body, she felt the tightness of the clothing intra-acting with her flesh which did not align with her views on acceptable women’s bodies. Therefore, she tried to hide her body, feeling embarrassed by the rolls. Interestingly, it is the body created by athleisure, and the ways the fabric holds, presses, and shapes flesh, that spurs some women to take action and cover their body.

Feeling Fit

While for some women athleisure-body intra-actions created negative feelings, for others, the flatter stomach produced through high-waisted leggings resulted in feelings of confidence and pride in their fit bodies. For example, Lana (36 years old, Pākehā, aerobics/weightlifting) described “good” leggings as “firm, in control, fitted and slim.” She went on to say, “if they hold everything in and come up high enough, I feel quite slim and I do feel firmer, like cause I guess they are tight and compressed a bit.” She later went on to describe her favourite pair of high rise pants: “These ones here do actually go higher and so it kinda sometimes make you feel flatter cause they’re not cutting in when you’re sitting or doing any movements. You’re not rolling over the top of them.” Lana is referring to the lack of “muffin top” and how the clothing physically shapes her body to prevent the “muffin top” and flatten her

stomach. This intra-action (clothing, fat, fabric) was agentic and made her feel “flatter,” “fitter” and better about her body. Tara (44 years old, Pākehā, aerobics/cycling) echoed such sentiments, describing feeling healthier and fitter when wearing athleisure: “I think it [athleisure] helps, especially the compression stuff will hold you in more... you feel more fit.”

Various feminist scholars have emphasised that within many Western societies, firm, solid bodies are prioritised over soft, viscous, fluid ones (Grosz, 1994; Irigaray, 1985; Longhurst, 2001a, 2005). They describe how it is men’s bodies that are often coded as firm while women’s bodies are coded as soft and fluid (Longhurst, 2001a). Therefore, it is primarily women who are called upon to control their soft, bouncing bodies. Here, the participants used the high-waisted leggings as a means to discipline their “muffin top,” to hold in the fat, and produce a firm, solid midsection. In these examples, agency arises from the intra-actions between material, skin, flesh, fit femininity, body ideals: these athleisure-body-discourse intra-actions *do* something. The lack of the “muffin top” and the sucking in of the stomach resulted in participants feeling better about their bodies, feeling fit, and confident. Of course, such “feelings” are reproducing of dominant discursive constructions of the “fit feminine ideal” as thin and toned. However, these “discursive constructions” are not produced by discourse alone, activewear and nonhuman matter play a role. The leggings pushed and dispersed fat away from the midsection to create a leaner looking stomach which had considerable effects on how women felt, as well as reinforcing discourses of the idealised female form as toned and fat-free.

On one level, it can simply be seen that women wear clothing that they believe is more flattering and in line with particular discursive understandings of the female body. However, a Baradian approach encourages us to not privilege the discursive, but to explore material-discursive intra-actions. As fabric and the body come together and fat and skin are

pushed, a flat stomach is created. Through this intra-action, agency emerges; it causes some women to feel confident when their bodies resemble an idealised thin, firm body while others feel fear, shame, and even disgust when the “muffin top” appears. Such affective responses to seeing and feeling their own bodies as “excess” prompt some women to avoid such clothing, with others seeking out items that work to contain the unruly body. So even when athleisure might offer some women opportunities to feel good about their moving bodies, ultimately the material-discursive intra-actions work to make some bodies more visible (and desirable) than others. In Baradian theory, there is a need to recognise how “matter is thoroughly co-implicated in entangled relations that produce phenomena” (Fullagar, 2020a, p. 177). When thinking about the construction of the fit feminine ideal and the fear of the “muffin top” and other fleshy bumps and bulges, there must be an acknowledgement of how athleisure and the body intra-act, and the unanticipated agency of everyday material-discursive intra-actions.

Intra-action #2: “Booty Support”

Although mainstream Western culture has tended to favour a thin, toned (often White) body, various other cultures have idealised different female bodies. In a study about body dissatisfaction amongst White and Black women, Overstreet et al. (2010) shows how White women participants idealised a body that was slender, whereas Black women participants preferred a curvier woman with a large bottom. As various scholars have suggested, for many African American and Latina women, a bigger backside is often celebrated and idealised (Barrera, 2013; Celio et al., 2002; Gentles-Peart, 2020; Guzman & Valdivia, 2004). In Bailey’s (2008) commentary of a Nike advertisement that featured a curvaceous Black woman in shorts, he describes how many African Americans appreciated the advertisement and that in “the African American community, a butt like that is considered the epitome of feminine beauty” (p. 2). Similarly, a Black female participant in Capodilipo and Kim’s (2014) research on Black women’s bodies in the United States said, “You want curves, hips

and a butt. It's not what mainstream society thinks is ideal, but it's what our men like" (p. 43).

Similarly, in her analysis of popular culture's obsession with Jennifer Lopez's backside, Barrera (2013) critiques how although White feminists often universalise ideal bodies based on White standards, "in Latino communities—especially Caribbean ones—butts are 'huge,' in terms of size and popularity" (p. 409). Interesting to note, research on Pacific nations' ideal female body shows an emphasis on bigger bodies, but not the backside itself (Ngamanu, 2006; Schaff, 2005; Swami et al., 2007). Ngamanu (2006) describes that in Aotearoa New Zealand, Māori culture has traditionally been "more tolerant of obesity" (p. 17), preferring a fuller and heavier female body shape than Pākehā culture. However, both in Ngamanu's (2006) research and Schaff's (2005) work around Pasifika women and body image, scholars cite the impact of Western body image ideals on Māori and Pasifika women. They describe how many Pasifika women's ideas about their bodies (and ideal image) have shifted in response to the increase in Western imagery of thin models.

While a larger backside is appreciated in many African American and Latina cultures, scholars have illustrated how within mainstream (White-produced) media, both African American and Latina women's backsides have been racialised, sexualised, and discriminated against (Guzman & Valdivia, 2004; Hill Collins, 2004; Parasecoli, 2007). Drawing upon a range of historians, Parasecoli (2007) writes that historically "White men, feeling both desire and repulsion, often perceived Black female sexuality as dangerous and consuming, almost cannibalistic, as opposed to the White female body, which is normalised and subsumed in patriarchal order" (p. 114). She goes on to focus on Black women's backsides describing how "if the behind was considered excessive, at the same time it exerted a deep attraction as a symbol of hypersexuality which made it dangerous and obscene" (p. 114). This contradiction—fascination and repulsion—of Black women's backsides summarises how

mainstream media has portrayed many Black and Latina women. In an analysis of Latina women in the United States, Guzman and Valdivia (2004) describe how representations of African and Latina women are “predominantly characterised by an emphasis on the breasts, hips, and buttocks. These body parts function as mixed signifiers of sexual desire and fertility as well as bodily waste and racial contamination” (p. 212). Similarly in the colonialist histories of Aotearoa New Zealand and some Polynesian cultures, Indigenous women’s (and men’s) bodies were simultaneously sexualised and seen as “ignoble, savage heathens” (Keown, 2005, p. 2). According to legendary Black feminist scholar Patricia Hill Collins (2004), the overt emphasis on non-European women’s backsides continues to serve as “a sign of racial difference” (p. 28).

Activewear and the Sculpted “Booty”

Recently, within mainstream media the bigger backside (known as the “booty” in popular culture) has increasingly been embraced and glorified as part of the fit ideal. A 2015 BuzzFeed video showing beauty trends over time, described the current idealised version of beauty as a woman who has a “flat stomach, is ‘healthy,’ skinny, has large breasts and butt, thigh gap” (BuzzFeed, 2015) with magazines often highlighting the body of celebrity, Kim Kardashian, as the epitome of the female “hot” body. In her research on British Black women’s body ideals and motivation to exercise and diet, Appleford (2016) underscores how powerful Kim Kardashian has been in influencing many women’s perceptions of the ideal body. Today, the ideal figure is one that “recognises and celebrates full hips and a big bottom but places heavy emphasis on having a very slender waist, offering a middle ground between Black and White ideals” (p. 208). Within these ideals is an appreciation for the bigger backside (i.e., “the booty”) yet this glorification fails to acknowledge the sexualised and racialised history of non-White bodies (for more, see Romero 2017). Instead, the “booty” becomes an ideal for women of varying ethnicities and nationalities. In this thesis’ individual

interviews with participants of different ethnicities and cultures, the women often spoke of wanting a “booty” (see below). Importantly, although origins of the “booty” are from African American and Latina cultures and have been misappropriated by American mainstream media, this ideal has had global reach transcending country borders and infiltrating popular culture within Aotearoa New Zealand.

Within the athleisure and fitness industry, the “booty” has been co-opted and transformed by Western commodity culture with little, if any, consideration for the distinctive cultural contexts from which the phenomenon of the “big booty” has emerged. As Gentles-Peart (2020) describes, “the prominence of the ‘Black butt’ in White American [and Western] popular culture functions to deepen the dehumanization of Black women by taking what is desired from Black women’s bodies, but eliminating Black female bodies altogether” (p. 310). In the context of the fitness and athleisure industry, the “booty” is viewed through a neoliberal “body as project” lens where the “booty” can be created via exercise and nutrition. Particularly evident in North American fitness magazines and social media, there is an abundance of articles and videos instructing women on exercises to help achieve the idealised “booty”: one that is tight, toned, curvaceous, and free of cellulite. Within Aotearoa New Zealand and Australia, there has also recently been an increase in discourse focused on the “booty.” For example, in the past five years, *Women’s Fitness Australia* has published a range of articles instructing women how to sculpt their backside, with titles that read: “Ready to firm up that peach” (2017), “This Barre workout will sculpt your booty” (2017), and “This booty workout doesn’t involve squats” (2016). Despite the glorification of this new feminine ideal, it is another unrealistic ideal being placed on women. This idolised “booty” is not one that is natural, but created through exercise and appears toned, smooth, and free of cellulite yet over 85% of the female population over the age of 20 have cellulite mainly located in the legs (Rawlings, 2006).

Recognising the growing demand for this trained and constructed “booty,” athleisure companies have increasingly taken to designing material and clothing that will work to give an illusion of a cellulite-free, sculpted “booty.” From high-end companies such as Lorna Jane, to cheaper international sites such as Wish, leggings³¹ are described as “butt sculpting,” “cellulite hiding,” and offering a “flattering fit” (see Figure 12). In Figure 12 there are images from Sweaty Betty, Lorna Jane, Lift and Light-in-the Box’s websites that each emphasise the sculpting power of their leggings. In the description of Lift Leggings’ cellulite-hiding pants, they wax lyrical about the unique properties of the material and design: “The Honeycomb Bubble Textured Fabric will hide any flaws, as it is specifically designed to deceive any skin imperfections. Curved seams are designed to enhanced shape and support” (“Booty lifting,” 2020).

³¹ Some of these leggings are also high-waisted, but not all “booty sculpting leggings” necessarily have a thick/high waistband.

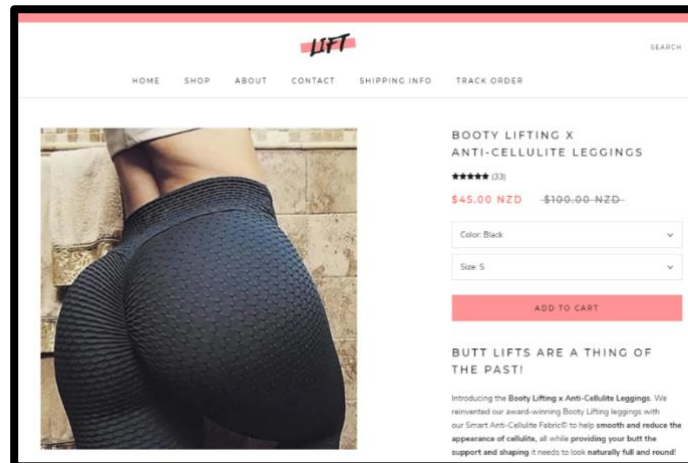
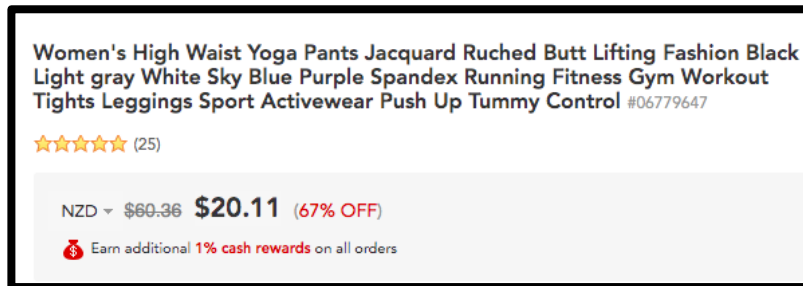
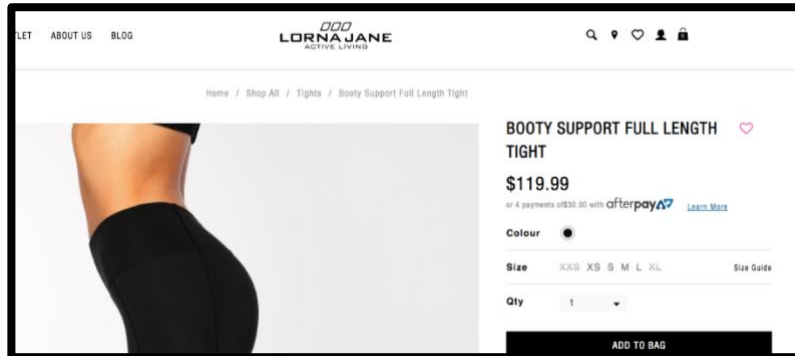
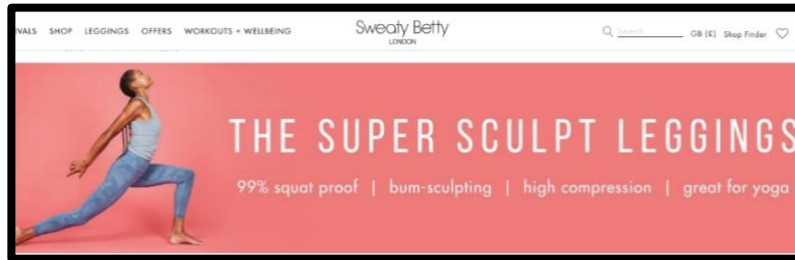


Figure 12: Examples of “booty sculpting” leggings. Top to bottom: Sweaty Betty, Lorna Jane, LightInTheBox, and Lift

Two years into this research, there was a pair of leggings³² that went viral on the social media app, TikTok (Penn et al., 2021). The leggings were then commonly referred to as the “TikTok Leggings” described as “leggings that make your butt look amazing” (Stressman, 2021) (see Figure 13). The leggings are similar to other popular leggings in that they feature a high-waist and use a honeycomb fabric. However, the defining feature is a scrunched seam that runs down the centre of the woman’s backside which accentuates the round shape of the backside (see images below from Penn et al., 2021, where three authors tried the Viral TikTok leggings).



Figure 13: Examples of viral TikTok leggings

³² This trend and style of leggings became popular after I conducted interviews with participants and near the end of writing this thesis. While I did not wear the leggings myself, from my observations at fitness centres around Kirikiriroa Hamilton, these types of pants (seams down the middle) were becoming increasingly popular.

The clothing itself—the fabric texture, seams, material, and shape—are designed to intra-act with a woman’s backside to create a “perfect” cellulite-free curvaceous “booty.” In touting the possibilities of obtaining the “booty” via simple consumption practices, the athleisure industry joins a long history of companies capitalising on Black and Brown cultures and bodies for profit. As one participant in Capodilupo and Kim’s (2014) study (described above) said, “they’re taking our body characteristics and using them to market magazines, but no Black models are being used who are born with the thick lips and the big butts and the big breasts...it’s like they’re taking our stuff, what makes us beautiful and unique, and they’re not acknowledging us” (p. 45). Particular agential cuts are created within the activewear phenomenon and fitness industry/advertising around the “booty” which serve to make some (White, toned) bodies more visible than others (Black, bigger bodies). Herein we see material-discursive forces playing an integral role in the (mis)appropriation and (dis)appearance of the cultural history of “booty.”

Leggings in Action: Athleisure and the “Booty”

When speaking with my participants about their leggings, many described the ways in which athleisure *does* something to the body, and particularly the “booty.” For example, Katherine described her favourite pair of leggings as “hug[ging] all the right places.” Similarly, in her photo diary, Caroline (31 years old, Māori/Pākehā, amateur boxing) explained why she chose to wear a pair of purple leggings during a training session: “I was feeling pretty good and felt the need to appreciate my curves (which is what these tights do)” (see Figure 14).

Interestingly, in the language used, both Caroline and Katherine describe their pants in an agentic manner—hugging, appreciating, accentuating, *doing*. In such comments, we see that women are not simply wearing athleisure leggings for the purposes of fashion or functionality, but instead these items of clothing are intra-acting with the body to *do*, to emphasise, and to create the allusion of the ideal “booty.”



These purple nike tights I hadn't worn in yonks! But I like to wear them with this nike black bra and usually a singlet over top but tonight I was feeling pretty good and felt the need to appreciate my curves (which is what these tights do) plus my abs were slightly popping lol.



Figure 14: Examples of Caroline’s (right) and Katherine’s (left) photo diaries

Other participants also discussed the powerful way clothing affects their body and the agency that arises from the body-clothing intra-action. For example, Dana (34 years old, Iranian, group fitness instructor) talked about the way her body position changed when she was wearing athleisure. Admitting that she liked to look at her body in the mirror for a specific shape, Dana explained: “My body... the shape... I really like to see that shape in the mirror [curvy, hourglass-drawn on paper]. I like to see those curves.” This could be read as the impact of powerful media messaging (e.g., social media, mainstream media, advertising), but she continued to describe how athleisure actually helped her to achieve this shape with the tightness of the clothing “sucking you in.” Dana added: “The tighter the better! I don’t know, it squeezes more. That’s why I like it. It helps me... squeeze more or push my butt back a little, or lift my chest up.” She used this example photograph (see Figure 15) from her

photo diary to illustrate the shape she liked and the effect of the tightness of her activewear clothing.



Figure 15: Image from Dana’s photo diary on October 18, 2018.

Again, athleisure becomes something “more than mere matter,” it becomes active, intra-acting with the body and discourses around the “booty.” In this example of the “booty” as an intra-action of material and flesh, we come to understand “the object [athleisure in this context] as part of a relationship whereby through ‘mere’ intra-action with a body, they become different” (Baxter, 2020, p. 157). As athleisure is worn on the body, it intra-acts with the muscles, skin, and fat of the backside to produce a lift, to hug the curves, to squeeze the body. Through this, the body and athleisure transform, creating new shapes and new corporeal forms that align with and work to produce the sculpted, constructed, idealised “booty.” Not dissimilar from the “muffin top,” the promises offered by athleisure companies for clothing that produces the “booty” reinforce a largely unrealistic feminine ideal that many women then dedicate time, energy, and resources towards trying to achieve. In contrast to the “muffin top,” however, the “booty” within the athleisure phenomena is entangled in complex processes of cultural misappropriation for profit.

Intra-action #3: Sweat Free Fit Femininity

The high-waisted leggings that suck in belly fat and the “sculpting” leggings that work to produce the appearance of the toned booty do not exist in isolation, but rather are entangled to produce an idealised female body. However, this female body is not only shaped in particular ways, but is one that is carefully controlled, preventing leakiness and excessive sweating. As alluded to above, feminist scholars have written about the ways in which women’s bodies have been socially coded and perceived as “fluid, leaky, swampy, soft compared with the hard, defined, contained bodies of men” (Grosz, 1994; Irigaray, 1985; Longhurst, 2005; Shildrick, 1997; Twigg, 2004, p. 68). Longhurst (2001a) elaborates how women are often seen as “in possession of insecure (leaking, seeping) bodily boundaries... It is commonly thought that such bodies are not to be trusted in public spaces” (p. 2). She later adds that in many Western cultures, “men’s body fluids have not been regarded as polluting and contaminating for women in the same way as women’s has been for them” (p. 32) (explored in greater depth in Chapter Seven). Within the fitness phenomenon, it is mainly women who are called upon to control their sweating bodies.

In Atkinson’s (2017) ethnographic research on the sensuality of sweat, he describes sweat as being radically contextual, being understood in both positive and negative ways within society depending on the situation. Within the fitness industry, sweat can be understood meritocratically as a visual indicator that a woman is working towards a “healthy, athletic and/or sexually attractive body” (Johnston & Longhurst, 2010; Waitt, 2014, p. 669). However, excessive sweat and sweat in the “wrong” places can also serve as a source of embarrassment for women and contrasts with socially respectable and acceptable fit femininity. In many cultures, feminine respectability “consists in conforming to norms that repress sexuality, bodily functions [i.e. visible sweat], and emotional expression” (Waitt, 2014; Waitt & Stanes, 2015, p. 136). Having a sweat free, non-smelly, “clean” and controlled

body becomes a key element of respectable femininity and moral cleanliness (Shove, 2003; Young, 1990). Classen et al. (1994) elaborate that in Western conventions, “while men are allowed to smell sweaty and unpleasant without losing any of their masculine identity, women who don’t smell sweet are traitors to the ideal of femininity and objects of disgust” (p. 164). This was seen in Waitt’s (2014) study on gender and sweat, where his female participants all described feeling repulsed by their own sweat. Many of the women felt that it was not acceptable for young women to sweat (or look sweaty) in public, with one participant saying that girls and women “think they should look clean and presentable” (p. 673). Therefore, fit femininity encompasses not only a particular idealised form, but the regulation of the “leaky,” sweaty, smelly female body.

Controlling Sweat: Activewear’s Sweat-Wicking Capabilities

The activewear industry contributes to this fear of sweat and the need to control the leaky body as part of fit femininity in various ways. It has become common for popular press articles and fitness blogs to recommend activewear that hides the sweat. In an article on popular fitness workout site, *POPSUGAR Fitness*, Mantz (2019) provides suggestions for the best sweat-proof leggings. Mantz (2019) begins the article writing, “sweat might be the sign of an effective workout, but that doesn’t mean you have to wear the proof on your leggings. Leaving the gym with a ring of sweat around your butt isn’t exactly a look we love” (para 1). Similarly, in an article for *Cosmopolitan*, Oerman and Duong (2021) open their post with, “light-coloured gym clothes are cute...until you end up with visibly damp butt cheeks” (para 1), before recommending five leggings that are “sweat-proof.” Along with popular press articles, activewear companies have developed, produced, and promoted new fabric that is designed to wick away the sweat. In Table Three (see above) —examples of different brands’ leggings’ descriptions—the companies each highlight the moisture-wicking and quick dry

capabilities of the clothing. Similarly, at the top of the website page for lululemon's tank tops, the description reads:

Lift and stretch and run without distraction in our latest tank tops for women. From fitted styles for when you're practising inversions to loose-fitting designs for when you want a little more room to breathe, we've got you covered whatever your sweaty pursuit. *Our lightweight tank tops are designed with anti-stink technology and quick-drying fabrics, so you can keep your mind focused on your workout, without ever having to think twice about your sweat.* See our latest tank tops for women (lululemon, 2020, emphasis added).

In this description of lululemon and in the clothing properties listed in Table Three, there is an acknowledgement that women will become sweaty during their workout, but a reassurance that it will be wicked away from both the body and the clothing. Here, the material and discursive come together and intra-act as discourses which position sweat as negative and embarrassing are materialised through the production of sweat-proof fabric. Lenz Taguchi (2012) describes how intra-active entities are "understood *not* to have clear or distinct boundaries from one another" (p. 271, emphasis in original). "Sweat-proof leggings" are not just material, nor are they purely discursive, but rather are an example of the intra-acting forces between the material and discursive that work to produce sweat-free fit femininity.

"Bum and Front Bum" Sweat

In Coen et al.'s (2020) visceral geography-new materialist inspired research on gender dichotomies and fitness spaces, the scholars look towards the ways in which materials and visceral domains—sweat, women's clothing, sounds—produce gender boundaries. Many participants in their study described pressure to maintain a certain feminine appearance at the gym including wearing tighter fitting clothing and preventing visible sweat, since as one of their participants said, "it's inappropriate [for women] to sweat" (p. 8). Coen et al. (2020) contrast this with expectations of men in which men's clothing is often loose and functional, their bodies "at times, literally spilled over with sweat (and deliberately with spit) into the gym, while women were expected to maintain firm bodily boundaries separating them from

the gym” (p. 9). In this way, Coen et. al. (2020) describe how clothing was/is used as a “mechanism to maintain gendered bodily boundaries, such as keeping sweat in or out” (p. 8). Within my research, it was when this mechanism (i.e. the clothing) failed, that women felt embarrassed and, at times, shame for failing to conform to “appropriate femininity.”

When discussing activewear choices, many of my participants discussed the important role sweat plays in what they wear. Some women did discuss the important functional aspect of moisture-wicking and quick dry materials as it allowed them to remain dry and more comfortable during the workout. However, many others discussed the need to hide sweat patches describing how they did not want to feel embarrassed when others could see the sweat on their clothing. Katherine described how she chose specific activewear tights for exercise and for lounging depending on how much sweat they show “around bum and your front bum.” She continued saying:

The reason I wear these [green lululemon pants] a lot during the day [as lounge pants, not for exercise] is because they show a big sweaty mark between your legs and around your bum [when exercising] and I wore them teaching [fitness class] one time and I had to tell the joke that you know “Sorry guys it looks like I wet myself but I swear I didn’t” and then never wore them again...it’s not a nice look.

While Katherine made a joke about her sweaty pants to cover her embarrassment, other participants describe feeling very self-conscious about sweaty activewear. Lana described how she likes fitted tops for working out because they are functional, but with them “you can see the sweat, even though that’s what you’re meant to do in activewear... If I feel like people can see it, then I’m more aware of it and if it’s hidden then they’re not going to be staring.” Lana recognised the irony that although activewear is designed for sweat and physical movement, there are limits imposed on “appropriate femininity” with the threat of the gaze—staring (or mocking) her sweat patches—regulating her clothing decisions. Winona did not feel as nervous about her top, but was “more self-conscious of the pant sweating.” She stated:

I don't really care about the top being all sweaty or showing sweat as much as the bottoms for the only reason of the formation of the sweat where it would go like in my crotch and buttercrack. It's probably a little bit extreme...a little embarrassing...you don't want to draw attention to it so much.

There was a fear of being embarrassed by the clothing, by the sweat, by the leaking body, by not conforming to feminine respectability.

In their work on young women's understandings of menstruation, Moffat and Pickering (2019) locate their participants' embarrassment around menstruation to Europe in the Middle Ages when "heightened self-awareness emerged in tandem with heightened self-discipline, leading to feelings of shame if bodily processes were not concealed from social view" (p. 767). In the 21st century, activewear (and the neoliberal ideological underpinnings of society) contribute to this heightened awareness and sense of discipline as clothing and materiality is created to control women's leaky bodies (see above and Chapter Seven). Importantly, this fear of sweat and the desire to appear sweat free is a result of the interactions between the material and the discursive, between the advertising of activewear, the material development, the sweaty body, and gendered expectations.

Final Thoughts

As alluded to earlier, many scholars have explored the ways in which the discourses of the ideal female body, self-transformation, and the "body as a project" within the fitness-health nexus (and broader society) have negatively impacted women in varying ways—self-esteem issues, extreme diet/exercise behaviours, and low body confidence (Dworkin, 2003; Koyuncu et al., 2010; Lodewyk & Sullivan, 2016; Markula, 2006c; Tiggemann & Zaccardo, 2016). These scholars have emphasised the power of discourses showing how even when women are aware of unrealistic body ideals, "they still want to tone their bodies and lose weight. By doing this they attempt to imitate the very same image that they have judged as degrading, unrealistic, and misleading" (Markula, 2003, p. 70). Similarly, many feminist scholars have

discussed their own complex relationships with their body and discourse (Bordo, 1993; Longhurst, 2012; Murray, 2005; Stinson, 2001). In an autobiographical piece describing her weight loss, feminist cultural geographer, Longhurst (2012) describes the contradictions and pressure she has felt “by being a feminist scholar who critiques discourse around women and slimness while at the same time desiring to be slim and embarking on a weight loss journey” (p. 872). This resonated greatly with me as someone who considers herself a strong feminist, yet has also always struggled with body anxiety and experienced a desire to conform to idealised female forms.

Scholars, interested in the complex relationship women have with their bodies, have analysed and written extensively about the impact of social discourses on these relationships. While discourse is important, Barad emphasises that scholars must explore the impact and agency of material-discursive intra-actions. Using a more material-discursive approach compliments previous scholarship and emphasises how small, daily intra-actions between discourse, activewear, and women’s bodies are powerful. They (re)enforce and produce particular understandings of fit femininity and are agentic in that they do something: they create feelings of confidence (and disgust); they enable particular versions of femininity; and they make (in)visible different women’s bodies. Rather than agency stemming from discourse or women’s actions, agency arises from these intra-actions of fabric, flesh, fat, sweat, and discourse. These intra-actions produce feelings and prompt women to take action. For example, when participants put on their high-rise leggings, it was the intra-action of their bodies looking like the “ideal,” with the feeling of being sucked in and supported, which resulted in them feeling fit and confident. However, when the “muffin top” was created by the intra-action of clothing and flesh, many women felt disgust and shame, looking to change clothing or hide their bodies. When women noticed sweat stains on their pants, they were

embarrassed and quickly changed. Here the negative discourses of fatness, femininity, the fleshy roll, and wet fabric are entangled and agentic, resulting in “ugly feelings.”

Importantly, these affective experiences are ever-changing and not permanent. Causal relations are not fixed, but develop through specific intra-actions. Therefore, the feelings of confidence (or feeling fit or disgust) arise through *specific* intra-actions. What happens when women take off their activewear clothing and the “muffin top” disappears, the “booty” is no longer perfectly shaped, or the damp and smelly clothing is tucked away into a gym bag? How do women feel about their bodies when their pants are not “hugging” their backside or when sweat marks their crotch? While intra-actions create particular cuts and entail particular exclusions, they are described as “constraining, but not determining,” effectively “providing the condition for an open future” (Barad, 2007, p. 177). Intra-actions “iteratively reconfigure what is possible and what is impossible—possibilities do not sit still” (ibid). Hence, the intra-actions discussed in this chapter —“muffin top,” “booty,” and sweat—resulted in feelings and actions that are not universal or fixed, but open and dynamic, their agentic possibilities constantly changing.

In their analysis of a Reebok advertising campaign for women, Piedra et al. (2020) write “women are condemned to constantly experience a distance between their real body, to which they are chained, and the ideal body, which they are constantly trying to approach” (p. 3). In some ways, this chapter has come to a similar conclusion in that many women are using activewear to shape their body into the “ideal” sweat-free figure and have feelings of shame and disgust when their bodies do not conform. However, how I came to this “conclusion” differs from other approaches because in a Baradian framing, the “real body” (material) and the “ideal body” (discursive) are entangled and inseparable. It is not simply that women are shaped and affected by the discursive production of the idealised female form, but their bodies, clothing, and materiality are entangled in the production of fit

femininity. In so doing, this analysis reveals how idealised female body standards are always “caught in a multitude of interlocking systems and forces” (Coole & Frost, 2010a, p. 9) comprising both human and nonhuman forces. There is a “convergence of forces at work on and through the reproduction of women’s bodies” (Pittard, 2017, p. 44) that produce fit femininity. The simple act of moving and wearing activewear plays a vital role in the production of fit femininity and how women feel about their moving, (in)active bodies. I began this conclusion describing how many feminist scholars and women experience a contradiction surrounding their bodies and often credit the powerful impact of discourse. However, messaging around women’s bodies is powerful not through discourse alone, but because of these small, daily intra-actions of wearing leggings and moving in activewear. Put simply, the intra-action between women’s bodies and clothing is agentic, an active force in the production of fit femininity.

CHAPTER SEVEN

Bras, Bodies, and Boundaries: (Re)conceptualising the Moving Body

Nina, Activewear Study Participant: ...you know when you have more [breasts] than you need you can't, it's just too uncomfortable to not brace yourself. You have to hold them still because it actually physically hurts if things are too vigorous....it's really, really important to be well buttressed.

Dialogue from "Living with the Sports Bra": Unlike with other sport bras I felt like I was wearing a garment that wasn't seeking just to squish them against my chest to prevent bounce but actually worked with them....when jumping and moving through different levels and doing planks and upper body exercises that involve muscles in the back, chest, arms flexing and contracting, the bra stopped being something I wore ON my body and became part of my moving body, constraining and enabling specific movements in certain ways.

The sports bra: an important and personal object in the lives of many physically active women, yet an object that is often hidden under fabric, rarely visible on bodies in public (although often seen on social media and in advertising), and largely overlooked within socio-cultural academic literature (for exceptions, see Schultz, 2004, 2014). In socio-cultural scholarship, the sports bra is subsumed into larger critiques of women's sporting fashion focusing on the discursive production of activewear clothing, and the multiple and various ways it is linked to understandings of identity, power, feminist politics, as well as broader social notions of women's empowerment (Farrell-Beck & Gau, 2002; Lipson et al., 2020; Montemurro & Gillen, 2013; Mu & Lennon, 2018; Schultz, 2004, 2014). The few sociological analyses that prioritise the sports bra have typically focused on its discursive construction and representation, a passive substrate awaiting for humans to assign it importance and meaning (Schultz, 2004, 2014).

Yet for many women who wear a sports bra, it is anything but passive. The sports bra is an active component of exercise, constraining breasts³³ and allowing for certain movements while restricting others. An intimate and personal relationship forms between women and their bras, particularly during movement. For example, during the “living with the sports bra” project, one of women described how during exercise, “the bra stopped being something I wore ON my body and became part of my moving body” (Brice et al., 2020, p. 8, emphasis in original). The intimate connection between women and their bras was recognised by many participants and was evoked during discussions of buying secondhand sports bras. While many women were comfortable buying non-activewear secondhand clothing, there was an aversion and affective response to the idea of buying previously worn athleisure. For example, Megan (54 years old, Pākehā, hiking/Pilates) discussed how she supported buying secondhand clothing, but not secondhand activewear. During our interview, she described:

People might have abject reactions to wearing really intimate close to the skin apparel where skin does come off into it, but your body fluids, *everything is in activewear...*If someone has worn it and you buy it and you wear it, it’s right there by all your bodily bits and where your body opens and shuts, basically (emphasis added).

Other participants were more specific and often bought secondhand activewear, but not sports bras. Brenda (32 years old, Māori, recreational sports) stated, “I’d be more picky about what I bought so I don’t think I would buy sports bras secondhand. I’m thinking that when someone is hot and sweaty and how many times have they have worn it hot and sweaty.”

There was a consensus among various women that wearing another woman’s sports bra was off-putting because the sports bra was connected in a very intimate and personal way to someone else’s moving, sweating, and porous body. Even when a woman stops wearing her sports bra after exercising, there was a sense amongst participants that she remained part of her bra. These discussions around secondhand sports bras and women’s own personal

³³ In interviews with participants, most referred to their own breasts as “boobs.” When discussing other women’s chests, they described them as “breasts.” In this chapter, I will primarily use “breasts” as I am discussing women’s bodies broadly.

experiences and descriptions of their relationships with bras point towards a very embodied and unique human-clothing relationship. There is an intra-action that occurs between the body and the bra, where together they produce movement and in so doing, are both affected; sweat stains on the bra, bra marks on shoulders, memories shared between flesh and fabric.

While the participants' discussions evoked this intimacy and ideas around intra-actions, the sports bra-moving body entanglement is often overlooked within literature on the moving body. Due to various agential cuts (e.g., anthropocentrism, Humanism, previous ways of knowing), society, academia, and much sport sociology research, often refer to the moving body as *only* the movement of skin, muscles, and limbs failing to recognise the objects and clothing that become part of this movement. Markula (2019b) describes the moving body as “what the body is doing” (p. 6). Alan Ingham (1997) defines movement as the “neuralphysiological and kinesiological activity...anchored in ‘culturated’ distinctions” (cited in Markula, 2019, p. 1), while Newman and Giardina (2014) equate the body that moves with one which “performs, sweats, runs, and jumps” (p. 419). The moving body is often limited to that bounded by flesh and skin. Yet, as the participants emphasised, the sports bra was a necessary part of their fitness practices. Thinking through the relationship of the bra and the body during movement brings up questions around how the female “moving body” is conceptualised and the various objects, forces, things that play an integral part in movement. In this chapter, I draw upon Baradian theorising, specifically their concept of entanglement, to (re)think the boundaries of women's exercising bodies and how we come to know movement in sport sociology research.

The lack of attention to the human-object entanglements of movement and narrow definitions of women's moving bodies have been created by a series of material-discursive intra-actions. According to Barad (2007), such ideas are produced through agential cuts or “boundary-drawing practices” (p. 140). There are not objects, things, phenomena that

ontologically exist, rather the way these phenomena come into being and boundaries enacted around them are through agential cuts. Applying this to the “phenomenon” of the moving body means recognising how particular apparatuses and various agential cuts have created boundaries around understanding of the female moving body, often limited to the human anatomical body. Hence, if different cuts were made, then different articulations and understandings around the body could be conceptualised.

Many academics and feminist scholars across a range of fields have come to similar conclusions and looked towards different ways of conceptualising the moving body and what it means to be human (Alaimo, 2010a; Grau, 2020; Grosz, 1994; Haraway, 2016). In line with this research, Millington and Wilson (2016) question the physical within physical cultural studies and advocate for “*de-centering[sic], although not de-contextualising, the (human) body in PCS research*, namely by ‘flattening’ physical cultural contexts to consider the associations between human bodies ... and active nonhumans” (p. 912, emphasis in original). Similarly, Barad’s (2003) agential realism encourages a recognition of how matter is an “active participant in the world’s becoming, in its ongoing ‘intra-activity’” and that we must “understand how matter matters” (p. 803). In this final conceptually inspired chapter, I explore how matter is an active participant in women’s movements by using a Baradian posthumanist approach to (re)think the boundaries of women’s moving bodies through three sports bra-women entanglements.

This chapter draws upon both socio-cultural and “hard science” research on the sports bra and women’s moving bodies. Barad (2007) emphasises that the agential cuts made around disciplines have made it appear as if different fields are “separate entities (and separate sets of concerns) with sharp edges,” but in actuality they do “not actually entail a relation of absolute exteriority at all” (p. 135). Instead, Barad (2007) encourages a diffractive approach to research that places “understandings that are generated from different (inter)disciplinary

practices in conversation with one another” (pp. 92-93). This approach enables scholars to “be attentive to the iterative production of boundaries, the material-discursive nature of boundary-drawing practices, and the constitutive exclusions that are enacted, and questions of accountability and responsibility” (Barad, 2007, p. 93). Hence, in this chapter, I bring together research from various fields with my “empirical data” to look at the constitutive exclusions and possibilities for ways of knowing women’s moving bodies. In so doing, I also discuss some of the agential cuts that have (and continue) to be made that affect how we know and understand what it means to be a (female) moving body. The chapter begins with an overview of feminist theorising and review of some of the scholarship on bodily boundaries and Barad’s contribution to this scholarship. I then explore the ways in which the boundaries of women’s corporeal bodies are questioned by focusing on three sport-bra body entanglements: (1) sweat and the bra; (2) movement and the bra; and (3) memories and the bra.

“Knowing” the Moving Body

Boundaries are complex. There can be physical, theoretical, disciplinary, metaphorical, and symbolic boundaries all of which serve a purpose of creating a divide. Many scholars have written about what boundaries mean, how they are formed, and their impact within society. For example, in his exploration on understanding the processes of modernity, Hetherington (1997) sees boundaries as “relational ordering” (p. 64) practices within society. They are “threshold spaces that demarcate one thing from another...places of uncertainty and as such, play a very significant role in processes of social ordering” (p. 64). He draws upon the work of feminist scholar, Mary Douglas (1966) as she discusses the role of rituals in creating symbolic boundaries. Using dirt to think through ideas around purity and social order, Douglas (1966) shows how nothing is inherently dirty, but it is the social and cultural ideas and processes that create boundaries around what is considered dirty or “matter out of place”

(p. 36). Although they do not use the term “symbolic boundaries,” Barad (2007) provides a similar conceptualisation of boundaries as being created through particular intra-actions. It is the various intra-acting elements that contribute to particular agential cuts and ways of knowing. As they write, “boundaries don’t hold; times, places, beings bleed through one another” (Barad, 2014, p. 179). This chapter explores boundaries in two ways. Primarily it looks at how the boundaries of a “body” can be expanded to include the objects, things, and ideas around them and thus can be understood as an entanglement. It also looks at the boundaries of knowledge production and the contributing factors that have created boundaries around how (and what) knowledge is produced around women’s moving bodies.

Within sport sociology and physical cultural studies, boundaries have been produced around the understanding of a moving body. While sport sociology and physical cultural studies are fields of multiplicity with many different theoretical and methodological approaches employed in a range of sporting and movement contexts, a unifying theme across the literature is an interest with the moving body. Scholars are commonly looking to “examine the ways the moving body acts as an *embodiment* of some broader political, social or economic configuration” (Newman et al., 2020a, p. 7, emphasis in original). In their description of physical cultural studies, Silk and Andrews (2011) cite sport historian, Patricia Vertinsky, in defining physical culture as “those cultural practices in which the physical body—the way it moves, is represented, has meanings assigned to it, and is imbued with power—is central” (p. 6). In much of this scholarship, the human body is conceptualised through anthropocentric thinking where the “body” is limited to just the biological and anatomical human.

Although the human body is often viewed through an anthropocentric lens in society and much literature, there is a long history of scholars exploring different ways to conceptualise it. Rich et al. (2012) describe how “Philosophers and anthropologists have long

contemplated the malleable natures of bodies within their environments and in other cultures” (p. 4). In particular, feminist scholars have written extensively about (and challenged) conventional understandings of the body and in so doing, have worked to rethink bodily boundaries. It was Donna Haraway (2016) who famously wrote in *The Cyborg Manifesto*, “Why should our bodies end at the skin...” (p. 61). In this seminal piece, she critiques the “impenetrable” boundaries and binaries between human/nature/machine/technology. Through this, Haraway questions what it means to be human and how conceptualisations of the body can be reimagined. Haraway’s work has been taken up and expanded on by many other scholars and theories: Elizabeth Grosz’s (1994) volatile bodies and open materialities; Moira Gatens’ (1996) imaginary bodies; Robyn Longhurst’s (2001a) fluid boundaries; Nancy Tuana’s (2008) viscous porosity; Stacy Alaimo’s (2010b) transcorporeality; Samantha Frost’s (2016) biocultural creatures; and Begonya Enguix Grau’s (2020) overflown bodies, to name a few. These scholars have all questioned the ontological separability between humans, nature, environments and challenged the idea that human skin serves as a permanent barrier. These conceptualisations, in various forms, emphasise the “openness, relationality and porosity [of the body] towards other forces and stimulations” (Grau, 2020, p. 5).

Drawing upon these, and other, theoretical approaches, scholars have discussed bodily boundaries in an array of different topics. One prominent theme, within feminist scholarship, has been the ways in which bodily fluids trouble bodily boundaries, and in particular how women’s bodies have been positioned as “in possession of insecure (leaking, seeping) bodily bodies” while men “are often understood to have secure (autonomous) bodily boundaries” (Longhurst, 2001a, p. 2) (see Chapter Six). Bringing together writings from Mary Douglas (1966), Elizabeth Grosz (1994), and Julia Kristeva (1982), amongst others, Longhurst (2001a, 2001b) examines pregnant bodies in public spaces and the ways the “leaking” pregnant body “seems to occupy a borderline state” (2001b, p. 84) resulting in particular “feelings of

discomfort about bodily fluids—the inside making its way to the outside” (2001b, p. 92). Using various examples (i.e., water breaking, blood stained mucous, nausea and vomiting, fluidity of breasts), Longhurst (2001b) describes how pregnant bodies are seen as abject, something that “provokes fear and disgust because it exposes the border between the self and other” (2001b, p. 83). Bodily fluids threaten and challenge the understanding of bodies as controlled and completely bounded entities.

Also drawing upon feelings of abject and bodily fluids, Roy (2013b) explores how the wetsuited lesbian surfing body can “at times become both abject in disgust and object of desire” (p. 329). The wetsuited body can be both desirable as it displays the female form, yet can result in abjection as anything excreted from the body is absorbed into the suit, resulting in experiences of disgust and shame. In addition to drawing on abject theory, Roy (2013a, 2013b) uses Deleuze to understand the female surfing body as an assemblage. Using Deleuze’s concept of the Body without Organs and assemblage, Roy (2013a) describes how when riding a wave, “the body extends to being a part of the complexity of the wave” (Evers, 2006 cited in Roy, 2013a, p. 172) and it can be understood as an “assemblage of surfer, wetsuit, board, wave, energy, oceanography, affects, emotions and many more things besides” (p. 172). Other action sports scholars have also explored the connection between participants and their equipment, and how at times, the sporting object (surfboard, skateboards) feel as if it is as “hybrid extension of the body” (Booth, 2008; Dant, 1999; Dant & Wheaton, 2007; Ford & Brown, 2006, p. 162; Thorpe & Rinehart, 2010).

In a similar vein, scholars within disability studies have been at the forefront of work exploring the connection between bodily boundaries and technology/equipment (Howe, 2011; Lacy, 2020; Norman & Moola, 2011). For example, in their study on Oscar Pistorius (a famous South African Paralympian), Norman and Moola (2011) use Haraway’s cyborg to question the concept of a natural, human body. In another example, Lacy (2020) draws upon

new materialist and posthumanist research to explore the relationship between a high school girl and her wheelchair showing how “one’s becoming/identity is not fixed, but rather constantly changing through the entanglements and intra-actions of our material reality” (p. 104). Using similar concepts and theories, in addition to more inter- and multi-species approaches, other scholars have begun to look at animal-human relationships, such as humans and horses (Dashper, 2019; Linghede, 2019) and humans and canines (Haraway, 2003; Merchant, 2020) to again, question the borders around humans.

This association between animals, humans, and nature has much in line with how many Indigenous cultures understand humans and the boundaries between humans and nature (Norman et al., 2020; Power, 2017; Rosiek & Snyder, 2020; TallBear, 2015; Te Aramoana Waiti & Awatere, 2019; Wheaton et al., 2019). For example, in her writing on waka ama³⁴ within Aotearoa New Zealand, Liu (2020) describes the importance of blue-spaces in Māori culture and that the “sea is not a background for human activity or an exterior environment to us, but has dynamic and embodied relationships with humans and is an integral part of who we are” (p. 6). Similarly, in their research on Māori surfer’s sense of place and connection with the environment, Te Aramoana Waiti and Awatere (2019) describe how a “Māori worldview contains no dichotomy between humans and the natural world” (p. 36). Rather, mountains, lakes, the ocean, and the environment are part of their whakapapa (genealogy). When surfing, kaihekengaru (Māori surfers) described feeling a deep connection their iwi (tribe), their ancestors, and various Ātua (gods, deities). Within the Fisher River Cree Nation in Canada, Norman et al. (2020) describe how the stories by Elders of the community stressed an embodied understanding of the relationship of humans and the Land.³⁵ Humans are understood as “perpetually becoming through the relations they hold with other humans

³⁴ Liu (2020) describes how in its simplest form, waka ama refers to outrigger canoe paddling.

³⁵ The authors make it clear that Land should be understood differently from land. The land is a Western worldview which is primarily limited to geographical territory, while Land denotes a more spiritual understanding encompassing all earth, wind, and air.

and more-than-human worlds” (p. 90) and are in “relationships of reciprocal responsibilities within interconnected communities of relatives inclusive of humans, nonhuman beings (i.e., plants, animals, etc.), entities (i.e., sacred and spiritual places, etc.) and collectives (i.e. prairies, watersheds, etc.” (Whyte et al., 2016, cited in Norman et al., 2020, p.90). Hence, within many Indigenous approaches, the body is conceptualised in more fluid and dynamic ways, particularly regarding the connection between humans and the environment.

Increasingly, sporting scholars are questioning the anthropocentrism and humanistic understandings of bodies within sport sociology (Baxter, 2020; Brice et al., 2020; Clevenger et al., 2020; Evers, 2019a, 2019b; Fullagar, 2017; Fullagar, O'Brien, et al., 2019; Jeffrey, 2020; Markula, 2019b; Millington & Wilson, 2017; Roy, 2013a, 2014; Thorpe, Brice, et al., 2021; Thorpe, Clark, et al., 2021). Many are looking towards different conceptual and theoretical approaches, such as new materialisms, that allow them to “think beyond the humanist phenomenological body that [they] have learned to conceptualise through dominant visual metaphors as a bounded whole and as an entity that we possess” (Fullagar, 2017, p. 253). For example, Baxter (2020) uses new materialisms to (re)conceptualise the relationship between women boxers and their boxing glove showing how the “boundary of the body is not necessarily at the end of one’s epidermis” (p. 155). In her analysis, she emphasises the importance of looking at the relationship between women and the glove because, as she writes, “you cannot have a boxer without boxing gloves; it is the subject-object entanglement of woman and gloves that makes the assemblage ‘female boxer’” (p.155). Similar to Baxter (2020), this chapter uses Baradian theorising to think about the bra-body entanglement that co-produces movement and the exercising female body.

Barad’s writing on boundaries reflects and expands upon many of the ideas from previous theoretical approaches and scholarship on bodily boundaries. Similar to other feminist scholars, Barad (2003) questions the normative conceptualisation of the human body

as a bounded, fixed entity arguing that “any robust theory of the materialisation of bodies would necessarily take account of how the body’s materiality – for example, its anatomy and physiology – and other material forces actively matter to the processes of materialisation” (p. 809). They emphasise that common understandings of the body as bounded by flesh and skin have used a particular measuring apparatus based primarily on visual cues. As they write, “it has become increasingly clear that the seemingly self-evidentiary nature of bodily boundaries, including their seeming visual evidence, is a result of the repetition of (culturally and historically) specific bodily performance” (Barad, 2007, p. 154). The conceptualisation of the neatly bound human is not an objective “fact” or reality, but has rather been created through agential cuts (e.g. prioritisation of visual empirical data, anthropocentric and binary ways of thinking).

Within Baradian theorising, human bodies are “phenomena that acquire specific boundaries and properties through the open-ended dynamics of intra-activity” (Barad, 2007, p. 172). There is an emphasis on connectivity, intra-actions, and entanglements and how humans and matter intra-act to produce boundaries. Therefore, the body can be seen as an entanglement of various intra-acting entities: flesh, fabric, gender, structures of power, skin, and gravity. In recognising the body as a material-discursive phenomenon that is changing, Barad emphasises that their posthumanist account also requires an examination of “practices through which these differential boundaries are stabilised and destabilised” (Barad, 2003, p. 808). Hence, there should be a recognition of the agential cuts and intra-actions within apparatuses and societal structures that work to produce specific understandings around bodies and, particularly, women’s bodies. To summarise, within agential realism, the human body is not assumed to be a fixed, neatly bounded object, but is a material-body-discursive entanglement that comes into being through agential cuts and intra-actions. Using this understanding, in the remainder of the chapter, I provide examples of these intra-actions and

entanglements that question bodily boundaries and provide a possibility for a different conceptualisation of what it means to be a moving female body.

Sports Bra-Body Entanglements

In this section, I discuss three sports bra-human body entanglements to explore the boundaries of women's moving bodies. I begin by looking at how bacteria and bodily fluids (primarily sweat) intra-act with the bra during movement and the bacterial trace women's moving bodies "leave" with the bra. This then leads into a discussion of various biological and physical forces that are part of the bra-body movement entanglement. The final entanglement focuses on women's memories and experiences that become embedded within their sports bra (and activewear, more broadly). Through these examples, I point towards the ways that Baradian thinking encourages alternative understandings of the body beyond the flesh towards human bodies as "beings in their differential becoming" (Barad, 2003, p. 818).

While the primary purpose of this chapter is to demonstrate the "inherent indeterminacy of bodily boundaries" (Barad, 2007, p. 157), in these examples, I also highlight some of the agential cuts and intra-actions that have contributed to previous ways of knowing women's bodies. In each of these examples, I draw upon research from biomechanics, interviews with researchers at lululemon, interviews with participants, and "living with the sports bra." In line with my diffractive methodology and similar to other chapters, the "data" is "read through each other in a relational way, looking for creative and unexpected provocations" (Murriss & Bozalek, 2019b, p. 873). Hence, not one piece of "data" is privileged, but rather the various "data" are placed in conversation with each other. However, before exploring these entanglements, it is important to clarify how I am understanding and defining the sports bra.

At first, the definition of a sports bra may seem obvious and taken for granted, but, in reality, sports bras are understood in multiple ways. According to Sports Medicine Australia,

there are three types of bras: (1) fashion bras (worn for everyday activities); (2) crop tops (bras with no cups that compress both breasts together against the chest); and (3) sports bras (bras with structure cups that are worn during physical activity) ("Exercise and breast support," 2021). However, in discussions with my participants, they often used the terms "crop tops" and "sports bras" interchangeably. Also in our discussions, some participants and colleagues described how they would often use their bikini top as a sports bra and vice versa. There are also multiple popular press articles online that provide readers with ideas for the best swimsuits that double as sports bras (Andrews, 2015). A sports bra, crop top, and bikini top, for some, are all understood as a sports bra and the boundaries around how a sports bra is defined and what it is used for vary and change depending on many variables. However, within this chapter, a sports bra is defined as a bra bought with an intent to be used for support during physical activity or exercise.

In addition to the many ways a sports bra is defined, there are also various discursive readings around bras and women's bodies. As alluded to in the introduction, Schultz (2004) conducts a critical analysis of the mediated representation of sports bras in the United States looking at "iconic sports-bra moments" (p. 186). Through her analysis she shows the ways in which the media sexualises and eroticises the sports bra and, in so doing, the sports bra contributes to the (re)production of hegemonic femininity. Within her analysis, Schultz (2004) draws upon Foucault to discuss how the mediated images of the sports bra contributes to the disciplinary nature of the fitness industry, encouraging women to control and shape their bodies into a desirable female form. Other feminist scholars have critiqued (regular) bras, but more in relation to the ways in which they discipline and control the female body (Bordo, 1993; Dworkin, 1974; Longhurst, 2001a, 2005; Young, 1990). These scholars often draw upon the belief that within society it is primarily the hard, masculine body that is appreciated while the fluid, leaking, gooey body associated with femininity is seen as

revolting, something to be maintained and controlled (see Chapter Six). Since (both regular and sports) control breast movement and reduce the bounce and freedom of breast tissue, they can be seen as a way to “discipline” the breasts” (Bordo, 1993, p. 20) and understood as “binding objects” (Dworkin, 1974, p. 114). In her research on “man-breasts,” Longhurst (2005) draws upon Young (1990) writing:

‘Without a bra, the fluid being of breasts is more apparent...Many women’s breasts are much more like a fluid than a solid; in movement, they sweat, jiggle, bounce, ripple even when movement is small’ (Young, 1990). Wearing a bra solidifies the breast (p. 173).

Therefore, for many feminist scholars, the bra (and sports bra) do not provide women with more freedom to move, but are rather objects used in the continuing control over women’s bodies.

Many of these scholars were speaking about bras and breasts in relation to cisgender women’s bodies because, as Young (1990) describes, “breasts are the symbol of feminine sexuality” (p. 189). Research has explored the ways in which breasts have been understood within society in varying ways; eroticised, politicised, commercialised, used as a symbol of rebellion and activism, objectified (for an overview of the literature, see McCann, 2020; Yalom, 1997). However, cisgender women are not the only bodies that have breasts or use and wear sports bras. Recently, sports bras have become popular for transmen, non-binary and gender fluid people as a way to compress and flatten their breasts, with multiple online articles discussing the most comfortable sports bras to use as binders and online message boards discussing tips and suggestions (Farber, 2017). Some cisgender men also have come to wear sports bras at various times. In speaking with men who have “man-breasts” (i.e. gynecomastia), Longhurst (2005) describes how men who have breasts “disrupt the border between heterosexuality and homosexuality, and between masculinity and femininity” (p. 172). In response, many of her participants experienced cultural anxiety about their breasts and would turn to measures, such as bras, to hold, support, and bind their breasts. While the

research on this topic is limited, it is important to recognise the impact sports bras have on the lives, bodies, and physical activity of many different types of people beyond cisgender women. However, this chapter primarily addresses sports bras in relation to cisgender women and their experiences. This is because all of my participants identified as cisgender women and the activewear industry mainly targets cisgender women within their advertising and promotional materials.

Although this chapter primarily addresses cisgender women and uses the term “women,” I recognise the category of “women” is not a static, essentialist understanding but is always changing. In Ingram’s (2021) new materialist analysis on the production of beauty, she describes how new materialisms has shifted conceptualisations of the human and gender from “thinking about the human as discursively produced towards a relational becoming involving multiple co-constitutive forces” (p. 2). What develops from these relational becomings “is [an]unstable performative phenomena (an enactment) rather than a fixed attribute of bodies” (p. 5). Therefore, while in this chapter I speak to cisgender women’s bodies, I recognise that “women” and gender are phenomena, in themselves, constantly being produced through intra-actions (including sports bra intra-actions) and are never fixed essentialist categories.

Entanglement #1: Sweat, Bacteria, and the Bra

In the introduction, I mentioned Megan’s (participant) comment about her aversion to wearing secondhand activewear. Within her justification, she said, “everything is *in* activewear...” pointing to the ways in which the body’s liquids and skin shed into activewear. The body is porous, not defined by impenetrable boundaries, and therefore, the bra becomes the recipient of many bodily fluids (e.g., sweat, breast milk, spit). However, the bra is not just the recipient, but is an active component in this relationship. Here I look at the

entanglement of sweat, bacteria, skin, and nonhuman matter with the sports bra to think about different ways of conceptualising boundaries of women's moving bodies.

As a woman begins to exercise, her moving (corporeal) body undergoes a series of metabolic processes, such as increasing blood supply and oxygen flow throughout the body, regulating the body's temperature, and ensuring glucose is available for muscle contraction (Kraemer, 2012). Through (some) of these processes the body produces and excretes fluids and liquids, such as sweat, which contain various elements (i.e., water, sodium chloride).

While many activewear companies advertise the "sweat-wicking" capabilities of their clothing, the sweat and moisture still interact with the sports bra. As the body sweats, the liquid is absorbed by the bra causing the bra's fabric fibres to expand in size (Gorea et al., 2020; Watkins & Dunne, 2015). Through this, the sweat/fluids and bra become entangled to produce something new and unrecognizable as either a "neutral, clean" sports bra or human sweat. Interestingly, the sweat patterns and the expansion of the bra are dependent on each individual woman and her exercising behaviour. The degree to which a woman will sweat depends on a variety of factors such as the external temperature, her fitness level, weight, age, diet, and genetics (Davis, 2018). And, unsurprisingly, the movement of the woman will affect how much she sweats and where much of it is produced. For example, in many cases running (as compared to walking, jogging) tends to produce a great amount of sweat, often accumulating in between and under the breasts (Havenith et al., 2008). The woman's sweat pattern (amount and location) becomes imprinted into the bra during movement.

The sweaty sports bra also intra-acts with both human-produced and nonhuman bacteria. The human skin is not a completely smooth surface as it appears to the naked eye, but rather is full of niches, each with a specific bacterial community (Callewaert et al., 2014). Various areas of the body have between 10^2 to 10^7 bacteria per square-centimetre with over 19 categories of bacteria. When the bra is worn on the skin, it interacts with this bacteria so









that bacteria is transferred onto the fabric. The sweat on the sports bra creates a perfect environment for this “human/nonhuman” bacteria to grow in the clothing. In their research on the impact of bacteria on activewear clothing, Callewaert et al. (2014) explore the difference in bacteria growth and odour between synthetic and natural textiles by having 26 different people exercise in t-shirts. While Callewaert et al. (2014) are primarily interested in the production of bacteria that lead to malodour, they did note a different microbacterial pattern for each of the 26 shirts their participants wore. There was an individual bacterial pattern, a “fingerprint” for each human on his/her/their specific clothing.

Although Callewaert et al. (2014) are looking at t-shirts, the same logic can be applied to the sweaty sports bra. Each woman’s bacteria becomes part of the bra she wears and her sweat contributes to the amount of bacteria that continues to grow. Research has shown the presence of Staphylococcus, Corynebacteria, Streptococcus bacteria on sports bras that are transferred from the human to the bra when exercising (J.R.Thorpe, 2019). The amount of each type of these bacteria on the sports bra is dependent on the woman’s age, pH level of her skin, moisture of the skin, heat of the environment and many other factors but is unique from woman to woman. Here, the boundary between human and bra can be seen to be extremely porous as the sweat, bacteria, movement, bra, and fabric all come together and become entangled to produce something new, a woman-body-bra phenomenon.

Along with the sweat patterns, the sweat cells, and the bacteria, women shed skin cells into their sports bra. Humans are estimated to shed between 30,000-40,000 skin cells, which become part of the environment around “them” including their clothing (“What kids should know,” 2020). But there are also nonhuman produced fluids and materialities that become part of the bra-bacteria-skin cell entanglement. There are lotions, perfumes, and deodorant that are on women’s skins that then intra-act with the bra itself. In speaking with my participants about their clothing, it was common for the women to describe the frustration

with the deodorant stains that became a permanent fixture on the bra. For me as well, my once completely black Enlite became permanently etched with white deodorant stains along the armpit, a permanent presence of my body's sweat and antiperspirant (see Table Four). In this way, both the body and the bra become transformed through the act of moving and exercising "together."

Table 4: Comparison of a New Enlite Sports Bra with One After 20 Months of Use

	Brand New	After 20 months of use
Front of bra		
Back of Bra		
Outside fabric of cup		
Inside fabric of cup		

Similarly, the human body is transformed after wearing the bra as the bra leaves its “mark,” its “trace,” on the skin (see Figure 16). There are imprints from the various bands and straps; there is chafing from the material, skin, sweat intra-actions; and there is discomfort and back pain from being strapped and held in one position. The bra, the body, movement, all come together and are transformed through the entanglement.



Figure 16: Examples of “marks on bodies” from sports bra

Previous understandings of bodily boundaries have been determined primarily through optics. A woman’s body ends at her skin, the sports bra at its fabric edges. However, Barad (2007) emphasises how these boundaries are “not determinate either ontologically or visually” (p. 156), but have been created through the optics of light and vision. They write, “there are actually no sharp edges visually either; it is a well-recognised fact of physical optics that if one looks closely at an ‘edge,’ what one sees is not a sharp boundary between light and dark but rather a series of light and dark bands” (p. 156). Hence, boundaries are not as permanent or as fixed as they appear. This could be applied to bodily boundaries as well. If (some) scholars were to move away from relying primarily on vision as a means of justification for bodily boundaries, different agential cuts could be made and different conceptualisations of the moving body could be understood. In this case, it would mean expanding the boundaries

of the body beyond the skin to include the bra, fabric, sweat, bacteria, skin cells, and other nonhuman fluids.

Entanglement #2: Movement, Force, and the Bra

A second entanglement that allows for a questioning bodily boundaries, is conceptualising movement itself as an entanglement of various forces and entities. For many women, one of the most important nonhuman material components of their movement exercises is the sports bra and the way it “holds” and “supports” their breasts. Participants in the study emphasised that for many of them, physical activity was actually enabled by the wearing of sports bra.

Shana (25 years old, South Korean, recreational sports), for example, described how she tried to go without a sports bra to run and was surprised at the difficulty and pain she experienced.

As she said:

See that’s the thing because I’m small chested, I thought I wouldn’t need it. So one day I didn’t wear a sports bra and went running. It was, at home, downstairs there is a treadmill so I went down there and ran and was like “Oh it actually hurts.” I was surprised and like “Why does it hurt?”

Similarly, Winona (31 years old, Pākehā, aerobics), who is a larger breasted woman, described how she would often wear two sports bras for high intensity workouts which felt “tight and supportive” and allowed her to move without pain in her back.

One of the reasons why many of the women felt they needed the sports bra was because the movement of women’s breasts during exercise is quite complex and affected by a multitude of forces. Biomechanical research has shown how the breast tissue itself lacks structural support (although some scholars have described skin as a supportive tissue) (Burbage et al., 2018) since breast tissue is comprised primarily of glandular tissue and fat, held in place by Cooper’s ligaments. Cooper’s ligaments are thin sheets of fibrous bands that connect the inner side of the breast with the pectoralis muscle. There are no experimental data regarding the mechanical properties of Cooper’s ligaments, but many scholars believe that

they provide some anatomical support to the breast tissue (Burbage et al., 2018). An excessive amount of movement can cause the tissue to stretch, putting strain on the ligament and can result in pain (Josephson, 2015).

There are many compounding forces and factors that impact breast movement during exercise such as gravity, speed of movement, breast skin strain, friction, and velocity and acceleration of the breast tissue itself (Burbage et al., 2018). This results in the breast tissue not just moving vertically, but multi-directionally (McGhee et al., 2013). Around 56% of breast displacement is vertical, while 44% consists of anterior-posterior and mediolateral breast displacement which means the breast tissue often moves in a figure eight pattern during exercise (Burbage et al., 2018; Josephson, 2015). The breast movement is also affected by the woman's shoulder rotation and arm swing movement when exercising (Josephson, 2015). All of these factors give rise to the phenomenon of movement of a woman's body. It is not simply breast tissue that moves in isolation, but movement is a result of skin, glandular tissue, ligaments, shoulder movement, arm swing, gravity, and force. Another contributing entity in this entanglement, for many women, is the sports bra.

The sports bra was created as a means of counteracting the myriad of forces that affect breast movement and to constrict/allow only certain movements of the breast tissue. Currently, there are two main types of sports bras: (1) compression bras that are designed to keep the breasts close to the torso to reduce the figure-eight motion of the breast tissue; and (2) encapsulation bras which often have an underwire and cup for each individual breast to provide support and reduce gravitational pull. Along with the structure, various fabric and materials are used to aid in reducing movement and make women more comfortable during exercise. One bra alone can have up to eight different fabrics that serve different functions, such as support, structure, breathability, sweat wicking, and comfort (Josephson, 2015). The bra is designed to be part of the movement as it counteracts certain gravitational forces and

yet allows for others. In a way, the sports bra actually becomes a co-participant—an active agent—in women’s movement. During these experiences and movement, the woman and the bra are entangled, they are not simply “intertwined with another, as in the joining of separate entities” but “lack an independent, self-contained existence” (Barad, 2007, p. ix).

As a co-participant in movement and part of the movement entanglement, the bra is transformed and affected. When the bra is taken off, it does not look, feel, or smell the same as it did before intra-acting with the body, but rather the movement entanglement and experience is etched into the fabric. Many of the women discussed how the sports bra loses functionality over time, becomes stretched out or faded after multiple wears and washes. Winona used the loss of functionality as a reason why she was against purchasing secondhand sports bras, saying “I wouldn’t buy sports bras secondhand cause I feel like they have more things/stuff [i.e. function]. They could be more worn out than pants because of the bounce and support.” Brenda echoed Winona describing how she would try to keep her sports bra for as long as she could, even if it had a few holes, but added “if they [holes] get too big and there is like multiple holes in it, I’d be like ‘okay I think it’s time to get rid of it’.” These holes and the loss of functionality occur through exercise and from the sports bra’s role in the movement entanglement.

Importantly, the loss of functionality and the “wear and tear” is specific to each woman; her breast size, weight, and shape, the amount and type of activity she performs, her torso dimensions, her specific laundering practices. In a way, a woman’s movement experience, is engraved into the materiality of the fabric—the stretched out band, the faded fabric, the loose shoulder straps, the tears and holes in the material are her movement traces. Therefore, when a woman takes the bra off her body, even though her fleshy body is not directly intra-acting with the bra, her “body,” her movement patterns, and her “self” is still present. Women’s moving bodies do not exist “as fully formed, pre-existing subjects” but as

beings “intra-actively co-constituted through the material-discursive practices that they engage in” (Barad, 2007, p. 168). Hence, the moving body can be understood as being constituted through these intra-actions of the sports bra, gravity, force, and tissue.

While Barad (2007) encourages a different way of thinking about bodily boundaries, They also write that “intrinsic to these concerns is the question of the boundaries of nonhumans as well as humans and how these differential boundaries are co-constituted” (p. 160). Across history and within different academic fields, the ways in which the female moving body and the sports bra have been understood have been created through material-discursive intra-actions. For example, even though my participants noted that their bra’s functionality decreased over time, this has been ignored within research on the biomechanics of sports apparel. During my interview with the research design team at lululemon, the biomechanics research assistant, who has worked for both lululemon and Nike, talked about how there has not been enough research into the decline in the functionality of sports bras. According to her, “There isn’t a ton of information on how the function of a bra changes over time....We know that a shoe will wear down or wear out after wearing it for so many hundred miles, but there are no standards around sports bras *just because there has been no research in that area*” (emphasis added). This is in part because of the anthropocentric way of knowing moving bodies which prioritise human movement, but it is also likely the result of societal systems of oppression and patriarchal society that have created cuts around how knowledge about women’s bodies is produced.

Within the sporting industry and STEM related fields, the interests of women have long gone unnoticed and ignored. The first sports bra was not invented until 1977 and was initially made from two jock straps. The sports bra was not created by scientists, sportswear manufacturers or elite athletes, but rather two female running enthusiasts frustrated with the discomfort they experienced when running and lack of women’s sporting goods. Lisa

Lindhahl, a graduate student and part time secretary, and Hinda Miller, a costume designer, would often go running together and while they enjoyed the physicality of it, “there was a downside: our breasts jiggled uncomfortably when we ran. Our nipples became sore from chafing against our sweaty T-shirts” (Miller quoted in Josephson, 2015, p. 34). One night, while Lindahl, Miller, and fellow designer, Patty Smith, were thinking about the sports bra, Lindahl’s husband walked in and jokingly put his jockstrap around his head and chest, providing Lindahl, Miller, and Smith with an idea. They took two jockstraps and sewed them together to create the first modern day sports bra. Josephson (2015) writes that the first sports bra can almost be understood as “anti-technology” since it was “technology derived from a function for another gender, and an old technology at that” (p. 35). The jockstrap was invented in 1874 in the United States to protect bicycle jockeys that were cycling along cobblestone streets (Kimmel et al., 2014). It took over a hundred years from the development of the jockstrap for a prototype of the sports bra to be developed even though both perform similar functions for the body; protect and support. The dated development of the sports bra can be, in part, attributed to the belief that within society (and much of sport science) the moving body is understood only as a *male* moving body with little concern for the anatomical and material needs of women’s bodies (Cooky & Dworkin, 2012; Costello et al., 2014).

In the beginning, Lindahl and Miller had difficulty convincing stores owners to stock the bra because “many store owners were male, ignorant of the need, did not appreciate the innovation, and probably worried about giving up floor space to ancillary equipment” (Josephson, 2015, p. 37; Schultz, 2014). Instead, Miller and Lindahl promoted the sports bra through magazines using mail-in ordering. They adopted a very woman-centred approach in their advertising often using slogans such as “no man-made sporting bra can touch it” and “the best athletic supporter a woman ever had” (Schultz, 2014, pp. 153-154). Within a few years, sports bra sales had skyrocketed. The success of the sports bra was due to many

reasons, but can be partly attributed to its novelty and as one of the first sporting objects designed specifically to support women's moving bodies which had been vastly ignored within sporting apparel and broader society. Again, the fact that store owners would not even sell the sports bra emphasises the various agential cuts that were made within society around understandings of the moving body. The normative conceptualisation of the moving body was *male*.

The popularity of the sports bra led to increased interest in the biomechanical study of women's moving bodies and in designing and creating sports bras. Although there has been progress in the development of sports bras since the 1980s when much of the research began, there is still much to be learned about breast tissue and sport bra. For example, within research around women's breast movement, while breast pain is assumed to be associated with the lack of anatomical support to the breast tissue, scientists are still unsure of the true and exact cause of pain (Burbage et al., 2018). A similar point is made by Laura Tempesta—founder of activewear company Bravolution, sports bra designer, and the only person in North America with a Master's degree in lingerie design. In a 2018 TED talk, Tempesta critiqued the bra industry for their lack of innovation and the lack of improvements in bras design over the past century, emphasising how (regular) bras from 2018 are almost identical to bras from 1920 (Tempesta, 2018). Dr. Joanna Scurr, a biomechanist who specialises in sports bra design, contributes the slower innovation in sports bra (and regular bra) design and research to the lack of women in STEM careers: “Sports science has always been dominated by men and for them, studying breasts is seen as slightly laughable. For women, though, it's completely credible—they can see the benefits” (Josephson, 2015, p. 47). The lack of women in STEM related careers and the male-dominant nature of the sporting industry has contributed to particular ways of knowing bodies, and scientific and technological understandings of sports bras.

In the 21st century, conceptualisations of the moving body are slowly moving away from *male* as the standard and norm. However, gender continues to play a role in how scholars and scientists understand women's bodies. During the interview with lululemon's biomechanist, she mentioned the impact of gender on the development of sports bras:

The first one was 1977, the first invention of the sports bra so it's still a pretty new category so there hasn't been as much innovation with some of that product. Now with some more engineering going into it, I definitely have noticed that when we have men engineers looking at the problem of breast motion, it is very much, you know, the mass models, the ligament models, there is a spring. It's very much an engineering problem and that might help us solve the movement sides of it, but how does it help us solve discomfort or pain?

She continued describing how she and one of the other research scientists fought for the lululemon Enlite sports bra project to be led by women and to increase the number of women on the Research and Development team because, as she says, "with sports bras, you've got to have a level of empathy." She describes how:

For me it helps being a female that is active because as much as I think duct tape around your breasts can reduce movement completely, that is not something I ever want to experience when I'm running. I think it definitely helps me being female and being active and having experience wearing different sports bras allows me to have a ton of empathy when I'm in the work.

In the 21st century, gender continues to act as an agential cut. As men tend to dominate STEM careers, women's moving bodies are conceptualised as mechanical and primarily through engineering and anatomical measures, rather than from more embodied and experiential perspectives. Before Enlite, many of the bras were either compression or encapsulation bras which are designed to minimise as much movement as possible and can be quite painful to wear for extended periods of time. As Winona (participant mentioned above) describes it, "I wouldn't want to go for more than an hour with two [sports bras] on or an hour and a half. I want to get it off straight away after I've worked out." With sports bra design research primarily dominated by men, this more affective and embodied experience is often overlooked. Women's moving bodies were/are seen as a problem that need to be

controlled and disciplined through the sports bra, a viewpoint that many feminists have discussed and rebelled against (e.g., bra burning of the 1960s/1970s) (for more on bras and the control of women's bodies, see Dworkin, 1974; Hinds & Stacy, 2001; McCann, 2020)). However, having more women present in the designing of the sports bra has challenged how some activewear companies (or at least lululemon in this example) understand women's moving bodies and the bra. There is more focus on the embodied sensation of being a moving sports-bra wearing body. The body begins to be conceptualised differently as different agential cuts are made.

Entanglement #3: Memories, Materiality, and Movement

Thus far, I have discussed the entanglement of sweat and bacteria, and the bra and movement, both of which allow for women's bodies to be understood as entanglements of human and nonhuman forces. In this final example, I look towards the ways in which a person's experiences, history, and memories become embedded within the bra and, activewear, more broadly. In Chapter Five I elaborated on Barad's concept of spacetime mattering. To reiterate, in Baradian theory, space is not static or already existing, nor is time seen as a set of linear fixed increments. Instead, "space, time, and matter are intra-actively produced in the ongoing differential articulation of the world" (Barad, 2007, p. 234) through various material-discursive intra-actions. Memories and experiences from the past are never finished once and for all, but are actively intra-acting with the materiality of the present. In the two "cutting together-apart" focus group activities conducted with participants, many of the women discussed the importance of clothing in their lives and the ways in which their activewear was entangled with emotions, experiences, and memories.

During one of the "cutting together-apart" activities, one of the women discussed how she decided not to bring her favourite pants because they literally embody the memories of her pregnancies:

I have these old pants... they're so stretched out, I've worn them through my pregnancies. Now I wear them as pyjamas cause they're ridiculously comfortable. I know I need to get rid of them, they should not be worn anymore. But I can't do it, I can't let them go, I'm not ready yet.

In contrast, another woman described how she hated the item of clothing (spandex shorts) she had brought along because of the negative experiences and memories that were part of it. She had initially bought them with the dual purpose of doing yoga and as a form of shapewear to wear under clothing for special events. Yet, she recounted a frustrating story of wearing the item as shapewear:

I wore them to an event with a long black lace dress and all night all I wanted to do was pull them down. Really inelegant, right? I thought, it's better to have my belly sticking out, honestly! The whole yoga thing, yuck. I tried that a couple of times and it was shit, didn't like that. That was that. The pants have had like two wearings and I hate them. It was a really bad purchase and I want to make them go out of my life.

Not only did she express regret in purchasing this uncomfortable item, the pants were even more frustrating because of a complicated relationship with activewear. She went on to describe how her “lack of comfort with this stuff comes from the fact that it wasn't that many years ago that I had a completely different [larger] body than this body... Having to live in a different body, what does that mean?” Feelings associated with a previous body, discomfort with activewear, the frustration she had with her shapewear/activewear pants all became entangled with the materiality.

Barad's spacetime-mattering encourages a recognition of the ways in which space, time, *and* matter are entangled in the world's becoming. Matter plays an agentic role in the production of memories and time and space. In line with their diffractive approach of reading physics through feminist theory, Barad uses the double split experiment to think about memory and spacetime-mattering. They describe how the double split experiment in physics illustrates that “molecules and particles remember what has happened to them” (Barad in interview with Juelskjær, 2012, p. 21). They state that “it might seem perverse or unimportant, or meaningless, to attribute memory to an inanimate happening, but that speaks

of the failure of imagination that gets stuck at the threshold of one of the most stubborn dualisms-the animate/inanimate dualism” (p. 21). Deciding “who” gets to hold a memory, what is animate/inanimate is a matter of boundary drawing practices and “how they matter, and who and what gets to matter” (p. 21). As my participants discussed, their memories were shared with their clothing, the fabric entangled with feelings and experiences.

In an interview with Fiona (30 years old, American, mountain biking), she explained how activewear was comforting and a co-participant in her experiences of her changing body. Due to medical sicknesses, Fiona’s weight often fluctuated and it was activewear she turned to when she was at her heaviest. As she described:

I gained a lot of weight and it was nice to be able to wear activewear because it can give if your body does adjust and you have more flexibility with your wardrobe.... It was nice to have activewear to turn to because “Cool, I can still feel comfortable, in some regards I can still feel a little bit confident and it’s being flexible with me.” And then it was nice because when I started to lose the weight again, I still have this shirt, I still have those pants...Almost everything I have in here, I still own and nice to see it can still fit me at my fattest and me in my trimmest.

In a way, activewear became a part of her health journey, with weight fluctuations, changing body, and self-esteem all experienced with and through the materiality of the clothing.

In a different vein, Dana talked about the love she had for a red cycling top that, although she did not wear anymore, will never retire or donate. When I asked about how she feels wearing it, she reflected on how it reminded her of her childhood: “I don’t know, the feeling I get when I wear it is so different. I feel so tiny and small but apart from that, it feels so good. I had something like that when I was a child, I just remembered, same colours, same lines... Maybe that’s why I like it.” She described feeling good, but also feeling different wearing this top. In part, this could be because the clothing reminded her of her family and childhood: an entanglement of familiarity, materiality, and nostalgia. Thinking about these entanglements of activewear, bodies, and memories is a “way that reopens the past” and emphasises how the “universe itself holds a memory of each event” (Barad in interview with

Juelskjær, 2012, p. 20). For many of my participants, their activewear was part of their memories and feelings, materiality becoming entangled with the body and the self.

Final Thoughts: Boundaries of the Moving Body and Implications

The idea for this chapter began with an interest in the intimate relationship between women and their sports bra. Throughout the various “data collection” techniques, the sports bra was discussed as something necessary for movement, yet something detestable when it was worn by someone else. Thinking about the intimacy of this object and its important role in so many women’s lives led to an interest in how the sports bra-woman relationship calls into question what it actually means to be a moving body and where the body begins and ends when a woman is moving in her sports bra. Using Barad’s agential realism, their writings on bodily boundaries, and the concept of entanglement, this chapter looks at three entanglements that complicate and question bodily boundaries.

The first entanglement explores the intra-actions between the corporeal body and the sports bra, and how sweat, skin bacteria, lotions, sprays, and fabrics come together during exercise. From this intra-action, a woman’s bodily fluids become embedded within the sports bra creating a bacterial fingerprint that lingers in the bra long after the skin and bra make contact. Similarly, when a woman moves there are many forces at play—gravity, Cooper’s ligament, fat tissue, acceleration—which are “counter-acted” by the sports bra. In so doing, the sports bra is affected—the waist band stretches out, the fabric thins, the shoulder straps lose elasticity. These changes on the sports bra are a result of each individual woman’s particular movement patterns and body affected by her age, breast size, differences between individual breasts, and exercise regime. The bra comes to hold all of this “information.” The last example reveals how sports bras, and activewear more broadly, become entangled with participants experiences and memories. Together, these examples provide a way of

conceptualising women's moving bodies as an entanglement of many human and nonhuman forces.

Much of the literature within sport sociology is founded on a universalised understanding of the body as a fixed, fleshy object that interacts with its surroundings. But, as Barad (2007) emphasises:

Bodies do not simply take their places in the world. They are not simply situated in, or located in, their particular environments. Rather, "environments" and "bodies" are intra-actively co-constituted. Bodies ("human," "environmental" or otherwise) are integral "parts" of, or dynamic reconfigurings of, what is (p. 170).

Bodies, and understandings of bodies, are constantly changing and being (re)created through various intra-actions. The ways in which the body is understood is the result, in large part, because of the specific apparatus that is used. As Barad (2007), drawing upon Haraway, describes "bodies in the making are never separate from their apparatuses of bodily production" (p. 159) emphasising how apparatuses play a fundamental role in how knowledge is created. Within much sport sociology and kinesiology, the moving body has been articulated through an apparatus which often tends to privilege visual and sensory evidence. Hence, interiority and exteriority of the body have primarily been premised on the visual boundary between the body and the environment.

When thinking about women's bodies, there are a variety of intra-acting material-discursive factors that have contributed to particular ways of knowing. As this chapter discusses, the lack of women in STEM careers has resulted in women's sportswear and the sports bra not developing until only the 1970s when the same principles and technology were used to make the jockstrap one hundred years prior. Similarly, Parkins (2008) highlights that many "varieties of popular and activist feminism have been relatively hostile to fashion" resulting in "general critical/theoretical silence on the topic among feminists in the academy" (p. 501). She describes how for those feminist scholars who have looked at the clothing and fashion, it has historically been from a critical approach where clothing is part of "a range of

symptoms of patriarchy's discipline of women's bodies" (Parkins, 2008, p. 501) or a tool used to sexualise and objectify women's bodies. While this is a completely valid approach, it has also, in some ways, created boundaries around how fashion and clothing have been understood in relation to women's bodies. There has been less focus on how the clothing supports and moves with women's bodies. The agential cuts and boundaries produced around women's bodies have not been a matter of choice in the "liberal humanist sense" or made by particular individuals. Rather "the specific of particular cuts is a matter of specific material practices through which the very notion of the human is differentially constituted" (Barad, 2007, p. 217). Women's moving bodies are phenomena that have been "constituted and reconstituted out of historically and culturally specific intra-actions of material-discursive apparatuses of bodily production" (p. 217).

However, apparatuses and structures of knowing are not permanent. Instead, they are "constituted through particular practices that are perpetually open to rearrangement, rearticulations, and other reworkings" (Barad, 2007, p. 170). Therefore, Barad and many others propose different ontological and epistemological apparatuses for understanding bodies (and phenomena). In Barad's onto-epistemological framework, the human body is seen as a material-discursive phenomenon where there is an emphasis on the many intra-actions and entanglements that occur between "human" and nonhuman matter. Importantly, for Barad (2003), "boundaries do not sit still" (p. 817) and there is a lack of fixity and permanency around these understandings of the body, rather the body (and conceptualisations of the body) are constantly in a state of being. This fluidity is hopeful as it allows for new agential cuts and intra-actions to occur to produce different ways of knowing and understanding women's moving bodies. This open-endedness produces "a build-up of energy and the creation of new fault lines that disrupt, unsettle, and undermine even the most seemingly solid grounds" (Barad in interview with Kleinman, 2014, p. 8). And ultimately, "it

is this uncertainty and flux that produces the conditions of social change” (Sikka, 2020, p. 3).

Using different apparatuses creates endless possibilities for alternative ways of doing research, for thinking about gender and gender politics, and for knowing women’s bodies.

CHAPTER EIGHT

Conclusion

It was July 1999 when United States Women's National Soccer Team's player, Brandi Chastain, ripped off her jersey after scoring the winning penalty kick of the FIFA Women's World Cup Final to reveal a black Nike sports bra. While this celebration was an expression of pure joy, the image of Chastain in her sports bra turned into a moment of controversy sparking intense discussion about women's bodies, clothing, and acceptability. Many criticised Chastain, calling her actions indecent and setting a poor example for young girls (Schultz, 2004). In so doing, Chastain (and other women soccer players) were held to different standards than her male counterparts as it is common practice for male soccer players to remove their jerseys after games and swap with other players. This moment resulted in discussions around the unequal standards for men and women athletes and has been seen "as a key part of the female journey from athletic afterthought to athletic equal" (Rosenwald, 2019, para 8). While there were many factors that contributed to making this a seminal moment in women's sports, the sports bra played a pivotal and agentic role. The bra became so iconic and controversial that it was displayed at the Sports Museum of America in New York before the museum closed at which point the bra was returned to Chastain where it now hangs, framed, in her home. While it was "just" a sports bra, Chastain recognises that this specific moment and the sports bra "is part of the story. To get where we are now...everything has an evolution" (Rosenwald, 2019, para 9).

Twenty years later and the sports bra is still prompting outrage and igniting controversy as seen by the multiple stories of women being told to cover up while wearing sports bras (Farzan, 2019; Stripling, 2019; "Woman forced to leave gym," 2020). In 2020, a woman (in the United States) wearing a sports bra and leggings exercising at a local gym,

was told by the gym staff she would need to put on a shirt or leave the gym. She was not given an explanation as to why, yet took to social media to voice her frustration:

If the problem is that I will be a distraction, why isn't the accountability on the one who is distracted?... And WHEN will we start ALLOWING women to feel comfortable enough in the gym to wear whatever the f**k is comfortable to them in an otherwise already uncomfortable environment? ("Woman forced to leave," 2020, para 6).

However, the criticism has moved beyond the bra to other forms of women's active clothing, including leggings and crop tops. In 2020, a Sydney woman (Gabi Goddard) was asked to leave her gym after being told her outfit (grey bike shorts and crop top) was inappropriate because there was a group of teenage students sharing the same facility and their teacher voiced concerns. Goddard responded on social media:

...your school is perpetuating the values (with real life consequences) that are demonstrably harmful. Namely that we live in a world where 14-year-old boys are given priority over women. Where women are punished for boys' and men's propensity for objectifying women ("Woman outraged," 2020, para 7).

Women have been told on numerous occasions that their tight fitting athletic clothing is too revealing and distracting to those around them (Tiffany, 2019). Vox reporter, Tiffany (2019), describes "how spandex athletic apparel [has become] a staple of American [and Western culture's] wardrobe and a lightning rod for debates about policing women's bodies" (para 1). As Tiffany (2019) highlights, activewear has featured in political statements for over 20 years.

However, activewear is also clothing that women wear because it is comfortable and functional. It is clothing that can suck and hold in fat, bind and strap breasts, stretch and move with the exercising body. For some women, activewear makes them feel comfortable and enables their body to move in unrestricted ways throughout their day. It is also a technology that is vital for many women's sport and fitness practices. Thus, while activewear is a political "lightning rod" in discussions around women's bodies, it is also part of the material and physical experience of being a female moving body. In this research, I set out to

use activewear to explore alternative ways of understanding women's bodies, fitness, and gender. To accomplish this, I turned to new materialisms and Karen Barad's agential realism, which emphasises the vitality of matter and the ontological inseparability of the material-discursive. Therefore, the primary purpose of this thesis was to explore the possibilities (and limitations) of using Karen Barad's agential realism to think about the activewear phenomenon and women's moving bodies.

When I started this project in 2018, much of the research around new materialisms focused on its theoretical implications and the potential impact this onto-epistemological approach could have on social sciences research. However, there was much less engagement with how these implications could be put into practice within the research process. Therefore, in addition to wanting to contribute to the literature on women's moving bodies and fitness through the lens of Barad's work, a secondary purpose of this project was to explore the methodological implications of using new materialisms, specifically Baradian theorising, throughout the *entire* research process. Hence, the primary research question was, "How does Karen Barad's theory of agential realism contribute to ways of knowing the activewear phenomenon?" The secondary question was, "In what ways does Baradian theory inform the qualitative research process?"

The first half of the thesis addresses new materialisms broadly, speaking to its development, theoretical lineage, and how it can inform the research process. After the introduction, Chapter Two locates this thesis in two bodies of literature; the socio-cultural study of women's fitness/activewear and feminist new materialisms. Chapters Three and Four then look towards the research process of new materialisms, and how Baradian theory informs this project's methods and methodology. In the second half, I use a diffractive "analysis" process to think about the activewear phenomenon, gender, and fitness through three Baradian concepts. While each chapter focuses predominantly on one concept because

this enabled me to examine each in turn, it is important to recognise that the concepts do not exist in isolation within Baradian theorising, but are intertwined and work together to produce Barad's onto-epistemology.

In this concluding chapter, I "reflect" on this research process exploring the possibilities, as well as challenges in using Barad's work. This conclusion begins with a discussion of the contributions of Barad's theorising for both the research process and for knowing activewear. Next, I explore some of the challenges feminist sport sociologists may face when using agential realism to think about sporting and physical cultures. This is then followed by a discussion of possible research directions regarding both agential realism and activewear. The chapter closes with some "final" concluding thoughts about Baradian theory.

Importantly, when beginning this project, I wanted to expand upon previous academic literature and theoretical understandings of women's bodies, but was also deeply committed to doing research that can improve women's lives. Frustrated by decades of feminist scholarship that has failed to dismantle the gendered structures that continue to make many women feel less than or not "good enough," my ontological politics included a search for possibilities to challenge dominant ways of knowing (and producing knowledge) on female embodiment and women's moving bodies. Part of my ontological politics also entailed a desire to ensure that my research and these "new" ways of knowing women's bodies were accessible to all audiences, particularly the women who were part of the research project. Therefore, during this project, I co-wrote articles in mainstream media about the politics of activewear (Brice & Thorpe, 2021c), participated in radio interviews (Brice, 2021), and gave presentations to different academic and nonacademic audiences, always ensuring my participants were aware of these outputs. Thus, this thesis is both an academic journey into activewear and agential realism, but also a political project aimed at challenging conventional ways of knowing and expanding knowledge around women's bodies, activewear, and fitness.

Understanding Activewear: Key Contributions of Agential Realism

After spending more than three years thinking with Baradian theory, I have come to realise that to work with Barad's agential realism is to, as they describe it, re-turn:

Re-turning—not by returning as in reflecting on or going back to a past that was, but re-turning as in turning it over and over again... We might imagine re-turning as a multiplicity of processes such as the kinds earthworms revel in while helping to make compost or otherwise being busy at work and play: turning the soil over and over — ingesting and excreting it, tunnelling through it, burrowing, all means of aerating the soil, allowing oxygen in, opening it up and breathing new life into it (Barad, 2014, p. 168).

Re-turning encourages scholars to take previous ways of knowing and turn them over and over again with different noticings and different emphases. Barad's agential realism enabled me to re-turn women's fitness and issues surrounding body image and fit femininity. In so doing, I took up familiar ideas in the existing literature, but sought to extend them in new directions, shifting my focus towards the materiality and liveliness of activewear and towards the intra-actions of the material-discursive. From this re-turning, I conducted research that accounts for the material-discursive nature of this phenomenon and envisioned alternative ways of understanding activewear and women's bodies. In the following two sections, I elaborate on this re-turning and the contributions Barad's work has made to those interested in new materialisms within sport sociology.

Barad and the Research Process

Since one of the goals of this research was to explore the impact of Barad's work on the research process, I "experimented" with various methods and used diffraction to guide my meaning-making/analysis. The methods were developed based upon two prominent approaches to methods by scholars contributing to the posthuman, new materialist turn. One approach is to use humanist-based methods, but to modify them in order to think and operate differently within the larger research apparatus (Fox & Alldred, 2015, 2018a). A second

approach is in line with postqualitative inquiry where scholars are encouraged to develop new methods and research designs that align with the ontology of new materialisms.

Interested in the possibilities of both of these approaches, I developed a series of methods to explore the activewear phenomenon. In using humanist-based methods, I attempted to adapt them in line with new materialisms (e.g., interview guide that focused more on relationality, use of photos of activewear) and also understand them through a diffractive approach to decentre the human and to see the multitude of intra-acting entities that are part of the activewear phenomenon. These methods included focus groups, photo diaries (participants either took photographs of themselves in activewear or just the clothing), individual interviews, and moving methods (participants and I went hiking). In addition to these humanist-based methods, I developed two creative and innovate forms of data collection; “living with the sports bra” and “cutting together-apart.” In the “living with the sports bra” method, I led a collaborative project with two other feminist scholars where we used Baradian theory to think through the entanglements of a lululemon Enlite sports bra. This was an unscripted, fluid process which involved each of us wearing our own Enlite for a period of seven months, whilst engaging in an online dialogue (in addition to visiting a lululemon store and online yoga class together) (Brice et al., 2020). Part of this project also entailed me going to Vancouver, Canada to visit the lululemon headquarters where I received a tour of White Space (their research facility), in addition to interviewing two of the researchers who helped design Enlite.

Another creative method was “cutting together-apart” inspired by Baradian theory and the arts-based methods used by various other new materialist scholars (Hickey-Moody et al., 2016; Hickey-Moody & Willcox, 2019; Safron, 2019; Shelton et al., 2019). In “cutting together-apart,” I conducted two focus groups with participants and feminist scholars. In both of these focus groups, participants were asked to cut apart their (or donated) activewear and

then put it back together any way they choose. This resulted in some participants fashioning new pieces of clothing, others creating collages with magazines, and some who decided not to put it back together. Similar to “living with the sports bra,” “cutting together-apart” was not designed with a specific intent or goal in mind, but was rather about experimenting with theory and method. In order to “make sense” of the various methods and “data,” I turned towards Barad’s concept of diffraction.

Barad’s understanding of diffraction brings together Donna Haraway’s (2004b) writings on diffraction with the physical phenomenon of diffraction. They describe diffraction as an “apt metaphor for describing the methodological approach.... Of reading insights through one another in attending to and responding to the details and specificities of relations of difference and how they matter” (Barad, 2007, p. 71). In my research, rather than reading particular fields through each other, I brought together various forms of data. Similar to Linghede (2018), my diffractive approach was a “process of ‘reading-the-data-while-thinking-the-theory’” that worked to “disrupt thought as we ‘plug in’ multiple texts and concepts into data and read them through one another” (p. 574). However, data were not limited to the interview transcripts or photo diaries, but included theory, concepts, conversations, participant data, my own experiences, and the fabric of activewear. Diffraction meant seeing how all of this data—human and nonhuman—intra-acted, overlapped, diverged, and produced particular ways of knowing the activewear phenomenon. Drawing upon Barad, Haraway, and Trinh Minh-ha’s writings on diffraction, Geerts and van der Tuin (2021) describe how:

...thinking diffractively steps out of the phallogocentric, reflexive logics of producing the Same all over again by acknowledging the differences that exist, while at the same time pointing at where the problematic reductions and assimilations of difference have taken place (p. 174).

Diffraction can be used and interpreted in many ways. For me, similar to how Geerts and van der Tuin (2021) describe, diffraction was to re-turn previous understandings of activewear

(i.e., the power of dominant discourses on women's experiences of their moving bodies), to think about how we do research on women's bodies and how we *know* women's fitness practices.

While diffraction can be useful and can be re-turned with other approaches, it is important to recognise that a diffractive approach can be challenging in various ways. Holly Thorpe, Marianne Clark, and I have reflected on our experiences in a transdisciplinary project on women's health and amenorrhea, highlighting how "even for those with a commitment to collaborating on a topic of shared interests, ontological and epistemological differences and power inequalities between the disciplines can evoke (sometimes insurmountable) tensions and challenges" (Thorpe, Clark, et al., 2020, p. 19). Within my own research, it was not necessarily issues with different disciplines coming together that was challenging, but making sense of an entanglement of thought and data. In other methodological approaches scholars often look across the data for similarities to organise and thematicise. But diffraction "functions to move away from normative readings that zero in on sameness towards the production of readings that disperse and disrupt thought" (Linghede, 2018, p. 574) which results in "multiplicity, ambiguity and incoherent subjectivity" (ibid). It is a challenge to take this multiplicity and turn it into a coherent and logical thought. For me, it was a process of writing and rewriting chapters and attempting to clarify concepts and ways of knowing, yet simultaneously not oversimplifying them.

While it can be challenging, diffraction is about "respectful engagements with different disciplinary approaches" (Barad, 2007, p. 92) providing a way for scholars to conduct transdisciplinary work that does not "uncritically endorse or unconditionally prioritise one (inter)disciplinary approach over another" (p. 92). For sport sociologists, diffraction encourages and allows for research that accounts for the many different aspects of being a moving, living, body (e.g., biology, anatomy, sociology, psychology). In addition to

transdisciplinary work, it also encourages scholars to bring together a variety of human and nonhuman matter in that same respectful and critical way, paying attention to the fine details that arise from reading data through each other. Within this project, using diffraction helped to enable a re-turning of previous ways of knowing women's bodies and activewear resulting in new understandings of the role of activewear in the production of gender and femininity. It is to these understandings that I now turn.

Material-Discursive Understandings of Activewear

This research used three Baradian concepts to explore the potential of Barad's agential realism for thinking about activewear. Chapters Five through Seven use different Baradian concepts—spacetime-mattering, intra-action, entanglements/bodily boundaries—to think about women's bodies, fitness, and the activewear phenomenon. Here, I briefly review each of the three chapters and concepts, before offering an agential realist reading of activewear.

Exploring Baradian Concepts: Spacetime-mattering, Intra-action, and Bodily Boundaries

Chapter Five used Barad's concept of spacetime-mattering to think about the feminist politics within activewear and how the activewear-clad body in public spaces works to (re)produce femininity (Brice, In Press). While many feminist and sporting scholars have explored the complexity of space, bodies, and gender (Borden, 2001; Duncan, 1996a, 1996b; Johnston & Longhurst, 2010; Marfell, 2016; Massey, 1994, 2005), as well as how time and space are inextricably linked (Braidotti, 2013a, 2019; Thrift, 2007), Barad's spacetime-mattering re-turns these ideas. A Baradian approach emphasises the ontological inseparability of time, space, and matter, and the world's dynamism, where "every bit of matter, every moment in time, every location...is diffractively/differentially constituted" (Barad, 2017, pp. G109-110). This has many implications for scholars interested in the moving body as it asks scholars to think about how the "past is never left behind, never finished once and for all" (Barad, 2007,

p, 181) or how space is “not a collection of pre-existing points set out in fixed geometry” (ibid, p. 180). Instead, scholars are encouraged to explore how time, space, and matter are all entangled in the production of phenomena.

Taking up this concept, Chapter Five explored the activewear phenomenon as entangled with material-discursive events across spatiotemporalities. More specifically, I discussed how Barad’s spacetime-mattering meant recognising how the phenomena of the “eternally wounded woman” (Vertinsky, 1994a) and various codes of femininity from the past two centuries are entangled with women’s contemporary experiences of wearing activewear. With its tight-fitting nature and lack of coverage, activewear often puts the (strong) female body on display, in addition to emphasising the mobility and athletic nature of the wearer. Through this, activewear can be seen (in some ways) to counteract the historical production of femininity and instead contribute to the production of femininity as being strong, athletic, and mobile. Spacetime-mattering provides a way to think about wearing activewear as an (un)conscious political statement as it does not require the human, experience, or even language to resist. It is a concept that re-turns historical analysis and previous literature around time and space, encouraging scholars to look towards the many different events, ideas, things from across space and time as not only impactful, but active in the becoming of the world.

Chapter Six used Barad’s concept of intra-action and the material-discursive to discuss the ways in which the materiality of activewear intra-acts with prominent discourses to produce an unattainable, idealised form of “fit femininity” (Brice & Thorpe, 2021b). In agential realism, phenomena do not exist as preformed, bounded entities existing “out there” that need to be researched and discovered. Rather, reality is composed of “things-in-phenomena” (Barad, 2007, p. 140) and of material-discursive intra-actions. Therefore, fit femininity is not simply a discursive construction that activewear comes to symbolise.

Instead, this phenomenon and version of femininity is created as the fabric, fat, muscle, skin, and advertising all come together and intra-act to (re)enforce the importance of a slim waist, a big “booty,” and a sweat free body in many Western cultures. It is both the material and discursive that are agentic in the production of phenomena.

Barad’s concept of intra-action and the material-discursive make an important contribution to the work of feminist scholars interested in how gender, politics, bodies, and phenomena are produced. Barad’s theorising re-turns decades of feminist scholarship about how ideas of gender are produced, encouraging scholars to look beyond the discursive in the production of phenomenon. Of course, they are not the first to do so, but agential realism encourages the researcher to shift their attention slightly towards the nonhumans, towards intra-actions, and towards boundary making practices that produce particular phenomenon. Taylor (2020) nicely summarises how her thinking has changed since engaging with new materialisms writing, “Now paying attention to the ontologically diverse confederations entailed in material matterings is key to my research orientation...as is the close noticing of how objects-bodies-spaces are entangled and produce cuts...” (p. 28). For feminist sport sociologists, this means looking at how nonhuman objects contribute to gender, to ideas around women’s health, to systems of oppression, and to inequalities present in society. I agree with Pasley (2021) who succinctly states that, “agential realism is simply open to registering the radically different ways in which gender materialises” (n.p.).

In the final conceptual chapter (Chapter Seven), I used Barad’s writings on boundaries and the idea of entanglement to explore the relationship between women and their sports bras (as well as activewear more broadly) to expand understanding of the moving body. Many feminist scholars have theorised the body in ways that challenge dominant understandings of a body as bound by skin and as simply anatomical. Barad (2007) encourages scholars to take some of these concepts and re-turn them with a focus on

nonhuman matter and a focus on the “inherent indeterminacy of bodily boundaries” (p. 157). Humans and bodies are “particular (re)configurings of the world with shifting boundaries and properties that stabilise and destabilise” (Barad, 2003, p. 818). Taking up the idea of the intimate relationship between women and their sports bras, I derived three sports bra-body entanglements: (1) sweat, bacteria, and the sports bra; (2) mechanical forces, movement, fat, bodies, and the bra; and (3) memories, fabric, and emotions. Through these examples, I explored how the human body can be conceptualised as an entanglement of human and nonhuman entities and forces.

Barad’s concept of entanglement and their focus on the production of bodily (and various other) boundaries is helpful for sport sociology scholars who want to continue focusing on the human, but also account for the many entities/things/objects that intra-act with humans during movement (e.g., air, earth, water, clothing, equipment). It encourages scholars to question what it means to be a moving body and to look towards all of the other nonhuman matter that are co-participants in movement. Their writing on bodily boundaries also means looking towards *how* those boundaries are produced. Within this thesis, looking at the production of understandings of women’s bodies and sports bras, underscored the role gender has played in the technological development of sporting equipment for women and how women’s bodies are understood as objects to be controlled within STEM fields. Entanglement and bodily boundaries offer another conceptual tool to reimagine sporting experiences and how we come to understand and know bodies and movement.

An Agential Realism Approach to Activewear

As discussed throughout this thesis, agential realism is “an epistemological-ontological-framework that provides an understanding of the role of the human and nonhuman, material and discursive, and natural and cultural factors in scientific and other social-material practices” (Barad, 2007, p. 26). It encourages scholars to look at how both human and

nonhuman matter intra-act to produce “reality.” Højgaard and Søndergaard (2011) dissect the individual terms in agential realism, describing how agential is used to denote “the conceptualisation that everything does something, that everything is performative...everything is always in intra-activity with something else” (p. 345), while realism is “about real effects of intra-activity” (p. 346). While “everything” is always intra-acting, Barad (2007) does provide the concept of “*agential separability*—the condition of *exteriority-within-phenomena*” (p. 140, emphasis in original) to describe how there are particular intra-actions that demarcate (cut) one entity from another. Activewear is one such entity that creates boundaries and cuts around (acceptable) femininity and gender.

Activewear works to co-produce understandings of the “modern” socially acceptable and idealised woman as someone who “cares” about her health, who exercises, whose body is thin and toned, but has a “booty,” whose breasts are controlled by a sports bra, who wears tight-fitting (and, at times, revealing) clothing, who is cisgender, and (often) White. The production of this form of femininity lies not only in the discursive construction of activewear, but is created through the material-discursive phenomenon of activewear, where activewear is a co-participant in the production of ideas and understandings. The clothing shapes the body, it makes some bodies (toned and thin) more visible than others, it reveals toned stomachs and arms, it can result in some bodies (particularly bigger) being shamed and criticised, it causes (some) women to feel shame when they have rolls or pride when stomachs are flat. Through these intra-actions, activewear creates boundaries around acceptable femininity.

An agential realist account, however, also means exploring what is excluded by these cuts. Agential cuts “do not mark some absolute separation but a cutting together/apart—‘holding together’ of the disparate itself” (Barad, 2012, p. 46). Said differently, “What is on the other side of the agential cut is not separate from us” (Barad in interview with Dolphijn &

van der Tuin, 2012, p. 69). Therefore, agential realism means also recognising who and what are often (but not always) “excluded” from mattering by activewear; “gooey” or leaky bodies, maternal bodies, fat bodies, non-White bodies, masculine bodies, transgender bodies, disabled bodies, to name a few. Therefore, the fit femininity that activewear produces is created by both what is made visible, but also what is excluded from mattering.

Activewear matters not only because it symbolises femininity or contributes to representations of femininity, but because it co-produces boundaries around acceptable femininity. These boundaries are performed through material-discursive intra-actions by both humans and nonhumans, from small actions such as high-waisted pants squeezing fat to create the appearance of a flat stomach, to larger actions such as women protesting about their right to wear yoga pants when and where what they want. In this project, Barad’s agential realism offered a re-turning of scholarship on women’s bodies and activewear that has led to similar ideas about the way activewear produces a particular version of acceptable fit femininity. Yet, along the way it has also led to new ways of envisioning the relationship between women and activewear, the boundaries around femininity and how these are created, understanding the body as an entanglement of human and nonhuman factors, seeing agency as arising from clothing-human intra-actions, and how wearing activewear can be an (unconscious) political act. For feminist sport sociology scholars, Barad’s agential realism offers many possibilities for re-turning understandings of bodies, fitness, and gender. It encourages scholars to explore the material and discursive intra-actions that produce phenomena and how these intra-act to produce boundaries and cuts around who and what comes to matter.

Challenges of Agential Realism

While agential realism enabled various ways of understanding activewear, there are challenges that scholars may face when working with this ethico-onto-epistemology. In this

section, I address three areas of tension that emerged in my own work when engaging with Barad's concepts, and some of the challenges socio-cultural scholars may encounter when using agential realism, in particular. These include difficulties actually "implementing" or "applying" Baradian concepts, the journey agential realism requires of the researcher, and difficulties in relation to representation.

"Applying" Baradian Theory

Agential realism was created through a diffractive approach where insights from poststructuralism and feminism were read through quantum physics principles. Bringing together writings from scholars such as Haraway, Foucault, Butler, and Derrida with quantum physics principles from primarily (but not exclusively) Niels Bohr, Barad explores how ideas and concepts from each overlap with each other, interfere, and diverge. Although this approach has much to offer, with Barad reading such disparate bodies of literature through each other, there are limits to how much a social scientist (without any training in quantum physics) may fully understand Barad's theory of agential realism. Within this project, I found myself challenged by the physics principles and had difficulty "reading" them through social sciences and feminist studies. Even with extensive attempts to better understand the physics principles, there were times when the physics was not accessible. This sentiment appears to be shared by other social science scholars, with some turning to reading basic introductions to quantum physics to help better understand and contextualise Baradian theory. It can be challenging to scholars to take these theoretical concepts inspired by physics and apply them with the empirical and more tangible/practical aspects of a research project (i.e., data, researcher positionality, ethics, and responsibility).

In particular, Barad's writing around researcher positionality and diffraction/reflexivity remain quite abstract as they often rely on physics principles to explain diffraction in relation to the researcher's role in knowledge production. In agential realism,

the boundaries between researcher/researched, and object/subject are challenged and instead researchers are understood as being part of the research process. It requires scholars to “in[sert] oneself into these [research] practices, to feel the movement of practices from within...sensing how the specific of practices makes a difference, practically and emotionally, in the experience of becoming positioned in certain material-discursive practices” (Hultin, 2019, p. 101). This is a justification for Barad’s critique of reflexivity which they describe as being on the optics of reflection and thus, “still holds the world at a distance” (Barad, 2007, p. 87). Instead, they offer diffraction as a “way of understanding the world from within and as part of it” (Barad, 2007, p. 88) where there “is no researcher as independent subject” (Bozalek & Zembylas, 2017, p. 117). Diffraction seeks to explain how the researcher is entangled within the process, their self dispersed, made and remade throughout research.

At times during this research, I struggled to put diffraction into practice in a way that accounted for the human researcher, but did not suggest all knowledge and decisions within the research process are conducted by the human alone. Saying “I did this” assumes an independent, acting researcher and enacts a binary between the researcher and the researched. Writing about diffraction, difference, and identity, Barad (2014) explains:

...it’s important that any “I” that might have seemed to give a sense of narration be interrupted, since this position is counter to diffracting...this story in its ongoing (re)patterning is (re)(con)figuring me. “I” am neither outside more inside; “I” am *of* the diffraction pattern (p. 181).

However, what does being part of the diffraction pattern entail? What does this look like in practice? Barad has not written about their positionality explicitly or how they entangled in the research practices. Across their scholarship, there is little to nothing about themselves and how they are diffracted across research and ways of knowing. Thus, they provide little direction as to how diffraction operates in practice in ways that differ from reflexivity. As explained in Chapter Four, I attempted to use diffraction to discuss my role in the research by

conducting a “diffracted reflexivity.” However, it was quite challenging and, at times, I found myself repeatedly creating boundaries between me and the research and engaging in a more reflective process.

Along similar lines, it was challenging to think about and account for the agential cuts within the research process. Barad (2007) describes agential cuts as boundary making practices that are created “by the larger material arrangement of which ‘we’ are a ‘part’” (p. 178). Yet, there were decisions I made as the researcher within this project that did enact agential cuts (e.g., methods to use, “analysis” techniques, following particular threads of thought). While important to think through, there is little guidance as to *how* to practically account for such intra-actions and agential cuts in the research process. Calvert-Minor (2014) critiques Barad for being anti-humanist, arguing that agential realism “must retain a particular form of humanism, a humanism that stakes human subjectivity as the locus of rationality and objectivity, without which it creates intractable problems” (p. 124). Calvert-Minor (2014) continues, writing, “No matter how hard one might want to deprioritise all methodological priorities in Barad’s ‘diffractive’ methodology, one cannot forgo certain epistemological ones. The human must remain the centrepiece in conceptions of objectivity and our understandings of intelligibility” (p. 136).

In some ways, I agree with Calvert-Minor (2014), as this research was created through me, my understandings of Barad, activewear, and the various decisions I made during the research process. However, I also understand Barad’s point that the researcher is not an independent, wilful individual, but is a phenomenon themselves. The agential cuts were enacted by me intra-acting with theory, with advisors, with activewear, and with data. I experienced tension between Barad’s ontology—objects, things, humans intra-act to produce knowledge as a phenomena—with a recognition that I affect the research process and make particular agential cuts that impact the research direction and knowledge produced. When

turning to Barad for guidance regarding this tension, there is little practical application of these concepts (or researcher positionality more broadly), and thus diffraction and researcher positionality remain quite abstract and difficult to implement. This is not to say that diffraction is not useful for exploring the role of the researcher, but rather it is an area that requires further examination, perhaps with more education in quantum physics to more deeply understand how the principle works and can be put into practice in social sciences.

A Process of Learning and Re-Turning

Another challenge of working with Barad's concepts, is that it requires researchers to engage in a process of learning, unlearning, and re-learning. In writing about the production of knowledge in feminist new materialisms, Taylor (2020) describes how producing knowledge should be understood as "a doing, an unfolding, a process that is open, nomadic, unfinished and perhaps unfinishable" (p. 30). In a way, the same is true with working and understanding Baradian concepts. It is an open-ended process of thinking and experimenting, of getting entangled with the theory and lost in the concepts, of playing with possibilities, of re-turning over and over again. It is challenging to fully understand this ethico-onto-epistemological shift as articulated by Barad, particularly for social science scholars who have been trained to prioritise human experience and voice. To recognise the vitality of matter, to see agency as arising rather than being possessed, and to emphasise relationality and inseparability all require changes in language, in thinking, in writing, and in the *doing* of research. Throughout this research, I often found myself slipping back into humanist tendencies whether it be in language (e.g., interaction versus intra-action, localising agency) or writing in a way that attempted to clarify, simplify, and communicate in a linear format. Thus, working with Barad is a process of (un)learning, becoming with theory, and re-turning that offers the potential to transcend the boundaries around a doctoral thesis, a research project, or a single publication.

Within this research project, however, I was able to see my own understanding of the theory progress, and see potential for re-turning some of my methods. During this project, I completed two moving method interviews where participants and I went hiking in activewear (see Chapter Three). I only completed two because the participants described that they felt they were at a point of saturation. At this time, I was only a year into my reading of new materialist scholarship, and admittedly, felt the participants were simply repeating what they had said earlier and that the moving methods did not provide me with anything new or different from previous interviews. Now, after three years of engaging with Baradian and new materialist theory, I recognise that this frustration stemmed from a more logocentric viewpoint where I was prioritising language. A Baradian approach to hiking and moving methods would have meant moving away from privileging language and looking more towards entanglements.

Drawing upon various research projects, Fullagar (2020b) underscores the importance of walking methods (in addition to dance and body mapping) through new materialist and post-qualitative research: “walking propels bodies into thinking-making-doing whereby knowledge creation is entangled with its sharing, circulation and critical examination with the publics it desires to engage and affect” (p. 125). However, this ability to understand the importance of moving methods and of different ways of knowing meant the hiking interview (besides what the participants said) manifested only after living with Baradian theory for three years. Therefore, for scholars interested in working with Barad, there needs to be a recognition that it is a circuitous process of doing and doing again, of learning and unlearning, of excitement and frustration. Such processes require time to read, learn, explore, and play, to re-turn again and again.

Representational Challenges

As discussed above, one of the challenges facing many scholars who choose to draw on Barad's work is being able to make practical use of some of the abstract concepts, particularly those where they rely heavily on quantum physics. A related issue, is how to represent the type of thinking enabled by agential realism in a clear and logical manner. Agential realism encourages a way of viewing the world as entangled, complex, and intra-acting. While agential cuts help to create boundaries around ideas and phenomena, attempting to represent this type of thinking and knowing can be extremely challenging. This is especially the case for many scholars within social sciences who have been trained to write in a linear style and who often rely on language as a form of representation. Within this thesis, writing was part of the diffractive meaning-making process, but was also used to represent the thinking that Barad enabled. For some chapters and concepts (Chapters Six and Seven), I was able to more easily use familiar styles of writing to articulate Baradian understandings of activewear. This is not to say it was an "easy" process in general—using writing as a form of representation—but I did not find language to be a limiting factor in my ability to articulate Baradian ideas. However, upon reflection, language and writing proved more limiting when attempting to describe the entangled nature of space, time, and mattering (Chapter Five).

While I was able to theoretically understand a spacetime mattering analysis of activewear, I found it difficult to represent this thinking in way that would be different from a more traditional historical analysis (of course, historical analysis themselves can be challenged by language). Language was limited in its ability to show how ideas, materialities, experiences, discourses, and events from different spatiotemporalities are entangled. For example, the word "historical" immediately implies to the reader that it is in the past, while terms such as "today" and "contemporary" assume present tense, which creates divisions and is antithetical to that entangled nature of spacetime mattering.

Similarly, when describing the entanglement of previous discourses with activewear today, I often would use the verb “affect.” Yet, using the term “affect” implies a binary and a linear cause and effect relationship, which is very similar to how a historical analysis understands the ways objects affect the present. I was often relying on Barad’s terminology of “entangled” and “intra-act” to signal ontological inseparability. Thus, I found spacetime-mattering to be a concept that was theoretically interesting and helpful in thinking about feminist politics, but when writing about it, was very similar to more traditional and/or materialist historical analyses. This is not necessarily a limit of spacetime-mattering, but of the use of writing to fully embrace the representational innovations necessary when using Barad and new materialism. In the future, I am interested to re-turn spacetime-mattering exploring alternative representational approaches.

In so doing, I would focus even more on the co-participatory nature of matter and look towards different modes of representation that can allow for the entangled nature of spacetime-mattering. In writing about the potential of new materialisms for historians, Schouwenburg (2015) describes how a Baradian new materialist approach to history offers a “new *conceptualization* of developing theory and reading texts, which cut through established dichotomies between matter and meaning or culture and the social” (p. 61). Within spacetime-mattering (and new materialisms) objects are not only “cultural artefacts made and modified by humans” (p. 66) or “passive transporters of human ideas” (p. 62), but are “productive and agentic force[s]” (p. 65) that intra-act with humans to produce phenomena and society. Spacetime-mattering is about the nuances, about the fine details of how we know, use, and understand history (Thorpe et al., In Press). Thus, there is great potential to continue re-turning with spacetime-mattering. However, scholars must be prepared for some of the challenges they may face in being able to represent such entanglements between space, time, and matter in the production of phenomena.

Future Directions

Throughout this final chapter, I have spoken to both the potential in using Baradian theory and the challenges scholars may face as they work with this ethico-onto-epistemology. While I have “experimented” with Baradian implications for the research process (i.e., methods, “analysis”, researcher positionality), I believe there is great scope here to continue pushing, pulling, and playing with Barad’s work, to continue exploring its implications for the research process and for how scholars understand various phenomena. In addition, there is much more research that can be done around activewear itself. As this project has shown, activewear is a vital force in the production of femininity and an important part in understanding gender in the 21st century. While activewear may go out of fashion as quickly as it came in, this thesis also reveals the importance of finding approaches that recognise nonhuman agency of matter (i.e. clothing) in women’s sporting and fitness experiences.

Barad and the Research Process

As discussed throughout this chapter, there are various challenges that scholars may face when thinking and working with Barad’s texts. There is potential for future research to take up these challenges and continue re-turning with Baradian theory. Specifically, scholars can continue exploring the practical implications of Barad’s concepts regarding the methods, “analysis,” representation, and researcher positionality. Recently, there has been a growing body of literature in which scholars have either re-turned humanist methods or developed completely new methods as a way to recognise Barad’s onto-epistemological concepts (see Chapter Three for an overview). Using dance, art, sculptures, poetry, story completion methods, object interviews, and various other methods, scholars have attempted to focus on the intra-active nature of humans and nonhumans. Within my own research, I can see the possibilities of re-turning my moving methods and “living with the sports bra” method. Future possibilities for “living with the sports bra” could entail a transdisciplinary project

with scholars studying material science and sports bra, reading insights from my collaborative project through their knowledge of the material properties of the sports bra.

Yet, within this posthumanist research scholars face many questions, tensions, and challenges. New materialist, posthumanist scholars have described the difficulty of including nonhuman matter, especially within participatory research where nonhuman elements such as clothing, water, bees, and air are seen as co-participants in knowledge production (Bastian et al., 2017). Some scholars have critiqued the very possibility of “giving agency” or “giving voice” to a nonhuman object describing how new materialists have “come to colonise [them]” (Mayes, 2019; Petersen, 2018, p. 12; Rekret, 2016). Petersen (2018) writes how “researchers, against their stated intention, come to take and own the nonhuman actors, whose agency, existence and integrity they graciously wish to respect and honour” (p. 12). Attempting to “give voice” to nonhuman matter, and to move into a completely posthumanist, new materialist realm is challenging, especially for scholars trained in humanist research practices (Thorpe, Brice, & Clark, 2020). This challenge presents an opportunity for scholars to continue working in this space, to experiment with methods and the research process to account for matter.

In this project, thinking with Barad produced a way of understanding women’s moving bodies as an entanglement of human and nonhuman matter (i.e., sports bras, lotions, sweat, and gravity) (see Chapter Seven). Thinking about the body as an entanglement has implications for how sport sociology scholars can—ontologically and epistemologically—conduct research on the moving body. Within women’s fitness, this could expand the research focus from women’s anatomical bodies alone to the intra-actions between bodies and weight machines and how the machines play an active role in shaping and moulding the body. It would also be interesting to re-turn Markula’s (2006c) Foucauldian inspired research where she talks about the disciplining effect of mirrors and group fitness studios in women’s

fitness practices. How would a Baradian approach where the mirror and studio are not passive, but intra-act with bodies expand our understanding of women's fitness practices and behaviours? In line with this, Barad could be used to re-turn Foucault's ideas of discipline with lululemon's new at-home interactive Mirrors, described as the "nearly invisible home gym" (MIRROR, 2021). Similarly, there is potential in using new materialisms to explore the entanglement of fitness equipment, women's bodies, gender, and technology.

COVID-19 has greatly affected how women exercise with sales of some online exercising equipment and services increasing sales by over 100% (Duffy, 2021). For example, according to one report, both Peloton (bike) and Tonal (TV and band workout system) sales have increased by 420% and 800%, respectively since early 2020. In addition to the equipment, these companies offer live classes connecting women (and all users) at home to other participants and instructors. An agential realist approach could explore how these technologies—bike, the Mirror, and Tonal— are active in the production of ideas around health, bodies, gender, and fitness. Agential realism allows scholars to develop research practices that "reimagine humanistic objectives through a posthumanist accounting of the complex, enduring relations between people, ecologies, and nonhuman actors" (Clevenger et al., 2020, p. 561).

Agential Realism and Activewear

Across all research projects, decisions are made regarding the methods to use, the themes to follow, and the lines of flight to be pursued. Agential realism requires scholars to explore these decisions and to think about how all intra-actions during the research project enact boundaries resulting in particular inclusions *and* exclusions. Barad (2007) stresses that accountability within agential realism, "must be thought of in terms of what comes to matter and what is excluded from matter" (p. 184). Thus, embedded within agential realism is an "ethics of inclusion and an ethics of exclusion" (Hollin et al., 2017, p. 918) where attention

must be paid to cuts that produce particular exclusions. However, Barad is also clear that these intra-actions that produce inclusions/exclusions are not the result of individuals or human intentionality, but rather result from agentic intra-actions between humans and nonhumans. Within this thesis (and as in all research projects), there were various intra-actions in the research apparatus that created boundaries around the knowledge produced resulting in particular inclusions, but also exclusions. These exclusions are important and can provide direction for future projects. Here I explore two ways to re-turn Baradian theory to look towards these exclusions and possibilities; the heteronormativity of activewear and how differences come to matter.

The Heteronormativity of Activewear

When recruiting for this project, I made various efforts to attract a diverse sample regarding age, gender, sexuality, and ethnicity (see Chapter Three for recruitment efforts). In some ways, the participants were very diverse ranging in age from 21-63, representing many different nationalities and ethnicities, having very different body shapes/sizes, and competing in a range of different fitness activities. However, in other ways, the women were quite similar in that they were all cisgender and only two of the 22 women interviewed were part of the LGBTQIA community. The similarities amongst the women could have resulted in part because many of them fit the targeted demographic of the activewear industry. When this project began, the activewear industry primarily used models that represented a very young, heteronormative, White, cisgender form of femininity and often those women who wore activewear conformed to this ideal. This form of femininity present in the activewear industry could have affected who felt comfortable as a participant in the research project, potentially excluding some queer and transgender women. Also, as a straight, White cisgender woman who worked in the fitness industry and felt very comfortable wearing and being in activewear, I am very similar to many of the participants. Therefore through my own

positionality and the self-selection method, primarily it was the voices of cisgender, White, physically-able and straight women who were most present throughout this research project. This resulted in an exclusion of those voices and experiences of women and people who do not conform to this heteronormative version of femininity.

Also, the goal of this thesis was to explore the possibilities of using Baradian theory to think about the activewear phenomenon. This resulted in the development of questions and methods that focused more on acknowledging the vitality of activewear and on the interactions between activewear clothing and participants. Focusing more on the liveliness of activewear meant that this project did not explicitly and directly explore the specific ways activewear contributes to the production of specific types of femininity, such as heteronormative femininity. Future research could be developed that works towards attracting a more diverse participant sample (regarding gender, sexuality, race and ethnicity, dis/ability) with people who may have more complex, nuanced, and problematic relationships (i.e., those with disabled bodies, transgender women, nonbinary people) with activewear. Similarly, other projects could focus more explicitly on the various representations of heteronormativity in the activewear phenomenon that have been doing particular “gendered work” for many years.

Interestingly, however, near the end of this thesis, there were shifts in the activewear phenomenon regarding the diversity of bodies represented. Recently, across many different activewear brands, companies have been using models of varying shapes and sizes, cultural and ethnic backgrounds, and with some even featuring gender nonbinary models. This has been seen in local Aotearoa New Zealand brands, such as the Hine Collection which uses women of differing sizes and ethnicities, but has also be seen on the advertising of larger international companies, such as lululemon and Nike, who have included gender nonbinary models. While an argument can be made that using more diverse models is primarily a

mechanism to increase revenue, the inclusion of different models is important as it works to represent more versions of femininity beyond the dominant heteronormative femininity historically seen in activewear. There is also a shift in the production of activewear as there has been an increase in brands that produce modest athleisure (e.g., hijabs and more full coverage) for women from cultural or religious backgrounds who prefer to show less of their bodies (Hwang & Kim, 2020; Lin, 2021) with many of these brands started by women of colour. As activewear has gained popularity, it is also being offered at a range of prices becoming more accessible to women from varying socio-economic classes. Therefore, who and what bodies are wearing activewear is becoming more diverse with more femininities being represented across the phenomenon that might not have been present at the beginning (and prior) to this thesis. Future research could use Baradian concepts to explore this increasing representation, looking towards the ways in which human and nonhuman matter are challenging (and reproducing) the heteronormative, cisgender, White representation of femininity in activewear.

How Differences Come to Matter and the Production of Activewear

In addition to using Barad to explore the changing nature of activewear, future research could focus more explicitly on how activewear contributes to the production of differences between humans regarding such ideas as age, gender, race, and sexuality. While there are many ways this could be explored, Barad's diffraction offers possibilities. In this thesis, diffraction was primarily used as a methodological tool to think about activewear differently than previous understandings. However, in re-turning diffraction, there is the possibility to explore the ways in which activewear affects which bodies and whose bodies come to matter, as well as the differences between these bodies. As Barad (2007) writes, diffraction as a process of reading insights through one another, "help[s] illuminate differences as they emerge: how different differences get made, what gets excluded, and how these exclusions matter" (p. 30).

Diffraction can be helpful for thinking about the production of differences as it asks scholars to map those agentic intra-actions between humans and nonhumans that produce particular ways of knowing and being.

Barad's understanding of difference can be used to think about differences between humans, particularly "identity" in a way that does not work along categorical lines, but sees identity as more relational and emerging within and through phenomena. As Davies (2017) emphasises, in a diffractive analysis, "Barad takes us away from clearly demarcated entities to *blurred* boundaries and the *enactment of those boundaries*, disrupting the binary thinking that separates the Self and Other, representer and represented, being and doing" (p.267, emphasis in original). Identity and differences between people are not seen as existing prior to a phenomena, but rather emerge through relations and are constantly changing. In writing about identity, Barad (2014) describes:

The key is understanding that identity is not an essence, fixity or givenness, but a contingent iterative performativity, thereby reworking this alleged conflict into an understanding of difference not as an absolute boundary between objects and subject, here and there, now and then, this and that, but rather as the effects of enacted cuts (pp. 173-174).

Thus, differences between humans (e.g., race, gender, sexuality, and class) are not absolute, nor do they exist prior to a phenomena. Rather, scholars are encouraged to explore the ways in which these differences emerge through entanglements within phenomena.

While there are various possibilities for using diffraction to explore the activewear phenomenon and difference, one direction could be to think about the ways in which the production of activewear works to create differences and inequalities amongst women regarding race and class. During the cutting together-apart activity, one of the participants commented on how she felt guilty because she was undoing someone's (presumably a woman from the Global South) hard work in sewing and producing activewear. Many sport sociology scholars have explored the anti-sweatshop movement in the 1990s and the

exploitation of women labourers from poorer countries in the production of sportswear clothing (Cushman, 1998; Dworkin & Messner, 2002; Greenberg & Knight, 2004; Williams, 2016). Barad's scholarship can contribute to and re-turn this literature by emphasising how these processes of production are not just exploitative, but *productive* in creating differences amongst women of different ethnicities, between the Global North and Global South, and the wealthy and the poor. According to Barad (2007), "production is a process not merely of making commodities but also of making subjects, and remaking structures" (p. 238). Future research could draw upon a Baradian understanding of production (and difference) to examine how the activewear phenomenon not only reinforces racial or class divisions, but is complicit in making some bodies more visible than others, in producing power inequalities, and differences between women that have material and political effects. It could entail looking towards the human and nonhuman forces within activewear that are entangled with these inequalities: clothing; the design process; the buildings in which the objects are designed, produced, sold, and worn; the ships that transport the clothing; the economic and labour laws in locations where the objects are produced and sold; and advertising. Thus, future research using agential realism to explore the exploitative practices of the activewear industry has the potential to reveal how such practices enact boundaries around difference, visibility, and who comes to matter.

However, while there is a possibility to use Barad to think about how activewear contributes to the workings of difference, it does present challenges as scholars must do so in a way that does not revert back to anthropocentric ways of thinking, that recognises the vitality of matter, and thinks through entanglements of humans and nonhumans. Thus far, there is limited scholarship that engages with Barad to explore such ideas around difference, in part because in much of Barad's work, these types of differences (i.e., class, race, sex, gender, sexuality) are not extensively pursued. In discussing the presence of race in Barad's

work, Hvenegård-Lassen and Staunæs (2021) describe how “race exists as an epistemological backdrop, with a tendency to keep disappearing” (p. 60). Similarly, Barla (2021) describes how “Barad does not engage directly with the question of the political” (p. 15). It is only more recently that Barad “suggests that matter and politics are inextricably entangled” (Barla, 2021, p. 15) and has discussed the use of agential realism to think through injustices and difference more explicitly (Barad, 2019; Barad & Gandorfer, 2021). Only a few scholars have recently begun to re-turn to “identity categories” with diffraction (Fullagar, 2020a; Hvenegård-Lassen & Staunæs, 2021). For example, in one of the few pieces to draw upon agential realism to discuss race, Hvenegård-Lassen and Staunæs (2021) diffractively weave together poems, history, and academic spaces to explore “hauntings” of race in higher education in Denmark and the ways race comes to matter. As more scholars become familiar and engage with agential realism, they are opening up possibilities for continuously re-turning Baradian concepts to rethink difference.

Continuing Thoughts

Near the end of this project, Lipson et al. (2020) published a journal article on activewear and how women and society understand activewear-clad bodies in public. While this article is interesting (and I am in no way attempting to disparage their work), their “findings” were unsurprising and supported years of feminist research on the association between appearance, fitness, and women’s (and society’s) perceptions of their bodies. In this project, I used Barad to think about similar concepts as Lipson et al. (2020) and previous research (fit femininity, feminist politics, and the moving body), but have done so in a way that acknowledges how activewear and nonhuman matter are co-participants in the production of these ideas. As discussed, that is one of the strengths of Baradian theory, a “dis/continuity, a cutting together-apart” where various ways of knowing and theoretical approaches are diffractively read

through each other. It enables scholars to take previous approaches and ideas and re-turn with them, adding in new noticings and subtle shifts in thinking.

Agential realism has encouraged a way of understanding phenomena as not wholly bounded “things,” but as being produced through human and nonhuman intra-activity. Using an agential realist approach, activewear does not represent femininity, but physically intra-acts with the body and discourse to produce idealised forms, shaping, sucking, and moulding the body. The sports bra is both an object used to sexualise sportswomen’s bodies and also an active, material player in women’s movement. Women’s bodies are not bounded by flesh, but are human and nonhuman entanglements. Agential realism means recognising activewear as an active force in the production of femininity, but also paying close attention to the boundaries around femininity that activewear produces (and challenges). Within the research process, agential realism encourages scholars to use and develop methods in innovative ways that account for the vitality of matter and the material-discursive, but also rethinks the boundary of the research apparatus and how knowledge is produced. Therefore, Baradian theorising offers feminist sport sociologists ways of re-turning sporting phenomena (both theoretically and methodologically), recognising the material and discursive, the human and nonhuman, the researcher and the researched, dissolving and remaking boundaries and understandings.

In re-turning, however, social science scholars must also be prepared to experience various challenges. Baradian language can be inaccessible, and in fact at times almost impenetrable, for those not trained in quantum physics. As Pinch (2011) describes, her writing contains a “a series of dense assertions” with sections of *Meeting the Universe Halfway*, containing “some of the densest prose I have recently read in the field” (p. 433). The writing style and heavy emphasis on quantum physics means there are moments when the theory remains quite abstract and difficult to implement in practice. This is particularly

the case for concepts where they rely heavily on physics metaphors, such as diffraction/reflexivity and spacetime mattering. There will be moments of tension and confusion about how to use these ideas in ways that can lead to “new” or “different” understandings and practices. There are also issues around representation. How can one take a complex entanglement of material, discursive, and human factors in thought and articulate or present it in a clear and logical manner? Therefore, scholars should be prepared (and excited) to develop new methods and ways of representing this entangled thinking.

Overall, there is potential in using Baradian theory for rethinking sporting and physical cultural phenomena, but it will be filled with twists and turns, of getting lost and found, and then lost again. Using Baradian theory is a process of re-turning, of having small mindset shifts and of taking new noticings to the fine details of knowledge production. At times this process of re-turning might produce different ways of knowing and other times reinforce previous theories and ideas. Or still, reflect familiar ideas but offer subtle differences in the fine detail. However, as a feminist scholar who is deeply invested in social justice and gender equality, I believe that we have a “response-ability” (Barad, 2007) to continuously be re-turning, open to exploring new ways of knowing and conducting research. Being response-able “involves a playful, desiring, creative, experimental and risk-taking approach” (Bozalek, 2020, p. 144) where we are open to the unexpected, to the unthought, and to the already known. Barad’s agential realism offers one possibility for feminist scholars to continue being response-able, providing a path towards innovative ways of knowing, of being, and of living justly with *everything* with which we are entangled.

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APPENDICES

Appendix A

Focus Group Session Outline and Questions

- A) Introduction of project (PPT)
 - a. Introduce myself: ‘About me’ slide (5-10 min)
 - b. Basic of project
 - c. Project details
- B) Activewear Skit Box and/or SNL skit (PPT)
 - a. *Tell me about activewear in NZ?*
 - i. *Depictions in video are accurate?*
 - ii. *What terms have you heard or think are used?*
 - b. *Is activewear popular in NZ? In Hamilton? Why? What is the appeal of activewear?*
 - i. *Compare Hamilton to other places they’ve been*
 - c. *“In some countries and places in Europe, the female body is celebrated and flaunted, but I’ve heard that in NZ, people (women) are looked at differently if they show off their body. Have you heard of something like this before? Do you agree and how does activewear play a role in this?”*
 - i. *How do you think NZ feels about seeing people in their activewear?*
 - ii. *In what spaces/places it is acceptable to wear athleisure? Where is it not acceptable?*
 - 1. *“For example, my grandma gets pretty angry with me if I wear leggings to church”*
 - d. *Have you heard of or seen any negative reactions to people wearing athleisure?*
 - i. *Is there a perception around who should or shouldn’t be wearing activewear?*
 - e. *Are women wearing activewear outside of the gym? Where do you see activewear the most?*
 - f. *Who in NZ wears activewear? Who do you think is the target for activewear? Is there a target audience?*
 - i. *Why women more than men?*
 - ii. *What type of models are being used to sell activewear?*
 - iii. *Accurate depiction?*
- C) Branding
 - a. *What are the some of the biggest brands in New Zealand that you see?*
 - i. *What are the most popular? Why?*
 - ii. *Where do you (or NZ women in general) learn about new activewear?*
 - 1. *Social media?*
 - 2. *Follow particular brands or they pop up in advertisements?*
 - 3. *Where do you see advertisements?*
 - iii. *Are there any celebrities in NZ (or international celebrities) that seem to be associated with activewear?*
 - 1. *Follow any on social media*

D) Individual questions (can be saved for individual)

- a. *Where do **you** purchase activewear?*
 - i. *Price? Brand? Quality?*
 - ii. *What's most important feature? What do you look for and what do you like about your clothes?*
- b. *What's your favourite piece of activewear? Why?*
 - i. *Do you have a least favourite but you wear anyways? Why?*
- c. *Where do you primarily wear activewear?*
 - i. *What do you primarily use activewear for?*

E) Concluding Questions

- a. *Have we missed anything that you believe is really important about activewear and or about your experiences of activewear?*
- b. *Any final thoughts that haven't been discussed?*

B) Explain visual methods and get sign up? (5-10 min)

Appendix B

Focus Group PowerPoint Slides








Welcome to the *Activewear Focus Group*

Please:

- Make a nametag
- Look over the consent form
- Help yourself to snacks on the table, tea/coffee/water in the back of the room

About me



About project

- ▶ Part of a much larger project critiquing a new social theory
- ▶ Exploring activewear/athleisure with women living in NZ
- ▶ Today:
 - ▶ Discussion
 - ▶ Consent Form
 - ▶ RECORD!!



<https://www.youtube.com/watch?v=CYRENW18z8&list=366>

IF INTERESTED....Photo diary and interview

- ▶ Compose a photo diary for 2-3 weeks THEN
- ▶ Short, individual interview of 30-60 minutes at location of your choosing
- ▶ Interviews would be end of October/beginning of November
 - ▶ (December via Skype if necessary)

Photo Diary

- ▶ 3 options (choose 1, 2, or all 3)
 - ▶ *Selfies*: Taking selfies wearing activewear
 - ▶ *Screen Grabbing*: Taking pictures of social media/ billboards/advertisements of athleisure
 - ▶ *Life of athleisure*: Take a picture once a day of athleisure clothing
- ▶ Take a picture once a day and text to Julie with small caption
 - ▶ Screenshot, archive (Best Secret Photo App) and delete message

Selfies



Oh how I both love and hate this shirt. I feel like a traffic cone, a beacon for anyone lost on their way to the fitness studio. Yet it's mixed with the pride I have from running the ridiculously hilly Baltimore half and the memories of going to that expo with my mom.



I was cold and wet changed into my yoga pants and T-shirt and felt so warm, relaxed and comforted to be home and cozy.



Next digital entry: Home Yoga on a Sunday morning in my old favs, sad to see a thread coming loose. Legs feeling as tired as the pants today after a long week.

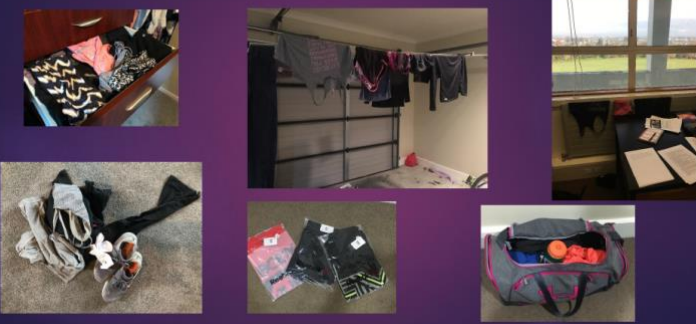


I wore my Lululemon pants for the first time today, and I was a navy ninja. I was afraid that they wouldn't fit, so I actually brought an additional pair just in case. I really liked them, except that they showed my underwear line and hit my stomach at just the wrong spot that my belly kept popping out. I did like the pockets in them though, and they made me feel strong.

Screen Shots



Life of Athleisure



THANK YOU!

Appendix C

First Round of Interview Questions (October 1, 2018)

F) Method

- a. First off, how did you find the photo diary? What were your thoughts about taking photographs everyday?
 - i. What did you enjoy?
 - ii. Was there anything surprising about the experience?
 - iii. What were your initial reactions when I said compile a photo diary?
- b. Which method did you choose and why?
- c. What was the thought process behind each photograph?
 - i. Which photograph stands out for you and why?
- d. Which is your favourite photograph? Why?
 - i. How did you feel in this activewear? What feelings did it evoke?
- e. Which is your least favourite ? Why?

G) Intra-action of body/material. Moving body and clothes

- a. What aspects of activewear clothes do you enjoy? Material/Fit?
 - i. What is the perfect material of clothing? Why?
 - ii. What is the perfect fit of clothing? Why?
- b. What are words that come to mind when you think of activewear clothing?
- c. What are words that come to mind when you put on activewear?
- d. How does it influence your movement?
 - i. Does it ever impeded your movement?
 1. “For example, I have a couple of pants that fall down if I start to jump or sports bra that I can’t jump in or I have a couple of pants where the seam is about to break in the inner leg so I try to avoid wearing them for squatting?
 - ii. Stories of catastrophes or negative experiences with athleisure?

H) Body Image

- a. Would you ever be uncomfortable wearing activewear?
 - i. Pressure to look a certain way/dress a certain way?
 - ii. What is that pressure?
- b. Do you look at other women’s bodies and clothing?
 - i. What do you think when you see other women wearing activewear out and about?
 - ii. What are your impressions about person?
- c. What are your reactions to seeing models wearing activewear or the models being used in stores?
- d. How does activewear influence how you feel about your body?
 - i. Liberation/empowered/restricted/self conscious

I) Materiality

- a. Is there a particular material you tend to look for when purchasing activewear?
 - i. How important is the material of the clothing when purchasing activewear?
- b. How do you wash your activewear?
 - i. Any particular way? Temperature of water/alone/mixed
 - ii. How do you dry your activewear?
 - iii. Do you notice a difference in your activewear between washes and how does this affect your body and physical sensations of the activewear?

- c. Where does your activewear live when not being used? Treated any differently than other clothing?
- d. When do you “retire” your activewear?
- J) Thoughts
 - a. After doing the focus group and photo diary, how (if any) has your relationship with activewear changed?
 - b. Final thoughts?
- K) Closing
 - a. Thank you so much for taking the time to participate in the study. As I talked about in the consent form, if I do end up using your photos in publication, I will email them to you and have you look them over and give your consent before publishing but I will remove any identifiable information (face will be removed, location blurred).
 - b. I have one more phase in the project that will happen when I return and after summer holidays so February/March. It’s a longer but more fun interview using more innovative and methods not used before. So for example, we could go do a fitness class together and then grab a coffee after to talk about that physical experience OR we could go for a run together and coffee after OR wardrobe rummaging where I come over and we go through your wardrobe together and the idea is that through physical action and through an interview where athleisure is present on the body, we can explore athleisure a little bit more in depth and embodied approach.

Adaptations of Interview Questions (October 30, 2018)

- A) Method
 - a. First off, how did you find the photo diary? What were your thoughts about taking photographs?
 - i. Why did you choose these particular method(s)?
 - b. Were there any parts of the photo diary you did not enjoy?
- B) PHOTO DIARY QUESTIONS
 - a. Which is your favourite photograph? Why?
 - i. Visualize that day, putting on the outfit and taking the photographs, what feelings, thoughts, words come to mind when you put it on?
 - 1. Now if you had to draw a photograph of that feeling, what would it be? Metaphor for that feeling?
 - ii. In general, how do you feel when you put on activewear? What emotions does it evoke?
 - 1. How does activewear influence how you feel about your body?
 - a. Liberation/empowered/restricted/self conscious
 - 2. When putting on activewear, is there ever a conscious any concern or worry what others might think of you?
 - iii. How does your body confidence/body feelings change when you put on activewear compared to “normal clothes”?
 - 1. What are some things that affect your body confidence?
 - iv. What are some things you like about wearing activewear? What are some things you hate about wearing activewear?
 - b. What is your most essential piece of activewear for physical movement? Why?
 - i. Have you ever experienced any activewear failures that have impeded or stopped your ability to exercise? I.e. pants ripping or shirts riding up

- c. Has what you've worn for exercising changed over the past XX time? Why has it changed?
 - i. Has how you've felt in activewear changed over time? What factors have contributed to this change?
 - ii. Have any of the same pieces been survived your changes in activewear or survived life changes? How has the material changed?
- d. When do you "retire" your activewear? Where/what is your favourite piece of clothing?
 - i. If this piece could speak, what would its story be?
- e. If someone looked over all the photos and your entire collection of activewear, what do you think the person would learn about you? What does your collection of activewear say about you?
 - i. Now, if your activewear could speak, how would it describe the relationship it has with you?

C) Activity-MAPPING

- a. Pick a photograph from your photo diary, any photograph and put in the middle
 - i. Now draw, or write, anything that influenced your outfit choice that day
 - 1. How you were feeling that day affect outfit choice?
 - ii. Add in why you bought that outfit
 - 1. EXAMPLES: Family, food, magazines, celebrities, social media, school, activity, health
 - iii. Add in where you learn about activewear items
 - iv. Add in any other thing that influences how you feel about or where your ideas about activewear come from?

D) Why do you think activewear has become more popular? What influences have started this trend?

- a. What messages do you see within the athleisure trend?

E) BONUS:

- a. How do you wash your activewear?
 - i. Any particular way? Temperature of water/alone/mixed
 - ii. How do you dry your activewear?
 - iii. Do you notice a difference in your activewear between washes and how does this affect your body and physical sensations of the activewear?

F) Thoughts

- a. Final thoughts?
 - i. After doing this reflective photo diary, did you have any thoughts throughout the way about the phenomenon that we have not already covered or questions you have?

Appendix D

Interview Questions During Moving Methods

Purpose: Explore the agency of the moving body and the various intra-actions between the body and activewear. How does the body push back against activewear and activewear against the body?

Pre-Exercise Questions:

- 1) What are you wearing and why did you choose to wear these pieces of activewear?
- 2) How did you feel changing into this activewear?
 - a. What sensations do you feel?
 - b. (BC/BS) How does your body physically feel?
- 3) Has anything changed about your body position since putting on activewear?
- 4) How are you feeling now regarding how you look?
 - a. What parts of your body look good in activewear? Why?
 - b. Do you look any different now than when you had your “regular” clothes on?
- 5) What are some things that are standing out right now about your body or activewear? Have you paid more attention to any part of your body?

Exercise Questions/ Things to Notice:

- 1) Change in movement because of activewear
- 2) Indentations on the body/marks

After Exercise Questions:

- 1) What are your first reactions after working out?
 - a. What stands out from this exercise?
 - b. What were some factors that you took notice of while exercising?
 - c. What were some of your thoughts during the workout?
- 2) Were you aware of your clothes when you were exercising/Any moments during class where you were aware of your activewear?
 - a. Where you aware of your body?
 - b. Did you notice your activewear and how did it affect your movement?
- 3) When we were moving was there any part of the class you were unable to do? Why?
 - a. Was there a time you had to adjust your clothes?
 - b. Are there any marks on your body from activewear?
 - c. Was anything uncomfortable?
- 4) How are you feeling now regarding how you look?
 - a. What parts of your body look good in activewear now? Why?
- 5) Has anything changed about your body position since putting on activewear and exercising in it?
- 6) Has your activewear changed at all since before the workout? (sweat, tightness, stretched out, fell down).
 - a. Are there any marks that you are aware of? Sweat marks/rips/stains?

- 7) How is this particular outfit different for exercise than your other activewear? Does it feel different against your skin?
- 8) Were you aware of what other people in the room were wearing? How did this affect you? What were the instructors wearing?

Appendix E

Interview Questions for Innovation Manager (Neuromechanics Researcher) for Enlite at White Space

- 1) First off, I know your training is in neuromechanics, but can you tell me a little bit more about your background and how you came to this role at lululemon?
- 2) Your job title is innovation manager but what does your job entail now and what is a typical day?
- 3) I'm assuming you've tried on Enlite but do you wear it often? What were your initial thoughts putting it on and what do you think of it now?
- 4) When designing a sports bra, and when leading a team, what and who are prioritised? Fabric design/colour, function? What comes first?
- 5) Looking at Enlite, who are the key people involved in the Enlite bra? How did you recruit people to work on the project? Certain qualities? All women?
 - a. Similar to other bras?
- 6) When starting out, what was the ultimate goal of the Enlite bra/project? How did you know when you reached it?
 - a. Why did lulu feel a need to create a "perfect" high impact bra?
- 7) What were some of the first concerns/problems you encountered throughout the designing/fabric process? How were they different than other bra design processes?
- 8) After speaking to Rob and Erica, they mentioned that part of Enlite required focus groups and speaking to women about what comfort meant to them.
 - a. How were you able to get at what comfort means?
 - b. How did you take language and turn it into material and into a sports bra?
- 9) After speaking with Rob/Erica, I know that lulu is a brand that values "feel" but how did you understand "feel"?
- 10) When designing the bra, how important is the fabric and where does fabric consideration enter into the design process?
 - a. Is what differentiates Enlite from other lulu bras, the Ultralu fabric? Therefore, is the "innovation" of Enlite the fabric or design?
 - b. How does this fabric differ from other lulu bras?
 - c. How does sustainability play a role in the fabric development?
 - d. What do you believe is important for your consumers/guests to know about the fabric?
- 11) I asked Erica this but as well but the other women and I doing the studies have very different bodies. For someone who is smaller chested, why would they need the Enlite bra?
 - a. Therefore, who is the target audience of this bra? Is it possible that one bra can be 'amazing' for all women?
- 12) How do you think women experience the lululemon Enlite bra different than other options out in the market?
 - a. What does she/lulu hope women get out of this bra?
- 13) Why does the newly designed fabric matter to the woman wearing a bra?
 - a. How does this new innovation matter to the woman wearing a bra?
- 14) After this interview and hearing more about the project, do you think there is anything else that I should be aware of concerning the development of Enlite?

Interview Questions with Research Scientist (Biomechanics Researcher) for Enlite Sports Bra at White Space

1. First off, I know you are a biomechanics research assistant but can you tell me a little bit more about your background and how you came to this role at lululemon?
2. What does your job entail now and what is a typical day?
3. What exactly is the role of science/technology in designing sports bras? Where is science seen in the bra design?
4. Can you comment as to how the way lululemon uses science is similar or different to other companies.
5. When designing a sports bra, what aspects of the body are taken into consideration (fat, body mass, sweat, skin)?
 - a. How do you mimic the human body? Flesh/sweat/fat/bounce?
6. Looking at Enlite, who are the key people involved in the Enlite bra?
 - a. Similar to other bras?
7. Looking at the Enlite bra specifically, what factors of the body were most important? How does this high impact bra differ from a low impact bra regarding the technology of it?
8. Are the needs of women different for high impact and how do you account for this?
 - a. Who were the models and how did this affect the testing/designing process?
9. When designing the bra, how important is the fabric and where does fabric consideration enter into the design process? At one of the stores I've been to, I asked the saleswoman about the bra and she said it actually moulds to the body. The more the bra is worn, through the heat from the body, the material actually conforms to the body?
 - a. How was this tested/mimicked? Was this accomplished purposefully?
 - b. Where was the inspiration for this moulding idea?
10. What were some of the first concerns/problems you encountered throughout the designing/testing process?
 - a. When did you know that you had perfected the Enlite bra?
11. At the stores, the sales women all pushed the new zip up bra instead of the clasp behind.
 - a. How are you supposed to clasp in the back?
 - b. Why was the zipper not the original design?
12. Now that the bra has been out for a while:
13. How do you think women experience the lululemon Enlite bra different than other cheaper options out in the market?
14. What does a sports bra mean to women and what is lululemon's role?
15. Why does the newly designed fabric matter to the woman wearing a bra?
16. Why does good quality matter to the woman wearing a bra?
17. How does this new innovation matter to the woman wearing a bra?

Appendix F

Worksheets used in "Cutting together-apart"

(DONATED CLOTHES)

What made you choose this particular piece?



What might be this piece's history?



(BROUGHT CLOTHES)

**What does this piece of clothing mean to you?
What is its significance?**



What made you bring this piece along today?

