

ARTICLE

Biosocial borders: Affective debilitation and resilience among women living in a violently bordered favela

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Abstract

Within emerging fields of research focusing on neuro-urbanism, neuro-geographies, and biosociality, which experiment with using emerging mobile biosensor methods, few if any have used them to research socio-spatial life in communities that suffer high levels of violence and other socio-spatial injustices. Extending non-representational accounts of the body, emotions, and affect, this paper discusses an experimental geography–neuroscience collaboration, working in a favela of Rio de Janeiro to explore the embodied urban emotions and affects of violently bordered urban communities. Emphasising non-representational, corporeal spatial practices in a study of women living in Brazil's favelas, we use electrodermal activity biosensors to propose a novel methodological and analytical approach that focuses on forms of affective debilitation and resilience. Theoretically, we draw on biopolitical theory and border theory to propose a method that avoids oppositions between biopolitical and necropolitical accounts of borders. The aim of the research, conducted in June 2016, is to understand levels of affective debilitation or resilience among women living in the Maré Complex of favelas in Rio de Janeiro. Using a wearable biosensor, we took measures of electrodermal activity of eight women as they undertook one of their routine, everyday journeys within the favela. We also conducted an hour-long qualitative interview with each participant. We find that for all our participants, navigating the favela's violent border spaces subjects their bodies to very high levels of affective and cognitive demand. While some women responded to this with stress reactions that created acute levels of affective debilitation, others responded very strongly, showing exceptionally high levels of affective resilience. Our research highlights the affective labour required of women to co-construct urban borders, and emphasizes their agency and forms of everyday resistance in shaping the favela's affective atmospheres. Combined biosensing (electrodermal activity/galvanic skin response) data and interview data reveal that women living in the favela experience high levels of

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stress and fear. For one resident this results in affective debilitation (a wounding of the capacity to affect and to be affected). However, other women showed exceptionally high levels of affective resilience and resistance. The research points to the important role of women in co-constructing the embodied borders of the favela.

KEYWORDS

biosensing, borders, debilitation, resilience, skin, violence

1 | INTRODUCTION

In Brazil's favelas, the (im)possibilities for common life are defined by a violent bordering of the city through racialized state terror, organized criminal violence, and spatial stigma. This essay offers a feminist analysis of affective geographies of mobility within the Maré community of 16 favelas in Rio de Janeiro. We discuss the results of an exploratory geography–neuroscience collaboration, examining women's neurophysiological responses to, and lived experiences of, moving around conflict-laden urban border spaces. Using data from portable electrodermal activity (EDA) biosensors, we argue that biological data can offer an important window onto the gendered biopolitical geographies of urban affect, including insights about 'affective resilience' (Koenig, 2020; Rodman et al., 2019) in conditions of systematic state terror.

Our research empirically engages with longstanding debates around the relationship between affective states and urban environments (Amin & Richaud, 2020; Mubi Brighenti & Pavoni, 2019). Asking how urban borders are embodied through an interplay between material environment, affective atmosphere, lived experience, and neurobiological processes, our approach views the city as an affective milieu that is heterogeneous, non-deterministic, and enabling (Söderström et al., 2016, p. 105). Our research extends emerging work on biosociality and neuro-urbanism (Fitzgerald et al., 2016; Fitzgerald & Callard, 2014; Gagen, 2015; Naughton, 2022; Pykett, 2018; Pykett et al., 2020) by adapting methods using portable biosensor technology to research in favelas. Despite the great interest in embodiment and preconscious practices in non-representational geographies and related fields, applied research on the combined biological and social mechanisms of urban mental life remains relatively rare. Our research brings the analytical possibilities of affect theory and geography's 'neural turn' (Pykett, 2018) to bear on a study of the favelas of Brazil. In doing so, we offer a corrective to the 'top-down' viewpoint of some work on urban affective atmospheres by listening to the experiences of women who are worst affected by the violent bordering of the city (Machado da Silva & Pereira Leite, 2007). In this way, we build on research on affective atmospheres and politics in spaces of conflict (Fregonese, 2017; Gandy, 2017), heeding feminist geographers' calls for research rewriting women back into conflict (Laketa, 2016). Our approach emphasizes the agency of women in producing and modifying the favela's border spaces (see also Barbosa, 2001; de Carvalho Cruz, 2020; Gay, 2005; Rocha, 2012; Wilding, 2012; Wilding & Pearson, 2013).

We begin by theorizing relations between borders, bodies, and territory via a discussion of the 'biopolitical', 'necropolitical', and 'debilitating' functions of violent bordering. We then offer a methodological reflection on the potentials of biosocial analysis for emotional and affective feminist geographies. In the empirical sections of the paper, we suggest that while for some residents the constant fear of violence destroys the conditions for affective resilience, other women respond by developing exceptionally resilient, elastic affective capacities. Attention to biosocial affective geographies helps us understand how violent urban borders enact finely graded processes of gendered and racialized 'differential inclusion' (Mezzadra & Neilson, 2013).

2 | BORDER VIOLENCE, GENDER, AND AFFECTIVE DEBILITATION

Rio de Janeiro dramatizes many typical features of neoliberal urbanization in the global south, including militarized security, high levels of violence, and a proliferation of internal borders through the splintering of the city into favelas, gated communities, and security enclaves (Caldeira, 2000). Its favelas are produced through a division of the city into contested territories where structures of power and authority are multiple, overlapping, and often violent (Dahlberg & Krug, 2006; Wilding, 2012). The killing of young black men in favelas has reached such high levels that activist groups have long considered it as a 'genocide of the black population', referring both to the overt assassination of blacks by the

police and to the structural violence that limits black life in Brazil (Alves, 2018; Flauzina, 2006; Nascimento, 2016; Vargas & Alves, 2010). Favelas are paradigmatic sites of the proliferation, heterogenization, and rescaling of borders associated with neoliberal urbanization (Mezzadra & Neilson, 2013).

Our analysis works with an approach to the urban border as a spatial practice that organizes and reproduces difference and hierarchy. The border, conceptualized as an active and dynamic practice rather than a static space, 'is not so much an object or a material artefact as a belief, an imagination that creates and shapes a world, a social reality' (Van Houtum et al., 2005, p. 3). Borders are institutions for organizing difference, performing functions of legitimation, meaning-making, and domination, to create a system through which control is exercised (Newman, 2006, p. 149). However, borders do not exert power simply through inclusion and exclusion, but by means of processes of 'differential inclusion' that stratify and hierarchize populations. From this perspective, residents of favelas are not 'marginal' or 'excluded' subjects, but are included in society in ways that make them key actors in the performance of the spatialities, temporalities, and materialities of the social (Mezzadra & Neilson, 2013, p. 159).

Borders are sites of violence where state power is exerted, not only through a 'biopolitical' management of life, which distinguishes between 'good' and 'bad' circulations and devises techniques for maximizing the former and minimizing the latter, but through a 'necropolitical' mode of sovereignty that controls the reproduction of death (Mbembe, 2003). This is not as simple as marking out the formal city as a biopolitical space that nurtures life and growth and the favela as a necropolitical space that functions through death. McIntyre and Nast (2011) coin the term 'bio(necro)polis' to capture how boundaries between 'biopolis' and 'necropolis' increasingly overlap or even dissolve (for a related argument in the context of Brazil's favelas, see also Smith, 2016). Further troubling the dichotomy between biopolitics and necropolitics, Puar (2017) calls attention to forms of power whose logics focus neither on maximizing life nor on killing, but on damaging the conditions for life. Puar's discussion of practices of debilitation in the 'asphyxiatory control society' (Puar, 2017, p. 135) prompts us to reconsider the productivity of spaces of maiming and wounding. Such a perspective is usefully extended in Aradau and Tazzioli's (2020) account of 'biopolitics multiple', which similarly focuses on unsettling oppositions such as biopolitics/necropolitics, letting live/letting die, and inclusion/exclusion, and suggests focusing on the myriad ways biopolitical technologies are deployed in practice (see also Minca et al., 2022).

Aradau and Tazzioli's (2020) focus on the apparent withdrawal of the will to govern, or what they call 'subtractive' biopolitics, is particularly helpful for conceptualizing the gendered nature of violent borders in favelas. Lethal violence in favelas is mostly directed at young black men. However, women suffer very high levels of non-lethal, everyday violence (Coelho, 2012; Krenzinger et al., 2021). By shifting the frame of analysis from death to debilitation and 'biopolitics multiple', we are better able to understand women favela residents' experiences of violent bordering. Debilitating violence attacks the environments that make life liveable (Puar, 2017). It undermines social infrastructure; it withdraws access to health care, sanitation, and education. It impedes mobility by splintering the city into violently bordered enclaves. It confines life to the home, frequently itself a site of terror (de Seixas Filho et al., 2020; Santiago et al., 2019). According to Puar, the end result of debilitating violence is the creation of a kind of double disability: directly inflicting harm on individuals but also wearing down the life-support systems that could enable populations to heal from this harm, thereby producing life as a condition of permanent debilitation (Puar, 2017, p. 143).

One crucial aspect of the biopolitics of debilitation, we suggest, is its impact on affective resilience. In turning to an analysis of affective debilitation and resilience in Brazil's favelas, we join Meier (2020) in paying attention to the gendered emotional work of borders, but focusing on the urban scale rather than international borders. Meier emphasizes the extent to which border violence occupies emotional and mental space, creating overwhelming quantities of 'emotional borderwork' (Meier, 2020, p. 2). Similarly, we ask what kind of gendered work embodied affective rhythms do in co-producing urban borders. Our research thus connects to longstanding feminist work on the role of fear and anxiety in reproducing the masculine nature of public space (Dunckel Graglia, 2015; Koskela, 1997; Pain, 1997; Saffioti, 2004; Siqueira, 2015).

3 | BIOSOCIAL MOBILE METHODS: NEGOTIATING THE BOUNDARIES BETWEEN PRECONSCIOUS EMBODIMENT AND LIVED EXPERIENCES

The elusive and embodied nature of affect makes it a challenging phenomenon to research, requiring inventive and performative methods to express and capture (Dewsbury, 2010; Simpson & Brigstocke, 2019). In this research we analyse data from mobile biosensors in conjunction with qualitative interviews. By working with EDA readings of women conducting routine journeys in the Maré, we connect work on geographies of affect to broader debates around neuro-urbanism, neuro-geography, and bio-sociality (Gagen, 2015; Naughton, 2022; Pykett, 2018; Pykett et al., 2020). Our

research is among the first to extend new mobile biosensing methodologies to challenging fieldwork sites that experience high levels of racialized violence.

Electrodermal activity refers to small changes in levels of perspiration that cause tiny variations in the electrical conductance of the skin. The amount of perspiration expresses unconsciously controlled processes in the autonomic nervous system, which regulates the internal environment of the body through autonomous, unconscious physiological processes (Dawson et al., 2007). The sympathetic nervous system, a rapid-response mobilizing system that facilitates immediate motor action, is a key part of the autonomous nervous system. Higher activity in the sympathetic nervous system is associated with biophysical indicators such as perspiration, higher heart rate, and changes in blood pressure. Greater affective or emotional stimulation leads the skin to perspire more, resulting in measurable variations in the electrical conductivity of the skin (Critchley, 2002).

We worked with eight research participants, all adult women, of varying socio-economic background, living in the Maré district of favelas. In 2016, we conducted qualitative interviews and measured journeys within the favela using a Shimmer3 portable biosensor, attached to their wrist under a sleeve. The sensor gathered quantitative data on skin conductance levels, skin temperature, and displacement (using a tri-axial accelerometer and gyroscope). Participants remained motionless for a few minutes, to establish their biometric baselines, and then travelled on a route that they chose themselves as one of their ordinary, routine journeys in the favela. The biosensor is unobtrusive, making it ideal for our purposes here, where ensuring the security and anonymity of research participants was a key concern. For most journeys, a GPS was also used to track the participants' location and these data were linked to the biophysical data. (One participant declined to use the GPS, due to safety concerns.) The biophysical data were analysed by Froes using various statistical techniques (see supplementary information file, Appendix S1), including polynomial regression analysis to establish the tonic curves, analysis of frequency distributions of skin conductance levels, and differential analysis of the accelerometer and skin conductance data.

Our primary question was whether the biophysical data could give us useful insight into the preconscious rhythms of women's affective responses to the environment as they moved around the city. In addition, we conducted one-hour qualitative interviews with the women immediately after their journey but without showing them visual representations of the biophysical data beforehand (thereby avoiding the temptation to impose representational meanings on non-representational affective processes).

Portable biosensors are now widely available, and various researchers have experimented with tracking users' affective states across space and place (e.g., Aspinall et al., 2015; Reifschneider, 2016; Yang et al., 2021). However, as Osborne and Jones (2017) argue, too often the approach is positivist or quasi-positivist and is not supported with qualitative analysis. This is a problematic approach given how hard electrodermal activity data are to interpret. Indeed, Poplin (2020) argues that we should be wary of saying that electrodermal activity references 'emotions' at all, arguing that 'additional research needs to be invested to better understand how these and other measurements can be translated into emotions' (Poplin, 2020, pp. 131–132). Poplin's critique, however, still assumes that electrodermal activity can and should be 'translated' into subjective emotion. We wish to question this assumption, suggesting that electrodermal activity gives us insight into embodied affects but should *not* be seen as directly recording lived emotions.

Electrodermal activity data offer quantitative information about levels of arousal of the sympathetic nervous system. However, these data tell us nothing about the *quality* of the affect, or how it is experienced at a subjective level. Peaks in sympathetic nervous activity might be linked to heightened emotional response, or to high cognitive demands, or both at once (Dawson et al., 2007). They might be triggered by external stimuli or internal mental processes such as thoughts and memories. Thus, far from providing any kind of scientific certainty about the meanings of affects, EDA data are useful only to the extent that they help us to work experimentally, cautiously, and creatively with the ambiguous and non-representational registers of affect. They should not be used to impose singular representational meanings on bodies' affective lives.

Given the large number of uncontrollable variables in walking around an urban environment, and our emphasis on exploratory rather than positivistic renderings of the human body, we did not (and could not) establish laboratory-style controls. We stress that these mobile biophysical data, acquired outside laboratory conditions, do not achieve the standards of scientific validity. When treated with the appropriate level of caution, however, and in conjunction with qualitative data, biophysical data do offer useful performative and experimental tools for understanding embodied affects. Our approach rejected the temptation to determine the meanings of individual phasic events (i.e., specific peaks in sympathetic activation), which is the usual approach within psychological and market research (e.g. 'was there an affective response at the moment an image of a puppy appeared on screen?'). Instead of this 'representational' approach, we suggest that EDA data can most productively be used through analysis of the wider non-representational patterns and

rhythms of sympathetic activation, to learn lessons about the forms of affective resilience discernible in participants' bodies. By analysing broader rhythms of sympathetic activation, rather than ascribing meanings to specific peaks and troughs in the data, we learn much about how moving around the favela's border spaces impacts the body's affective resilience, defined here simply as the body's ongoing capacity to affect and to be affected.

Biosensor technology makes possible novel ways of 'reading' the body that have potential as performative and experimental research tools (Spinney, 2015). Osborne and Jones (2017) argue for the need for mixed-methods approaches in working with EDA, suggesting that 'taking the different measures in combination gives the opportunity to cross-examine findings from individual datasets, both for contextualizing and deepening understanding' (Osborne & Jones, 2017, p. 168; see also Pykett et al., 2020). Beljaars (2020), similarly, uses mobile eye trackers as an elicitation device for qualitative interviews in her analysis of geographies of compulsivity. Such studies do not extract biophysical data to enable the body to somehow 'speak for itself'; instead, they use them as generative and experimental tools for questioning the body in new ways. A similar approach – using biophysical data as an exploratory and experimental research tool rather than a scientific window onto the body's 'true' affective states – animates our own analysis.

As well as quantitative biophysical data, our research draws on qualitative interviews with the research participants about their journeys. Rather than showing interviewees their electrodermal activity readings and discussing them, and risk succumbing to the temptation to impose representational meanings on specific peaks in the data, we wished to allow lived experiences and preconscious affects a level of analytical autonomy and separation. Through a focus on the broader rhythms of affective activation, we strive to identify and creatively work with – not overcome – gaps, disparities, and discontinuities between qualitative and quantitative data sets. This enables us to treat urban affect as relatively autonomous from lived experiences and emotions, but as still impacting on embodied states and practices.

The research methodology raises complex ethical issues. First, we had to confront the deeply problematic colonial and patriarchal histories of biological data extraction. This raises issues around the possibility of treating our participants as passive sources of data, to be extracted for their value in the world of university research. Related to this is the risk of naturalizing the placement of poor women, especially black women, within 'unliveable' spaces such as favelas (McKittrick, 2006). We attempt to address this by foregrounding the active agency of women in co-producing the borders and affective atmospheres of the Maré, as well as by strongly contesting narratives that assume favela residents to be passive victims or to lack agency over their own affective resilience. In our analysis, the biophysical data offer important resources for *contesting* entrenched stereotypes by demonstrating the extraordinarily high levels of affective resilience of many women living in the Maré. This enables a fuller recognition of women's spatial agency undertaking highly skilled, demanding affective labour in co-producing the favela's border spaces.

Similarly, this emphasis on women's active co-production of the borderscape helps us avoid articulating an exclusively 'damage-centred' research agenda (Tuck, 2009) – though we acknowledge that our research may still remain closer to this paradigm than we might wish. To partly mitigate this, the research participants were offered the opportunity to take part in a participatory artwork, an installation designed by Cabral, in which participants could actively and creatively explore, engage with, and co-construct the research data. The research was approved by ethics committees at Cardiff University and the Universidade Federal do Rio de Janeiro. All the participants' names have been anonymized, and the details of their journeys have not been given, again in order to ensure anonymity.

4 | FLATTENED AFFECTS: FEAR AND DEBILITATION IN THE VIOLENTLY BORDERED CITY

The favelas in the Maré, like most favelas in Rio, are splintered into different territories by drug trafficking gangs and militias (Bueno, 2018; Ferreira & Penna, 2005; Hamann-Nielebock & de Carvalho, 2008; Wilding, 2012). The main boundaries between rival factions are relatively clear and stable, but violent skirmishes around the border areas are frequent. The Maré is also the site of particularly aggressive, invasive, and militarized police operations (Silva, 2009). The gendered nature of this everyday conflict, and how it impacts on embodied feelings and emotions, needs to be understood more fully (Coelho, 2012; Krenzinger et al., 2021; Wilding, 2012). In this section, we focus on the debilitating effects of urban violence on women's biosocial embodiments and lived experiences.

Residents of the Maré witness gunfights on a regular basis. The ever-present fear is of getting caught up in the cross-fire. At times, the street is a space of terror. Most of the time, the atmosphere is cooler and more diffuse, generating a low-lying stress and tension. The threat of being caught up in shootouts and hit by stray bullets is a demobilizing, alienating presence in women's lives. As one interviewee put it:

It's a really bad feeling, that you're lost there, with nowhere to run because you're in the middle of a situation, of a war that you ... feel like you're not part of, right? ... In the sense that it's not your war, so you feel helpless, with nowhere to run, not even being able of getting out of here, because it's very hard, financially, right? So sometimes you have to suck it up and try not to think too much about it, otherwise your stress levels increase too much, right? Or you stop moving around and you get depressed.

(Interview, Maria)

For Maria, moving around a community fractured by violent bordering is both alienating and disorientating. Urban violence makes basic, everyday journeys such as going to work or taking children to school extremely tense. Because gunfights can start anywhere, with little or no warning, everywhere is a site of potential danger.

Many women we spoke with felt relatively free to cross the borders between rival criminal factions, especially those with jobs which required them to move around the city. In this respect women typically have greater mobility than men, in a reversal of the usual gender mobility patterns. However, one interviewee told us a different story. Ana, who is unemployed and an occasional drug user and sex worker, is subject to exceptionally high levels of stigma (see Levy, 2021). Thus she is not perceived by the criminal factions to have an 'excuse' to cross into rival territories. She is forced to live a life that is spatially extraordinarily constrained:

Ana: Down there ... It's scary, it's dreadful, with anyone.

Lidiane: And are you afraid of walking around on the other side of the boundary? *Ana:* I am ... I am, I do not go that way, I do not walk around there ... I've never been there and I never will.

Lidiane: Why are you afraid?

Ana: Because I'm from this side, the guys over there know who's who.

Lidiane: And, if they see you there, do you think they'll do something?

Ana: They will, they'll take me in there, they'll tell me ... they'll do mean things to me.

(Interview, Ana)

Our interviewees made it clear that navigating the streets of the favela demands high levels of attentiveness, which we might describe as the sensory labour of an active and vigilant attunement to the favela's volatile atmospheres. Even when the atmosphere feels quiet and calm, this itself can be a source of stress: 'Now I think it's calm here, isn't it? It's quiet. But it's a calmness that's scary sometimes' (Interview, Márcia). Living in a space of conflict imposes a constantly 'switched-on' orientation, making it impossible to relax. Fear about being caught up in violent confrontations between police and criminal groups is ever present.

This imperative to maintain constant alertness and vigilance is clearly discernible in the rhythms of the body's autonomous self-regulation. Figure 1 shows a graph of Ana's stroll around her neighbourhood, from an area known as Cracolândia (Crackland) to the nearby area Parque União. The graph shows measures of skin conductance and skin temperature. The skin conductance show the rhythms of sympathetic activation over time – the frequency and strength with which affective responses are triggered. The skin temperature reading offers an additional indication of stress, as a lowering of skin temperature is associated with a rise in stress or fear (hence the phenomenon of 'cold sweats'). In this electrodermal activity profile we can identify a large number of phasic events, irregularly distributed, and with low autonomic variability (in other words, the variation between the highest and lowest values is low). Ana responds to many stimuli, creating rapid but also shallow peaks and troughs in her state of affective arousal. The amplitude range of these responses is very small. Various events, presumably of differing significance or importance, all appear to have similar impacts. Thus, we see here a kind of flattening of affect.

One other trend is clear. Ana relaxes while she is out walking, but as she draws near to home, her skin temperature drops dramatically, and her levels of sympathetic arousal increase. It appears to be home, not the street, that is most stressful for Ana. This is backed up by our conversations with her, where she tells us about an abusive relationship with her partner. 'He does things and he thinks I won't know about it. Then he gets in a compromising situation if I find out what he does to me, and he starts to make things up, to pretend ... he was ... then it's already a reason for us to fight. And we be fighting a lot, that's why I ... He beats me ... he does. [...] Nobody likes to be assaulted like that, specially for no good reason, I never needed that' (Interview, Ana). Here, we are reminded how the hyper-masculinity of state terror and criminal terror in the public spaces of the city is reflected in domestic terror (Pain, 2014). Home is a place of safety and relaxation for some, but a space of heightened fear for others.

Physiologically, Ana's body responds to these multiple spatialities of terror through affective responses that are rapid, shallow, and uneven. Her biophysical profile is indicative of a state of acute tension that makes her body less responsive

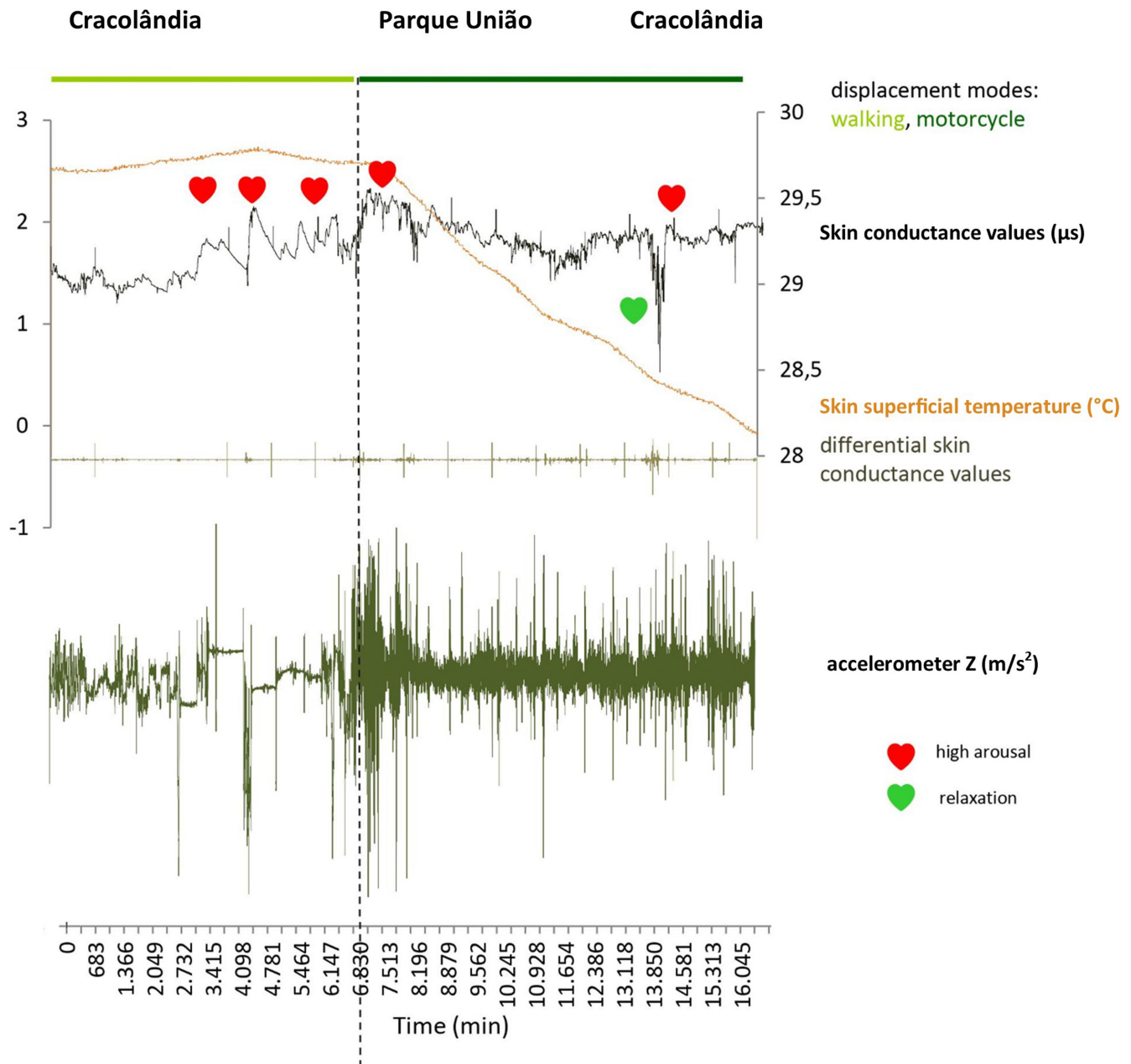


FIGURE 1 Ana's walk from Cracolândia to Parque União, returning home to Cracolândia by motorbike. Her home is the start point and end point.

to stimulations. Her sympathetic nervous system is frequently excited, but this means it is no longer excitable: it has a diminished capacity to respond to attentional and emotional demands. Its capacity to be affected has been drastically reduced; physiologically, the body cannot effectively develop new reactions to events (Yang et al., 2021). Thus, Ana's physiological response supports a story of affective debilitation. Her embodied processes and experiences echo Puar's critique of a form of debilitating biopolitical government where '[d]istance is stretched and manipulated to create an entire population with mobility disabilities. And yet space is shrunken, as people are held in place, rarely able to move far' (Puar, 2017, p. 136). Ana's profile indicates a wearing down of affective resilience, caused by exposure to an environment that systematically undermines the material, social, and emotional conditions for life. Indeed, Ana's biophysical profile is consistent with the neuro-physiological state known as autonomic hyporeactivity, a reduced activity of the autonomous nervous system that is commonly associated with conditions such as acute depression or chronic pain (see Sarchiapone et al., 2018). Body and city fold into each other through a biophysical rhythm of continual, rapid attention and stress response, resulting in a wounding of the body's affective resilience.

Ana's electrodermal activity data help illuminate elements of a distributed architecture of attention and affect, where the 'body-border-territory' assemblage is constructed through violent political, economic, and geopolitical processes (Smith et al., 2016). Of all our research participants, Ana's story was the one that most closely conforms to narratives of favelas exclusively as sites of fear, abjection, and debilitating violence. Her biophysiological profile, along with her lived experience of anxiety and depression, testify to a form of 'biological subcitizenship' in which bio-inequalities emerge through extraction and exploitation (Schliehe et al., 2022; Sparke, 2017).

However, as we explore in the following two sections, other participants' lived experiences and biophysical profiles revealed very different stories about the embodiment of violent urban borders.

5 | MISFITTING BODIES

The bodies of favela residents are denigrated, stigmatized, threatened, and humiliated, by means of a racist, hyper-masculine, militarized security apparatus, as well as through spiralling economic inequalities that enact their own forms of structural violence (Almeida, 2019; Da Silva, 2010; Hamann-Nielebock & de Carvalho, 2008). Women's bodies in favelas are regulated through a gaze that is racializing, exoticizing, patriarchal, sexualizing, and dehumanizing (Caldwell, 2007; Gonzales, 1984; Zaluar, 2009). Violent bordering shapes residents' bodies, capacities, emotions, and affects. However, it is important to remember that bodies also offer an important source of atmospheric power. The body is 'an active, territorial agent in processes of border- and territory-making' (Smith et al., 2016, p. 259). In the streets of the favela, the materialities of body and urban milieu fold through each other in distinctive ways, leading to the emergence of new kinds of bodily capacities within unusual ecologies of experience. Bodies are used as resources for generating security within the favela. One interviewee, for example, makes every effort to enlarge her body-space by making herself more visible and audible:

[My husband] laughs his ass off when I start to do this; if we're going somewhere, I always walk in the middle of the street, in the middle of the street and speaking loudly as hell, talking loudly; then he goes: 'Stop talking so loudly, you're talking too loudly.' At least people are listening; they can see that the person coming isn't a big deal. [Laughs.] So it seems silly, but it makes me feel a little better.

(Interview, Adriana)

For Adriana, generating a sphere of security requires disrupting norms about where to walk and about the appropriate volume to speak. Here the gendered body becomes a resource for generating a more secure atmosphere around it, reducing the prospect of surprising anyone by being visible and audible from a long distance. In this way, the experience of insecurity complicates wider norms about how women are expected to avoid filling too much space. Adriana uses a voice that is 'too loud', enlarging her body-space and creating a protective sphere around her. Sound becomes a way of asserting and protecting the borders of the body.

The spatialities of fear also transform the boundaries and capacities of the body and rearrange distributions of mobility, immobility, capacity, and debility. Fernanda is a wheelchair user. She recounts an episode when she was out in the street with a male friend, and they were caught up in the middle of a shootout between police and drugs dealers. The man who was with her was so scared that he grabbed onto her wheelchair and remained rooted to the spot, unable to move; she ended up having to push them both to safety, her friend clinging onto the wheelchair as he could not make his legs move (Interview, Fernanda). Fernanda is able here to utilize capacities that the able-bodied man accompanying her lacks. Her explanation for this is striking:

Lidiane: And do you think you are more vulnerable because you are in a wheelchair?

Fernanda: No.

Lidiane: No? Not in a shootout?

Fernanda: No. because if I have to go out, it's the same as someone who walks ... At that moment [in a shootout], you do not know where you are going, you know? So, sometimes, it turns out that the person who's with me gets more scared than me. The reason is that I already know what it's like ... So, it's a little easier for me, but whoever's with me gets really nervous, because they want to defend themselves and me. So I laugh. People think I'm crazy.

(Interview, Fernanda)

Fernanda is used to living in a permanent state of severe mobility restrictions, in a community where there is no infrastructure for wheelchair users and where disabled people are subject to multiple socio-spatial injustices (see Ribas, 2017). This corporeal training in dealing with structural immobility leaves her extremely resilient to cope with stressful occurrences on the street. This contrasts with the able-bodied man accompanying her (and supposedly protecting her), for whom the terror of being caught in the middle of a shootout is totally disabling.

These examples highlight the importance of viewing affective resilience in relational terms, as effects of specific configurations of body and world, rather than as inhering within a supposedly self-contained organic body. In encounters that amplify the fragility of the material body and its vulnerability to wounding, the fit between body, world, and atmosphere is reconfigured. Capacity and disability are material arrangements: they are ways of being in an environment (Garland-Thompson, 2011). Capacity and debility do not inhere within individual bodies, but in specific relationships between body, territory, and environment in a particular place and time. Vulnerability and resilience lie not in the body itself but in the 'fit' or 'misfit' between body and world. In the encounter that Fernanda narrates, a wheelchair-using body has a highly developed set of affective and habitual bodily capacities that enable her to form a strong 'fit' to the urban environment in a moment of potentially paralysing danger.

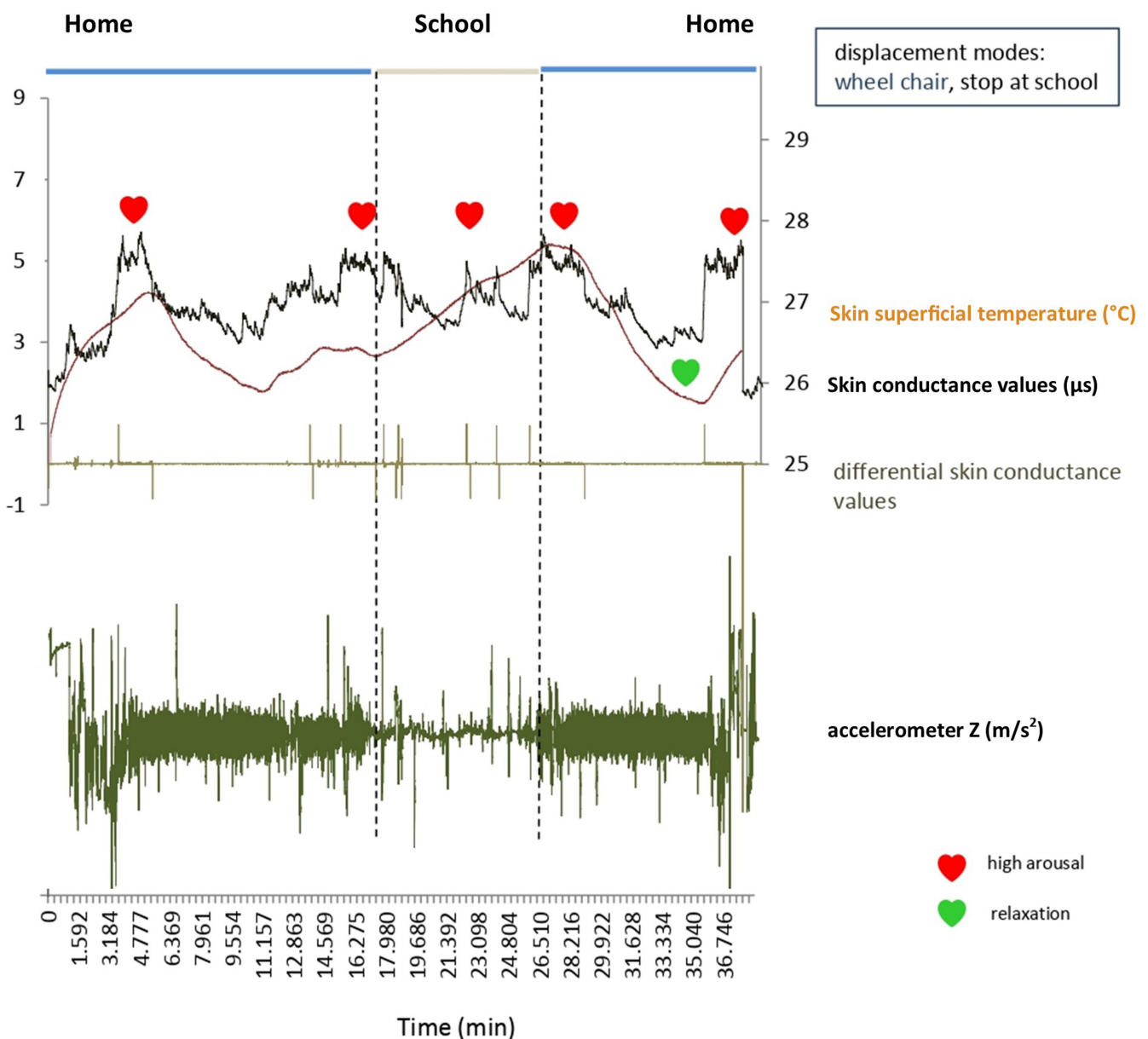


FIGURE 2 Fernanda's 37-minute journey from home to school and back home again, in a highly contested region of the Maré.

This affective resilience is clearly discernible in Fernanda's biophysical data (Figure 2). In this profile, we see Fernanda moving with her grandson from home to school, returning home on her own. She passes through a contested border region. Asked about her experience of crossing this border, a volatile site of contestation between three rival criminal factions, Fernanda simply says: 'It's normal. For me, it's normal. I normally come and go ... If they bother me, I say right away, "It's nobody's fault we live here and so-and-so lives there." ... A normal coming and going thing' (Interview, Fernanda). Fernanda does not report any experience of fear or anxiety when crossing the borders. Fernanda's electrodermal activity data reveal that her tonic (baseline) level of affective arousal is very dynamic and variable during the journey. There is a lot of change, both in skin conductance and in skin temperature, with many phasic components. Autonomic variability (the difference between the highest and lowest level of affective activation) is high, meaning her sympathetic nervous system shows a strong capacity to be affected. As they pass over the border, there are large jumps in her levels of sympathetic activation. This is a striking reading, given her testimony that she feels no fear or anxiety in the border regions. It indicates that, even if Fernanda does not have a lived experience of fear when crossing the border, her body's affects are highly activated and are performing large amounts of cognitive and affective work.

Fernanda's lived experience of ease in crossing borders to some extent conflicts with the biophysical data that indicate that the urban environment places high affective and cognitive demands on her. The affective rhythms measured in this journey indicate that Fernanda's autonomic responses respond exceptionally actively and dynamically to the attentional demands of navigating a dangerous border space. Fernanda's body is very switched on, and her affective responses are supple. Physiologically, she is extremely resilient, able to function cognitively and affectively very well in stressful situations. While her physiological data indicate that she is performing a very high mental workload, with high levels of affective stimulation, we do not see her falling into the kind of debilitating stress reaction that reduces cognitive and affective capacities, as we did with Ana.

Fernanda's biophysiological profile offers a powerful empirical counter-narrative to any assumption that living in a situation of 'chronic' violence (Pearce, 2007), 'slow' violence (Bickerstaff, 2022), or 'enduring' violence (Jones, 2022) might necessarily result in a deadening of affective response. Despite undergoing various deeply traumatic experiences, she embodies the border in ways that sustain active engagement in community work. Far from being a passive subject of dominating power, Fernanda is an extremely skilled, active co-producer of the favela's affective borderscapes. This constitutes a powerful act of everyday resistance.

6 | FINDING COMFORT IN ATMOSPHERES OF VIOLENCE

One striking feature of our conversations was how many interviewees switched from describing the favela as a space of terror (during shootouts) to describing it as a space of safety and comfort in other contexts. This sense of safety is partly constructed by the local criminal groups, who enforce security and enact harsh, violent punishments for infractions within the community. Our participants mostly viewed the police with hostility, as forces that destroy public security and humiliate ordinary residents (see also Machado da Silva & Pereira Leite, 2007; Silva, 2017). One interviewee tells us: 'Yeah, I feel unsafe, scared ... It was announced that the favela has been pacified. But we, the people in here, know that's only on paper, right? ... it's not like that. They [the military police] terrorize us and they leave' (Interview, Sandra). In practice, it is mostly left to the criminal groups to maintain order. In communities where state authority is largely experienced negatively as violence and denigration, criminal groups represent a channel of authority that is largely uncontested (Bueno, 2018; Da Silva, 2010). This social order plays an important role in reinforcing the borders between the favela and the formal city. Criminal gangs provide a degree of security to residents, through a structure of authority that is patriarchal, unaccountable, violent, and also able to impose authoritarian meanings on this violence (Wilding, 2012).

All our interviewees emphasized that they felt most nervous when leaving the favela and entering the formal parts of the city, where the authority structures within their community had no force. One woman told us that in the Maré:

Women can walk around in peace; no one bothers them. You can put a bed sheet on the street and lie there the whole night in your nightgown and no one will bother you ... In here, I can be wearing a gold necklace, my purse can be full of cash, I can enjoy myself all night, I can do anything ... Now, if you go outside [the favela], you have to change: either you won't carry money outside, or if you go, you have to somehow hide it on your body. So, like, it's unsafe out there.

(Interview, Juliana)

The comfort experienced by residents within the favela is a symptom not just of the strong spirit of solidarity binding members of the community together but also of the rigidity of the border separating the formal city from the favela. While it might sound strange to speak of comfort in an atmosphere of violence, Philippopoulos-Mihalopoulos (2014) reminds us that atmospheric bordering can lead to a situation where outside, beyond the border, there appears to be no air to breathe whatsoever, and the result of this is that the 'inside' feels like a space of comfort, in contrast to the asphyxiating atmosphere of the outside. Insofar as comfort is linked to belonging, therefore, atmospheres of conflict and violence can succeed in creating an experience of comfort partly *through* processes of violent bordering. This form of violent bordering binds residents closely to the criminal groups who maintain order and security within the favela (Wilding, 2012).

Comfort in the streets of the favela is discernible in the physiological profile of Mariana. Mariana works for a local Residents' Association, and as part of her job she routinely takes walks around the favela, stopping to talk to residents about their day-to-day issues and problems. She feels very comfortable walking around the area, and can go almost wherever she likes, crossing borders between criminal factions with ease. Her physiological activity (Figure 3) is cyclical. Her tonic curve has little variation, indicating that her levels of affective and cognitive activity are stable throughout her journey. Her patterns of sympathetic response are even and reliable. Her electrodermal activity readings exhibit

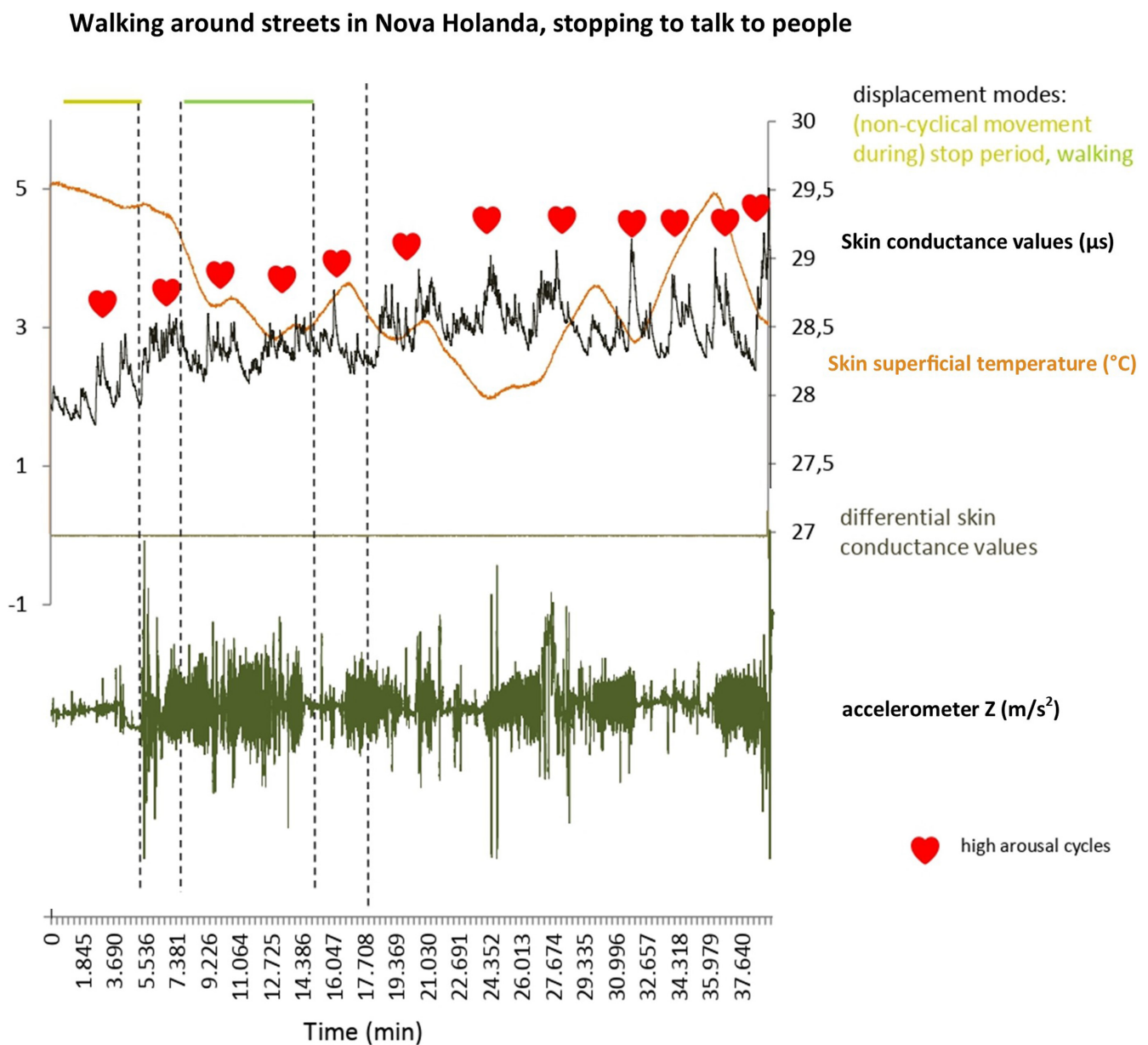


FIGURE 3 Mariana's 38-minute walk around various streets in Nova Holanda, in Maré, stopping to talk to local residents.

variable kinetics and magnitudes, with sympathetic arousal consistently high (though this may be within the range of normal variation for her individual physiology – controls in laboratory conditions would be needed to be certain about this). Stimuli are broadly homogeneously effective along the route. Her readings show relatively low autonomic variability, meaning there is quite a small difference between the lowest and highest peaks of affective excitation. While her tonic level of arousal is stable, the phasic components are very rich, with variable magnitudes and release times. Her superficial skin temperature is also very varied. Overall, her physiological readings show a strong capacity to respond to environmental demands through the activation of sympathetic affective arousal. Her biophysical readings register high levels of cognitive and affective demands, but also elastic affective responses. In other words, Mariana's body is switched on all the time, but succeeds in managing and regulating these demands very successfully. Her body shows very strong affective resilience.

Mariana's profile, like Fernanda's, offers a clear counter-example to narratives assuming violent bordering necessarily leads to an anaesthetized or affectively damaged orientation towards the self and others (Mubi Brighenti & Pavoni, 2019). Through fine-grained analysis of the relation between urban environment and affective capacity, we see that for some residents, while mobility within the border spaces of the favela requires very high levels of cognitive and affective activity (the urban environment is unquestionably demanding and stressful), this trains their bodies to respond extremely sensitively and dynamically to the urban milieu. Our interviewees were acutely aware of the risks of navigating the streets, and were all frightened of being caught up in gunfights – an event that all of them had experienced multiple times. But most of them, with the important and troubling exception of Ana (discussed above), exhibited electrodermal activity profiles that showed high levels of affective resilience.

The stresses of navigating an urban environment that is violent both in terms of the punctual violence of gunfights and in the slow, structural violence of poverty, exclusion, and lack of services (Anuniação et al., 2020; Berlant, 2011; Galvão & de Carvalho Martins, 2013) do not necessarily result in affective debilitation or wounding. However, they do contribute to the forces and pressures keeping favela residents 'in place', making leaving the favela feel overwhelmingly stressful or frightening. The attentional demands of mobility within the favela take the form of high levels of affective resilience. This affective resilience results from sensitive attunement to a damaged urban milieu created through racist state terror and the violent, patriarchal structures of authority of criminal organizations.

7 | CONCLUSIONS

In her work on undoing the 'genre' of man, charting the historical shift from 'theocentric' to 'biocentric' descriptions of man, black feminist theorist Sylvia Wynter draws on neurobiology as a potential way of breaking out of the dichotomy between biological and cultural theories of embodiment. She argues that neuroplasticity, particularly our awareness of it and mapping of its mechanisms, represents the condition of possibility for a new understanding of being human as *praxis* not substance (McKittrick, 2015). By coming to a fuller awareness of our neuroplasticity – the creative capacity of the nervous system to change and adapt itself in response to internal or external stimuli by reorganizing its structure, functions, or connections – Wynter suggests that a new descriptive statement of man becomes possible, as 'We-the-ecumenically-Human' (Wynter, 2015, p. 194). Contemporary neuroscience, she argues, offers a new answer to the question 'who are we?' It makes visible a level of being-human as 'dually biological and meta-biological', with a capacity for 'auto-institution' and auto-poesis that enables humans to emerge as hybrid living beings that can enact themselves as humans, consciously and creatively creating 'a new kind of planetarily extended cum intercommunal community' (Wynter, 2015, p. 194).

Such optimism for neuroscientific understandings of the human to empower new ecumenical, anti-racist genres of the human is not shared by all of Wynter's readers (Hantel, 2020; Marriott, 2011). Certainly, there are good reasons to be wary of the use of biosensing methodologies in favelas, given the long history of scientific authoritarianism and racism, including the dehumanizing treatment of poor and black bodies as mere repositories of data to be extracted. Nevertheless, the work of philosophers such as Malabou (2008) indicates that creative and emancipatory potential can also be found in neurobiological redescriptions of the human. In our own research, Cabral designed a participatory art installation, and an initial prototype of this was showcased at the *Multiplicidade* digital art festival in Rio.¹ In the complete version of the installation, members of the public (including research participants) are able to wear a biosensor, watch a live display of their electrodermal activity (as well as a projection of their visual appearance), and use digital tools to creatively explore their own biophysical rhythms. Through simple digital buttons, participants can playfully deform and reform their images and biological profiles. Images of key quotes from the qualitative research are visible in the installation. Part

of the aim of this is to enable research participants to reclaim their identity, body, and neurobiology, seeing it not as the objective truth of their being but as raw material for a playful transformation of themselves.

Our research indicates that women navigating Rio's violent border spaces conduct high levels of affective labour or 'emotional borderwork' in co-producing the border and its everyday affective atmospheres (Kolehmainen & Mäkinen, 2019; Meier, 2020, p. 2). This work is collective, inter-corporeal, and partly unconscious. Through it, women's bodies are enrolled into co-producing the emotional and affective circuits of the favela's violent borders. However, our analysis points to the finely graded ways in which borders enact forms of 'differential inclusion' (Mezzadra & Neilson, 2013) among favela residents, stratifying and dividing them. Our research identified a wide range of responses to violent urban bordering, from very high levels of emotional and affective resilience to distressing levels of affective debilitation. Our aim here is not to ask why some are resilient and some are not, but to offer insights into the specific embodiments and lived experiences of affective debilitation and resilience. In doing so, we explored aspects of the relationship between preconscious affect and lived experience, showing how, even when women do not report lived experiences of fear, their bodies appear to be responding to exceptionally high affective demands. In doing so, we hope to have contributed to a new geographical understanding of the embodiment of urban emotions and affects in violent urban border spaces.

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DATA AVAILABILITY STATEMENT

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ENDNOTE

¹ Videos of the installation can be viewed at: <https://www.youtube.com/watch?v=FIGdMQKF5vA> and <https://www.youtu.be/8IacA3pn7Aw>.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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