Universidade de Évora - Instituto de Investigação e Formação Avançada

Programa de Doutoramento em Motricidade Humana

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Body and trauma: from comprehension to intervention in female victims of domestic violence

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A tese de doutoramento foi objeto de apreciação e discussão pública pelo seguinte júri nomeado pelo Diretor do Instituto de Investigação e Formação Avançada:

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Body and Trauma: from comprehension to intervention in female victims of domestic violence

Abstract

Intimate Partner Violence (IPV) is a form of domestic violence affecting around 30% of women globally. While being a pressing issue in public health, IPV has drawn significant attention from the scientific community due to its extensive impact on victims' lives. Victims endure physical, psychological, and social consequences of such violence, which damage their experience of themselves. The main objectives of this thesis were to understand how their experience of the body is impacted, and to develop a psychomotor therapeutic intervention for victim healthcare. These objectives were achieved through i) a theoretical reflection about victims' embodiment, ii) quantitative and qualitative studies involving women with and without an IPV history, and iii) a study on the effectiveness and feasibility of a psychomotor intervention for IPV women victims residing in shelter homes.

Women who have experienced IPV exhibit high levels of bodily dissociation, biased interoceptive awareness, difficulties in trusting bodily sensations, and uncertainty about body ownership. These embodiment characteristics mediate and predict their poorer mental health outcomes (e.g., depression and posttraumatic stress) and increased somatic complaints, distinguishing them from women without a history of IPV.

Together, the results support the hypothesis of a feeling-owning-acting cycle that, impacted by violence as a traumatic experience, alters victims' ways of being and acting in the world. This understanding led to the development of the psychomotor intervention Feel-Own-Move, which proved feasible and effective in reducing bodily dissociation levels among women living in shelter homes. Results support recommending this psychomotor therapy approach to enhance positive embodiment practices, mental health, physical activity levels, and health-related quality of life for women recovering from IPV.

This thesis provides an in-depth understanding of how women victims of IPV perceive and inhabit their bodies, and how healthcare providers can consider and address victims' embodiment characteristics to better facilitate health and trauma recovery.

Key-words: Embodiment; Women; Trauma; Bodily Dissociation; Psychomotor Therapy.

Corpo e Trauma: da compreensão à intervenção com mulheres vítimas de violência doméstica

Resumo

A Violência numa Relação de Intimidade (VRI) afeta cerca de 30% das mulheres em todo o mundo. Sendo um problema premente de saúde pública, a VRI tem atraído a atenção da comunidade científica pelo alargado impacto na vida das vítimas. As vítimas sofrem consequências físicas, psicológicas e sociais desta violência, que impactam a sua identidade e vivência de Si. Os principais objetivos desta tese foram entender como a experiência do corpo destas mulheres é afetada, e desenvolver uma intervenção psicomotora dirigida a essas alterações e necessidades de saúde. Estes objetivos foram alcançados através de i) uma reflexão teórica sobre a vivência corporal de mulheres vítimas de VRI, ii) estudos quantitativos e qualitativos com mulheres vítimas e não-vítimas, e iii) um estudo sobre a eficácia e viabilidade de uma intervenção psicomotora aplicada em casas abrigo.

As mulheres que sofreram VRI exibem altos níveis de dissociação corporal, alterações na consciência interoceptiva, dificuldade em confiar nas sensações corporais e incerteza sobre serem donas do seu corpo. Estas características mediam e predizem os piores resultados de saúde mental (como depressão e stress pós-traumático) e o maior número de queixas somáticas de mulheres vítimas de VRI em relação a mulheres sem histórico de VRI.

Os resultados suportam a hipótese de o impacto no ciclo *Feeling-Owning-Acting* alterar as experiências e formas de agir das vítimas. Esta compreensão levou ao desenvolvimento da intervenção psicomotora *Feel-Own-Move*, que se mostrou viável e eficaz na redução dos níveis de dissociação corporal das mulheres em casas abrigo. Os resultados permitem recomendar esta intervenção para promover vivências positivas do corpo, a saúde mental, os níveis de atividade física e a qualidade de vida relacionada com a saúde de mulheres que sofreram VRI.

Esta tese permite uma compreensão aprofundada de como mulheres vítimas de VRI percecionam e habitam os seus corpos, e de como os profissionais de saúde podem atender à vivência do corpo destas mulheres como estratégia de promoção da saúde.

Palavras-chave: Vivência corporal; Mulheres; Trauma; Dissociação corporal; Terapia Psicomotora.

Publications and submitted papers

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Book chapters

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Oral communications

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Poster

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Workshops

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Contents

Abbreviations

ANS	Autonomic Nervous System
BA	Body Agency
BO	Body Ownership
BMO	Body and Movement-oriented
CRN	Core Response Network
IPV	Intimate partner violence
MAIA	Multidimensional Assessment of Interoceptive Awareness
MIQ	Movement Imagery Questionnaire
PTSD	Posttraumatic Stress Disorder
RHI	Rubber Hand Illusion
SBC	Scale of Body Connection
SMH	Somatic Marker Hypothesis

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Chapter I. Introduction

> "(…) *the bodies of other human beings can be studied scientifically (e.g. in physiology or anatomy) as one kind of object in the world, but more normally we experience them as expressions of a person's manner of being-in-the-world; we can no more separate other human subjects from their embodiment than we can separate ourselves from our own bodies."* (Mathews, 2014, p.59)

Interpersonal violence has been a persistent element throughout human history, manifesting in varied contexts and through diverse means. Notably, domestic violence (DV) and violence against women (VAW) have emerged as critical concerns for global health and social agencies (Ekström, 2018). Various approaches, including phenomenological, psychological, and social frameworks, have been adopted to analyze the resilience mechanisms of victims, the aggressive behaviors of perpetrators, and the extent to which both can achieve recovery and break the cycle of violence. Recognized as a multifactorial phenomenon, violence consequences reach out both direct and indirect victims within their ecological contexts. For instance, exposure to domestic violence during childhood significantly heightens the risk of future perpetration or victimization (Li et al., 2019; 2020). Therefore, advancing our understanding of the holistic impacts of violence on victims is imperative to effectively break the cycles of violence and victimization. Ecological systems theory offers a valuable lens for this examination, since it is based on the impact of violence on the health of victims, it enables to envision the repercussions on their body, emotions, behavior, lifestyles, close relationships and communities (Bronfenbrenner & Morris, 1998; Richardson et al., 2008). It is known that victims endure physical, psychological, and social consequences of such violence, which can damage their experience of themselves and the world. Knowing how their experience of the body is impacted is one of the main aims of this thesis.

The body and embodiment in Human development

It is through and for the body that humans develop and enrich their understanding of the world. Jean Piaget's theory of cognitive development (1929) was fundamental in recognizing the body and actions as central for perceiving the world and engaging with it. Also, it is through the body that internal representations of objects, constructs, and relationships evolve, shaping the structure of the Self (Gallagher & Meltzoff, 1996; Needham & Libertus, 2011). Thereby, ecological perspectives of the action-perception link claim that humans perceive in order to act, and they act in order to perceive

(Gallagher, 2018; Gibson, 1988).

Beyond perception and action, also body awareness – feeling the body-, body connection -feeling connected to the body-, body ownership -feeling the body as one's own-, and body agency -feeling agency towards one's actions- are features of one's embodiment, the way a person experiences the body and the interplay between body, mind and context (Ataria & Gallagher, 2015; Gallagher, 2018; Gibson, 1988). The study of embodiment has allowed researchers to explore how people experience their body (also called how they inhabit their body), and the evolution of such experiences over time (Lux et al., 2022). Research has focused on unpacking the development of embodiment experiences, and how those interact with internal and social features (Marmeleira & Duarte Santos, 2019; Marshall, 2016; Needham & Libertus, 2011; Piran & Teall, 2012). One notable result of these efforts is the work of Niva Piran, a clinician and researcher specializing in women's health and embodiment, who introduced a developmental approach to understanding embodiment in girls and women (Piran, 2016, 2017). Using a constructivist grounded theory approach, Piran conducted and analyzed both life history studies and prospective interviews of girls and women, shedding new light on the ways women inhabit their bodies (Piran, 2016). The author identifies three domains in the development of embodiment experiences in women: the physical domain, the mental/representational domain, and the social/relational domain. Within these, women's embodiment experiences fluctuate between positive and negative poles across five parallel dimensions: 'body connection and comfort', 'agency and functionality', 'experience and expression of desire', 'engagement in attuned self-care practices', and 'resistance to self-objectification' (Piran, 2016; Piran & Teall, 2012). Empirical studies suggest that embodiment experiences are stronger predictors of life satisfaction than body esteem in women (Gattario et al., 2020; Munroe, 2022). Thus, embodiment experiences are a cornerstone of identity and human nature, shaped by contextual and developmental processes (Gallagher, 2005).

Embodiment and Health

As previously detailed, human perception and experience of the world are rooted in the body (Gallagher, 2018; Gibson, 1988; Niedenthal, 2005). Self and body awareness and experience emerge from multisensory integration processes, being crucial for adaptive behavior and health monitoring (Herbert et al., 2020). Both conscious and

unconscious bioregulatory loops influence how individuals interpret the world and make decisions in uncertain situations (Bechara & Damásio, 2005; Damásio, 1994; Marmeleira & Duarte Santos, 2019). This understanding is being applied to explore various research aims within the field of primary healthcare, such as promoting preventive health behaviors, increasing adherence to treatment in physical and mental health, and fostering changes in health-related habits (Ghane & Sweeny, 2013; Sherman et al., 2010). Disrupted embodiment experiences are linked to a variety of illnesses and maladaptive behaviors. For instance, dysfunctional interoception, the ability to perceive, integrate and/ or processing internal visceral sensations such as heartbeat, breathing patterns or gastric sensations, has consistently been associated with somatic complaints such as chronic pain and gastrointestinal problems (e.g., Herbert, 2021; Opdensteinen et al., 2023). It is also linked to psychopathology (impaired emotional processing, anxiety and stress-associated disorders, depression, suicidal ideation, self-harming behaviors; e.g., Jenkinson et al., 2023; Khalsa et al., 2018; Murphy et al., 2017), eating disorders (anorexia nervosa, obesity; Herbert et al., 2020), and non-communicable diseases (cardiovascular disease; Bonaz et al., 2020). Specifically, dysfunctional interoception impacts health through impaired regulation of homeostatic psychophysiological needs regarding well-being and survival (Herbert, 2021). Consequently, interoception is currently considered a transdiagnostic factor that plays a significant role on mental health, wellbeing and psychopathology (Jenkinson et al., 2023).

In addition to being aware of the body, to feel connected with the body is also a vital aspect of embodiment, closely linked to physical and mental health (Price & Thompson, 2007). When this connection is disrupted, it is referred to as a state of bodily dissociation, characterized by feeling disconnected from one's body, difficulty in identifying and expressing emotions, and an inability to recognize or respond to sensations of comfort or discomfort (Price & Thompson, 2007). Bodily dissociation impairs self-regulation, relational skills, decision-making, and behavior, also impacting health monitoring and disease progression (Piran, 2016; Price & Thompson, 2007; Price et al., 2017).

Embodiment and trauma

Traumatic experiences arise from acute or chronic events that threaten a person’s physical and/or psychic integrity. In dangerous situations, unconscious defensive responses trigger neurophysiological and chemical mechanisms, leading to either a fight,

flight or immobilization response. During the presence of the aggressor or threat, primary physiological needs recede, and survival becomes the sole focus (van der Kolk, 2015).

Once the threat is over, the body must resolve these defensive responses to return to normal functioning and restore homeostasis. However, in some cases, trauma persists even after the threat is gone, leading to a chronic state of hypervigilance with increased sympathetic activity or apathy with heightened parasympathetic activity (van der Kolk, 2015). Individuals with post-traumatic stress disorder (PTSD) experience permanent dysregulation of the autonomic, limbic, motor, and arousal systems, collectively referred to as the core response network (CRN, Payne et al., 2015). The combined action of those systems is responsible for one's implicit knowledge of how to do things, contributing to the senses of body ownership, the feeling that the body is one's own, and body agency, the feeling of control over one's actions (Ataria & Horovitz, 2020).

As mentioned above, body ownership and body agency are essential components of embodiment. Trauma often impairs these components, leading individuals to feel the body as an enemy or foreign (body disownership), and as if they are operating on autopilot with weakened or no control (loss of sense of agency) (Gallagher, 2017; Ataria, 2018; Ataria & Horovitz, 2020). Trauma can also disrupt interoceptive accuracy, the ability to perceive bodily sensations accurately, and sensibility, the dispositional tendency to focus internally on these sensations. This disruption may either bias, intensify, or diminish the perception of sensations, sometimes leading to mistrust in bodily signals and the development of maladaptive attentional patterns (Ataria, 2018; Schmitz et al., 2021; Schulz et al., 2021).

The case of intimate partner violence

> *"(…) her body is getting away from her, it is no longer the straight-forward expression of her individuality*" (de Beauvoir, 1974, p. 346)

Intimate partner violence (IPV) is one form of domestic violence includes any act of violence, threat, coercion or deprivation of freedom within an intimate relationship that leads to physical, sexual, or psychological suffering (WHO, 2021). The World Health Organization (WHO, 2021) has made significant efforts to highlight the impact of IPV on victims, reporting a prevalence of about 30% in adult women worldwide. Health

consequences for victims often include physical injuries, depression, anxiety, posttraumatic stress disorder, altered sleep and eating patterns, and suicidal ideation (Pico-Alfonso et al., 2006; Stubbs & Szoeke, 2022; WHO, 2021). Additionally, victims may experience somatic symptoms such as chronic pain, gastrointestinal disorders and limited mobility (WHO, 2021; Blasco-Ros et al., 2010; Signorelli et al., 2020).

Being a traumatic experience, IPV detrimentally affects victims' embodiment, (Ataria & Gallagher, 2015; Mensch, 2008; van der Kolk, 2015; Payne et al., 2015). Such trauma disrupts victim's embodied Self, altering how they understand themselves, perceive their environment and act in the world (Ataria, 2013; Heitzler, 2013; Piran, 2016). IPV often involves repeated aggression, resulting in chronic states of perceived danger and increased neurological, sensory, and relational hypervigilance. This repetitive nature of IPV prevents the body from resolving the defensive responses and regaining a sense of safety and presence. Moreover, victims' sense of "predictability, trust and connection" becomes fractured (Westin, 2022, p.53), negatively affecting their emotions, relational skills and embodied experiences. Ultimately, bodily dissociation, body disownership, depersonalization and derealization can occur (Ataria, 2018; Payne et al., 2015; van der Kolk, 2015).

It is hypothesized that, by impacting the embodied Self, IPV disturbs the 'I can' feeling of the victim and her/ his possibilities of action (Gallagher, 2018; Kirmayer & Gómez-Carrillo 2019; Mensch, 2008). Recent research posits that interoception mediates the loss of that sense of agency in trauma survivors (Fehertoi, 2019).

In summary, research suggests that beyond physical injuries and mental health disorders, IPV victims with trauma may experience difficulties in being aware of their bodies, feeling connected to the body, perceiving the body as their own, and/or feeling agency towards their actions. Further empirical research is needed to explore the embodiment-related challenges faced by IPV victims and their impact on health and behavior.

Body-mind and trauma-informed therapeutic approaches

The holistic impact of trauma on health and well-being has led to the development of body-mind integrative therapeutic approaches, which appears to be the most effective means of overcoming trauma and its consequences (Classen et al., 2021; van der Kolk, 2015; Ogden et al., 2006). As trauma survivors often exhibit dysregulated neurochemical

and psychophysiological responses (i.e., either through hypo-arousal or hyper-arousal to stress triggers), stabilizing arousal and affect regulation is a recommended first step in trauma interventions (Ogden et al., 2006; Payne et al., 2015; Shepherd & Wild, 2014; Van de Kamp & Hoven, 2019). In cases of PTSD, body-mind-oriented therapies like Sensorimotor Psychotherapy (Classen et al., 2021), Somatic Experiencing (Payne et al., 2015; Andersen et al., 2017), Dance/movement therapy (Dieterich-Hartwell, 2017) and Psychomotor therapy (PmT; Bieleveldt, 2019), have shown promising results through reclaiming bottom-up sensations and regulation processes (Van der Kolk, 2015; Van de Kamp et al., 2019).

Reestablishing a regulated arousal state, particularly through healthy attention toward interoceptive sensations, helps trauma survivors reclaim a sense of safety within their bodies. This is a crucial step in trauma-informed interventions: to gather a sense of safety for the Self (Dieterich-Hartwell, 2017). With this in mind, exercise practices, movement-based therapeutic interventions and breathing and meditation techniques have been studied for their benefits (Caldwell & Victoria, 2011; Rosenbaum et al., 2015; Taylor et al., 2020). However, to the best of our knowledge, research on psychomotor interventions that address the embodiment characteristics and needs of IPV victims is lacking. Exploring such approaches could provide valuable insights into developing and delivering IPV-appropriate health practices.

Objectives of the thesis

Building on evidence that i) violence impacts physical health, mental health, and the victim's Self in different ways, ii) victims often endure post-traumatic states with altered homeostasis, psychophysiology, emotions and behavior, iii) trauma is linked to altered embodiment experiences, iv) embodiment and the experience of inhabiting the body are thought to be altered in victims of IPV, and v) body- and movement-oriented interventions have shown promise in alleviating post-traumatic symptoms and their impact on health, this doctoral project was designed with the following objectives.

1. To analyze embodiment-related features of female victims of IPV;
2. To compare the experience of embodiment between women with and without a history of IPV;
3. To explore the experiences of the body of female victims of IPV across their lives, and the impact of violence on their embodiment-related narratives;

4. To examine de contribution of embodiment-related features to the health of female victims of IPV;
5. To develop a psychomotor therapy program targeting the embodiment-related impairments of female victims in shelter settings;
6. To examine the feasibility and effects of a psychomotor therapy program on the body and embodiment of female victims of IPV in shelter settings.

Thesis outline

In the first chapter of this thesis an introduction to the fields of embodiment, trauma, IPV and trauma-focused body-oriented interventions is provided.

The second chapter of this thesis gathers the state of the art regarding the extent and impacts of trauma in human body and embodiment (book chapter 1). This chapter progresses to summarize the current knowledge on the evidence-based mechanisms for addressing the embodiment of trauma in both preventive and therapeutic contexts.

The third chapter encloses the resulting papers (articles 1 to 4) of the empirical studies of this PhD project, on the embodiment-related impairments found in female victims of IPV through both quantitative and qualitative methodologies of data collection and analysis.

In the fourth chapter, the integration of the findings exposed in chapter three gives structure to the development of a psychomotor therapeutic intervention program (book chapter 2). In this, the theoretical bases and mechanisms of action of the program Feel-Own-Move (FOM) are detailed.

In the fifth chapter, the feasibility and effects of the FOM are presented and discussed (article 5).

This thesis ends with a final discussion encompassing the initial research questions, results found, the development and implementation of the intervention, the project's contributions to the field, and final conclusions.

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Chapter II. State of the art: The extent of trauma in the body, and important mechanisms for developing a therapeutic approach.

Book chapter 1. Embodiment: features, measures and importance in IPV

Embodiment: features, measures and importance in intimate partner violence[1]

Joana Machorrinho, Guida Veiga, Graça Duarte Santos, and José Marmeleira (2022)

Abstract

Intimate Partner Violence (IPV) impacts both physical and mental health of victims. The embodiment refers to the inner and outer features that structure how we feel and act within our bodies. The study of the impact of violence on embodiment has led to a growing interest among researchers and practitioners. This is a review chapter about the embodiment features in need to be considered in research and support of victims of intimate partner violence. The chapter also encloses the embodiment measurement tools and ethical cautions, as well as the importance of the embodied possibilities – feeling, owning, and acting- as therapeutic resources for victims of IPV. This chapter ends with a schematic organization of the embodied mechanisms involved in therapy targeting victims of IPV, and a briefcase report of the embodied therapeutic journey of a female victim.

Keywords

embodiment, intimate-partner violence, women, body disownership, interoception, proprioception, body agency, assessment, behavior, trauma, bodily resources, psychomotor therapy, treatment.

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Chapter II. State of the art

Introduction

The discussion about embodiment has come a long way since the body and mind were considered separate agencies, each one with its own functions and expertise. In the last century, philosophers, constructivists, neuroscientists, and developmental theorists have been building pathways between the body, cognition, emotions, and sensations. Merleau-Ponty (1954) claimed that the ability to perceive demands to be experienced in and through the body. The study of embodiment, i.e. the study of the body–mind interplay, assumes that human thinking, perception, and emotions are grounded in one's body (Gallagher, 2005). Our abilities to learn new concepts, feel emotions, and relate with each other, arise from the multiple biological, neurochemical, and neuropsychological pathways via which body and mind communicate (Marmeleira & Santos, 2018).

Embodiment is a lifespan and developmental process. During our lives, sensing, moving, and relating with others shape our entire embodiment experiences and, ultimately, our human nature, continuously from birth to the final moments of life (Gallagher, 2005). As embodiment processes influence and are influenced by context and life events, there is a compelling need to study which events can cause disruptions and under what terms those disruptions occur (Kirmayer & Gómez-Carrillo, 2019).

One of the most critical and prevalent events that act negatively on many facets of embodiment is intimate partner violence (IPV). Hence, not only the physical body but also other aspects of embodiment can be ruptured by violence and by the continuous and relational characteristics of IPV. The literature reviewed in this chapter brings awareness to violence-related trauma as possibly being one of the most intense disruptions of embodiment.

In the next sections of this chapter, a review of the embodiment processes and possibilities that might be most vulnerable to violence and how those can impact the well-being and health of victims is presented. We further discuss ethical and methodological considerations for the assessment of embodiment features in IPV victims. The final section encloses an evidence-based synthesis of recommendations for therapy using embodiment-related resources, which are informed by a briefcase report of a female victim's embodiment-therapy process.

Embodiment: feeling, owning, and acting

"The body has an ambiguous status, as it seems to be both what we are and what belongs to us." (De Vignemont, 2007, p.427)

Current interdisciplinary research understands cognition as being embodied but also embedded, enactive, and extended, like a self-regulating system through the interactions between the brain, the body and the world (explore 4E cognition; Kirmayer & Ramstead, 2017; Carney, 2020). One great example is the work of António Damásio, in particular the somatic marker hypothesis (SMH, Damásio, 1994). The neuroscientist and his colleagues state that the decision-making processes are influenced by somatic markers produced and stored in the body from previous emotional experiences (Bechara et al., 2000). Those somatic markers arise in both conscious and unconscious bioregulatory loops, affecting how people make decisions in situations of uncertainty (Bechara et al., 2000; Marmeleira & Santos, 2018). Additionally, recent research on the effects of embodiment phenomena on higher-order psychological functions, such as imagination and associative thinking, is being undertaken (Lux et al., 2021).

Body image is another domain of embodiment that has captured a lot of attention. Being conceptualised as a person's internal representation of the body, it comprises diverse and complex constructs, such as the physical and psychological skin, the muscular tonus, the communicational abilities of the body, the 'feeling of existing', and the perception of the internal state of the body (Pireyre, 2015). Theoretical and empirical work has also brought attention to the concepts of body ownership (feeling the body as one's own) and body agency (one's feeling of being the executor of one's actions and movements) as partially influencing the structuring of identity (Braun et al., 2018; David & Ataria, 2021).

Thus, as seen before, embodiment research supports the idea that the body is embedded in one's environment, is a product and producer of physical, psychological, and identity features, and gathers subjectivity and our ability to make sense of the world (Mesch, 2008; Marmeleira & Santos, 2018). Accordingly, Marshall and colleagues propose three main standpoints, whose intertwining may, in their view, represent the embodiment: the body morphology, the body as lived experience, and the body that actively engages with the world (Marshall et al., 2021).

It is as early as in the womb that the fetus starts rehearsing movements of balance, rocking, stretching, pulling, and pushing to get closer to and move away from the mother. After birth, the presence and absence of the caregiver, the rhythms, the holding, the care, and responsiveness show the baby what to expect from each relationship and from the world. These movements of presence and intentionality form the basis of the relational view of the world (Kirmayer & Gómez-Carrillo, 2019). During childhood, kids explore their bodily movements, and their possibilities for action become implicit in their emotions, learning skills, and behaviour (Bradley et al., 1989; Hirose, 2002). From an ecological point of view, the implicit intentions of acting in the world "are not mental as opposed to physical but are instead embodied (…)" (Withagen et al., 2012, p.253). Theorists with a dynamic systems perspective view human beings as self-organising systems, ever developing through processes and feedback and complex relationships between multiple subsystems (Keenan, 2010). In line with this, our actions are embedded in physical, mental, affective, and motivational features, which are grounded in internal and external representations, which are renewed over time. From the moment-by-moment intertwining of the multiple bodily representations and their internal and external systems arises embodiment and our way of being and acting in the world.

Therefore, as a developmental process, embodiment experiences can unfold in more positive or negative ways according to contextual influences. In this line of thought, Piran (2016) looked at the lived and embodied experiences of girls and women (9–68 years) and proposed five distinct processes that characterize embodiment and can oscillate between negative and positive poles: (1) connection with the body, (2) sense of agency and functionality of one's body, (3) awareness of bodily needs, (4) self-care directed to internal needs, and (5) inhabiting the body in the first person as a subject (as opposed to an object). The author considers these as developmental processes subject to contextual influences that can disrupt the experience of embodiment.

The scope of this chapter is not to conduct an extensive review of all the known features of embodiment but rather to examine the ones that are thought to be most vulnerable to violence and trauma, as well as their assessment tools. In the next pages, those features are organised according to their embodied possibilities: feeling the body – interoception, proprioception, and motor imagery; owning the body – body ownership; and acting from the body – body agency.

Feeling the body – Interoception, proprioception, and motor imagery

The construct of interoception has been attracting strong interest in the scientific community, and is currently defined as the sensing, interpretation, integration, and regulation of the internal visceral signals, including the subjective experience of the body (Chen et al., 2021; Fazekas et al., 2021). The recently endorsed neural circuits of interoception share the representation of cognitive, emotional, and behavioural processes (Berntson & Kahlsa, 2021), corroborating the idea of interoception as being "the foundation of human embodiment of affective and cognitive processes" (Coello & Fischer, 2016, p.5).

The perception of visceral sensations allows the moment-by-moment assumption of the internal state of the body, making inferences about the intensity, precursors, and consequences of those sensations. Taken together, the explicit and implicit links between sensations and emotions and the adaptive or maladaptive attention given to each felt sensation may determine how interoception contributes to the regulation of behaviour and, ultimately, to the embodied self (Kahlsa et al., 2018). Dysregulated interoceptive features are strongly associated with psychiatric disorders (e.g. depression, panic disorder, posttraumatic stress disorder, autism spectrum, eating disorders), psychosomatic disorders (e.g., fibromyalgia, irritable bowel syndrome, asthma, chronic pain), self-harm, suicidal behaviour, and functional neurological disorders, among others (Kahlsa et al., 2018; DeVille et al., 2020; Bonaz et al., 2021).

From behavioural tasks to self-administered questionnaires, researchers strive to measure the sensitivity, sensibility, awareness, and accuracy of interoceptive sensations, still without a complete agreement on this taxonomy (Murphy et al., 2019; Fazekas et al., 2021). Furthermore, assessment of interoception can consider various sensorial modalities (e.g. cardiac, gastric, respiratory) and use different methods, as detailed below.

Another pathway for the perception and feeling of the body is proprioception, which is considered the sense of body position and orientation. Proprioception has major repercussions on balance, strength, and tonus and is thought to store important procedural memory pieces of information (how to do things) (Mishkin et al., 1984; Stillman, 2002). Muscle tonus and posture awareness have long been associated with low back and neck pain as well as with mood disorders, levels of confidence, fatigue, energy, and strength

(Mast et al., 2014; Harvey et al., 2020; Riskind et al., 2021). The connection between proprioception and psychophysiological mechanisms has been explored, with recent findings showing that there is an influence of postural biofeedback on health conditions and well-being (Harvey et al., 2020). For instance, research has shown that clenching fists enhances feelings of power and self-control and walking in a more sad or happy manner can elicit sensorimotor memory patterns recalled from earlier embodied emotions (Riskind et al., 2021).

Briefly, proprioceptive receptors give people the notion of how the body is standing and moving in space, and through feedback mechanisms, proprioceptive information enriches our body schema and allows for the feeling of body ownership (Gallagher & Cole, 1995; Shenton et al., 2004). Currently, proprioception is being assessed by exploring participants' detection of passive motion, the discrimination of the amplitude of active movements, or the reproducibility of joint position (Han et al., 2016).

Being able to imagine one's body moving, reaching (pulling and pushing), and acting in time and space is an opportunity for the rehearsal of our actions and representations in every day (Shenton et al., 2004). Thus, movement imagery (a type of mental imagery) is considered a dynamic simulation of movement, action, or physical sensation in the absence of any motor output, and its implications for various behaviours and symptoms have been under study (Moran et al., 2011).

There is some work regarding movement imagery in the field of mental health. For example, in neuroimaging studies, patients with PTSD show increased cerebral blood flow to the motor cortex when re-experiencing a traumatic event, a hypothesis that was first suggested by the fact that PTSD (as well as violence-related trauma) emerges after an attack or threat that can prompt a movement response in the victim to resist or escape it (Moran et al., 2015). Conversely, for people with major depressive disorder (MDD), an impairment of movement imagery abilities might be contributing to the psychomotor retardation symptoms and might even be associated with the chronicity of MDD episodes (Chen et al., 2013). In fact, the cortical activity of primary motor areas is responsible for the abilities of movement imagery (Miller et al., 2010).

Scientists believe that motor imagery can be used to rescript movement restrictions, either due to physical constraints, beliefs of vulnerability or pain, or struggles with

performance self-confidence (Moran et al., 2011; Kutsuzawa et al., 2021). We add to this, suggesting that therapeutic movement imagery might also be helpful when there is a belief that one does not have the contextual possibilities to perform a certain action (see section 3. 1. Embodiment –Therapeutic resources for victims of IPV). Self-report questionnaires are the most frequently used tool to measure motor imagery, although it can also be measured through mental chronometry, prospective action judgments, or perceptual decision paradigms (McAvinue & Robertson, 2008).

Owning the body – Body ownership

What makes the body one's own? Research shows that an integration of both multisensory signals and pre-existent models of the body is necessary for the experience of a coherent sense of body ownership (BO) (Gallagher, 2000; Tsakiris, 2011; Ataria & Gallagher, 2015). Recently, the fronto-insular-parietal network has been associated with the processes of experiential body ownership (Moro et al., 2021). Also, higher cortical thickness in the somatosensory regions, the temporoparietal junction, the intraparietal areas, and the occipitotemporal cortex have been positively associated with higher indexes of subjective body ownership, as well as being involved in cognitive-affective perspective-taking and bodily awareness (Matuz-Budai et al., 2022).

The study of which variables can help maintain or disrupt the coherence of BO and embodiment is a growing field of exploration, including the sense of boundaries of the self (Ataria, 2013). Those boundaries can fluctuate between being more rigid and close vs more flexible and open and can contribute to the structure of body schema and consequent regulation of social relationships (Ataria, 2013). Also, De Vignemont (2007) suggests the existence of a protective body schema, which encompasses the notion of an affective attitude towards one's body as being responsible for people protecting the body or body parts that they feel as their own.

Acting from the body – Body Agency

Various clinical cases and neuroimaging studies with the embodiment of rubber body parts made clear that the sense of BO itself does not completely explain the embodiment of a body or body part as being one's own (Tsakiriset al., 2010; Kalckert & Ehrsson, 2012). The sense of body agency (BA) is defined as one's feeling of being responsible for performing certain movements or actions, meaning that it arises from "recognising a

causal influence on the external world" (Zopf et al., 2018, p.1). Kirmayer and Gómez-Carrillo (2019) state that agency involves not only the sense of BO but also the perception of causality, responsibility, and control over actions "which are related to our goals, plans and intentions" (p.172). In this sense, agency strengthens the feelings of belonging, autonomy, and possibilities for action in the world.

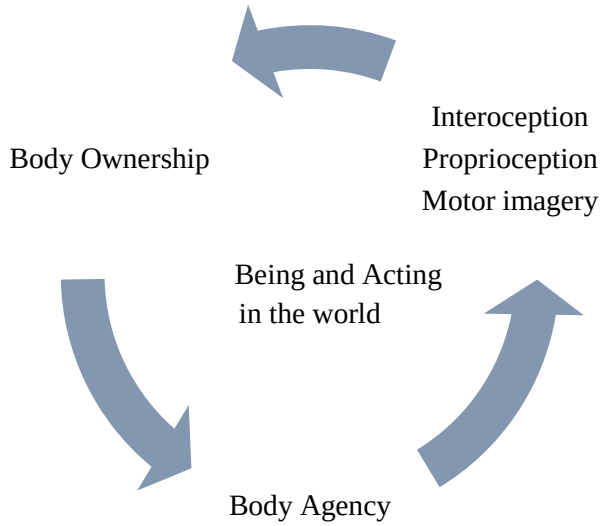
It has been shown that combining a lack of agency with an integral sense of BO makes one feel that one cannot control their own body in terms of flashbacks, involuntary movements, or even inertia or fighting against adversities. The feeling of agency is impaired, for example, in people with schizophrenia and PTSD (David & Ataria, 2021).

The rubber hand illusion (RHI) is the most accepted experimental task to assess both body ownership and agency (Botvinick & Cohen, 1998; Kalckert & Ehrsson, 2012). Participants stand with both hands lying on a table and focus their visual attention on a third hand, a rubber hand, placed either between both hands, in front of, or above the respective hand. For the experiment, the participant's real hand and the rubber hand are stroked or moved synchronously with a gentle paintbrush. After about two minutes, participants are asked about feelings of ownership, agency, and felt location of the rubber hand, or disownership, lack of agency, and felt location of their real hand.

A feeling-owning-acting cycle

Based on the reviewed assumptions, it can be established that the construct of embodiment is complex and dynamic and that there is an unlimited number of variables that contribute to its development. As we have seen, embodiment processes are underpinned by having a sense of ownership towards one's body and a sense of agency towards one's actions and body movements (Gallagher, 2000). These processes are supported by significant internal body information that arises from interoception and proprioception systems. Moreover, this type of information could be re-enacted in the form of movement imagery. Being and acting in the world is grounded in all these embodiment features, which means that the disruption of one part could affect our everyday lives and behaviour. Figure 1 represents the idea that the feedback cycle between feeling one's body (awareness of sensations and abilities), structuring the sense of body ownership, and feeling agency towards our acting in the world is an underlying dynamic mechanism that supports and is supported by one's embodiment.

Figure 1
The Feeling-Owning-Acting Cycle.



Note: Simplified representation of the feeling-owning-acting cycle as a dynamic mechanism underlying one's being and acting in the world.

The suggested cycle is in line with the embodied-embedded approach to behaviour of Richardson and colleagues (2008), who work in the field of ecological psychology. For understanding embodiment, the authors uphold integrative principles, such as i) the active interplay between an individual and the environment, ii) the continuity of the perception-action cycle, and iii) the notion that to perceive "is to perceive affordances – opportunities for action" (Richardson et al., 2008, p.179). We add to this view the senses of body ownership and agency as being fostered by conscious and unconscious sensorial information. Also, these senses are indexed as having an influence on one's way of being and acting in the world, which, as we can see in the following section, suffers critical impairments in victims of IPV.

What happens with embodiment in intimate partner violence?

IPV towards women refers to any act of violence perpetrated by an intimate partner that results in "physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty" (WHO, 2021). It is estimated that, worldwide, nearly 30% of women have suffered IPV, with 42% of them reporting an injury as a consequence (WHO, 2021). Beyond physical injuries, IPV commonly leads to PTSD, depression, anxiety, sleep disturbances, eating disorders, behaviours of self-harm and suicidal ideation, psychosomatic symptoms (e.g. pain syndromes,

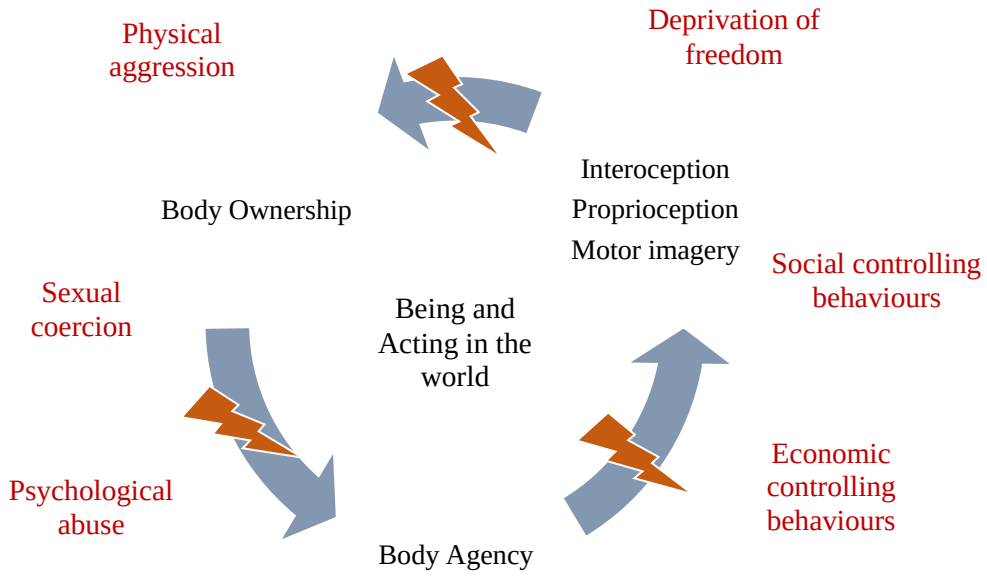
gastrointestinal disorders), and poor general health (WHO, 2021).

The suffering caused by violence and aggression ruptures one's "sense of predictability, trust, and connection" (Westin, 2022, p.53). In particular, the recurrent assaults, distinctive of IPV, do not allow for the body to restore its sense of safety and switch the alarm responses off. According to the hierarchy of needs of Abraham Maslow (1943), safety is one of our basic needs, right after the need for food, water, oxygen, and biological homeostasis. The lack of safety pushes the body to a state of hypervigilance, increased sympathetic activity, and the awareness of primary physiological needs often fades into the background (van der Kolk, 2015).

The permanent feeling of a lack of safety in victims of traumatic IPV frequently makes them disconnect from the body as an unconscious mechanism of survival, engaging in a spectrum of bodily dissociation, depersonalisation, or derealisation (Payne et al., 2015; van der Kolk, 2015). When victims report bodily dissociation, symptoms usually rely on, for example, not feeling or distracting themselves from sensations of pain or discomfort, not feeling control over one's body, or feeling separate from one's body (Price et al., 2017). Heightened dissociation is linked to impaired interoceptive accuracy (Reinhardt et al. 2020) and is a risk factor for the development of mental health disorders among victims of IPV (Machorrinho et al., 2021b). Furthermore, research has shown that female victims of IPV report higher levels of body disownership in the RHI compared to non-victims (Machorrinho et al., 2021a).

One accepted explanation for these phenomena was proposed by Payne, Levine and Crane-Godreau (2015), who stated that trauma perpetuates a state of dysregulation of the autonomic, limbic, motor, and arousal systems, namely the core response network (CRN). Accordingly, the motor and sensorimotor loops (the feeling of the body) involved in CRN are responsible for one's implicit knowledge of how to do things and contribute to the maintenance of one's "strong grip on the world" (Ataria & Horovitz, 2020, p.259). Trauma loosens these sensorimotor loops, undermining the sense of agency towards one's actions (Gallagher, 2017; Ataria & Horovitz, 2020) and, we add, the sense of ownership towards one's body, as represented in figure 2. In fact, the loss of access to body information caused by trauma is thought to also deprive people of sensing their "physical container", losing their boundaries, and confusing the 'I' vs 'Other' distinction (Heitzler, 2013, p.12).

Figure 2
Schematic representation of the influence played by IPV (red boxes) on embodiment.



Note: Violent aggression may disrupt reception, awareness or processing of sensations, either at a neurological or physiological level, directly opening up the possibility disownership of the body and weakened feelings of agency (BA). This impacts the opportunities for action, and we hypothesise that it shrinks the quantity and diversity of movements and actions/behaviours. Additionally, the restriction of freedom frequently imposed by IPV perpetrators on the victims, diminishes even more their possibilities for action, undermining the contribution that those actions could have on the enrichment of sensations and the feeling of one's body.

It is interesting to recall that the World Health Organization (WHO, 2021) describes IPV as not only acts of aggression but also threats, coercion, or deprivation of freedom. The present reflexive review stands with the idea that all those forms of violence can disrupt embodiment at any point of the cycle represented in figure 2. Nevertheless, deprivation of the freedom to act, move, connect with others, and try different things decreases sensorimotor input and variability, both important features of motor learning, behavioural adaptation, and, ultimately, of maintenance of the senses of BO and BA (Buchanan & Ulrich, 2001; Ferri et al., 2012; Renart & Machens, 2014).

Assuming an ecological perspective, we acknowledge that the reviewed embodiment features are not isolated from other phenomena (such as fear, avoidance, depression, or withdrawal), which are frequently found in victims of IPV and which also restrict possibilities for action and sensorial input (Pijpers et al., 2006; Gallagher, 2018).

IPV perpetrators aim to diminish the body-as-subject of the victim, amending it to a body-as-object, an object that only they can possess. This eradicates almost every possibility of the victim feeling agency over anything and creating subjectivity within their own body. In summary, for victims of intimate violence, regardless of the type of violence, there is a high possibility of ending up with a body that they do not feel as their own, they do not control, they do not feel, and with which they cannot explore new paths.

Assessment and therapy of embodiment resources with victims of IPV

Assessment of embodiment of victims: ethics and methodology considerations

The victims' need for safety in any support or therapeutic environment is noticeable. This safety has to be considered when preparing any research setting, including the time for a brief meeting with the participant before the assessment per se. This initial meeting also has the purpose of cultivating empathy and is of major importance when embodiment measures are going to be taken. There are a number of methods available for assessing embodiment-related variables. Many of them have not yet been used with victims of IPV. Possible methods to be used are listed in table 1.

One should note that the most frequently used measures of embodiment require i) body-related literacy (e.g. MAIA) and ii) the capability to perform some movements (e.g. MIQ). With this in mind, it is important to take into consideration that victims of IPV show elevated rates of chronic pain, past bone fractures, herniated discs, and other physical conditions caused by the aggression and worsened by poor health care, which can constrain movement possibilities. Adding to this, psychiatric disorders like PTSD or depression can alter the verbal recalling of body memories and general sensorial awareness (Reinhardt et al., 2020), which can bias the self-reported measures of embodiment.

Table 1
Methods to assess embodiment-related features on victims of IPV

	Behavioral tasks	**Self-administered questionnaires**
Interoception	Heartbeat tracking task (Brener & Ring, 2016) Gastric - Water load test (van Dyck et al., 2016) Respiratory resistance (Garfinkel et al., 2016) Exhalation speed	Multidimensional Assessment of Interoceptive Awareness – 2 (Mehling et al., 2018) The Interoceptive Accuracy Scale (Murphy et al., 2020)

	(Murphy et al., 2018) Intestinal interoception (Whitehead et al., 1990) Heartbeat-evoked potential (electroencephalography; Park & Blanke, 2019)	
Proprioception	Detection of Passive Motion (Weerakkody et al., 2008) Active Movement Extent Discrimination Assessment (Waddington & Adams, 1999) Joint Position Matching (Lephart et al., 2002)	
Motor Imagery	Mental chronometry (Liepert et al., 2012) Prospective action judgments: Grasping Task (Johnson, 2000) Rotating Screwdriver Task (De'Sperati & Stucchi, 2000) Motorically Driven Perceptual Decision paradigm (Parsons, 2001)	Movement Imagery Questionnaire (MIQ-3; Williams et al., 2012)) Questionnaire on Mental imagery (QMI; (Sheenan, 1967)
Body Ownership	Rubber Hand Illusion (Botvinick & Cohen, 1998) Full body ownership illusion (Petkova et al., 2011) Body distortions illusions (Ehrsson et al., 2005; Ramachandran & Hirstein, 1998) Out-of-the-body illusions (Lenggenhager et al., 2007; Ehrsson, 2007) Skin conductance responses to threat (Electrodermal activity; Boucswin et al., 2012)	Rubber Hand Illusion questionnaire (Rabellino et al., 2016) Embodiment questionnaire (following VR embodiment stimulation; Weijs et al., 2021) Virtual Embodiment Questionnaire (Roth & Latoschik, 2020) Embodiment Short Questionnaire (Eubanks et al., 2021)
Body Agency	Moving rubber hand illusion (Tsakiris et al., 2006)	Virtual Embodiment Questionnaire (Roth & Latoschik, 2020) Embodiment Short Questionnaire (Eubanks et al., 2021)

Psychomotor therapy in the intervention with victims of intimate partner violence

i. Importance of working embodiment in IPV: outcomes and ethical considerations

Trauma symptoms caused by IPV leave the victims with an objectified body that perceives the environment (as close as their own home) as a minefield, where every step needs to be vigilant. For these victims, to be grounded within feelings of safety, using body interoceptive and proprioceptive sensations, is one of the main benefits that embodiment work can bring (Westin, 2022). While it is not the aim of the present chapter

to offer an extensive review of treatments for IPV, there are important therapeutic embodiment mechanisms that can be synthesised to help practitioners in their work with victims. To make these mechanisms easier to understand, they will be organised in table 2 according to the embodied possibilities described in section 1: feeling one's body, owning one's body, and acting from one's body.

Table 2
Mechanisms for embodiment work with victims of IPV

Feeling	*1. Activation, awareness, and acceptance of interoceptive and proprioceptive sensations* Through the activation of muscles and the cardiovascular system, clients can more easily be aware of interoceptive and proprioceptive sensations. The acceptance or non-judgemental awareness of those sensations allows clients to become reacquainted with the body and help them reclaim ownership over their bodies (MacLaren, 2016; Lang, 2017). Moderate to vigorous physical activity, running, cycling, dance, and strength training are examples of activities that promote this activation and awareness. Biofeedback therapy has also proven to be a valuable tool for rehabilitation and awareness of the body-mind relationship. Yoga and other movement meditation techniques (Tai-chi, Qi-gong, etc.) also activate interoceptive and proprioceptive awareness, adding a mindful, non-judgemental body scan.
Owning	*2. Integration of sensations and physical abilities into the sense of body ownership* The awareness of bodily sensations and the feeling of a grounded, safe body must be followed by a reinforcement of the body–mind connection. This dynamic gives rise to a slow integration (of sensations, of the body–mind connection, and of internal and social affordances) into the feelings of ownership towards one's body (Kirmayer & Gómez-Carrillo, 2019). An example of a great practice to improve this integration would be the grounding techniques commonly used in yoga, meditation and mindful walking. Also, psychomotor therapy aims for the integration of bodily sensations into the bodily self.
Acting	*3. Enabling opportunities to move in different ways and explore different forms of expression* Expanding the movement repertoire, particularly if assisted by imagery techniques, helps victims to explore new ways of being, new ways of embodying life experiences, thereby promoting broader ranges of movement and containment of the body (Chang & Leventhal, 2008; MacLaren, 2016; Fuller, 2019). Payne and colleagues also

	recommend the use of imagery and subtle movements in the process of titration to complete the unconscious motor response to traumatic memories and reverse the hyper-arousal state of the Autonomic Nervous System (Payne et al., 2015). Importantly, narratives about the body of IPV victims may also be met since their negative value is thought to constrain the exploration of movements, feelings, and actions. Counternarratives have been shown to be a valuable tool to reverse negative words about body feelings and sensations (Osborn & Rajah, 2020). Dance movement therapy, expressive arts therapy, psychomotor therapy, and creative movement are examples of optimal practices that engage with acting in different ways. One can also try to learn a new physical practice, such as gymnastics, aerobics, or urban dance, endorsing actualisations of usual movements, strength, or body representations.

In summary, therapy must aim at the awareness and acceptance of sensations, their integration into the sense of BO, and restoration of feelings of safety and freedom that contribute to the sense of body agency, whilst providing variability of sensorimotor input and, in consequence, new internal representations of one's body. Recent findings suggest that relaxation techniques can also be a valuable tool for victims of IPV (Holston & Taylor, 2021).

ii. "Now I can feel myself": a case report

Hanna (real name withheld) is a 50-year-old woman living in a shelter for IPV victims for about 2 weeks, with sad green eyes, underweight, shoulders slumped forwards. In the first session, she rushes "I don't have much time. I've scheduled a job interview. I can't stand still." She was actually the most active and autonomous woman in the shelter at that time. In the next session, Hanna already had the job and was looking for a place to live.

She was always lacking time, although almost never missed a session. At the beginning of each session, we performed an activation practice, using free dance, structured dance (choreography), running, strength exercises, or aerobics. During those exercises, Hanna learned movement sequences with ease and started to expand her body in the free dance. She told me her father was a dance teacher and that she grew up watching him in school. She loved to dance freely and was surprised to have this new chance to 'just dance'.

At the end of each session, we had a relaxation exercise. Interestingly, her body seemed relaxed, completely passive to the immobilisations or the imagery requests. However, Hanna always used to say she wasn't able to relax at all and just wanted to thank me for the opportunity anyways. She could not relax but could not resist it either. Acceptance, passiveness, and submission were attitudes difficult to distinguish in this process. They all were present in Hanna's behaviour in therapy.

Self-massage, mirror watching, and micro-movement awareness were promoted over time. Hanna was increasingly able to recognise some psychosomatic symptoms, such as headaches, muscle tension, and physical and cognitive agitation. One day she told me her son (living with his grandmother, far from the shelter) had fainted, and when someone called to let her know, she had an anxiety attack, which she no longer used to have. When I asked about what she had done to overcome the anxiety, she answered, "I went outside, and started clenching my hands, breathing in, and suddenly relaxing, just as we do in our sessions. And it worked!" I noticed she was actually surprised by that new resource she had just built in her body. The forgotten body was alive after all. Body agency was like a treasure she had found.

Her arguing about the exercises we did in therapy was getting more frequent, suggesting both activation of body awareness and agency and a rebuilding of confidence to speak out and conceive a world that resonated with her. The body boundaries were growing stronger, giving structure to the self, and empowering the 'I' vs 'Other' distinction. It was only in the last session that Hanna truly spoke about emotions. She shared feelings of sadness and embarrassment about almost having been forced to prostitution by the aggressor. She was sad in that moment because a relative who had major importance in her life, shared the thought that she was "in sex life" just by looking at her face: "skinny, aged, depressive eyes! He said." She cried as never before … and affirmed she was starting to glance at some of the origins of her intergenerational trauma and the repercussions it had on her relationship choices.

When finally asked about our therapy process and what it brought to her, Hanna started to slowly and softly touch her shoulder, … arm, … hand, then … smiled and said:

"Now I can feel myself".

Conclusion

Along with this reflexive review, the embodied possibilities for our ways of being and acting in the world were explored. The perception and processing of one's internal and external environment are grounded in the body as well as in one's ability to act, make plans, and establish moment-by-moment intentions. Reflection on those embodiment features allowed the authors to suggest the feeling-owning-acting cycle, a simplified, comprehensive view of the intertwining of the major embodied possibilities.

Each one of the reviewed embodiment features is influenced by IPV, from the control of physical and intellectual freedom to extreme aggression and torture. Overall, victims of IPV face a high risk of having impaired perceptive abilities (to sensations from within and outside of the body) and disrupted senses of body ownership and body agency, endorsing a maladaptive way of being and acting in the world. Each impaired embodiment feature has major repercussions on the physical and mental health of victims of IPV, making it important to consider the assessment of the embodiment of victims at primary support services.

Most importantly, the authors suggest evidence-based therapeutic mechanisms that can restore the feeling-owning-acting cycle by improving perceptive abilities and repairing the senses of body ownership, body agency, and safety within the body for victims to explore new ways of being and acting in the world.

Applications of the material

In this chapter, we review the features and measures of embodiment that are important for understanding and working with victims of IPV. This supports the methodological and ethical cautions practitioners and researchers must have when assessing embodiment features among victims, and, with the help of evidence-based comprehensive schematic representations, it supports the structuring of feasible therapeutic interventions. We propose that both primary care professionals and victims support services consider addressing embodiment-related information with the victims. Additionally, shelters for IPV victims can promote intervention programs based on the reviewed evidence-based therapeutic mechanisms, such as the awareness and acceptance of bodily sensations, and the integration of sensations into the senses of body ownership

and body agency.

As it was acknowledged, embodiment is a lifespan and developmental process, susceptible to diverse contextual influences and systems. With this in mind, traumatic episodes, other than IPV, can cause disruptions in one's way of being and acting in the world by means of the feeling-owning-acting cycle. Thereby, natural catastrophes, accidents, or disabling diseases are contexts where the present comprehensive framework can be applied.

The proposed therapeutic mechanisms can be explored in primary care services and victims' support, but also in preventive interventions, aiming to provide people with resources to an adaptive embodiment and to the awareness of one's way of being and acting in the world.

Summary Points

- Intimate partner violence impairs victims' body, and physical and mental health
- Embodiment, the body-mind interplay, is a lifespan and developmental process, subject to the influence of diverse contextual processes. One of the most critical and prevalent events that act negatively on many facets of embodiment is IPV.
- Embodied possibilities that enrich one's way of being and acting in the world can be organized into feeling, owning and acting one's body.
- Feeling the body can include interoception, proprioception and movement imagery. Owning the body is defined by the sense of body ownership. Acting from the body is aided by the sense of body agency.
- Women victims of IPV show disrupted interoceptive and proprioceptive abilities, and weakened senses of body ownership and body agency, with major repercussions for their general health.
- There are evidence-based practices that can restore totally or partially the feeling-owning-acting cycle, including Psychomotor therapy, Dance-movement therapy, Yoga, movement meditations, grounding techniques and physical activity.

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Chapter III. Empirical studies: Embodiment-related characteristics of female victims of IPV

Article 1. Embodiment-related risk factors for Posttraumatic Stress, Anxiety and Depression in female victims of intimate partner violence

Article 2. Battered Body, Battered Self: A Cross-Sectional Study of the Embodiment-Related Impairments of Female Victims of Intimate Partner Violence

Article 3. Attention to the body! The connection between interoception and somatic complaints of survivors of intimate partner violence

Article 4. Echoes of a living body: A mind-body approach on how women victims of intimate partner violence experience their bodies

Embodiment-related risk factors for posttraumatic stress, anxiety and depression in female victims of intimate partner violence[2]

Joana Machorrinho, Guida Veiga, Graça Duarte Santos, and José Marmeleira (2021)

Abstract

A central notion in the field of embodiment is that body sensorimotor processes and body mental representations influence emotion, cognition and behavior. By affecting the body, intimate partner violence (IPV) can leave victims with a fragile self, and significant physical and mental health problems. In this study, we aim to examine embodiment-related variables and mental health of female victims of IPV, as well as the impact of embodiment on mental health. A total of 38 female victims of IPV (mean age 40.3 ± 10.9 years) were recruited from shelters and the community. The study assessed the levels of Posttraumatic Stress Disorder (PTSD), Anxiety and Depression, and abilities of Movement Imagery, Interoceptive Accuracy, Interoceptive Sensibility, Body Ownership and Bodily Dissociation. Univariate, bivariate and binary regression analysis were used. PTSD, Anxiety and Depression were highly prevalent among our sample, alongside with altered values of body ownership and interoception. All three mental health disorders were significantly correlated with interoceptive self-regulation, interoceptive trusting, and bodily dissociation. For this group of women, each unit rise in the bodily dissociation scale increased two and six times the risk for developing Depression and Anxiety, respectively. The embodiment of female victims of IPV is altered, and higher bodily dissociation can be a risk factor for the development of mental health problems. Restoration of embodiment-related functions could be important for the victims to overcome the negative effects of violent relationships.

[2] Machorrinho, J., Veiga, G., Santos, G., & Marmeleira, J. (2021). Embodiment-related risk factors for Posttraumatic Stress, Anxiety and Depression in female victims of intimate partner violence. Journal of Trauma & Dissociation, 1-17. https://doi.org/10.1080/15299732.2021.1989109

Chapter III. Empirical studies

Introduction

The field of embodiment emphasizes the reciprocity between mind and body (Gallagher, 2018; Gibbs, 2005). Overall, embodiment concerns the idea that the body, its sensorimotor processes, its morphology, and its mental representation influence individual development and experience, including emotion, cognition and behavior (Marmeleira & Santos, 2019; Pollatos & Ferentzi, 2018). Substantial evidence shows that embodiment shapes human qualities, including self-identity, emotion experience, self-regulation, decision-making, health and well-being (Ataria, 2018; Furman et al., 2013; Marmeleira & Santos, 2019; Palmer & Tsakiris, 2018; Pollatos et al., 2009; Thompson, 2005).There are substantial research studies on several body-related constructs, in their relationship to mental health and psychopathology, including interoception, proprioception, body image, body schema, and body ownership. In particular, interoception, defined as the perception, processing, and representation of the internal state of the body (Craig, 2003; Herbert & Pollatos, 2012), has captured much attention in psychological research over the last few years. As interoception plays an important role in emotion regulation, people more attuned to their body signals (including from viscera, skin and muscles) can experience more benefits in their everyday life, including better mental health (Paulus & Stein, 2010; Pollatos & Ferentzi, 2018). Proprioception cues, which regards the position/movement of the body in space, and muscle tension/ effort, has also been considered important for sensing the internal state of the body (Khalsa et al., 2018; Payne et al., 2015).

Intimate partner violence (IPV) is considered a major social problem in modern societies (Ekström, 2018). According to a recent report by the World Health Organization (WHO, 2017), almost one-third of women worldwide who have been in a relationship had experienced some form of physical and/or sexual violence by their intimate partner. Furthermore, several mental health problems like Post-traumatic Stress Disorder (PTSD), Anxiety, Depression and Alexithymia were frequently reported by female victims of IPV (Blasco-Ros et al., 2010; Signorelli et al., 2020; WHO, 2017), as well as other health-related issues, such as limited mobility, eating and sleeping disorders, substance abuse, self-injury and suicidal ideation (WHO, 2017).A rich body of evidence shows that the mental health conditions common to victims of IPV (i.e., PTSD, Anxiety or Depression) have been related to changes in embodiment-related processes, in particular, to changes in interoception (Paulus & Stein, 2010; Wiebking et al., 2010), body ownership (Ehrsson

et al., 2007), body agency (Larkin et al., 1997), and motor imagery (Chen et al., 2013; Moran et al., 2015), as well as to bodily dissociation (Schäflein et al., 2018), and altered gait-pattern (Michalak et al., 2009). Overwhelming trauma experiences often lead to a sense of disconnection between body and mind and to the victims' fear of their emotions and bodily sensations (Machorrinho et al., 2019; Neukirch et al., 2019; Van der Kolk, 2015).

At a neural level, trauma experiences seem to dysregulate the functioning of neural circuits associated with interoception and emotional regulation, including the insula, the amygdala and the prefrontal cortex (Bruce et al., 2013; Nicholson et al., 2015). Moreover, there is evidence that proprioception and motor imagery are altered in the dissociative subtype of PTSD due to changes in the amygdala connectivity with the superior parietal region (Nicholson et al., 2015). Recent literature offers some theoretical models to understand the intersection between embodiment (especially interoception), cognition and health (e. g., Gallagher, 2018; Khalsa et al., 2018). Payne et al. (2015) propose that trauma and chronic stress lead to the dysregulation of a brain network entitled Core Response Network (CRN), connecting the limbic, autonomic, motor, and arousal systems. According to this framework, the malfunction of the CRN could perpetuate emotional and physical numbing or hyper-activation, as well as other characteristics of PTSD, Anxiety and Depression (Levine, 2010; Payne et al., 2015; Van der Kolk, 2015). Besides, the restoration of the CRN functionality depends on the use of internal body awareness (interoceptive and proprioceptive cues) to disturb trauma-linked implicit memories and restore flexible responsiveness (Payne et al., 2015).

Based on previous research (e.g., Nicholson et al., 2015; Payne et al., 2015; Van der Kolk, 2015; Wesely et al., 2000), in the present study, we focus on the relationship between embodiment-related abilities and mental health in women victims of IPV. The investigation of this relationship may ultimately contribute to better clinical practices focused on embodiment-related therapeutic approaches. In this line of thought, the aim of the current study is twofold. First, we aim to describe embodiment-related variables (i.e., interoception, motor imagery, body ownership, and bodily dissociation) and mental health problems (i.e., PTSD, Anxiety and Depression symptoms) of female victims of IPV. Secondly, we intend to examine whether (and to what extent) embodiment-related variables are associated with the mental health problems of these women. In this regard, we hypothesize that embodiment-related abilities might be negatively associated with mental health problems of IPV victims.

Methods

Procedures

After obtaining approval from the Ethics Committee and the managing entities of three victims' shelters, women living in shelters and in the community, who met the inclusion criteria were invited to participate. The inclusion criteria were: women, aged ≥ 18 years, and having a history of intimate partner violence. All participants were informed about the goals of the study and gave their written and oral informed consent prior to participation.

The technical director scheduled each shelter's assessments, and these were carried out individually, in a silent room in the shelter, taking a total of 60 minutes. First, participants filled out a brief sociodemographic survey focused on the types of violence (i.e., psychological, physical, sexual or eco-nomic) that they suffered in an intimate relationship and the periods of duration and cessation of such violence. The questionnaire also collected information about participants' health problems, previous formal diagnosis of PTSD, Anxiety or Depression, past behaviors of self-injuring, suicidal ideation, substance use, and participation in mind-body practices. Second, embodiment-related variables and mental health symptoms were assessed individually following the order described in the Measures' section.

This study is part of a major research project to assess people from the community with and without a history of domestic violence, the first ones being recruited for the present study. The study was approved by our University ethics committee and conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014).

Participants

Thirty-eight female victims of domestic violence participated in the study, mean age 40 years and four months (SD 10.9, range 23–68 years), comprising all levels of academic qualification until high school, and mostly unemployed (66%). Seventy-six-point three percent of the participants were living in a women's shelter. Less than half of the participants engaged regularly in exercise: 39,50% (n = 15) reported walking, and 7,9% (n = 3) reported doing other kinds of practice (e.g., meditation, hydro gymnastics or Pilates).

Measures

Interoceptive Sensibility was obtained through the Multidimensional Assessment of Interoceptive Awareness (MAIA). MAIA is a self-report questionnaire assessing seven interoception dimensions: Noticing, Not-distracting, Not-worrying, Attention Regulation, Emotional Awareness, Self-regulation and Trusting (W.E. Mehling et al., 2012). Participants are asked to rate the frequency of each item on their daily life on a 6-point Likert scale (0: never;5: always). Scores are accounted for each dimension separately, with higher scores representing more positive interoceptive sensibility on the respective dimension. The Portuguese version of the MAIA questionnaire has 33 items and shows good psychometric properties, with Cronbach's alphas ranging from .61 to .87, and test-retest reliability ranging from .52 to .83 through the seven dimensions of the questionnaire (Machorrinho et al., 2018).

Interoceptive accuracy was measured through the Heartbeat Counting Task (HCT; Schandry, 1981). Participants used a pulse oximeter fitted on their index finger of the left hand for physiological heartbeat detection. After sitting quietly for about five minutes, they received the following instructions. "Without manually checking, I ask you to silently count each heartbeat you feel in your body from the time you hear 'one, two, tree, start' to when you hear the phone ringing." This task was repeated four times, using time-windows of 45, 35, 55 and 25 seconds, presented in a fixed order. For each trial, an accuracy score was derived: 1 − (real beats− reported beats)/((real beats + reported beats)/2). Resulting accuracy scores were averaged over the four trials, yielding an average value for each participant.

Body ownership was obtained through the Rubber Hand Illusion (RHI) task, following the protocol of Rabellino et al. (2016). Participants sat across from the experimenter with their arms resting on a table, palms facing downwards. They placed their right hand inside a specially constructed black box. For the assessment of the proprioceptive location judgments, we placed a blackboard above the box so the rubber hand was out-of-view to the participant, as well as the limits of the black box. At the beginning of the RHI phase (with the blackboard covering both the real and the rubber hand), participants were asked to perceive the location of their right index finger and to indicate its position on a ruler laid across the board at the top of the box, parallel to the table. Next, without the blackboard covering the rubber hand, each of the fingers of the

rubber hand and the participants' real hand were brushed during two minutes with two identical paintbrushes. The board was then again placed over the box and a post-induction proprioceptive location judgment was asked as before. Proprioceptive drifts were calculated as the difference between the pre-induction proprioceptive judgments and post-induction judgments. In the end, the researchers asked the participants to complete a nine-item questionnaire (translated to Portuguese from Rabellino's study (Rabellino et al., 2016) by three independent researchers) to assess their subjective experience.

Motor Imagery was assessed through the Movement Imagery Questionnaire-3 (MIQ-3; Williams et al., 2012) which examines kinesthetic, visual internal and visual external modalities of motor imagery in adults. After doing four movements (i.e., lifting the right leg, abduction of the non-dominant arm, jump and bend over) from a standing position, we asked the participants to imagine themselves doing each movement from a first-person perspective or a third-person perspective or to imagine sensing the movement without doing it. Participants used a 7-point Likert scale to rate the ease or difficulty of seeing and feeling the movements (1: very hard to see/feel; 7: very easy to see/feel). The Portuguese version shows acceptable validity and reliability values (Mendes et al., 2016).

Bodily Dissociation was assessed through the Scale of Body Connection (SBC; Price & Thompson, 2007), a self-report 5-point Likert scale that measures two important dimensions of connection to the body: Body Awareness (BA) and Bodily Dissociation (BD). BD has eight items representing the sense of separation from the body, and its score on SBC can range between eight and 40 (each item scoring between never (1) and always (5)), with higher scores meaning higher bodily dissociation. The Portuguese adaptation used in the current study confirmed the reliability (Cronbach's alpha = 0.73) and validity of this scale for the Portuguese population (Neves et al., 2017). Since BA items are strongly concurrent with the MAIA measure, we only used the BD items in our study.

Posttraumatic Stress Disorder was assessed using the PTSD Checklist – civilian version (PCL; Weathers et al., 1993), a self-report questionnaire that measures the frequency of PTSD symptoms in the last two months related to a traumatic event in the respondent's life. Through a 5-point Likert scale, it assesses the presence of symptoms from the three PTSD clusters of DSM-IV medical diagnostic manual: Reexperiencing, Avoiding and Hyper-vigilance. Scoring of each item ranges from 1 (nothing) to 5 (extremely), and symptoms are considered to be present when the respondent scored

higher than 3. The Portuguese version includes 17 items and has shown good psychometric properties for the total score (Cronbach's alpha = .94) and for each of the clusters (Marcelino & Gonçalves, 2012).

Anxiety and Depression were assessed through the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a 14 item self-report questionnaire, with seven items assessing anxiety and seven items assessing depression symptoms. Each item, rated in a 0–3 scale, classifies the symptom has feeling equal to times before or a lot worse than before. Clinically relevant levels were considered using the following criteria: for PTSD, at least one symptom of the reexperiencing cluster, three of avoiding and two of hyper-vigilance; for anxiety, a score > seven in the HADS – Anxiety subscale; and for Depression a score of > seven in the HADS – Depression subscale (Snaith & Zigmond, 1994). The Portuguese version has good internal consistency, with Cronbach's alpha of .76 to the anxiety scale, and of .81 for the depression scale (McIntyre et al., 1999).

Data analysis

First, descriptive data (mean, standard deviation, range) on sociodemographic, violence information, embodiment-related variables and mental health were gathered (see Tables 1 and 2). Second, univariate analysis, followed by multivariate regression, were performed to examine the embodiment-related risk factors for PTSD, Anxiety and Depression. Associations between embodiment-related variables and mental health symptoms were quantified as Spearman's correlation coefficients. Statistical significance was considered when *p*-value <.05, and followed correlation thresholds of 0.10, 0.30 and 0.50 for small, moderate and strong correlations, respectively (Cohen, 1987). We used the Mann-Whitney test for non-parametric variables to compare the levels of the embodiment-related measures between participants with and without mental health disorders symptoms.

Multicollinearity diagnosis was performed, checking for variance inflation factors (VIF). Binary logistic regression analysis was performed (backward stepwise selection, elimination through Likelihood Ratio) to examine if the embodiment variables contributed as risk factors to symptoms of PTSD, Anxiety and Depression. Variables with *p*-values <0.05 were considered statistically significant. To determine the predictive value of each statistical model, a receiver operating characteristic (ROC) curve was plotted, and

its area under the curve (AUC) analyzed considering the criteria: 0.90–1.00 = excellent, 0.80– 0.90 = good, 0.70–0.80 = fair and 0.60–0.70 = poor (Van Gastel & Ferdinand, 2008). Goodness-of-fit of the models was evaluated using the Hosmer and Lemeshow test (Bewick et al., 2005). Statistical analyses were performed with SPSS (Statistical Package for the Social Sciences), version 24.0.

Table 1
Descriptive statistics of demographic and health information

Sociodemographic variables	**N=38**		
	N (%)	M ± SD	Range
Age (years)		40.3 ± 10.9	23-68
Body Mass Index (km/m^2)		26.2 ± 5.1	16.4-36.8
Types of violence			
psychological	36 (94.7)		
physical	30 (78.9)		
sexual	19 (50)		
Time since violence ended (years)		2.4 ± 6.1	0.1-30.0
Marital status			
single	14 (36.8)		
married	13 (34.2)		
non-marital partnership	2 (5.3)		
divorced	8 (21.1)		
widow	1 (2.6)		
Health			
Sleep problems	21 (55.3)		
Anxiety attacks	20 (52.6)		
Migraines	17 (44.7)		
Respiratory problems	12 (31.6)		
Memory difficulties	11 (28.9)		
Chronic pain	10 (26.3)		
Hypertension	10 (26.3)		
Behavior			
Substance use			
Tabaco	17 (44.7)		
Drugs	1 (2.6)		
Self-injury	12 (31.6)		
Suicidal ideation	23 (60.5)		

Results

Female victims of violence showed a weak sense of body ownership and weak interoceptive accuracy levels, as shown by the achieved scores nearby the maximum and the minimum in the RHI survey and the HCT task, respectively (see Table 2). However, participants also showed a good awareness of the relationship between body sensations and emotional states, as shown by the results nearby the maximum in the emotional awareness scale of MAIA.

Table 2
Mean and range scores on embodiment-related measures, PTSD-Checklist and Hospital Anxiety and Depression Scale (n = 38).

	M* ± *SD	**Range**	**Frequency (percent)**
MIQ-3, Kinesthetic [4-28]	18.9 ± 6.8	4 – 28	
MIQ-3, Visual Internal [4-28]	19.4 ± 6.3	4 – 28	
MIQ-3, Visual External [4-28]	20.5 ± 5.9	4 – 28	
HCT, Interoceptive accuracy [0-1]	0.29 ± 0.25	0 – 0.8	
RHI, proprioceptive drift	0.06 ± 4.22	-18 – 8	
RHI, survey [-3 – 3]	2.06 ± 1.49	-2.7 – 3	
MAIA Noticing [0-5]	3.75 ± 0.82	1.7 – 5	
MAIA Not-distracting [0-5]	1.61 ± 0.93	0 – 3.8	
MAIA Not-worrying [0-5]	2.57 ± 0.85	0.5 – 4.8	
MAIA Attention Regulation [0-5]	2.97 ± 1.20	0.4 – 5	
MAIA Emotional Awareness [0-5]	4.40 ± 0.51	3.2 – 5	
MAIA Self-regulation [0-5]	3.03 ± 1.16	0 – 5	
MAIA Trusting [0-5]	3.15 ± 1.41	0.7 – 5	
SBC, Bodily Dissociation [1-5]	2.74 ± 0.88	1.3 – 4.8	
PTSD, total			24 (63.2)
PTSD, Reexperiencing [5-25]	16.7 ± 5.4	5-25	
PTSD, Avoiding [7-35]	20.8 ± 6.2	7-32	
PTSD, Hyper-vigilance [5-25]	14.7 ± 5.3	5-24	
Anxiety [0-21]	10.8 ± 3.8	4-18	27 (71.1)
Depression [0-21]	7.9 ± 3.7	1-15	19 (50.0)

Note. MIQ, Movement Imagery Questionnaire; HCT, Heartbeat Counting Task; RHI, Rubber Hand Illusion; MAIA, Multidimensional Assessment of Interoceptive Awareness; SBC, Scale of Body Connection; PTSD, Posttraumatic Stress Disorder.

Regarding mental health symptoms (see Table 2), there was a high prevalence of PTSD (63%), Anxiety (71%) and Depression (50%) among female victims of domestic violence. Concerning PTSD symptoms, the mean score of the Reexperiencing cluster was particularly high, and some participants reached the maximum value. Items related to physical reactions received the highest score for both PTSD ("Having physical reactions (e.g., accelerated heartbeat, breathing difficulty, sweat) when something reminded me of the traumatic event," M =3.64) and Anxiety instruments ("I am tense," M =1.46).

Regarding the associations between embodiment-related variables and mental health symptoms (see Table 3), Interoceptive Self-regulation was moderately related to fewer symptoms of PTSD and Depression. Furthermore, Interoceptive Trusting was strongly associated with fewer symptoms of both PTSD and Depression, and moderately associated with fewer symptoms of Anxiety. Bodily Dissociation showed strong positive associations with the three mental-health symptoms. There was no evidence of multi-collinearity among these independent variables (i.e., VIF values ranged from 1 to 1.578).

Table 3
Spearman correlations between mental health symptoms and embodiment variables

	PTSD	Anxiety	Depression
MIQ-3, Kinesthetic	-.038	-.242	.236
MIQ-3, Visual Internal	-.006	-.209	.170
MIQ-3, Visual External	.066	-.098	.123
HCT, Interoceptive accuracy	.101	.104	-.021
RHI, proprioceptive drift	-.123	-.047	-.126
RHI, survey	.215	.153	-.021
MAIA Noticing	.186	.220	.037
MAIA Not-distracting	-.108	-.123	.089
MAIA Not-worrying	-.188	-.076	-.089
MAIA Attention Regulation	-.114	-.235	-.180
MAIA Emotional Awareness	-.023	.121	-.185
MAIA Self-regulation	-.359*	-.321	-.342*
MAIA Trusting	-.564**	-.493**	-.505**
SBC, Bodily Dissociation	.710**	.652**	.624**

Note. **p*-value<.05; ***p*-value<.01. MIQ, Movement Imagery Questionnaire; HCT, Heartbeat Counting Task; RHI, Rubber Hand Illusion; MAIA, Multidimensional Assessment of Interoceptive Awareness; SBC, Scale of Body Connection

The Mann-Whitney test for non-parametric variables showed that, in comparison with women without clinical symptoms of PTSD (N= 12), women with symptoms of PTSD (N= 24) had higher levels of Bodily Dissociation (Mdn_{noPTSD} = 1.9, Mdn_{PTSD} = 2.9; *U*= 44.5, *z*= −3.35, *p*=.001) and lower levels of Interoceptive Trusting (Mdn_{noPTSD} = 4.8, Mdn_{PTSD} = 3.0; *U*= 42.5, *z*= −3.43, *p*=.001) and Interoceptive Self-regulation (Mdn_{noPTSD} = 4.1, Mdn_{PTSD} = 3.1; *U*= 55.5, *z*= −2.98, *p*=.003). Women with symptoms of Anxiety (N= 27), compared with women without symptoms (N= 10), also had higher levels of Bodily Dissociation ($Mdn_{noAnxiety}$ = 1.9, $Mdn_{Anxiety}$ = 2.8; *U*= 52.0, *z* = −2.85, *p*= .004) and lower levels of Interoceptive Trusting ($Mdnn_{oAnxiety}$ = 4.0, $Mdn_{Anxiety}$ = 3.0; *U*= 71.0, *z* = −2.21, *p*= .027). Finally, in comparison with women without symptoms of Depression (N= 18), women with symptoms of Depression (N= 19) had higher levels of Bodily Dissociation ($Mdnn_{oDepression}$ = 2.1, $Mdn_{Depression}$ = 2.9; *U*= 99.5, *z* = −2.18, *p*= .029).

After verifying the associations between variables, we tested one model for each dependent mental-health disorder through binary logistic regression. Tables 4, 5 and 6 present the regression results for the prediction models of PTSD, Anxiety and Depression, including the variables Interoceptive Trusting and Bodily Dissociation, and the Interoceptive Self-regulation in the case of PTSD and Depression models. The final models for Anxiety and Depression had good fits ($\chi 2$ (7, N= 38) =3.192, *p* = .867 and $\chi 2$ (7, N= 38) = 8.644, *p* = .279, respectively), but the PTSD showed a poor fit, $\chi 2$ (7, N=

38) = 20.292, p = .005.

Table 4
Results of binary regression with embodiment variables predicting PTSD

	β	OR	95%CI	P-value	Nagelkerke R^2
Model 1					
Step 1					.558
Constant	3.969	52.944		.215	
Interoceptive Self-regulation	-.840	.432	.132-1.411	.164	
Interoceptive Trusting	-.785	.456	.157-1.325	.149	
Bodily Dissociation	.952	2.592	.693-9.691	.157	
Step 2					.505
Constant	2.027	7.593		.517	
Interoceptive Trusting	-1.088	.337	.108-1.050	.061	
Bodily Dissociation	1.091	2.977	.745-11.897	.123	

Note: CI, confidence interval; OR, odds ratio.

Table 5
Results of binary regression with embodiment variables predicting Anxiety

	β	OR	95%CI	P-value	Nagelkerke R^2
Step 1					.332
Constant	-1.968	.140		.620	
Interoceptive Trusting	-.222	.801	.275-2.330	.684	
Bodily Dissociation	1.582	4.863	.633-37.384	.129	
Step 2					.327
Constant	-3.461	.031		.055	
Bodily Dissociation	1.882	6.565	1.347-32.006	.020	

Note: CI, confidence interval; OR, odds ratio.

Table 6
Results of binary regression with embodiment variables predicting Depression

	β	OR	95%CI	P-value	Nagelkerke R^2
Step 1					.184
Constant	-.645	.525		.792	
Interoceptive Self-regulation	-.169	.844	.399-1.785	.657	
Interoceptive Trusting	-.157	.855	.441-1.657	.642	
Bodily Dissociation	.663	1.941	.677-5.568	.217	
Step 2					.177
Constant	-1.144	.319		.606	
Interoceptive Trusting	-.202	.817	.430-1.553	.538	
Bodily Dissociation	.708	2.030	.710-5.800	.186	
Step 3					.166
Constant	-2.336	.097		.053	
Bodily Dissociation	.913	2.492	1.032-6.018	.042	

Note: CI, confidence interval; OR, odds ratio.

The analysis showed that body dissociation was the best predictor for Anxiety and Depression. For each unit increase in the Dissociation SBC scale, the Anxiety risk increased six-fold (OR 6.565, 95% CI: 1.347–32.006), and the Depression risk increased

two-fold (OR 2.492, 95% CI: 1.032–6.018). The models that included Bodily Dissociation as the only independent variable correctly classified 81%, and 65% of the participants with Anxiety and Depression, respectively. The models accounted for 40%, 33% and 17% of the variance in PTSD, Anxiety and Depression, respectively. According to the AUC, the values for the PTSD (.845, p = .001), Anxiety (.807, p = .005) and Depression (.709, p = .030) models were considered fair to good.

Discussion

The first aim of this research was to investigate embodiment-related variables and mental health of female victims of IPV and to study the relationship between those variables. We have found significant changes in some embodiment-related variables, and a high prevalence of PTSD, Anxiety, Depression and other health problems among this specific group of women, which is in line with previous studies (Ellsberg et al., 2008; WHO, 2017). Furthermore, our results suggest that some embodiment variables could act as a risk factor for the mental health of female victims of IPV.

Most of the embodiment-related measures scored across the entire range of possible responses, except for the interoceptive sensibility scales of Noticing, Not-distracting and Emotional Awareness. Female victims of IPV show high abilities to note physical sensations and increased awareness of the relationship between those sensations and the respective emotional states. Along with the low scores of interoceptive not-distracting, these findings suggest that the tendency to distract from bodily sensations of pain or discomfort might be a coping mechanism for female victims of violence. Besides, these findings are in line with a systematic review (De Jong et al., 2016), which showed that the Not-distracting dimension of interoceptive sensibility is associated with, and can be a predictor of, depressive symptomatology, especially in individuals with high levels of pain catastrophizing.

According to the self-report measures of mental health, Anxiety was the most prevalent mental health disorder, as in previous studies (Ahmadzad-Aslet al., 2016), followed by PTSD and Depression. Moreover, the prevalence of PTSD (63%), Anxiety (71%) and Depression (50%) among our sample of IPV victims was significantly higher than the prevalence of those disorders found among the Portuguese population in previous studies (5.3%, 4.9% and 5.7% respectively) (Cardoso et al., 2020; WHO, 2017). Looking

closely at the scores of each item of PTSD and Anxiety scales, we found that body sensations related items tend to have the highest scores.

Embodiment-related variables play an important role in the mental health of victims of domestic violence. In particular, the abilities to regulate distress by paying attention to body sensations and to experience one's own body as safe (i.e., interoceptive self-regulation and interoceptive trusting) were related to fewer mental-health symptoms. Conversely, bodily dissociation, that is, feeling more disconnected from the body and finding it difficult to identify emotions, was associated with a higher prevalence of mental health symptoms. These findings add to previous studies, showing that bodily dissociation and interoceptive emotional dysregulation are not only associated with PTSD but also with Anxiety and Depression (Price & Herting, 2013). Moreover, our results show that bodily dissociation can increase six times the risk of Anxiety and two times the risk of Depression in female victims of domestic violence. Likewise, the findings of this study show that the tendency to actively listen to the body sensations to form a sense of physical condition is related to Anxiety (Ginzburg et al., 2014) but also to Depression and PTSD.

Our results make sense in the light of recent neuroscientific models that associate psychiatric conditions with embodiment abilities as interoception, proprioception and motor imagery (Nicholson et al., 2015; Payne et al., 2015; Van der Kolk, 2015). It was proposed that trauma events might dysregulate specific brain networks (including the CRN described in the introduction section), leading to embodiment symptoms (e.g., altered interoception, body dissociation) and negative mental health outcomes (Lanius et al., 2015; Payne et al., 2015). Moreover, by showing that embodiment variables are associated with mental health disorders of female victims of IPV, our findings suggest that future treatments for these women should focus on the body and movement-related activities. For instance, the increase of awareness of bodily sensations and their association with specific emotions may help traumatized individuals to overcome emotional detachment and restoration of insular-interoceptive and other affected brain networks (Lanius et al., 2015; Payne et al., 2015). In fact, previous studies reported benefits of body-oriented interventions in the mental health of victims of trauma or of people at risk of developing PTSD (W. E. Mehling et al., 2018; Winblad et al., 2018). Besides, a previous qualitative study that explored the lived body experiences of female victims of IPV reported that they tend to disconnect from their bodies, and also that these

women view participation in physical activities as a way to reconnect to their bodies and to empower themselves (Wesely et al., 2000).

It is important to note that we have not found a significant logistic model of PTSD in female victims of IPV that encompasses embodiment-related risk factors. This suggests that, for these specific group of women, the risk of developing PTSD can be influenced by other psychophysiological factors not assessed in the present study. One should note, however, that the PTSD Checklist used in the current study is aligned with DSM-IV criteria, not covering for more detailed DSM-V depersonalization and derealization symptoms. Our results consistently showed that bodily dissociation is significantly associated with mental health symptoms of IPV victims. In addition, the high prevalence of PTSD and the high mean score (above the cutoff value of 2) of bodily dissociation symptoms in our sample, provide support to the DSM-V actualization of the PTSD criteria, and let us hypothesize that a significant logistic model of bodily dissociation as a risk factor for PTSD might be found if the PTSD assessment tool is aligned with the new DSM-V criteria.

Moreover, we additionally suggest that future research addresses the differences in embodiment-related variables between women with and without a history of domestic violence, regardless of having PTSD symptoms or not, as violence can pass over the effects of trauma (Payne et al., 2015), yet still damaging embodiment-related variables of these victims.

To the best of our knowledge, this is one of the first studies examining embodiment-related variables of IPV victims. The present study clarifies the dysfunctions of embodiment in female victims, which is known to be of major importance for the recovery of the sense of self and, consequently, for overcoming the negative effects of violent relationships (Van der Kolk, 2015). One strength of this study is the inclusion of, not only female victims living in shelters but also women living in the community. However, similar to other studies focused on female victims of IPV (Clark et al., 2014; Weaver et al., 2019), the small size of the sample is a limitation, which takes us to consider the results with caution. Moreover, as this was a cross-sectional study, causation cannot be inferred. We additionally acknowledge that, since there is no normative data about the embodiment-related variables analyzed in this study, we could not draw more detailed conclusions about the descriptive results of those variables. To address this issue, future

research should compare embodiment functions between women with and without a history of domestic violence.

In summary, female victims of IPV show a high prevalence of Anxiety, PTSD and Depression, alongside with altered values of body ownership and interoception. Our results support our hypothesis, showing that interoceptive self-regulation, interoceptive trusting, and bodily dissociation are negatively related to female victims' mental health. Bodily dissociation is a risk factor for developing Anxiety and Depression. Considering these findings, future research should examine whether interventions focused on interoception and bodily dissociation may benefit female domestic violence victims' mental health.

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Battered body, battered self: a cross-sectional study of the embodiment-related impairments of female victims of intimate partner violence[3]

Joana Machorrinho, Guida Veiga, Graça Duarte Santos, and José Marmeleira (2023)

Abstract

Intimate-partner violence (IPV) is a major threat to women's lives, with an impact on their physical and mental health, often causing trauma symptoms. The IPV consequences for embodiment-related features that are detrimental to the quality of life and identity structure of victims are understudied. With this study, we aim to examine embodiment-related functions and physical and mental health of women with and without a history of IPV. Methods: A total of 47 female victims of IPV (mean age 41.3 ± 11.5 years) living in shelters and 44 non-victims (mean age 43.1 ± 12.5 years) living in the community participated in this cross-sectional study. We used a self-administered survey to assess the prevalence of mental health symptoms, somatic symptoms, and behaviors of self-injury and suicidal ideation. The levels of interoception, movement imagery, body ownership, and bodily dissociation were assessed through tasks and questionnaires, controlling for mental health covariates. Results: Women victims of IPV showed a greater prevalence of posttraumatic stress disorder (p=.014), depression (p<.001), somatic symptoms (p=.006), self-injury behaviors (p<.001), and suicidal ideation (p<.001). Also, IPV victims showed higher levels of body disownership (p=.025) and bodily dissociation (p<.001) than non-victims, controlling for the presence of PTSD and depression. Conclusion: Our study shows strong evidence of the link between IPV and impairments in embodiment, namely the sense of body ownership and the disconnection from the body. Intimate-partner violence victims need embodiment-informed care to be parallel to the attention given to mental health and somatic symptoms.

Key-words: Intimate partner violence; embodiment; women; body ownership; bodily dissociation; posttraumatic stress disorder; depression.

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Introduction

Intimate partner violence (IPV) is a major threat to women's life and health, which can be even more significant in times of crisis. Indeed, during the worldwide lockdown due to the COVID-19 pandemic, there was an overall increase of IPV incidents (Piquero et al., 2021). Several mental health problems like post-traumatic stress disorder (PTSD), anxiety, depression and alexithymia are frequently reported by female victims of IPV, as well as other health-related issues, such as limited mobility, eating and sleeping disorders, pain syndromes, substance abuse, self-injury and suicidal ideation (WHO, 2021).

The impact of violence can reach beyond the physical and mental health, affecting embodiment features (e.g., interoception, motor imagery, body ownership, bodily dissociation) that are detrimental for the quality of life, functionality, and identity of women victims of IPV (Dillon et al., 2013; Edelman, 2005; Machorrinho et al., 2019, 2021; Marmeleira & Santos, 2019). Repeated violence triggers several defensive responses of social engagement (e.g., call out for help), mobilization (fight/flight) or immobilization (Levine et al., 2018). When continuously maintained, the defensive responses of mobilization or immobilization become maladaptive, causing trauma symptomatology (van der Kolk, 2015; Payne et al., 2015). Payne, Levine and Crane-Godreau (2015) propose that a dysregulation of the autonomic, limbic, motor and arousal systems, namely the Core Response Network, perpetuate those defensive responses and negatively impacts interoception, proprioception, imagery, and affective regulation.

However, other than violence, there are other factors that can impact embodiment-related functions. For example, people vulnerable to suicide attempts seem to better tolerate situations that cause physical harm and/ or threaten life, through decreased interoceptive awareness (Smith et al., 2018), or by using self-regulation strategies less based on bodily sensations (Paulus et al., 2019). Also, individuals with eating disorders and substance use, show a dysregulated (either enhanced or impaired) insular processing of interoceptive cardiac sensations (Köteles, 2021). Besides, in anxiety and trauma-related disorders, the sense of body ownership (highly studied as a measure of embodiment (Longo et al., 2008)) has been found to be somehow altered (Ehrsson et al., 2007; Macpherson et al., 2021; Rabellino et al., 2016).

In accordance, a recent study showed a high prevalence of PTSD, anxiety, and depression among female victims of IPV, along with significant symptoms of bodily

dissociation and difficulties in trusting the internal sensations of the body (Machorrinho et al., 2021). Also, among that group of women, somatic symptoms were the most reported on questionnaires assessing PTSD and anxiety. One should note, however, that in the study of Machorrinho et al. (2021), embodiment and mental health variables of women victims of IPV were not compared with women not exposed to IPV. Thus, the aim of the present study was to compare embodiment-related measures and mental health of women with and without history of IPV. Therefore, based on Machorrinho and colleagues' findings (2021), we hypothesized that women with past IPV experiences might have (1) weakened embodiment-related abilities, and (2) greater prevalence of PTSD, anxiety, depression, and substance use behaviors, self-injury and suicidal ideation.

Methods

This study uses part of the data from a cross-sectional study with female victims of IPV living in Portuguese shelters, between January 2020 and November 2021.

Procedures and sample

Based on the European Union Agency for Fundamental Rights 2014 report, almost 20% of Portuguese women have suffered some kind of IPV. Of those, 2877 women have lived in a Portuguese victims' shelter during 2021 (Comissão para a cidadania e igualdade de género, 2021). This study used a case-control design, with the aim of comparing women who had experienced IPV and women who had never experienced IPV. OpenEpi was used to calculate the minimum required sample size for unmatched case-control studies (Sullivan & Soe, 2007). For this calculation, significance level (alpha) was set at .05, power at 90%, proportion of controls with exposure at 20%, ratio of sample size at 1, and hypothetical proportion of cases with exposure at 80% (Moreira et al., 2019). Results indicated that a minimum of 15 cases and 15 controls was required.

For the IPV group, the study was presented to four shelters for female victims of IPV, from the region of Alentejo, Portugal. After approval from their managing entities, female victims were asked to participate, and a total of 47 accepted to enroll in the study (92% of acceptance). For the no-IPV group, a presentation of the study and an invitation to participate was disseminated through social media, through personal relationships, and at the university facilities. With the purpose of not biasing the interest to participate, the study was described as assessing embodiment-related variables in adult women, with no

reference to IPV. The no-IPV inclusion criterium was only explained in the first contact with the participant, and women who have suffered any type of IPV were included in another study (Machorrinho et al., 2021). Of the 53 women from the local community who showed interest in participating, 44 women without a history of IPV were included in the study.

In general, the invitation to participate had as inclusion criteria a) being female, b) aged ≥ 18 years. Confidentiality was maintained and participation was subject to informed consent. Assessments took about 60 minutes with each participant and were performed individually in a quiet room of the shelter – for the IPV group – or at university facilities or participants' home – for the no-IPV group. After a brief explanation of the purpose of the study, participants filled out a sociodemographic survey (assessing social variables, general health symptoms and past behaviors of substance use, self-injury, and suicidal ideation). Mental health and embodiment-related functions (levels of interoception, movement imagery, body ownership, and bodily dissociation) were assessed through tasks and questionnaires.

The study was approved by the University ethics committee and conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014).

Measures

Motor imagery was evaluated by the Movement Imagery Questionnaire-3 (MIQ-3, Williams et al., 2012). The MIQ-3 evaluates kinesthetic, visual internal and visual external modalities in adults. After performing each of the four simple movements (i.e., lifting the right leg, abduction of the non-dominant arm, jump and bend over), participants were asked to use a 7-point Likert scale to rate the ease or difficulty of seeing and feeling the movements, without moving (Mendes et al., 2016). The Portuguese adaptation showed acceptable validity and reliability properties (Cronbach's alpha = 0.88; Mendes et al., 2016).

Interoception is, i.e., the sensing, interpretation and regulation of the internal visceral signs of the body (Craig, 2003; Chen et al., 2021). It was evaluated in two dimensions: interoceptive accuracy (objective accuracy detecting internal signals of the body), and interoceptive sensibility (dispositional tendency to focus internally into the sensations of

the body) (Garfinkel & Critchley, 2013).

For assessing *interoceptive accuracy* we administered the Heartbeat Counting Task (HCT, Schandry, 1981). In a sitting position, participants were asked to count the heartbeats felted during each trial of 45, 35, 55 and 25 seconds, presented in a fixed order. A pulse oximeter was fitted on their index finger of the left hand for physiological heartbeat detection. For each trial, an accuracy score was derived: 1−(real beats− reported beats)/((real beats + reported beats)/2). Resulting accuracy scores were averaged over the 4 trials, yielding an average value for each participant.

Interoceptive sensibility was assessed through the Portuguese version of the self-report questionnaire Multidimensional Assessment of Interoceptive Awareness (Machorrinho et al., 2018). MAIA's Portuguese version comprises 33 items, and through a 6-point Lickert scale (0: never; 5: always) where higher scores represent more positive interoceptive sensibility, assesses 7 dimensions: Noting (i.e., awareness of body sensations), Not-distracting (i.e. tendency not to distract oneself from sensations of pain or discomfort), Not-worrying (i.e. tendency not to worry with sensations of pain or discomfort), Attention Regulation (ability to sustain and control attention), Emotional Awareness (i.e. awareness of the connection between body sensations and emotional states), Self-regulation (i.e. ability to regulate distress by attention to body sensations) and Trusting (i.e. experience of one's body as safe and trustworthy) (Mehling et al., 2012; Machorrinho et al. 2018). The MAIA's Portuguese version shows good psychometric properties (Cronbach's alphas ranging from 0.61 to 0.87 across the scales, and test-retest reliability ranging from 0.52 to 0.83; Machorrinho et al., 2018).

For assessing *Body Ownership* (the feeling of my body as my own), the Rubber Hand Illusion was administered following the protocol from Rabellino et al. (2016). Participants sat across from the experimenter with their arms resting on a table. With their right hand inside of a specially constructed black box, each of the fingers of the participant's real hand, and of the rubber hand, were synchronously brushed for two minutes, with two identical soft paintbrushes. After the experiment, participants were asked to complete a nine-item questionnaire that assessed their subjective experience (translated from Rabellino's study (2016) by three independent researchers).

Bodily Dissociation (the sense of separation from the body) was assessed through the

Scale of Body Connection (SBC; Price & Thompson, 2007), a self-report Lickert scale that measures Body Awareness and Bodily Dissociation. The adaptation from Neves, Price and Carvalheira (2017) confirmed the reliability and validity of this scale for the Portuguese population. (Cronbach's alpha = 0.73).

Posttraumatic Stress Disorder symptoms in the last two months was evaluated through the PTSD Checklist – civilian version (PCL; Weathers et al., 1993). This self-report questionnaire is able to differentiate the three PTSD clusters from DSM-IV medical diagnostic manual: Reexperiencing, Avoiding and Hyper-vigilance. Following Barreiras (2015), we have considered as clinically relevant levels of PTSD, having at least one symptom of the reexperiencing cluster, three of the avoiding and 2 of the hyper-vigilance cluster. The Portuguese version includes 17 items and has showed good psychometric properties (Cronbach's alpha= 0.94; Marcelino & Gonçalves, 2012).

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) enables health professionals to assess aAnxiety and dDepression levels at a brief and objective way (Herrmann, 1997). It is a self-report questionnaire with 14 items, seven assessing anxiety and seven assessing depression symptoms. Each item is rated in a 0-3 scale and classifies the symptom has feeling equal to times before or a lot worse than before. Scores higher than 7 in each subscale, indicate clinically relevant levels of anxiety or depression. The Portuguese version has good internal consistency (Cronbach's alpha_anxiety scale= 0.76; Cronbach's alpha_depression scale= 0.81; McIntyre et al., 1999).

Data analysis

Descriptive statistics of socio-demographic data, health symptoms, health behavior, and embodiment-related variables were performed for both IPV and no-IPV groups. Shapiro-Wilk test was used to check data normality. Accordingly, a comparison of both groups' mental health and embodiment-related variables was performed by means of the Chi-square test for categorical variables, the independent sample t-test for parametric variables, or the corresponding non-parametric Mann-Whitney test. Based on previous studies that found associations between some embodiment-related variables and symptoms of PTSD, anxiety, and depression, in this study, the embodiment variables that were statistically different between groups were then analyzed through one-way analysis of covariance (ANCOVAs; 95% confidence interval), controlling for the presence of

PTSD, anxiety and depression diagnoses. Statistical analyses were performed with SPSS (Statistical Package for the Social Sciences), version 24.0.

Results

A total of ninety-one women participated in this study. Table 1 presents the sociodemographic characteristics of both IPV and no-IPV groups. The majority of IPV victims had a secondary educational level or less, whereas most of the non-victims had an educational level above the secondary level (p=.001).

Table 1
Descriptive statistics of sociodemographic and health information

	IPV group N= 47	**No IPV group** N=44	***p***
Age (years old), *mean (SD)*	41.3 (11.5)	43.1 (12.5)	.478[a]
BMI (km/m^2), *mean (SD)*	27.8 (6.0)	23.1 (5.8)	.000[a]
Number of children, *mean (SD)*	2.2 (1.3)	1.2 (0.9)	.000[a]
Education, *n(%)*			.001
Primary	16 (34)	2 (4)	
Secondary	24 (51)	29 (64)	
Post-secondary	7 (15)	13 (27)	
Health, *n(%)*			
Sleep problems	30 (64)	13 (30)	.002
Anxiety attacks	25 (53)	11 (22)	.006
Migraines	23 (49)	9 (18)	.004
Respiratory problems	16 (34)	5 (11)	.010
Memory difficulties	15 (32)	7 (16)	.075
Chronic pain	14 (30)	7 (16)	.116
Hypertension	11 (23)	6 (13)	.232
PTSD	6 (13)	0 (0)	.014
Anxiety	12 (26)	10 (21)	.755
Depression	31 (66)	12 (28)	.000
Behavior, *n(%)*			
Substance use			
Tabaco	22 (47)	9 (20)	.008
Drugs	3 (6)	0 (0)	.088
Self-injury	17 (36)	1 (2)	.000
Suicidal ideation	33 (70)	7 (16)	.000

Note: IPV, Intimate Partner Violence; BMI, Body mass index; PTSD, Posttraumatic Stress Disorder. [a] p-value of the Mann-Whitney test for non-parametric variables

When compared to non-victims, IPV victims showed significantly higher Body Mass Indices (BMI) (p<.01), along with an increased frequency of smoking behaviors (p=.008), sleep problems (p=.002), respiratory problems (p=.010), anxiety attacks (p=.006), migraines (p=.004), and medical diagnosis of PTSD (p=.014) and Depression (p<.001). In our sample, IPV victims also reported to have previously engaged in more self-injury

(p<.001) and suicidal behaviors (p<.001). Of the 47 participants of the IPV group, only 37 were able to perform de MIQ tasks, due to difficulty in understanding the mental tasks, or due to physical impairments that enabled them to perform the movements.

Table 2
Results for the comparison of embodiment-related variables between IPV and no-IPV groups

	IPV group (n=47)	No-IPV group (n=44)	*p*	Test Statistic
MIQ-3, Kinesthetic	19.4 (6.4)	21.6 (4.6)	.077	-1.79 [c]
MIQ-3, Visual Internal	19.0 (6.5)	21.5 (4.9)	.090	636
MIQ-3, Visual External	19.8 (6.4)	20.6 (5.4)	.707	775
HCT, Interoceptive accuracy	0.34 (0.26)	0.40 (0.30)	.413	931
RHI	1.52 (1.92)	0.41 (2.23)	.025	724
MAIA Noting	3.80 (1.11)	3.82 (1.13)	.924	979
MAIA Not-distracting	1.51 (1.14)	1.55 (1.13)	.776	934
MAIA Not-worrying	2.63 (0.84)	2.48 (0.80)	.362	860
MAIA Attention Regulation	3.07 (1.41)	3.23 (0.83)	.780	956
MAIA Emotional Awareness	4.22 (1.01)	4.07 (0.90)	.361	900
MAIA Self-regulation	2.97 (1.39)	3.23 (0.77)	.824	985
MAIA Trusting	3.14 (1.61)	3.74 (1.00)	.121	822
SBC, Bodily dissociation	2.74 (0.87)	1.99 (0.63)	.000	489

Note. MIQ, Movement Imagery Questionnaire; HCT, Heartbeat Counting Test; RHI, Rubber Hand Illusion; MAIA, Multidimensional Assessment of Interoceptive Awareness; SBC, Scale of Body Connection. Results presented as mean (SD); [c]Independent samples *t*-test.

Table 2 presents the between-groups analysis of the embodiment-related variables. Results showed that IPV victims (*Mdn*= 2.667; range -3.0 – 3.0) experienced a stronger sensation of ownership of the rubber hand than the non-victims (*Mdn*= 0.667; range -3.0 – 3.0) (U = 724; p =.025), which translates into a weaker sense of body ownership. Bodily dissociation levels of both groups were also different (U= 467; p<.001), with IPV victims (*Mdn*= 2.75; range 1.3 – 4.8) showing significantly higher scores than non-victims (*Mdn*= 1.88; range 1.0 – 3.5). After controlling for diagnosis of PTSD and depression, ANCOVA results showed that there was still a significant difference in body ownership [F(1,87)=8.508, p=0.005] and bodily dissociation between groups.

Discussion

In the present study, we examined health and embodiment-related variables of women with and without a history of intimate partner violence. To the best of our knowledge, this is the first study to examine the differences between women victims and non-victims of IPV regarding embodiment-related variables such as interoception, movement imagery, body ownership and bodily dissociation. Female victims of IPV showed higher values of bodily dissociation, along with a weaker sense of body

ownership, representing an overall weaker sense of embodiment, compared to women who have never been victims of IPV.

Despite the efforts to recruit participants with similar sociodemographic characteristics for both groups, victims of IPV reported having a lower educational status, and more physical and mental health problems. These results corroborate the report of the World Health Organization about these being some of the known characteristics and risk factors for female victims of IPV (WHO, 2021).

The higher values of BMI and smoking behaviors among IPV victims also suggest a lower engagement into bodily self-care and healthy behaviors in this population. Indeed, a multidimensional comprehensive model considers that an acquired self-care deficit can be mediating the link between IPV and physical health problems (Schnurr & Green, 2004; Weaver & Resnick, 2004). Within this model, the authors consider self-care agency as being disrupted in consequence of PTSD, anxiety or depression disorders among victims of IPV, representing a risk factor for the development of other general health problems (Weaver & Resnick, 2004). Actually, PTSD and depression were significantly prevalent among our sample of IPV victims, alongside somatic symptoms such as difficulty falling asleep, migraines, respiratory problems and anxiety attacks.

It is equally important to note the high rates of self-injury and suicidal ideation among our sample of IPV victims, behaviors that are commonly linked with higher pain tolerance, higher interoception deficits, and lower levels of trust in bodily sensations (Dodd et al., 2018; Rogers et al., 2021). According to Young and colleagues (2019), self-injury behaviors can represent a way of dealing with the "interoceptive uncertainty", which is in the root cause of a lack of clarity about the "body's function in emotional experience" (Young et al., 2019, p.26). Moreover, Ataria (2018) summarizes self-injury as a behavior associated with negative core beliefs regarding the self, which enables the individual to "externalize emotional pain" and provides a sense of "security and control" (p.104), which are often compromised in the context of IPV.

Unexpectedly, the present study did not find impairments in interoceptive awareness and interoceptive cardiac accuracy, suggesting that interoception is preserved in female victims of violence. Considering previous studies (e.g., Machorrinho et al., 2021; Reinhart et al., 2020), it will be worthwhile to examine other interoceptive modalities in

future research (Ferentzi et al., 2018; Garfinkel et al., 2017).

Despite the preserved interoception, IPV victims report stronger experiences of body disownership than non-victims, which is not in accordance with the multisensory integration model (Horváth et al., 2020; Suzuki et al., 2013). Nevertheless, this finding is in line with other studies showing a negative (Tsakiris et al., 2011) or a non-existent (Crucianelli et al., 2018) relationship between interoception and body ownership. The stronger experiences of body disownership found in the present study support the hypothesis of a disrupted sense of body ownership as a repercussion of continued violence (van der Kolk, 2015; Ataria, 2018, Machorrinho et al., 2019). When continued violence leads to body disownership, the body ceases to be both a subject and an object to invest on. It ends being just a physical object, "not able to touch or to be touched" (Ataria, 2016, p. 225), which is closely related with bodily dissociation, a disconnection from the body that includes feelings of "being separated from the body" or having difficulties at identifying and expressing certain emotions (Price & Herting, 2013).

Indeed, IPV victims also scored significantly higher on bodily dissociation levels than non-victims. Furthermore, there is evidence of bodily dissociation as a risk factor for anxiety and depression among female victims of IPV (Machorrinho et al., 2021). Therefore, it is even more interesting to note that the difference between groups in bodily dissociation levels remained significant after controlling for mental health covariates.

There is increasing research on the neural and neuropsychological consequences of the continued assaults suffered by women in the context of violent relationships. IPV survivors are at a greater risk of having a Traumatic Brain Injury (TBI) caused by violent assaults. Also, Due to the context of fear and shame, the victims may not seek immediate medical support, increasing the long-term consequences of that injury (Monahan, 2019). Women with TBI caused by IPV showed a greater cortical thickness of the paracentral gyrus in comparison with participants with TBI caused by other factors (Likitlersuang et al., 2022). The paracentral gyrus plays an important role on the preparation, initiation and monitoring of movement, and controls for bowel and bladder voiding. It represents an uprising explanation mechanism for functional somatic disorders and pain syndromes, and was recently associated with alexithymia (difficulty identifying and expressing emotions) (Thomann et al., 2015; Terock et al., 2020). Accordingly, Monahan (2019) states that the brain tissue injuries caused by repeated assaults lead to "changes in the

immune system, inflammation, and neurological changes" (p.810), which are underlying mechanisms for mental and physical health, behavior, and structuring of a bodily Self.

Our study shows strong evidence on the link between IPV and impairments in embodiment, namely the sense of body ownership and the disconnection from the body. Nevertheless, we must address as study limitations the assessment of interoceptive accuracy through the Schadry's heartbeat counting task, which has recently shown some reliability issues (Zamariola et al., 2018; Ring & Brener, 2018; Zimprich, Nusser, & Pollatos, 2020). Also, due to difficulties in recruiting female victims of IPV from the community, the present study included IPV victims living in shelters, which can be a significantly different context from the no-IPV participants, namely in terms of opportunities to engage on health and leisure activities, physical environment and transports (Machorrinho et al., 2021).

Considering the major value of embodiment for one's health, behavior, and identity structure, there is a strong need for additional research on this matter in survivors of intimate partner violence. Unfortunately, research from Western Europe countries scarcely addresses these issues on preventive or therapeutic approaches to IPV. Thus, our results highlight one field needing attention, given the complexity and idiosyncrasy of embodiment.

We suggest that future research continue to examine embodiment-related functions of either female and male victims of IPV, and explore associations among embodiment variables, and between those variables and characteristics of IPV. it is crucial to study therapeutic interventions targeted for the recovery of a healthy embodiment in victims of IPV.

Implications for Practice

The present study brought to light a part of the role of embodiment-related processes on the health of female victims of IPV. These results can inform victims' support services about the assessment of embodiment-related functions and its implications for mental health, physical health, and behavior. Assessing the traumatized body in the aftermath of violence can be of paramount importance when accomplishing the therapeutic needs of each woman. At least in Portugal, the therapeutic support for victims while living in shelters is scarce and does not usually include any kind of exercise, psychomotor therapy

or body-mind therapy. The knowledge brought by the present study should inform the development of therapeutic interventions addressing body connection and the recovery of the sense of body ownership. Combining bottom-up (sensations' awareness) with top-down (mindful self-regulation) processes is currently thought to be a great approach to trauma interventions (explore van der Kolk, 2015).

Our results also imply the importance of stimulating body literacy among women, and knowledge about the associations between internal bodily sensations and mental health symptoms. That is, the promotion of body connection and awareness of internal sensations can be a part of secondary and tertiary prevention programs, targeting women at risk of engaging in violent relationships.

Conclusion

This study examined embodiment variables of women with and without a history of intimate partner violence. Beyond the expected higher rates of physical and mental health problems, self-injury and suicidal behaviors among victims of IPV, our results also showed that those women have weaker senses of body ownership and stronger levels of disconnection to the body. Although a lot is yet to be known about the onset of those impairments and their development and treatment tools, health practitioners must be mindful of the valuable role of embodiment in restructuring the self and recovering from traumatic experiences. Intimate partner violence victims need embodiment-informed care to be parallel to the attention given to mental health and somatic symptoms.

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Attention to the body! The connection between interoception and somatic complaints of survivors of intimate partner violence[4]

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(submitted)

Abstract

Somatic complaints are a critical burden to women, particularly to those women who survived intimate partner violence. The way women feel, perceive and relate to their own body, i.e., interoception, seems to have a significant role in the pathway to somatic complaints. However, no study has yet examined this relationship, and the role of violence in this interplay. The current cross-sectional study examined the relationship between somatic complaints and interoceptive abilities in order to deepen the understanding of the underlying mechanisms of the experience of somatic complaints. ***Method:*** Women with (N=44) and without (N=52) history of IPV were assessed regarding interoceptive accuracy, interoceptive sensibility, and somatic complaints. Associations between both variables in each group were examined, and a hierarchical regression analysis assessed to what extent somatic complaints were explained by the interoceptive abilities, with the moderating role of IPV group membership. ***Results:*** Women survivors of IPV reported more somatic complaints ($p<.001$), which were negatively associated with interoceptive attention regulation. The opposite association was found in women who have never suffered IPV. For the IPV group, the interoceptive attention regulation, added to age and the index of the violence suffered, explains 43% of the variance in somatic complaints. ***Conclusion:*** The findings suggest that for women with history of IPV, but not for those without, the ability to regulate the attention given to bodily sensations can be a promising therapeutic aim, leading to a lower risk of somatization and better health management.

***Key-words*:** Somatic complaints; Women; Interoception; Attention Regulation; Intimate Partner Violence.

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Background

Somatic complaints are frequently reported by survivors of intimate partner violence (IPV) (Nair et al., 2023; WHO, 2021). Complaints like back pain, headache, and dizziness generally derive from the distressing perception of bodily sensations, impairing daily functioning (van den Bergh et al., 2017). Indeed, the so-called interoception, i.e., the process of *sensing and perceiving internal bodily sensations, like heartbeat, breathing, or pain*, has been argued as a critical explanatory mechanism for the experience of somatic complaints (Köteles & Witthöft, 2017). However, external factors have also a role in this pathway. For example, the experience of traumatic situations, such as intimate partner violence, have a huge impact on interoceptive abilities. Understanding if and how this perception and interpretation of bodily signals exacerbates somatic complaints of IPV survivors is paramount for improving medical care and developing effective integrative therapeutic interventions.

For years, the evidence has pointed to somatic complaints arising from the ability to perceive bodily signals accurately - interoceptive accuracy; thus, bottom-up sensory information would originate and exacerbate the perception of a symptom (Ma-Kellams, 2014; Bogaerts et al., 2022). However, contradictory findings got this link questioned, suggesting that top-down cognitive and affective processes significantly alter this relationship and influence bodily signals' perception, interpretation, and reporting (van den Bergh et al., 2017; Köteles & Witthöft, 2017; Brand et al., 2023; Petzke et al., 2024).

Heightened arousal is one of the main interferences in interoception (Khalsa et al., 2015; Rief & Broadbent, 2007). It reflects mainly on increased bodily signals (Khalsa et al., 2015; Schulz et al., 2020), increased perception of minor bodily signals (Köteles & Witthöft, 2017; Barsky et al., 1988; Wolters et al., 2022) or on even minor bodily signals being categorized as threatening, pathological or stressful (Rief & Broadbent, 2007; Wolters et al., 2022; van den Bergh et al., 2018). The resulting misinterpretation of actual physiological signals and their slight changes result in a cycle of hypervigilance towards the body that continuously exacerbates symptoms' perception, thereby contributing to symptom maintenance (van den Bergh et al., 2017; Henningsen et al., 2018; Fani et al., 2024). Simultaneously, dysfunctional behavioral processes – such as avoiding physical activities and withdrawing from beneficial social contacts – may contribute to distress and other somatic symptoms (Witthöf et al., 2020).

Considering this, an approach to understanding somatic complaints as a more complex process involving both bottom-up and top-down processes arose. The concept of somatosensory amplification refers to the tendency to experience bodily sensations as intense, catastrophic, and disturbing (Köteles & Witthöft, 2017; Barsky et al., 1988; Wolters et al., 2022), involving either bottom-up processes (bodily signals) and top-down processes (as body hypervigilance; focus on slight and weak body sensations, and cortical reactions to sensations). According to Wolters and colleagues (2022), the brain generates predictions about internal bodily states based on incoming interoceptive information and adjusts these predictions accordingly. However, when there is a misinterpretation or misperception of interoceptive sensations, those predictions do not match with the sensory input, resulting in perceived somatic symptoms that do not correspond to physiological changes (van den Bergh et al., 2017; Wolters et al., 2022). Furthermore, this biased interoception leads to individuals affirming symptoms readily in ambiguous situations (Petersen et al., 2015). Altogether, these processes, contribute to exacerbating somatic complaints, resulting in health worries, expectations of symptoms, and amplified perception of external threats (Barsky et al., 1988; Wolters et al., 2022).

Moreover, studies on somatization, the tendency to express emotional distress as somatic symptoms (De Gucht & Fischler, 2002), suggest that maladaptive defense mechanisms such as suppression and displacement of negative emotions are associated with the formation of somatic symptoms, possibly through difficulties handling emotional stimuli that interfere with sensorial information interpretation (Lee et al., 2024). In this sense, showing an inflexible response (as opposed to a flexible adaptation) to repeated or severe threats to the body (as is the case of IPV), is suggested to compromise the accurate perception of bodily signals and resulting in interoceptive illusions, therefore contributing to somatic complaints (Zacharioudakis et al., 2020). Somatization is often found in people exposed to traumatic experiences, in particular in those experiencing posttraumatic stress disorder (PTSD) (Lee et al., 2024) which, in turn, is based on a condition of dysregulated arousal (Rabellino et al., 2017).

Taken together, these findings contribute to the current efforts to conceptualize the different Posttraumatic Orientations to Bodily Signals, an umbrella term that encompasses the tendency to interpret bodily signals as catastrophic and frightful after exposure to trauma (Tsur, 2024; Tsur & Solomon, 2023). However, in the literature review that supports this term only 8% of the included studies were on interpersonal

trauma or IPV (Tsur & Talmon, 2023), which highlights the need of more studies.

The case of IPV

Women survivors of IPV often report medically unexplained symptoms in gastrointestinal, cardiopulmonary, neurological, sexual, and reproductive dimensions (Lown & Vega, 2001; Campbel, 2002). Such symptoms have been reported by adults who suffered violence in childhood (Eilers et al., 2023), adolescence (Halpern et al., 2013), and adulthood (Ilosson et al., 2021; Machorrinho et al., 2023), corroborating the long-lasting detrimental effects of interpersonal violence. Furthermore, the more violence a woman is exposed to, the higher the number of somatic symptoms reported (Nair et al., 2023), especially if they suffered sexual violence or abuse and if the abuse came from someone close to them (Hilden et al., 2004).

Trauma consequences, such as maladaptive defense mechanisms, altered brain connectivity, hypervigilance, dissociation and psychopathology, contribute to either heightened or reduced alertness, a misinterpretation of interoceptive sensations, and somatic symptoms reporting (Fani et al., 2024; Paulus & Stein, 2010; Khalsa et al., 2018; Machorrinho et al., 2022). Also, bodily dissociation (i.e., the feeling of being separate from the body and with difficulty expressing emotions (Price & Thompson, 2007), another consequence of IPV (Machorrinho et al., 2022; 2023), has already proven to be a significant mediator between traumatic experiences and emotion dysregulation (Schmitz et al, 2023). Bodily dissociation decreases the ability to be aware of bodily sensations, sustain attention towards the body, and trust in interoceptive sensations (Mehling et al., 2021), thus adding as a possible mechanism linking interoception to somatic complaints in violence-related trauma (Fani et al., 2024).

So far, research has shown that women survivors of IPV show a high report of somatic complaints, a low interoceptive accuracy, and difficulties in interoceptive self-regulation and in trusting in bodily sensations which relate to increased symptoms of PTSD, anxiety and depression (Machorrinho et al., 2023; Reinhardt et al., 2020). Despite these significant findings, the dynamics between interoception and somatic complaints of survivors of IPV remain unexplored. Besides, considering that the cumulative aspect of IPV (co-occurrence of various forms of violence) has been related to the experience somatic symptoms of women exposed to violence across the lifespan, it is necessary to

account for a violence index in related research (Eberhard-Gran et al., 2007; Loeb et al., 2018). Hence, there is a need of a deeper understanding of the interplay between violence severity and interoceptive abilities and their role on somatic symptoms of IPV survivors.

The present study

Somatic complaints have a heavy impact on daily functioning. Regarding survivors of IPV, the experience of somatic complaints increases if they suffer more than one form of violence (Loeb et al., 2028). One of the most acknowledged mechanisms for perceiving and reporting somatic complaints is interoception, namely interoceptive accuracy and interoceptive sensibility. Biased interoception was both found in people with somatic symptom disorders (Wolters et al., 2022) and with violence-related trauma (Fani et al., 2024; Paulus & Stein, 2010; Tsakiris & Critchley, 2016). However, the contribution of interoceptive abilities for somatic complaints of survivors of IPV still lacks research.

Therefore, the main aim of this study is to gain a deeper understanding of the relationship between somatic complaints and interoceptive abilities (accuracy and sensibility) of women survivors of IPV, accounting factors that knowingly contribute to both somatic complaints and/or interoception, such as age (Nusser et al., 2020), mental health (van den Bergh et al., 2017; Paulus & Stein, 2010; Reinhardt et al., 2020), and the violence suffered (Loeb et al., 2018).

The aim of this study was threefold. First, we aimed to examine the somatic complaints, interoceptive abilities, violence index, and mental health (PTSD, Depression and Anxiety diagnoses) of women survivors of IPV, and compare them with women who have not suffered from IPV. Based on previous research (Lown & Vega, 200; Ilosson et al., 2021; Machorrinho et al., 2022; 2023; Mehling et al., 2012), we expected survivors of IPV to show higher rates of somatic complaints, and a higher tendency for not-distracting themselves from negative sensations, as well as lower interoceptive accuracy, attention regulation, self-regulation and trusting in bodily sensations. We also expected a higher violence index, and a higher report of mental health diagnoses (Nair et al., 2023; Fani et al., 2024; Machorrinho et al., 2022; 2023).

Second, we aimed to examine, how somatic complaints were related with interoceptive abilities and violence index, for women survivors of IPV and for women with no IPV history. Considering that age (Nusser et al., 2020), mental health (van den

Bergh et al., 2017; Paulus & Stein, 2010; Reinhardt et al., 2020), the history of violence (Loeb et al., 2018) influences both somatic complaints and/or interoception, these factors were accounted. Considering previous research**,** we expected a negative association between somatic complaints and interoceptive accuracy (Reinhardt et al., 2020), attention regulation, self-regulation and trusting for women survivors of IPV (Machorrinho et al., 2023; Mehling et al., 2012). However, for women non-victims of IPV, we expected a negative association of somatic complaints with interoceptive accuracy, and the noticing and not-worrying scales of interoceptive sensibility (Ma-Kellams, 2014; Verkuil et al., 2012), and a negative association with emotional awareness and self-regulation scales of interoceptive sensibility (Wei et al., 2020).

Third, we investigated to what extent somatic complaints were explained by the interoception abilities correlated in the previous step, with the moderating role of IPV group membership. Although no previous study has examined this mediatory role, we expected that IPV-group to play a moderating role in the relationship between somatic complaints and interoception, possibly in the accuracy, attention regulation, and trusting abilities, since preliminary evidence suggests they behave differently for people with and without a history of IPV.

Methods

Participants and procedure

A total of 96 women (18-68 years old) participated in this study (Table 1). Of this, 44 were women survivors of IPV living in shelter homes (IPV group; 18-68 years old), and 52 were women recruited from the community who reported never suffering IPV (no-IPV group; 19-64 years old).

For the IPV group, the study was presented to four shelter homes from the central and southern regions of Portugal. After approval from their managing entities, women were asked to participate, and a total of 47 accepted to enroll. Of these, 44 completed the assessments and were included in the analysis.

For the no-IPV group, a presentation of the study with an invitation to participate was disseminated using social media and the university communication channels, through a snowball effect. Of the 53 women from the local community who showed interest in

participating, 52 completed the assessments and were included in the analysis.

The inclusion criteria were a) being female, b) aged ≥18 years, and c) having suffered IPV (for the IPV group) or d) not having suffered IPV (for the no-IPV group). Confidentiality was maintained and participation was subject to informed consent. Each testing session took about 45 minutes and was performed individually in a quiet room of the shelter – for the IPV group – or at university facilities or participants' home – for the no-IPV group. After a brief explanation of the purpose of the study, participants filled out a sociodemographic survey (assessing sociodemographic data, mental health diagnosis, medication, somatic complaints and forms – psychological, physical and sexual- and contexts – intimate relationship, family relationship or work relationship-, of the violence suffered). The study was approved by the University ethics committee (GD/31071/2018) and conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014).[46]

Instruments

Somatic complaints were assessed through a checklist of 10 somatic symptoms. Women reported which complaints they experienced (e.g., sleep difficulties, migraines, chronic pain), in the past week. The total score was obtained by the mean of all the reported symptoms, with higher scores indicating more symptoms. In the present study, the Cronbach's alpha of this instrument was .723.

Interoception was evaluated in two dimensions: interoceptive accuracy and interoceptive sensibility. For assessing interoceptive accuracy we administered the Heartbeat Counting Task (HCT, Schandry, 1981). In a sitting position, participants were asked to count the heartbeats felt during each trial of 45, 35, 55 and 25 seconds, presented in a fixed order. A pulse oximeter was fitted on the index finger of their left hand for physiological heartbeat detection. For each trial, an accuracy score was derived: $1 - (\text{real beats} - \text{reported beats})/((\text{real beats} + \text{reported beats})/2)$. Resulting accuracy scores were averaged over the 4 trials, yielding an average value for each participant. Interoceptive sensibility was assessed through the self-report questionnaire Multidimensional Assessment of Interoceptive Awareness (Mehling et al., 2012). MAIA's Portuguese version comprises 33 items, and through a 6-point Lickert scale (0: never; 5: always) were higher scores represent more positive interoceptive sensibility, assesses 7 dimensions: Noting (i.e., awareness of body sensations), Not-distracting (i.e. tendency not to distract

oneself from sensations of pain or discomfort), Not-worrying (i.e. tendency not to worry with sensations of pain or discomfort), Attention Regulation (ability to sustain and control attention), Emotional Awareness (i.e. awareness of the connection between body sensations and emotional states), Self-regulation (i.e. ability to regulate distress by attention to body sensations) and Trusting (i.e. experience of one's body as safe and trustworthy) (Mehling et al., 2012; Machorrinho et al., 2019). In this study, the Not-worrying scale showed a Cronbach's alpha of .497, therefore it was removed from the analysis. For all the other scales, Cronbach's alphas ranged from .701 (Noticing) to .876 (Attention regulation).

Violence Index was obtained by computing the sum of all the forms of violence suffered (psychological, physical and sexual) ranging from 0 (zero) to 3 (three).

Data analysis

Primarily, descriptive statistics of socio-demographic data, somatic symptoms, mental health medical diagnosis, violence history and interoception skills were performed for both IPV and no-IPV groups. Shapiro–Wilk test was used to check data normality. Reliability of the somatic complaints checklist and of each subscale of MAIA was checked through Cronbach's alpha and inter-item correlation (Table 2). Independent sample t-tests (reporting t-test statistics, degrees of freedom and *p*-values) were used to compare age, somatic complaints, mental health and interoception between women with and without IPV history.

Secondly, for each group, Spearman's Rho partial correlations were checked between somatic complaints, violence index and interoceptive abilities, controlling for age, PTSD and depression diagnosis, since those are known confounders for interoception variability and/or somatic complaints.

Hierarchical regression analysis was used to assess the moderating role of interoceptive abilities and violence index on somatic complaints (model 1), adding an interaction term between each factor and the group (model 2). Adjusted *R*-squared terms were calculated to assess the proportion of variation in somatic symptoms predicted by the statistical models. Normality, linearity, and heteroscedasticity checks performed on the data confirmed that all model assumptions were met.

Few values (<5%) were missing, and Little's MCAR test ($p > .05$) indicated that these were missing at random. Therefore, all participants were included, and missing values were replaced by the mean value of the respective item scores. All statistical analyses

were conducted using version 24.0 of SPSS (IBM Corp., 2017) and significance level was set at $p < 0.05$ (2-tailed).

Results

A total of 96 women participated in this study. Table 1 presents the characteristics of both IPV (n=44) and no-IPV (n=52) groups. The majority of IPV victims had a secondary educational level or less, whereas most of the non-victims had an educational level above the secondary level (p = .001). When compared to non-victims, IPV victims showed significantly higher frequency of PTSD and Depression diagnosis, along with an increased violence index (p<.001) and report of somatic complaints (p<.001), namely sleep problems (p= .002), panic attacks (p=.006), anxiety attacks (p=.033), migraines (p= .014), and attention and memory difficulties (p=.044). IPV and no-IPV groups did not differ in age, interoceptive accuracy or interoceptive sensibility.

Table 1
Sample characteristics and descriptives.

	Group IPV (N=44) Mean(SD)	**Group no-IPV (N=52) Mean(SD)**	***p*-value**
Age	40.3(11.2)	43.1(12.5)	.254
Mental health diagnosis			
PTSD, n(%)	6.0(11.5)	0.0(0.0)	.021
Anxiety, n(%)	15.0(28.8)	10.0(22.7)	.501
Depression, n(%)	32.0(61.5)	12.0(27.3)	<.001
Violence Index	2.9(1.0)	0.3(0.5)	<.001
Somatic complaints	0.36(0.27)	0.18(0.18)	<.001
Sleep problems	0.65(0.48)	0.34(0.48)	.002
Panic attacks	0.21(0.41)	0.02(0.15)	.006
Anxiety attacks	0.46(0.50)	0.25(0.44)	.033
Respiratory problems	0.19(0.40)	0.11(0.32)	.295
Auto-immune diseases	0.10(0.30)	0.09(0.29)	.936
Chronic pain	0.29(0.46)	0.16(0.37)	.136
Migraines	0.44(0.50)	0.21(0.41)	.014
Attention and memory difficulties	0.42(0.49)	0.23(0.42)	.044
Gastrointestinal problems	0.33(0.59)	0.16(0.48)	.070
Cardiac/ vascular problems	0.27(0.49)	0.16(0.37)	.264

Note: PTSD, Posttraumatic stress disorder; SD, Standard Deviation.

Results from the second step showed that, for the IPV group, higher rates of somatic symptoms correlate with higher violence index (p<.001) and with lower attention regulation (p=.006), i.e., lower ability to regulate the attention given to internal sensations. On the other hand, no significant correlations with somatic complaints were

found for the no-IPV group (see table 3).

Table 2
Psychometric properties and mean scores (standard deviations) of the measures

	N items	Scale Range	Cronbach's α	Mean (SD) IPV	Mean (SD) No-IPV	U	p
Somatic complaints checklist	10	0.0-1.0	.723	0.4(0.3)	0.2(0.2)	691	<.001
Interoceptive Accuracy, HCT	1	0.0-0.9		0.4(0.3)	0.4(0.3)	1014	.625
Interoceptive Sensibility, MAIA							
Noticing	3	0.0-5.0	.701	3.8(1.1)	3.8(1.1)	1124	.882
Not-distracting	4	0.0-5.0	.860	1.4(1.1)	1.6(1.1)	1068	.578
Not-worrying	4	0.0-5.0	.497	2.6(1.0)	2.5(0.8)	1052	.496
Attention Regulation	7	0.4-5.0	.876	3.3(1.2)	3.2(0.8)	1099	.743
Emotional Awareness	5	0.2-5.0	.871	4.3(0.8)	4.1(0.9)	955	.160
Self-regulation	7	0.0-5.0	.863	3.0(1.2)	3.2(0.8)	1080	.640
Trusting	3	0.3-5.0	.857	3.1(1.5)	3.8(1.0)	904	.076

Note: HCT, Heartbeat Counting Task; MAIA, Multidimensional Assessment of Interoceptive Awareness

Table 3
Correlations of violence and interoception with somatic complaints

	Somatic Complaints	
	Group IPV (N=44)	Group no-IPV (N=52)
	Rho	Rho
Violence Index	.418*	.126
IAc	.173	-.157
Noticing	-.026	.232
Not-Distracting	-.102	-.050
Not-Worrying	-.217	.028
Attention Regulation	-.295*	.019
Emotional Awareness	.154	.117
Self-Regulation	-.118	-.035
Trusting	-.041	-.197

Note: Controlled for Age, PTSD, anxiety and depression; IAc, Interoceptive Accuracy

In the final analysis, a hierarchical linear regression was used including age, violence index and attention regulation as possible moderators of somatic complaints, adding an interaction term with group membership. Results (see table 4) showed that when group interaction was added, interoceptive attention regulation explained the variations in somatic complaints of women survivors of IPV, above and beyond the contribution of age and of cumulative violence This model explains 43% of the variance in somatic

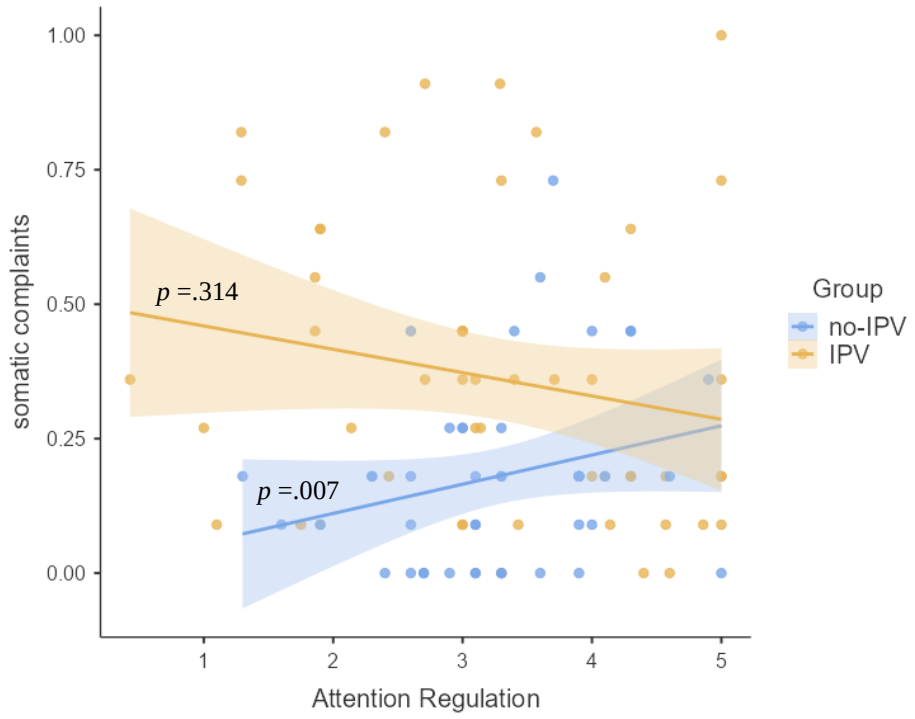
complaints. In the IPV group, interoceptive attention regulation is negatively associated with somatic complaints, while the opposite happens in the no-IPV group.

The scatterplots confirm the contribution of interoceptive attention regulation to somatic complaints behave differently for women with and without IPV history, unlike the other interoceptive abilities assessed.

Table 4
Hierarchical regression analyses for interoception on somatic complaints

	Somatic Complaints		
	b	p	95% CI
Step 1		R^2=.378, *p*= <.001	
Age	.386	<.001	[.005; .012]
Violence Index	.522	<.001	[.058; .111]
Attention Regulation	-.162	.060	[-.079; .002]
Step 2		ΔR^2=.051, *p*=.053	
Age	.253	.018	[.001; .010]
Violence Index	.460	.264	[-.057; .206]
Attention Regulation	.137	.314	[-.031; .097]
Group x Age	.485	.066	[.000; .011]
Group x Violence Index	.233	.614	[-.104; .175]
Group x Attention Regulation	-.765	.007	[-.175; -.029]

Figure 1.
Scatterplot of the relationship between somatic complaints and interoceptive attention regulation, *per* group.



Discussion

Somatic complaints are a critical burden to women, and particularly to those women who survived IPV. The way women feel, perceive and relate to their own body seems to have a significant role in the pathway to somatic complaints. The current study examined the relationship between somatic complaints and interoceptive abilities in order to deepen our understanding of the underlying mechanisms of the experience of somatic complaints. Indeed, our study showed that women survivors of IPV experience more somatic complaints than those without IPV, and that, above and beyond age and cumulative violence, interoceptive attention regulation plays a significant role in the experience of somatic complaints by women survivors of IPV.

The present study showed that IPV survivors were more likely to have a mental health diagnosis. In particular, 11.5% of these women had PTSD, and 61.5% had a diagnosis of depression, twice as much as the women who did not have a IPV history, which is in line with other studies (Machorrinho et al., 2022; Pico-Alfonso et al., 2006). Although the prevalence of anxiety disorder was slightly higher (29%) for IPV survivors, than for women with no IPV history (23%), these differences were not statistically significant. Moreover, both frequencies were higher than a previous report on Portuguese adults' mental health (21%, DGS, 2017). Nevertheless, survivors reported more anxiety symptoms and panic attacks than women with no IPV history. Altogether, these findings might suggest that women who suffer from IPV have fewer opportunities to access medical care or that when they do they tend to hide or undervalue these complaints (Cho et al., 2021; Warshaw et al., 2003).

In general, as hypothesized, women survivors of IPV reported more somatic complaints than women who have never suffered IPV (Nair et al., 2023; Lown & Vega, 2001; Ilosson et al., 2021). Besides, the experience of somatic complaints was related to a higher violence index. This finding strengthens the theory of exposure-response association between violence and symptoms, and reinforces the idea that somatic symptoms can be interpreted as markers of victimization (Witthöft et al., 2020; Halpern et al., 2013).

It is important to note that IPV survivors reported more somatic-cognitive complaints, i.e., memory and attention difficulties, than non-victims of IPV. These

findings are consistent with previous studies (Fernández et al., 2023; Raskin et al., 2024) and give support to Negrón-Oyarzo and colleagues' hypothesis (2016) that those somatic-cognitive symptoms can be a consequence of IPV-related phenomena such as distress (Negrón-Oyarzo et al., 2016) or PTSD (Twamley et al., 2009), showing the impact of IPV on neuropsychological functioning (Fernández et al., 2023). Alternatively, those somatic-cognitive complaints might be an indicator of attention deficit and hyperactivity disorder (ADHD) (Arrondo et al., 2023). It has been hypothesized a co-occurrence of genetic risks for both ADHD and severe IPV, either by parental mental illness leading to adverse childhood experiences that increase the risk of mental illness and IPV in adulthood, or by inherited genetic risk for mental illness increasing the likelihood of experiencing risk factors for IPV victimization (Ratanatharathorn et al., 2024). Therefore, symptoms of attention and memory difficulties are currently understood as either a risk factor or a sequelae of IPV victimization (Lagdon et al., 2014; Lehrer et al., 2006; Wymbs et al., 2017; Valera et al., 2019), and can be a crucial pathway to understand the relationship between interoception and somatic complaints in survivors of violence.

Taking into account all the somatic complaints most frequently reported by women survivors of IPV, namely panic and anxiety attacks, attention and memory impairments, sleep difficulties and migraines, those fall under a symptomatic framework of heightened arousal and hypervigilance (Wolters et al., 2022; Cripe et al., 2011; Gallegos et al., 2021). Moreover, the prevalence of PTSD diagnosis among the IPV group supports this framework and is consistent with IPV-PTSD subjects showing increased activation and decreased connectivity among the anterior insula and the amygdala, expressing a disconnection among affective and limbic sensory systems, and an exaggerated sensitivity to contextual cues (Fonzo et al., 2010). These findings strengthen the ongoing conceptualization of a posttraumatic orientation to bodily signals (Tsur, 2024) and reinforce the need of studies specifically focused on the IPV-PTSD cluster.

The influence of interoceptive attention regulation on somatic complaints differs for women based on their history of IPV. Our findings indicate that interoceptive attention regulation explains somatic complaints in women with a history of IPV, but not in those without. This sheds light on the varying impact of interoceptive bias on health within different relational contexts. Indeed, previous research showed that for populations with no history of violence, interoception (accuracy and sensibility) is not related to the experience of somatic complaints (Ferentzi et al., 2019), which reinforces the idea that

healthy individuals living in healthy environments and situations do not need to consciously focus on their bodies or divert their attention from external surroundings (Köteles & Simor, 2013). In a somatic and emotionally healthy state, attention can be regulated to detect and interpret signals from the body only when needed, since it is generally focused on the external world (Nord & Garfinkel, 2022). However, when external relational cues are frequently threatening and the body's integrity or identity is at risk, one's attention must constantly shift between cues to ensure survival. Hence, the negative impact of unpredictability on the experience of bodily sensations might increase the interoceptive bias and emotional distress (van den Bergh et al., 2017; Camola, 2021).

Concerning women survivors of IPV, the current study showed that interoceptive attention regulation plays a significant role in the experience of somatic complaints by women survivors of IPV. These findings suggest that for women who have lived in a violent relationship, it is of paramount importance to be able to sustain and control attention to body sensations. An adaptive attention regulation ability can help survivors to either divert attention from the distressing surroundings (preventing them from being continuously misinterpreted as dangerous) or use bodily sensations to self-regulate and manage health and illness symptoms adaptively (Camola, 2021;Tan et al., 2023; Lee S. et al., 2024; Price & Herting, 2013). Indeed, such interoceptive ability has been shown to improve emotional and physiological regulation (Lee S. et al., 2024). Thereby, therapeutic interventions that focus on interoceptive attention regulation abilities can allow women survivors of IPV an inner distancing from ruminating negative and catastrophic emotions and a flexible application of regulatory strategies, leading to a more adaptive coping and a lower risk of somatization (Lee D. et al., 2024; Zacharioudakis et al., 2019; Ferentzi et al., 2019; Tan et al., 2023; Lee S. et al., 2024). Moreover, to comfortably sustain attention in bodily sensations, those must not be perceived as catastrophic, threatening or misleading (Tsur & Talmon, 2023; Nord & Garfinkel, 2022). Thus, IPV-targeted interventions must also consider the importance of restoring the safety and acquaintance of the survivor’s traumatized body (Machorrinho et al., 2023b; Marmeleira et al., 2023; Punkanen & Buckley, 2021).

Limitations and Future diretions

This study does not come out without limitations. Considering the cross-sectional nature of the casual relations between IPV, somatic complaints and interoceptive abilities

can not be assumed. Therefore future longitudinal studies will be helpful to gain a deeper understanding of our findings. Future research should consider the between individuals' characteristics regarding interoception attention regulation abilities and somatic complaints. Moreover, our study endorsed the importance of future studies examining the experience of violence in individuals reporting medically unexplained symptoms, especially concerning symptoms of hyperarousal such as hypervigilance, state anxiety, attention difficulties, sleep disturbances, and migraines.

Conclusion

The present findings provide insight into the contribution of interoception to the experience of somatic complaints by women who suffered IPV. Those women report significant somatic complaints consistent with a framework of heightened arousal. Furthermore, the ability to regulate the attention given to bodily sensations seems crucial for them to improve emotional and physiological regulation, leading to a lower risk of somatization and better health. Therapeutic interventions for survivors of IPV must consider promoting interoceptive attention regulation, to help them use bodily sensations to self-regulate and manage health and illness symptoms adaptively.

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Echoes of a living body: a mind-body approach on how women victims of intimate partner violence experience their bodies.[5]

Joana Machorrinho, Guida Veiga, José Marmeleira and Graça Duarte Santos (2024)

Abstract

Intimate partner violence (IPV) against women is a worldwide health problem. IPV impact on women's embodiment remains embedded in their narratives. However, the subjective complexity of victims' embodiment and its impact on healthcare still urges to be understood. We aimed to understand (i) how women victims of IPV experience their bodies and (ii) the impact of IPV in their embodiment. From a thematic analysis of six interviews with women victims, four themes arouse: Living body, Reaction to adversities, Impact of violence and Identity. Participants revealed a tendency to perceive negative bodily sensations, the body as restrictive of their ability to react to illnesses and other adversities, and impacts on health and decision-making processes. We encourage healthcare providers to be responsive to the feelings of physical and psychological exhaustion experienced by victims and highlight the potential of promoting positive bodily experiences in the support given to women.

***Keywords*:** domestic violence, embodiment, identity subjective experience, women, health

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Background

Intimate partner violence (IPV) refers to acts of physical, sexual, or psychological aggression, coercion, and threats in the context of an intimate relationship (World Health Organization [WHO], 2021). About 30% of women worldwide are impacted by IPV, perpetrated mainly by male partners, which makes researchers consider this type of violence a gender-based crime, regardless of nationality, ethnicity, or age (Devries et al., 2013; Rajah & Osborn, 2022). IPV has corrosive effects on women's mental health, physical health, sense of Self and relational dynamics, leading to a disrupted sense of embodiment (Bakaiytè et al., 2022; Bensley et al., 2003; Machorrinho et al., 2021b, 2022; WHO, 2021).

Embodiment encompasses the interactions between the mind, the body, and the Self within one's social structures (Malecki et al., 2018). The concept of embodiment covers not only the body and how it is perceived by the person, but also how a person i) experiences the surroundings from within the body, ii) interacts with Self and others through the body, and iii) reacts to those interactions (Bakaiytè et al., 2022; Gallagher, 2005; Machorrinho et al., 2021a, 2021b, 2022; van der Heyden, 2023). Therefore, embodiment has been understood through a phenomenological approach to the body, its functionality, and its ability to engage with the world (including through the senses of body ownership –"this is my body" -, and body agency – "I am in control of my body and actions") (van der Heyden, 2023; Gallagher, 2005; Merleau-Ponty, 1962; Ataria, 2013). Combined, these features allow for an understanding of how people inhabit their bodies, and of their bodily "I can" (Ataria & Gallagher, 2015; Lux et al., 2022).

Efforts have been made to understand the lifetime development of embodied experiences and how internal, environmental, and social features interact with those experiences (Marmeleira & Duarte Santos, 2019; Marshall, 2016; Needham & Libertus, 2011; Piran & Teall, 2012). Niva Piran, a clinician and researcher in the field of women's health and embodiment, proposed a developmental approach for girls' and women's embodiment (Piran, 2016, 2017). Supported by a constructivist grounded theory, Piran conducted and analyzed both retrospective and prospective interviews of girls and women, shedding new light on how women inhabit their bodies (Piran, 2016). The author refers to three domains of the development of embodiment experiences among women: the physical, the mental/representational, and the social/relational domains. Embodiment

experiences of women can fluctuate between a positive and a negative pole in five parallel dimensions: ‘body connection and comfort’, ‘agency and functionality’, ‘experience and expression of desire’, ‘engagement in attuned self-care practices’, and ‘resistance to self-objectification’ (Piran, 2016; Piran & Teall, 2012). For a woman, the way how those experiences of embodiment unfold is a better predictor of life satisfaction than body esteem (Gattario et al., 2020; Munroe, 2022) and, in specific, we know that traumatic situations can greatly undermine and disrupt embodiment (Mensch, 2008; Ataria & Gallagher, 2015). Therefore, studying the experiences of embodiment in women who have suffered from IPV is a pivotal need.

Indeed, traumatic experiences such as IPV, adverse childhood experiences, and sexual assaults often result in symptoms of bodily dissociation or disembodiment through emotional, neurophysiologic, and psychophysiological processes (Payne et al., 2015; van der Kolk, 2015). Symptoms of bodily dissociation are, for example, feeling separate from one’s body, not feeling or consciously distracting from sensations of pain or discomfort, or not feeling control over one’s body (Machorrinho et al., 2021a, 2023; Price et al., 2017). Likewise, disembodiment symptoms refer to experiencing the Self as localized outside the physical body (Tanaka, 2018). Ultimately, traumatic experiences influence the feelings of ownership of the body and the feelings of agency towards such body and actions (Ataria, 2013).

Through a qualitative study, Scheffers and colleagues (2017) specifically examined the bodily experiences of adult women with complex trauma from early childhood abuse. Through self-report questionnaires and scales, women showed severe impairments in body attitude, body satisfaction, and body awareness compared with a non-clinical sample (Scheffers et al., 2017). Another study showed that the body awareness of female victims tends to be suppressed with the violent relationship, and women were suggested to reclaim ‘their female self by reconnecting with the body’ (Wesely et al., 2000, p.211). Conversely, negative feelings, sensations, and emotions, such as anxiety and shame, are commonly reported in the literature regarding the experience of the body victims of IPV (Tani et al., 2016; Thaggard & Montayre, 2019). Those disruptions to embodiment seem to undermine overlapping dimensions of the Self (Chase, 2021). For example, bodily dissociation seems to mediate the relationship between adverse childhood experiences of violence and adult IPV victimization among women (Campagna, 2021; Marmeleira et al., 2023; Widom et al., 2014). Moreover, women with a weaker sense of embodiment seem

to greatly legitimate violations of their body territory (Campagna, 2021), which also supports the hypothesis that disruptions in embodiment in childhood represent a risk factor for suffering IPV in adulthood.

Thus, research has consistently corroborated that violence is destructive of the sense of Self since it disrupts embodiment and causes bodily dissociation. On the other hand, the body itself plays a major role in victims' resistance to IPV in their help-seeking and restoration responses (Machorrinho et al., 2023; Mensch, 2008; Rajah & Osborn, 2022). Nevertheless, it remains unclear whether adult victims of IPV have always felt disconnected from their bodies, to what extent, and how the positive-negative spectrum of their embodiment experiences has influenced their life. Henceforth, it seems essential to explore how women victims of IPV had experienced their bodies throughout life and how those experiences influenced their behavior, health, and well-being.

The present study

Considering the valuable insights provided by qualitative research into the subjective experiences of violence, we used a thematic analysis (Braun & Clarke, 2019) of semi-structured interviews with women victims of IPV, with a twofold aim: to understand i) how women victims of IPV had experienced their bodies throughout life, in matters of bodily sensations, the sensation-emotion relationship, and the meaning of their bodies, and ii) the differences felt within the body after the violent episodes began. Specifically, with the first aim of this study, we intend to reach retrospective memories of the participants about their embodied experiences without focusing on the violence suffered. This qualitative research is drawn on narratives of women victims of IPV about their experiences of embodiment, offering a reflexive thematic analysis of the implicit meanings found, exploring three main research questions:

1. How women victims of IPV experience their bodies in matters of bodily sensations, the sensation-emotion relationship and the meaning of their bodies?
2. What influenced the experience of the body, and how the body has influenced experience, namely the reaction to adversities and healthcare?
3. What differences were felt within the body after the violent episodes began?

Method

Study Design

This study was designed and analyzed fitting within the constructivist-interpretivist paradigm of research (Schwandt, 1994). Semi-structured interviews were used to allow for variability and adaptability of the questions to the returned narratives, in order to increase data depth and richness. Codes and themes were generated from data following a thematic analysis (TA) approach, which was thought to be the most suitable method to search for latent and inferred meaning from each statement (Braun et al., 2018; Braun & Clarke, 2006; Willig, 2008). TA endorses an inextricable dynamic process of developing hypotheses and questions from an existing theoretical background that pertains to each one's interpretations of data and consequent generation of themes (Braun & Clarke, 2019). Therefore, analysis combined an initial inductive (data-driven) approach to generate themes from the latent meaning of codes, with a following deductive (theory-driven) exploration to confront initial themes with our theoretical background.

Participants and procedures

After obtaining approval from the Ethics Committee and the managing entities of two victims' shelters, women victims aged ≥ 18 years and with a history of intimate partner violence were invited to be interviewed. Six female victims of IPV living in the shelter homes participated in the study, with a mean age of 42.5 years (SD=10.9, range 34–53 years), comprising all levels of academic qualification (primary school- high school), and mostly unemployed (83%). For all participants, the violent relationship ended in less than six months. More details about each participant are shown in Table 1.

All participants were informed about the goals of the study and gave their oral and written informed consent prior to participation. Each interview was scheduled by the technical director and was carried out by a trained researcher in a silent room in the shelter. Interviews had a duration of 50 to 80 minutes, with an average interview time of 60 minutes, and were audio-recorded and transcribed verbatim. When conducting the interviews, the researcher took notes about non-verbal expressions (e.g., sounds, silences, facial and corporal movements) and information that could enrich the transcription and subsequent analysis. Interviews were carried out until saturation of data was achieved, considering the sample's heterogeneity regarding identity-based and age-related diversity

of embodied experiences (Braun & Clarke, 2021; Charmaz, 2006).

Table 1
Description of Participants

			Types of violence				Medical diagnosis			
	Age	Kids	Physical	Psychological	Sexual	ACE	Depression	PTSD	SHB	Duration of violence (years)
E1	40	2	yes	yes	yes	yes	yes	no	no	20
E2	41	2	yes	yes	yes	yes	yes	no	no	9
E3	37	2	no	yes	yes	no	yes	no	no	10
E4	34	2	yes	yes	yes	yes	yes	no	yes	14
E5	50	1	yes	yes	yes	yes	yes	yes	yes	25
E6	53	1	yes	yes	no	yes	yes	yes	no	18

Note: ACE, Adverse Childhood Experiences; PTSD, Posttraumatic Stress Disorder; SHB, Self-Harming Behaviors

Semi-structured interview

The main objectives and questions of the interview were developed by four different researchers with expertise in psychomotor approaches, psychology, and comprehensive health research, teaching, and intervention. The final questions were pre-tested in a sample of four other women with a history of IPV. After brief adjustments in the questions to better attend to the research aims, semi-structured interviews were conducted with six women.

The interviews included 15 open questions aligned with the previously defined objectives and the three research questions. In specific, to explore the first research question, was asked, e.g., ‘How does your body's energy vary throughout the day?’, ‘When you try to remember (like now, for example) situations from the past, besides the words we sometimes say, and the images that sometimes come to mind, what kind of sensations do you usually recall? (and where, in the body?)’, or ‘When you look into the mirror, what do you see?’.

To explore the second research question, was asked, e.g. ‘In your daily life, what situations have the strongest influence on your body?’, ‘Across all your life, have you felt that your body has helped you to feel alive? How? Why?’, ‘How do you react when your body is ill?’.

Finally, to explore the third question, it was asked, e.g. ‘Do you feel that at every moment of your life you are or have been entirely within your body?’, or ‘If your body

could talk, what would it say?'.

Ethics

All participants gave their written informed consent. To assure participants' confidentiality and anonymity, we removed all identifying information from the transcripts and referred to participants according to identification codes. These are the codes used in the Findings section to identify the source of quotations. This study was conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014), and received approval from the university's ethics committee, and from the managing entities of each shelter home.

Data Analysis

Data analysis followed the six steps proposed by Braun and Clarke (2006). The first step consisted in becoming familiar with the data. The same researcher conducted the interviews and the analysis. Thus, the researcher had already noticed the major unfolded themes that could be emerging from the dataset. The second step involved generating the initial codes by labeling relevant words and sentences. The initial coding process was run in accordance with the main objectives of the study, following a deductive approach. A second coding process prompted by an inductive approach was also carried out. In the third step, the combination of deductive and inductive approaches allowed for the search for themes and categories. The fourth step, the review of categorization, was carried out on one theme at a time by three independent researchers to guarantee reliability. The fifth and sixth steps were the last definition of themes, categories, and subcategories and report writing. In this study, investigator triangulation was used to minimize bias (Graneheim & Lundman, 2004). To ensure credibility and replicability, a peer review was used in which the fourth author reviewed the data and coding to confirm categories and refined the most accurate labels for the final themes and categories. All data, analysis codes, and research materials are available by emailing the corresponding author. This study's design and its analysis were not pre-registered.

Results

Each participant shared idiosyncratic experiences of their bodies, mostly without mentioning the episodes of violence. Rather, women expressed their bodily experiences

according to when, in their lives, that experiences occurred, mainly comparing "today" with "when I was with him", or with "when I was just a child". Almost 400 units were coded (398). Four themes emerged from the data, covering references to women's experiences of a (1) Living Body, (2) (embodied) Reactions to adversity, the (3) Impact of violence on different dimensions of life and health, and (4) Identity traits and positions.

Living Body. Encompasses different aspects of the bodily experience, including related sensorial, emotional and psychological processes, as well as the mental representation and subjective experience of one's own body.

E3: (…) of trying not to show what I'm feeling. I'm tired. I feel very worn out.

When coding the six interviews of women, the first theme identified was the experiences of the Living body. This theme includes narratives about bodily sensations that women were able to identify, as well as the links of those sensations with particular emotions in critical moments. The semi-structured interviews also allowed the expression of particularities regarding the experience of embodiment of these women.

As detailed in table 2, the theme Living Body encloses references to different categories, such as (a) sensations, (b) sensation-emotion relationship, (c) experience of embodiment, (d) meaning of the body, and (e) factors that have influence in the state of the body, which are described below.

Across the category of body sensations, a spectrum of sensations (from negative – neutral – to positive) was identified and classified as subcategories. The most referenced subcategory was negative sensations. Five of the six participants had references to negative sensations, mostly sensations of pain, fatigue, or discomfort, as illustrated above:

E5: I can sort of feel a weight in my back! It's like if I have walked for miles and miles! And I have a really great weariness over me.

The only participant not mentioning any negative, positive, or neutral sensation (E4), actually made us to consider the subcategory of Unawareness, since she referred:

E4: 'I don't know how to explain', 'I have never thought about that', 'I honestly don't know'

Table 2
Categories and subcategories of the theme I. Living Body

Category	**Subcategory**	**# references**	**# archives**	**%**	**participant (E)**
Sensations (31)	Positive sensations	5	2	1.9	2,3
	Negative sensations	19	5	7.3	1,2,3,5,6
	Neutral sensations	3	2	1.2	1,3
	Unawareness	4	2	1.5	4,6
Sensation-Emotion relationship (70)	Exhaustion	18	6	6.9	1,2,3,4,5,6
	Anxiety	4	3	1.5	2,3,5
	Sadness	6	3	2.3	1,2,3
	Anger	9	2	3.5	2,5
	Shame	2	1	0.8	5
	Missing something	6	2	2.3	2,4
	Other negative emotions	16	6	6.2	1,2,3,4,5,6
	Other positive emotions	9	6	3.5	1,2,3,4,5,6
Experience of Embodiment (76)	Body Image	5	5	1.9	1,3,4,5,6
	Body connection and Comfort	7	3	2.7	2,3,5
	Body discomfort and desire of being different	18	4	6.9	1,4,5,6
	Self-care	11	4	4.2	2,3,5,6
	Sexuality	3	1	1.2	5
	Sense of agency and functionality	10	5	3.9	1,2,3,4,6
	Development of a bodily Self	10	5	3.9	1,2,3,4,5
	Bodily Dissociation and inhabiting the body-as-an-object	12	5	4.6	1,2,4,5,6
Body meaning (18)	For herself	8	4	3.1	2,3,4,5
	For others	10	4	3.9	2,3,5,6
Body influencers (62)	Internal	32	6	12.4	1,2,3,4,5,6
	External	30	6	11.6	1,2,3,4,5,6
total		259	6	100	

The intertwining between sensations and emotions rose as an important and highly mentioned category of the living body theme. Within this category, participants mentioned awareness of the links between some bodily sensations and specific emotions. Subcategories included exhaustion (6.9%), anxiety (1.5%), sadness (2.3%), anger (3.5%), shame (0.8%), missing something (2.3%), other negative emotions (6.2%), and other positive emotions (3.5%). Exhaustion and other negative emotions were the most mentioned subcategories regarding sensation-emotion relationships. In this regard, all six women mentioned feeling tired or exhausted as both a physical and emotional sensation:

E1: Tired. I feel so tired!

The (c) Experience of Embodiment was the most referenced category within the theme of the Living Body. Eight subcategories emerged, and the theoretical background

of Niva Piran served as a rationale for subcategories as, for example, 'body connection and comfort' (iii), but also the respective negative poles of the spectrum 'bodily dissociation and inhabiting the body-as-an-object' (vii), and 'body discomfort and desire of being different' (viii). Overall, from the least referenced to the most referenced, the subcategories are: (i) sexuality (1.2%), (ii) body image (1.9%), (iii) body connection and comfort (2.7%), (iv) Sense of agency and functionality (3.9%), (v) Development of a bodily self (3.9%), (vi) Self-care (4.2%), (vii) Bodily dissociation and inhabiting the body-as-an-object (4.6%), and (viii) Body discomfort and desire to be different (6.9%). The most referenced subcategory, (viii) Body discomfort and desire of being different is well illustrated by participant E6, when asked about what she saw when watching herself in the mirror:

> E6: I see a person that could be better, that could take better care of herself but she is not able to do that because… because she is disgusted by her own body.

Importantly, E6 was a highly depressed, overweight women who repeatedly referred to her desire to change her body through quick and effective plastic surgery, specifically her teeth, belly, and hair. Although she did not have physical scars from the aggressions suffered, she was forced to sleep on the floor for the last 6 years and reported being forced to get pregnant again after the tragic death of her little boy. She blamed that second pregnancy on her being overweight.

This desire to have a different body, reported by most women, might suggest that they do not feel that that body represents who they are or does not belong to them since it was also accompanied by references to being separate from the body. These cues of <u>bodily dissociation</u> thus were categorized, representing the second subcategory most covered within the experience of embodiment category. For example, participant E2 said:

> E2: It's almost as if you live every day as… how can I say… involuntary. You do your things because… actually, you don't even notice what you do. It's unconscious.

Regardless of feeling more or less connected with their own body, women also mentioned what that body means to them. Within the category (d) <u>Meaning of the Body</u>, subcategories distinguish between the meaning of the body (i) for themselves (3.1%) and (ii) for others (3.9%), both having similar coverage. For themselves, participants reported their bodies as representing their home (E2), their vehicle (E2), or as not representing

who they genuinely are (E3, E4). One participant with a history of sexual assaults perpetrated by her father and her ex-husband (E5) also conceived her body as being like a 'bad stepmother', conveying a sense of restriction of freedom, covered in the theme '(embodied) Reactions to adversities'.

When asked what their bodies could represent to others, participants mainly mentioned negative impressions relating to body image (too fat, too small, toothless). However, some of them reported that in the present moment (in comparison with when they were in a violent relationship), they are not concerned with the opinion of others about their bodies, which could reveal a turning point, as illustrated:

E3: In this moment of my life, I don't care too much about what others think or not. I'm past that phase.

Regarding the category endorsing the (e) factors that can influence a women's body's state, participants referred to (i) internal (12.4%) and (ii) external (11.6%) influencers, also with similar coverage across the corpus. On the one hand, internal influencers are mainly the brain (cognition), emotions, illness symptoms, and the quality of sleep, and are mostly valued as negative influences.

E6: With the pain and all that… of course, my body doesn't react at all.

On the other hand, external influencers are mainly the nature, the energy of other people and places, and music, and are mostly characterized as positive influences. Nevertheless, we found negative external influences from medication, the environment, and the lack of time for rest.

***Reaction to Adversities*.** Includes elements of embodied, cognitive, and behavioral reaction towards different kinds of adversity.

E1: I feel like doing it... my mind wants to do it, I feel like doing it, but my body doesn't... it doesn't respond.

The second central theme that emerged from our data accounts for references about different reactions to adversity, once identifying adversities as illnesses, violent episodes, and financial, social, and emotional struggles. As reported in Table 3, three categories were found: (a) Embodied reactions, (b) Role of the body, and (c) Other resources.

The most mentioned types of Embodied reactions were opposition (8.2%) and dissociation (7.1%), followed by fight (4.7%), isolation (4.7%), inertia (3.5%), flight (2.4%), self-harm (2.4%) and avoidance (2.4%). Specifically, opposition reactions were directed to counter illness states or the use of medication, either for physical or mental health diseases. There was only one reference of opposition to the violent relationship:

E5: I've said enough! I put an end to all of this!

The same participant mentioned some flight reactions in two different moments of her life: in childhood, and the present moment while running away from the aggressions of her husband.

Table 3
Categories and subcategories of the theme II. Reaction to adversity

Category	**Subcategory**	**# references**	**# archives**	**%**	**participant (E)**
Embodied (re)actions (30)	Inertia	3	2	3.5	2,6
	Fight	4	3	4.7	2,3,5
	Flight	2	1	2.4	5
	Isolation	4	3	4.7	3,4,5
	Opposition	7	4	8.2	2,3,4,5
	Dissociation	6	4	7.1	1,2,3,4
	Self-harm	2	2	2.4	5,6
	Avoidance	2	1	2.4	3
Role of the body (32)	Body as a facilitator	13	4	15.3	2,3,5,6
	Body as a limitation/ restriction	19	5	22.4	1,2,3,5,6
(other) Resources (23)	Internal	17	5	20.0	2,3,4,5,6
	External	6	3	7.1	2,3,6
total		85	6	100	

The Role of the body in each reaction was mainly classified as being either (i) a facilitator (15.3%) or (ii) a limitation/ restrictive (22.4%). Illustrative of the feeling of the body as restrictive of reactions is for example:

E6: We sometimes get to think about doing something, but then the body doesn't react!

On the other side, some positive references to the role of the body as a facilitator of the reaction to adversities were also stated, mainly referring to feelings of pride and relief when the body allowed them to walk, get up and move on:

E5: At that moment, I get angry, but then I move, I breathe in, I breathe out…. and

then I feel calm again.

In a third category, (c) Other resources to react to adversity were mentioned, including (i) internal resources (20%), such as volition, positive thinking, inner strength, and lack of courage, and (ii) external resources (7.1%) such as family traits, social relationships, and habit changes. As an example of internal resources:

E2: I can't just stand there and let things happen. No. I have to take charge of my life; I do!

***Impact of Violence*.** Includes elements referring to memories, scars, and changes related to or as a consequence of the violent relationship.

E2: He tormented me a lot. Really a lot! And I had to be there pretending everything was fine, with a smile on my face... so the family would see that everything was fine, that we were the perfect family.

Throughout the interview questions, participants made references to the impact of violence in their lives. The dimensions of those impacts were organized in four categories: (a) mental health (44.8%), (b) image and self-care (17.2%), (c) body listening (13.8%) and (d) scars (24.1%) (see table 4).

Mental health seems to be suffering the major impacts, with repercussions on (i) decision-making processes (10.3%), and mostly on (ii) emotional well-being (34.5%):

E3: I lately felt like a rag, like I was there… worse off as an employee.

Yet considering the impact of violence on mental health, symptoms of depression, panic attacks, and obsessive and persecutory sensations were mentioned by four of the six participants. Participants E1, E2 and E3 mentioned negative impacts on their Image and self-care through loss of interest in self-care, only recovered after being supported by the victims' shelter:

E3: I now like more of getting ready. There you go. It was something I noticed that I changed at.

One participant reported an impact on how she listens to her body. She stated that she was living in autopilot mode, and she now wants to 'turn it off' and be vigilant in

every decision she makes for her life:

> E2: I had all my children in my care, and I still had my stepson living with me. I had to pay the bills. I had to pay for everything because he said he didn't get paid. One day, I was working at a restaurant and I feeling really sick… I remember thinking, 'Oh. This is nothing!'. That day I dragged myself to work. Look, I was with intense pneumonia, already spread into both lungs. Today, I can tell you: yes, I do need to work. But I won't get to work again if I'm sick and dying. I won't do that anymore.

Moreover, the fourth category of the impact of violence refers to (d) scars. The scars left by constant violence go beyond the physical body, also 'marking the soul'. The 'traumatized body' influences everything, with…

> E3: Some scars [that] can be seen, and others [that] can only be felt.

Table 4
Categories and subcategories of the theme III. Impact of violence

Category	**Subcategory**	**# references**	**# archives**	**%**	**participant (E)**
On mental health	Emotional wellbeing	10	4	34.5	2,3,5,6
	Decision making	3	2	10.3	2,3
On image and self-care		5	3	17.2	1,2,3
On body listening		4	1	13.8	2
Scars		7	4	24.1	2,3,4,6
total		29	6	100	

Identity. Encompasses elements of participants' personality and how they perceive and define themselves, including dimensions that contribute to their sense of Self and belonging.

> E2: I admire myself for having the courage to leave where I left all by myself and come here alone...

The fourth theme emerged from references to identity (a) traits and (b) positionings. As seen in table 5, positions of (i) affirmation (32.0%), (ii) suppression (28.0%), or (iii) uncertainty (12.0%) about their own personality were mentioned. Although affirmation was the subcategory that covered most of the units, it was only mentioned by participants E2 and E3.

E2: I have always had a very keen sense of justice.

Participants E1 and E5 stated being uncertain about who they are, but most participants referred some tendency to suppress their will and emotions to comply with others. Only eight references to personality traits emerged, with E4 mentioning being mostly (i) rational (4%) in her behavior. Other participants reported being somehow (ii) skeptical (8%) about good things, trying to keep themselves (iii) active (8%), or being (iv) cautious and vigilant (8%) through each day:

E2: If I am now suffering, it's because I messed up in the past. Just that. Thus, nowadays, I am trying, to be connected, to be aware so that it will never happen to me again.

Table 5
Categories and subcategories of the theme IV. Identity

Category	**Subcategory**	**# references**	**# archives**	**%**	**participant (E)**
Positioning	Affirmation	8	2	32.0	2,3
	Suppression	7	4	28.0	2,4,5,6
	Uncertain/ confuse	3	2	12.0	1,5
Traits	Rational	1	1	4.0	4
	Cautious/ vigilant	2	2	8.0	2,3
	Skeptic	2	1	8.0	3
	Active	2	2	8.0	2,3
total		25	6	100	

Discussion

Intimate partner violence is a major social problem, outreaching embodiment features of the victims that remain embedded in their narratives. Besides, it was unclear whether women experienced their bodies differently before the violent relationship. This study aims were to identify i) how women victims of IPV experienced their bodies throughout life and ii) how violence impacted their embodiment experience. Four themes emerged regarding the women's lived experiences of the body, their embodied reactions to adversity, the impact of violence, and identity traits. The narratives of women victims mostly revealed negative body sensations and feelings, the body as restrictive of their volition to react to various adversities, significant impacts of violence on mental health and invisible scars, and a tendency to suppress emotions and desires. These findings will be discussed according to the question of the study they attend to.

The living body and embodied reactions to adversity

Our findings corroborate the research consensus on the high prevalence of negative feelings, sensations, and emotions among women victims of IPV (Tani et al., 2016). Although victims of IPV frequently report anxiety and shame regarding their experience of the body, we found that feelings of exhaustion and emotional sensations of fatigue and discomfort best represent the embodiment experience of the women interviewed (Thaggard & Montayre, 2019). The continuum between comfort and discomfort with the body, identified across our data, is aligned with Niva Piran's theory (2016), which highlights the experience of embodiment as being subject to contextual influences across the lifespan, which can enrich or disrupt the embodied Self (Piran, 2016). Considering the five different bodily processes that oscillate between more negative or positive poles (e.g., connection with the body, sense of agency and functionality, or inhabiting the body as a subject as opposed to an object), the narratives of women victims of IPV were strongly positioned in the negative pole of body discomfort, disconnection from the body and dissociation. It is important to acknowledge that all the participants had a diagnosis of depression, a mental health disorder with an impact on (and impacted by) the experience of the body (Fuchs & Schilme, 2009; Machorrinho et al., 2021b). Phenomenological perspectives on the embodiment in mental health suggest that depressive symptoms are felt as a heavy, slow, and rigid body and that the depressed body stands as an obstacle to the goals one aims to attend (Fuchs & Schlime, 2009). In fact, participants reported that their bodies are mainly felt as a limitation and restriction of their reactions and opposition attitudes. Conversely, some were able to identify situations where the body facilitated such reactions, which left them feeling proud of themselves. This impact of the body state in emotions highlights the importance of bodily affordances for the aftermath of trauma and possible recovery of volition and reaction abilities (Robinson & Thomas, 2021). Our findings also disclose that bodies' possibilities of action (*affordances*) seem parallel to their meanings. Indeed, victims attributed different action-related meanings to their bodies, e.g., a home (which conveys comfort, affect, safety), a vehicle (which allows mobility, independence, the reaching of a destination), or a stepmother (when it is restrictive, a punisher). Some also referred to the body as not representing who they indeed are (as being distant, foreign, or misleading). In summary, the meaning of the body for them is consistent with what that body allows them to do.

Impact of violence

The participants' body was experienced as a battered body, that is, a body challenging to look in the mirror and with scars that cannot be seen, which is in line with a previous study (Freysteinson et al., 2018). The body image distress caused by visible scars of intimate violent assaults has already been shown to be a predictor of posttraumatic stress disorder symptoms, even stronger than the violence intensity itself (Keeling, 2014; Weaver et al., 2007), thus representing one important embodiment-related variable to account for in the care for victims' mental health. Mental disorders represent a 'disturbance of a person's being-in-the-world', which manifest through disruptions of the experience of embodiment (Fuchs & Schlime, 2009, p.573).

As a result of the continuous violence, victims mentioned negative impacts on body image, self-care behaviors, body agency, and awareness of needs. Some also explained how the violence shaped their way of listening to their bodies, referring to a need to keep going while disconnecting from discomfort, illness, or pain sensations to cope with suffering. Traumatic experiences commonly demand such unconscious dissociation from the body's experiences as a way of psychic survival (Payne et al., 2016; van der Kolk, 2015). Interestingly, highly violent assaults or profound states of fatigue seem to function as triggers for the victim to acknowledge those intense negative bodily experiences and prompt a turning point to resist and oppose to the violent relationship (Rajah & Osborn, 2022). In our sample, not only fatigue but also extreme states of illness were mentioned as triggers to resistance, and to changes in behavior and personality.

Identity, or how to stand one's ground

Embodied traits were reported as a part of participants' identity. The tendency to suppress emotions and desires, to hide or get away from people in early childhood, or comply with others' will, was reported as participants' embodied way of being. Importantly, traits like inertia of struggling to fight against adversities have been found in people with PTSD, thus it can be a consequence of this mental disorder, instead of being part of those women's identity (David & Ataria, 2021; van der Kolk, 2015). However, some victims also mentioned intentions and behaviors of affirmation by standing their ground, keep on going, and being 'brave enough' to leave. Participants who reported to be able to affirm their will and opinions also claimed to stand vigilant and

cautious about their present and future directions. This can reveal that caution, vigilance to threats and skepticism are being used as coping mechanisms to maintain the integrity of the Self and strengthen their self-affirmation skills (Harris, 2011).

To summarize, the discourse of women victims of IPV mainly demonstrates negative body sensations and feelings, presents the body as restrictive of the desire to react to various adversities across the lifespan, and reflects a tendency to self-objectification, with a body image defined by being fat, short or ugly. However, narratives also convey that, as they become free from the oppressive opinion of others, such negative body image gets progressively disentangled from the internal representations of their bodily self, giving rise to a willingness to affirm themselves differently. Especially those with stronger self-affirmation traits seem to endorse an attitude of not caring about the external image of the body, almost as expelling the body from the representativeness of their identity.

Limitations and future research considerations

This study has some limitations to be considered. First, almost all the participants had experienced sexual violence, which can exacerbate the negative impacts on embodiment and bodily dissociation. It would be important for future studies to include women without history of sexual abuse. Second, participants were recruited only from shelter homes. Assuming that shelters are one of the various support services available, it can be important that future research focuses on other social and health services.

This qualitative research allowed victims to freely talk about their own bodies, emotions, and desires, without those being attached to the experience of violence, shedding light on the fact that they are more than just victims of IPV. The innovative results highlight the potentialities of qualitative methods for violence, health, and bodily experience research. Henceforth, we hypothesize that exploring retrospective memories of both victims and perpetrators, males and females, without focus on the violence, could help to achieve a more holistic understanding of overall human development and behavior. Furthermore, considering the equally important contributions of quantitative methods for the research on IPV, we suggest that a mixed-methods approach would also add valuable insights to the field.

Clinical implications

Based on the findings of this research, we can suggest the need for body-oriented interventions targeting the negative embodiment experiences of victims of IPV. Thus, to encourage resilient and positive representations of the body, the mind-body approaches, such as psychomotor therapy or body-oriented psychotherapy, can be important for IPV-directed clinical and social interventions (Buckley et al., 2018; Marmeleira et al., 2023). We also encourage a parallel effort of social and healthcare providers to be responsive to the feelings of physical and psychological exhaustion possibly experienced by victims.

The negative representations and meanings of body's positioning in the Self's reactions and affirmations, must also be addressed. For example, research has stated that, in support services, women benefit from being called 'survivors' instead of 'victims', bringing light to the importance of embodying a more positive and empowered self-identification (Dunn, 2005; Hoff, 2016). To attain this goal, the use of counter-narratives in the interventions facilitated in shelter homes has shown promising results (Lafrance & McKenzie-Mohr, 2014; Rass, 2020).

Conclusions

Research has shown us the various impacts of violence on victims' physical and mental health and some embodiment functions. This study provides important insights into how those impacts are experienced by female victims of IPV (e.g., bodily sensations overly felt as negative; the body felt as a restriction when reacting to adversities, even when there is inner strength and volition to resist). Such a subtle and holistic understanding of the victim's lived experiences is pivotal for developing feasible and effective interventions.

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Chapter IV. Development of Feel-Own-Move: a Psychomotor therapy program to restore the embodiment of victims of violence-related trauma

Book chapter 2. Psychomotor intervention in intimate partner violence: empirical support for preventive and therapeutic approaches

Psychomotor intervention in intimate partner violence: empirical support for preventive and therapeutic approaches[6]

José Marmeleira, Joana Machorrinho, Graça Duarte Santos and Guida Veiga (2023)

Abstract

Intimate Partner Violence negatively impacts both the physical and mental health of victims. General impairments include chronic pain, posttraumatic stress, anxiety, depression, sleep disorders, and eating disorders (WHO, 2021). There is growing evidence of the effectiveness of body-oriented interventions on most of those symptoms, namely through the work of interoception, (Weng et al., 2021) bodily awareness (Mehling et al., 2018) or connection to the body (Price, 2007). By promoting awareness of the sensations of the body, and nourishing/ empowering the bridge between sensations, emotions and behavior, Psychomotor therapy (PMT) use afferent information to redefine neural circuits and efferent responses. PMT takes as a starting point the positioning of the body as a safe and owned space for one person to explore and take care of. Even though the therapeutic objectives can be individualized in PMT, it mostly enhances the structuring of a bodily Self, aiming to improve self-regulation, body awareness, and emotional awareness. Research demonstrates that victims of IPV report higher scores on body disownership and bodily dissociation than non-victims (Machorrinho et al., 2021). Also, the extent of the bodily dissociation represents a risk factor for the development of anxiety and depression among victims (Machorrinho et al., 2021). Accordingly, associations between violence and the levels of physical activity of female victims of IPV suggest an important role of movement autonomy on the recovery of trauma (Machorrinho et al., 2022).

Based on the above-mentioned research and rationale, a PMT program was developed, targeting female victims of IPV living in shelters. Following a therapeutic and a preventive purpose, the PMT program comprises a three-step approach. Hence, the psychomotor therapist first (i) promotes awareness and acceptance of sensations, second (ii) promotes the integration of sensations and abilities into the senses of body ownership and agency, and finally (iii) enables opportunities to the participants to explore new ways of moving their bodies.

The central aim of this chapter is to present the theoretical framework of a PMT specially designed for victims of IPV. That framework informs a case study of an adult female victim living in a shelter, which is explored below. The expected outcomes and possibilities for the intervention in both the prevention of IPV and therapy programs for victims are discussed.

***Keywords*:** embodiment, psychomotor therapy, women, trauma.

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[6] Marmeleira, J., Machorrinho, J., Santos, G. & Veiga, G. (2023). Psychomotor intervention in intimate partner violence: Empirical support for preventive and therapeutic approaches. In: *Intimate Partner Violence: Indicators, psychological impact and prevention*. Nova Science Publishers, New York.

Introduction

Intimate partner violence (IPV) refers to any kind of physical, sexual, or emotional act or threat to an intimate partner, and it is mostly inflicted on female victims (Tjaden & Thoennes, 2000). The World Health Organization estimates that nearly 30% of women worldwide suffer from IPV, which is usually detected through social services and police, or by primary health care services due to the physical and mental sequelae (WHO, 2021). Physical injuries, anxiety, depression, and posttraumatic stress disorder are highly prevalent among victims of IPV, and there are also reports of psychosomatic complaints such as chronic pain, gastrointestinal symptoms, asthma, and fibromyalgia (Khurana et al., 2020). Furthermore, prolonged violence impacts the way in which victims experience the world and how they act in it (Machorrinho et al., 2022). Recent findings show that female victims of IPV have a weaker sense of body ownership than non-victims (Machorrinho et al., 2021). This corroborates the idea that victims of IPV tend to not experience their bodies as their own and, simultaneously, act on a daily basis by feeling separate from their bodies, with a consequent impairment on the sense of agency towards their actions (Ataria, 2018).

Although IPV is a complex phenomenon, research has continuously found that suffering and/or witnessing violence during childhood are the most accepted risk factors for being a victim of IPV in adulthood (Sanz-Barbero et al., 2018; Riggs et al., 2000). The hypothesis of augmented risk/ vulnerability being due to early disruptions in one's embodiment through bodily dissociation is discussed in detail in the following sections.

Based on the Embodiment framework, we have organized this chapter around two themes: I) positive embodiment practices as a strategy for the prevention of IPV re-victimization in youths, and II) a psychomotor therapy intervention, specially designed for the recovery of victims of IPV. The presented Psychomotor therapy intervention is enriched by a case study of an adult female victim living in a Portuguese shelter.

Trauma in the body

Intimate Partner Violence is one of the most complex forms of violence. Particularly, physical violence includes aggressive attacks that are frequently inflicted on the head, neck, face, back, and abdomen, resulting in a spectrum of injuries that range from mild bruises to broken bones and traumatic brain injury (Monahan, 2019; Wu et al., 2010). Some of the short-term outcomes of these injuries include balance issues, headache,

memory and concentration difficulties, and lethargy, which make the victim even more vulnerable to new attacks (Monahan, 2019). In addition, aggressive attacks are often followed by medical care deprivation or even blaming the victim for the aggression, which worsens the recovery of the body and also the victim's cognitive response.

In most reports, victims face diverse types of physical, sexual, economic, and psychological violence, the latter being present in almost every case (Thompson et al., 2006). Coercive behaviors toward the victim make them hide the aggressions, the oppressions, and the limitations inflicted on them daily. Psychological aggression aims at diminishing the victims' strength, autonomy, and their will to fight or flee, and can include humiliation and isolation from friends, family, and possible help providers (Krebs et al., 2011). Even in the absence of physical violence, psychological violence by itself is associated with adverse health outcomes, such as chronic pain, migraines, chronic pelvic pain, stomach ulcers, and frequent indigestion or constipation, which corroborates the findings that physical and mental health are intrinsically connected (Coker et al., 2000).

Overall, there is strong evidence that the identity structure of women victims of IPV is somehow altered (Bakaitytė et al., 2022). Survivors end up being trapped in symptoms of depression, anxiety, and PTSD, low self-esteem and feelings of shame, insecurity, and self-blame for the aggressions (Bakaitytė et al., 2022; Loke et al., 2012; Pereira et al., 2020). The sense of self of the victim is strongly affected by the continued denial of women's value and "disassembling" of identities (Bakaitytė et al., 2022). Adding to this, the physical and psychological mechanisms of violence compromise the freedom to move, to make decisions, and to relate and communicate with others, impoverish the senses of body ownership (BO) and body agency (BA), which play a pivotal role on constant identity structuring (Braun et al., 2018; David & Ataria, 2021; Machorrinho et al., 2022). By diminishing the possibilities to feel bodily sensations, integrate them, and act from the body, IPV undermines the victims' cycle of bodily identity development (Machorrinho et al., 2022). Hence, victims end up feeling separate from their bodies (bodily dissociation), with low awareness of internal bodily sensations (interoception), and disrupted feelings of agency towards their own actions.

Risk factors for IPV victimization

Research on factors that correlate with IPV perpetration is becoming increasingly

clear. However, factors that correlate with IPV victimization are still understudied and difficult to establish (Sanz-Barbero et al., 2018; Riggs et al., 2000). The most common factor is past victimization during childhood. According to Riggs and colleagues (2000), the fact that a woman suffered or witnessed family violence in childhood is a risk marker for her being a victim of IPV when adult, especially if associated with a "perceived legitimacy of violence in family relationships" (Riggs et al., 2000, p.1299). Legitimizing violence is socially learned and is one of the most dangerous factors since it grows within the identity structure of either the victim or the perpetrator. In fact, being a victim of child abuse, or having previously experienced IPV-related injuries, emotional abuse victimization and perpetration, self-harming behaviors, or PTSD, were recently suggested as risk markers for being a victim of IPV in adulthood (Spencer et al., 2019). From an ecological perspective, these microsystem factors seem to be the strongest risk markers for IPV victimization (Spencer et al., 2019).

Bioecological systems theory posits that the body is also a part of the microsystem since it supports life, mobility, and perception of and interaction with the environment (Paquette & Ryan, 2001). Reciprocal interactions between the individual's own biology and the environment shape the development of each involved feature (Bronfenbrenner and Morris, 1998). As an example, recent biomarkers research found associations between adverse childhood experiences and the levels of C-Reactive Protein (a biological marker of inflammatory levels) and the body mass index of 10-year-old children, unveiling one possible mechanism for the biological embodiment of adverse experiences (Soares et al., 2022). Witnessing interparental violence is also related to children's reduced performance on emotion regulation tasks, which is mediated by their "physiological (dys)regulation of the vagal tone" (McCoy, 2013, p.258). Interestingly, the level of physiological reactivity to stress during childhood is emerging as a mediation factor of both the resilience to a violent context and the negative outcomes related to that stress exposure (McCoy, 2013). Regarding adult women who develop trauma-related dissociative disorders, research has found high cortisol secretion in women without other mental health disorders, but a somehow blunted stress system in those with PTSD (Boulet et al., 2021). In fact, high levels of bodily dissociation were recently found to be a risk factor for the development of mental health disorders among victims of IPV (Machorrinho et al., 2021).

The concept of bodily dissociation is characterized by feeling separate from the body

and it translates into attitudes of avoidance of internal sensations and experiences, and difficulty identifying and expressing emotions (Price & Thompson, 2007; Price et al., 2017). Moreover, dissociation emerges as a defense mechanism to protect the identity and the bodily self from violence and serves to cope with physical pain and trauma (Price, 2007). Paradoxically, dissociation seems to facilitate self-harm and suicidal behaviors, which arise from two possible paths: a) to regain control over the body, exacerbating sensations and emotions (anti-dissociation); or b) to reject one's feelings (dissociation-inducing) (Polskaya & Melnikova, 2020; Shelef, Levi-Belz & Fruchter, 2014).

In summary, the newest directions of research point to an emotional and physical numbing provoked by either dissociation or body disownership, which impairs the recovery of the victim and his/her posttraumatic growth (Bakaitytè et al., 2022; Riggs et al., 2000; Ataria, 2018). Supported in recent empirical studies (Bakaitytè et al., 2022; Campagna, 2021; Schmitz et al., 2021; Ataria & Gallagher, 2015; Machorrinho et al., 2022), we argue that bodily dissociation, body disownership, low self-esteem, and other forms of disembodiment in youths, represent a risk factor for re-victimization, either through i) doubt of one's self-value and consequent legitimization/ acceptance of violence, or through ii) physical and psychological weakening and consequent vulnerability to new aggressions and struggles on leaving a violent relationship.

How can positive embodiment be a preventive strategy against IPV?

There is consensus that most of the adult victims of IPV have suffered or witnessed domestic violence during childhood. Early traumatic violence undermines one's emotional, cognitive, and movement patterns, giving rise to defense responses which, when maintained, translate into maladaptive habits of threats' perception and defensive behaviors (Buckley et al., 2018; van der Kolk, 2015; Payne et al., 2015). One of those maladaptive consequences is bodily dissociation, which, as detailed in the previous sections, is related with the development of mental health disorders, and disruptions on emotion regulation, body ownership, and body agency. Considering this, we aim to suggest that promoting restorative, resilient, positive embodiment practices among children and adolescents at risk, could help them overcome the consequences of early trauma, decrease the risk of dissociative disorders, and prevent future victimizations from IPV. In line with this suggestion, promising concepts have recently emerged.

Through the Developmental Theory of Embodiment, Niva Piran (2016, 2017) establishes five developmental dimensions through which embodiment expands into a positive-negative spectrum of possibilities. 'Body connection and comfort,' 'agency and functionality,' 'experience and expression of desire,' 'engagement in attuned self-care practices,' and 'resistance to self-objectification' seem to be representative markers for the development of either positive or negative embodiment experiences among women (Piran, 2016), and can be measured in order to define the areas to attend to when working towards the restoration of embodiment among young girls (Campagna, 2021). Overall, practicing each one of these dimensions of positive embodiment brings benefits to women's health, and was recently found to be a protective factor against the impact of social media on body dissatisfaction (Piran, 2016; Munroe, 2022; Campagna, 2021). Women with weaker embodiment levels were more prone to describe the female body as "deficient" and to view their own bodies with an "objectifying lens" (Campagna, 2021, p.105). Upon these results, the authors shed light on the extent to which women with weaker embodiment legitimate and experience violations of the body territory (Campagna, 2021).

In a parallel research effort, the concept of Embodied Resilience has emerged (Buckley et al., 2018). Based on the assumption that resilience can be learned, Buckley, Punkanen, and Ogden (2018) propose actions of boundary-setting, activities to feel grounded and to develop a flexible strong core, as well as the promotion of body awareness and self-regulation skills, as valuable body-related resources to allocate when the aim is to increase resilience among children and adolescents in risky violent contexts. In this regard, the authors Cook-Cottone and Guyker (2018) have been claiming that also mindful self-care practices (e.g., mindful awareness and relaxation, self-soothing, nutrition, exercise, rest, self-compassion, and supportive relationships) can further represent a protective factor against the onset of symptoms of mental illness in both youths and adults, and consequently prevent and decrease job/school burnout (Cook-Cottone & Guyker, 2018).

To strengthen or restore the sense of safety within the body, and consequently promote trust in bodily sensations and engagement in attuned self-care behaviors, thus seems to be a promising strategy to foster positive embodiment as a protective factor against IPV victimization or re-victimization in youth.

Implications to practice

Implementing positive embodiment practices for children living in a domestic violence environment can add promising value to the existing secondary prevention activities, such as peer-based programs for relationship skills training and education to healthy intimate relationships in schools (Coker, 2004). To make this possible, not only prevention programs would have to be empirically studied, but also embodiment-related assessment tools would have to be validated with youth populations. The screening of embodiment practices of those at-risk could enrich the conceptual frameworks used in educational, social, and clinical practices, and strongly facilitate preventive strategies.

Although various embodiment questionnaires are already available for adult populations (e.g., the Experiences of Embodiment Scale (EES; Piran et al., 2020), the Scale of Body Connection (Price et al., 2017), or the Mindful Self-Care Scale (MSCS; Cook-Cottone & Guyker, 2018)), the operationalization of assessment tools for children and adolescents is an urgent need (Guest et al., 2022). As far as we know, only the Objectified Body Consciousness Scale-Youth (Lindberg et al., 2006) and the Rubber Hand Illusion for children (Cowie et al., 2016) were validated, the latter being difficult to implement in either clinical or educational settings. Adding to this, the inclusion of body-oriented and trauma-informed professionals in educational, social, and medical services is a must-have resource for the assessment of embodiment-related abilities.

In this regard, it feels legitimate to aim for every child to be assessed for "how much" they posit a positive embodiment and that they all have access to embodied resilience tools, given the fact that violence is a widespread, complex, and not completely predictable phenomenon.

Psychomotor therapy Program for adult victims of IPV

Research on a focus group of women who left abusive relationships found that learning about themselves, "loving themselves", and considering their own needs were major important factors that enabled them to leave and end the violence, which, we highlight, were "points of view that were previously unfamiliar" to them (Short et al., 2000). In this regard, it is important to acknowledge the benefits of integrating activities of mindful self-care and embodied awareness into the social and health services that women attend, whether they are at risk or have already engaged in a violent relationship.

Intervention with victims of IPV is, naturally, an intervention on trauma. Trauma involves sensorial and emotional perception and processing, and can assume complex dissociative forms. Disembodiment, poor physical and mental health, and psychosomatic complaints are frequent among victims of IPV. It is thus increasingly accepted that the body must be at the core of any holistic therapeutic intervention with this traumatized population (van der Kolk, 2015; Levine, 2010; Ogden et al., 2006). For example, Pesso-Boyden Psychomotor System is a body-based psychotherapy specifically designed for adults with trauma, which requires the treatment to be both experiential and cognitive, embodied and minded, combining bottom-up and top-down influences (Baylin & Winnette, 2017; Slaninová & Pidimová, 2014).

Psychomotor Therapy (PMT) is a holistic body-based intervention that is broadly used in both preventive and therapeutic contexts, and aims for the integration of bodily sensations and representations into the bodily self. PMT involves the comprehension of the complexity of different bodily features, namely the real body, the imaginary body, the functional body, the anatomical body, and the representational body (Fernandes et al., 2022; Potel, 2019). Through body, movement, and expressive activities, PMT sessions promote the awareness of interoceptive, proprioceptive, and exteroceptive sensations, focusing the bridge between sensations, emotions, and behavior. Distinctively, the PMT therapist is not focused on the resolution of disrupted behaviors as a primary goal. Instead, he/she works at the expression of anguishes embedded in the body, in movements, gestures, and postures, allowing for its awareness and restoration into one's internal representations of the Self, the others, and the world.

Therefore, PMT is a particularly important approach to work with trauma and IPV. To achieve its goals, PMT employs two parallel mechanisms: i) promotes emotional and symbolization abilities arousing from bodily experiences, and ii) facilitates the acquisition of new postures and movement patterns via the relational and emotional bodily sensations (Fernandes, 2015; Probst et al., 2010). Specifically, in regard to victims of IPV, PMT's main therapeutic objectives are to enhance the structuring of a bodily Self and the integration of the senses of body ownership (BO) and body agency (BA), while aiming to improve self-regulation, body awareness, emotional awareness, and voluntary relaxation. In summary, the psychomotor therapist aims to enrich the interactions between one's relationship with the body, and the body functionality itself (Fernandes et al., 2022).

A three-step approach to reconnect with the traumatized body

PMT makes use of bodily techniques that allow the person to improve physical activity, functionality, physical and behavioral flexibility, emotion regulation, psycho-motor integration, and psychosomatic relaxation. Based on current PMT approaches, and aligned with other therapeutic approaches to trauma, we have structured a three-step PMT for work with victims of IPV. This constitutes the rationale for a PMT program of 8 weeks, specially designed for shelters and support centers for female victims of IPV.

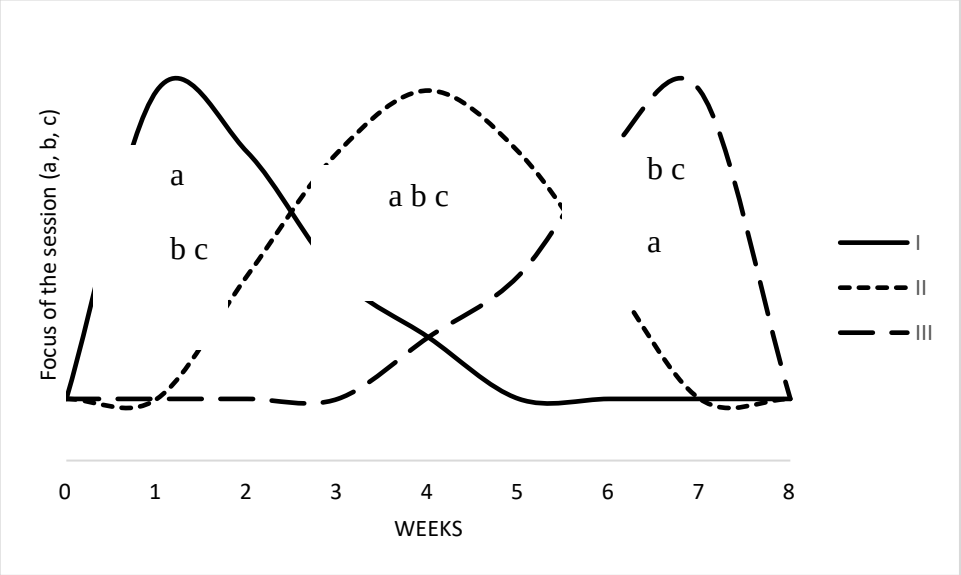

Figure 1.
Psychomotor Therapy (PMT) program objectives and activities rationale.
Over the PMT program, victims of IPV progressively experience (I) awareness and acceptance of bodily sensations, (II) integration of those sensations into the senses of body ownership and body agency, and the (III) exploration of new possibilities of movement and action. The focus given to each type of exercise varies across the three phases: (a) cardiovascular activation and strength, (b) body awareness, or (c) relaxation and self-expression, although they are all present in every therapy session.

The three steps refer to different therapeutic objectives, which are all present over the intervention, but the focus given to each one varies across the intervention phases (see figure 1). In this way, the first phase of the PMT program will focus on (I) awareness and acceptance of bodily sensations, the second one on (II) integration of bodily sensations into the senses of body ownership and body agency, and the final phase will focus on the (III) exploration of new possibilities of feeling, owning, and acting.

I. Awareness and acceptance of bodily sensations

It is through the body that we get and create information about ourselves and others

(Louková & Hátlová, 2015). Sensations, representations, touch, and voice, integrate into each one of the body systems, in a developmental and situational way (Lesage, 2015). Although this integration mostly occurs in the unconscious arena, being able to posit an intentional focus on bodily sensations has been strongly associated with better health, resilience, and better treatment outcomes (Price et al., 2020; Mehling et al., 2009; Landsman-Dijkstra et al., 2004). Body awareness is "the subjective, phenomenological aspect of proprioception and interoception that enters conscious awareness," and is broadly used among body-mind therapies to enhance an embodied self in (inter)action with the environment and with the world (Mehling et al., 2011, p.1). Improved stability, balance, grounding, and relaxation are important mediators of one's acceptance (Gyllensten et al., 2019).

In the realms of IPV, body awareness gains an outstanding complexity, either in the perception of internal sensations of the body or in the non-judgmental acceptance of those sensations. In fact, Caldwell claims that embodied oppression can be expressed as "judging, misinterpreting or suppressing interoceptive signals" (Caldwell, 2018). Interoception refers to the ability to perceive and experience internal visceral sensations, such as heart beating, respiratory frequency, resistance, and load, or gastric load, and is an intrinsic way of body awareness and self-knowledge (Tsakiris & Critchley, 2016; Craig, 2002). Disruptive interoceptive and proprioceptive awareness directly influence patterns of breathing and moving, such that we often find trauma clients with erratic patterns of breathing (shallow or chronically restricted), and walking, standing, or moving (high muscular tension, protective postures) (Cook-Cottone et al., 2017). Chronic tension in movement, postures, and breathing has a strong negative impact on various health dimensions and impairs quality of life. Also, not being able to breathe freely, is an indicator that the body is still feeling unsafe, and thus the therapeutic work won't be fruitful. In this sense, using breathing techniques, stabilizing/ focusing on a certain part of the body, reconnecting with the sound of the therapist's voice, or orienting attention to the environment, can be valuable bodily tools for the client to ground herself/ himself and progressively build in embodied safety (Estey et al., 2021). Overall, paying conscious attention to body signals and becoming attuned with the bodily self is thought of as the starting point to being able to move freely and claim ownership and agency of one's body (Caldwell, 2018; Cook-Cottone et al., 2017; Erickson, 2021).

Although, for some, the body is so "shut down" that simply asking them to pay

attention to the body will be answered with 'I can't feel anything'. We propose the use of cardiovascular and strength exercises to activate internal sensations and facilitate the initial body awareness of clients with trauma (Probst et al., 2010; MacLaren, 2016; Lang, 2017). Importantly though, this exercise must first be delivered with a recreational and joyful focus, as a path to find pleasure in movement and vitality, as opposed to either a therapeutical/ catharsis method or a bodybuilding/ body-changing perspective. Excessively difficult exercise (if delivered with a bodybuilding or body-changing objective) could activate defense mechanisms (Louková & Hátlová, 2015). Defensive mechanisms could also be triggered if movement and body awareness were immediately introduced with a deep therapeutic purpose. To overcome these challenges, activities must promote an attuned exercise approach: process-oriented (as opposed to outcome-oriented); adequate level of difficulty; safe and joyful (Calogero et al., 2019; Louková & Hátlová, 2015). We add that the main objectives of exercise practices in an initial phase of PMT with victims of IPV should be:

- short-term (in therapy): to activate movement; to regain pleasure in physical activity; to increase vitality and strength.
- long-term (beyond therapy): to establish regular physical activity as a tool to accomplish mental and physical health.

To cultivate attuned exercise and joyful physical activity, would not only be a facilitation strategy for the bodywork of PMT, but would also allow the victim to build up an internal resource of presence, self-care, and vitality.

II. Integration of sensations and abilities into the senses of body ownership and agency

Feeling the body, becoming aware of its resistance, strength, and flexibility, and of its patterns of heart rate and breathing, will awaken the awareness of what one can and can't do and, therefore, of what one could do differently. When physical activity reaches its goal of enhancing mobility and strength, feelings of vitality arise, and a pathway to well-being is opened up. A phenomenological approach to sport developed upon vitality in terms of the quality of one's movement – which "facilitates engagement with individuals, spaces and moods" – and of the "peaceful dimension of vitality," which brings acceptance of present and future experiences (Mayoh et al., 2020, p.175).

Moreover, research shows that physical activity facilitates the empowerment of women, by providing them with both a sense of ownership, I am my body, and agency, My body can (Mayoh et al., 2020; Machorrinho et al., 2022).

The aim of the second phase of PMT with victims of IPV should then be for the victim to reclaim ownership over this process of empowerment and of identity (re)structure. Indeed, identity is a bodily phenomenon of feeling and moving, where paying mindful attention to internal, sensory-emotional states during either movement or stillness, progressively brings a sense of coherence and authentic behavior (Erickson, 2021; Cook-Cottone et al., 2017). This relationship takes place within the sensorimotor loop of the nervous system: during a certain action, the bottom-up information (interoceptive and proprioceptive) that is derived from bodily sensations and movement is compared with previous experiences and expectations, creating additional sensory feedback that informs us about "coherence and alignment between one's feelings and actions" (Erickson, 2021, p. 206).

In this sense, a slow and progressive integration of bodily sensations and abilities into the senses of body ownership and agency can arise through activities that reinforce the body-mind connection. Activities of self-regulation, self-grounding, and decision-making (specifically about movements, daily self-care, postures, or actions) might be helpful (Cook-Cottone et al., 2017; Kirmayer & Gómez-Carrillo, 2019). The bodily sensations and the emotions that arise from these sensations must be acknowledged to guide behavior. Body schema exercises are often used in PMT with that purpose, but also to counteract the segmentation of the body and promote its wholeness (Louková & Hátlová, 2015; Giromini, 2003). In fact, PMT theorists have put special focus on body schema, recently considering that proprioception, peripheric vision, and the vestibular system play the major influences on body schema development, but also the recently found construct of peripersonal space (recently found to be vulnerable in trauma-related symptoms (Rabellino et al., 2020; Pireyre, 2021).

To summarize, in the second phase of PMT with victims of IPV, it is important to integrate bodily sensations and abilities into the restoration of feelings of body ownership and agency, which can be accomplished through activities of positive embodiment, attuned and mindful self-care, body image, and body schema restoration, awareness of the sensation-emotion interplay, and of identity expression through the body in relation.

III. Exploration of new possibilities of movement and action

Following the first two steps of PMT, the victim of IPV will hopefully start to experience residual changes in movements, posture, and breathing patterns. The perception of those changes can alter victims' understanding of themselves, as well as their "ways of acting and interacting with others" (Ekerholt & Bergland, 2021, p.3). In this stage, it is important to note that even negative narratives about the body are known to restrict the exploration of movements, sensations, and actions (Osborn & Rajah, 2020). Positive counternarratives thus need to be addressed in PMT to unlock the freedom of moving and feeling the body in different ways. Adding to this, using a neurophysiological approach, the authors Peter Payne, Peter Levine, and Mardi Crane-Godreau (2015) defined the Somatic Experiencing trauma therapy, based on the assumption that trauma leaves the victim with a blocked motor defensive impulse, and dysregulated interoceptive and proprioceptive sensations, within the hyper-arousal state of the autonomic nervous system. In therapy, the authors recommend the use of imagery techniques and subtle, different movements to unlock and complete the motor impulse related to the traumatic memory (Payne et al., 2015). Increasing research points to the use of movement imagery to assist practices of movement and performance exploration, but also to the client to autonomously rebuild their body containment (Chang & Leventhal, 2008; MacLaren, 2016; Fuller, 2019). In fact, while the top-down cognitive processing, mainly responsible for our decision-making, relies on body schema and existing internal representations, the embodied bottom-up processing allows for a refreshing of that body schema, giving rise to new perspectives of reality and, ultimately, of one's own identity (Siegel, 2017).

Erickson has recently released an interesting update to the model of Embodied Identity Development for work with victims of interpersonal violence (Erickson, 2021). The author suggests that therapists explore movements that enclose behavioral and relational intentions, in order to promote a repatterning of those movements. In particular, to work on the sequence, content, and value of yielding, pushing, reaching, grasping, and pulling, as movements that represent the search for safety, contact with others, realization, and independency (Erickson, 2021). Completing and repatterning that cycle of movements might allow the victim to "meet their essential needs" and "expand abilities in sensing, moving, and experiencing an embodied sense of self" (Erickson, 2021, p.207).

Beyond PMT, the exploration of an embodied identity must be encouraged on a long-

term perspective. Addressing practices of physical activity, gymnastics, dance, yoga, and other body-mind activities that enable one's development, maintenance, and/ or actualization of the body in movement should be part of the everyday life of anyone who is in the aftermath of violence and trauma (Paulson & Greenleaf, 2022; Machorrinho et al., 2023).

A case-study

Elizabeth is a 48 year-old woman, who came to the shelter with her young daughter to protect themselves from the continuous violent attacks from her husband. In the first appointment, Elizabeth informed the psychomotor therapist she had suffered physical, psychological, sexual, and economic violence, not only from her second husband, but also during childhood and adolescence. She introduced herself as someone who used to practice Reiki and knew that her body had been neglected for too long. Elizabeth was walking heavily, carrying a smile on her face, which was not in accordance with her watery eyes. Her shoulders prostrated timidly every time she had to answer something, looking like a shy young girl. Initial assessments revealed that although she did not have intense PTSD symptoms and tried to follow self-care practices, Elizabeth was highly dissociated from her body, and was not capable of feeling any heartbeat (interoception) or even to imagine herself doing a certain movement (especially in a third-person perspective as if she was watching herself in the mirror). In the course of the first sessions, Elizabeth was always strict to the therapy schedule, waiting outside at least half an hour before the session. It was also clear that she was in need of a therapeutic space, given the way that she kept her daughter distant from the therapy room.

Evolution on phase 1. "I can't feel anything"

From the first session, Elizabeth easily acknowledged that she had "tension in every muscle" that she was aware of, and complained of constant pain in her shoulders, back, and feet, but only if she touched them. Otherwise, she couldn't "feel anything". At the same time, she started a new job in a nursing home, where she had to carry out repetitive heavy tasks for extended periods of time, without any care to prevent injuries or reduce physical effort. Yet, her determination and commitment to therapy and to the initial strength and resistance exercises were remarkable. Across sessions, the therapist noticed that Elizabeth seemed worried every time she asked her to walk around the room and just

feel the soles of her feet on the floor… Until she finally confessed: “But I can’t feel anything.” Following that, they sat on the floor, balancing the body, stretching the legs, and massaging each foot slowly, carefully, and with a mindful touch. With one hand pressing the foot, and the other hand resting on the chest, feeling the breath, and visualizing that the air breath-in reached as far as the foot. The unification of the different body parts into a whole body schema was fundamental to her awareness of interoceptive and proprioceptive sensations. With that in mind, Jacobson’s Progressive Relaxation technique was facilitated at the end of each session, until Elizabeth found that giving focused attention to a certain body part immediately elicited involuntary micromovements in that same part…, particularly in the feet.

Evolution on phase 2. “I used to avoid doing that”

The realization of the impact of conscious attention on her movements made Elizabeth feel increasing frustration during therapy. However, that same frustration was a catalyst for her to reveal important details of her victimization. When asked to climb on a chair, to do an initial exercise of strength, balance, and trust, Elizabeth had a hard time, trembling, and struggling to get over all the fear she had.

“When I was a kid, I used to climb trees and ride a bike. Then I learned to ride a motorcycle and wasn’t afraid of anything. Actually, that was my only freedom. Some years ago, I started to be afraid of heights, had panic attacks every time I had to drive through one bridge, and even passed out at home one day when I needed to climb on a ladder! I feel frustrated because I don’t know why that happened to me! I want to be able to do all of that, but my body doesn’t respond!”

That statement became clearer in the following sessions. In exercises of coordination, rhythmic movement, laterality, and body awareness (aiming to improve body schema and the senses of body ownership and agency), Elizabeth’s body responded in a robotic, heavy, and seemingly painful way. It was heart-rending to see her immense effort to move “just one shoulder” or coordinate her right leg and left leg into one simple rhythm. “If I look at my legs, I immediately stop being able to move them. It feels as if they don’t want me to see them!”, she said.

Watching Elizabeth persistently massaging/ squeezing her own legs and arms to

move them as she wanted to… just as if, in that moment of inward awareness, her body just transformed into a puppet… was definitely one of the most challenging moments of this therapy. Just as, in phase 1, the psychomotor therapist opted for adjusting the level of difficulty of activation tasks and increasing the detailed descriptions and labeling of each body part, here she proceeded with smaller and smaller distinctions between movements, orientations, and positions. For example, instead of trying to coordinate legs and feet, the therapist asked her to softly try to move one toe at a time. Patiently, Elizabeth started to regain partial control over her body and the pride was evident in her eyes.

Evolution on phase 3. Stretch, relax, and express yourself

Along with the functionality and body agency evolutions, an interest in self-care and self-expression was reviving. Not surprisingly, her self-expression betrayed the physical violence that she had suffered from her own mother, which started early in her childhood. As a child, Elizabeth went hungry, worked hard to buy food for her mother, and even spent several nights in a degraded house, sleeping on the floor close to rats…

Finding inner peace was Elizabeth's new life goal, which she brought to the therapy: in every session, despite the persistent struggles, Elizabeth seemed more peaceful in searching for her heartbeat, for plantar sensations, or for trying out a usual action in a different manner. When the psychomotor therapist asked about the tension and pain that she reported at the beginning of the therapy…

"Now I find myself stretching at the corridors of my workplace. I can acknowledge when my muscles are getting tense and in pain, and… I don't care what other people think. I just move, stretch, and even dance if I want to!"

Fight – was the final word chosen by Elizabeth to define her therapeutic journey.

Presence, time, and space in Psychomotor Therapy: a safety plan for the body

Body-Self is a unique entity: always relational, embodied in memories of the past, sensations of the present, and hopes about the future. Since trauma memories can be triggered by any unpredictable sensory or relational input (immediately activating the sympathetic nervous system and defensive responses), any intervention must have as its primary aim the restoration of the victim's sense of safety within her body, and in the spatial and relational environment of the therapy (Baylin & Winnette, 2017). In fact, the

constant vigilance of women victims toward their personal safety restricts their movement and represents an obstacle to positive embodiment (Calogero et al., 2019). However, it should be acknowledged that the introduction of any bodywork with persons with trauma might trigger a "phobia about the body," based on physical and attachment traumas, that challenge the therapeutic relationship (Punkanen & Buckley, 2021). It is important to overcome this challenge, knowing that one's experience of safety is bodily based, and the use of body interoceptive and proprioceptive sensations to ground feelings of safety seem to bring paramount benefits to the embodiment work with victims of IPV (Punkanen & Buckley, 2021; van der Kolk, 2015; Westin, 2022).

Psychomotor therapy sessions promote a reassuring space that conveys comfort, privacy, and a space of freedom for the person to move, act, and express herself. Apart from the physical conditioning of each clinical or social space, the place where PMT occurs has to be imbued with a trustworthy atmosphere, which is often built upon i) a relational empathy and responsiveness by the therapist, ii) spatial affordances to self-expression, movement and relaxation, and iii) a well-defined and informed intervention timeline (sessions length and frequency). These three components of PMT allow for the safe awareness and acceptance of bodily sensations, the safe integration and structuring of the senses of body ownership and agency, and the free and also safe exploration of new possibilities of being and acting in the world (Machorrinho et al., 2022).

Concluding remarks

The revised knowledge supports Psychomotor therapy as an embodiment practice important for the prevention of IPV victimization and the treatment of IPV outcomes on victims. We reflect upon the important contribution of Psychomotor Therapy to the attention to victims of IPV, supporting the development of a PMT program, already administrated to a sample of female victims living in shelter homes. PMT features form a safety plan for the body of the victim, and a three-step approach aims at the integration of bodily sensations into the senses of body ownership and agency, as a way to facilitate the discovery of new possibilities in moving, acting, and being in the world. A case study of the therapeutic journey of a female victim was detailed to enrich the theoretical rationale of PMT in IPV.

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Chapter V. Feasibility and effects of Feel-Own-Move on health and embodiment-related variables of female victims of IPV

Article 5. Feel-own-move: a psychomotor therapy program for victims of intimate partner violence living in shelter homes. Feasibility and effects on mental health, dissociation, and quality of life

Feel-own-move: a psychomotor therapy program for victims of intimate partner violence living in shelter homes. Feasibility and effects on mental health, dissociation, and quality of life[7]

Joana Machorrinho, José Marmeleira, Guida Veiga, and Graça Duarte Santos (2023)

Abstract

Intimate partner violence (IPV) is a worldwide concern, impacting victims' mental health, physical health, and quality of life. High rates of posttraumatic stress disorder (PTSD), depression, anxiety, bodily dissociation, and somatic symptoms have been found in victims of IPV, with an important impact on the chronicity of impairments and on the outcomes of psychological interventions. Therapeutic interventions available in shelter homes for victims are scarce in addressing their body-mind needs therefore asking for better empirical research. Thus, the aim of this study was to evaluate the feasibility and effects of Feel-Own-Move (FOM), an 8-week psychomotor therapy program for victims of IPV, on their mental health, levels of bodily dissociation, and general quality of life. A within-subject repeated measures design was used to evaluate the intervention effects, and feasibility results were analyzed. Seventeen women completed the program (mean age 42.8 years, range 21-64). Results showed a significant decrease in levels of bodily dissociation, with FOM having a large effect size. The intervention also had a large effect size at increasing the environment domain of quality of life, although no statistically significant differences were found. FOM ended with excellent rates of reach, adherence, acceptability, and satisfaction. A positive retention rate was also found. In conclusion, FOM seems to be a feasible psychomotor therapy intervention for female victims of IPV living in shelters. Importantly, this program showed to be effective in reducing bodily dissociation among participants, which is suggested to prospectively contribute to their mental health and quality of life.

***Keywords**:* psychomotor therapy, intimate partner violence, women, health, quality of life, bodily dissociation, intervention.

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Introduction

Intimate partner violence (IPV) refers to any physical, psychological, sexual or economic act of violence perpetrated to a victim in the context of an intimate relationship (World Health Organization, 2021; Fonagy, 1999). IPV is a widespread social concern that affects about one-third of women worldwide (WHO, 2021). Victims extensively report symptoms of anxiety, depression, posttraumatic stress (PTSD), and altered patterns of sleep and eating (Lagdon, 2014). Research has also found a high prevalence of reported pain, neuromuscular, and gastrointestinal symptoms, which were associated with the severity of symptoms of PTSD and depression, and with health-related quality of life (Kelly, 2010).

Mental health, physical health, and behavior are intertwined. Some of the internal processes necessary for self-regulation, knowledge, and self-growth, rely on information arouse from the psychophysical awareness, namely the awareness of bodily sensations and the connection to the body (Price, 2007). Aligned with this, an alarming prevalence of self-injury and suicidal behaviors, along with symptoms of body disownership (the sense of not owning one's body (Ataria, 2018)) and bodily dissociation (the feeling of being separate from one's body and emotions; an "avoidance of internal experience" (Price, 2007)) have been found among victims of IPV (Machorrinho et al., 2021a; Machorrinho et al., 2021b). Importantly, body disownership and bodily dissociation have been pointed out as responsible for the development of PTSD symptoms, the restriction of treatment outcomes, and the prognoses of IPV victims (Tschoeke, 2019; Ataria, 2018). Bodily dissociation can include difficulty with the identification and expression of emotions, and also represents a risk factor for the development of anxiety and depression symptoms in female victims of IPV (Machorrinho et al., 2021b). Dissociation often emerges as a defense psychological mechanism, to protect the bodily self and to cope with pain and trauma (Price, 2007). It has a particularly higher prevalence among victims of physical and sexual IPV, for whom it is negatively associated with health-related quality of life (Costa et al., 2015).

Support centers, shelter homes and primary social and health care services strive to increase the reach and effectiveness of programs to prevent IPV and reduce its consequences (Arroyo et al,. 2017). Shelter homes (also called transitional supportive housing, TSH) represents a tertiary prevention strategy that aims to reduce mortality or

disability (Coker, 2004). In this regard, shelters commonly deliver advocacy support, Cognitive Behavioral Therapy (CBT) and social assistance while providing a safe home, food, education, and employment opportunities for a limited period (6–12 months) ((Klein et al., 2021). By being physically secure and distant from the violent environment, shelter homes might represent a valuable place for therapeutic interventions targeted at victims' recovery of health and reconstruction of life and identity (Arroyo et al., 2017). Although some advocacy and psychoeducation interventions have shown positive effects, mostly on healthcare use and mental health symptoms, the broad and complex consequences of IPV on women's health and identity require extensive research and consideration of body-mind interventions (Arroyo et al., 2017; Eckhardt et al., 2013; Ogbe et al., 2020).

The lasting effects of trauma on the body and on the body-mind relationship, have brought growing interest to the development of effective therapeutic interventions (Classen et al., 2021). Yoga (van der Kolk, 2014), Sensorimotor psychotherapy (Classen et al., 2021), Somatic Experiencing (Andersen et al., 2017; Payne et al., 2015), and Psychomotor therapy (PmT, Marmeleira et al., *in press*; Rekkers et al., 2021; Bieleveldt, 2019) are some of the approaches addressing the trauma in the body. In specific, psychomotor therapy is a movement and body-oriented therapy that explores embodied emotional, cognitive and relational identity processes (European Forum of Psychomotricity, 2012). PmT acts upon complex bodily dimensions, namely the real body, the imaginary body, the functional body, the body schema and the body image (Fernandes et al., 2022; Potel, 2019; Marmeleira et al. *in press*). The awareness and processing of those bodily dimensions are promoted through movement, breathing, and expression, as a vehicle to enhance the adaptive functioning of the individual (Lebre et al., 2020; Llauradó, 2008). Distinctively, solving problematic behaviors (namely disruptive behaviors) is not the primary goal for a PmT therapist. Instead, he/she works at the expression of anguishes embedded in the body, allowing for new representations of the Self, the others, and the world, with an indirect impact on behavior (Marmeleira et al., *in press*).

Feel-Own-Move (FOM) is a PmT program specifically designed to be implemented in shelter homes, and its therapeutic mechanisms have been recently described (Marmeleira et al. *in press*). Upon a safe, empathic and cohesive investment of the therapeutic space and of the therapeutic relationship, participants are invited to i)

experience interoceptive and proprioceptive sensations, ii) become aware of bodily internal sensations and representations with a non-judgmental approach, iii) experience and learn relaxation techniques, and iv) express, through movement, writing, drawing and verbal and non-verbal communication, their body knowledge, insecurity, fears and desires. In summary, through PmT principles, mediators, and the attitude of the PmT therapist – responsive, empathic and encompassing (Llauradó, 2008). FOM allows victims of IPV the safe embodiment of new internal and external representations. FOM is an 8-week PmT program that integrates the benefits of group sessions and individual sessions, apart from being implemented in a short period of time. It considers the minimum time needed for a therapeutic process to occur, and the short periods of time that victims actually stay in the shelter home (Arroyo et al., 2017). However, the effectiveness and feasibility of FOM was not empirically examined yet.

In this regard, the aim of the present study was twofold. First, the feasibility (reach, adherence, retention and acceptability) of FOM was assessed in a sample of female victims of IPV living in three different shelter homes. Second, the effects of FOM on quality of life and mental health indicators, such as bodily dissociation, anxiety, depression and PTSD of women victims of IPV living in shelters was examined.

Methods

Study design

A non-random within-group repeated measures design was used to evaluate the effects and feasibility of FOM on female victims of IPV living in shelter homes. Participants were tested at week 1 (T1) and week 5(T2) before the intervention, to a monitoring of the control period. Participants were again tested at week 13, after the 8-week intervention (T3). The study was previously approved by the University ethics committee and conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014). From June 2021 to November 2022, this intervention research was proposed to the managing entities of three Portuguese shelters for victims of IPV. With the agreement of all three shelters, the study procedures and characteristics of the intervention were presented to the women eligible to participate in the study. The inclusion criteria were being 18 years or older and having suffered IPV in the first person. Ninety-four percent of the women showed an interest in participating (N=30), as represented in figure 1.

Participants

Thirty women accepted to enroll in this study. Due to incompatible schedules (considering work and mothering tasks), 6 women could not engage in the program. Of the 24 initial participants, seventeen (mean age 42.8 years, *sd*=11.1; range 21-64) completed the program. Those reported that they had suffered physical (71%), psychological (94%), and sexual (59%) violence for a mean duration of 16 years and 3 months *(sd*=16.5 years; range 2-48 years) and were free from violence for a mean of 6 months (*sd*=0.53 years; range: 1 – 18 months). At T1, 82% (n=14) of the participants were unemployed or retired, and 71% (n=12) were living in the shelter with one or more children. In the sociodemographic survey, the most reported symptoms were sleep problems (65%), chronic pain (41%), and anxiety attacks (29%).

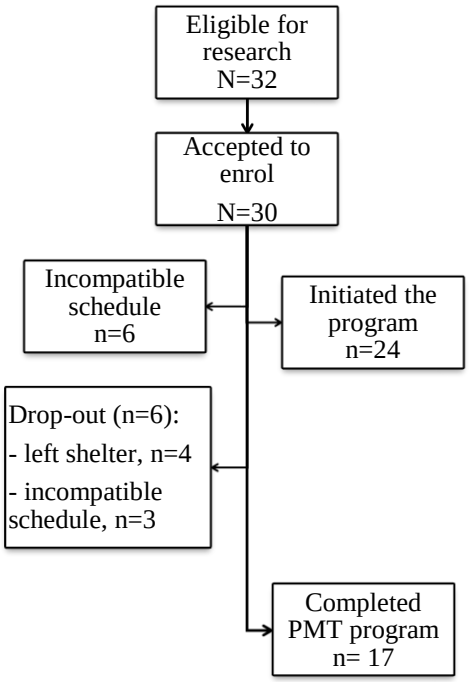

Figure 1.
Flow diagram of recruitment and participation

Procedures

After signing the informed consent form, the baseline assessment session was scheduled. Participants completed a sociodemographic survey about general health symptoms, medical diagnosis of posttraumatic stress disorder, anxiety and depression, use of psychiatric medication, leisure activities or therapeutic practices, and the types of violence they have suffered, for how long, and since when they were free from the violent

relationship. Participants completed the PTSD Checklist (Marcelino & Gonçalves, 2012), the Hospital Anxiety and Depression Scale (HADS, McIntyre et al., 1999), Scale of Body Connection (SBC, Neves et al., 2017), and World Health Organization Quality of Life checklist (WHOQoL-bref, Vaz Serra et al., 2006). Assessment sessions took about 60 minutes, and occurred at baseline (T1), after 4 weeks of control time (pre-intervention, T2), and after 8 weeks of intervention (post-intervention, T3).

Instruments

PTSD Checklist

Posttraumatic Stress Disorder symptoms in the last two months were evaluated using the PTSD Checklist – civilian version (PCL; Weathers et al., 1994). This self-report questionnaire can differentiate the three PTSD clusters from the DSM-IV medical diagnostic manual: experiencing, avoidance, and hypervigilance. A Likert scale, from zero (nothing) to five (extremely) was used to score the frequency of each symptom. The sum of the scores for each cluster was analyzed. The Portuguese version includes 17 items and has good psychometric properties (Cronbach's alpha= 0.94; Marcelino & Gonçalves, 2012).

Hospital Anxiety and Depression Scale (HADS)

Hospital Anxiety and Depression Scale (HADS; (Zigmond & Snaith, 1983) enables health professionals to assess anxiety and depression levels at a brief and objective way (Herrmann 1997). It is a self-report questionnaire with 14 items, seven assessing anxiety and seven assessing depression symptoms. Each item is rated in a 0-3 scale and classifies the symptom as feeling equal to times before or a lot worse than before. Scores higher than 7 in each subscale, indicate clinically relevant levels of anxiety or depression, and results can be analyzed through the sum of the items, ranging from 0 to 21. The Portuguese version has good internal consistency (Cronbach's alpha_anxiety scale= 0.76; Cronbach's alpha_depression scale= 0.81; McIntyre et al., 1999).

Scale of Body Connection (SBC)

Bodily Dissociation (the sense of separation from the body) was assessed through the Scale of Body Connection (SBC; Price & Thompson, 2007), a self-report Likert scale that measures body awareness and bodily dissociation. Mean scores higher than 2 suggest a significant presence of bodily dissociation symptoms. The adaptation from Neves, Price and Carvalheira (2017) confirmed the reliability and validity of this scale for the

Portuguese population (Cronbach's alpha = 0.73).

World Health Organization Quality of Life checklist (WHOQoL-bref)

The WHOQoL is a self-administered Likert scale that allows the assessment of perceived quality of life in four domains: Physical health (domain 1; e.g. dependence on medical aids, mobility, pain, work capacity), Psychological health (domain 2; e.g. negative and positive feelings, self-esteem, body image, personal beliefs, learning and memory), Social relationships (domain 3; e.g. personal relationships, social support, sexual activity) and Environment (domain 4; e.g. freedom, physical safety, accessibility to health and social care, opportunities for acquiring new information and to participate in recreative activities, transport). The Portuguese version of the WHOQoL-bref includes 26 items and shows good reliability and validity scores (Cronbach's alphas ranging from .64 for domain 3 and .87 for domain 1; Vaz Serra et al., 2006).

The Feel-Own-Move Psychomotor Therapy Program

The program consisted of an 8-week Psychomotor Therapy (PmT) with 24 three-weekly sessions, combining 16 individual sessions with 8 group sessions. PmT was facilitated by a therapist with expertise in body-mind interventions. The individual sessions had an approximate length of 40 minutes and allowed for personalized attention to the bodily sensations, representations, and expressions of each participant. This individualization offered a specific therapeutic space and time, for a deepened exploration and integration of each insight. In addition, group sessions (4-6 participants), with approximately 60 minutes each, allowed for an empathetic expression of each participant, offering a meeting of different ways of embodied being. The encounters promoted by group sessions aimed for a widening of images, sensations, and representations into the therapeutic process of each participant.

Overall, both individual and group sessions included three sequential moments: an initial warming-up activity (cardiovascular activation and strength training, with an attuned exercise approach, using positive music, demonstration, and empowerment), a second moment with body awareness and grounding activities (slow movements, focusing on the weight of the body on the floor or against the wall, for example, using therapeutic touch, guided sensations or imagery as mediators), and a final relaxation moment (progressively experiencing passive to active relaxation techniques). Through movement, expression, breathing, and relaxation techniques, the aim of each session was

twofold. On the one hand, to progressively promote and deepen a non-judgmental awareness of bodily sensations and of sensation-emotion relationships, strengthening the mind-body connection. On the other hand, the second aim was to increase emotion regulation, as a path to weaken mental health symptoms, and indirectly increase the quality of life.

Having a bachelor's degree in Psychomotricity, the psychomotor therapist has expertise in the holistic understanding and facilitation of bodily expression and movement, and is characterized by a consistent, responsive, and encompassing attitude (Llauradó 2008). This particular approach is an ally for the safe embodiment of each sensation and supports the verbal and non-verbal expression of the participants.

Feasibility and acceptability

The reach of the program and adherence of the participants was assessed to examine its feasibility. To examine acceptability and satisfaction with the PmT intervention, a 9-item survey developed by the authors of this study was administrated to the participants who completed the program. Following recommendations of Bowen and colleagues (Bowen et al., 2009), each item was classified on a Likert scale, between zero (nothing) and four (extremely), and covered topics related to perceived personal impact, sense of trust and respect and comfort regarding the sessions, the therapist, and the assessments.

Data analysis

A descriptive analysis of sociodemographic and health variables was performed. The normality of data was checked through the Shapiro-Wilk test. A one-way repeated measures ANOVA was used to examine within-group changes between T1 and T2, and T2 and T3. Significance levels were adjusted using the Bonferroni correction, considering significance if $p<.05$. Mean and standard deviations are reported. Effect sizes are provided as partial eta-squared ($\eta p2$) and interpreted as: 0.01-0.06, small effect, 0.06-0.14, medium effect, and ≥0.14, large effect (Cohen 1988). Results of non-parametric variables are presented as median and interquartile range (IQR). Friedman tests were carried out to examine changes in non-parametric variables, using post hoc pairwise comparisons (Wilcoxon Signed-Rank test) and a Bonferroni adjustment was applied. Significance levels were considered at $p<.017$. Effect sizes were calculated using Kendall's W Value, and interpreted as <0.3, small effect, 0.3-0.5, moderate effect, and >0.5, large effect (Tomczak and Tomczak 2014). The delta value (Δ%) of proportional

change between each moment (T1, T2 and T3) was calculated using the formula: Δ% = [(momentY – (momentY−1))/(momentY-1)] x 100

Statistical analyses were performed, using SPSS version 24.0 software.

Results

Overall, the results suggested good feasibility of the program. Regarding reach, it was measured as the rate of women who accepted to participate in the study, from all the ones who were invited to. Thirty out of thirty-two agreed to participate (94%). The two women who declined had just arrived at the shelter (2 or 3 days before the invitation) and claimed not being prepared to initiate a therapeutic process yet. Due to schedule incompatibilities, 6 women were not able to integrate the program. In those cases, women had intense and rotating schedules, added to house and mothering chores. Twenty-four women initiated the program, and seven drop-out, representing a retention rate of 71%. Considering adherence, among participants who completed the program, they attended 86% of the individual sessions and 75% of the group sessions. Results showed strong acceptability and satisfaction with the program, as detailed in table 2 (all positive questions ≥3.5).

Table 1.
Descriptive statistics of demographic and health information

Sociodemographic variables	**N=17**		
	N (%)	Mean (SD)	Range
Age (years)		42.8 (11.1)	21-64
Body Mass Index (kg/m^2)		27.7 (5.1)	18.7-37.6
Types of violence			
Psychological	16 (94)		
Physical	12 (71)		
Sexual	10 (59)		
Duration of violence (years)		16.3 (16.5)	2.0-48.0
Time since violence ended (years)		2.4 (6.1)	0.1-30.0
Health			
Sleep problems	11 (65)		
Anxiety attacks	5 (29)		
Migraines	4 (24)		
Memory difficulties	2 (12)		
Chronic pain	7 (41)		
Gastrointestinal problems	4 (24)		
Hypertension	2 (12)		
Medical diagnosis			
Posttraumatic Stress Disorder	1 (6)		
Anxiety disorder	5 (29)		
Depression disorder	9 (53)		
Behavior			
Self-injury	5 (29)		
Suicidal ideation	9 (53)		

Note. M, mean; SD, standard deviation.

Results show a significant decrease in levels of bodily dissociation over time ($F(2)=4.517$, $p=.029$, $\eta_p^2= 0.376$). Post hoc analysis with Bonferroni adjustment revealed that bodily dissociation decreased from pre ($M=2.3$, $SD=0.8$) to post-intervention ($M=2.0$, $SD=0.7$) ($\Delta\%=12{,}4\%$). Scores of the environmental quality of life showed a non-significant increase between assessments, although a large effect size was found ($F(2)=1.543$, $p=.246$, $\eta_p^2=0.171$).

Table 2.
Acceptability and satisfaction with FOM

Questions	Mean (SD)	Range
Do you feel satisfied with the program you've participated in?	3.9	3-4
Do you feel yourself different from before initiating the program?	3.5	2-4
Do you feel that this program brought positive things to you?	3.8	2-4
Were the activities of the sessions interesting?	3.7	2-4
Did you felt respected in the sessions?	3.9	3-4
Do you feel that this program brought negative things to you?	0.0	0
Did you felt that you could trust in the therapist?	4.0	4
Did you felt yourself safe during the sessions?	3.9	3-4
Did you felt bothered/ disturbed with the assessments?	1.2	0-4

Table 3.
Scores on dependent variables at baseline (T1), pre-intervention (T2) and post-intervention (T3).

	T1	T2	T2	p	Δ%	Effect size
PTSD						
Reexperiencing[a]	12.6(6.0)	12.2(6.0)	11.0(13.0)	.808		
Hyper-vigilance[b]	12.9 (5.2)	12.2(5.2)	12.3(5.3)	.749		
Avoidance[a]	15.0(8.0)	14.0(15.0)	14.0(11.5)	.345		
Anxiety[b]	9.9(4.1)	9.3(5.1)	9.0(5.5)	.762		
Depression[a]	7.0(5.0)	6.0(5.0)	7.0(5.5)	.405		
Bodily dissociation[b]	2.3(0.8)	2.3(0.8)	2.0(0.7)	.029	T3<T2 (12.4%)	.376[d]
Quality of life						
Physical[a]	3.2(0.9)	3.3(1.0)	3.1(0.8)	.939		
Psychological[b]	3.7(0.6)	3.5(0.7)	3.6(0.6)	.467		
Social relationships[b]	3.0(0.6)	3.0(0.7)	3.1(0.8)	.967		
Environment[b]	3.1(0.5)	3.0(0.5)	3.3(0.5)	.246	T3>T2 (10.0%)	.171[d]

Note. PTSD, Posttraumatic Stress Disorder; [a]data reported as median (interquartile range); [b]data reported as mean (standard deviation); Δ%, proportional change; [c]effect size reported as Kendall'sW value; [d]effect size reported as partial eta-squared, η_p^2

Discussion

The study of the associations between mental health and embodiment-related variables among victims of IPV has gained paramount importance (Machorrinho et al. 2021; Machorrinho et al. 2022). Although there is increasing research on therapeutic and preventive interventions for victims of trauma, highlighting body-mind interactions and their influence on victims' health, trauma recovery, and quality of life, the necessary adaptations for victims of IPV were yet scarcely attended (Marmeleira et al. in press; van der Kolk 2014). The aim of the present study was to examine the effects of a Psychomotor Therapy "Feel-Own-Move" (FOM) program delivered in shelter homes for victims of IPV. The FOM program was shown to be effective at decreasing the values of bodily dissociation in victims, also with a suggested effect on increasing quality of life.

The recruitment and retention of participants in IPV-related research have been a longstanding concern (Dutton et al. 2003). In this study, the attractiveness of the body-mind program, the schedules flexibility and adaptation to participants' possibilities, the close positive recommendation of the shelters' managing entities, and the empathic attitude of the PmT therapist, might have been important factors to the excellent reach of the program (94% of women accepted to enroll in the study) (Dutton et al. 2003). Nevertheless, 7 of the 24 participants (29%) did not complete the program, mostly because they have left the shelter to rebuild their lives in another city or to move to another shelter with more adequate social-economic support. Although this is a positive retention rate compared with other IPV research (Hansen et al. 2014; Arroyo et al. 2017), it is important to note that the study design here implemented may have influenced the retention rate of the program, since it compelled participants to a 4-week control period before initiating the intervention. Without this control period, inherent to the research, we can hypothesize that more participants would be able to complete the program, since its short duration is in accordance with current recommendations of interventions to be delivered in shelter homes (Arroyo et al. 2017). Moreover, to surpass the schedule constraints pointed out by 13% of the initial participants who dropped out, we suggest that in the future the FOM should provide a set of videotaped sessions that participants can easy watch and perform individually at any time. Although these would imply a close supervision from the psychomotor therapist, we believe that it could be advantageous for the feasibility of the FOM program.

IPVis equally prevalent across all age groups, and shelter homes welcome adult women with no age grouping. Thus, as expected, our sample included women in a wide age range. More than half (59%) have suffered the three types of violence (sexual, physical and psychological), which is known to increase the repercussions of trauma on mental health and quality of life (Campbel, 2002). At baseline, participants mostly reported symptoms of chronic pain, difficulty falling asleep and staying asleep, and anxiety attacks. Adding to this, self-reported measures at baseline revealed clinically relevant levels of anxiety, bodily dissociation and PTSD (avoidance cluster), but only normal to light levels of depressive symptoms. Conversely, depressive disorder was the most medically diagnosed in this sample (n=9; 53%), whereas only 5 participants (29%) had a previous diagnosis of anxiety disorder, and only one (6%) of PTSD. This finding suggests an underdiagnosis of trauma-related mental health problems, possibly due to women not having any medical/ psychological check-ups after they have exposed their IPV victimization. Suicidal ideation and self-injury behaviors, which are commonly an expression of depressive feelings and of a disconnection from the body, were highly reported in this sample (You et al., 2012; Hielscher et al., 2019; Polskaya & Melnikova, 2020).

Prior to intervention, a control period allowed for important monitoring of each variable evolution, since the shelter home, as a preventive and supportive strategy for victims, can have a positive impact on their well-being and mental health (Yakubovich et al., 2022). However, none of the variables have shown significant differences between baseline and pre-intervention assessments, which highlights the lack of effective short-term therapeutic interventions at these shelters.

The FOM program allowed women to reconnect with their bodies in a trustworthy relational atmosphere. Along with the relevant decreases in bodily dissociation levels, participants ended up being extremely satisfied with the program, reporting feelings of safety, respect and trust towards the setting and the therapist. These results corroborate research that suggests both physical and relational safety as a primary step for effective intervention with trauma clients (Baylin & Winnette, 2016).

While bodily dissociation is importantly related with poorer quality of life and physical and mental health, its improvement through therapeutic approaches is yet scarcely studied (Price et al., 2012; Price, 2007; Cheng et al., 2022). Although not

pathological (compared with the dissociative states commonly diagnosed in patients with the dissociative type of PTSD), bodily dissociation acts through a disregard of internal experience, an avoidance of sensations and emotions, and interfering with one's monitoring of health and self-care behaviors (Price et al., 2007). The avoidance or dissociation from bodily experience is part of the concept of psychophysical awareness, linked to the internal processes necessary for self-regulation and self-knowledge (Price et al., 2007). Bodily dissociation thus causes significant impairments on daily life and impoverish the possible outcomes of psychological therapeutic processes (Price et al., 2017)

While various body-mind interventions have shown to be effective at increasing body awareness (the awareness of body sensations, also part of psychophysical awareness), impacting bodily dissociation has shown to be more difficult, especially when considering short-term interventions (Classen et al., 2021; Cheng et al., 2022). A possible explanation mechanism for the positive effect of this Psychomotor therapy program on bodily dissociation is the inclusion of cardiovascular and strength exercises with an attuned exercise approach (Marmeleira et al., 2023; Louková & Hátlová, 2015). These exercises were delivered with joyful, safe and process-oriented instruction, again embedded in an empathic and encompassing therapeutic setting. By (i) increasing biological sensations of movement, rhythm, and vitality, whilst (ii) emphasizing the connections between sensations and emotions, and (iii) delivering words of agency toward the body, these exercises aimed to facilitate awareness and reconnect female victims of IPV with their living bodies, allowing them to regain their sense of body ownership (Machorrinho et al., 2022; Marmeleira et al., 2023). This mechanism might also explain the large effect size of the intervention on the environmental domain of quality of life. This domain refers to senses of safety, mobility, autonomy and opportunity to participate in leisure activities, which corroborates the rationale of the Psychomotor therapy intervention where some of the short-term objectives are to activate movement, to regain pleasure in physical activity, and to increase vitality and strength (Marmeleira et al., 2023).

Overall, results suggest that FOM has an impact on reconnecting women victims of IPV with their bodies, diminishing their bodily dissociation and promoting their willingness to move more and autonomously engage in activities. This program had, however, no significant effects on reducing anxiety, reexperiencing, or hyper-vigilance, nor on their perceived quality of life in terms of physical, social or psychological

healthcare. It is thus important to notice that many of those women were on a waiting list for physical therapy, reconstruction surgery, or general medical and psychological assistance related to serious sequelae from the violent assaults. Additionally, as time goes by in shelter homes, each woman is under increased pressure to leave, find a job, and provide children enough social and economic autonomy, which can increase their feelings of anxiety and fear of being somehow a victim again.

One factor that might have limited the impact of the FOM, was the poor conditions of the shelter to effectively implement the relaxation moments during sessions. In general, the small, cold and loud rooms made available for therapy were not adequate to practice relaxation and hindered the therapist efforts to counterbalance such limitations. Also, some sessions length had to be shortened due to women not having no one in the house to keep an eye on the children. Future projects might benefit from having parallel activities for the children.

Future research is encouraged to examine the evolution of these results on follow-up assessments. Additionally, we suggest exploring the effectiveness of FOM on reoccurrence rates, acknowledging that bodily dissociation was recently hypothesized as playing an important role in revictimization numbers (Zamir et al., 2018). Considering the positive effects found in the present study, it could be important to adapt FOM to be extended to other levels of IPV prevention, such as primary support centers and healthcare settings.

In conclusion, FOM, a 8-week Psychomotor therapy program seems to be a feasible and highly accepted therapeutic intervention for female victims of IPV living in shelters. Most important, this program showed to be effective in reducing bodily dissociation among participants, which is suggested to prospectively contribute to their mental health and quality of life (Machorrinho et al., 2021).

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Chapter VI. General discussion

Discussion

Intimate Partner Violence (IPV), whilst being one of the most concerning problems of public health and social development, has gathered major attention from the scientific community due to its broad impact on victims' lives. This thesis aimed to advance knowledge on the impact of IPV regarding the embodiment of victims, and to develop a beneficial therapeutic psychomotor intervention. To achieve this, a three-step strategy was implemented: First, an extensive literature review and reflexive overview of the possible implications of IPV on the embodiment of victims was carried out (chapter II). Second, studies for qualitative and quantitative assessment of the embodiment-related experiences and abilities of women victims were carried out, allowing for comparisons between women with and without a history of IPV (chapter III). Third, a psychomotor therapy intervention program was developed, and its feasibility and effects were examined in groups of women living in shelter homes, targeting their embodiment-related features previously identified as needing therapeutic care (chapters IV and V).

The embodiment of victims of IPV – A reflexive overview

Literature indicates a high prevalence of trauma-related symptoms among women victims of IPV, alongside mental and physical health impairments, such as anxiety, chronic pain, substance use, suicidal ideation and somatic complaints. Based on approaches from neuroscience and psychophysiology, it has been corroborated that people with trauma may exhibit impaired interoception, proprioception and imagery abilities, as well as disrupted senses of body ownership and body agency (Levine, 2010; Payne et al., 2015; Ataria, 2018; Rabellino et al., 2020; Tsakiris et al., 2007). Simultaneously, body disownership and bodily dissociation appear to impair one’s ability to be aware of the body, to feel the body, and to make somatic-based decisions with impact on action and behavior (Price et al., 2020; Tsakiris et al., 2010; Chen et al., 2021; David & Ataria, 2021; Reinhardt et al., 2020).

In our first book chapter (Machorrinho et al., 2022), building upon the discussion of that literature, we conceptualized the feeling-owning-acting cycle. This cycle represents a dynamic mechanism, in which the abilities to feel the body, to feel ownership over the body, and to act upon, underly one’s way of being and acting in the world (Machorrinho et al., 2022). Trauma weakens several of the sensorimotor and psychomotor processes within this cycle (Gallagher, 2017; Ataria & Horovitz, 2021). Such a combined effect can

deprive people of sensing their "physical container" and undermine their inner sense of safety and overall embodiment experiences (Heitzler, 2013; Machorrinho et al., 2022). In the case of IPV, not only trauma but also the direct influence of aggressions and the deprivation of freedom (to move, speak, relate with others and to self-expression) imposed by the perpetrator can overly shatter a victim's embodiment experience, specifically through his/ her senses of body ownership, body agency, and the bodily Self (Machorrinho et al., 2022). However, despite the increment of empirical research connecting embodiment and trauma, specific studies focusing on the embodiment of victims of IPV mainly adopt a phenomenological and/ or ecological perspective (Rajah & Osborn, 2022; Selgas, 2014; van der Heyden, 2023), thus reinforcing the need of empirical studies regarding the embodiment of victims of IPV.

Embodiment-related characteristics of victims of IPV

In our first empirical study with women living in shelter homes, participants reported high levels of PTSD, anxiety, depression, self-harm and suicidal ideation (article 1, Machorrinho et al., 2021b). The scores on mental health measures were worse than those reported in previous studies with Portuguese women that did not account for IPV experiences, suggesting a higher prevalence of these symptoms in women victims (Machorrinho et al., 2021b; Cardoso et al., 2020; WHO, 2021). This suggestion was confirmed in our second study (article 2), where women victims of IPV, compared to women non-victims, showed significantly higher scores of PTSD, depression, self-harm and suicidal ideation, but also of health complaints such as sleep problems, respiratory problems and migraines (Machorrinho et al., 2023).

Multivariate models exploring the relationship between IPV and health suggest that chronic stress (heightened arousal), major depression, poor self-care, and biased body awareness may serve as mediators in this relationship (Weaver & Resnick, 2004; Tsur & Talmon, 2023; Fani et al., 2024). For instance, deficits in self-care agency - a person's ability to take care for themselves and sustain life, health, and well-being, are one of the disabling mental health effects of IPV (Machorrinho et al., 2022; Schnurr & Green, 2004; Weaver & Resnick, 2004) that have been found to mediate the impact of IPV on health and somatic complaints (Orem, 1995; Campbell & Weber, 2000). Self-care strongly relies on one's abilities to detect symptoms and recognize needs (Riegel et al., 2022), which are influenced by mental health and interoception (Van den Berg et al., 2017).

The findings from our first study (article 1), confirm that women survivors have a) low interoceptive accuracy, and b) negative correlations between PTSD and interoceptive trusting and self-regulation (Machorrinho et al., 2021b). Such results support the hypothesis that PTSD, since involving negative and intrusive interoceptive sensations, when combined with low interoceptive accuracy, can amplify interoceptive uncertainty, undermine trust in bodily sensations, and hinder their use for self-regulation (Young et al., 2019; Machorrinho et al., 2021b; Reinhart et al., 2020). In addition, studies suggest that interoceptive awareness and related self-regulation jointly contribute to one's psychosomatic competence (self-regulatory competence in dealing with somatic information) since they are mechanisms for homeostatic and allostatic control (Fazekas et al., 2020). Homeostatic and allostatic control mechanisms are at the basis of physiologic regulation, having important implications for health and disease (Ramsay & Woods, 2014). Thereby, for women victims of IPV with PTSD, the impairment of interoceptive awareness abilities can exacerbate their difficulties with self-regulation and compromise health (Machorrinho et al., *submitted*; Twamley et al., 2009).

Based on the findings of our first and second studies , we hypothesized that decreased accuracy in detecting bodily signals (interoceptive accuracy), decreased regulation of the attention given to the body (interoceptive attention regulation), a lack of trust in bodily sensations (interoceptive trusting), and difficulties in using thereof for self-regulation (interoceptive self-regulation), could serve as potential mediators in the relationship between IPV and health complaints. In our third study (article 3, *submitted*), we made important advances in this field by confirming that the better a woman survivor of IPV can control and sustain the attention given to the body (interoceptive attention regulation), the fewer health complaints she experiences, which can be paramount for improving emotional and physiological regulation, ultimately leading to a lower risk of somatization and better overall health (Machorrinho et al., *submitted*).

Conversely, for women who have never suffered IPV, this mediation relationship was not found; instead, better interoceptive attention regulation was related with more health complaints. Our findings align with literature, suggesting that for women who do not live in a violent relationship, and without major health threats, paying attention to the body only when needed might be the healthier approach (Köteles & Simor, 2013; Nord & Garfinkel, 2022; Tan et al., 2023). These results strongly contribute to the discussion on the role of context in interoceptive awareness and its health-promoting function.

Besides interoception, the first and second studies of this thesis also showed that bodily dissociation i) is linked with mental health in women victims of IPV, ii) is significantly higher in women victims, compared with non-victims, and iii) is a risk factor for the development of PTSD, anxiety and depression in women victims (Machorrinho et al., 2021b; 2023). These findings align with a recent study (Schmitz et al., 2023) that showed that bodily dissociation, assessed alongside other measures of interoceptive sensibility, was the only measure with a significant association with both childhood traumatic experiences and current emotion dysregulation, highlighting its potential as a transdiagnostic feature. Our results corroborate those of Schmitz and colleagues, since bodily dissociation was the only embodiment-related measure consistently associated with PTSD, anxiety and depression symptoms, and its levels were significantly higher in women victims of IPV, compared to women non-victims (Machorrinho et al., 2021b; 2023). Furthermore, our findings support the associations between PTSD, emotional dysregulation, and embodiment-related impairments in women survivors of IPV, but also showed that those women have higher levels of disconnection from the body (bodily dissociation) and disownership towards the body than women non-victims, regardless of having either PTSD or depression (Machorrinho et al., 2021a; 2023). These findings enable us to take a further step and suggest that the impact of violence on women's embodiment extends beyond trauma responses; it encompasses much more.

The levels of body disownership reported by women survivors of IPV (presented as oral communication in Machorrinho et al., 2021a) were significantly higher than the ones of women non-victims, giving strength to the theory and qualitative findings of Niva Piran (2001), who has been suggesting that sexual and physical aggression are violations of the sense of body ownership (Piran, 2001; Piran & Thompson, 2008). To the best of our knowledge, this thesis encompasses the first empirical studies to establish a close association between intimate partner violence (IPV) and body disownership (Machorrinho et al., 2021a).

From a developmental and healthy perspective, body ownership and interoception are both “perceptual and affective components leading up to the construction of the Self” (p.211, Ataria et al., 2021). Considering this, future studies should examine the long-term consequences of body disownership and low interoceptive accuracy in components of the Self in survivors of IPV. Qualitative results from our fourth study (article 4) support this recommendation, as participants reported a tendency to perceive negative bodily

sensations, view their bodies as restrictive in their ability to react to illnesses and other adversities, and noted the impacts of violence on their health and decision-making processes (Machorrinho et al., 2024). Regarding their personality, positions of affirmation, suppression and uncertainty were mentioned, with only two of the six participants reporting affirmative personality traits. Self-affirmation is the behavior of reflecting upon one's values and strengths and is grounded in the concept of self-integrity (Harris, 2011). The two participants who reported self-affirmation traits were also the ones who mentioned being aware of positive bodily sensations and fell within the subcategories of 'Body connection and comfort', 'Self-care', 'Sense of agency and functionality', and 'Development of a bodily Self'. Therefore, it seems to be a legitimate discussion to address these qualitative results as supportive of the perspective of Ataria, Tanaka and Gallagher (2021), who claim that body ownership and interoception play a crucial role in the construction of the Self.

Based on the literature, we have also hypothesized that movement imagery could be impaired in women victims of IPV, especially those with mental health symptoms (Chen et al., 2013; Moran et al., 2015; van der Kolk, 2015). However, in study 2 we found that despite women victims scoring lower than non-victims in kinesthetic and visual internal imagery, these differences were not statistically significant. Based on our results we cannot conclude that women, whether victims or non-victims, exhibited deficits in movement imagery. Indeed, on the three types of movement imagery, our participants scored higher than elderly participants (Suárez Roco et al., 2022), and lower than college-aged students (Monsma et al., 2022) in other studies. Although we did not conduct a meta-analysis, these results could support the suggestion that movement imagery abilities decline with age (Suárez Rozo et al., 2022; Suica et al., 2022). More research is needed to clarify these results and to examine movement imagery in trauma-related and mental health disorders (Moran et al., 2015; O'Shea & Moran, 2019).

In summary, our studies strongly support the recommendation of attending to interoceptive attention regulation, bodily dissociation, and body disownership as health indicators, and suggest promising therapeutic aims to be included in IPV-directed interventions.

Psychomotor therapy for victims of IPV

Body and movement-oriented (BMO) interventions have shown promising effects in people with trauma-related disorders (Chang & Leventhal, 2008; Erickson, 2021; Kirmayer & Gómez-Carrillo, 2019; Payne et al., 2015; Price & Hooven, 2018; Punkanen & Buckley, 2021; van der Kolk, 2015). In most cases, BMO interventions have shown to effectively improve mental health, reducing trauma-related symptoms, and enhancing general body awareness, particularly through proprioception and interoceptive awareness and accuracy (van der Kolk, 2015; Payne et al., 2015; Louková & Hátlová, 2015). However, achieving significant changes in levels of bodily dissociation or disownership remains challenging (Classen et al., 2021; Cheng et al., 2022).

Feel-Own-Move – the psychomotor intervention developed in the scope of this thesis (chapter IV, Marmeleira et al., 2023), proved to be effective at reducing levels of bodily dissociation in women victims of IPV living in shelter homes (chapter V, Machorrinho et al., 2023b). Moreover, during post-intervention interviews, women shared experiences of increased bodily awareness regarding breathing sensations, the body-mind connection, the ability to differentiate tension from relaxation, feelings of strength, vitality and relaxation skills (results presented as oral communication, Machorrinho et al., 2022). By (i) increasing biological sensations of movement, rhythm, and vitality, whilst (ii) emphasizing the connections between sensations and emotions, and (iii) delivering words of agency toward the body, this PMT approach aimed to facilitate awareness and reconnect female victims of IPV with their living bodies (Machorrinho et al. 2022; Marmeleira et al. 2023).

Combined, our results concerning the effectiveness of FOM, suggest that this intervention has a positive impact on reconnecting women victims of IPV with their bodies, diminishing their bodily dissociation and encouraging them to move more and autonomously engage in activities (Machorrinho et al., 2022b, 2023b). Importantly, the psychomotor therapist is an expert on the holistic understanding and facilitation of bodily expression and movement, having a consistent, responsive, and encompassing attitude within the therapeutic relationship (Llauradó, 2008). This particular approach is an ally for the safe embodiment of each sensation and supports the verbal and non-verbal expression of the participants, therefore contributing to the embodiment needs of people with trauma.

Practice Implications

In this thesis, we review, analyze and discuss the dimensions of the embodiment that can be crucial for understanding and working with victims of IPV. This work gathers the methodological and ethical considerations that practitioners and researchers must address when assessing and intervening in victims' embodiment experiences. Therefore, through evidence-based recommendations, it supports the development of feasible psychomotor interventions.

Based on this, both healthcare professionals and victims' support services must consider the professional assessment of embodiment-related experiences of the victims, including levels of bodily dissociation, body disownership, interoceptive awareness, sedentary behavior and health-related quality of life. Additionally, shelters for IPV victims are recommended to promote Psychomotor Therapy (PMT) intervention programs based on the reviewed evidence-based therapeutic mechanisms, such as awareness and acceptance of bodily sensations, interoceptive attention regulation, and integration of sensations into the senses of body ownership and body agency.

In general, PMT is a holistic body and movement-oriented intervention broadly used in both preventive and therapeutic contexts and aims for the integration of bodily sensations and representations into the bodily Self. It is important to recall that both physical and relational safety are the primary steps for an effective intervention with people with trauma, therefore being requirements for any psychomotor intervention for IPV. FOM, through its particular aims and PMT mechanisms, showed to be effective at reducing levels of bodily dissociation, which is of paramount importance to the field of IPV, in particular to the public health and social aim of breaking the cycle of violence. This is explained by recent advances in identifying dissociation as a significant mediator in the revictimization of women who were abused during childhood (Zamir et al., 2018). In this context, dissociation (closely related to bodily dissociation) often emerges in adolescents as a repercussion of childhood traumatic experiences and represents a risk factor for becoming victims of IPV in adulthood. Thereby, by decreasing levels of bodily dissociation, FOM seems to be an important intervention to disentangle the revictimization cycle of IPV. Therefore, promoting FOM intervention at earlier stages of development, after the first traumatic experiences, might be a promising health and social care strategy.

In summary, the therapeutic mechanisms and strategies of FOM, detailed in chapter IV, can be applied in primary care services and victim support, as well as in preventive interventions, with the goal of providing communities with valuable and reliable tools for a positive embodiment and adaptive awareness of one's way of being and acting in the world.

Theoretical implications

The study of embodiment has been increasingly applied to advance knowledge on the repercussions of trauma. Our reflexive overview of the literature guided us on conceptualizing the feeling-owning-acting cycle, a dynamic feedback mechanism underlying one's way of being and acting in the world. The suggested cycle adds to the embodied-embedded approaches to behavior that the senses of body ownership and agency also are fostered by conscious and unconscious sensorial information, influencing the body in relation - with the self, the others and the world.

Trauma often weakens the conscious and unconscious loops of the feeling-owning-acting cycle. We suggest that in the case of IPV, not only trauma but also the direct influence of aggressions and the deprivation of freedom (to move, speak, relate with others and to self-expression) imposed by the perpetrator can overly shatter a victim's embodiment experience and possibilities of action, specifically through his/ her senses of body ownership, body agency, and the bodily Self.

Moreover, as a lifespan and developmental process, embodiment is susceptible to diverse contextual influences and systems. With this in mind, traumatic episodes beyond IPV can cause disruptions in an individual's way of being and acting in the world through the feeling-owning-acting cycle. Thereby, acute episodes of violence, sexual assaults, or other aggressions to one's physical and emotional integrity are contexts where this comprehensive framework, detailed in chapter II, can be applied.

Limitations and Recommendations for Future Studies

This thesis encompasses the assessment and understanding of the body and embodiment- related characteristics of women who were victims of IPV and live in shelter homes. The study of embodiment, although well-established, is clearly on the rise and

evolving rapidly. As such, it demands a complex, holistic and multidisciplinary approach to advance research in this area. While this thesis, could not possibly provide an exhaustive examination of all embodiment-related features of victims of IPV, it recommends that future studies continue to assess additional characteristics and use updated assessment instruments.

Furthermore, this understanding must be extended across various dimensions of IPV: including different forms of violence, and onset ages (childhood, adolescence, early adulthood, late adulthood); as well as different levels of support, such as primary healthcare, community services, and violence prevention efforts.

Regarding the intervention, future studies should examine the mediation effect of interoceptive awareness (particularly interoceptive attention regulation) on improving health outcomes (by reducing health complaints) in survivors of IPV. Such empirical testing gathers important implications for understanding health comorbidities and enhancing integrative care practices for victims of IPV. We also encourage studies that assess the long-term effects of FOM through follow-up assessments, adding the examination of, for example, revictimization rates. To adapt FOM to younger population is also a primordial step for implementing this PMT intervention in preventive and early trauma care settings.

Conclusion

The findings from this thesis provide important insights into the embodiment experiences of women in the aftermath of intimate violence. Regardless of the type of violence, being victimized in the context of an intimate relationship leads to remarkable changes in the body, and in how one's body is embedded in identity, behavior, and health. Through interviews, validated questionnaires, behavioral tasks and an evidence-based intervention program, this thesis provides an in-depth understanding of how women survivors of IPV perceive and inhabit their bodies, and how healthcare providers can account for and attend to survivors' embodiment characteristics to better promote health and trauma recovery.

First, women survivors of IPV have higher rates of depression and PTSD than women who never suffered IPV, along with more suicidal ideation, self-injury behaviors, health

complaints, and sedentarism. In addition to these repercussions, their experience of the body is altered, with a strong impact on somatic and mental health. In specific, women who survived IPV and managed to get sheltered, still find themselves with dysregulated arousal, having biased interoceptive information and difficulties trusting in bodily sensations, feeling separate from their bodies and uncertain about body ownership, ultimately saying that they live "on autopilot mode". Such embodiment characteristics mediate and are predictors of poorer mental health and higher somatic complaints.

By contrast, these embodiment characteristics seem preserved in women who have never suffered from IPV. For these women, the ability to regulate attention to the body does not serve a significant health-protective role. This contrast underscores the importance of contextualizing interoception and body and movement-oriented interventions based on participants' health, trauma history, and regulatory needs.

Altogether, results shed light on (and are supportive of) the hypothesis of a feeling-owning-acting cycle through which bodily processes impact an individual's way of being and acting in the world. This understanding led to the development of the psychomotor intervention Feel-Own-Move, which proved feasible and effective in improving women survivors' connection to their bodies. Thus, we suggest this approach to enhance positive embodiment, mental health, physical activity levels, and health-related quality of life for women in the aftermath of IPV.

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APPENDICES

FOLHA DE REGISTO *Cód:*

Idade:	Nacionalidade:
Altura:	Peso:
Habilitações:	Profissão:
Situação profissional:	Estado civil:
Filhos: Idade dos filhos: Com quem vivem?	

Assinale os problemas de saúde que tem no presente ou que sente com frequência:

	Insónias		anorexia
	dificuldade em adormecer		bulimia
	ataques de pânico		obesidade
	ataques de ansiedade		refluxo
	doenças respiratórias		doenças cardíacas
	doença auto-imune		hipertensão
	dor crónica		problemas digestivos
	enxaqueca		disfunção sexual
	dificuldades de memória		dificuldades de concentração

Outros:_____

É fumadora?	Sim	Não		Ocasional / Frequente
Consome atualmente:				
- Drogas?	Sim	Não		Ocasional / Frequente
- Álcool?	Sim	Não		Ocasional / Frequente

Tem ou já teve algum diagnóstico médico de

- Perturbação de Stress Pós-traumático?	Sim	Não
- Perturbação de Ansiedade?	Sim	Não
- Depressão?	Sim	Não

Se sim, toma alguma medicação? Sim Não

Qual? _____

Frequenta/ pratica atualmente alguma das seguintes atividades?

	Ginástica		Dança		Meditação
	Pilates		Yoga		Reiki
	Fisioterapia		Hidroterapia		Caminhada

Outra_____

Tipo(s) de violência que já sofreu (assinale com um X no tipo de relação em que aconteceu):

	Psicológica	Física	Sexual	Económica
Relação íntima				
Relação familiar				
Amigos/ conhecidos				
Trabalho/ escola/ outros				

Já cessou? ( ) Não ( ) Sim Há quanto tempo? _____

Alguma vez se auto mutilou (se agrediu a si própria com intenção)? ( )Sim ( ) Não

Alguma vez teve pensamentos suicidas? ( )Sim ( )Não

Movement Imagery Questionnaire - 3

Formulário de Resposta

(se as instruções e os itens forem lidos aos participantes)

Após ter completado a tarefa mental requerida, classifique a facilidade/dificuldade com que foi capaz de realizar a tarefa. Classifique a partir da escala fornecida. Tente ser o mais preciso possível e leve o tempo que sentir necessário para chegar à classificação adequada para cada movimento. Pode escolher a mesma classificação para qualquer número de movimentos "vistos" ou "sentidos" e não é necessário utilizar toda a amplitude da escala.

ESCALAS DE AVALIAÇÃO Escala de Imagem Visual

1	2	3	4	5	6	7
Muito difícil de ver	Difícil de ver	Um pouco difícil de ver	Neutro (nem fácil nem difícil)	Um pouco fácil de ver	Fácil de ver	Muito fácil de ver

Escala de Imagem Cinestésica

1	2	3	4	5	6	7
Muito difícil de sentir	Difícil de sentir	Um pouco difícil de sentir	Neutro (nem fácil nem difícil)	Um pouco fácil de sentir	Fácil de sentir	Muito fácil de sentir

Item	classificação	Item	classificação
1. Levantar o joelho		7. Movimento do braço	
2. Salto		8. Dobrar a cintura	
3. Movimento do braço		9. Levantar o joelho	
4. Dobrar a cintura		10. Salto	
5. Levantar o joelho		11. Movimento do braço	
6. Salto		12. Dobrar a cintura	

Rubber Hand Illusion

Classifique cada uma das seguintes afirmações entre -3 (discordo completamente) e 3 (concordo completamente).

	-3	-2	-1	0	1	2	3
1. Foi como se eu estivesse a sentir o pincel tocar-me na zona onde eu via a mão de borracha ser tocada							
2. Foi como se o toque que eu senti estivesse a ser causado pelo pincel a tocar na mão de borracha							
3. Senti como se a mão de borracha fosse a minha mão							
4. Senti como se a minha mão (real) se estivesse a deslocar na direção da mão de borracha							
5. Senti como se pudesse ter mais do que uma mão (esquerda/direita) ou braço (esquerdo/direito)							
6. Foi como se o toque que eu estava a sentir viesse de alguma zona entre a minha mão verdadeira e a mão de borracha							
7. Senti como se a minha mão (real) se estivesse a transformar em “borracha”							
8. Parecia (visualmente) que a mão de borracha se estava a deslocar na direção da minha mão verdadeira.							
9. A mão de borracha começou a assemelhar-se à minha mão (real), em termos de forma, tom de pele, marcas ou qualquer outra característica visual.							

PTSD CHECKLIST (PCL) - VERSÃO CIVIL - Weathers et al. (1993)

Versão traduzida e adaptada por Gonçalves, Lima & Marques Pinto (2006)

Avaliação do Acontecimento Traumático

INSTRUÇÕES: O seguinte questionário descreve sintomas ou queixas que as pessoas por vezes têm após terem vivido uma experiência traumática. Pedimos-lhe agora que concentre a sua atenção no **acontecimento/experiência** que considera ter sido **a mais traumática** para si.

Por favor, leia cada frase que se segue cuidadosamente e assinale em que medida apresentou os seguintes sintomas no **último mês**. Para tal **assinale com um círculo (O) o valor que melhor corresponde à sua opinião utilizando a escala apresentada:**

Escala:

Nada	Um pouco	Moderadamente	Bastante	Extremamente
1	2	3	4	5

Em que medida sofreu dos seguintes sintomas:	**1**	**2**	**3**	**4**	**5**
1. Recordações, pensamentos e imagens perturbadoras e repetitivas referentes ao acontecimento traumático					
2. Sonhos perturbadores e repetitivos referentes ao acontecimento traumático					
3. Agir ou sentir subitamente como se o acontecimento traumático estivesse a acontecer de novo (como se o estivesse a reviver)					
4. Sentir-se muito preocupada quando algo a relembra do acontecimento traumático					
5. Ter reações físicas (ex: coração acelerado, dificuldades respiratórias, transpiração) quando algo a relembra do acontecimento traumático					
6. Evitar pensar ou falar sobre o evento traumático, evitar ter sentimentos relacionados com esse acontecimento					
7. Evitar atividades ou situações porque elas lhe relembram o acontecimento traumático					
8. Ter dificuldade em relembrar aspetos importantes do acontecimento traumático					
9. Perder o interesse por atividades de que antes costumava gostar					
10. Sentir-se distante ou isolada das outras pessoas					
11. Sentir-se emocionalmente adormecida ou incapaz de sentir afeto pelas pessoas que lhe são próximas					
12. Sentir que a sua vida futura vai acabar cedo					
13. Ter dificuldade em adormecer ou em manter-se a dormir					
14. Sentir-se irritável ou ter ataques de fúria					
15. Ter dificuldade em se concentrar					
16. Estar “super-alerta” ou hipervigilante ou em guarda					
17. Sentir-se sobressaltada ou facilmente alarmada					

Escala Hospitalar de Ansiedade e Depressão (HADS)

(versão traduzida e validada por Pais-Ribeiro et al., 2007)

Leia cada frase e assinale a resposta que mais se aproxima da forma como se tem sentido na última semana. Não demore muito tempo a pensar nas respostas. A sua reação imediata a cada frase será provavelmente mais exata do que uma resposta muito refletida.

Assinale só uma resposta para cada afirmação

1. Sinto-me tensa ou contraída
    a. A maioria das vezes
    b. Muitas vezes
    c. De vez em quando, ocasionalmente
    d. Nunca
2. Ainda tenho prazer nas mesmas coisas que anteriormente
    a. Tanto quanto antes
    b. Não tanto
    c. Só um pouco
    d. De modo nenhum
3. Tenho uma sensação de medo como se algo de mau estivesse para acontecer
    a. Nitidamente e muito forte
    b. Sim, mas não muito forte
    c. Um pouco, mas não me incomoda
    d. De modo algum
4. Sou capaz de me rir e de me divertir com as coisas engraçadas
    a. Tanto como habitualmente
    b. Não tanto como antes
    c. Nitidamente menos agora
    d. Nunca
5. Tenho a cabeça cheia de preocupações
    a. A maioria das vezes
    b. Muitas vezes
    c. De vez em quando
    d. Raramente
6. Sinto-me bem-disposta
    a. Nunca
    b. Poucas vezes
    c. Muitas vezes
    d. Quase sempre
7. Sou capaz de me sentir à vontade e sentir-me relaxada
    a. Sempre
    b. Habitualmente
    c. Algumas vezes
    d. Nunca
8. Sinto-me parada
    a. Quase sempre
    b. Com muita frequência

   c. Algumas vezes
   d. Nunca
9. Fico tão assustada que até sinto um aperto no estômago
   a. Nunca
   b. De vez em quando
   c. Muitas vezes
   d. Quase sempre
10. Perdi o interesse em cuidar do meu aspeto
   a. Com certeza
   b. Não tenho cuidado como deveria
   c. Talvez não tanto como dantes
   d. Tanto como habitualmente
11. Sinto-me impaciente e não consigo estar parada
   a. Muito
   b. Bastante
   c. Um pouco
   d. Não me sinto assim
12. Penso com prazer no que tenho que fazer
   a. Tanto como habitualmente
   b. Menos que anteriormente
   c. Bastante menos que anteriormente
   d. Quase nunca
13. De repente, tenho sensações de pânico
   a. Com grande frequência
   b. Muitas vezes
   c. Algumas vezes
   d. Nunca
14. Sinto-me capaz de apreciar um bom livro ou um programa de rádio ou de TV
   a. Frequentemente
   b. Algumas vezes
   c. Poucas vezes
   d. Muito raramente

Multidimentional Assessment of Interoceptive Awareness

Em baixo encontra uma lista de afirmações. Indique por favor com que frequência cada afirmação se aplica a si na sua vida do dia a dia, considerando 0(zero) como nunca e 5 (cinco) como sempre.

	Nunca					**Sempre**
1. Quando estou tenso(a), eu noto onde a tensão está localizada no meu corpo.	0	1	2	3	4	5
2. Eu noto quando estou desconfortável no meu corpo.	0	1	2	3	4	5
3. Eu noto quais as partes do meu corpo onde estou confortável.	0	1	2	3	4	5
4. Quando sinto dor ou desconforto, tento aguentar e continuar com o que estava a fazer.	0	1	2	3	4	5
5. Eu tento ignorar a dor.	0	1	2	3	4	5
6. Eu afasto as sensações de desconforto focando-me noutra coisa qualquer.	0	1	2	3	4	5
7. Quando sinto sensações corporais desagradáveis, ocupo-me com outra coisa qualquer para não ter de as sentir.	0	1	2	3	4	5
8. Se sinto algum desconforto, começo a preocupar-me que algo não está bem.	0	1	2	3	4	5
9. Eu consigo aperceber-me de uma sensação corporal desagradável, sem ficar preocupado(a) com ela.	0	1	2	3	4	5
10. Eu consigo manter-me calmo(a) e não me preocupar quando sinto desconforto ou dor.	0	1	2	3	4	5
11. Quando estou desconfortável ou com dor não consigo tirar isso da minha cabeça.	0	1	2	3	4	5
12. Eu consigo prestar atenção à minha respiração sem me distrair com as coisas que estão a acontecer à minha volta.	0	1	2	3	4	5
13. Eu consigo manter-me consciente das minhas sensações corporais internas, mesmo quando há muita coisa a acontecer à minha volta.	0	1	2	3	4	5
14. Quando estou a conversar com alguém, consigo prestar atenção à minha postura.	0	1	2	3	4	5
15. Se me distrair, consigo voltar a prestar atenção ao meu corpo.	0	1	2	3	4	5
16. Eu consigo redirecionar a atenção dos meus pensamentos para as sensações do meu corpo.	0	1	2	3	4	5

	Nunca					Sempre
17. Eu consigo manter a consciência de todo o meu corpo mesmo quando uma parte de mim está com dor ou desconforto.	0	1	2	3	4	5
18. Eu sou capaz de focar-me conscientemente no meu corpo como um todo.	0	1	2	3	4	5
19. Eu noto como o meu corpo se altera quando estou zangado(a).	0	1	2	3	4	5
20. Quando algo não está bem na minha vida consigo senti-lo no meu corpo.	0	1	2	3	4	5
21. Eu noto que o meu corpo fica diferente depois de uma experiência tranquila.	0	1	2	3	4	5
22. Eu noto que a minha respiração se torna mais livre e fácil quando me sinto confortável.	0	1	2	3	4	5
23. Eu noto como o meu corpo se altera quando me sinto feliz/contente.	0	1	2	3	4	5
24. Quando me sinto sobrecarregado(a), consigo encontrar um lugar de paz dentro de mim.	0	1	2	3	4	5
25. Quando dirijo a minha consciência para o meu corpo sinto uma sensação de calma.	0	1	2	3	4	5
26. Eu consigo usar a minha respiração para diminuir a tensão.	0	1	2	3	4	5
27. Quando fico preso(a) a pensamentos, consigo acalmar a minha mente focando-me no meu corpo ou na minha respiração.	0	1	2	3	4	5
28. Eu "escuto" a informação que o meu corpo me dá sobre o meu estado emocional.	0	1	2	3	4	5
29. Quando eu estou aborrecido(a), procuro perceber como o meu corpo se sente.	0	1	2	3	4	5
30. Eu "escuto" o meu corpo para saber o que fazer.	0	1	2	3	4	5
31. Eu sinto-me bem no meu corpo.	0	1	2	3	4	5
32. Eu sinto que o meu corpo é um lugar seguro.	0	1	2	3	4	5
33. Eu confio nas minhas sensações corporais.	0	1	2	3	4	5

Scale of Body Connection (D-scale)

	Nunca	**Poucas vezes**	**Metade das vezes**	**A maior parte das vezes**	**Sempre**
2. É difícil para mim identificar as minhas emoções					
5. Sinto o meu corpo gelado ou dormente, em situações desconfortáveis					
7. Sinto-me a olhar para o meu corpo como se estivesse fora dele					
10. Sinto-me separada do meu corpo					
11. É difícil para mim expressar certas emoções					
16. Não me dou conta do desconforto físico					
19. Sinto-me separada do meu corpo durante a atividade sexual					
20. É difícil para mim prestar atenção às minhas emoções					

Escala de *Lickert* sobre satisfação com a intervenção.

Classifique em que medida sente/ sentiu cada uma das seguintes afirmações, em relação ao programa de intervenção terapêutica em que participou, considerando os valores entre 1 (nada) e 5 (bastante).

		1	2	3	4	5
1.	**Sente-se satisfeita com a intervenção que recebeu?**					
2.	**Sentiu-se diferente durante o período em que recebeu intervenção comparativamente a antes de esta começar?**					
3.	**Sente que a intervenção lhe trouxe coisas positivas?**					
4.	**As propostas das sessões foram interessantes?**					
5.	**Sentiu-se respeitada nas sessões?**					
6.	**Sente que a intervenção lhe trouxe efeitos negativos?**					
7.	**Sentiu que podia confiar na terapeuta?**					
8.	**Sentiu-se segura durante as sessões?**					
9.	**Sentiu-se incomodada com as avaliações?**					

Q1. Quais foram para si as maiores diferenças entre as sessões individuais e de grupo? Quais os pontos positivos e negativos de cada uma?

_____
_____
_____

Q2. Se voltasse a participar, o que é que mudava no programa?

-

_____
_____

Q3. Tem sugestões que nos queira fazer?

_____
_____

Perguntas abertas a responder verbalmente na última sessão:

1. Que recursos descobriu nestas sessões (individuais)?

2. O que é que a modificou?

3. Que palavras definem este processo?

Feel-Own-Move®: Protocol for a psychomotor intervention for survivors of domestic violence

Abstract

Domestic violence is dramatically prevalent in Portuguese population, often causing chronic trauma and health problems among victims. Research indicates that trauma victims frequently show alterations in embodiment-related functions, health and quality of life. We aim for the development and effectiveness evaluation of a psychomotor therapeutic approach. Adult women victims of domestic violence will be recruited from shelters to participate in a study to evaluate the effects of a psychomotor intervention on victims' embodiment (interoception, movement imagery, body ownership and dissociation), physical activity, mental health and quality of life.

Background

In Europe, about 19% of women have experienced domestic violence (DV) in the form of physical and/or sexual abuse by a partner, a relative or family member, with varying report rates across countries (e.g. Portugal (11.5%), Spain (15.9%) and the Netherlands (19.9%) (Eurostat, 2024). Since DV refers to any act of physical, psychological, sexual or economic violence within an intimate relationship or family system, children living in violent family contexts are also victims, either by witnessing violent behaviours, by relating with adults with disruptive behavioral and psychological patterns, or by suffering direct abuse (e.g. humiliating physical punishments or psychological coercion; European Parliamentary Research Service, 2024; World Health Organization, 2020).

Victims of DV suffer negative repercussions on their physical and mental health, identity structure and social integration (WHO, 2020; Pingley, 2017; Van der Kolk; 2014;

Bostock et al.2009). Specifically, women victims report high rates of anxiety, post-traumatic stress disorder, depression, somatic symptoms, traumatic brain injury and physical impairments (Sanz-Barbero et al., 2019; Machorrinho et al., 2022), which carry significant social and public health costs. Additionally, women face structural societal inequalities, such as lower socioeconomic status, reduced access to education, limited employment opportunities, and restrictive gender expectations (Humphreys, 2007). These factors, through social and emotional mechanisms, perpetuate the risk of domestic violence, hindering victim's chances of recovering health and quality of life (Van der Kolk, 2014; Humphreys, 2007; Larsen, 2016).

DV perpetrators often deprive victims of appropriate and timely health care, of emotional and economic independence, healthy social relationships, and leisure opportunities (Larsen, 2016). These characteristics, combined with victims' chronic feelings of being endangered, undermine women's and children's possibilities and motivation to autonomously engage in health-enhancing practices (such as physical activity and self-care), leading to physical and mental health risks added to social isolation. Structural interventions that improve women's economic well-being, relationship quality, empowerment, or social group membership, as well as the social, relational and physical protection of children are necessary to prevent and diminish DV (Bourey et al., 2015).

One of the globally recognized actions to support the immediate safety and extended recovery of DV women survivors and their children is shelter homes. Shelter homes are part of victims' support policies, offering them an opportunity to relocate to a safe place, with food, social counselling, legal support, employment support, and in some cases psychoeducation, in addition to a facilitated school process for the children. Due to shelters being a favorable context for safe trauma recovery, efforts have been made to

give the residents psychological and health care. However, research suggests that women living in shelter homes still have poor general health, including trauma-related symptomatology, somatic symptoms, sedentarism, and a strong disconnection from the body, which undermine their quality of life, identity structure and decision-making processes, crucial for preventing revictimization (Bostock et al., 2009; Marmeleira et al., 2023; Humarun & Khan, 2023). Advances in trauma care and related interventions suggest that the support to victims of violence must consider a more holistic approach to their health, including physical activity, body awareness, and relaxation (Van der Kolk, 2014; Payne et al., 2015; Rosenbaum et al., 2014; Van de Kamp et al., 2023). To address this recommendation, various body-mind approaches for trauma recovery have been developed and implemented (Van der Kolk, 2014; Marmeleira et al., 2023; Van de Kamp et al., 2023; Fisher, 2019).

Feel-Own-Move®

Feel-Own-Move® (FOM) is an innovative evidence-based approach, designed to enhance the health and well-being of women survivors of DV living in shelter homes, strengthening their body-mind connection and self-confidence. Based on the principles of psychomotor therapy, FOM uses physical activity, body awareness, and relaxation techniques to help DV survivors safely regain awareness of bodily sensations, integrate these sensations into the sense of body agency, and develop their abilities for self-regulation (Marmeleira et al., 2023). Each individual or group session sequentially follow three therapeutic steps: warming up; body awareness and grounding; and relaxation.

Warming-up

The initial phase of each session involves activating proprioceptive (muscular) and interoceptive (visceral) sensations through aerobic exercises (e.g., running in place, dancing without stop to a 4 minutes music) and strength training (e.g., mindful push-ups,

core strength exercises with breathing), which potentially alleviate PTSD symptoms (Rosenbaum et al., 2014; Powers et al., 2015; Björkman & Ekblom, 2021). In FOM's approach, exercise intensifies neutral bodily sensations to counteract bodily dissociation and hypo-arousal, fostering greater awareness (Machorrinho et al., 2022). This process is supported by the use of bodily metaphors (e.g., 'where is your strength?') and movement imagery (e.g., imagine before doing this movement, how are your going to do it?) to deepen body connection and empowerment. Activities are tailored to participants' abilities and designed to emphasize safety, joy, and process-oriented engagement, reducing dropouts and enhancing motivation (Calogero et al., 2019; Louková et al., 2015; Van de Kamp et al., 2024).

Body awareness and grounding

For individuals experiencing dissociative symptoms, fostering sensory awareness in a gradual, integrative, and non-judgmental manner is crucial (van der Kolk, 2014; Fisher, 2019). Postural awareness and grounding techniques often support this by enhancing bodily awareness and strengthening the body–mind connection, contributing to stabilization and a peaceful reconnection with the body (Brand et al., 2011; Brown, 2021). In FOM, the therapist guides participants through slow, intentional movements (e.g., using therapeutic touch -in group, in-person sessions-, imagery, or directed focus). For example, prompts such as "Feel the weight of your body against the wall" or questions like "Where in your body do you feel strength/ resistance/ movement/ stillness?" serve as tools to deepen body awareness. These approaches aim to reinforce the mind-body connection, promoting a sense of body ownership and agency (Marmeleira et al., 2023; Loukové & Hátlová, 2015; Kirmayer & Gómez-Carrilho, 2019).

Relaxation

Regulating arousal is a critical focus of interventions for trauma-related disorders

(Van de Kamp et al, 2019). Techniques such as relaxation and controlled breathing are commonly used to lower excessive physiological arousal and build emotional regulation skills (Veiga et al., 2019). FOM's sessions end with relaxation practices rooted in physiological regulation, including progressive muscle relaxation and Wintrebert's active-passive relaxation (Guiose, 2007). Progressive muscle relaxation is introduced early as an accessible, present-focused method that can be adapted for quick, everyday use (Hazlett-Stevens & Fruzzetti, 2021). Once participants become proficient in this technique, the active-passive relaxation method is introduced to deepen relaxation. In the final sessions, participants are encouraged to practice attention regulation exercises to support ongoing arousal regulation in daily life.

In summary, the FOM program offers each woman individual and group sessions, focusing on movement, expression, breathing, and relaxation techniques, with two main goals. The first goal is to gradually foster a non-judgmental awareness of bodily sensations and the connection between sensations and emotions, thereby enhancing the body-mind relationship. The second goal is to improve self-regulation as a means to alleviate mental health symptoms, trauma symptoms and, indirectly, enhance overall quality of life.

Study Aims

This study protocol aims to test the feasibility and effects of Feel-Own-Move (FOM), an 8-week Psychomotor Therapy approach to women victims of IPV. FOM integrates the benefits of group sessions and individual sessions, apart from being implemented in a short period of time. It considers the minimum time needed for a therapeutic process to occur, and the short periods that victims actually stay in the shelter home (Arroyo et al. 2017).

Specifically, the aim of this protocol is to examine the feasibility (reach, adherence, retention and acceptability) and effects of FOM on embodiment, physical activity, quality of life and mental health indicators of women victims of IPV living in shelters.

Methods

Study design and Sample recruitment

Participants will be recruited from victim shelters, upon the approval of each direction board. Directive members of the shelters will inform their residents about the study and invite them to participate. The study procedures and characteristics of the intervention will be presented to the women eligible to participate in the study, following the inclusion criteria: be 18 years or older and have suffered IPV in the first person. Their participation is voluntary, and the anonymity and confidentiality of all data will be guaranteed.

This study was approved by the University ethics committee and will be conducted in accordance with the Declaration of Helsinki (General Assembly of the World Medical Association, 2014).

A non-random within-group repeated measures design will be used to assess the effects and feasibility of FOM, with participants being tested at week 1 (T1) and week 5(T2) before the intervention, to a monitoring of the control period, and at week 13, after the 8-week intervention (T3).

Procedures

Participants will sign an informed consent with information about confidentiality, procedures, researchers identification and the right to drop-out the study at any moment. After signing the informed consent form, the baseline assessment session will be scheduled, which will occur on the associations' facilities, according to the best

availability of each participant.

In this session, participants will be asked to complete a sociodemographic survey about general health symptoms, medical diagnosis of posttraumatic stress disorder, anxiety and depression, use of psychiatric medication, leisure activities or therapeutic practices, and the types of violence they have suffered, for how long, and since when they are free from the violent relationship

Behavioral tasks will be applied to measure Movement Imagery (Movement Imagery Questionnaire-3, MIQ-3), Interoceptive Accuracy (Schandry's Heartbeat Perception Task, HBP) and Body Ownership (Rubber Hand Illusion). After completing the tasks, participants will also complete self-report questionnaires of PTSD (PTSD Checklist; Marcelino & Gonçalves, 2012), Anxiety and Depression (Hospital Anxiety and Depression Scale, HADS; McIntyre et al., 1999), Bodily Dissociation (Scale of Body Connection, SBC; Neves et al., 2017), and Quality of life (World Health Organization Quality of Life checklist, WHOQoL-bref; Vaz Serra et al., 2006). Assessment sessions will take about 60 minutes each. Participants will also be asked to use an accelerometer for 7 days and 7 nights to assess physical activity levels and sleep quality.

Instruments

Assessment instruments will be the following:

Movement Imagery – Movement Imagery Questionnaire-3 (MIQ-3)25, a group of four movements, each to be classified between *Very easy to see/feel* and *Very hard to see/ feel,* in three different trials for internal, external and kinesthetic imagery ability.

Body Ownership – Rubber Hand Illusion will be applied and assessed with the protocol designed by Rabellino et al. (2016). To carry out this task, the participants must be seated, with one hand on the table and the opposite hand under the table. A rubber hand is placed on the table parallel to the real hand that is under the table, with a towel

placed over the participant's shoulder to create the illusion that the rubber hand is their real hand. During the illusion, small synchronous and asynchronous tactile stimuli will be applied to the hands in the participant's field of vision, on top of the table. After each of the two trials (each lasting a maximum of 2 minutes), the participant must verbally rate the intensity of the illusion using two scales developed by Rabellino et al. (2016), so that at the end, the overall intensity of the illusion and its progression throughout the task can be assessed.

Interoceptive accuracy – Schandry's Heartbeat Perception Task (HBP; Schandry, 1981) will be applied. To this task, participants will be fitted with electrodermal sensors on their index finger for physiological heartbeat detection. After sitting quietly for five minutes, the following instructions will be given: 'Without manually checking, silently count each heartbeat you feel in your body from the time you hear "start" to when you hear "stop"'. This task will be repeated four times, using time-windows of 45, 35, 55 and 25 seconds, presented in this order. For each trial, an accuracy score will be calculated and averaged over the four trials.

Interoceptive sensibility – the Multidimensional Assessment of Interoceptive Awareness (MAIA) will be applied. MAIA's Portuguese version is a 33-item self-administered questionnaire assessing seven interoceptive dimensions: noticing, not-worrying, not-distracting, attention regulation, emotional awareness, self-regulation, and trusting (Machorrinho et al., 2019).

Bodily Dissociation – the Scale of Body Connection (SBC; Price & Thompson, 2007) is a self-report Likert scale that measures body awareness and bodily dissociation. Mean scores higher than 2 suggest a significant presence of bodily dissociation symptoms. The Portuguese version of the Bodily Dissociation subscale will be applied (Neves, Price & Carvalheira, 2017).

Physical Activity – Participants will use an accelerometer ActiGraph wGT3X-BT, at waist, for 7 days and 7 nights at each assessment moment. Intensity levels will be calculated as follows: <100 counts/min: sedentary; 100 - 2019 counts/min: light; 2020-5998 counts/min (corresponding to 3-5.9 metabolic equivalent of tasks or METs): moderate; >5999 count/min (corresponding to >6 METs): vigorous. We will consider the results of 3 valid days (including 1 weekend day) from each participant and a minimum wear time of 10 hours/day. Periods of at least 60 consecutive minutes of zero intensity counts should be considered non-wear time.

Sleep quality will also be examined through accelerometry (accelerometer ActiGraph wGT3X-BT), counting for total sleep time, i.e. the sum (in minutes) of all sleep epochs between sleep onset and sleep end; and sleep efficiency, i.e. the percentage of sleep per time in bed, using Cole–Kripke algorithm.

Posttraumatic Stress Disorder - PTSD symptoms will be evaluated using the PTSD Checklist – civilian version (PCL; Weathers et al., 1994). This self-report questionnaire can differentiate the three PTSD clusters from the DSM-IV medical diagnostic manual: experiencing, avoidance, and hypervigilance. The frequency of each symptom in the last two months is rated between zero (nothing) and five (extremely). The sum of the scores for each cluster will be analyzed. The Portuguese version includes 17 items (Marcelino & Gonçalves, 2012).

Anxiety and Depression - Hospital Anxiety and Depression Scale (HADS; (Zigmond & Snaith, 1983) is a self-report questionnaire with 14 items, seven assessing anxiety and seven assessing depression symptoms. Each item is rated in a 0-3 scale and classifies the symptom as feeling equal to times before or a lot worse than before. Scores higher than 7 in each subscale, indicate clinically relevant levels of anxiety or depression. Results will be analyzed through the sum of the items, ranging from 0 to 21. The Portuguese version

has good internal consistency (Cronbach's alpha_anxiety scale= 0.76; Cronbach's alpha_depression scale= 0.81; McIntyre et al., 1999).

Quality of Life - The World Health Organization Quality of Life Questionnaire (WHOQoL-bref) is a self-administered Likert scale that allows the assessment of perceived quality of life in four domains: Physical health (domain 1; e.g. dependence on medical aids, mobility, pain, work capacity), Psychological health (domain 2; e.g. negative and positive feelings, self-esteem, body image, personal beliefs, learning and memory), Social relationships (domain 3; e.g. personal relationships, social support, sexual activity) and Environment (domain 4; e.g. freedom, physical safety, accessibility to health and social care, opportunities for acquiring new information and to participate in recreative activities, transport). The Portuguese version of the WHOQoL-bref includes 26 items and shows good reliability and validity scores (Cronbach's alphas ranging from .64 for domain 3 and .87 for domain 1; Vaz Serra et al., 2006).

At the end of the intervention participants will be asked to write about their personal progress, changes they may have felt and their general satisfaction with the intervention. This will be important to study the impact as well as the feasibility and acceptability of the intervention.

The Feel-Own-Move Intervention

FOM consists of an 8-week Psychomotor Therapy (PmT) with 24 three-weekly sessions, combining 16 individual sessions with 8 group sessions. FOM will be facilitated by a psychomotor therapist with expertise in clinical practice with adults.

The individual sessions will have an approximate length of 40 minutes and allow for personalized attention to the bodily sensations, representations, and expressions of each participant. This individualization offers a specific therapeutic space and time, for a

deepened exploration and integration of each insight.

In addition, group sessions (4-6 participants), with approximately 60 minutes each, allow for an empathetic expression of each participant, offering a meeting of different ways of embodied being. The encounters promoted by group sessions aim for a widening of images, sensations, and representations into the therapeutic process of each participant.

Through movement, expression, breathing, and relaxation techniques, the aim of each session is twofold. On the one hand, to progressively promote and deepen a non-judgmental awareness of bodily sensations and of sensation-emotion relationships, strengthening the mind-body connection. On the other hand, to increase emotion regulation, as a path to weaken mental health symptoms, and indirectly increase the quality of life.

Overall, both individual and group sessions include three sequential moments: an initial warming-up activity (e.g., cardiovascular activation and strength training, with an attuned exercise approach, using positive music, demonstration, and empowerment), a second moment with body awareness and grounding activities (e.g., slow movements, focusing on the weight of the body on the floor or against the wall, for example, using therapeutic touch, guided sensations or imagery as mediators), and a final relaxation moment (e.g., progressively experiencing passive to active relaxation techniques).

As represented in figure 1, the overall intervention will occur across three sequential phases or stages.

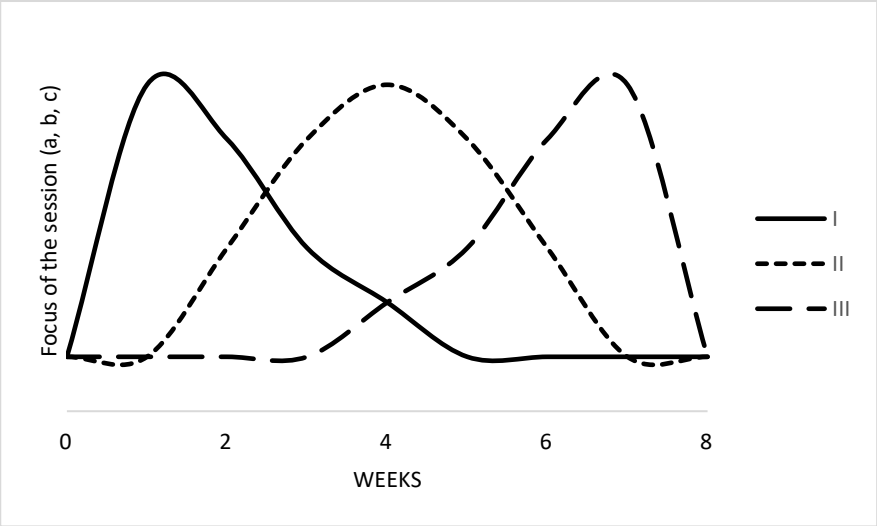

Figure 3. ***Schematic representation of FOM's phases (I, initial; II, fundamental; III, final) and activities (a, cardiovascular activation; b, body awareness; c, relaxation). Figure retrieved from Marmeleira et al., (2023).***

Initial Phase

The first 2 to 4 sessions will focus on getting familiar with the activities while demonstrating concepts such as attention to bodily sensations, mindfulness, focusing attention, recognizing different parts of the body, and emotions associated with sensations (Weineck, 2018).

Specific objectives:

* Prepare for body-centered work

* Establish a therapeutic relationship

* Provide reassurance and a sense of safety

* Familiarize the participant with the type of exercises

* Establish a commitment to the full intervention program

Core Phase

In the core phase of the intervention (16 to 20 sessions), the sessions will follow the main structure and propositions order: First, cardiovascular activation, second, activities focused on bodily and emotional awareness, third, relaxation. The body awareness and

relaxation activities should increase in complexity (e.g., Jacobson's progressive relaxation → active-passive relaxation → meditation).

Specific objectives:

* Promote body awareness
* Promote the activation of bodily sensations without judgment
* Encourage conscious movement
* Foster connection to the body and trust in bodily sensations
* Stimulate identification between bodily sensations and emotions
* Encourage non-judgment of emotions
* Promote tonic-emotional regulation
* Encourage the ability for voluntary relaxation

Final Phase

The 2 final intervention sessions will focus on consolidating the results achieved and carrying out activities that allow for more free and autonomous expression by the participant, such as body drawing and sharing emotions and experiences.

Specific objectives:

* Identify the results obtained
* Consolidate learning and progress
* Promote non-judgmental reflection on the therapeutic process
* Identify achievements, difficulties, and remaining needs
* Encourage autonomy in relaxation
* Foster emotional expression, both verbal and non-verbal

The Psychomotor therapist must have expertise in the holistic understanding and

facilitation of bodily expression and movement, in trauma-informed practices, being characterized by a consistent, responsive, and encompassing attitude (Llauradó, 2008). This particular approach will be an ally for the safe embodiment of each sensation and supports the verbal and non-verbal expression of the participants.

Feasibility and acceptability

The reach of the program and adherence of the participants will be assessed to examine its feasibility. To examine acceptability and satisfaction with the PmT intervention, a 9-item survey developed by the authors of this study will be administrated to the participants who complete the program. Following recommendations of Bowen and colleagues (Bowen et al., 2009), each item will be classified on a Likert scale, between zero (nothing) and four (extremely), covering topics related to perceived personal impact, sense of trust and respect and comfort regarding the sessions, the therapist, and the assessments.

Data handling and Analysis Plan

A descriptive analysis of sociodemographic and health variables will be performed. The normality of data will be checked through the Shapiro–Wilk test. Missing values should represent less than 5% of the data, and Little's MCAR test must have $p > .05$, indicating that these are missing at random. If so, missing values will be replaced by the mean value of the respective item scores. All statistical analyses will be conducted using version 28.0 of SPSS and the significance level set at $p < 0.05$.

A one-way repeated measures ANOVA will be used to examine within-group changes between the different moments (T0, Baseline, Post-intervention, follow-up I and follow-up II). The Bonferroni correction will be used to adjust significance levels, considering significance if $p < 0.05$.

Effect sizes will be provided as partial eta-squared (η_p^2) and interpreted as: 0.01–

0.06, small effect, 0.06–0.14, medium effect, and ≥ 0.14, large effect [47]. Results of non-parametric variables will be presented as median and interquartile range (IQR). Friedman tests will be carried out to examine changes in non-parametric variables, using post hoc pairwise comparisons (Wilcoxon Signed-Rank test) and a Bonferroni adjustment with significance levels considered at $p < 0.017$. Effect sizes will be calculated using Kendall's W Value, and interpreted as <0.3, small effect, 0.3–0.5, moderate effect, and > 0.5, large effect [48]. The delta value (Δ%) of proportional change between each moment will be calculated using the formula: $\Delta\% = [(momentY - (momentY-1))/(momentY-1)] \times 100$.

Contingency plan

Knowing the sensitivity of this population and high rates of drop-out from the social services, we will always have the mediation of one of their reference professionals, who will give them the information about the study, motivate them and schedule the assessments. We will also guarantee full availability of the researcher to adapt herself to the participants' needs.

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Body ownership of women with and without history of intimate partner violence

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Introduction

Intimate-partner violence (IPV) is a major threat to women's life and health (WHO, 2021).
A recent study showed altered embodiment-related characteristics in female victims of IPV, namely bodily dissociation and interoceptive sensibility (Machorrinho et al., in press). Body ownership, i.e., the feeling of the body as one's own, and as being part of the self, is one of the most representative features of embodiment, and is commonly assessed through the Rubber Hand Illusion (RHI) paradigm (Longo et al., 2008).

The aims of the present study were:
(i) to compare the sense of body ownership between women with and without a history of IPV
(ii) to analyze the relationship between body ownership and mental health variables (behaviors of self-injury, suicidal ideation, and diagnoses of Posttraumatic Stress Disorder (PTSD), Anxiety or Depression).

Methods

The RHI protocol (Rabellino et al., 2016) was administered to twenty-seven women victims of IPV living in Portuguese shelters (IPV group; mean age 39.7 ± 10.6 years), and to twenty-seven women non-victims of IPV living in the community (no-IPV group; mean age 43.6 ± 11.4 years).
For two minutes, the researcher synchronously brushed each of the fingers of the rubber hand and the participant's real hand.

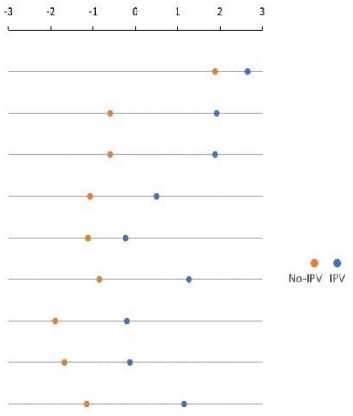
Subjective experience of ownership of the rubber hand (mean score of a nine-item questionnaire, where higher scores suggest a weakened sense of body ownership)

Figure 1. *Apparatus of the RHI*

Results

Mann-Whitney test revealed that, in comparison with women without history of IPV, victims of IPV were significantly more prone to illusory ownership of the rubber hand (thus, have a weakened sense of ownership) (*Mdn* noIPV = -.33, *Mdn* IPV = 2.67; U= 204.5, *z* = -2.86, *p* =.004).

Figure 2. Mean answers from both IPV and no-IPV Groups in the survey assessing subjective experience of the RHI, ranging from -3 (totally disagree) to 3 (totally agree)



Q1. It seemed as if I were feeling the touch of the paintbrush in the location where I saw the rubber hand touched.
Q2. It seemed as though the touch I felt was caused by the paintbrush touching the rubber hand.
Q3. I felt as if the rubber hand were my hand.
Q4. It felt as if my (real) hand was drifting towards the rubber hand.
Q5. It seemed as if I might have more than one left/ right hand or arm.
Q6. It seemed as if the touch I was feeling came from somewhere between my own hand and the rubber hand.
Q7. It felt as if my (real) hand were turning "rubbery".
Q8. It appeared (visually) as if the rubber hand were drifting towards my hand.
Q9. The rubber hand began to resemble my own (real) hand, in terms of shape, skin tone, freckels, or some other visual feature.

Moderate positive correlations (*r*= .239, *p*=.03) were found between subjective experience of ownership of the rubber hand and suicidal ideation. No significant relationships were found between body ownership and diagnoses of PTSD, Anxiety or Depression

Conclusion

The results sustain the hypothesis of a weakened sense of body ownership in women victims of IPV, particularly related with suicidal ideation behaviors. Further research should explore other embodiment-related variables of victims of violence. We also suggest the development of therapeutic interventions for IPV victims, focused on their sense of body ownership, and on nurturing compassion towards the body-mind self.

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Special thanks to all the women who enrolled in the study, as well as the managing entities of the victims' shelters.

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Physical activity and its associations with quality of life of female victims of domestic violence living in shelters

Joana Machorrinho, Guida Veiga, Graça Duarte Santos, José Marmeleira (2022)[8]

Abstract

Considering the impact of continued violence on general health, we aimed to assess the physical activity (PA) and quality of life of female victims of domestic violence (DV) living in shelters. Also, we aimed to search for associations between PA, quality of life and violence length among our sample.

Methods Seventeen female victims participated in this study (mean age=43.9 ± 13.1 years). Participants were asked to use an accelerometer for seven days to assess PA and filled out the WHOQoL-Bref and the EuroQol – 5D to assess quality of life, as well as a brief survey assessing violence information.

Results Fourteen (82%) participants met the accelerometer criteria (≥ 5 days per week). Six participants (42.9%) reached the recommendations of at least 150 minutes of moderate-intensity PA per week (*M*=172.5±136.3). Also, participants had, on average, 8.9 (±1.5) hours/day of sedentary behavior. Moderate-to-vigorous PA (MVPA) per week was positively correlated with the environment domain of WHOQoL (Spearman rho (SR)=.555, *p*=.040). Also, EuroQol scale was negatively correlated with total duration of violence (SR=-.603, *p*=.013), but positively correlated with total sedentary hours/day (SR=.639, *p*=.014). The length of time since violence ended correlated positively with the number of steps (SR=.803, *p*<.01).

Conclusions Participants had low levels of PA. Physical activity, perceived quality of life and length of time with and without violence, were correlated among female victims of DV. Movement-based interventions should be promoted in victims' shelters as it could positively impact their physical activity behavior, quality of life and recovery process.

Keywords: Accelerometry; Domestic violence; Health; Women.

[8] Machorrinho, J., Veiga, G., Santos, G. & Marmeleira, J. (2022, 13 May). Physical activity and its associations with quality of life of female victims of domestic violence living in shelters [Oral communication]. *2nd CHRC Summit*. CHRC, Évora.

Effects of Feel-Own-Move on the experience of the body, sleep quality and physical activity of female victims of violence. A mixed-methods study

Joana Machorrinho, Graça Duarte Santos, Guida Veiga, José Marmeleira (2023)[9]

Abstract

Women victims of intimate partner violence (IPV) tend to experience their bodies as heavy, slow or anxious. As a result of trauma, they also feel disconnected from their body. To promote healthy bodily experiences is both a therapeutic and a social need in the field of IPV. The aim of this study was to explore the effects of Feel-Own-Move (FOM) on the experience of the body, physical activity (PA), sedentary behavior (SB) and sleep quality of female victims of IPV, through a mixed methods approach.

Methods Nine women living in shelter homes (mean age 45.9 years; range= 32- 64 years) received FOM, an 8-week psychomotor intervention with 2 individual sessions and 1 group session per week. At week 1 (T1, baseline), week 5 (T2, pre-intervention) and week 9 (T3, post-intervention), participants were asked to use an accelerometer for seven days and nights to assess PA, SB and sleep quality. At T3, brief semi-structured interviews were conducted with each participant to explore their experience of the body and perceived internal changes.

Results There was a decrease in SB (Δ%= 16%) and in sleep fragmentation index (Δ%= 27%) between T2 and T3, although not statistically significant. Women shared experiences of increased bodily awareness regarding breathing sensations, the body-mind connection, tension-relaxation differences, and feelings of strength. Also, improvements in self-regulation, self-confidence, inner strength, motivation and vitality were reported, along with relaxation skills.

Conclusions Feel-Own-Move showed promising results in improving bodily experiences, sleep quality and active behavior of women victims of IPV.

[9] Machorrinho, J., Santos, G., Veiga, G. & Marmeleira, J. (2023, May). Effects of the Feel-Own-Move psychomotor intervention on the experience of the body, sleep quality and physical activity of female victims of violence. A mixed-methods study. *CHRC 4th Summit.* CHRC, Évora.

Tracing the body: qualitative analysis of the body maps of victims of intimate partner violence in the context of Psychomotor Therapy

Joana Machorrinho, Graça Duarte Santos, Guida Veiga, José Marmeleira (2023)[10]

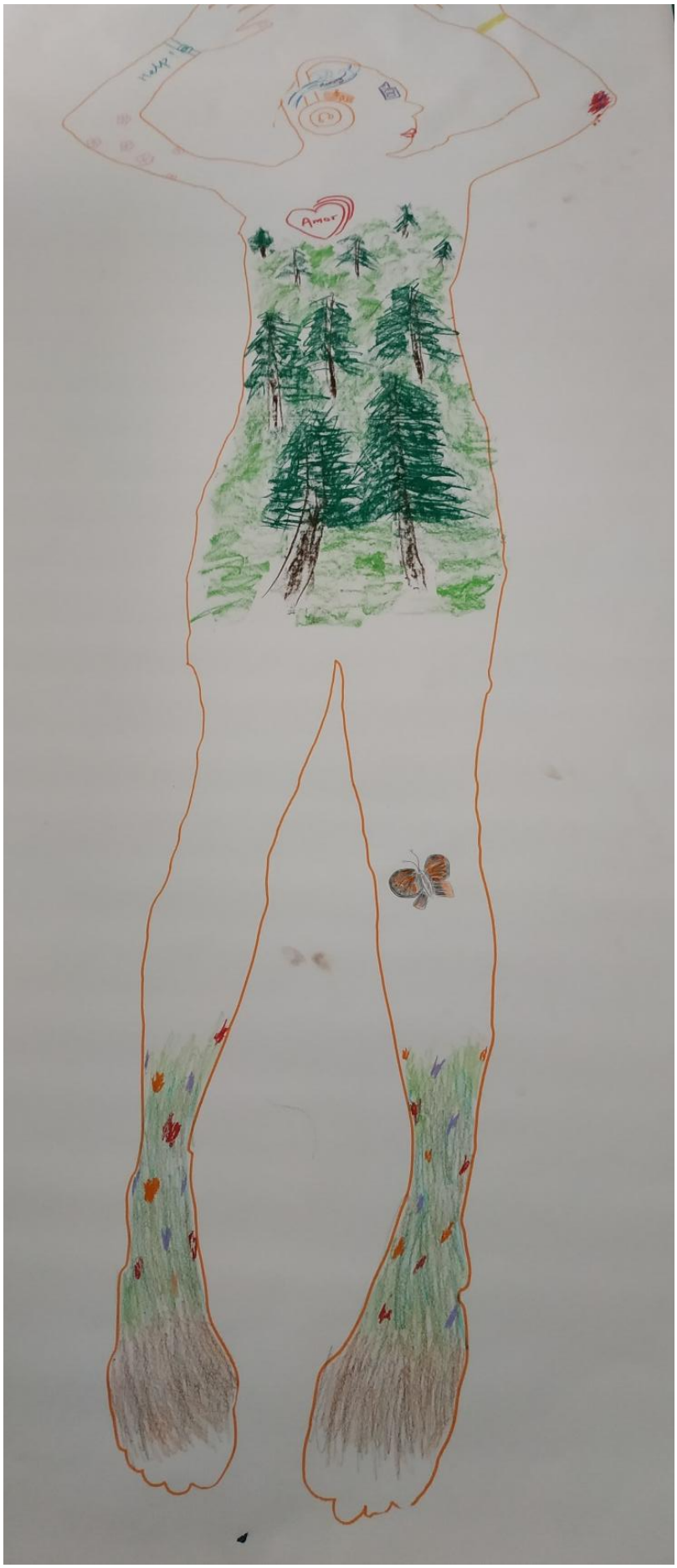
Abstract

Intimate partner violence (IPV) remains in the survivors' bodies, influencing their ways of being and acting in the world. In Feel-Own-Move (FOM), a psychomotor therapy program for victims of IPV, reconnecting with the body and restoring the bodily Self are the primary aims. Through movement, body awareness, relaxation and self-expression, participants explore their embodied knowledge and embedded narratives, thus strengthening their body limits and affirming their identity. At the final sessions of FOM, body maps are produced to allow participants an inner encounter with their conscious and unconscious embodied experiences. Participants are invited to trace around their bodies on a human-size scenery paper. The resulting outline must be filled in with colors, words, or symbols that express their embodied experiences. In this study, the body maps of 7 women participants of FOM are analyzed.

Immature lines and symbols, a discontinuity of colors and images at the hips zone, and a discreet permeability of body limits were commonly found among the body maps. Importantly, the idiosyncratic expressions of each map and implications for psychomotor therapy will be discussed in this presentation.

key-words: Trauma; Body-maps; Psychomotor therapy; Intimate violence; Qualitative.

[10] Machorrinho, J., Veiga, G., Santos, G. & Marmeleira, J. (2023, May). Tracing the Body: Analyzing the body maps of female victims of intimate partner violence. X *Congresso Mundial de Psicomotricidade*. Verona, 6 de maio de 2023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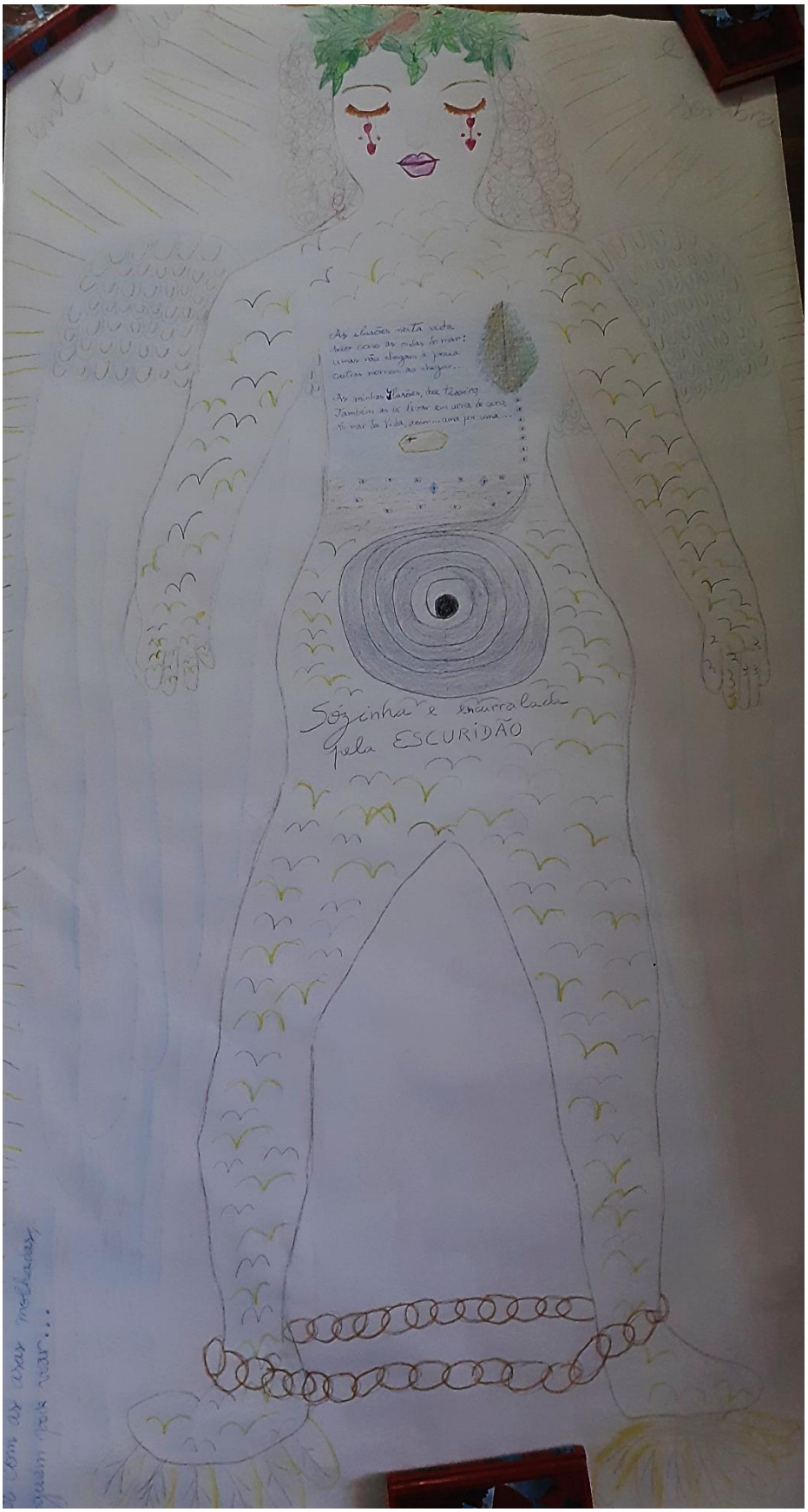
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